Welcome

Lakeshore Stormwater Master Plan Study – Phase 1

Public Information Centre #1 (PIC)

View displays and discuss the study with project staff

Feel free to ask questions and fill out a comment sheet

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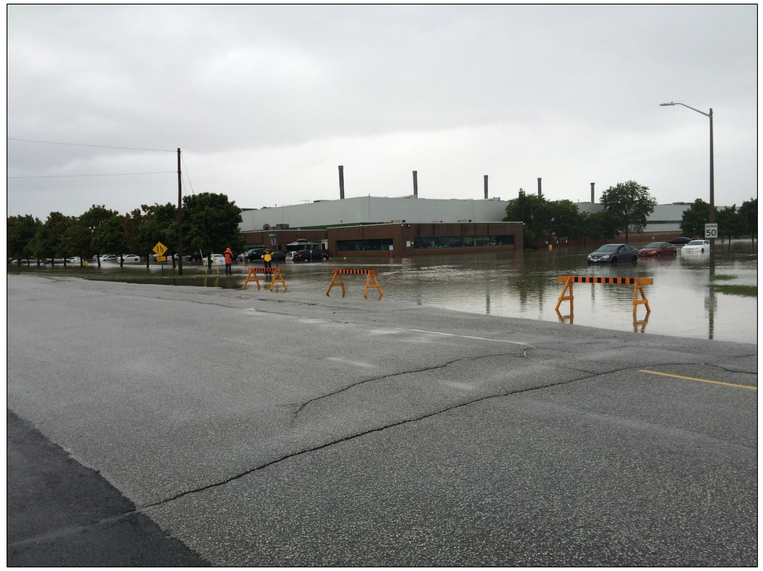
Purpose of Tonight's Meeting

- Educate public on the Town's infrastructure design and private drainage systems
- Identify the problem – **CAUSE OF PRIVATE (BASEMENT) FLOODING**
- Propose **PRELIMINARY SOLUTIONS (FOR BOTH PRIVATE AND PUBLIC)**
- **Hear from you!** Your input is ***very important***.



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Purpose of Our Study

- Investigate the cause and solutions to basement flooding resulting from rainfall events that occurred in September 2016 and August 2017 (Tonight's focus)
- Perform a comprehensive review and analysis of stormwater infrastructure and identify areas of need for infrastructure improvements.
- Prioritize improvements based on level of service/risk to develop phasing and sustainable cost strategy.
- Recommend best management practices to develop inspection and maintenance programs for Lakeshore's stormwater infrastructure assets

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Study Area

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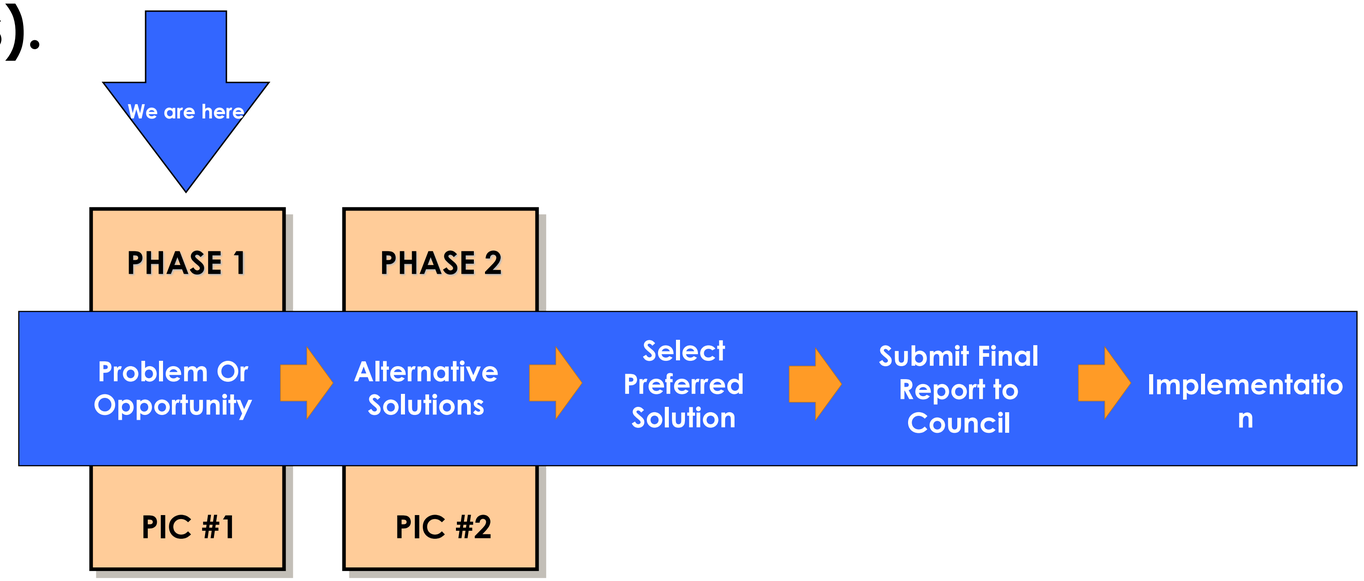
Municipal Class Environmental Assessment Process

- The Town will meet the requirements of Ontario's Environmental Assessment (EA) Act for infrastructure projects.
- The project has been identified as a Schedule B which requires completion of Phases 1 and 2 of the Class EA process as set out by the Municipal Engineers Association. We are currently in the Phase 1 stage.
- The EA process is an opportunity for the public and agencies to provide input. Consultation is facilitated via two rounds of **Public Information Centres (PICs).**



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Investigating Basement Flooding: The Steps Involved

Many steps are involved in the study before solutions can be recommended. This work includes:

- Collect and review background data on storm drainage systems designs and construction records, rainfall data, soil conditions and flooding history.
- Develop computer models to analyze the causes of flooding and to predict flows under various weather conditions;
- **Present potential causes of flooding and identify preliminary solutions (Tonight's Public Information Centre No. 1)**
- Develop solutions and present recommended improvements **(Future Public Information Centre No. 2)**;
- Undertake assessment and refinement of alternatives; and
- Finalize the study recommendations based on input from the public and review agencies.

We Are Here

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Potential Basement Flooding Factors

Under normal rainfall events, the storm sewer systems operate as designed. However, during extreme storms, the following takes place:

- Stormwater flow exceeds the storm sewer capacity and overloads the system.
- Private drainage systems can become surcharged – backfill areas surrounding foundation walls become saturated with water.
- Private drainage systems are potentially deficient (i.e. – cracked pipes, sump pump failure, tree roots, grading around the house, etc.)
- At low lying areas, water accumulates (ponds) and enters the sanitary sewer system through manhole covers or cleanouts.

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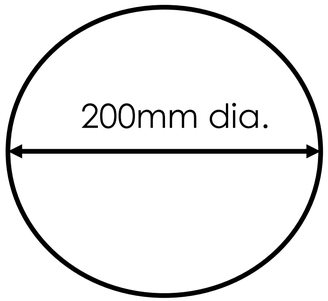
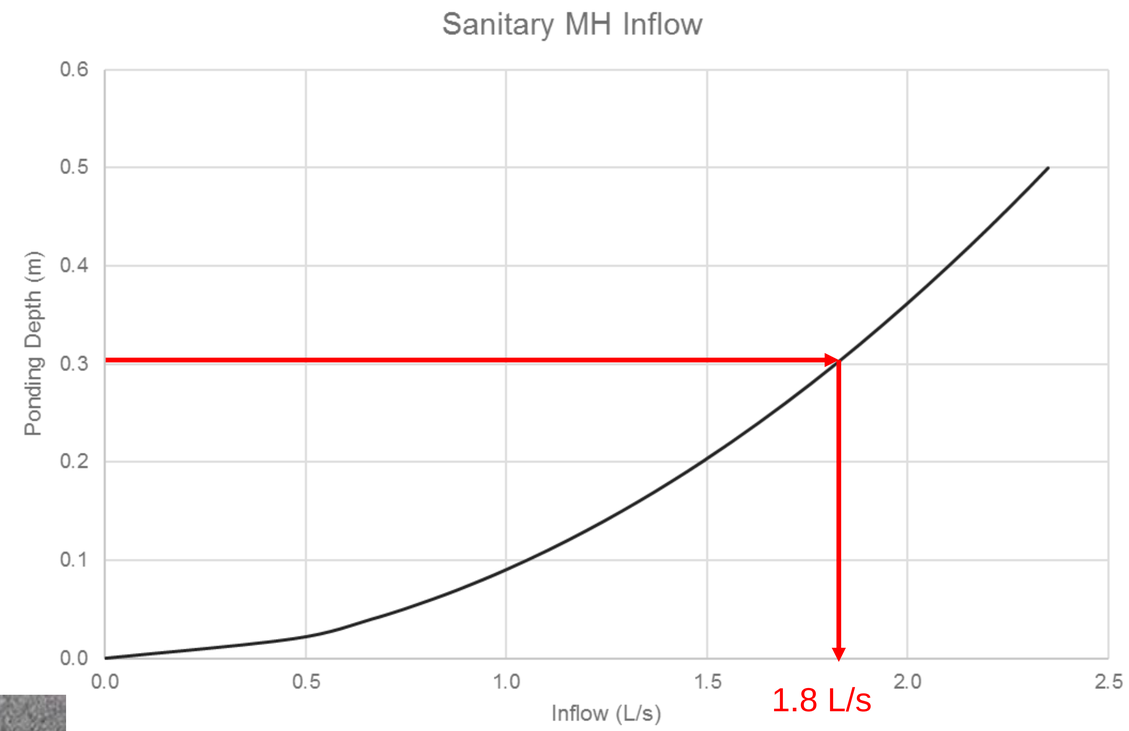
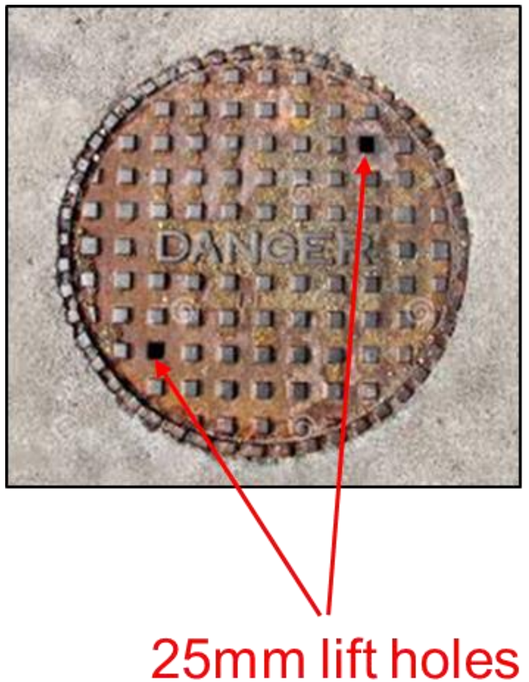
Sanitary Sewer Inflow & Infiltration

Manhole lift holes can be a significant source of inflow to the sanitary sewer.



- A typical 200mm dia. sanitary sewer has an approximate capacity of **18 litres per second (L/s)**
- At an inflow rate of 1.8 L/s for one manhole, it would only take 10 manholes with 0.3 metres of ponding to use up the sewer capacity.





Inflow insert (pan) being installed in a manhole to mitigate surface water entering the sanitary sewer system

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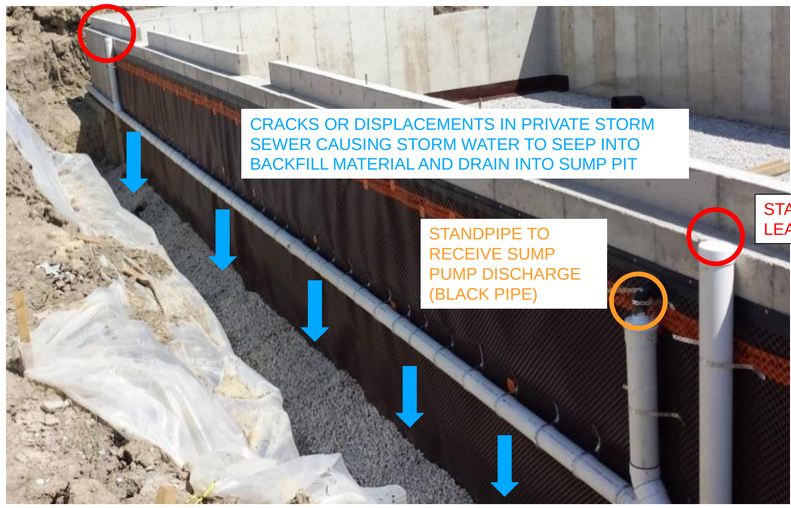
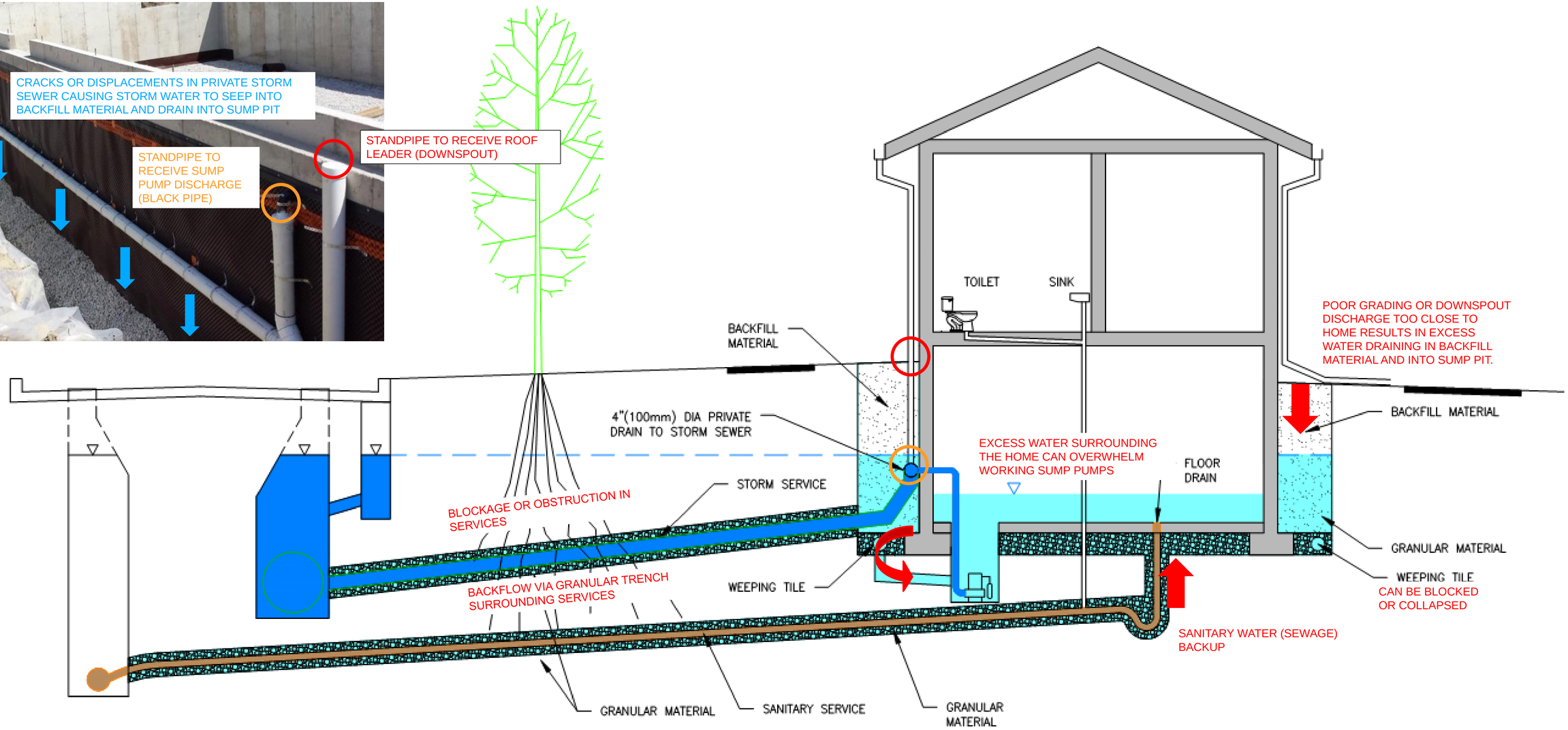
Potential Causes of Basement Flooding





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NOTE:

PRIVATE DRAINAGE SYSTEMS CAN BE COMPLEX AND COULD DIFFER FROM THAT SHOWN. IT IS CRITICAL THAT THE HOME OWNER CARRY OUT A SITE ASSIGNMENT WITH A LICENSED PLUMBER, DRAIN CONTRACTOR, OR DRAINAGE ENGINEER TO UNDERSTAND HOW THE EXISTING DRAINAGE SYSTEM OPERATES BEFORE DETERMINING THE APPROPRIATE SYSTEM IMPROVEMENTS.

LEGEND

STORM WATER

SANITARY WATER

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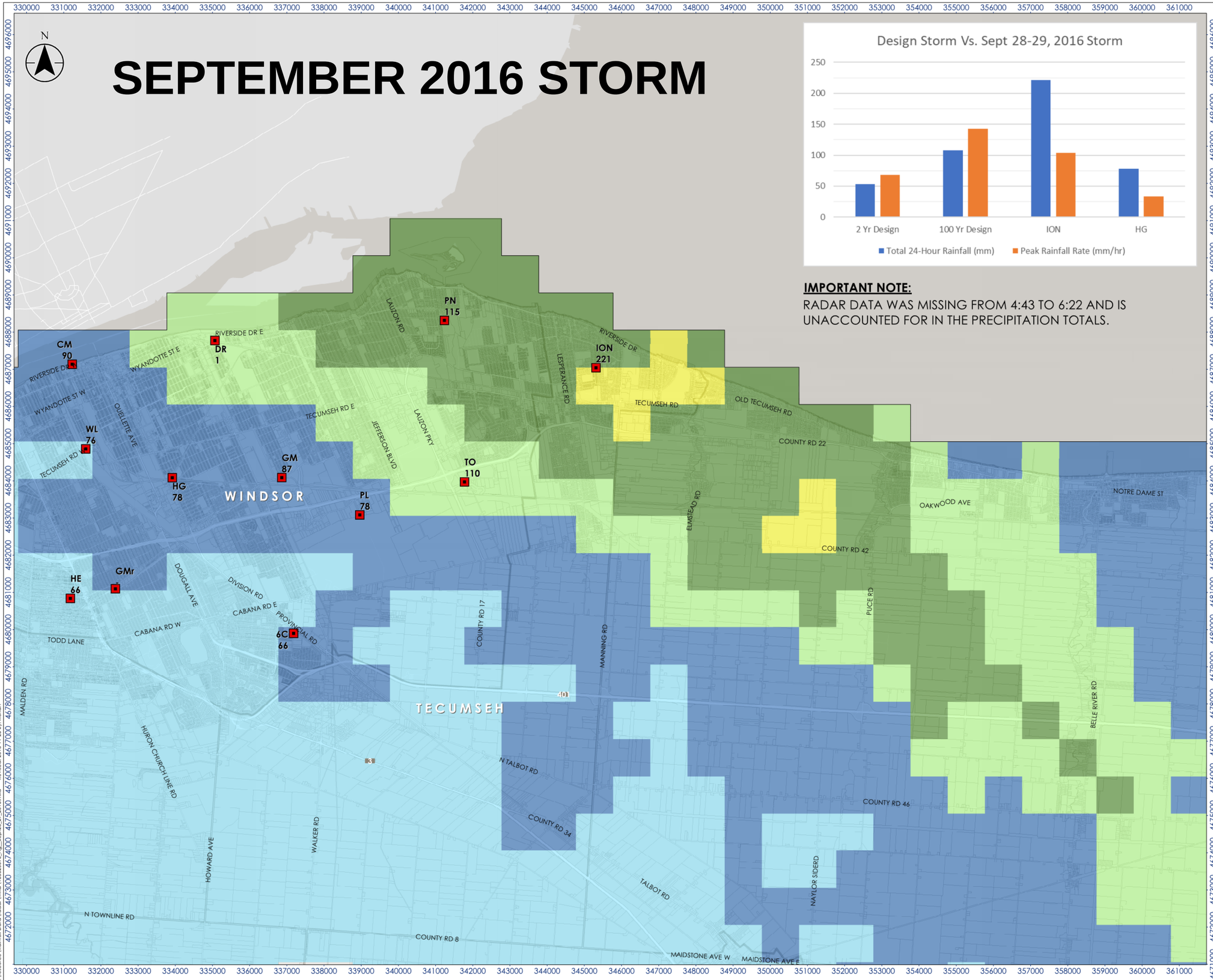
SEPTEMBER 2016 STORM



IMPORTANT NOTE:

RADAR DATA WAS MISSING FROM 4:43 TO 6:22 AND IS UNACCOUNTED FOR IN THE PRECIPITATION TOTALS.

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Legend

- Analysis Area
- Rain Gauge and Observed Precipitation Amount (mm)

Precipitation (mm)

- 175 - 206
- 150 - 175
- 125 - 150
- 100 - 125
- 75 - 100
- 50 - 75
- 25 - 50

< 25 mm not shown

Rain Gauge Key

6C	6th Concession PS
AM	Ambassador PS
CM	CMH Woods PS
DR	Drouillard PS
GM	Grand Marais PS
GMr	Grand Marais @ Rankin
HE	Huron Estates PS
HG	Howard Grade Separation PS
ION	IONTARIO771
LE	Leffler PS
LR	Lou Romano WRP
PL	Pillette PS
PN	Pontiac PS
TO	Twin Oaks PS
WL	Wellington PS

0 2,500 5,000 metres

1:50,000 (At original document size of 22x34)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2016.
3. Rainfall amounts shown are estimated from uncalibrated radar rainfall data and may not accurately represent the actual amount of rainfall that occurred. Radar data was obtained from the National Centers for Environmental Information (NCEI). NEXRAD Level-III Digital Precipitation Rate (DPR) product, Detroit, Michigan radar station (Station ID: KDTX).

Project Location

Essex County

Prepared by KDB on 2017-10-10
Reviewed by LMF on 2018-11-23

Client/Project

ESSEX COUNTY
AUGUST 28-29, 2017 RAINFALL EVENTS
UNCALIBRATED RADAR ANALYSIS

Figure No.

Title

24-Hour Rainfall Amounts
Sept. 28 & Sept. 29, 2016; 18:00 to 18:00

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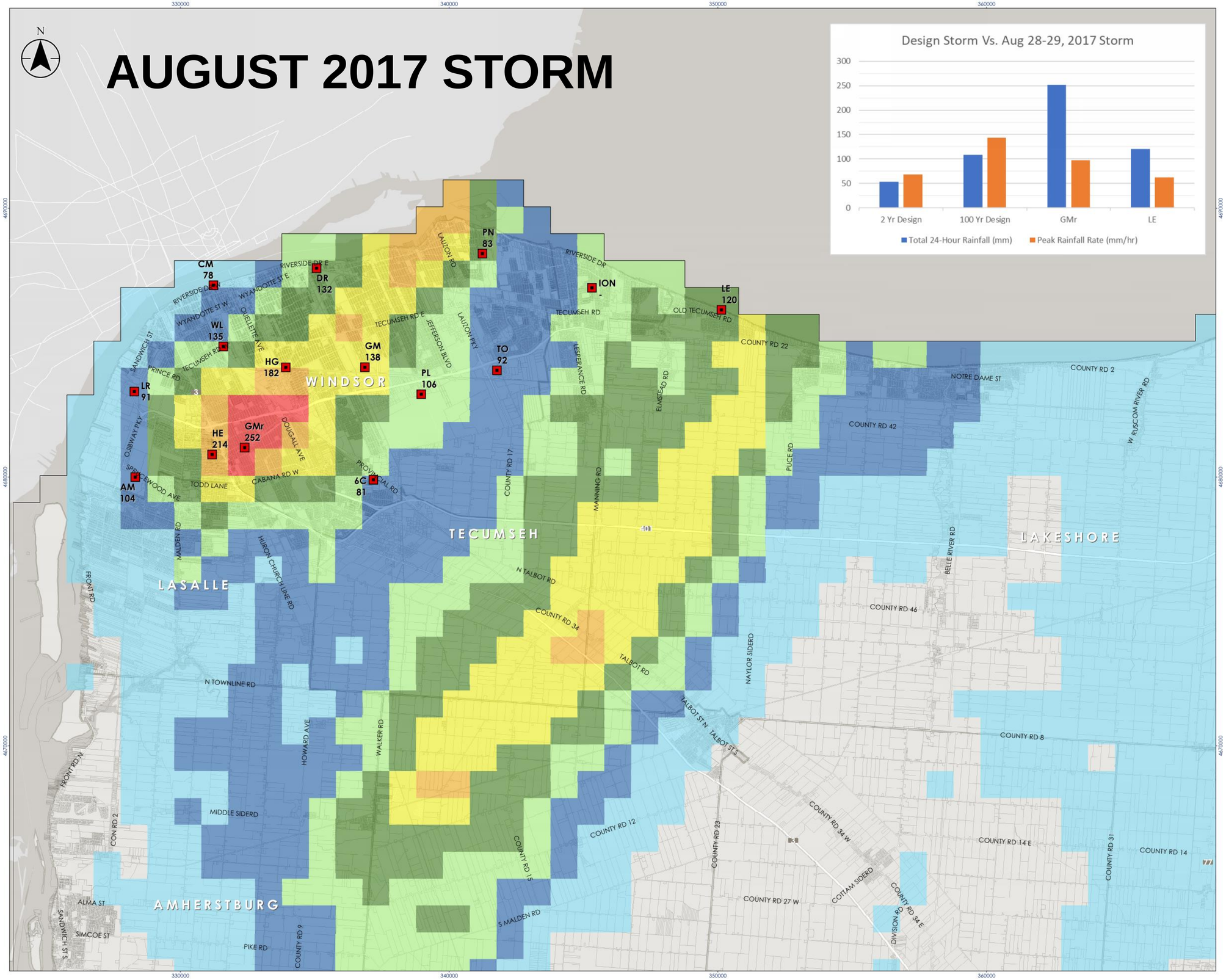
AUGUST 2017 STORM



Stantec

Legend

- Analysis Area
- Rain Gauge and Observed Precipitation Amount (mm)

Precipitation (mm)

- 175 - 206
- 150 - 175
- 125 - 150
- 100 - 125
- 75 - 100
- 50 - 75
- 25 - 50

< 25 mm not shown

Rain Gauge Key

6C	6th Concession PS
AM	Ambassador PS
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ION	IONTARIO771
LE	Leffler PS
LR	Lou Romano WRP
PL	Pillette PS
PN	Pontiac PS
TO	Twin Oaks PS
WL	Wellington PS

0 3,500 7,000 metres

1:70,000 (At original document size of 22x34)

Notes

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Project Location

Essex County

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Client/Project

ESSEX COUNTY
AUGUST 28-29, 2017 RAINFALL EVENTS
UNCALIBRATED RADAR ANALYSIS

Figure No.

Title

24-Hour Rainfall Amounts
Aug. 28 & Aug. 29, 2017; 17:30 to 17:30

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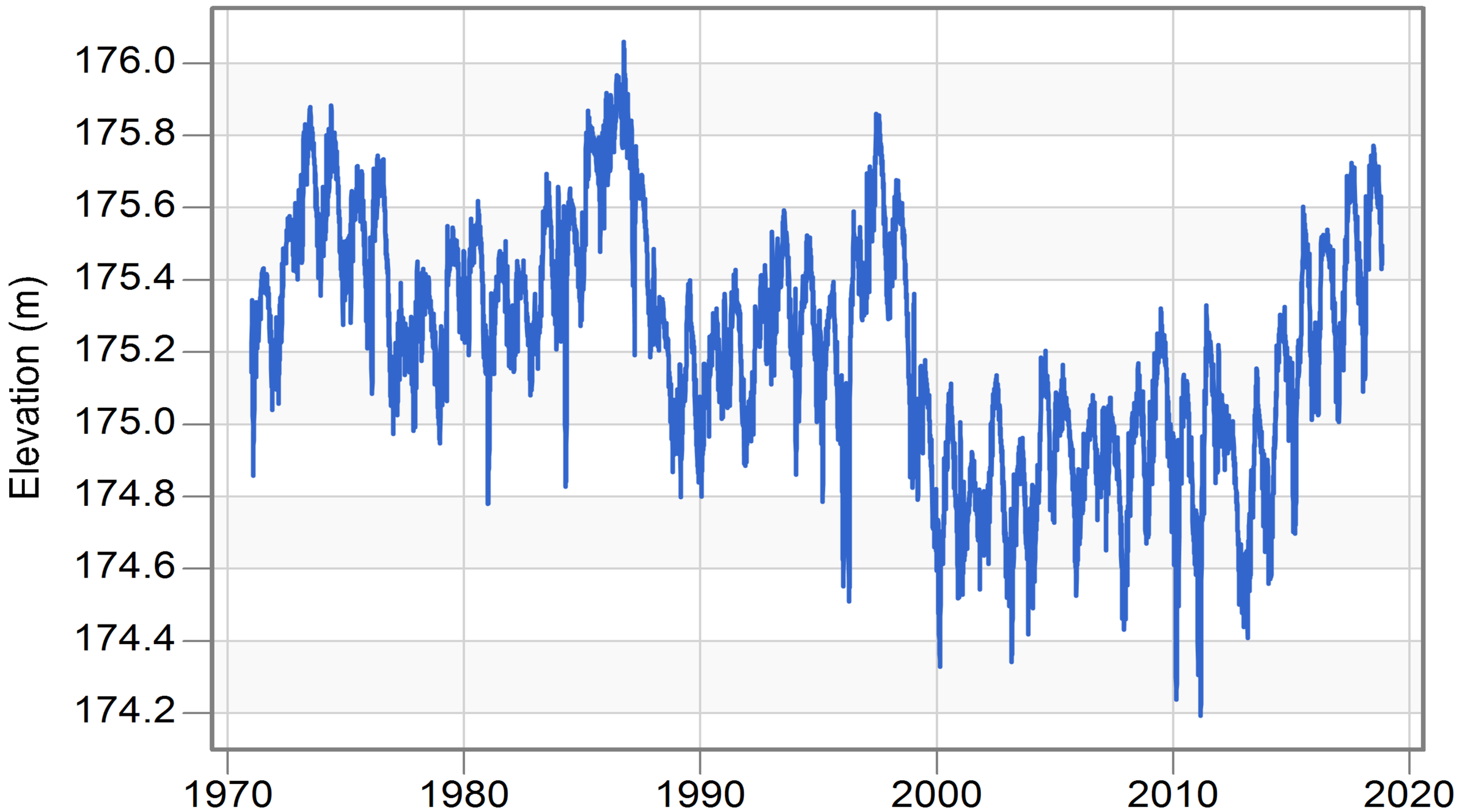
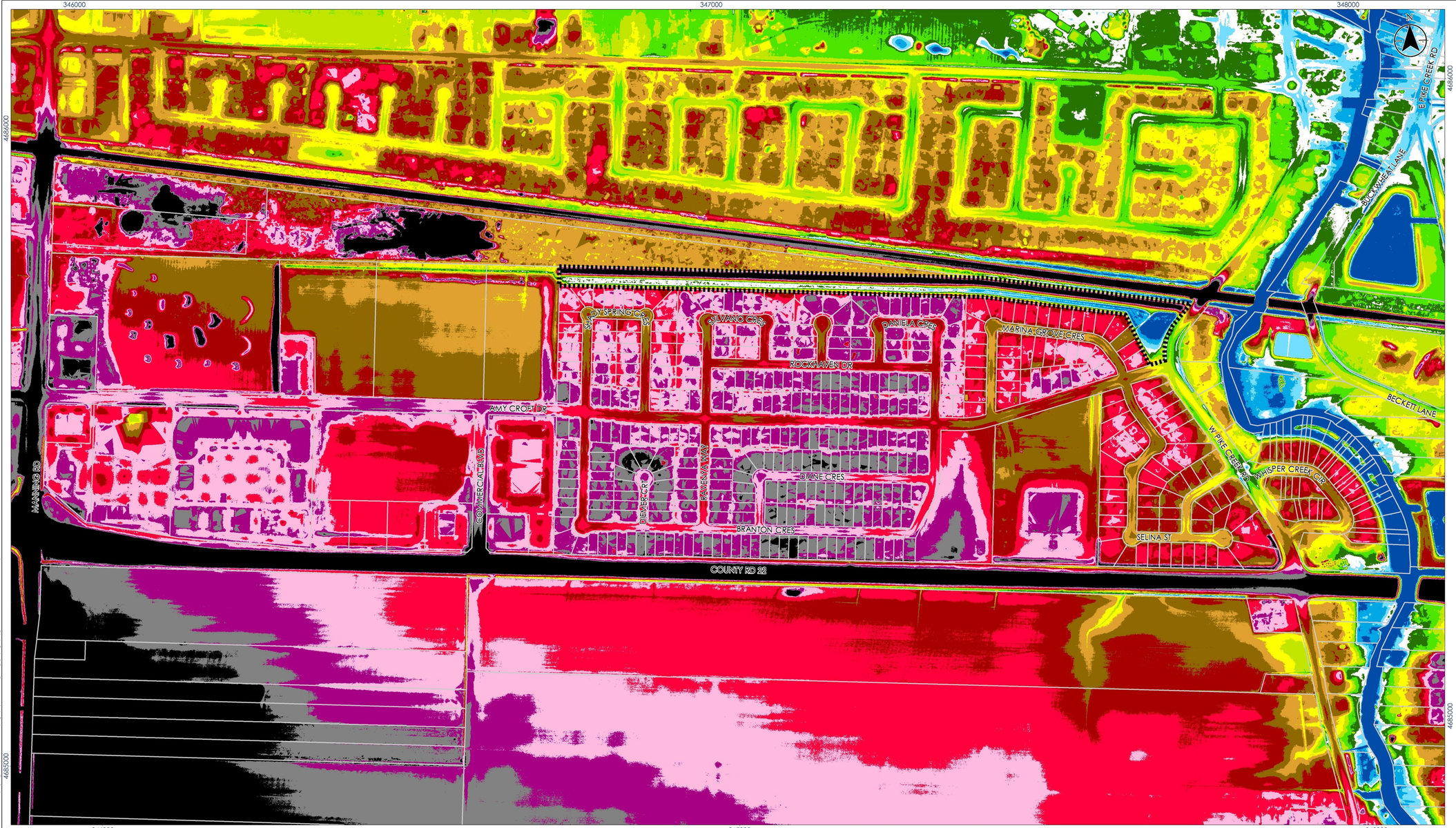
Historical Lake St. Clair Levels



Topography Area 1 – Manning Rd to Pike Creek



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Legend

- Parcel Fabric
- Storm Ponds

Elevation (m)

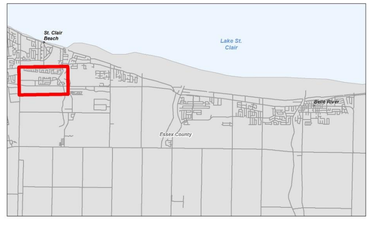
- ≥ 178.8
- 178.6 - 178.8
- 178.4 - 178.6
- 178.2 - 178.4
- 178.0 - 178.2
- 177.8 - 178.0
- 177.6 - 177.8
- 177.4 - 177.6
- 177.2 - 177.4
- 177.0 - 177.2
- 176.8 - 177.0
- 176.6 - 176.8
- 176.4 - 176.6
- 176.2 - 176.4
- 176.0 - 176.2
- ≤ 176.0

0 75 150 300 Meters

1:2,500 (At original document size of 22x44)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Elevation from Ontario Ministry of Agriculture, Food & Rural Affairs (OMAFRA) Topographic LIDAR Digital Terrain Model.



Project Location
Municipality of Lakeshore

165620165
Prepared by LMF
on 2018-11-26

Client/Project
Lakeshore SWM Master Plan

Figure No.
A-1

Title
Area 1 - Topography

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Topography Area 2 – Pike Creek to Patillo Rd

Stantec

Legend

- Parcel Fabric
- Storm Ponds

Elevation (m)

- ≥ 178.8
- 178.6 - 178.8
- 178.4 - 178.6
- 178.2 - 178.4
- 178.0 - 178.2
- 177.8 - 178.0
- 177.6 - 177.8
- 177.4 - 177.6
- 177.2 - 177.4
- 177.0 - 177.2
- 176.8 - 177.0
- 176.6 - 176.8
- 176.4 - 176.6
- 176.2 - 176.4
- 176.0 - 176.2
- ≤ 176.0

0 75 150 300 Meters

1:2,500 (At original document size of 22x34)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Elevation from Ontario Ministry of Agriculture, Food & Rural Affairs (OMAFRA) Topographic Lidar – Digital Terrain Model (2017) produced under the Open Government Licence – Ontario.

Project Location
Municipality of Lakeshore

165681084
Prepared by LMF
on 2018-07-13

Client/Project
Lakeshore SWM Master Plan

Figure No.
A-2

Title
Area 2 - Topography

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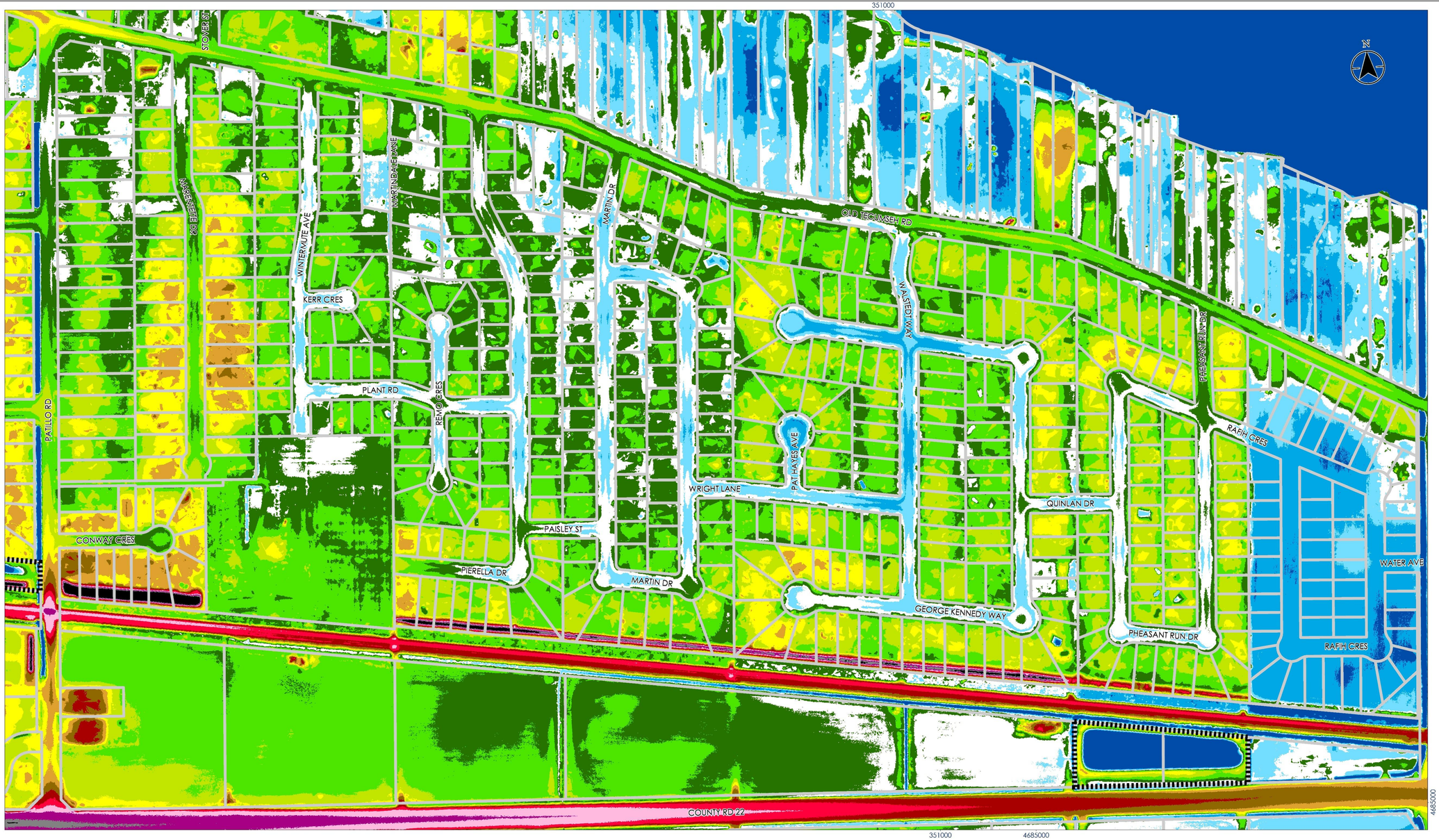
Topography Area 3 – Patillo Rd to Wallace Line Rd



Stantec

Legend

Parcel Fabric

Storm Ponds

Elevation (m)

- ≥ 178.8
- 178.6 - 178.8
- 178.4 - 178.6
- 178.2 - 178.4
- 178.0 - 178.2
- 177.8 - 178.0
- 177.6 - 177.8
- 177.4 - 177.6
- 177.2 - 177.4
- 177.0 - 177.2
- 176.8 - 177.0
- 176.6 - 176.8
- 176.4 - 176.6
- 176.2 - 176.4
- 176.0 - 176.2
- ≤ 176.0

0 50 100 200 Meters

1:1,700 (At original document size of 22x34)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Elevation from Ontario Ministry of Agriculture, Food & Rural Affairs (OMAFRA) Topographic Lidar – Digital Terrain Model (2017) produced under the Open Government Licence – Ontario.

Project Location

Municipality of Lakeshore

165681084
Prepared by LMF
on 2018-07-13

Client/Project

Lakeshore SWM Master Plan

Figure No.

A-3

Title

Area 3 - Topography

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Problems and Opportunities

The exact cause of basement flooding at each individual home is difficult to identify and can be a result of one or many circumstances. The findings of our study suggest the following:

- The **primary cause** of the basement flooding is **deficient private drainage** systems (i.e. – cracked pipes, sump pump failure, sanitary backflow valve failure, tree roots, grading around the house, etc.)
- The rainfall intensities that were experienced at the study area for September 2016 and August 2017 storm events **significantly exceeded the sewer design capacity** – resulting in significant surcharging and surface ponding.
- **Surface ponding in itself is not a cause of basement flooding**, however it can challenge the private drainage system and expose any existing deficiencies.

The most effective way to reduce the risk of flooding involves a two-part solution that aims to:

Solution A. Maintain/Improve private drainage systems to ensure adequate drainage of surface, roof and groundwater around the home, *SUPPLEMENTED WITH*;

Solution B. Improvements to the Town's stormwater system to reduce the duration and frequency of sewer surcharging during intense rainfall events.

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Solutions to Mitigate Basement Flooding

Maintaining Private Drainage Systems

Maintaining private drainage systems to ensure that surface water and groundwater surrounding the home is directed away from the home and towards the roadway/storm sewer system.

Improving Conveyance Capacity

Improving conveyance capacity or limiting stormwater inflow to the storm sewer system to limit the amount and frequency of sewer surcharging.

Adding Storage Capacity

Adding storage capacity within the system to temporarily detain runoff from high intensity rainfall events and reduce peak flows to the storm sewer.

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Recommended Solution A

MAINTAINING PRIVATE DRAINAGE SYSTEMS

Private Drainage System Maintenance

Periodic maintenance and repairs to private drainage systems is important to ensure that surface water and groundwater surrounding the home is directed away from the home and towards the roadway/storm sewer system. Some maintenance/repair items include;

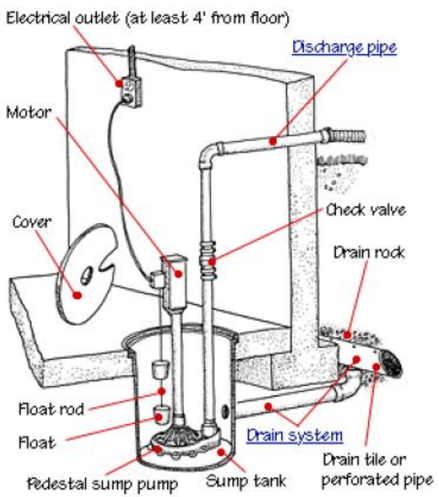
- cracked pipes, cracked basement walls, **sump pump system**, blockages from tree roots, **sanitary backflow valve**, poor grading around the house, etc.

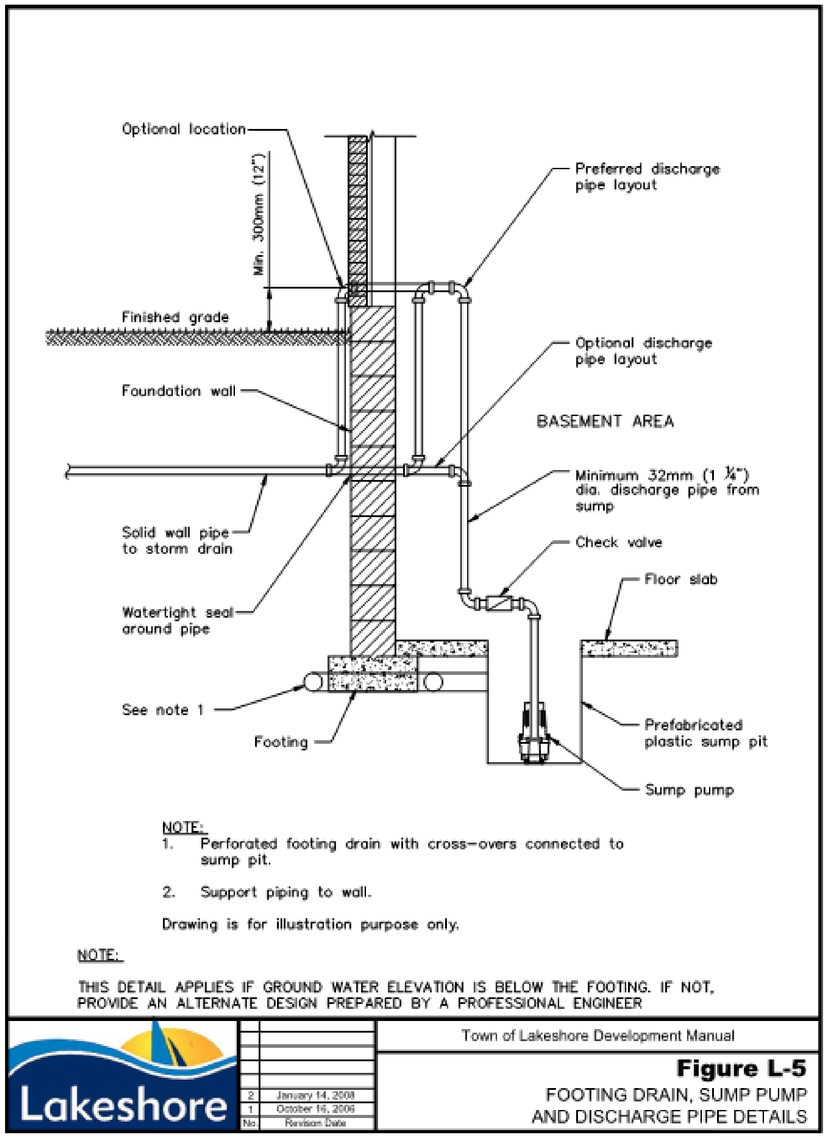
Sump Pump System Is Critical

In the event of a power outage, **a backup sump pump system is strongly recommended**. It is also recommended to have a sump pump discharging to the ground surface.

Common failures:

- Primary pump can't keep up
- Power outage
- Primary pump burns out
- Pump switches get hung up – pump doesn't turn on
- Pump clogs with sediment, mud, debris





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Recommended Solution A

IMPROVING PRIVATE DRAINAGE SYSTEMS

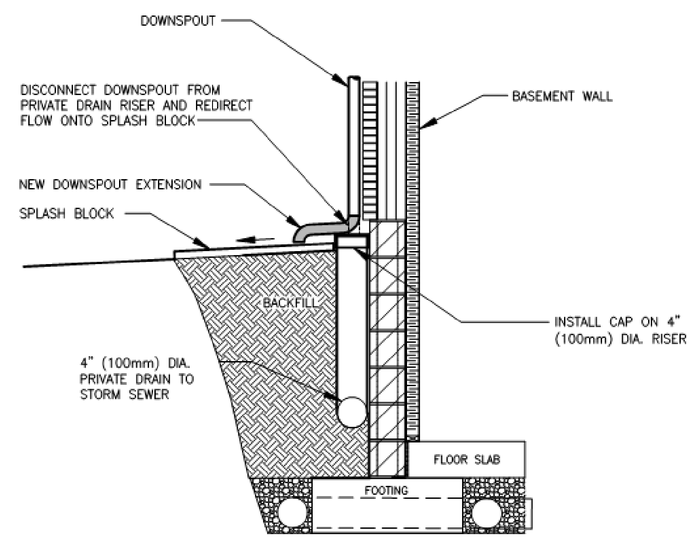
Downspout Disconnection

When feasible, disconnection of the roof downspouts from the underground sewer system can significantly reduce the direct inflow of water to the private drainage system. However, care must be taken to direct roof water to the street and/or rear yard drainage inlet and <u>not</u> on neighbouring property. Steps to disconnect include:

1. Assessment of the house layout, number of downspouts, and surrounding land
2. Cutting the downspout pipe(s) and adding an elbow joint to redirect the water to a grassed surface away from the building
3. Use of a concrete or plastic splash-pad to prevent erosion
4. Capping and sealing the old ground connection(s) to be water-tight

<u>CHALLENGES:</u>

- Findings suitable locations to outlet (grass)
- Preventing outflow from causing flooding or ice on own or neighbouring property.



EAVESTROUGH DOWNSPOUT DISCONNECTION DETAIL

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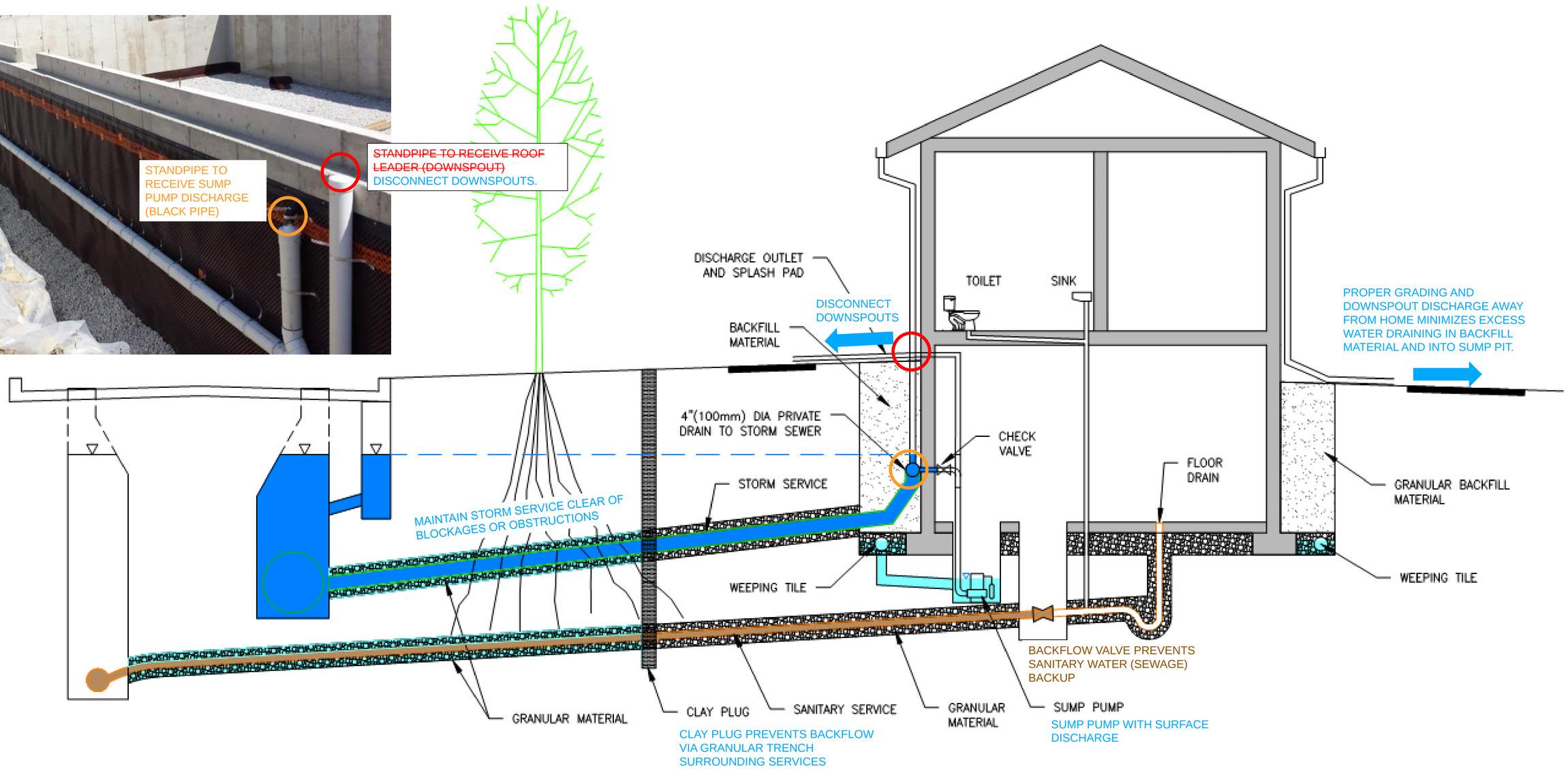
Recommended Solution A

BASEMENT FLOODING MITIGATION MEASURES



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LEGEND

STORM WATER

SANITARY WATER

Stantec

SERVICES CURRENTLY PROVIDED BY THE TOWN OF LAKESHORE

SERVICES

THE TOWN OF LAKESHORE CURRENTLY PROVIDES THE FOLLOWING SERVICES

1. CAMERA INSPECTION FOR SANITARY AND STORM SEWERS (FREE)
    - FOR INVESTIGATING SOURCES OF PROBLEMS WITHIN PRIVATE SANITARY AND STORM SYSTEM
2. BACKFLOW VALVE (SUBSIDY AVAILABLE)
3. SUMP PUMP OVERFLOW (SUBSIDY AVAILABLE)
4. DOWNSPOUT DISCONNECTION (SUBSIDY AVAILABLE)

PLEASE CONTACT THE TOWN FOR FUTHER INFORMATION
Email to: subsidies@lakeshore.ca
Phone Number: (519) 728-2818 ext. 1

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Potential Solution B Future Improvements

IMPROVING CONVEYANCE CAPACITY

Replacement of Existing Storm Sewers

Description

- Increase the size of the sewer pipe by replacing the old sewer with a larger pipe

What Does it Involve?

- Road excavation within Town limits
- Removal of old sewer and structures (manholes & catchbasins)
- Placement of new sewer, reconnection of sewer service line(s) and restoration of road and boulevard

Adding New Sewers (Twinning)

Description

- Increase the capacity of the sewer system by adding another sewer pipe in addition to the existing pipe

What Does it Involve?

- Road excavation within Town limits
- Replacement of old structures (manholes & catchbasins) and reconnection of sewer service line(s), if necessary
- Placement of new sewer, reconnection of sewer service line(s) and restoration of road and boulevard

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Potential Solution B Future Improvements

ADDING STORAGE CAPACITY

Dry Pond

Description

- An engineered surface depression that controls the quantity of inflowing stormwater through storage and slow release to the receiving system
- Typically fills with water during extreme storm events and drains within 24 to 48 hours or less

What Does it Involve?

- Excavation and shaping of a suitable open space
- Addition of inlet/outlet structures
- Restoration and landscaping; signage

Wet Pond/Wetland

Description

- An engineered pond or wetland with a permanent water surface that controls the quantity and quality of inflowing stormwater through storage and slow release to the receiving system

What Does it Involve?

- Excavation and shaping of a suitable open space
- Addition of inlet/outlet structures
- Restoration and landscaping (aquatic and side-slope)
- Infrequent maintenance (sediment removal)

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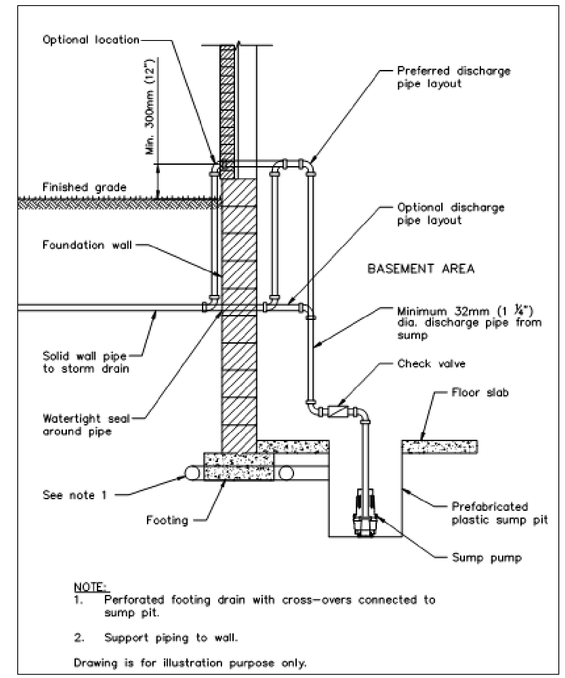
Recommended Solutions

SOLUTION A – PRIVATE SYSTEM MAINTENAINCE/IMPROVEMENTS

- Most critical – First line of defense
- Can be implemented immediately
- Homeowner must take an active role
- Need to direct water away from the home
- Private systems can be complex – Seek help from a professional



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Potential Future Solutions

SOLUTION B – INCOMPLETE LIST OF POTENTIAL TOWN IMPROVEMENTS

- Country Walk & Dean subdivision – Pond deepening
- Leffler Drain system improvements
- Pond expansions to meet new stormwater standards
- Where feasible and beneficial, utilize parkland for major storm storage
- Storm sewer system improvements on a prioritized basis
- Outfall improvements to mitigate backwater from waterbodies
- Standard Operating Procedures for pump stations and improvements where applicable

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Study Recommendations To Date…

1. Expand inflow & infiltration reduction program to include RainGuards on all sanitary manholes.
2. Retrofit submerged outfalls to have backflow prevention and impervious plug. Where feasible, consider pumping to dewater sewer systems and trenches.
3. Perform required maintenance on SWM Facilities.
4. Expand upon storm sewer condition assessment and maintenance program.
5. Support camera inspection program of private infrastructure with no cost for camera inspections.
6. Support continued education & subsidy programs to maintain/improve private drainage systems. (Educational video's, etc.)
7. Enhanced new SWM standards for future development.
8. Country Walk Pond deepening.

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Thank You for Attending

We welcome your feedback. Please fill out the comment sheet and flooding survey provided.

Following this PIC, the study team will review and consider your comments in the assessment of the flooding issue and development of alternative solutions.

The next PIC is tentatively scheduled for Winter 2019 to present various solutions considered and solicit feedback from the public on alternative solutions.

Contact Information

For more information on this study, to provide your comments, or to be placed on the project mailing list, please contact:

TOWN OF LAKESHORE

Town Hall: 519-728-2700 Toll Free: 1-877-249-3367

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