INFORMATION REPORT

TO:	Chair and Members Public Works Committee
COMMITTEE DATE:	May 15, 2023
SUBJECT/REPORT NO:	2022 Annual Wastewater Treatment Bypass Report (PW23031) (City Wide)
WARD(S) AFFECTED:	City Wide
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SUBMITTED BY: **SIGNATURE:**	Shane McCauley Director, Water & Wastewater Operations Public Works Department 

COUNCIL DIRECTION

In 2019 Council directed Hamilton Water to provide the Public Works Committee with an annual report on discharges to the natural environment from the Dundas and Woodward Wastewater Treatment Plants.

INFORMATION

Report PW23031 details the bypass frequency and volume for the Woodward and Dundas Wastewater Treatment Plants for 2022 and provides the five (5) year average for each. Report PW23031 also provides similar data from other Ontario municipalities that publicly report wastewater treatment plant bypass information.

The City of Hamilton's (City) website houses a live map of bypass and combined sewer overflow locations and a historical log of wastewater treatment plant bypass and combined sewer overflow events (https://www.hamilton.ca/home-neighbourhood/water-wastewater-stormwater/wastewater-collection-treatment/monitoring)

Wastewater Treatment Plant Discharges:

The City operates two (2) wastewater treatment plants. The Woodward Wastewater Treatment Plant is located at 700 Woodward Avenue, Hamilton and discharges to the Red Hill Creek. The Dundas Wastewater Treatment Plant is located at 135 King Street East, Dundas and discharges to the Desjardins Canal. Both discharge locations are connected to the Hamilton Harbour.

The City has a large complex wastewater collection network consisting of both separated sewer and combined sewer systems. Combined sewers are found in older areas of the City and carry a combination of stormwater and wastewater in the same pipe. During periods of heavy rainfall, snowmelt, or elevated lake levels the combined sewers are inundated with large volumes of stormwater that can exceed the capacity of the pipes. This results in combined sewer overflows and can overwhelm the wastewater treatment plants resulting in a temporary bypass of certain treatment processes.

Wastewater treatment plant operators monitor incoming flows and make operational adjustments to the treatment processes as required. To protect the wastewater treatment plant from infrastructure damage, prevent flooding, and maintain compliance with the Wastewater Treatment Plant Environmental Compliance Approval (ECA) the Wastewater Treatment Plant Operator will initiate a bypass event.

Woodward Wastewater Treatment Plant

At the Woodward Wastewater Treatment Plant, a bypass can occur at various stages in the wastewater treatment process. There are currently four (4) different levels of treatment bypass that can occur at the Woodward Wastewater Treatment Plant as described in the following table.

Table 1 - Treatment Levels of Bypass Locations at the Woodward Wastewater Treatment Plant

Bypass Type	Treatment Processes Bypassed
Secondary treatment bypass (Secondary bypass)	Secondary treatment processes including aeration and secondary clarification. Bypasses receive chlorine disinfection between May 15 and October 15.
Primary treatment bypass with disinfection (Primary bypass)	Primary and secondary treatment processes including primary clarification, aeration, and secondary clarification. Bypasses receive chlorine disinfection between May 15 and October 15.

Primary treatment bypass without disinfection (Headworks bypass)	Primary and secondary treatment processes including primary clarification, aeration, and secondary clarification. Bypasses do not receive chlorine disinfection.
Preliminary treatment bypass (Plant bypass)	All processes at the Wastewater Treatment Plant are bypassed. Bypasses do not receive chlorine disinfection.

Since the completion of infrastructure upgrades in 2012 most bypass events have been secondary bypasses. Occasionally, flows to the Woodward Wastewater Treatment Plant are sufficiently large that both a primary bypass and a secondary bypass must be initiated at the same time. On rare occasions, a headworks bypass or a plant bypass may be required where flows exceed the preliminary treatment capacity, or where flows risk flooding and causing damage to surrounding properties, the main pumping station, or other wastewater treatment plant infrastructure.

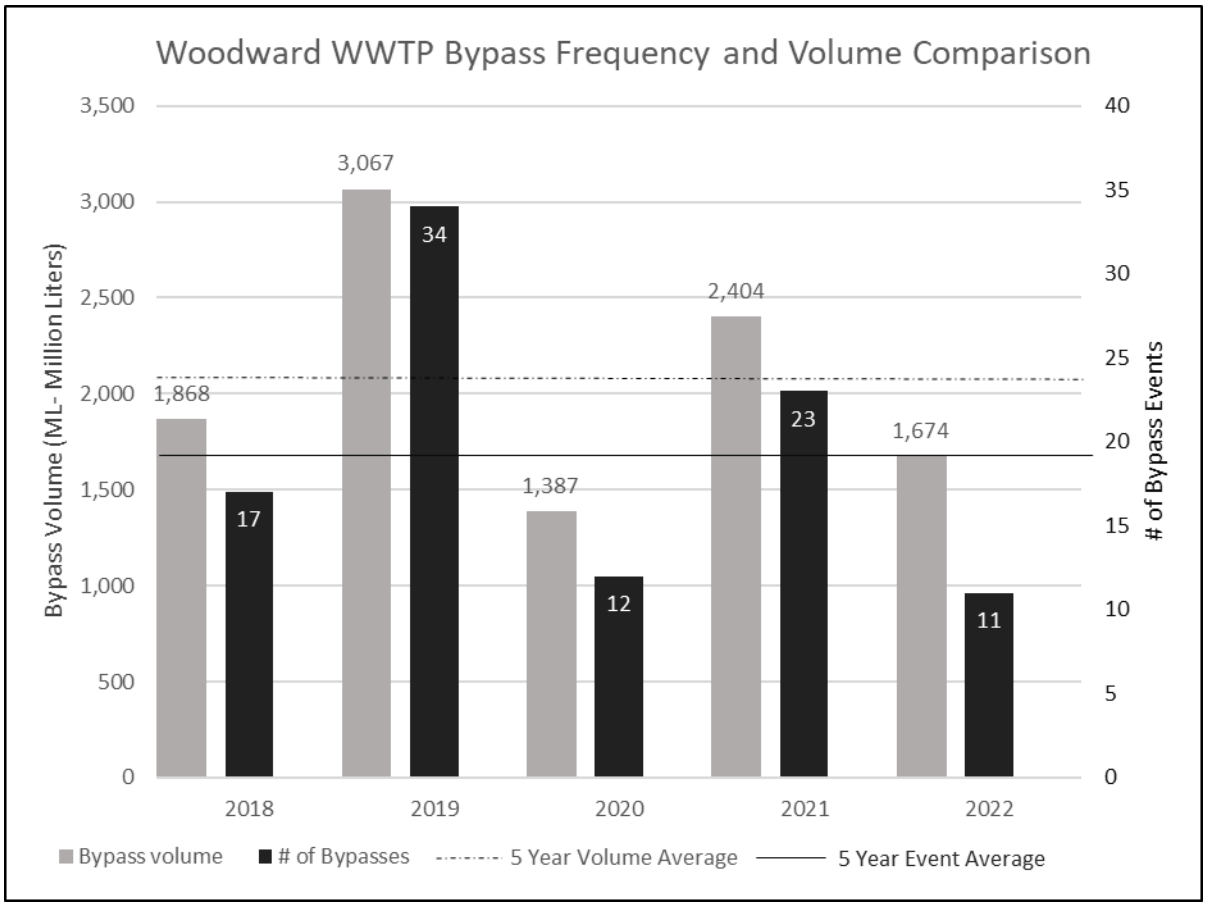
In 2022, all bypass events at the Woodward Wastewater Treatment Plant were the result of wet weather that generated flows in excess of the wastewater treatment plant's treatment capacity. Bypasses are promptly reported to the Ministry of Environment, Conservation, and Parks Spills Action Centre and to Public Health Services as required by regulation.

The Woodward Wastewater Treatment Plant outfall is inspected regularly and after every significant wet weather event or bypass event. Any abnormal materials such as floatables that are present are removed by staff or a City contractor. It is important to note that the existing Woodward Wastewater Treatment Plant outfall discharges a combination of fully treated effluent from the wastewater treatment plant, bypass flows (if a bypass is initiated), and flows from the Dunn Avenue combined sewer overflow location.

This outfall has a floating containment boom installed and if abnormal materials such as floatables are present, it is highly probable that they originated from the Dunn Avenue combined sewer overflow unless a plant bypass occurred. In October 2022, a second outfall became active at the Woodward Wastewater Treatment Plant as the new tertiary treatment process began commissioning. Over the course of 2023, the location of the Woodward Wastewater Treatment Plant primary outfall will permanently move to this new location on the Red Hill Creek. The old outfall will receive flows only during bypass events.

The 2022 Woodward Wastewater Treatment Plant bypass event data is presented in the following table along with the five (5) year average for comparison.

Figure 2 - Woodward Wastewater Treatment Plant Bypass Frequency and Volume



2022 was a dryer than normal year with approximately 25% less precipitation than the 5-year average. As a result, and as shown in the Figure 2 above, both the number bypass events, and volume bypassed were below the 5-year averages. All but one of the bypass events were secondary bypasses with flows exceeding the rated capacity of the secondary treatment process. On March 23-24, 2022, a wet weather event resulted in a headworks bypass with a peak flow rate of 1,400 million litres per day. The event exceeded the capacity of the primary treatment process resulting in a bypass for 1 hour and 41 minutes.

Temporary capacity restrictions at the Woodward Wastewater Treatment Plant due to construction were in place for most of 2022. While these restrictions did not affect the rated dry weather wastewater treatment plant capacity it did reduce the capacity at which the wastewater treatment plant could operate during wet weather events. These restrictions were ended in December of 2022 and the Woodward Wastewater Treatment Plant is again able to provide full treatment of wet weather flows up to 614 million litres per day.

Dundas Wastewater Treatment Plant

Flows from the Dundas Wastewater Treatment Plant are carefully controlled and flows exceeding the plant's capacity are directed to the Woodward Wastewater Treatment Plant rather than initiating a bypass at the Dundas Wastewater Treatment Plant. A bypass could occur at the Dundas Wastewater Treatment Plant if wastewater treatment plant operators are unable to divert flow quickly enough. In these instances, any resulting bypass would be a tertiary bypass.

A tertiary bypass means the wastewater has been almost fully treated including the removal of large solids, grit, and floatable material, chemicals have been added to assist with phosphorus removal, biological treatment has been completed to break down organic material and nutrients, and most of the remaining solids have been removed. Between May 15 and October 15 each year, any tertiary bypasses that occur would also receive chlorine disinfection; however, would not have the chlorine removed prior to being discharged to the natural environment.

The Dundas Wastewater Treatment Plant had no bypass events in 2022 and has not had a bypass in the last six (6) years.

Municipal Comparison

Council requested at the January 13, 2020, Public Works Committee meeting, that available wastewater treatment plant bypass volumes for comparable municipalities be presented along with the bypass data for Hamilton's Wastewater Treatment Plants. The table below provides this data for Hamilton along with other Ontario municipalities that publicly report wastewater treatment plant bypasses. It should be noted that many comparator municipalities do not report this data publicly.

Table 3 - Municipal Wastewater Treatment Plant Bypass Volume Comparison in Millions of Litres

		Total Bypass Volume (Millions of Litres)	
Municipality	No of Wastewater Treatment Plants	2021	2022
Hamilton	2	2,404	1,674
Kingston	3	0	12
London	5	101	48
Greater Sudbury	10	11	223
Niagara Region	11	1,085	1,314
Toronto	4	1,622	2,721

The City of Hamilton along with the City of Kingston are the only known municipalities in Ontario who report overflows and bypasses publicly in real-time. The City's webpage which shows real-time overflows and bypasses (www.hamilton.ca/home-neighbourhood/water-wastewater-stormwater/wastewater-collection-treatment/monitoring) and houses historical data on Hamilton's wastewater overflows and bypasses, was launched in June 2020.

APPENDICES AND SCHEDULES ATTACHED

N/A