WELCOME

North-East End Flood Remediation Study

PUBLIC INFORMATION CENTRE

October 17th, 2019

5:00 p.m. – 7:00 p.m.

Branlyn Community Centre

238 Brantwood Park Road, Brantford

PURPOSE OF PUBLIC INFORMATION CENTRE

The Public Information Centre is designed to provide:

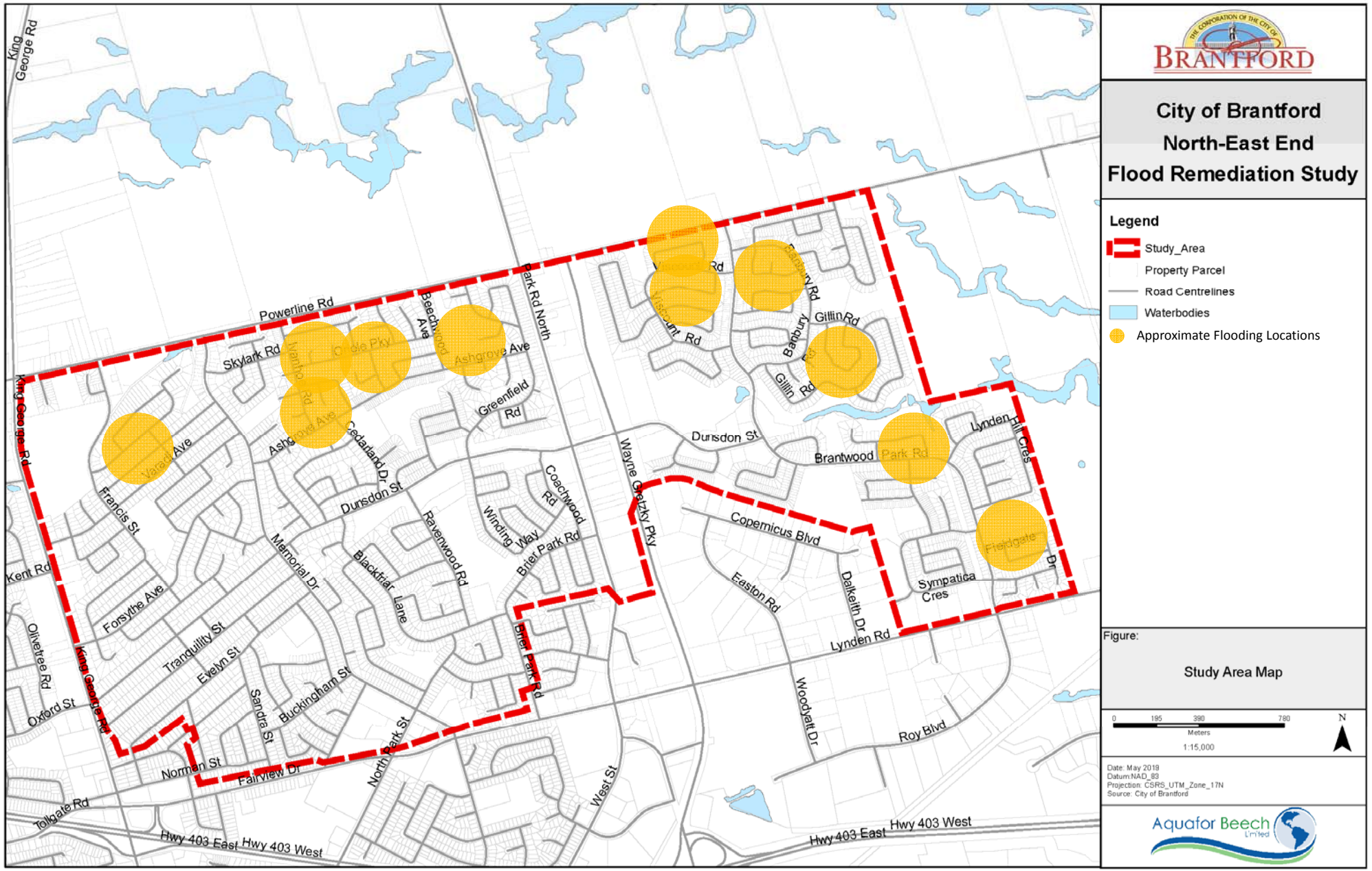
- Overview of the study
- Key tasks accomplished
- Findings of the investigations
- Stormwater recommendations
- Proposed remediation solutions
- Opportunity for community input

STUDY OVERVIEW

The north-east end of the City of Brantford experienced basement and surface flooding during a heavy rainfall event in August 2017.

As a result, the City initiated the North-East End Flood Remediation Study to investigate the causes of flooding, identify any deficiencies in the infrastructure, and recommend solutions to reduce the risk of future flooding in the area.

STUDY AREA AND FLOODING MAP



City of Brantford
North-East End
Flood Remediation Study

Legend

- Study_Area
- Property Parcel
- Road Centrelines
- Waterbodies
- Approximate Flooding Locations

Figure:

Study Area Map

0 195 390 780 Meters

1:15,000

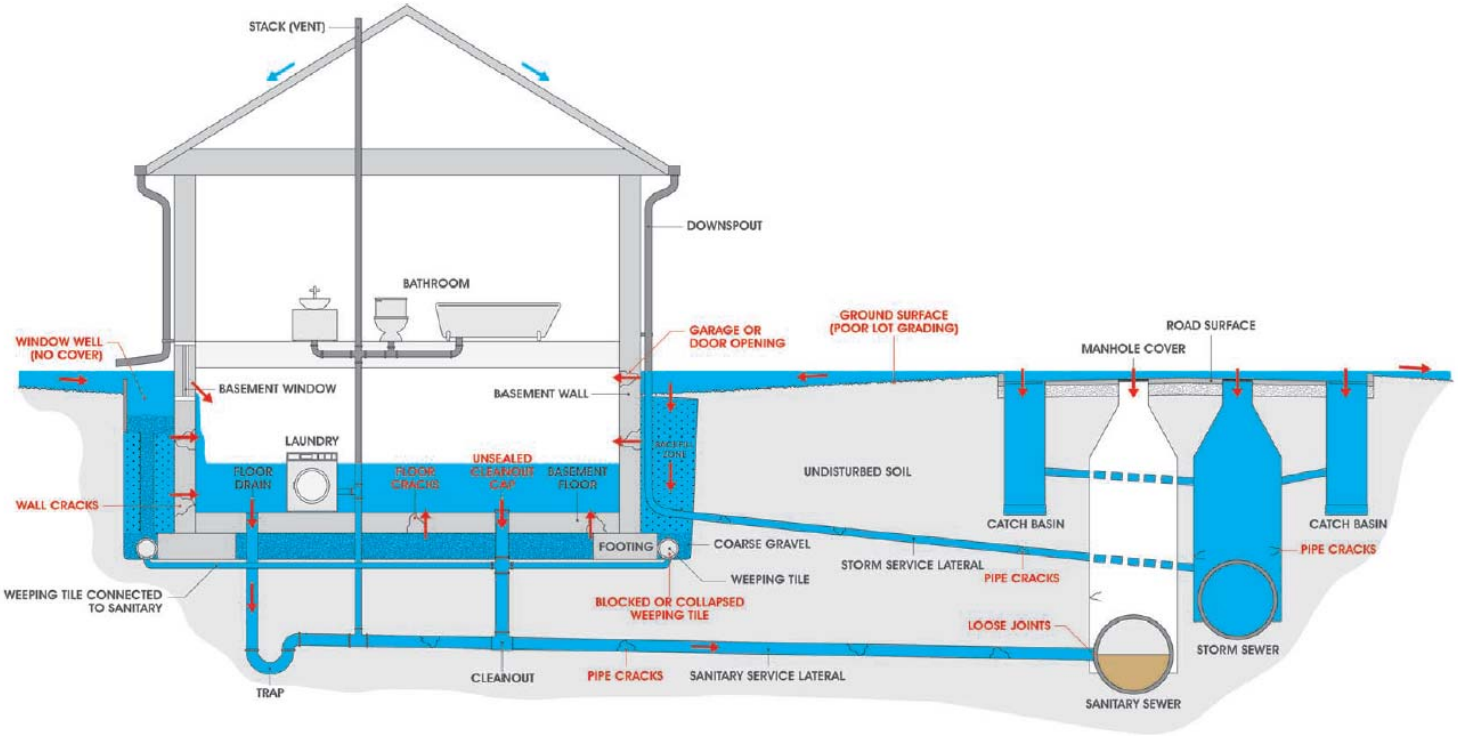
N

Date: May 2019
Datum:NAD_83
Projection: CSRS_UTM_Zone_17N
Source: City of Brantford

WHAT CAUSES BASEMENT FLOODING?

There are 3 major conditions that can lead to basement flooding:

1. **Overland flooding**
   - Intense rainfall events overwhelm the sewers;
   - Sewer surcharges and leads to excess surface water;
   - Improper lot grading directs water towards the house;
   - Water enters the house through uncovered window wells, doors, etc.



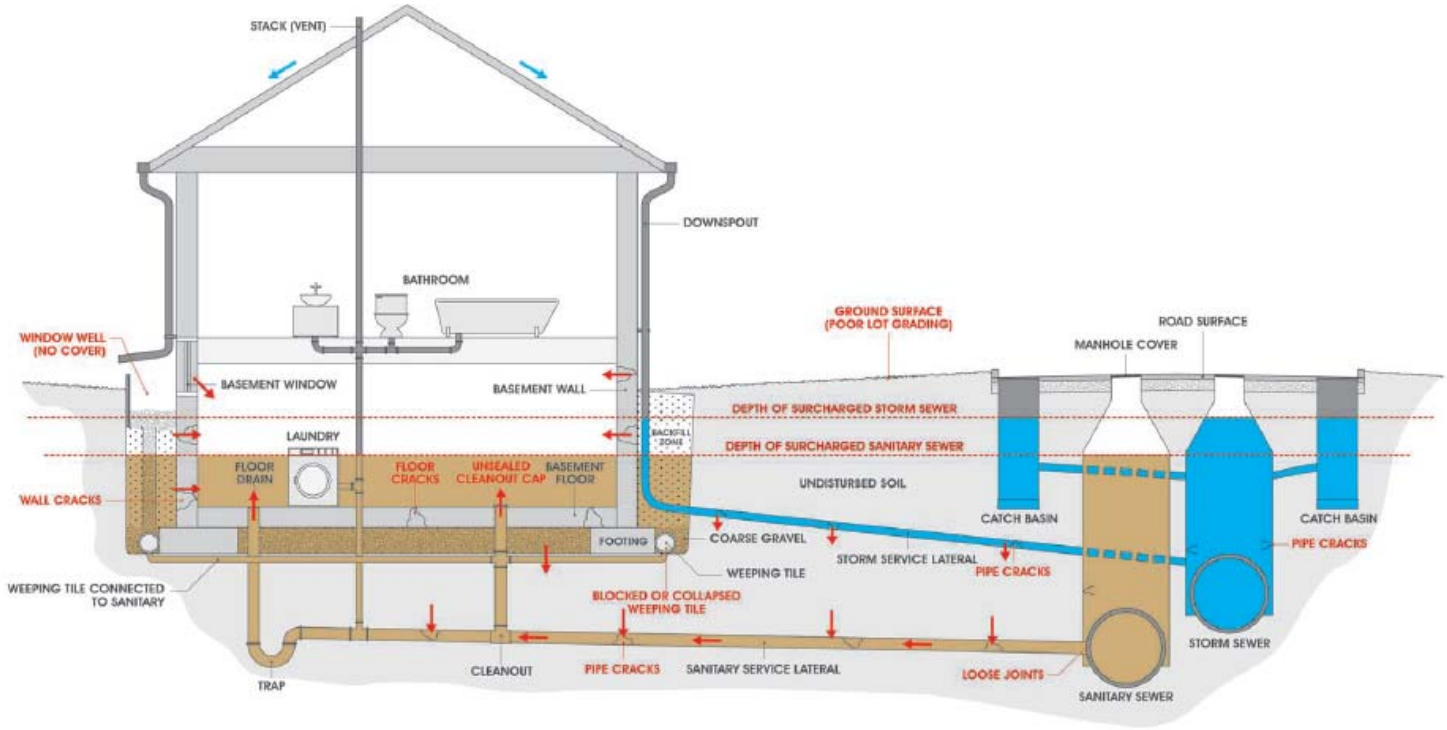
Basement flooding caused by overland flooding and infiltration flooding

Image source: Handbook for reducing Basement flooding, (Institute for Catastrophic Loss Reduction, 2009)

WHAT CAUSES BASEMENT FLOODING?

2. **Sewer Backup**

- Excess flows, infiltration and improper connections causes the flow to exceed what the storm or sanitary sewer is designed for;
- For homes with foundation drains connected to the sanitary sewer (pre 1970), water enters through weeping tile or floor drain (see illustration below).
- For homes with foundation drains connected to the storm sewer (post 1970), water enters through the weeping tile.



Basement flooding caused by Sanitary Sewer Backup

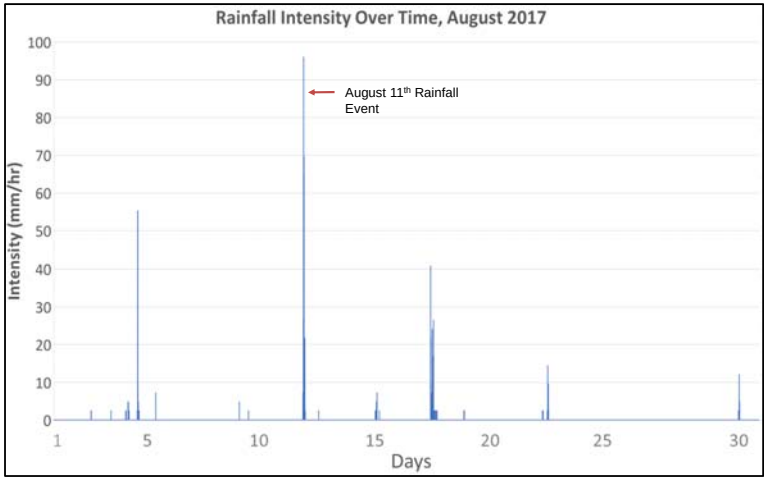
Image source: Handbook for reducing Basement flooding, (Institute for Catastrophic Loss Reduction, 2009)

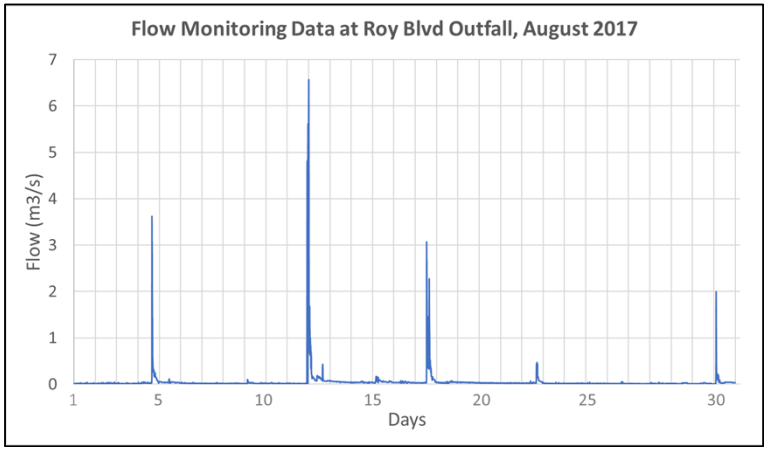
WHAT CAUSES BASEMENT FLOODING?

3. **Groundwater Infiltration**
    - Groundwater level is higher than the basement floor;
    - Groundwater enters the house through cracks in the basement floor and walls;
    - Weeping tiles / foundations drains are in disrepair and are unable to remove water from foundation.

OVERVIEW OF KEY TASKS COMPLETED

- **Review of available background information, included:**
  - Geotechnical and topographic information
  - As-built drawings and plumbing records
  - Closed Conduit Television (CCTV) records
  - Flood records
  - Rainfall and flow monitoring data
- **Field investigation**
  - Home visits with ten (10) private home owners
  - Powerline Road drainage survey
  - Ground elevation and manhole survey
- **Development of a computer model with both storm and sanitary sewers**
- **Smoke tests on storm sewer system**

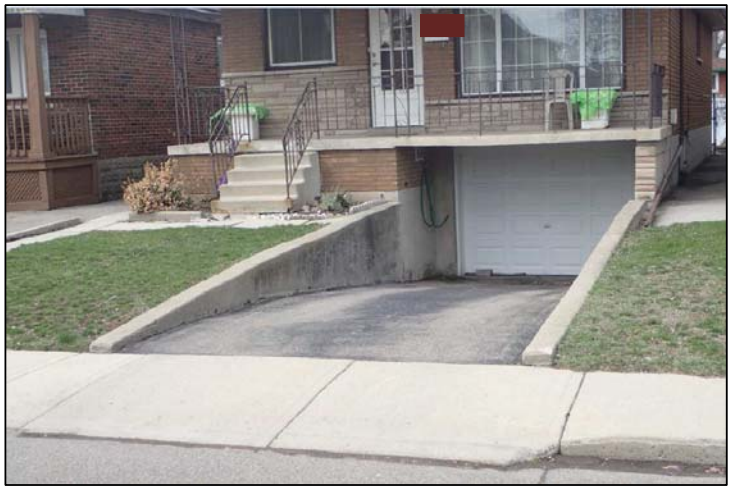




EXISTING CONDITIONS

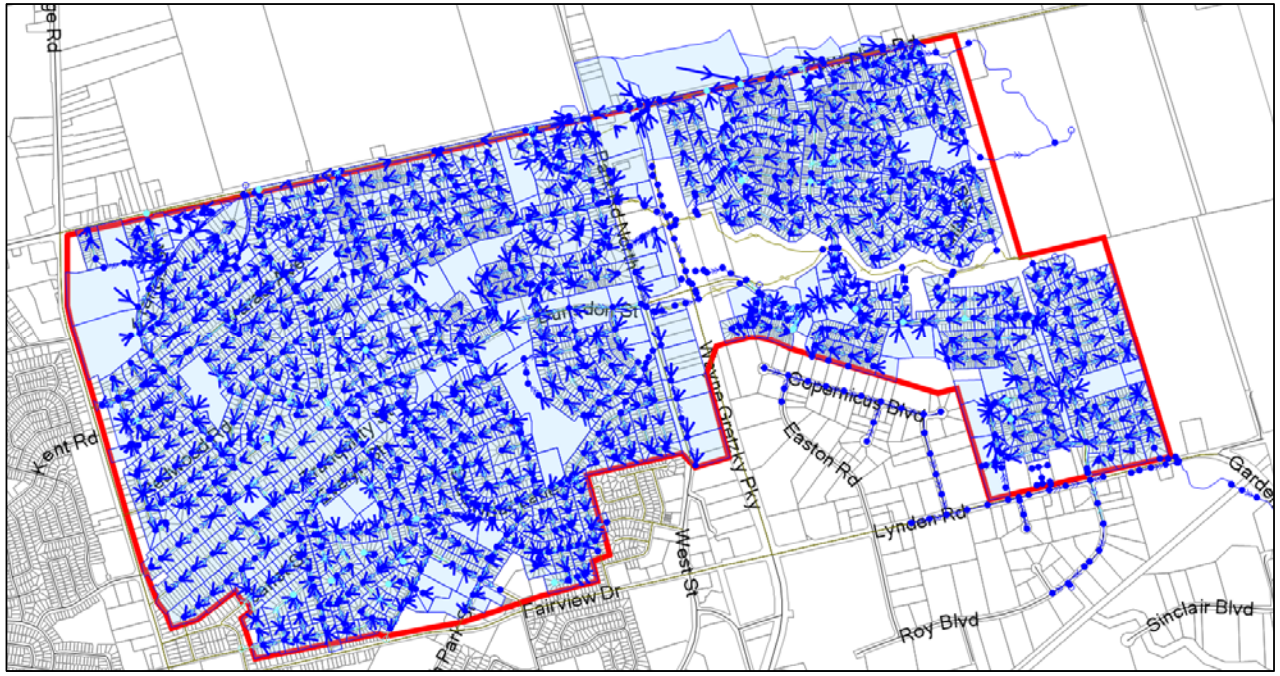
Connected downspouts (eavestroughs) direct flows into the underground sewer system and increase the potential of overwhelming the sewer system during heavy rainfall events.

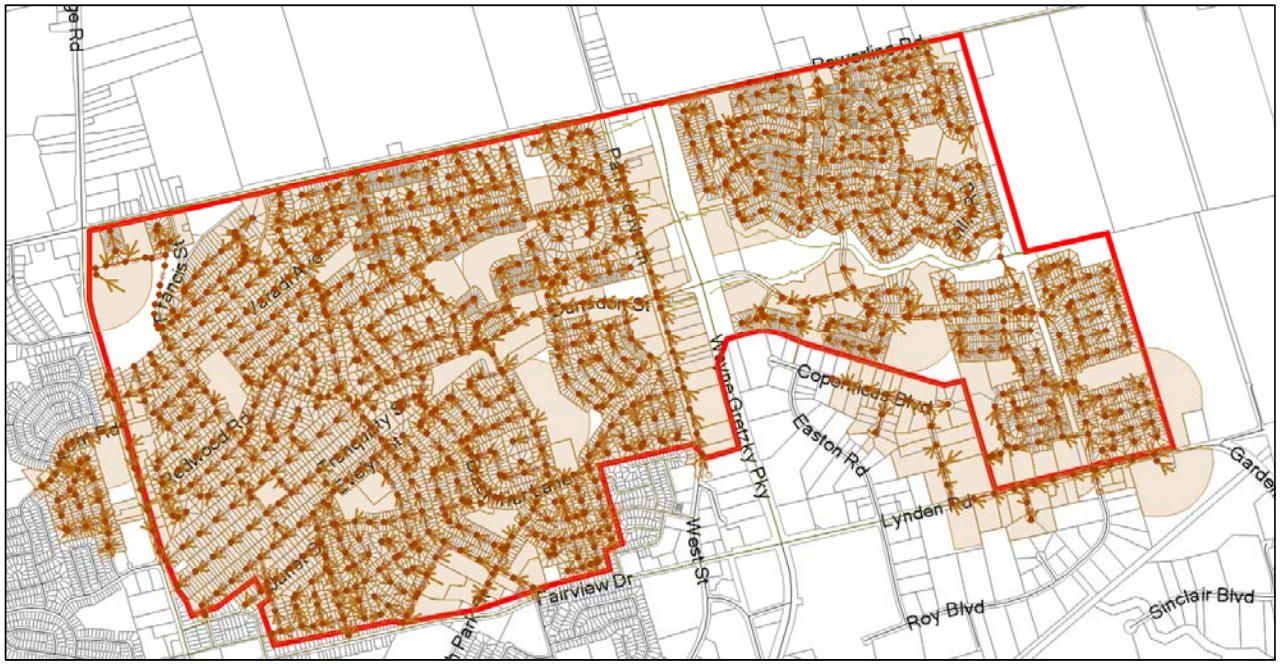
Disconnected downspouts (eavestroughs) direct flows to garden or lawn, which helps promote infiltration, reduce the amount of water entering the sewer system, and delays the time of water entering the sewer system.



Homes with reverse slope driveways, without trench drainage in front of the garage, could be susceptible to overland flooding.

COMPUTER MODEL

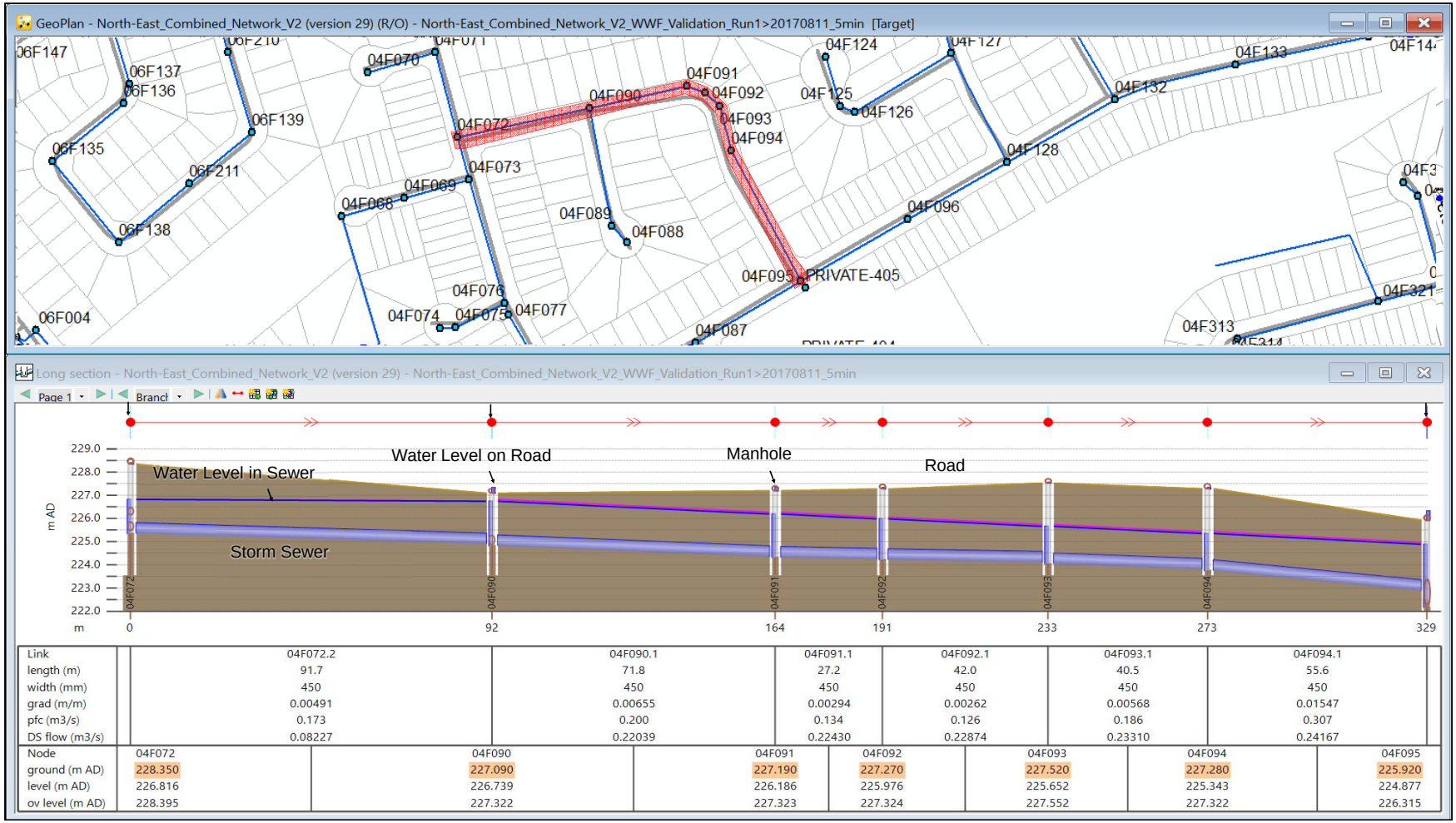




Storm network (on the top) and sanitary network (on the bottom) were developed and integrated in the computer model.

The two figures illustrate the subcatchment drainage and sewer network

COMPUTER MODEL



An example plan and profile view of model results under the August 11th, 2017 rainfall event.

The simulated water level in the storm sewer is higher than basement level at some locations. This results in the potential for sewer back-up and basement flooding for these houses.

PRELIMINARY RESULTS OF SMOKE TESTING

Smoke tests of the storm sewer system was undertaken at ten (10) select streets with in the Study Area. Preliminary findings are illustrated below.

Smoke from plumbing vent, indicating potential cross-connection between sanitary lateral and storm sewer.

Weak smoking garage catchbasin, indicating potential blockage in storm drain.

Foundation drain was smoking during the test.

Basement sump pump was smoking, indicating direct connection to storm sewers on street.

Connected downspout was smoking during the test.

RECOMMENDED SOLUTIONS

A primary cause of flooding is overloading of the storm sewer system during significant rainfall events. There are a number of measures that can be undertaken to reduce flooding. These measures are summarized below:

1. Operation and maintenance measures;
2. Private property measures;
3. Limit flow into storm sewers;
4. Protect homes with reverse slope driveways;
5. Provide extra capacity in storm sewers;
6. Other unique opportunities.

1. OPERATION & MAINTENANCE MEASURES

CCTV inspections provide a visual of the inside of a pipe and assist in defining the structural and hydraulic capacity of the sewers.

The results from the study show that some streets have issues such as calcite build-up, cracks along the sewer, etc., this can reduce flows within the pipe and ability to convey flows.

Recommendation

Continue with the existing CCTV program that identifies structural / hydraulic limitations within the system, followed with the City's Sewer Lining Program and/or installation of new pipes.

2. PRIVATE PROPERTY MITIGATION

Homeowners can help mitigate flood threats by managing stormwater on private property that can assist in reducing the stormwater amounts before it enters the City's sewers.

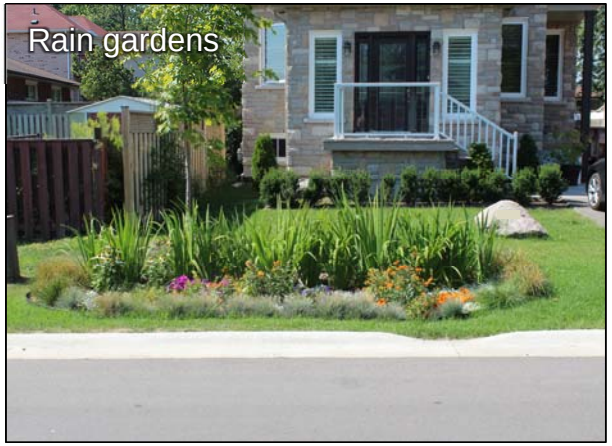
Recommendation

1. Downspout disconnection
2. Install rain barrels to collect stormwater
3. Install a sump pump and discharge flows to pervious ground surface
4. Build rain gardens to increase infiltration


Rain barrels


Disconnected downspout


Disconnected downspout to gardens


Rain gardens

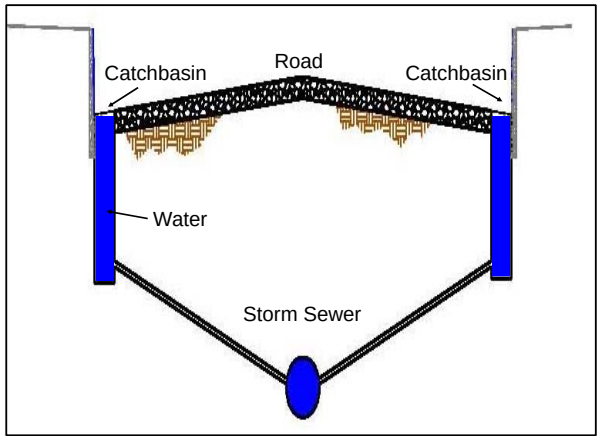
3. LIMIT FLOW INTO STORM SEWERS

Inlet Control Devices (ICD) are used to control the flow going into the storm sewer during large rainfall events. Some benefits include:

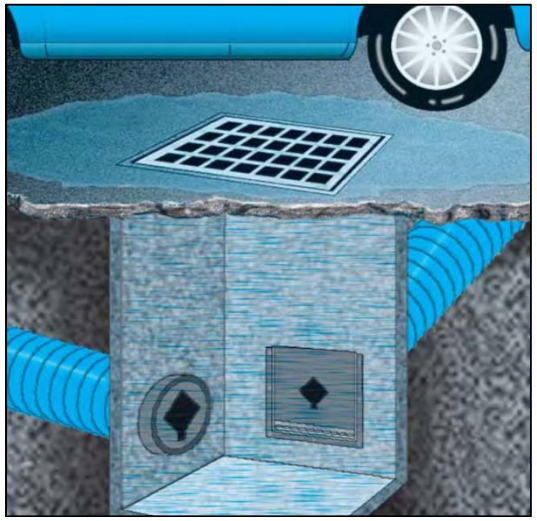
- Control flows into storm sewer and allow surface ponding where appropriate
- Reduce sewer overloading / surcharging conditions
- Mitigate foundation seepage and storm / sanitary sewer back-up downstream

Recommendation

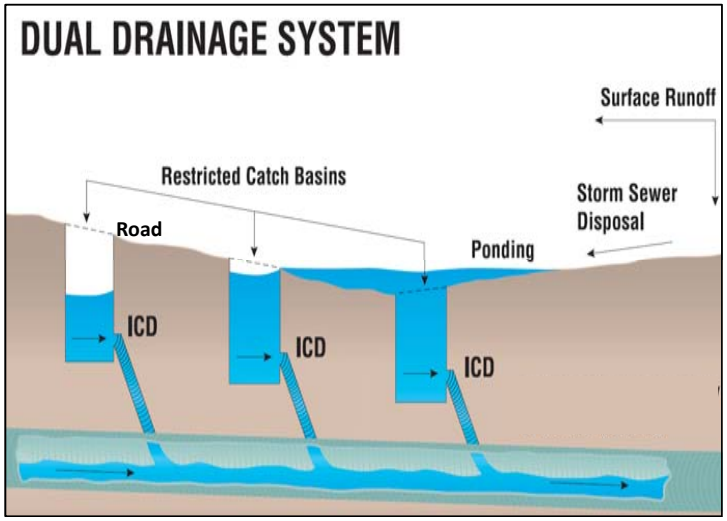
Expand the use of ICDs to restrict catch basin flows to the storm sewer system, where appropriate.



Overloaded storm sewers



ICDs installed on catchbasin



Previously overloaded sewer now able to convey flow at downstream (Source: http://www.canadiancontroldevices.com & http:// www.ipexamerica.com)

4. PROTECTHOMES WITH REVERSE SLOPE DRIVEWAYS

Many homes within the study area have reverse slope driveways with a single catchbasin drain in front of the garage (see photos to the right).

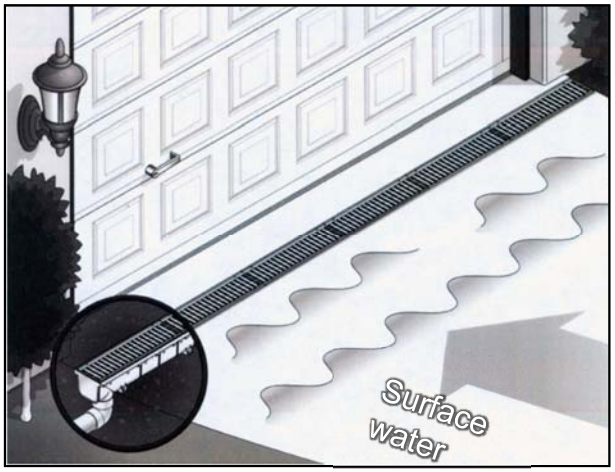
During large rainfall events, stormwater on the road spills over the curb and flows down the driveway. In turn, these homes are more subject to garage and / or basement flooding.


Elevated catchbasin which is not able to capture low overland flows


Accumulated sediments from past overland flows

Recommendation

Implementation of driveway grates at driveway approaches with reverse slope driveways for better stormwater capture during rainfall events.



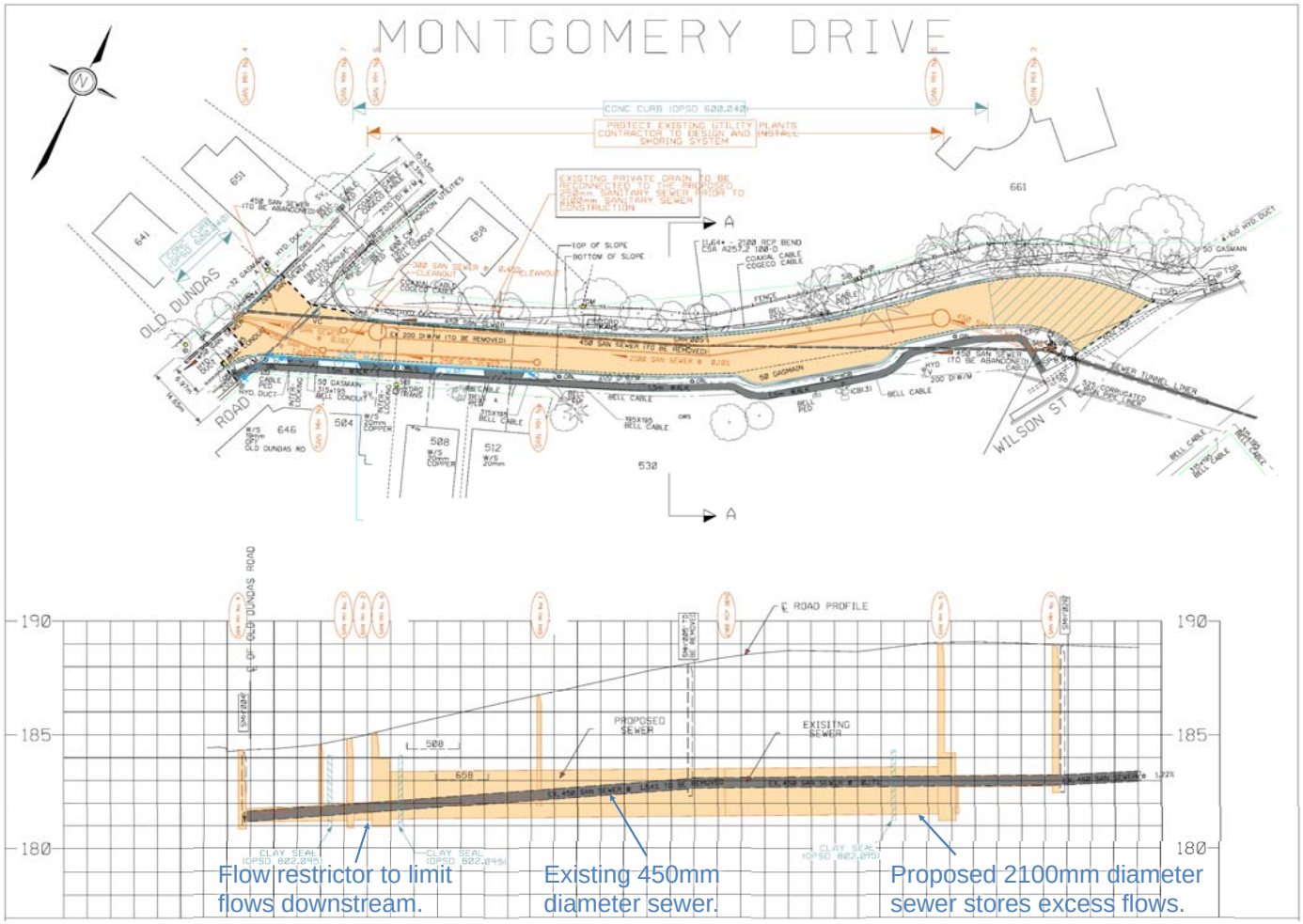

Grate in front of reverse slope driveway

5. PROVIDE EXTRA CAPACITY IN STORM SEWERS

Conveyance control measures help to control stormwater as it travels along the drainage system (in pipes or on road).

Recommendation

1. Increased sewer capacity
2. Underground storage pipes



The example shows that the existing 450mm sewer was replaced with a 2100mm sewer for both conveyance and underground storage.

6. UNIQUE OPPORTUNITIES

An innovative solution, includes a recreational playground or soccer field with an infiltration basin underneath. This assists local flooding issues with recreational services at the same time. The playground could provide storage for stormwater runoff and the infiltration facility underneath the playground can treat stormwater runoff.

Recommendation

Implement the comprehensive solution where appropriate.

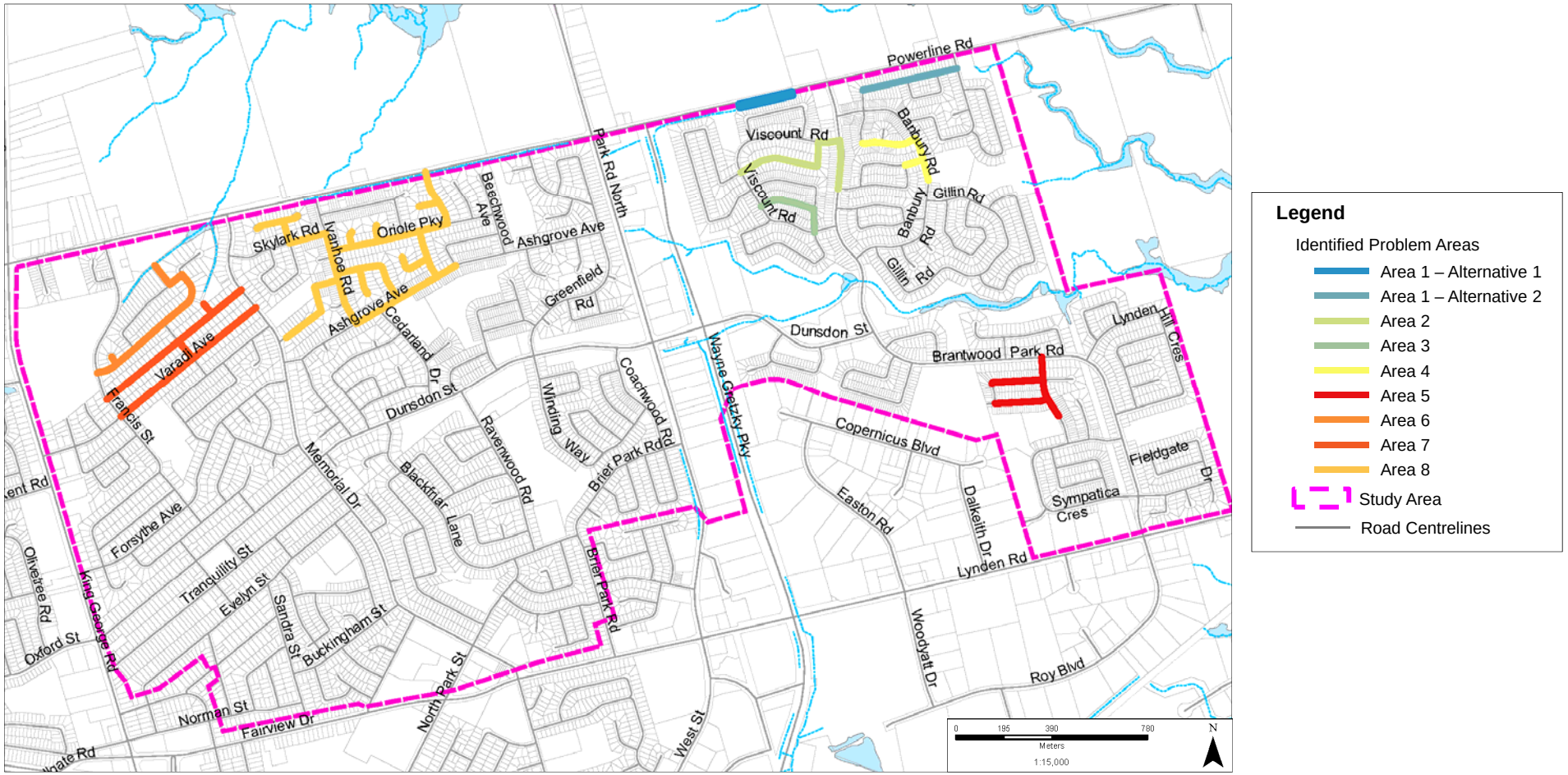
This example illustrates the implementation of a comprehensive and innovative plan to address a number of issues including flood control, recreation, water quality management, and aquatic and terrestrial habitat improvement. Terraview Park, City of Toronto.

Infiltration basin underneath the soccer field to treat stormwater runoff.

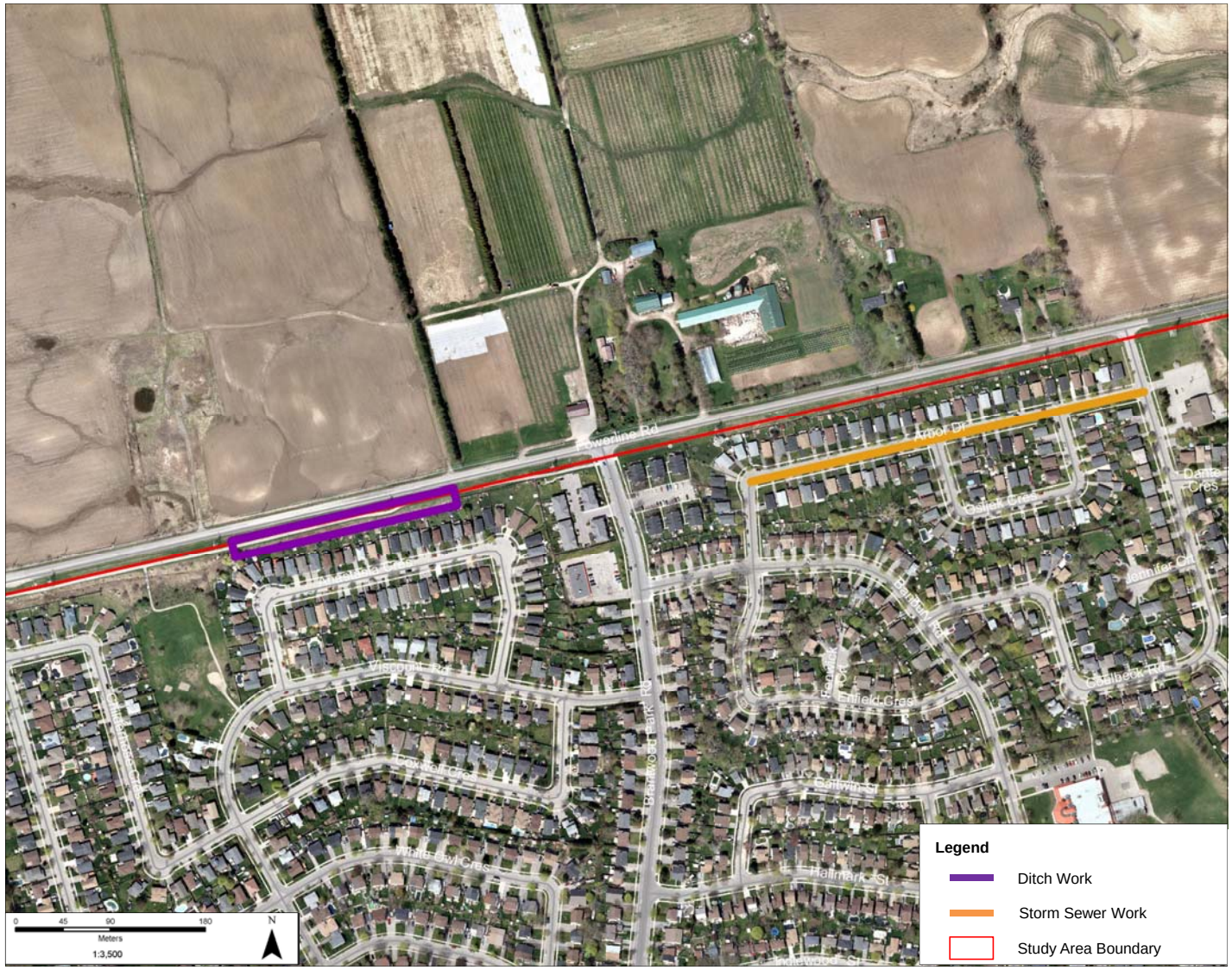
PROPOSED SOLUTIONS FOR PROBLEM AREAS

The North-East End Flood Study identified eight (8) areas that have been categorized based on the potential cause of flooding and the location.

A combination of remediation alternatives are identified for different areas within the flood study areas.



PROPOSED SOLUTIONS FOR AREA 1

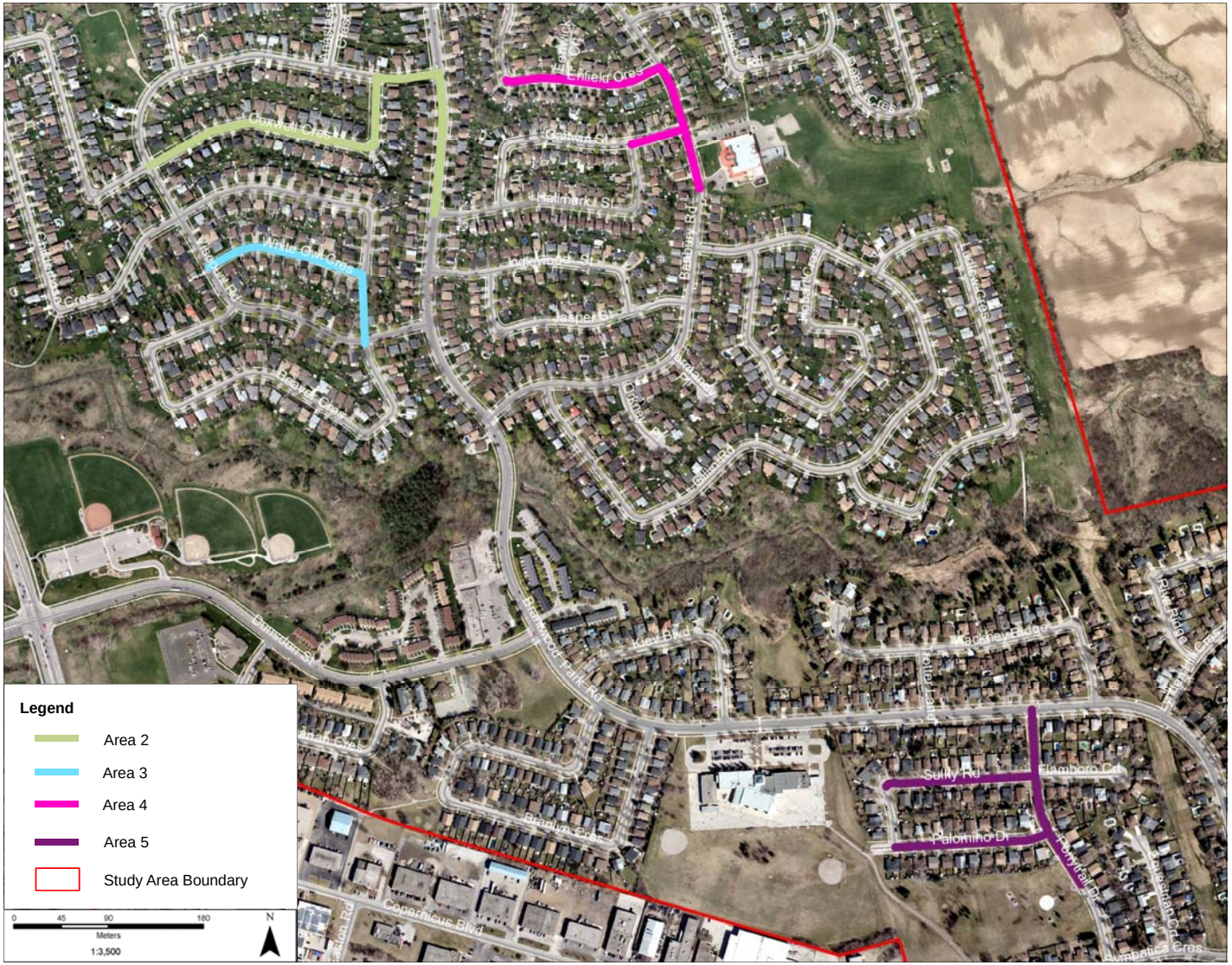


Flows along Powerline Road are conveyed easterly to a storm sewer located along Arbor Drive.

Remediation Solutions

- Regrade the channel along Powerline Road to increase the capacity, highlighted in purple; or
- Increase the storm sewer capacity along Arbor Drive, highlighted in orange.

PROPOSED SOLUTIONS FOR AREA 2 - 5



The highlighted streets have undersized storm sewers.

Remediation Solutions

- Limit flows into storm sewers
- Provide extra capacity in the storm sewer at strategic locations within the area

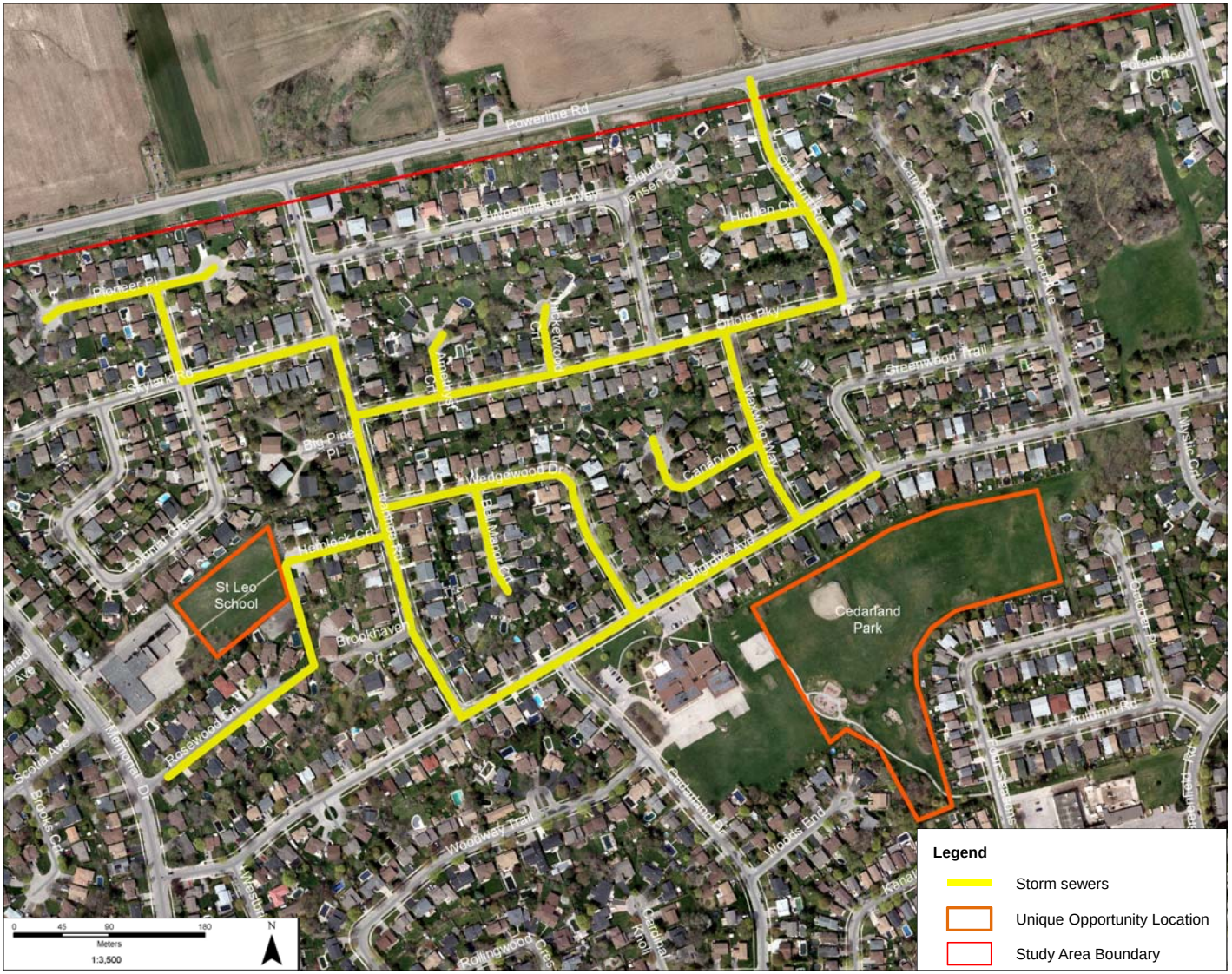
PROPOSED SOLUTIONS FOR AREA 6 & 7

The storm sewers highlighted convey stormwater to a trunk storm seer and adjacent creek (outlets).

Remediation Solutions

- Limit flows into storm sewers
- Increase the storm sewer capacity at strategic locations

PROPOSED SOLUTIONS FOR AREA 8



The stormwater sewers highlighted convey stormwater to a storm trunk sewer along Ashgrove Avenue.

Remediation Solutions

- Limit flows into storm sewers
- Protect homes with reverse slope driveways
- Increase the storm sewer capacity
- Opportunities to provide storage in St. Leo School playground, Cedarland Park may be implemented.

City of Brantford's Water Related Programs

The City of Brantford has a few grant, loan and incentive programs that are available to the residents within the Study Area.

1. Basement Flooding Prevention Program

   https://www.brantford.ca/en/living-here/basement-flooding-prevention.aspx

2. Private Sewer Lateral Replacement Grant Program

   https://www.brantford.ca/en/living-here/private-sanitary-sewer-lateral-replacement.aspx

3. Rain Barrels

   https://www.brantford.ca/en/living-here/rain-barrels.aspx

WE WANT TO HEAR FROM YOU!

Please fill out the comment sheets.

All information collected will be used for this study only, and will not be shared with other parties. Your continued input will help us better understand the existing conditions, improve the results and help us create a comprehensive plan that can be implemented in partnership with the community.

Anyone that has further information or questions should send their comments to:

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Please provide your comments by October 31, 2019.

Your comments are encouraged and appreciated, as this will provide us an opportunity to address project issues and concerns.

NEXT STEPS

PUBLIC CONSULTATION – October, 2019

- Comment forms available for input.
- Compile and review feedback.

DEVELOPMENT OF SOLUTIONS – Q4, 2019

- Refine and finalize short and long-term solutions.

STUDY REPORT AND DRAWINGS – Q2-Q3, 2020

- Preparation of study report and conceptual design drawings.

NEXT STEPS FOR IMPLEMENTATION

- Implementation of remedial measures will be in phases, subject to Council approval.

THANK YOU

FOR PARTICIPATING IN THE NORTH-EAST END FLOOD REMEDIATION STUDY