



The Corporation of the Town of Tecumseh

Public Works & Environmental Services

To: Mayor and Members of Council

From: Phil Bartnik, Director Public Works & Environmental Services

Date to Council: June 26, 2018

Report Number: PWES-2018-17

Subject: Flood Mitigation Strategy

Recommendations

It is recommended:

That the Public Works & Environmental Services Report PWES-2018-17, titled “Flood Mitigation Strategy,” **be received.**

Background

The Town of Tecumseh has recently experienced major rainfall events on September 29, 2016 and August 28, 2017 which inundated the normal operating capacities of the storm sewer system. As a result, street flooding occurred in low lying areas which increased the opportunity for storm water to enter the sanitary sewer system. In addition, storm water entered the sanitary system through inflow and infiltration routes, which in turn, caused the sanitary system to surcharge simultaneously.

Recent Rainfall Events

Using data from independent rain gauges monitored by Weather Underground located in Tecumseh, the following rainfall was observed:

September 29, 2016 Rainfall Event

- **220** mm of rain fell in the 24 hours between 6:00 p.m. September 28, 2016 and 6:00 p.m. September 29, 2016.
- 195 mm of rain fell in the 12 hours between 12:00 midnight and 12:00 noon on September 29, 2016.
- 175 mm of rain fell in the six hours between 6:00 a.m. and 12:00 noon on September

29, 2016.

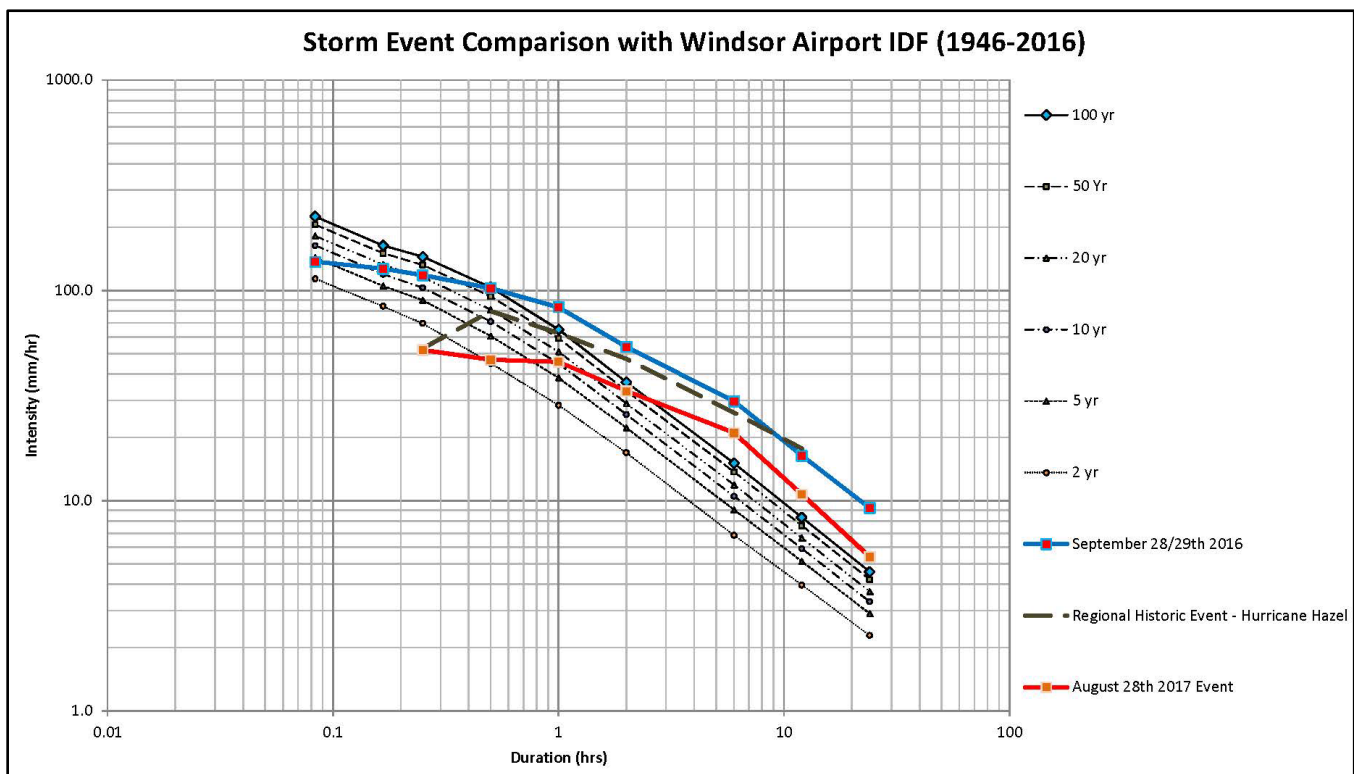
- 110 mm of rain fell in two hours during an intense period of the storm, between 8 a.m. and 10 a.m. on September 29, 2016.

August 28, 2017 Rainfall Event

- **129 mm** of rain fell in 11 hours between 1:00 p.m. and 12:00 midnight on August 28, 2017.
- 126 mm of rain fell in the six hours between 6:00 p.m. and 12:00 midnight on August 28, 2017.
- 94 mm of rain fell in 3.5 hours between 7:00 p.m. and 10:30 p.m. on August 28, 2017.

A rainfall event is typically classified according to its frequency of occurrence. Classifying the event considers various factors such as the duration and intensity of the rainfall, as well as the amount of accumulation. Rainfall frequency return periods typically are established through statistical review of rainfall events. The average rainfall intensity over a given time can also provide the expected return period noting that a short duration and high intensity rainfall can be characteristic of a 1:100 rainfall event as can be a longer rainfall event with a moderate rainfall intensity. In other words, a 1:100 year rainfall event is a relatively abnormal event as it has a 1 out of 100 chance of occurring every year. The Ministry of Environment and Climate Change (MOECC) Design Guidelines for Sewage Works identifies a minimum return frequency for storm sewer design is 1:2 or 1:5 year rainfall events for which the Town’s storm sewers are designed to. This is the standard practice throughout Ontario.

Both of the aforementioned rainfall events exceeded the 1:100 year return frequency and have been plotted on the Windsor Airport Intensity-Duration-Frequency (IDF) Curve below for 1:2 and 1:100 year return periods. To our knowledge, both rainfall events were the largest ever recorded in the Town of Tecumseh.



Comments

The Town's past and proposed infrastructure modifications and improvements are significant; however, they alone will not guarantee that a basement flooding event will never occur again. The cumulative effect of all actions completed to date as well as those proposed within the Flood Mitigation Strategy below will serve to reduce the impact of severe rainfall events and lessen the extent of basement flooding associated with heavy rainfall events.

Town of Tecumseh Flood Mitigation Strategy

To mitigate the risk of flooding, Administration is recommending the following multi-step plan spanning many different categories including: Planning & Development, Storm Infrastructure, Wastewater Infrastructure, works on Private Properties and Subsidy Programs.

Planning & Development

1) Completion of the Town's Development Manual

This will set the framework and design standards for how new development and redevelopments will occur. Ensuring that wastewater and storm water design standards are clearly outlined and adhered to will lessen the risk of basement flooding associated with heavy rain events. The engineering component of the manual has been completed and the development/planning section is currently under review and anticipated to be completed in late 2018/early 2019.

Once the Development Manual has been completed, it will be brought to Council for adoption.

2) Town-wide Site Plan Control

Site Plan Control is a way for municipalities to guide development on a site-specific basis to ensure that:

- Developments are built and maintained in a proper manner;
- New developments meet certain criteria of quality and appearance;
- Proper servicing and infrastructure is provided;
- There is safe and easy access for pedestrians and vehicles;
- The appearance and design features of buildings, and their sustainable design are satisfactory;
- There is adequate on-site landscaping, parking and drainage;
- Nearby properties are protected from incompatible development through noise abatement, screening and landscape design.

Generally Site Plan Control is applied to commercial, industrial, institutional and community facility developments, as well as medium and high density residential developments. It is noted that the existing legislation does not require low density residential development (typically single detached dwellings) to be subject to site plan control. Section 41 of the *Planning Act* permits a municipality to establish a site plan control area (or areas) within the municipality. The areas within the Town that are currently under Site Plan Control include Wards 1, 2, 3, and the newer development areas in Oldcastle Hamlet in Ward 4. It is proposed to expand the site plan control area to encompass the few remaining areas in the Town for commercial, industrial,

institutional and multi-residential developments, which will ensure that all properties being considered for new development are in compliance with the Town's Development Manual and current design standards. The most significant impact will be that some of the existing developed areas of Oldcastle Hamlet that are not currently subject to site plan control will become subject to this requirement at the time of infill development, redevelopment or construction of building additions.

3) Mandatory Sewage Ejector Pump Installations for New Home Builds

In 2014, the Town implemented a new standard for new residential subdivisions that all plumbing fixtures in basements must be drained via a sewage ejector pump to the sanitary building sewer. All plumbing fixtures on the first floor level and above may be drained by gravity pipes to the building sewer. This system virtually ensures that basement flooding will not occur from surcharging of the Towns sanitary sewer system. It also reduces the likelihood of cross connections of storm water into the sanitary system.

Administration will investigate opportunities to expand this standard to individual in-fill new home construction (occurring outside the framework of a development agreement).

Storm Infrastructure

4) Completion of Storm Drainage Master Plans

These Master Plans will have the combined effect of identifying recommendations for improvements to the existing storm infrastructure to reduce the risk and depth of street flooding and also providing a framework for the ultimate installation of appropriate infrastructure that will adequately support new development and redevelopment within their respective watershed areas.

a. Upper Little River Watershed Stormwater Master Plan (2004-2018)

The Essex Region Conservation Authority (ERCA), the City of Windsor and the Town of Tecumseh commenced a stormwater study in the Upper Little River Watershed in 2004 to document existing conditions and to recommend stormwater management measures to protect existing resources as development takes place in the upper reaches of the Little River watershed. The study area consists of the drainage area of the Upper Little River, upstream of E.C. Row Expressway. The drainage area is approximately 45 square kilometers including lands in both Windsor and Tecumseh.

In 2017 Council approved the issuance of the Notice of Study Completion (Motion RCM-174/17) which commenced the 30-day review period. The project team is currently addressing some concerns that were raised during the initial review period, but it is anticipated that this Master Plan will be finalized in 2018. The conclusions and recommendations of this Master Plan are being incorporated into the final draft of the Tecumseh Hamlet Secondary Plan.

b. Tecumseh Storm Drainage Master Plan (2017-2018)

This Master Plan will focus on an analysis of the storm infrastructure within the eight (8) storm pumping station service areas along Lake St. Clair, servicing Wards 1, 2 and 3. This analysis will review how the Town's stormwater infrastructure functions during minor and major rainfall events. The storm pumping stations will also be reviewed to determine if any modifications or improvements are required based on the pump station capacity and as a result of any of the recommended storm sewer network improvements (i.e. capacity upgrades).

Council commissioned this Master Plan as part of the 2017 PWES Capital Works Plan (Motion RCM-442/16) and it is anticipated to be completed by early 2019. Administration will seek Council's approval prior to the issuance of the Notice of Completion through a subsequent report to Council.

c. Oldcastle Hamlet Storm Drainage Master Plan (2018-2019)

The stormwater infrastructure network located within the Oldcastle Hamlet area is comprised of a combination of roadside ditches, Municipal Drains, storm sewers, swales/sub-drains, as well as County and Provincial storm infrastructure, typically associated with their roads. There are three (3) distinct watershed areas within the Oldcastle Hamlet which include Little River (8 outlets), Turkey Creek (1 outlet), and River Canard (3 outlets). This Master Plan will focus on an analysis of the storm infrastructure within these watersheds and will set the framework for how stormwater is addressed for new development and re-development.

Council commissioned this Master Plan as part of the 2018 PWES Capital Works Plan (Motion RCM-441/17) and it is anticipated to be completed by December 2019. Administration will seek Council's approval prior to the issuance of the Notice of Completion through a subsequent report to Council.

5) Completion of the 'Windsor-Essex Region Stormwater Management Standards'

In the Essex County/City of Windsor region, there has been a lack of consistent stormwater management standards amongst the seven lower tier municipalities. This leads to a wide range of variation in stormwater management design standards, which results in inconsistent stormwater management facilities and measures throughout Essex County.

In 2015 the Essex Region Conservation Authority (in cooperation with all of the County lower tier Municipalities, the County of Essex, and the City of Windsor), initiated the process to create technical standards that will provide a clear, concise and consistent approach to stormwater design within the Essex region. It is anticipated the standards will be completed in 2018.

The proposed standards will serve to identify the general policies and technical standards to be adopted by all Essex County municipalities, the City of Windsor and regulatory agencies (having jurisdiction). It will provide direction to consulting firms and municipalities during the development and review of stormwater technical reports in

support of new development. The standards will be tailored to the local challenges of this region and in this respect will take precedence over the current Ministry of the Environment and Climate Change (MOECC) Stormwater Management and Design Manual and the current Ministry of Natural Resources and Forestry (MNR) Natural Hazard Technical Guides.

6) Completion of a Regional Climate Change Strategy (Climate Adaptation Plan)

In September 2017 the Essex Region Conservation Authority Board of Directors adopted the recommendation to reallocate 2017 budget funding to initiate the development of a Regional Climate Change Strategy with municipalities and other partners. Like other Conservation Authorities and regions in Ontario, ERCA believes that a comprehensive and regional approach to addressing climate change that includes both mitigation and adaptation is required.

The development of a regional Climate Change Strategy (Climate Adaptation Plan) requires further discussion between ERCA and the local municipal partners.

7) Installation of a Regional Weather Station Network (Rain Gauges)

The Town currently has one rain gauge located at the Cedarwood Sanitary Pump Station (Cedarwood/Gauthier intersection), which is maintained and operated by the Town's contractor AMG Environmental. At the regional level, the Essex Region Conservation Authority has six weather stations located throughout the Essex region. Other municipalities within the region also have weather stations; however none of these separate systems are tied together for easy access during rain events. Also, the extent of maintenance and quality control on the collected data varies between station owners making it difficult to rely on recorded data to analyze storm events, as accurate data is needed for events that occur in the Essex region.

The development of a Regional Weather Station Network requires further discussion between ERCA and the local municipal partners.

8) Completion of a (storm and sanitary) Pump Station Emergency Response Plan

In 2016, the Town conducted an assessment on the eight (8) storm pumping stations and four (4) sanitary pumping stations to understand their condition and to effectively prioritize rehabilitation and any required replacement work in the future.

As part of the 2018 PWES Capital Works Plan, Council approved (Motion RCM-441/17) the completion of a Pump Station Emergency Response Plan for the Town's storm and sanitary pump stations. This plan will contain information on the key components for each pump station, contacts for pump suppliers and manufacturers, engineers and contractors, adjacent municipalities, regulatory authorities (i.e. ERCA) and operational entities retained by the Town (i.e. OCWA). The plan will also identify various situational emergencies (i.e. mechanical failures, illegal entry & vandalism, fire, loss of access to facility, etc.) and each of the required responses. It will be structured similar to the Water Services Emergency Response Plan which is legislated by the Ministry of the Environment and Climate Change.

9) Completion of a Shoreline Management Plan

In 1973 the City of Windsor and surrounding areas (including Tecumseh and St. Clair Beach) experienced widespread flooding from Lake St. Clair and the Detroit River due to a combination of record high lake levels and strong on-shore winds. The properties along the shoreline as well as inland (lower lying) properties sustained significant flood damage during that event.

The water levels in Lake St Clair reached new record highs in 1985 (from the previous record set in 1973) , which prompted the Essex Region Conservation Authority in coordination with many local municipalities to undertake Shoreline Management Plans, including:

- The City of Windsor, 1986
- Town of LaSalle (Township of Sandwich West), 1988
- Town of Amherstburg (Township of Malden), 1989
- Town of Kingsville (Township of Gosfield South), 1990

It is recommended that Tecumseh undertake a Shoreline Management Plan to determine the best ways to identify and manage flood and erosion risk to the developed shoreline of Lake St Clair and the Pike Creek. The plan will also determine opportunities where partners, stakeholders and landowners can work together to identify, manage and reduce the risk of flooding and erosion due to high lake levels and wave action.

The Shoreline Management Plan will be incorporated within the 5-year PWES Capital Works Plan that is brought to Council for approval.

Wastewater Infrastructure

10) Sanitary Sewer Rehabilitation (Inflow and Infiltration Removal)

As part of the 2017 PWES Capital Works Plan Council approved (Motion RCM-442/16) the Sanitary Sewer Rehabilitation (Inflow and Infiltration Removal) Project for which the Town was successful in receiving two grants, the Ontario Community Infrastructure Fund (OCIF) and the Canada Water Wastewater Fund (CWWF). Components of this work began in September 2017 and are expected to continue throughout 2018.

This project involves the renewal and rehabilitation of approximately 30,000 linear metres of sanitary sewer pipe, 500 manholes and the rehabilitation of approximately 500 sanitary sewer service connections. The work generally consists of:

- Camera inspections of the sewer pipes to identify: pipe condition; pipe defects; and sources of inflow and infiltration using trenchless technology.
- Flushing and cleaning debris from the sanitary sewer pipes and service connections to facilitate leak testing and repair using trenchless technology.
- Pressure testing and sealing of: mainline joints, cracked or otherwise leaking pipes, tee connections, clean outs, risers and sanitary service connections using innovative trenchless technology.

- Structural repairs of sanitary sewer pipes where required using innovative trenchless technology.
- Sealing leaks in manholes using rain shields, chemical sealants and latest technology.

Once completed, this work is anticipated to subsequently reduce the amount of storm water inadvertently being admitted into the sanitary sewer system thereby reducing the risk of basement flooding.

11) Increase Sanitary System Storage Capacity

At the April 23, 2013 Regular Council Meeting under PWES Report No. 13/13 (Motion: RCM-138/13) Council received the Municipal Class Environmental Assessment titled “Class Environmental Assessment (Class EA) Environmental Screening Report for the Town of Tecumseh Sanitary Collection System Improvements, April 2013”.

As part of the 2013 Class EA, various alternative solutions were identified and evaluated to address the problem of basement flooding and the lack of capacity in the sanitary sewage system to accommodate future growth. Based on a comparative evaluation, an expansion and upgrading of the existing sanitary sewage collection system was identified as the preferred solution.

The functional design for the preferred solution identified a reduction in the risk of basement flooding and could accommodate new development. These improvements included:

- Stage 1 (completed in 2014)
 - Lakewood Sanitary Pump Station Improvements
 - Increased storage capacity - Lakewood Park Trunk Sewer
- Stage 2 (future consideration)
 - Increased storage capacity - Riverside Drive Trunk Sewer
- Stage 3 (future consideration)
 - Additional investigation and sanitary sewer modelling required on Dillon Drive and Green Valley Drive

Stages 2 & 3 will be incorporated within the 5-year PWES Capital Works Plan that is brought to Council for approval.

12) Continued Flow Monitoring and Sanitary Sewer Modeling

In 2011 Council received the report (Motion RCM-227/11) titled “Town of Tecumseh, Sanitary Sewer Assessment Report, dated May 2011”. The report included a recommendation that the Town update their existing sanitary sewer model every three years, as well as carryout a flow monitoring program.

The primary purpose of the flow monitoring program is to gain further understanding into the flow characteristics of the sanitary sewer system, particularly under varying wet weather conditions and to determine the impacts of various rainfall events in combination with proposed development scenarios. The modeling will provide insight

on available sanitary sewer capacity to accommodate infill development within the Town.

The update to the Sanitary Sewer Model will be incorporated within the 5-year PWES Capital Works Plan that is brought to Council for approval.

Private Property / Subsidy Programs

13) Public Education and Awareness Program on Managing Risk of Basement Flooding

While the Town has undertaken studies to address extraneous flows into the sanitary sewer collection system and has implemented many improvements to both the sanitary and storm water systems, there is also an opportunity for private property owners to implement protective measures to reduce the risk of basement flooding and to eliminate sources of extraneous flows.

It is recommended that the Town continue to implement public education and awareness programs through Public Information Centres, one-on-one sessions with property owners, Information brochures and through the Town's social media accounts and website that addresses the following:

- The function and level of service provided by the Town's public storm and sanitary collection systems, including factors affecting their performance;
- The function and maintenance requirements of private storm and sanitary plumbing systems; and
- The opportunities to manage the risks associated with these services.
- Opportunities to reduce inflows of stormwater into the sanitary building sewers on the private property.

14) Mandatory Downspout Disconnection Program

In 2011 Council adopted a resolution (Motion RCM-277/11) that Administration develop a policy for the mandatory disconnection of rain water leaders (downspouts) and improper cross connections and report back to Council. However, the development and implementation of a mandatory disconnection of rain water leaders policy was suspended while the Ministry of the Environment and Climate Change, through the Essex Regional Conservation Authority offered a \$300 subsidy for the disconnection of rain water leaders. Work on the policy and report to Council was suspended due to the fact that there was a stipulation by the MOECC that the Town not have a mandatory disconnection policy in place in order to receive the MOECC/ERCA subsidy. The MOECC/ERCA subsidy has since expired and the recent significant rainfall events in September 2016 and August 2017 have brought this issue to the forefront again.

Downspouts are designed to convey water from eaves troughs and down the side of the house to a point of disposal. Downspouts often direct water to stormwater drains and/or the ground surface of the lot, but in some cases they may be connected to the weeping tile or the sanitary or storm sewer lateral. When connected directly to the municipal sewer system, eaves trough downspouts can contribute a substantial amount of water to these systems. Because of the environmental impacts and the increase in flood risk

that directly connected eaves troughs can cause, it has been made illegal to connect downspouts directly to municipal sewer systems in many Canadian municipalities.

Administration will develop a program and policy for the mandatory downspout disconnection program and report back to Council for approval and by-law adoption.

15) Mandatory Foundation Drain Disconnection & Storm Sump Pump Installation Subsidy Program

In 2012 Council implemented a voluntary subsidy program to assist homeowners with the cost of the disconnection of foundation drains from the sanitary sewer system. The eligibility for the program was backdated to June 2010. The program provides for a subsidy of a maximum of 50% of the cost of the disconnection of foundation drains from the sanitary sewer system up to a maximum of \$1,060.

Since program implementation in 2012, 84 residences have applied for the subsidy for the foundation drain disconnection, of which:

- 2012-2015: 0 applications
- 2016: 31 applications (All post September 29th rain event)
- 2017: 43 applications (29 post August 28th rain event)
- 2018: 6 applications (as of May 4, 2018)

The mandatory disconnection of foundation drains is viewed as an extremely important strategy to remove extraneous flows from the sanitary sewer system. This will in turn **significantly** reduce the risk of the sanitary system from surcharging which can cause basement flooding.

Administration will develop a program and policy for the mandatory foundation drain disconnection and storm sump pump installation program and report back to Council for approval and by-law adoption.

16) Backwater Valve Installation Subsidy Program

In 2012 Council implemented a voluntary subsidy program to assist homeowners with the cost of the installation of a new backwater valve. The eligibility for the program was backdated to June 2010. The program provides for a subsidy of a maximum of 80% of the cost of the installation of a new backwater valve up to a maximum of \$800.

Since the program implementation in 2012, 712 residences have applied for the subsidy for the backwater valve installation, of which:

- 2012-2015: 8 applications
- 2016: 263 applications (260 post September 29th rain event)
- 2017: 409 applications (178 post August 28th rain event)
- 2018: 32 applications (as of May 4, 2018)

Administration will review the subsidy program and report back to Council whether the value or percentage of the subsidy should be increased.

17) Sewage Ejector Pump Installation Subsidy Program

In 2014, the Town implemented a new standard for new residential subdivisions that all plumbing fixtures in basements must be drained via a sewage ejector pump to the sanitary building sewer. This was achieved by designing the sanitary sewer connection at such a depth that a sewage ejector pump was required, thereby bringing the use of a sewage ejector pump into alignment with the Ontario Building Code. During the extraordinary rainfall events of September 29, 2016 and August 28, 2017, none of the basements of residences that were constructed in new residential developments experienced basement flooding as a result of sanitary sewer back-up.

Other municipalities, such as the City of London, have incorporated the installation of sewage ejector pumps within their basement flooding subsidy programs.

Administration will review the creation of a subsidy program for the installation of a sewage ejector pump in existing residences and report back to Council. It is anticipated that significant consultation with the Province will be required given the current wording in the Ontario Building Code.

18) Creation of an annual inspection program for private stormwater management facilities

Administration has been able to inventory over 100 private stormwater management facilities that have been installed on Commercial, Institutional and Industrial properties since 2001. Currently, the Town does not have an inspection program in place to ensure that these systems are regularly maintained and functioning as designed.

Many other municipalities throughout Ontario have annual or semi-annual inspection programs in place, as they realize the benefits of the program and the risk that malfunctioning or abandoned and/or illegally removed stormwater facilities have in relation to increased flooding potential on public and private lands.

An annual inspection program will help develop a comprehensive database for comparison and trend analysis and future design considerations for what will be deemed acceptable by the Town.

Consultations

Planning & Building Services
Financial Services
Essex Region Conservation Authority

Financial Implications

There are no financial implications associated with this report.

Link to Strategic Priorities

Applicable	2017-18 Strategic Priorities
<input type="checkbox"/>	Make the Town of Tecumseh an even better place to live, work and invest through a shared vision for our residents and newcomers.
<input checked="" type="checkbox"/>	Ensure that the Town of Tecumseh's current and future growth is built upon the principles of sustainability and strategic decision-making.
<input type="checkbox"/>	Integrate the principles of health and wellness into all of the Town of Tecumseh's plans and priorities.
<input checked="" type="checkbox"/>	Steward the Town's "continuous improvement" approach to municipal service delivery to residents and businesses.
<input type="checkbox"/>	Demonstrate the Town's leadership role in the community by promoting good governance and community engagement, by bringing together organizations serving the Town and the region to pursue common goals.

Communications

Not applicable

Website

Social Media

News Release

Local Newspaper

This report has been reviewed by Senior Administration as indicated below and recommended for submission by the Chief Administrative Officer.

Prepared by:

Phil Bartnik, P.Eng.
Director Public Works & Environmental Services

Reviewed by:

Brian Hillman, MA, MCIP, RPP
Director Planning & Building Services

Reviewed by:

Luc Gagnon, CPA, CA, BMath
Director Financial Services & Treasurer

Recommended by:

Tony Haddad, MSA, CMO, CPFA
Chief Administrative Officer

Attachment Number	Attachment Name
None	.