



Date: December 11, 2023
To: Mayor and Council
Author: Shaun Martinho, Director of Public Operations
RE: August Extreme Weather Event Summary Report

RECOMMENDED ACTION

That Administration **BE DIRECTED** to:

1. Prepare a By-law establishing a compliance and inspection program for private greenhouse wastewater systems connected to public infrastructure, inclusive of an appropriate fee schedule and fines for non-compliance; and,
2. Prepare a By-law, or amendments to existing By-laws, for regulating the use of public and private sewer systems, inclusive of an appropriate fee schedule and fines for non-compliance.

BACKGROUND

A significant storm event, with extreme amounts of rainfall, impacted our region beginning August 23 and ending August 25, 2023. Intense rainfall over a short period of time caused widespread flooding across the southern portions of Essex County. The Town's drainage systems were overwhelmed with water resulting in overland flooding. A significant number of Kingsville homes were damaged by the resulting flood waters and surcharged municipal sewers.

A one-in-one hundred-year rain event has a probability of occurrence of one percent during any given year and is equivalent to 115mm of rainfall in 24 hours. The August storm was very unusual, with some areas of Kingsville receiving as much as 214 mm of rain. At its peak, on August 24, instrumentation at Jack Miner recorded 73 mm of rain in a single hour.

The Town has historically planned and constructed public infrastructure based on geography, regional climate, and population. However, with the increasing frequency and intensity of extreme weather events brought on by climate change, administration must take steps to minimize the damaging consequences of these storms by building robust infrastructure that meets the needs of residents today and into the future.

During the storm, there were numerous reports from residents that sanitary effluent was flooding basements in Ruthven and the Cedar Beach Area. Town staff responded and

determined that the Ruthven Sanitary Collection System was surcharged with stormwater and worked diligently through the storm to pump down the sanitary system to minimize property damage. Since then, administration has spent significant time gathering information, inspecting infrastructure, and working with various stakeholders to determine possible causes. Investigations consisted primarily of the following three activities:

- Retaining contractors to complete flushing and video of the collection systems to assess pipe condition.
- Completing maintenance hole inspections to ensure these access points are watertight.
- Retaining the Ontario Clean Water Agency (OCWA) to complete Inflow and Infiltration Reduction Studies to identify sources of rainwater entering the sanitary sewers (These studies involve blowing a harmless white vapor into sewer maintenance holes and piping and determining if there are any unexpected areas where smoke exits the system).
- OCWA completed an assessment of all the sanitary sewer pump stations and force mains that convey wastewater to Kingsville's Sewage Treatment Plant.

Some investigations are still ongoing or planned due to competing interests for contracted services in our region. However, administration believes that there is sufficient information to report on complications that arose during the storm.

DISCUSSION

To determine the extent of infiltration of rainwater into sanitary system, a review of flows at Kingsville's Treatment Plant and the Sanitary Lagoons was completed. The flowing data was gathered:

Site	Average Daily Flow	August 24 Flow	Percent Increase
LW Treatment Plant	4820 m3	14,747 m3	206%
Kingsville Lagoons*	1399 m3	11664 m3	733%
Cottam Lagoons	767 m3	3686 m3	380%

Kingsville lagoons are not used as a primary means of sewage treatment and are only used to by-pass the treatment plant during emergencies. Pump Station #1 and #2 were by-passing to the Kingsville Lagoons during the storm resulting in an artificially high increase over average daily flow rates. However, these figures provide conclusive evidence that rainwater entered the sanitary collection system during the storm. Inflow and infiltration into sanitary systems is not unique to Kingsville. For example, flows at neighbouring treatment plants during the storm were 350% to 1225% above average daily flows.

The Town initiated a sewer separation program around 2009, separating stormwater from wastewater infrastructure. The primary objective of this program was to increase capacity at the treatment plant and reduce instances of wastewater overflow into waterways. It also resulted in most of Kingsville's buried infrastructure being upgraded to modern materials like PVC. Kingsville's infrastructure is in good condition compared to other municipalities that have not completed their sewer separation programs. However, the unusual rainfall on August 24 exposed vulnerabilities in Kingsville's collection system that are not typically impacted by standard local weather conditions.

The Town received requests for assistance from residents who had wastewater in their basements from two areas in Kingsville. An investigation was initiated to assess local buried infrastructure, and it revealed the following results:

Cedar Beach Collection System

Residents on Catalina Ct and Montego Bay Ct reported sanitary sewage, mixed with stormwater, in their basements. This subdivision was developed between 1997 and 2002 and the sewers were constructed using PVC piping. Following the storm, the Town received Basement Subsidy Applications for backwater valves from five residences on Catalina Ct and twelve on Montego Bay Ct.

Maintenance Hole Inspections

Environmental Services completed maintenance hole inspections along Heritage Road and near Cedar Beach (136 manholes). They discovered frames and covers in this area that were dislodged and offset from the access holes below. Overland flooding from nearby farmland and on roadways is suspected to have entered the sanitary collection system at these locations. This would have resulted in the inflow of large amounts of rainwater. Town staff will work to repair these deficiencies to make these access points watertight.

CCTV Sewer Video

Sanitary and storm sewers on Heritage Road, in Cedarhurst Subdivision, and on Cedar Island were recently videoed in advance of capital project works. There were no deficiencies discovered in the collection system that could be correlated to surcharging of the collection system during the storm.

Inflow and Infiltration Reduction Studies (2020)

Testing revealed over 40 point sources of rainwater from private property, which included broken cleanout caps, cross-connected eaves trough downspouts, and improperly connected floor drains and catch basins. Currently, *By-law 80-2004 Being a By-law regulating the Use of Public and Private Sewer Systems* gives the municipality the authority to inspect sanitary connections on private property and compel residents to repair defects within a specified time. If the property owner fails to complete the work,

the By-law gives the Town the right to complete the repair and add the associated costs to the owner's property taxes. Public Operations will need to work with Building and By-law to issue letters to residents advising them of the cross-connection and assist them in becoming compliant with this By-law. Given the age of this By-law (2004), Administration is recommending the preparation of a new By-law respecting the same, to ensure the language, references, and practices are current.

Pump Stations

OCWA reported that all the sanitary pump stations in this area were working as designed and running at full capacity throughout the storm. The stations were checked continuously by staff throughout the storm and at no time were there faults or service interruptions.

Ruthven Wastewater Collection System

Road 2 E and Noah Ct residents reported sanitary sewage, mixed with stormwater, in their basements. This subdivision was developed between 2007 and 2012 and the sewers were constructed using PVC piping. Following the storm, the Town received Basement Subsidy Applications for backwater valves from two residences on Road 2 E and four on Noah Ct. However, in this case, witnesses reported effluent overflowing from maintenance access points on County Road 34 and on Road 2 E in the vicinity of the Ruthven Pump Station. Town staff responded to the emergency and reported that the sanitary collection system in Ruthven was completely surcharged. During and after the storm, contracted vacuum trucks were hired to supplement the pump station and aid in pumping the system down. This response probably resulted in reduced basement flooding and private property damage in Ruthven.

Maintenance Hole Inspections

Maintenance hole inspections in Ruthven are ongoing, with about 40 of 120 completed and no issues found. A large majority of these maintenance holes are in urban areas. They're located on roadways, making deficiencies much more unlikely in Ruthven when compared to Heritage Road. They are not suspected to be a significant source of rainwater in the Ruthven sanitary system.

CCTV Sewer Video

Flushing and video of the entire Ruthven Collection System were completed immediately following the storm in early September. Aside from minor deficiencies, no issues were found within the piping system.

Inflow and Infiltration Reduction Studies (2023)

Testing revealed over 40 point sources of rainwater from private property, which included broken cleanout caps, cross-connected eavestrough downspouts, and

improperly catch basins, and other issues. As noted above, the Town will need to enforce *By-law 80-2004 Being a By-law regulating the Use of Public and Private Sewer Systems* to ensure these deficiencies are corrected.

There are 22 greenhouse operations with sanitary connections tied into the Ruthven wastewater collection system. Most of these Greenhouses are far from Ruthven and pump their sanitary effluent long distances through force mains installed in the Municipal right-of-way and that outlet into Town-owned gravity sewers. For greenhouses to discharge more than what would be deemed "Domestic Sewage" they must meet wastewater quality and quantity parameters specified by the Town. These parameters include specific discharge rates and times and other quality control parameters such as nutrient load.

To ensure accurate billing, most of the greenhouse connections are metered. Administration completed a review of flows during the billing period that overlapped the storm and noted higher-than-usual average flows. For example, one operation saw a 161% increase in effluent flow compared to the same billing period in 2022.

Furthermore, wastewater with uncharacteristically high nutrient loads has been arriving at the treatment plant. Since 2015, expenses for chemicals to remove nutrients like nitrogen and phosphorus have more than doubled (\$60,000.00 to \$160,000.00). Treating this effluent erodes plant capacity because it is more difficult to remove these contaminants to meet the conditions of the Town's ECA for treated wastewater.

Some greenhouse operations have taken the initiative and have worked with OCWA to set up quality control programs, but an inspection program with municipal oversight needs to be created. In the future, the Town will need to complete a macro-level review of the impact of these connections on supporting wastewater infrastructure. Administration has already begun conceptualizing an inspection and compliance program, and it is recommended that the Town's sewer use by-laws be updated to include penalties for non-compliance.

Ruthven Pump Station

The Ruthven Pump Station is designed to pump wastewater through a sanitary force main that runs 6.5 km down the Chrysler Greenway, out-letting into a gravity sewer on Heritage Road. The forcemain has seven air relief valves that expel air as wastewater travels through the pipe. In 2023, the average daily hours the Ruthven Pump Station was active was only 8.25 hours, indicating that there is still additional capacity under dry weather conditions.

In 2020, during a period of high flows due to wet weather, OCWA staff received a high-level alarm from the Ruthven Pump Station. Investigations revealed that the pump was operating below the designed release rate of 50 l/s (27 l/s). It was discovered that the seven air relief valves along the force main had become plugged with solids, causing an airlock, which prevented the free flow of wastewater in the main. A review was

completed, and OCWA recommended upgrading the valves. Administration approved the purchase, and they were installed in late 2020. After the valves were replaced, no issues regarding pump station performance were reported by OCWA until the August storm.

Pumping under the fully charged conditions seen during the storm only resulted in a peak pump rate of 31 l/s. Dillon Consulting Limited was retained to investigate the cause and determined that an “Air Bubble Obstruction” in the length of forcemain between the pump station, and the highpoint of the forcemain, limits pump performance and flow rates. They have proposed two solutions to rectify the issue:

Phase 1 Air Management: an additional air relief valve is recommended between the magnetic flow meter and the forcemain high point to promote rapid removal of the accumulated air under pump pressure. This is currently being completed through operations, and pump performance will be reassessed after installation.

Phase 2 Water Column Management: adding two sewage pressure sustaining valves on the forcemain at existing chamber locations. The purpose of the valves is to prevent free draining of the system between pump cycles to limit air admission into the piping. The estimated cost of this work is approximately \$150,000.00 which was included in the 2024 Capital Budget.

Summary

Sewer systems cover large geographical areas, they contain mechanical components such as pumps and floats, and they're used by many residents. It is important that these systems are designed for current and future use, and to ensure diligent maintenance is completed for peak performance. To date, Kingsville's infrastructure has been designed for the environmental conditions typical of Southwestern Ontario. The primary cause of the issues experienced with Kingsville's sewer systems was the overwhelming amount of rain which occurred during this storm.

FINANCIAL CONSIDERATIONS

The storm resulted in several unplanned wastewater operational expenses including:

- \$13,406.00 in vacuum truck expense to pump down the Ruthven System during the storm.
- \$24,768.00 in CCTV expenses for investigations after the storm.
- \$8601.00 in additional garbage collection expenses.
- \$13,500.00 for inflow and infiltration reduction studies.

Total costs incurred to date related to the storm are \$55,218.00. Investigations are ongoing, but additional expenses are expected to be at most \$20,000.00 and will be captured in the operations budget. Future capital works related to the Ruthven

Wastewater Collection System will be considered later and expensed in accordance with the Town's Procurement By-law.

ENVIRONMENTAL CONSIDERATIONS

Extreme weather events related to climate change will require the municipality to implement more diligent maintenance programs and to design infrastructure that is more resistant to extreme weather events like the one that occurred this August.

CONSULTATIONS

Department of Planning and Development
Ontario Clean Water Agency
Dillon Consulting Limited

PREPARED BY:



Shaun Martinho, HBSoc., MBA
Director of Public Operations

REVIEWED BY:



John Norton
Chief Administrative Officer