



## Report to Council

Department: Infrastructure Services  
Division: Environmental Services  
Date: May 21, 2024  
Prepared by: Rob Mackie, Manager, Environmental Services  
Report Number: Environmental Services-2024-03  
Subject: Sanitary I&I Reduction Strategy  
Number of Pages: 11

### Recommendation(s)

**That** Environmental Services 2024-03 entitled, "Sanitary I&I Inspection" prepared by Rob Mackie, Manager, Environmental Services dated July 15, 2024, be received.

### Purpose

At its Regular Meeting of Council on May 21, 2024, Council resolved the following:

#### R24-05-206

**That** Council direct Administration to come back with a report discussing the inflow and infiltration to the Town's storm and sanitary sewers, and potential solutions to help reduce flooding. The report should speak to the ability to create an inspection program to identify and repair cross connects and sources of inflow and infiltration.

**Moved by** Mayor Bondy

**Seconded by** Councillor Verbeek

## Background and Discussion

The Town of Essex owns and operates 3 separate wastewater collection systems, the Essex Wastewater Collection system, the Harrow Wastewater Collection System and the Colchester Wastewater collection system. Each system has a various number of sanitary mains, manholes and service connections. These **systems'** estimated statistics are displayed below in **Table 1**.

Table 1

Waste Water Collection System	Total Length of Sewer Mains (KM)	Total Number of Service Connections	Total Number of Manholes
Essex	39	3,238	516
Colchester	23	1,151	283
Harrow	21	1,205	287
<b>TOTAL</b>	<b>83</b>	<b>5,594</b>	<b>1,086</b>

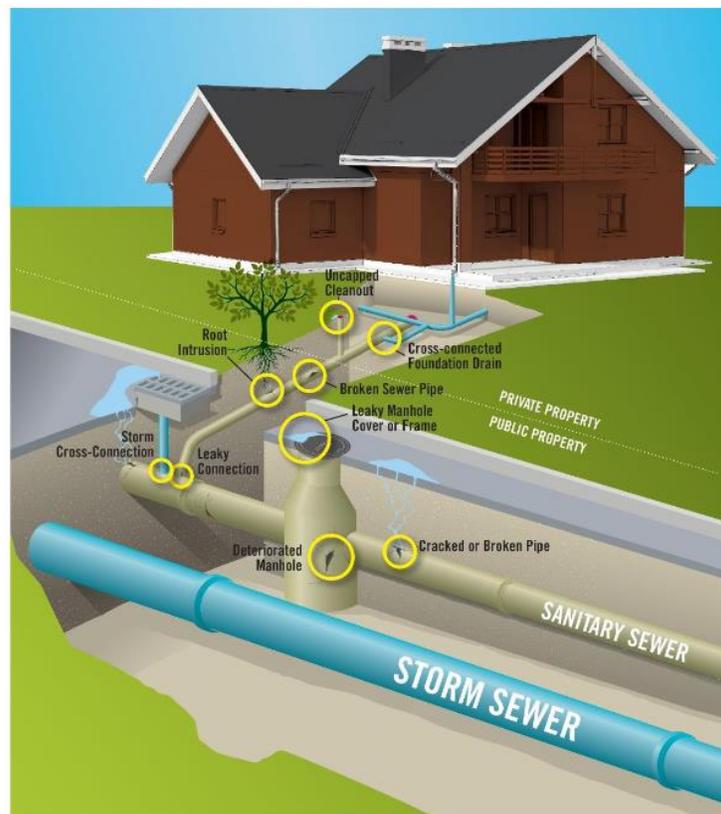
### Inflow & Infiltration (I&I)

Inflow and Infiltration is the term used when groundwater or storm water that should be makes its way into a sanitary sewer, where it does not belong. **Inflow** is stormwater that

enters the sanitary system through private property connections instead of the storm sewer such as down spouts, sump pumps, or foundation drains that are connected to the homeowner's sanitary system. **Infiltration** happens when groundwater enters the sewage system through damage or defects such as holes or cracks in manholes or sewer pipes. These sources are illustrated in **Figure 1**.

When an excess of water enters the sanitary sewer system, such as during a major rainstorm, it may cause the system to overload and sewage backups to occur, as these sewers are only designed to take on a marginal amount of extraneous flows from groundwater and storm water. This can ultimately lead to increased risk of basement flooding and private property damage. In addition, I&I also puts a strain on our wastewater treatment facilities, as the facility must treat a higher volume of water, resulting in increased operating, maintenance, and capital costs.

Figure 1



Managing stormwater is a large concern for municipalities, especially as extreme rainfall events continue to become more frequent and intense. These rainfall events can be taxing on a municipal sanitary sewage collection system and its ability to effectively pump, store and treat wastewater. The impacts of this increased rainfall are compounded by the fact that many residents have downspouts or sump pump/floor drains that are illegally connected to the sanitary system. These system discharge directly into the wastewater collection system and can cause sewage backup during extreme rainfall or wet weather events.

### **I&I Inspection Programs**

In the fall of 2023, the Environmental Services department created a Manhole Inspection program that would help identify sources of infiltration and aid the department in conducting necessary repairs.

This inspection program utilized our GIS system and allowed field staff to identify deficiencies at individual manholes. The entire sanitary systems of Harrow and Colchester were inspected between the months of October 2023 and January 2024. During these inspections, field staff **placed “inflow dishes” into manholes, which creates a watertight seal. The findings** from these inspections are displayed below in **Table 2**.

Table 2

Waste Water Collection System	Total Number of Manholes Inspected	Total Number of Inflow Dishes Installed	Number of Manholes where Surface Water Inflow Was Identified	Number of Manholes Where Groundwater Infiltration Was Identified
Harrow	282	202	13	13
Colchester	283	225	12	13

All manholes that were identified as having surface water infiltration have since been repaired, either by elevating the manhole frame above the flood zone or resetting and repairing the existing frame system.

All manholes that were identified as having ground water infiltration have been hydraulically grouted and sealed.

The Essex Centre collection system is currently scheduled to be inspected in the Fall of 2024.

This inspection program identifies I&I within the Town owned system(s) only. Identifying I&I from private property will need to be conducted utilizing industry methods such as Smoke/Fog testing and CCTV inspection programs. These programs can become quite costly and will need to be funded through capital budgeting, which is intended be addressed in the 2025 Operating Budget.

## **Public Education**

Public education, involvement and understanding the effects of I&I is vital to success.

Collaboration and involvement with property owners will be required to ensure our I&I program is successful. If illegal connections are identified, Town staff will work with property owners to understand the issue and what they can do to resolve the illegal connection.

Social Media messaging and water billing inserts will be utilized to inform and educate the public. The Town is also currently working on improving communication through a dedicated webpage describing I&I and their respective impacts on the Town and public.

## **Manhole Frame and Covers**

Manholes play a key role in the day-to-day operations of a wastewater collection system.

They serve as an access point for maintenance and inspection of the system, provide venting of sewer gas and can be utilized for debris removal. Manholes are fitted with a frame and cover for access. There are many different styles of frame and covers, ranging from Traditional, Ornamental and Water Tight.

Traditional manhole frames and covers are made of cast iron and are readily available from all manufacturers of cast municipal products. These covers are non-bolted and typically have 4 small square holes utilized for lifting the cover off for inspection/maintenance activities. These style of frame and covers are typically lower cost, provide easy access for operations staff and require minimal maintenance.

Traditional Frame and Covers are the style that is predominantly installed within all three collection systems and required through our Development Manual.

This style of frame and cover can allow surface water infiltration if installed in low lying areas or during times of heavy flooding. However, manhole “Inflow Dishes”, can be easily installed in this style of manhole, which provides water tightness and prevents water inflow through the cover. The installation of a “Inflow Dish” is a requirement in The Town of Essex’s Development Manual. An “Inflow Dish” is displayed in Figure 2 & Figure 3.

Figure 2



Figure 3



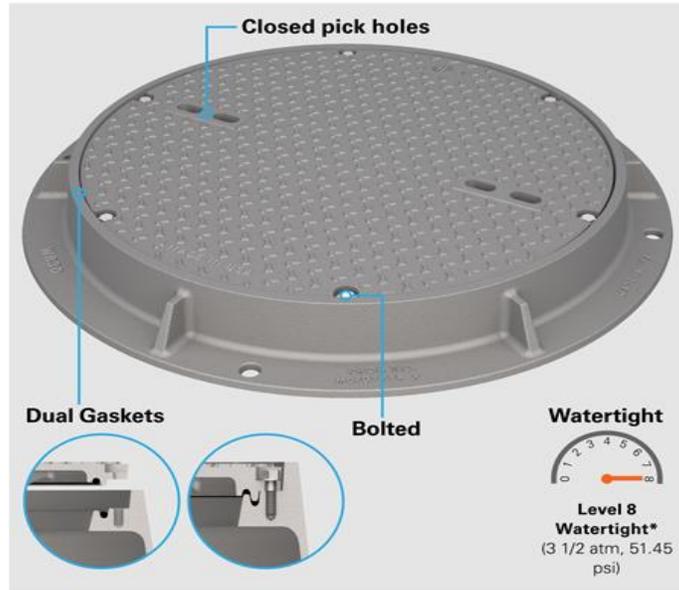
## Watertight Frame and Covers

Watertight frame and covers are made of cast iron and are readily available from select manufacturers of cast municipal products. These types of covers prevent discharges, protect against inflow, and suppress odors. This is achieved through a dual gasketed design, with a bolted cover, which creates a watertight barrier to contain manhole structures and prevent **inflow or overflow. Some manufacturers offer numerous classifications of “watertightness”,** the higher the rated level the more atmosphere pressure the frame and cover can withstand. The Watertight Frame and cover is displayed in **Figure 4.**

There are 6 watertight manhole covers installed in the Colchester Collection system, found in various locations around the waterfront. This style is currently not installed in any other collection systems, nor is it currently required through our Development Manual.

Watertight style frame and covers have a higher cost and require higher levels of maintenance in comparison to traditional frame and covers. System venting must be designed and managed properly when utilizing watertight manhole covers, which do not allow any venting. Operational staff must remove the bolts prior to removing the cover for inspections/maintenance. It is very common for the bolt holes to be filled with asphalt during road paving projects, road debris or salt deposits, which creates a higher level of maintenance and repairs. Great care must be taken to clean the gasket system prior to re-installing the cover to not risk damaging the gasket system and compromising the water tightness of the frame and cover.

Figure 4



## Regional Adoption

Three local municipalities were contacted regarding “Watertight” manholes being required into their Development manuals. All three municipalities polled require only traditional frame and covers and do not specify the installation of Watertight manholes.

## Costing

Watertight manholes range in pricing according to their Rating level. Pricing in materials can be volatile and can range from month to month. The pricing in **Table 2**, is representative of April 2024. This pricing is for supply of a frame and cover only, installation costs can vary depending on the installation location and additional site restoration costs. Typical manhole frame installations costs, with road restoration average \$4,000-\$5,500, not including the supply of the frame and cover.

Table 2

Frame Style	Supply Cost
Traditional Frame and Cover	\$510.00 + HST
Inflow Dish	\$85.00 + HST
Watertight Frame and Cover (No Rating)	\$670.95 + HST
Watertight Frame and Cover (Level 2, 7.35 PSI rating, 17 feet of water column)	\$1,486.25 + HST
Watertight Frame and Cover (Level 8, 51.45 PSI rating, 188 feet of water column)	\$1,649.20 + HST

**Summary**

Our inspection programs will use an adaptive management approach, meaning that as new industry information becomes available staff will make the necessary adjustments and integrate them into our programs and strategy. This program will evolve with a focus on continuous improvement. It is important to emphasize that I&I rates will never equal zero and that a continued focus will be required.

**Financial Impact**

There are no financial impacts as a result of this report. However, it should be noted that ongoing I&I efforts have been undertaken annually and are funded from the annual wastewater operating budget. Further, that any future projects related to I&I will be communicated to Council through the annual budget process for approval.

## Consultations

Kevin Girard, Director, Infrastructure Services

### Link to Strategic Priorities

- Embrace asset management best practices to build, maintain, and continuously improve our municipally owned infrastructure.
- Leverage our Town’s competitive advantages to promote jobs and economic investment.**
- Take care of our natural environment and strengthen the sense of belonging to everyone **who makes Essex “home”**.
- Deliver friendly customer service in an efficient, effective, and transparent manner while providing an exceptional working environment for our employees.
- Build corporate-level and community-level climate resilience through community engagement and partnership and corporate objectives.

## Report Approval Details

Document Title:	Sanitary Inflow and Infiltration Reduction Strategy - Environmental Services-2024-03.docx
Attachments:	
Final Approval Date:	Jul 8, 2024

This report and all of its attachments were approved and signed as outlined below:



**Kevin Girard, Director, Infrastructure Services - Jul 8, 2024 - 1:04 PM**



**Doug Sweet, Chief Administrative Officer - Jul 8, 2024 - 1:43 PM**