Report to Civic Works Committee

To: **Chair and Members**
Civic Works Committee
From: **Kelly Scherr, P.Eng., MBA, FEC**
Managing Director, Environmental & Engineering Services and City Engineer
Subject: **Sewage Overflows and Bypasses Into the Thames River**
Date: **April 20, 2021**

Recommendation

That, on the recommendation of the Managing Director, Environmental and Engineering Services and City Engineer, the following report on Sewage Overflows and Bypasses Into the Thames River, **BE RECEIVED** for information.

Executive Summary

Purpose

This purpose of this report is to provide Council with an overview of the causes of sewer system overflows and bypasses and provide an update on the various initiatives underway to reduce them.

Context

Overflows and bypasses occur in the sanitary collection system when excess flows push the sewer beyond its capacity. The most frequent cause of this is stormwater entering the sanitary system during heavy rainfall events. Sewer system overflows that exist in the sewer system were originally built to provide sewer system relief during these wet weather events, thus protecting homes from basement flooding. Bypasses at wastewater treatment facilities are to protect the facility from being inundated with flows that exceed its treatment capacity.

The City has a number of different programs and initiatives underway to help deal with unwanted water in the sanitary collection system and protect waterways, which are discussed in further detail below.

Linkage to the Corporate Strategic Plan

This recommendation supports the following 2019-2023 Strategic Plan areas of focus:

- Building a Sustainable City:
  - London’s infrastructure is built, maintained, and operated to meet the long-term needs of our community
  - Protect and enhance waterways, wetlands, and natural areas

Analysis

1.0 Background Information

1.1 Previous Reports Related to this Matter

September 26, 2017 – Civic Works Committee – Domestic Action Plan (DAP): London – Proposal Update

November 21, 2017 – Civic Works Committee – Pollution Prevention Control Plan Update

September 24, 2019 – Civic Works Committee – Wastewater Treatment Operations Environmental Assessment – Master Plan Study Initiation

2.0 Discussion and Considerations

2.1 Overflows and Bypasses

An overflow is the release of untreated wastewater to the environment, whereas a bypass is the diversion of wastewater around part of the wastewater treatment process, sometimes resulting in the release of untreated or partially treated wastewater. Overflows and bypasses are primarily caused by excess flows during wet weather events. Overflows can occur in sewer systems, while either overflows or bypasses can occur at pump stations and treatment facilities. Answers to frequently asked questions regarding London's bypasses and overflows are provided as Appendix 'A' Frequently Asked Questions.

The most common type of sewer that experiences overflows are called combined sewers. Combined sewer systems were designed to convey both storm and sanitary flows to the treatment plant. During large rainfall events, additional storm flows can cause the sewer to be over capacity so they were designed with overflow points to protect properties from basement flooding. Some pump stations also use emergency overflows to prevent basement flooding in the event of an equipment failure or a significant rainfall event that exceeds the capacity of the pump station. Wastewater treatment facilities may also experience overflows if the flow reaching the facility exceeds its capacity.

Sewers may also be partially combined. This means that there are separate sanitary and storm sewers; however, some rainwater is still directed to the sanitary sewer. This occurs in areas of the City where homes were constructed with their weeping tiles connected to the City's sanitary sewer system. During large storms, rainwater overwhelms the sanitary sewer system and causes basement flooding. More information on weeping tiles is provided in section 2.5 of this report.

Over the past ten years, the percentage of flows that bypassed the treatment plants with no treatment at all averaged of 0.17% of the volume of treated wastewater flow. All bypasses are monitored and reported to the Ministry of Environment, Conservation and Parks. Appendix 'B' "Annual Bypass Summary" provides a summary table of London's total annual bypass volumes as reported to the MECP since 2002.

There are six overflow points in the wastewater collection system that outlet directly to the Thames River and are monitored and reported on to the MECP annually. The flows vary dramatically every year as they are dependent on rainfall events.

2.2 Pollution Prevention Control Plan

London's Pollution Prevention and Control Plan (PPCP) is a multi-year master planning project designed to provide a long-term solution to address conveyance system sewer overflows and bypasses, and to mitigate the associated impacts of these discharges on receiving watercourses, including the Thames River, Pottersburg Creek, Medway

Creek, the Coves and Dingman Creek. Recommendations of the PPCP included considerations for climate change, data management, capital works, and removal of inflow and infiltration at the source.

The City has undertaken a number of initiatives that will help achieve the desired outcomes of the PPCP. These include:

- updates to storm data used for modeling to account for higher intensity storms that we experience due to climate change;
- data management updates such as continuous updates to GIS, sewer modelling, and flow monitoring program;
- sewer separation projects; and,
- inflow and infiltration reduction projects, e.g. weeping tile disconnections.

An update to the PPCP will be required in 2023. There is budget allotted in 2022 to retain a consulting engineering firm to complete this work.

2.3 Wastewater Treatment Master Plan

The Wastewater Treatment Operations Division is currently undertaking a Master Plan in order to develop a strategy for the collection and treatment of wastewater in London over the next fifty years. The City operates five wastewater treatment plants and thirty-eight pumping stations throughout the City and, even though the occurrence of overflows or bypasses is generally rare, the potential for them to occur exists in some form at each of them. The reliable and effective operation of each facility is therefore paramount to meeting the City's goals for environmental stewardship and the protection of the Thames River and other waterbodies, while also protecting the health of the City's residents, visitors and neighbours.

The Master Plan will provide a long term plan for the City's wastewater infrastructure, including treatment plants and pumping stations. Minimizing bypasses and overflows at these facilities will be a key consideration in developing this plan.

2.4 Lake Erie Domestic Action Plan

The Domestic Action Plan (DAP): London – A Proposal for Phosphorus Reduction highlights projects completed by the City that have reduced the discharge of phosphorous into the Thames River. It also highlights works currently identified with the 20-year plan to further reduce that phosphorous in the Thames River.

Because sanitary sewer overflows contribute to phosphorous loading in receiving waterbodies, a number of the actions identified relate to overflow reduction. Included are the replacement of combined sewers (discussed further below) and the development and circulation of an implementation plan for managing the highest priority sanitary sewer overflows as identified in the Pollution Prevention Control Plan.

2.3 Sewer Separation Program

One of the municipal actions identified in the Domestic Action Plan (DAP) for Phosphorus Reduction is the separation of combined sewers. The DAP states,

> “The City of London will accelerate plans to separate combined sewers, including the design and construction of necessary stormwater outlets, with the target of separating 80 per cent (17 kilometres) of its combined sewer system by 2025.”

This target for combined sewer replacement is contingent on federal and provincial funding. To date 6.2 kilometres of combined sewer has been removed and an additional 1.45 kilometres will be removed in 2021.

2.4 Unwanted Water: Inflow and Infiltration Reduction

Unwanted water entering the City's sewer system is the primary cause of sewer overloading during wet weather events. This unwanted water comes from two sources called inflow and infiltration. Inflow is the flow of stormwater into a sanitary sewer through a direct connection and infiltration is the seepage of groundwater into a sanitary sewer through leaks or cracks in the sewer. Infiltration is impacted by the condition of the sewers and can be addressed through long term management, rehabilitation, or replacement of sewers. Inflow, however, must be addressed in a different manner and should be minimized as much as possible through design and policy, since it has the potential to contribute very large volumes of extraneous flow.

The unwanted water from inflow and infiltration has a significant impact on London's collection system because it causes high flows of rainwater in the sewer system during large rain or snow melt events. The presence of this excess water leads to an increased risk of basement sewer backups and increases the probability that emergency discharges of untreated or partially treated sewage to the Thames River will be required to protect the City's residents and infrastructure from flooding.

A recent study completed in 2018 by KPMG quantified this problem further and found that the City of London receives approximately two and a half times more unwanted water than comparably sized municipalities in Southern Ontario. This analysis concluded that this unwanted water costs approximately $1 million per year in operational costs to treat.

A program led by staff to identify opportunities to reduce unwanted water in our sanitary sewer system is ongoing. This initiative, titled "Unwanted Water", will include alternatives for design and development standards, programs, enforcement, and bylaw changes with the goal of keeping unwanted water out of London's sewer system. The first report related to the Unwanted Water program will be submitted to Civic Works Committee Q3 2021 and lay out a series of initiatives for committee discussion and direction.

2.5 Weeping Tile Disconnection

Weeping tile connections are a leading cause of sanitary sewer overloading during heavy rainfall events that result in basement flooding. A weeping tile is a buried porous pipe that collects rainwater from along the bottom edge of a building's basement foundation. The pipe collects any rain or groundwater from along the bottom of the foundation wall preventing water from seeping into the building's basement. Homes generally built between the 1920s and 1980s are likely to have weeping tiles connected to the City's sanitary sewer collection system. Subdivisions built post-1985 have sump pits and sump pumps in basements addressing weeping tile flow, which consists of natural ground water, rainwater and snowmelt. There are an estimated 50,000 weeping tile connections contributing unwanted water to the City's sanitary collection system.

The current budget for the Basement Flooding Grant Program is $500,000 annually. This program provides homeowners with a 90% subsidy to separate weeping tiles from the sanitary sewer and install sump pumps and backflow valves. This protects the individual property from basement flooding and eliminates some unwanted water from the sanitary system. The Targeted Weeping Tile Disconnection Program is a City-led program that separates weeping tiles from the sanitary sewer in targeted

neighbourhoods in order to realize a noticeable reduction in unwanted water in the sanitary system and produce a neighbourhood-wide benefit. This program has an annual budget of $1 million which is sufficient to disconnect the weeping tile of approximately 30 homes each year.

3.0 Financial Impact/Considerations

There is no financial impact from this report.

Conclusion

Overflows and bypasses occur most frequently in the sanitary collection system when unwanted water enters the system during heavy rainfall events. The City has a number of initiatives underway to address the various causes of overflows and bypasses in order to reduce the number of occurrences and protect the health of our waterways.

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CC: K. Oudekerk, S. Chambers

Appendix A

Bypasses and Overflows: Frequently Asked Questions

What are overflows and bypasses?

An overflow is the release of untreated wastewater to the environment. A bypass is the diversion of wastewater around part of the wastewater treatment process.

What causes overflows and bypasses?

They are caused by there being more water in the sewer than the sewer can carry. This is most often caused by extra water entering the system during rainstorms.

When do they usually happen?

Overflows and bypasses happen most often during heavy rainfall events and snowmelts, when extra water enters the sanitary system.

Where do they occur?

Bypasses occur at wastewater treatment facilities, which are located along the Thames River. Overflows happen in the sanitary sewer system at points where the sanitary sewer was connected to the storm sewer, or where there is an overflow release point in a combined sewer system.

Could you swim in the Thames River if we stopped overflows?

Action taken on reducing overflows will continue to improve water quality in the Thames River immediately following heavy rainfalls. There are, however, many other sources of water pollution. E. coli levels are measured in the river upstream of London and are too high to allow swimming. This is before the water even reaches the city and is influenced by our overflows. Thus, removing overflows will not make it safe to swim in the Thames River.

Why can’t we stop them now?

Although the City is actively separating combined sewers, every construction project consumes considerable time and money. Therefore, it is not feasible to eliminate them all at once. We also cannot force property owners to disconnect weeping tiles from the sanitary sewer, which is a large source of unwanted water in the sanitary system. Upsizing the sanitary sewers to accommodate those flows would be extremely costly. Simply blocking off overflow points without removing the source of the unwanted water would risk flooding basements with sewage.

Is this a problem only experienced in London?

No. It is a problem that exists in most major cities around the world.

How nasty is water discharged during a sewage bypass or overflow?

The water discharged during a bypass or overflow is highly diluted by rainwater compared with sewage direct from a residential home; however, even though it’s diluted it is still sewage and it’s our goal to eliminate releases of sewage into the Thames Rivers.

What are some recent project completed to reduce the number and severity of overflows and bypasses?

> In 2019 and 2020, combined sewers on York Street and Richmond Street, which contribute to the largest overflow point in the city, were separated. Sewer separation work continues in 2021, with an additional 1.45km of combined sewer being removed. Upgrades at wastewater treatment plants, such as the recent project at Greenway Pollution Control Centre, reduce the number and severity of bypasses.

When will London be free of overflows and bypasses?

> Although the City has a plan in place to remove combined sewers and we continue to encourage property owners to disconnect weeping tiles and offer grants to do so, changing weather patterns due to Climate Change make future extreme rainfall events difficult to predict. This means that completely removing overflows and bypasses is difficult to guarantee, since they are highly linked with extreme weather, an effect of climate change.

Appendix B

Annual Bypass Summary

	Treated (ML)	Raw Bypass		Secondary Bypass		Total		% of raw bypasses to treated flow	Rainfall yearly total (mm)
		ML	#	ML	#	ML	#		
2002	75,150	225	32	567	11	792	43	0.30%	861
2003	74,385	285	99	365	40	650	139	0.38%	985
2004	77,304	375	106	679	47	1054	153	0.48%	964
2005	75,150	225	74	566	26	791	100	0.30%	868
2006	83,075	201	99	862	33	1063	132	0.24%	1,202
2007	71,874	24	36	227	19	251	55	0.03%	771
2008	78,979	219	70	1,033	38	1252	108	0.28%	1,094
2009	74,557	158	60	901	22	1059	82	0.21%	931
2010	70,426	47	38	123	17	170	55	0.07%	931
2011	84,793	375	94	1,630	31	2005	125	0.44%	1,165
2012	67,865	4	6	41	6	45	12	0.01%	660
2013	76,160	249	55	765	20	1014	75	0.33%	1,075
2014	72,351	72	39	142	13	214	52	0.10%	956
2015	65,709	56	40	208	11	264	51	0.08%	687
2016	70,786	67	40	148	16	215	56	0.10%	929
2017	72,427	50	27	248	16	298	43	0.07%	914
2018	70,994	266	32	482	10	748	42	0.37%	975
2019	72,434	26	10	10	3	36	13	0.04%	1,037
2020	71,094	122.6	24	137.9	8	260.5	32	0.17%	999
Average		160	52	481	20	641.1	72		