City of Windsor
SEWER
MASTER PLAN

Welcome to
Public Information Centre No. 1

Presented by:
DILLON CONSULTING
Project Overview

The City is completing a Sewer Master Plan to:

• Better understand the causes of basement & surface flooding;
• Identify the range of ways we can reduce the impacts and risks of flooding in the short-term and over the longer term; and
• Prepare an implementation strategy for City of Windsor Council consideration.

Tonight’s PIC No. 1

This is the first of two planned Public Information Centres for the project. At this event you can visit:

• Station 1: Project Overview
• Station 2: Learn about Flooding
• Station 3: Preliminary Problem Identification
• Station 4: Short-Term Alternative Solutions

Ask questions and provide the team with your input
Mayor’s 8-Point Plan

Following the August 2017 storm, Mayor Dilkens released an 8-point plan aimed at addressing flooding in Windsor.

The Sewer Master Plan integrates and forms a key part of the 8 elements in the Mayor’s Plan.

1. Review development policies and the impact of development on sewers.
2. Fund 100% of the installation cost of backflow valves and sump pumps.
3. Consider adding weeping tile disconnection to the Basement Flooding Protection Subsidy program.
4. Consider adding sewage ejection pumps to the Basement Flooding Protection Subsidy program.
5. Implement a mandatory downspout disconnection policy.
6. Expedite the Riverside Vista project between St. Rose and Ford Blvd.
7. Strongly urge the province to establish an affordable flood insurance program and to make the Disaster Recovery Assistance program available to homeowners with sewer backup.
8. Expedite completion of the Sewer Master Plan.
Problem & Opportunity Statement

The City of Windsor has experienced basement and surface flooding that resulted in property damage and disruption to the community.

This flooding generally results from significant storm events, which bring more water than our creeks and sewers have the capacity to manage.

The City is undertaking a Sewer Master Plan to identify specific problems and explore achievable measures to reduce the risks and impacts of flooding by identifying and evaluating the following:

• **Shorter-term** solutions that can reduce the amount of water going into our creeks and sewers, including partnering with homeowners to protect against the impacts of flooding; and

• **Longer-term** solutions to improve the sewer systems by increasing their capacity and/or identifying temporary storage measures.
Sewer Master Plan Study Process

- The study is following the requirements of the Municipal Class Environmental Assessment (EA), Master Plan Process (Approach No. 2)
- Public and agency input is integrated into the Class EA process
Key Engagement Activities

Earth Day Pop-up
• Over 100 people learned about the project at the Weathering the Storm booth

Stakeholder Advisory Committee

Interactive Website

Project Notifications

Public Information Centres

• PIC No. 1: Short-term Alternative Solutions
• PIC No. 2: Long-term Alternative Solutions

Partners for Action Survey
• Over 300 people provided survey input valuable to the project

Tell us your ideas on how to inform/invoke the community.
Add your ideas below with sticky notes:
Stakeholder Advisory Committee

A Stakeholder Advisory Committee has been formed to provide diverse perspectives on the project as it proceeds.

The Stakeholder Advisory Committee will provide insight, advice and feedback on:

- The impact of flooding on the community;
- Key issues related to the Sewer Master Plan;
- Evaluation criteria, potential solutions and mitigation of community concerns; and
- Opportunities to increase public engagement and awareness.
Stay Informed and Involved

Stay involved and provide your feedback....

Visit us 24/7 at weatheringthestorm.ca to:
• Follow the project
• Provide input & ask questions

Email us at: info@weatheringthestorm

Or mail a letter to the project team:

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Sign-up to our contact list to receive updates on future events

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Twitter: @CityWindsorON
What Causes Flooding?

Conditions that may result in flooding

- High intensity, short duration, or long duration **rainfall events** that produce high runoff and infiltration.
- **Saturated or frozen ground conditions** that result in more runoff.
- **Snowmelt**, including **ice blockage** that may limit drainage.
- **Shoreline flooding** from high lake and river levels.

Where does the rain go? It can:

1. Vaporize into the atmosphere = **Evaporation** and **Evapotranspiration**.
2. Soak into the ground through pervious surfaces like grass or soil = **Infiltration**.
3. Flow overland into creeks and sewers = **Runoff or overland drainage**.
4. Stay temporarily in lower-lying areas = **Depression storage or overland storage**.
What Causes Basement Flooding?

There are 3 major causes of basement flooding:

1. **Overland flooding** caused by a more intense rainfall than the sewer can manage or by improper grading, that results in surface water entering homes through windows, doors, etc.

2. **Groundwater infiltration** caused by groundwater entering the basement through cracks in the basement walls and floor, or by weeping tiles/foundation drain flows that exceed the sump-pump capacity.

3. **Sewer backup** caused by excess flows, infiltration and improper connections that contribute more flows than the sanitary and combined sewer systems were designed for, resulting in water surcharging through the home’s sanitary plumbing (floor drain, shower drain, etc.)
Mitigating Basement Flooding Risk

There are many ways a homeowner can reduce their risk of basement flooding, including:

- Repair cracks in your basement walls and floors
- Install a Sewage Ejector Pump (with Battery backup) to prevent backup from Sanitary Sewer Lateral
- Remove debris around your home
- Install a backwater valve to prevent back up from floor drains
- Grade your lot and landscape to promote water runoff away from home
- Inspect, repair, and maintain your sewer connection
- Add a cover to your basement window well
- Disconnect foundation drains from Sanitary plumbing
- Install a sump pump
- Disconnect your downspout
- Overland Flooding Measures
- Groundwater Infiltration Measures
- Sewer Backup Measures
Flooding Considerations

Thousands of Windsor residents have been impacted by flooding, including the recent major storms of 2016 and 2017. Last year’s storm alone dumped 220 millimetres of rain in 48 hours, which resulted in more than 6,600 homes being flooded.

*Flooding assessment in Windsor is complex.*

To address the risk of flooding, various factors need to be considered, including:

1. River & Lake water levels, ground elevation, and capacity of receiving creeks and rivers
2. Rainfall amount, duration and distribution
3. Ground cover, soil type and soil moisture conditions
4. Storm and sanitary drainage design criteria and level of service
5. Climate change

*These factors are described in the next panels.*
FLOODING CONSIDERATIONS

1. River & Lake Water Levels, Ground Elevations and Receiving Watercourse Capacity

Ground Elevations:
The central portion of the City is as much as 15 m (about 50 ft) higher than lands to the east and west.

Stormwater runoff from higher elevation areas can generally be managed by gravity measures.

River and Lake Water Levels:
To help drain lower-lying areas, the City has introduced the following strategies:
- Pump Stations
- Temporary Storage
- Barrier landforms (including the Ganatchio Trail and Little River Dykes) to protect low-lying areas from high River and Lake levels.

Capacity of Receiving Watercourses:
The capacity and water levels of receiving creeks and rivers (Little River, Grand Marais Drain, Lennon-Cahill Drain, Detroit River, etc.) will influence the range of solutions available for flood relief measures.
FLOODING CONSIDERATIONS

2. Rainfall Amount, Duration and Distribution

What is a 100 Year Storm?

- A “1 in 100” year storm means that there is 1% risk (1 in 100 chance) that a storm of this size will occur in any year.

- The 1 in 100 year storm is a significant storm event that is currently used as a design standard for overland drainage systems.

- In the last 70 years, Windsor experienced three storm events with a greater volume of rainfall than a 1 in 100 year storm – 1957, 2016 and 2017.

Storms vary across the City

- The total rainfall during the August 2017 storm varied across the City from 73 mm to over 200 mm.

<table>
<thead>
<tr>
<th>Year</th>
<th>Rainfall (mm)</th>
<th>Duration (Hours)</th>
<th>12 Hr Design</th>
<th>24 Hr Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>1957</td>
<td>100</td>
<td>12</td>
<td>99</td>
<td>108</td>
</tr>
<tr>
<td>2016</td>
<td>116</td>
<td>24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2017</td>
<td>220</td>
<td>48</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Historic Storms (>1:100 Year) 1:100 Year Design Storms

Riverside Drive; August 29, 2017
FLOODING CONSIDERATIONS

3. Ground Cover, Soil Type and Soil Moisture Conditions

Ground conditions can significantly impact the volume and rate of runoff produced from a rain event.

- Hard, impervious surfaces (like pavement) allow limited infiltration and have less depression storage, and therefore result in more runoff than pervious surfaces (like grass and soil).

- The amount of water that can soak into the ground (i.e. infiltration capacity) varies based on the type of soils. Most of Windsor consists of clay soils, which have low infiltration rates (see map below).

- Soil moisture conditions also affect the amount of water that can soak into the ground, affecting the volume and rate of runoff.

[Map of Windsor Soil Coverage with Detroit River and various soil infiltration rates indicated]
FLOODING CONSIDERATIONS

4. Storm Drainage Design Criteria & Level of Service

Sewer Drainage Design (Minor System)

Storm and combined sewer systems are currently designed to convey the 1:5 year design storm with no surface flooding.

Storm Pump Stations also work to limit surface (roadway) ponding to less than 0.30 m in larger 1:100 year storms.

Overland Drainage Design (Major System)

Overland Drainage Systems (roadways, low lying areas) are currently designed to reduce the amount of water from a 1:100 year storm to a surface ponding depth of less than 0.30 m.

Proposed Level Of Service

Storm Drainage (Public Right-of-way)

<table>
<thead>
<tr>
<th></th>
<th>Existing Developed Areas</th>
<th>New Development</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• 1:2 year to 1:5 year storm <strong>Goal: Reduce</strong> any existing surface flooding</td>
<td>• 1:5 year storm <strong>Goal: No</strong> surface flooding</td>
</tr>
<tr>
<td></td>
<td>• 1:100 year storm <strong>Goal: Reduce</strong> surface flooding to less than 0.3 m, <strong>where practical</strong></td>
<td>• 1:100 year storm <strong>Goal: No more than 0.3 m surface flooding depth (parking and roadways)</strong></td>
</tr>
<tr>
<td></td>
<td>• Climate Change <strong>Goal: Enhanced/variable level of service for higher-risk areas</strong></td>
<td>• Climate Change <strong>Goal: Enhanced/variable level of service for all new development</strong></td>
</tr>
</tbody>
</table>
FLOODED CONSIDERATIONS

4. Sanitary Drainage Design Criteria & Level of Service

**Sanitary Sewage Flows** are made up of waste water discharge from domestic uses and an infiltration flow component:

**Domestic Sewage Flows** are determined by:
- Average design sewage flow rate based on land-use (e.g. residential or employment land uses)
- Total population
- Other land-use variable (e.g. floor area, time of day differences)

**Infiltration** flow is determined by:
- Average infiltration rate (e.g. it is common for some water to enter sewers through pipe cracks)
- Total area

**Sanitary sewers are NOT designed to convey:**
- Surface water entering through Manhole Covers or other surface drains.
- Improper building Foundation Drain connections.
- Improper Roof Downspout connections.
- Improper Cross-connections from the storm system.

**PROPOSED LEVEL OF SERVICE**

**Sanitary Drainage**

**Goal:** Reduce **surcharging** in sanitary sewer system to a **reasonable/practical degree**.
- To be confirmed based on further understanding of sources of extraneous flows.

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**KEY INfiltration SOURCES: INTOW SOURCES**
- $RISK$
5. Climate Change

Climate change is the shift in weather patterns associated with an increase in global average temperatures. In Windsor, climate change appears to be increasing the intensity and severity of storms and flooding.

Though these climate change shifts may not be well-defined, the Sewer Master plan will look at ways to make our drainage infrastructure resilient to potential changes in more frequent and significant storms.
City-Wide Sewer and Overland Drainage Model

A computer software model was developed to represent the City’s sewer and overland drainage systems. The software model will help us understand the effectiveness of alternative solutions in reducing flooding risks.

The model includes:

• Over 690 km of storm sewers
• Over 550 km of sanitary sewers
• Over 190 km of combined sewers
• Over 11,000 ha of overland drainage area
• Over 40 Pumps Stations
• Over 30 Stormwater Management Ponds
Comprehensive Approach to Flood Risk Reduction

A comprehensive approach to reducing the risk of flooding must involve both:

A. Homeowner Protection Measures; and
B. Public (Right-of-Way) Infrastructure Improvements.

A partnering approach with the community
A. Homeowner Protection Measures

Existing City Programs to Help Homeowners

*The City has a number of existing programs. The Sewer Master Plan will consider ways to build on these programs.*

1. Basement Flooding Protection (BFP) Subsidy Program:

<table>
<thead>
<tr>
<th>Eligible Works</th>
<th>Available Subsidy</th>
<th>Maximum Combined Subsidy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Install backwater valve(s)</td>
<td>$ 1,000.00</td>
<td></td>
</tr>
<tr>
<td>Install sump pump with overflow and disconnect foundation drains to floor drains</td>
<td>$ 1,750.00</td>
<td></td>
</tr>
<tr>
<td>Install only sump pump overflow to discharge outside to surface</td>
<td>$ 300.00</td>
<td>$ 2,800.00</td>
</tr>
<tr>
<td>Install backwater valve and sump pump with sump pump overflow</td>
<td>$ 2,800.00</td>
<td></td>
</tr>
<tr>
<td>Disconnect foundation drains from floor drain and/or dye testing and camera work as required</td>
<td>$ 400.00</td>
<td></td>
</tr>
</tbody>
</table>

For more details see:
https://www.citywindsor.ca/residents/maintenanceandfieldservices/Sewers-/Sewers.aspx
OR
For general information, call 311.
A. Homeowner Protection Measures

Existing City Programs to Help Homeowners (cont’d)

2. Private Sewer Replacement Program:
   • The City offers a rebate of up to 50% of the cost for replacement of your private sewer laterals (drain connections).

3. Rain Barrel Conservation Project:
   • Rain barrels are available for purchase from the City (At the Ojibway Nature Centre).

4. Downspout (Eavestrough) Disconnection:
   • The City provides a downspout disconnection service to its residents free of charge.

5. Public Education:
   • The City’s website provides information related to flooding and flood protection.

For more details about the City’s existing programs visit:
• https://www.citywindsor.ca/residents/maintenanceandfieldservices/Sewers-/Sewers.aspx
OR Call 311 for general information and 519-255-6257 for detailed inquiries
A. Homeowner Protection Measures

Short-Term Alternative Solutions

The following additional short-term solutions are being considered in the Sewer Master Plan:

1. Support the Enhancements outlined in the Mayor’s 8-Point Plan:
   - Fund 100% of the installation of backflow valves and sump pumps, including the disconnection of weeping tiles from the sanitary sewer system.
   - Add a subsidy to include the use of sewage ejector pumps as an alternative to backwater protection valves.

2. Green Infrastructure / Low Impact Development (LID) measures:
   Use LIDs to promote infiltration, provide storage and reduce site-specific runoff. Examples include:
   - Permeable pavers
   - Enhanced swales
   - Rain gardens (or bio-retention systems)
   - Trench drainage/exfiltration system, including perforated pipe systems and soak-away pits
A. Homeowner Protection Measures

Short-Term Alternative Solutions (cont’d)

The following additional short-term solutions are being considered in the Sewer Master Plan:

3. Window Well Protection:
   • Protect window wells from surface water with guards.

4. Back-up Power and Pump Capacity:
   • Use back-up power supplies for sump pumps and sewage ejector pumps.
   • Increase sump pump capacity.

5. Lot Grading:
   • Improve grading by providing positive drainage away from the home.

6. Other Household Management Strategies:
   • Minimize water use during major storms.
   • Limit storage of valuable items in the basement (i.e. items that could be damaged by flooding).
   • Consider leaving your basement unfinished or use more resilient materials (i.e. tile compared to carpet).
   • Regularly maintain private flood protection measures.
A. Homeowner Protection Measures

Short-Term Alternative Solutions (cont’d)

The following additional short-term solutions are being considered in the Sewer Master Plan:

7. Sewage Ejector Pumps:
   - Consider mandating the use of sewage ejector pumps for basement plumbing in all new developments.

8. New Municipal Policies:
   Consider new municipal policies that reduce the risk of flooding, some of which are identified in the Mayor’s 8-Point Plan:
   - Mandatory downspout disconnection
   - New development policies to reduce runoff from private properties, including:
     - Limit the % of allowable impervious (hard) surfaces
     - On-site water balance (volume storage) requirements
   - Stormwater surcharges and green infrastructure credits.
   - By-laws that allow the City to enforce plumbing standards and sewer use requirements.
Provide Your Input on Short Term Solutions

Please provide your input on the existing City flood protection programs and the short-term alternatives being considered.

• What do you think about the short-term alternatives?
• Are there any other alternatives that should be considered?
• Would you consider implementing the homeowner protection measures? (Tell us here or on your comment form)
• What information do you need to help you decide whether to implement these short-term solutions?

Add your ideas below with sticky notes.
B. Public (Right-of-Way) Infrastructure Improvements

Existing City Programs

*The City has invested approximately $500 Million in public sewer infrastructure since 2001, and is continuing to invest. In addition, the City invests in the following programs:*

1. **Electrical Eel Service, or Eeling Program:**
   - The City will provide an eel cleaning service to clear the drainage connection from buildings to the sewer up to three times in any 24-month period.
   - Service is free, provided the lateral service is blocked by tree roots.

2. **Ditch/Drain Maintenance:**
   - Property owners are encouraged to call 311 immediately if they witness a blockage of a ditch or drain.

3. **On-going Investigation to Confirm Improper Sewer Connections:**
   - Smoke and dye testing.
   - Video camera inspection of sewers.
B. Public (Right-of-Way) Infrastructure Improvements

Short-term Alternative Solutions

The Sewer Master Plan will consider the following short-term alternative solutions for use in the public Right-of-Way:

1. **Inlet Control Devices (ICD):**
   - Expand the use of ICDs to restrict catch basin flows to the storm sewer system, where appropriate.

2. **Sanitary Rain Catchers or Plugs:**
   - Eliminate overland flow from entering the sanitary system through manhole covers.

3. **City’s Storm Water Management (SWM) Design Standards:**
   - Review level of service standards and design criteria.
   - Update requirements for use of design tools and software.
   - Consider climate change resiliency and vulnerability in developing sustainable solutions.
How Should We Decide?

What is important to the community when we make decisions on what alternatives to include in the Sewer Master Plan.

What should be considered when selecting alternative solutions?

Do you have any comments on the type of goals that should be considered for the level of service of the City’s sewer system?
Do you consider certain land uses or buildings to be more vulnerable or sensitive to flooding and would therefore warrant a higher level of service?

Add your ideas below with sticky notes.
What’s Next – Long-Term Alternative Solutions

Long-term public right-of-way alternative solutions will be developed in the next stages of the Sewer Master Plan. Information on long-term solutions will be presented at the next Public Information Centre in the Spring of 2019.

In general, these long-term alternative solutions will consist of:

1. **Increased Conveyance and Outlet Capacity:**
   - Increase sewer, open drain or major system (roadway) conveyance capacity.
   - Increase pump station capacity.

2. **Green Infrastructure / Low Impact Development (LID) Measures:**
   - Permeable pavers
   - Enhanced or vegetated swales
   - Bio-swales
   - Perforated pipes
   - Rain gardens or bio-retention
   - Exfiltration trenches

3. **Surcharge storage systems:**
   - Underground and surface storage systems for managing storm and sanitary surcharge conditions.
What’s Next?

- Continue building the model to confirm problem areas
- Test the effectiveness of short-term solutions
- Develop and evaluate long-term alternative solutions
- Prepare for Public Information Centre No. 2 in Spring 2019