Peel Region

2023

Inglewood Wastewater Treatment Plant annual report

Table of Contents

Inglewood 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 Inglewood Wastewater Treatment Plant (WWTP) located in Caledon, Ontario, is owned and operated by Peel Region (Peel). The plant is a class 2 wastewater treatment facility under Ontario Regulation 129/04. This WWTP was operated under Environmental Compliance Approval (Approval) number 9122- C99KDG.

This report summarizes the monitoring results for the Inglewood 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 **90.8 m^3/day**, which was well below the rated capacity of 243 m^3/day specified in the Approval.

Throughout 2023, the Inglewood WWTP met the effluent concentration limits for total suspended solids, carbonaceous biochemical oxygen demand, total ammonia nitrogen, total phosphorous, and *E. coli*, and maintained pH within the range of 6.0 to 9.5. A summary is shown in Table 1 and Table 2. Detailed information on the requirements and results are found in section 4.1 of this report, and parameter descriptions in Appendix A: Summary of tested wastewater parameter information.

There were no bypass, spill, or overflow events at the Inglewood WWTP during the reporting period.

In 2023, the Inglewood WWTP generated **336 m^3 of sludge**, which was hauled to the Clarkson WWTP. The monthly volumes of sludge hauled are presented in Table 4.

2023 Summary

Peel Region

Brampton, Caledon and Mississauga

1.5 million residents

175,000 businesses

provided with water and wastewater services

Inglewood Wastewater Treatment Plant

$3.2 million
Capital improvement expenditure

0.01%
of the Peel's total wastewater **treated at Inglewood**

33
million litres treated in 2023
Equivalent to volume of
13
Olympic size swimming pools

1,157
samples analyzed

100%
approval effluent limits met

100%
of wastewater underwent **complete treatment**

5.22 kWh
(Kilowatt-hour)
energy used per cubic metre of wastewater treated

$0.23
of chemicals used **per cubic metre** of wastewater treated

Glossary of terms and abbreviations

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

Aerobic: Living in the presence of free oxygen

Anaerobic: Living in the absence of free oxygen

Anoxic: Environment deprived of dissolved oxygen

Auger: A hollow moving screw to move large grit and debris

BOD_5: Five-day biochemical oxygen demand measured in an unfiltered sample and includes carbonaceous and nitrogenous oxygen demand (also known as total BOD or $TBOD_5$)

Bypass: An intentional diversion of wastewater around one or more wastewater treatment process(es) outside of normal operating conditions

$CBOD_5$: Five day carbonaceous (nitrification inhibited) biochemical oxygen demand measured in an unfiltered sample

COD: Chemical oxygen demand

DO: Dissolved oxygen

ECA: Environmental Compliance Approval

Effluent: The treated wastewater that flows out of process units and has not been disinfected

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

Geometric mean density: the nth root of the product of multiplication of the results of n number of samples over the period specified

Grinder: A pump with sharp blades that can grind large waste and debris into a fine slurry

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.

m^3: cubic metres. One m^3 equals 1000 litres.

Mixed liquor: mixture of activated sludge mixed with primary effluent or raw wastewater and return sludge

Ministry: Ministry of the Environment, Conservation and Parks

Nitrification: A biological process where aerobic bacterial convert ammonium to nitrite and then to nitrate. Nitrification is necessary for nitrogen removal in wastewater treatment.

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.

Overflow: a controlled discharge of wastewater to the environment from a designed location at the plant other than the approved final effluent outfall

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

PLC: Programmable logic controller

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

SBR: Sequencing batch reactor

Spill: An unplanned discharge of wastewater to the environment from any location that is not specifically designed for this purpose

TAN: Total ammonia nitrogen

TKN: Total Kjeldahl nitrogen

TP: Total phosphorus

TSS: Total suspended solids

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

UV: Ultraviolet

WAS: Waste activated sludge; excess microorganisms that must be removed from the wastewater treatment process to keep the system in balance

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.

Wet well: A holding pit for sewage in a pumping station. As the sewage level rises, pumps turn on to pump the sewage into the forcemain or to a higher elevation to continue gravity flow.

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 Inglewood Wastewater Treatment Plant (WWTP), to fulfill the annual performance reporting requirements set out in the Approval number 9122-C99KDG.

The Inglewood Wastewater Treatment Plant (WWTP), located in the Village of Inglewood, in the Town of Caledon, is owned and operated by Peel Region (Peel). It is a class 2 wastewater treatment facility under Ontario Regulation 129/04. The Inglewood WWTP uses sequencing batch reactor (SBR) technology with physical, chemical, and biological treatment processes. Ultraviolet (UV) radiation is used for disinfection of the final effluent prior to release into the Credit River. The Credit River flows into Lake Ontario at Port Credit in Mississauga.

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.

Inglewood 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 meters and analyzers continuously monitor the wastewater quality and flow 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

Commissioned in 2003, this communal treatment facility features three stages of treatment that include the following major processes (refer to Figure 2 for an illustration of the full process):

- Preliminary treatment: headworks
- Primary treatment: anaerobic chamber
- Secondary treatment: surge anoxic mix chamber and sequencing batch reactor
- Tertiary treatment: filtration and UV disinfection

3.1 Preliminary treatment: headworks

Wastewater is collected from homes and businesses through a system of underground sewer pipes known as the collection system. Wastewater flows by gravity through the Wastewater Collection System into the Inglewood Sewage Pumping Station that pumps it into the treatment plant (some areas are lower elevation than the WWTP, preventing gravity flow directly to the WWTP).

At the plant, the treatment process begins with headworks. A wet well, grinder and auger help to break up or remove any large objects (branches, rocks, and personal hygiene products) to prevent damage and clogging of the equipment and pipes within the plant. Debris that is removed is collected in a bin outside of the plant building and sent off-site for disposal. Wastewater splits into two parallel process trains (train 1 and train 2) for treatment.

3.2 Primary treatment: anaerobic chamber

The wastewater moves from headworks to primary treatment, where treatment occurs in two anaerobic (in the absence of oxygen) tanks. These tanks are known as integrated surge anoxic mix (ISAM). In this stage, wastewater treatment begins by combining the wastewater with an activated sludge, a thick mixture containing waste and microorganisms. With time, the heavier solids settle at the bottom of the tank, in what are called trash traps, where anaerobic bacteria (bacteria that live in the absence of oxygen) consume and remove nutrients, such as nitrogen. The remaining water moves to secondary treatment.

3.3 Secondary treatment: surge anoxic mix (SAM) chamber and sequencing batch reactor (SBR)

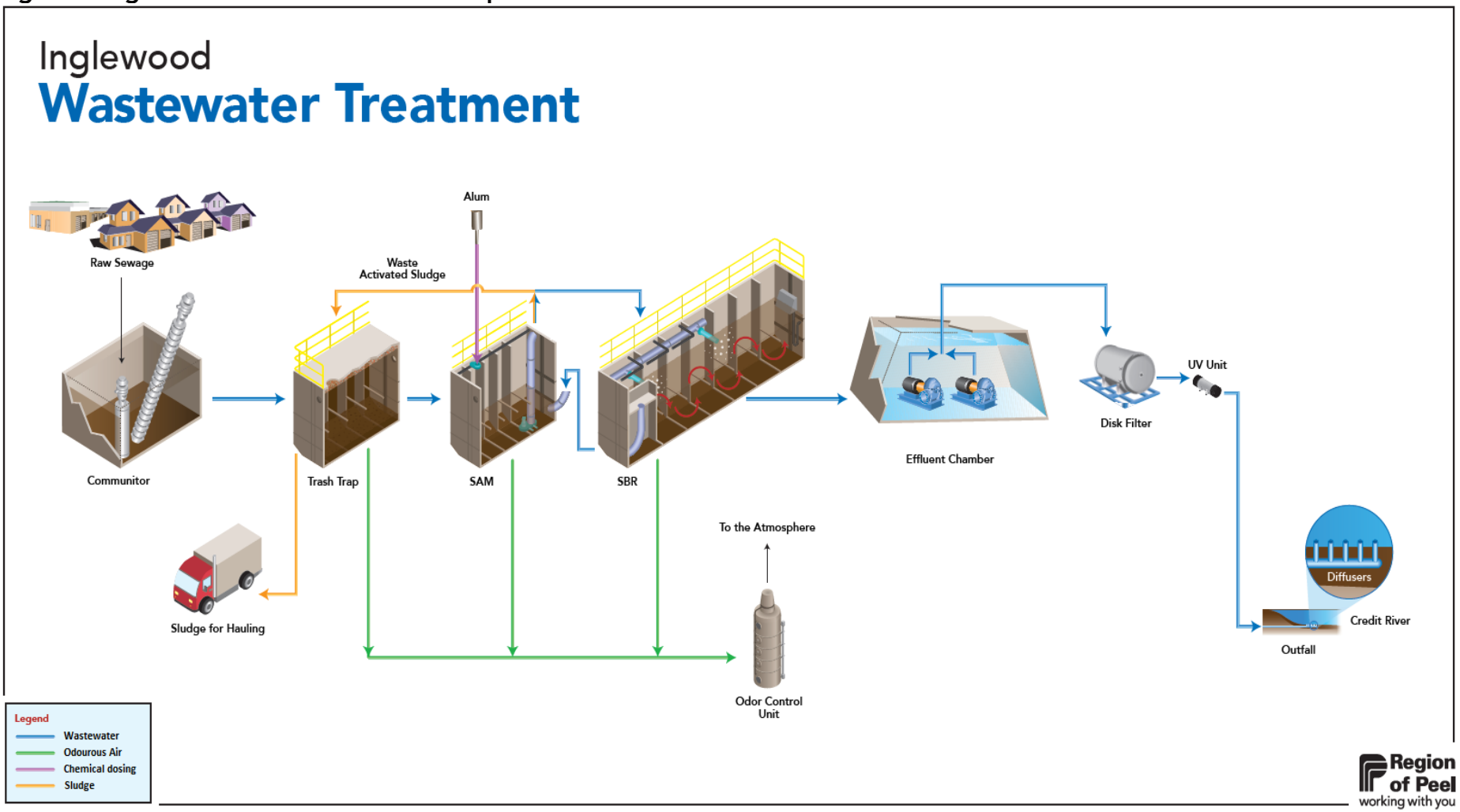
Secondary treatment occurs in two tanks. The SAM tank allows for flow to stabilize while providing an anoxic (without free oxygen) environment to enable nitrate to convert into nitrogen (denitrification). Aluminum sulphate (alum) is injected into the SAM tank to assist with phosphorous removal. Excess microorganisms, in the form of waste activated sludge (WAS) are removed from this process and sent to the anaerobic chamber to aid with settling. Excess sludge is hauled off-site to the Clarkson WWTP, a large OCWA-operated treatment facility in Mississauga.

The second tank in the process is the sequencing batch reactor (SBR). In this tank, the activated sludge process takes place in a single tank by cycling through four stages: fill, react (aerate), settle, and decant. In the **fill** stage, wastewater enters the SBR tank and blends with the activated sludge. In the **react** stage, air is bubbled through the wastewater to provide oxygen to achieve nitrification. Nitrification is the conversion of ammonia-nitrogen to nitrite and then to nitrate. Removal of nitrogen and phosphorous is important as high levels of these nutrients in the final effluent can cause vegetation and algae overgrowth in receiving waters. During the **settle** cycle, solids settle to the bottom of the SBR tank. The effluent is decanted off the top into the effluent chamber during the **decant** phase.

3.4 Tertiary treatment: filtration and ultraviolet (UV) disinfection

The effluent is pumped through a disk filter for final polishing and then directed through a UV light for disinfection to inactivate microorganisms such as bacteria. The final effluent, which is ultimately discharged into the Credit River, is sampled, and tested on a regular basis.

Figure 2. Inglewood wastewater treatment process



4. Operational performance

4.1 Summary of influent monitoring data

Influent and effluent are sampled in accordance with the monitoring and recording conditions of the Approval. Samples are submitted to an accredited laboratory for analysis. Based on the sample results, the quality of effluent from the Inglewood WWTP was consistently within the Approval limits for monthly average concentrations and monthly average loadings. Table 1 and Table 2 provide the influent and effluent monitoring summaries, respectively.

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 monitoring monthly averages [1]

Month	TSS (mg/L [2])	Total BOD_5 (mg/L)	TKN (mg/L)	TP (mg/L)
January	260	262	40.6	6.6
February	165	213	39.8	5.6
March	151	195	40.3	5.0
April	103	159	41.5	5.0
May	103	170	41.2	4.7
June	348	333	41.8	8.0
July	259	242	51.2	7.5
August	233	245	50.5	6.3
September	315	230	50.3	6.0
October	208	236	49.0	5.5
November	228	290	50.8	6.6
December	163	203	52.5	6.4
Annual	**211**	**232**	**45.8**	**6.1**

[1] To read about these parameters and units of measure, refer to Appendix A: Summary of tested wastewater parameter information
[2] mg/L = milligrams per litre

Table 2. Effluent monitoring monthly averages and the approval criteria [1]

Year	E. coli [3] CFU/100 mL	$CBOD_5$ (mg/L)	TSS (mg/L)	TP (mg/L)	TAN (mg/L)	DO (mg/L)	Field pH (pH units)
Approval Objective	100	5.0	5.0	0.15	Summer [4] 0.3 Winter [4] 1.2	None	6.5 to 8.5
Approval Limit	200	10.0	10.0	0.3	Summer [4] 0.5 Winter [4] 1.2	Greater than 2.0	6.0 to 9.5
Jan	0.1	2.2	5.9	0.18	0.1	6.6	6.7 to 6.9
Feb	0.0	2.9	5.6	0.16	0.1	7.6	6.6 to 6.9
Mar	0.0	2.2	5.3	0.15	0.1	6.9	6.7 to 6.9
Apr	0.0	<2.0	4.9	0.13	0.1	6.7	6.6 to 7.1
May	0.0	<2.0	4.0	0.11	0.2	6.1	6.7 to 7.0
Jun	0.0	2.9	3.8	0.12	0.2	5.7	6.7 to 7.8
Jul	0.4	2.2	4.9	0.13	0.1	5.3	6.7 to 7.9
Aug	0.0	<2.0	4.4	0.14	0.1	5.2	6.7 to 6.9
Sept	0.0	<2.0	4.9	0.15	0.1	5.4	6.6 to 7.0
Oct	0.0	<2.0	3.9	0.15	0.1	5.5	6.6 to 6.9
Nov	0.0	2.0	4.6	0.16	0.1	6.0	6.6 to 6.8
Dec	0.0	2.3	5.4	0.18	0.1	5.9	6.3 to 6.9

In addition to operating the plant in compliance with the Approval effluent limits, Peel strives to achieve more stringent effluent objectives (target concentrations or ranges). In 2023, there were 9 occurrences where the effluent objectives were not met (based on monthly averages for TSS and TP, and daily value for pH):

- pH measured outside of the effluent objective range 6.5 to 8.5 of on one day of the year,
- TSS was above the ECA effluent objective of 5 mg/L in the months of January, February, March, and December,
- TP tested above the ECA effluent objective of 0.15 mg/L in the months of January, February, November, and December.

See Table 3 for information on corrective actions taken to resolve these events.

[3] Monthly geometric mean density
[4] Summer: April 1 to November 30; Winter: December 1 to March 31

The Inglewood WWTP has a rated capacity of 243 m^3/day, which is based on an annual average of daily flows. In 2023, the annual average flow was 90.8 m^3/day, representing 37% of the rated capacity. Over the past five years, flows have remained steady.

4.2 Operating problems encountered and corrective actions taken

The Inglewood WWTP operates all year round, 24 hours a day. Occasional operating issues are encountered and are recorded in the facility logbook and on station failure reports. The issues are also logged into the computerized maintenance management system.

Table 3 summarizes these operational challenges and corrective actions taken to minimize environmental impact. All operational challenges were addressed and resolved through equipment maintenance, operational adjustment, or other mitigative action(s). Challenges with meeting ECA effluent limits and objectives are reported to the Ministry Inspector monthly.

Table 3. Summary of operating issues and corrective actions taken

Operational challenges	Date(s)	Corrective Actions
High effluent TSS	Individual elevated values were observed throughout 2023, with monthly objective exceedance in the months of January, February, March, and December	Process troubleshooting and adjustments made as appropriate. Actions included: • Wasting cycle adjusted • Tanks and filters cleaned • Removed sludge from trash traps • ISAM foam removed • UV bulbs changed • Alum feed adjusted
High effluent TP	Individual elevated values were observed throughout 2023, with monthly objective exceedance in the months of January, February, August, November, and December	Process troubleshooting and adjustments made as appropriate. Actions included: • Wasting cycle adjusted • Taks and filters cleaned • Removed sludge from trash traps • Alum feed adjusted • UV bulbs changed
Broken UV sensor	May 27 to June 7	UV sensor replaced. Daily *E. coli* effluent sampling was done to demonstrate adequate disinfection until sensor was replaced, with results sent to Ministry Inspector. Effluent was hauled offsite until first sample results were received.

Operational challenges	Date(s)	Corrective Actions
Effluent pH value lower than the objective range	December 27	Alum feed decreased by three minutes in both trains

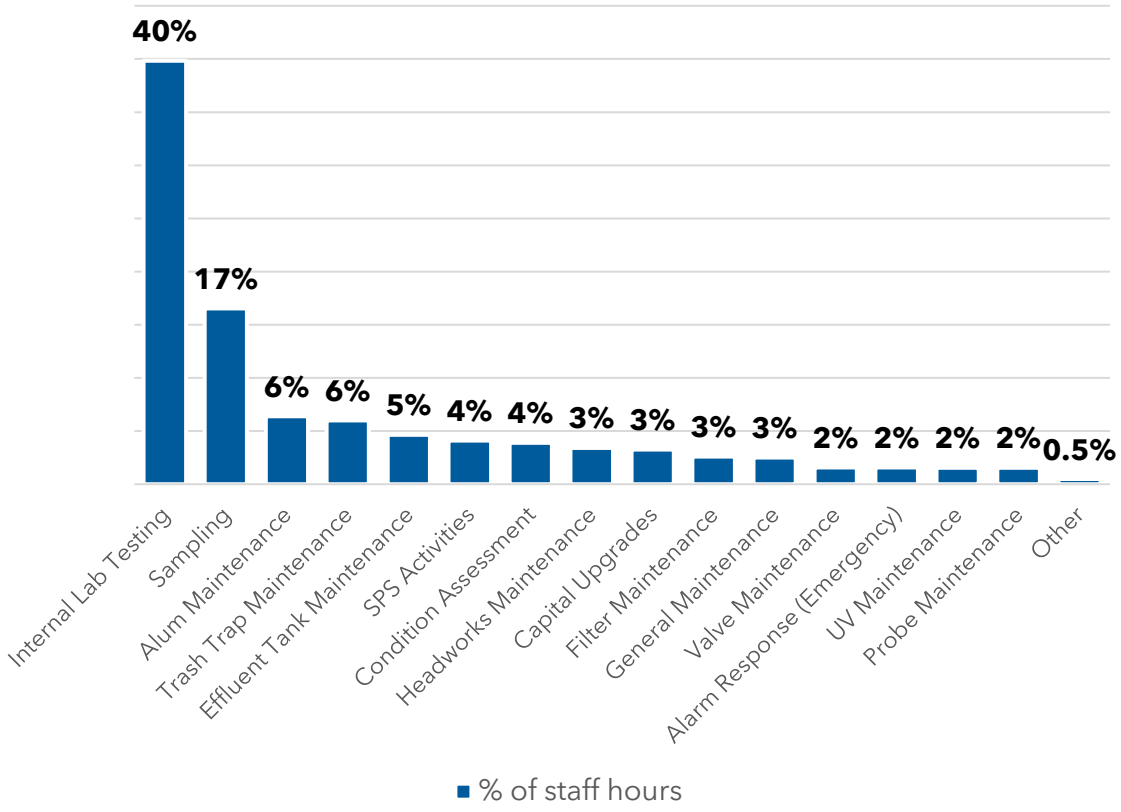
4.3 Summary of maintenance activities and significant expenses

To ensure availability of equipment for the proper and continuous operation of the Inglewood WWTP, major plant components must be inspected and maintained on a regular basis. A variety of maintenance activities are performed by Ministry-licensed wastewater operators, following the manufacturers' instructions where applicable.

4.3.1 Operation and Maintenance Activities

Figure 3 shows the various maintenance activities conducted at the Inglewood WWTP, with a total 2077.5 hours spent in 2023. In-house laboratory testing accounted for 40% of total hours, followed by sampling activities and alum maintenance.

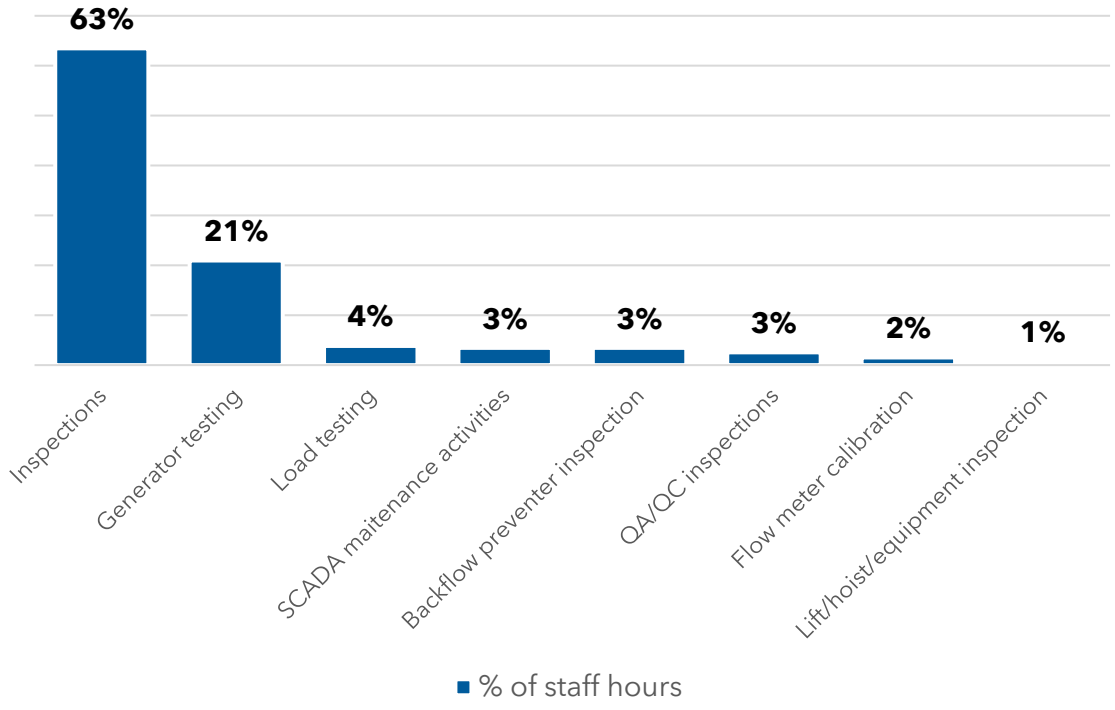
Figure 3. Maintenance activity



4.3.2 Preventive maintenance

Figure 4 shows the preventive maintenance activities at the Inglewood WWTP, conducted to avoid unplanned downtime and prevent equipment failure. A total of 117 hours were invested in preventive maintenance activities in 2023. Routine facility inspections accounted for 63.5% of the total hours, followed by generator testing to maintain plant operational readiness during emergencies.

Figure 4. Preventive maintenance activities



4.3.3 Operating costs

The Approval requires 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, $7,734 was spent on process chemicals (aluminum sulphate) with an average cost of $0.23 per cubic metre of wastewater treated.

Water and wastewater treatment plants are among the highest energy users in the Peel. Utilizing Peel's energy dashboard electricity numbers and volumes of wastewater treated it is possible to calculate how much energy is required to treat wastewater. In 2023, 5.22 kilowatt-hours of energy were used per cubic metre of wastewater treated at the Inglewood WWTP. Energy usage and performance of energy intensive equipment is monitored, and Peel continues to research ways to optimize and reduce energy use, such as identifying energy-saving opportunities during design of capital improvement and construction projects.

4.3.4 Expenditure information

Peel staff determine capital spending priorities to eliminate unnecessary expenditures while maintaining infrastructure. The multi-year expansion of the Inglewood WWTP

continued in 2023 and total capital spending associated with the construction works was approximately $3,200,000.

4.4 Summary of calibration and maintenance of effluent monitoring equipment

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 verification and maintenance of the flow meters, completed by a third-party vendor. For 2023, flow meters were found to be within acceptable range.

4.5 Summary of efforts made in meeting the effluent objectives

Effluent objectives prescribed by the Approval for individual parameters were met throughout 2023, except for eighteen instances, which were communicated to the Ministry Inspector through monthly compliance reports. See Table 3 for details on the instances and corrective actions taken.

Peel ensures high effluent quality through a multi-stage treatment process and well-developed monitoring program. Each year, Peel staff prepare a sampling schedule and monitoring plan for the coming calendar year that covers the required sampling plus additional sampling to assist in operational process monitoring. Operations staff collect samples and perform testing in accordance with the established schedule, including field measurements, on-site benchtop testing, and collection of samples that get submitted to a laboratory for analysis.

Monthly and quarterly monitoring reports are prepared that include a review of influent and effluent parameters to ensure that trends are identified and intervention where needed to ensure potential issues do not escalate.

Samples are collected from the Credit River downstream of the effluent discharge location and their results compared against effluent testing data to monitor for environmental impacts. In 2023, trending demonstrates that the Credit River water quality was not adversely impacted by the effluent from the Inglewood WWTP. As further diligence, Peel and the Credit Valley Conservation Authority share monitoring data to ensure both parties are kept informed, which improves collaborative protection of the natural environment.

4.6 Volume of sludge generated and hauled

Sludge is a by-product generated from the treatment of wastewater and must be removed from the trash traps. Sludge generated on site is hauled to Peel's Clarkson WWTP. Haulage from other process tanks is directed to either the Clarkson WWTP or the Mayfield Road Sewage Pumping Station (part of the Wastewater Collection System that flows to the Clarkson and G.E. Booth WWTPs). Table 4 provides a summary of sludge volume hauled in 2023, as well as volume of haulage from other process tanks.

There is no anticipated significant increase in the generated sludge volume for 2024. However, occasional events like cleaning of tanks may cause changes in haulage volume.

Table 4. Volume of sludge generated and haulage from the WWTP

Month	Sludge hauled from trash traps (cubic metres)	Haulage from other process tanks (cubic metres) [5]
January	33	22
February	35	24
March	55	22
April	30	10
May	36	253 [6]
June	30	22
July	18	10
August	36	19
September	18	10
October	24	10
November	12	12
December	9	8
Annual	336	422

4.7 Summary of complaints

The Approval requires that Peel log all resident complaints, investigate, and resolve them. Peel attempts to contact all customers and satisfactorily address their concerns and enquiries. A database is used to record details including information collected from

[5] Refer to Table 3 for information on haulage from other process locations
[6] Refer to Section 4.2 for more information

the customer on the nature of the enquiry and action taken by Peel. There were no complaints in 2023 related to the operation of the Inglewood WWTP.

4.8 Summary of all bypass, spill or 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.

A bypass is an intentional diversion of excess wastewater around one or more wastewater treatment process(es). 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 the receiving waterbody 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 government 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** at the Inglewood WWTP.

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 overflows in 2023** at the Inglewood WWTP.

A spill is an unplanned discharge of wastewater to the environment from any location that is not specifically designed for this purpose.

There were **no spills in 2023** at the Inglewood WWTP.

4.9 Modifications to the sewage works

The Approval allows for certain pre-authorized modifications to be made to the facility. The Ministry is notified of these modifications via Notice of Modification to Sewage Works. Peel undertakes construction projects to upgrade or enhance the WWTP to meet demands related to industrial and commercial growth in Peel Region that may alter incoming wastewater volume or loading, and to integrate new technologies.

There was no work requiring Notice of Modification to Sewage Works performed in 2023. Repair and maintenance activities are exempt from the documentation requirements and may be performed as needed to maintain the WWTP in good working condition.

In 2023, construction of the Ministry-approved works for the Inglewood WWTP continued, which involves plant expansion and includes a new treatment train, new headworks, replacement of existing SBR equipment, anoxic mixers, blowers, and fine bubble diffusers to provide additional aerobic capacity.

4.10 Other information required by the Ministry Water Supervisor

There was no other information requested by the Ministry Water Supervisor in 2023.

5. Performance management programs

5.1 Ministry Inspections

Wastewater system inspections are performed by the Ministry to ensure systems are operating as required and making efforts to achieve plant design objectives. Performance data and records are reviewed against the Approval and legislative requirements to confirm that Peel performed the required reporting for incidents when compliance limits were not met, per section 2.1 of this report. The inspections also verify that Peel meets sampling, testing and treatment standards and staff competency requirements. Inspections can be periodic or can be triggered through a variety of factors such as frequency of events or inconsistent system performance (e.g., increased number of spill events or incidents reported), in response to a complaint or concern, or as part of a follow-up from prior non-compliances.

There were no Ministry inspections of the Inglewood WWTP in 2023.

5.2 Wastewater Integrated Management System

Peel Region has developed and implemented the Wastewater Integrated Management System (WWIMS) to systematically assess pollution prevention, embrace quality work, and improve overall performance to meet compliance obligations. It also provides an effective framework for operational excellence, guidance to building and managing policies, procedures, and process, and fostering a culture of continual improvement within the wastewater division.

The WWIMS draws on the principles of ISO 9001 (Quality Management Systems) and ISO 14001 (Environmental Management Systems) and strives to implement optimal management practices for the Peel-operated wastewater collection and treatment systems. The scope of the WWIMS includes the Wastewater Collection System, and the Inglewood wastewater treatment plant.

In the fall of 2023, Peel completed a full internal audit of its management systems, with focus on the WWIMS. It was determined that conformance to both ISO 9001 and ISO 14001 requirements had been met. With ongoing changes in Peel's water and wastewater programs, alignment with the new operational framework of the wastewater collection and treatment systems continued to be maintained. A review of normal and abnormal operations for Peel's wastewater systems and the natural environment was carried out. Through the assessment of 144 risks and their potential impact, 15 activities were deemed to be significant, and objectives and targets were

then discussed and established to ensure effective controls are in place to remove or reduce the risk.

Appendix A: Summary of tested wastewater parameter information

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

Background colony count: Indicate general bacterial population in a sample. Most of these are not disease-causing, but their counts are used to assess disinfection effectiveness.

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

CFU: Colony forming units; that is, healthy, viable organisms.

Chemical oxygen demand (COD): Amount of oxygen needed to oxidize (combine with oxygen) all the organics in a wastewater sample. COD is used as a measure of organic pollution.

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.

Dissolved phosphorous: Phosphorous that remains in water after it is filtered to remove particulate matter. It is highly bioavailable to algae and can promote algae blooms.

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).

Heterotrophic plate count: Provides as estimation of the number of healthy, live heterotrophic bacteria in water following treatment. Heterotrophic organisms eat other plants or animals for energy and nutrients. Many pathogenic (disease-causing) bacteria are heterotrophs.

Fecal coliforms: Group of bacteria found in fecal excrement of humans, wildlife and livestock. They are an indication of presence of organisms that can survive in the digestive systems, some of which could cause disease.

Fecal streptococcus: Group of bacteria commonly found in animal and human feces that are known to cause many illnesses. They are a more accurate indication of presence of pathogens than coliforms.

mg/L: milligrams per litre

Nitrate, nitrite: 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.

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

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.

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

Total aluminium: A metallic element that occurs naturally in small amounts in the environment and can also be introduced into wastewater through industrial processes.

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.

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 presenting the sample, which can cause deplete DO in receiving waters.

Total cadmium: A rare metal that is introduced into wastewater through industrial processes (plating, batteries, pigments, etc.) as well domestic products such as hand soap and body wash in small concentrations.

Total chromium: Chromium is a metallic element that is the primary additive in stainless steel and chrome plating and introduced into wastewater through these industrial processes.

Total coliforms: Found widely in nature, e.g. animal manure, soil and wood. Coliform bacteria grow under the same conditions as disease-causing bacteria, which makes them useful indicator organisms.

Total copper: Copper is a conductive metallic element that is introduced into wastewater primarily through electronics manufacturing and manufacturing of wires and cables.

Total iron: Iron is the most widely used metal and enters the wastewater system through industrial processes such as the construction of machinery and tools as well as framework for buildings and, in small amounts, from domestic sources such as cleaning products.

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 lead: Lead is a heavy metal that is introduced into wastewater through various industrial processes such as battery production and construction material manufacturing.

Total nickel: Nickel is a metal that is introduced into wastewater through various industrial processes such as manufacturing of stainless steel, electroplating and batteries.

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 unionized ammonia: In water, total ammonia nitrogen occurs in ionized (NH_4^+) and un-ionized (NH_3) form. Un-ionized ammonia is toxic to fish.

Total zinc: Zinc is a heavy metal that is introduced into wastewater through various processes such as mining, coal and waste combustion and steel processing.

ug/L: micrograms per litre

Appendix B: Summary of additional wastewater testing results for 2023

Table 5. Raw wastewater (influent) characteristics

Parameter	Unit	Monthly average [7] (result range) (min to max)
Total BOD_5	mg/L	159 to 333
Total phosphorous	mg/L	4.7 to 8.0
Dissolved phosphorous	mg/L	2.9 to 4.4
Total suspended solids (TSS)	mg/L	330 to 364
Total Kjeldahl nitrogen (TKN)	mg/L	40 to 51
Alkalinity	mg/L	330 to 364
Total $CBOD_5$	mg/L	143 to 318
Chemical oxygen demand (COD)	mg/L	316 to 570
Field pH	pH	7.8 to 8.4
Field temperature	degrees Celcius	12 to 21
Total ammonia nitrogen	mg/L	26 to 40
Total aluminum	ug/L	259 to 1135
Total cadmium	ug/L	0.1 to 0.2
Total chromium	ug/L	<5.0
Total copper	ug/L	49 to 82
Total iron	ug/L	165 to 730
Total lead	ug/L	0.67 to 2.2
Total nickel	ug/L	1.7 to 3.0

[7] Results that were below the analytical method detection limit are reported with a "less than" (<) sign. The < sign is eliminated when calculating average values.

Table 6. Final effluent characteristics

Parameter	Unit	Monthly average [8] (result range) (min to max)
Total coliforms	CFU/100mL	0 to 12
Fecal coliform	CFU/100mL	0 to 2
Background colony count	CFU/100mL	7 to 500
Fecal streptococcus	CFU/100mL	0 to 1
Heterotrophic plate count (HPC)	CFU/mL	7 to 219
Dissolved phosphorus	mg/L	0.03 to 0.07
Alkalinity	mg/L	44 to 82
Chemical oxygen demand (COD)	mg/L	14 to 19
Total unionized ammonia	pH	0.0008 to 0.0013
Total Kjeldahl nitrogen (TKN)	mg/L	1.1 to 2.7
Field temperature	degrees Celcius	13 to 22
Total aluminum	ug/L	200 to 388
Total cadmium	ug/L	<0.09
Total chromium	ug/L	<5.0
Total copper	ug/L	7.7 to 12
Total iron	ug/L	<100
Total lead	ug/L	<0.50
Total nickel	ug/L	1.1 to 1.4
Total zinc	ug/L	41 to 58
Nitrite	mg/L	0.029 to 0.119
Nitrate	mg/L	23 to 32
Nitrate plus nitrite	mg/L	23 to 32

In addition to influent and effluent, the Region of Peel also tests the effluent receiving body (Credit River), downstream of the WWTP discharge point. Monthly samples were collected from January to December 2023 and tested for a variety of parameters.

[8] Results that were below the analytical method detection limit are reported with a "less than" (<) sign. The < sign is eliminated when calculating average values.

Appendix C: 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 10-15 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