

Appendix A
Notices and PIC Materials



Appendix A – Notice and PIC Materials**Table of Contents**

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4	Sign in sheet
5	Comments
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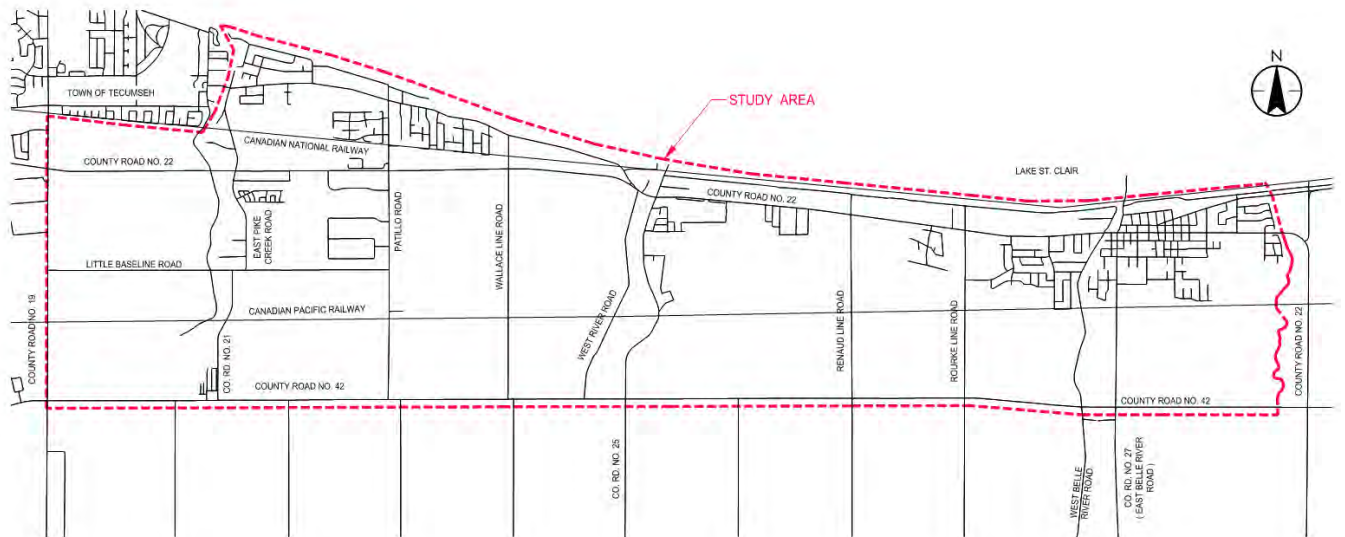
PIC#1

LAKESHORE STORMWATER MASTER PLAN STUDY – PHASE 1

NOTICE OF PUBLIC INFORMATION CENTRE NO. 1

THE STUDY

The Town of Lakeshore, through their consultant Stantec Consulting Ltd., has initiated a study to investigate the cause and solutions to basement flooding resulting from rainfall events that occurred in September 2016 and August 2017. The study is being undertaken as a Schedule B project under the Municipal Class Environmental Assessment. Phase 1 limits of the study area are County Road 42 to the south, Lake St. Clair to the north, County Road 19 (Manning Road) to the west and County Road 22 (near Duck Creek) to the east.



THE PROCESS

We need your help. Two Public Information Centres (PIC) are planned to solicit feedback from the public on initial findings of the study and potential solutions. Your participation will form an integral part of this study to ensure that your concerns, and those of affected residents within the study area, are identified, documented and assessed.

PUBLIC CONSULTATION

Public Information Centre No. 1

Purpose: To provide an information/progress update and solicit feedback from the public. The PIC will present typical causes of flooding and preliminary solutions.

Date: **Tuesday, November 27, 2018**

Time: Open House from 4:00 pm to 7:00 pm

Location: Atlas Tube Centre Lobby (447 Renaud Line Rd, Belle River, ON)

Any parties that wish to provide suggestions or comments about this study at this time should do so, preferably in writing, by contacting the individuals identified below.

Town of Lakeshore

Mr. Peyman Raji
Project Manager,
Floodwater Defence Action Strategy and Plan
(519) 728-1975 x240
praji@lakeshore.ca

Stantec Consulting

Mr. Alain Michaud
Municipal Engineer
Phone: 519-966-2250 x364
alain.michaud@stantec.com

Under the Municipal Freedom of Information and Protection of Privacy Act and the Ontario Environmental Assessment Act, unless otherwise stated in the submission, with the exception of personal information, all comments will become part of the public record.

This Notice issued 10th November, 2018

**ATTENTION RESIDENTS OF LAKESHORE
NOTICE OF PUBLIC MEETING**

**FLOODING ISSUE /
STORMWATER MASTER
PLAN PROGRESS UPDATE**

The Town of Lakeshore invites residents to an information/progress update meeting on the flooding issues resulting from recent extreme rainfall events. Visit the Town's website at www.lakeshore.ca under "Featured News" for more details.

**Tuesday, November 27 – Open House from
3:00 pm to 8:00 pm at Atlas Tube Centre
Lobby (447 Renaud Line Rd)**

Welcome

Lakeshore Stormwater Master Plan Study – Phase 1

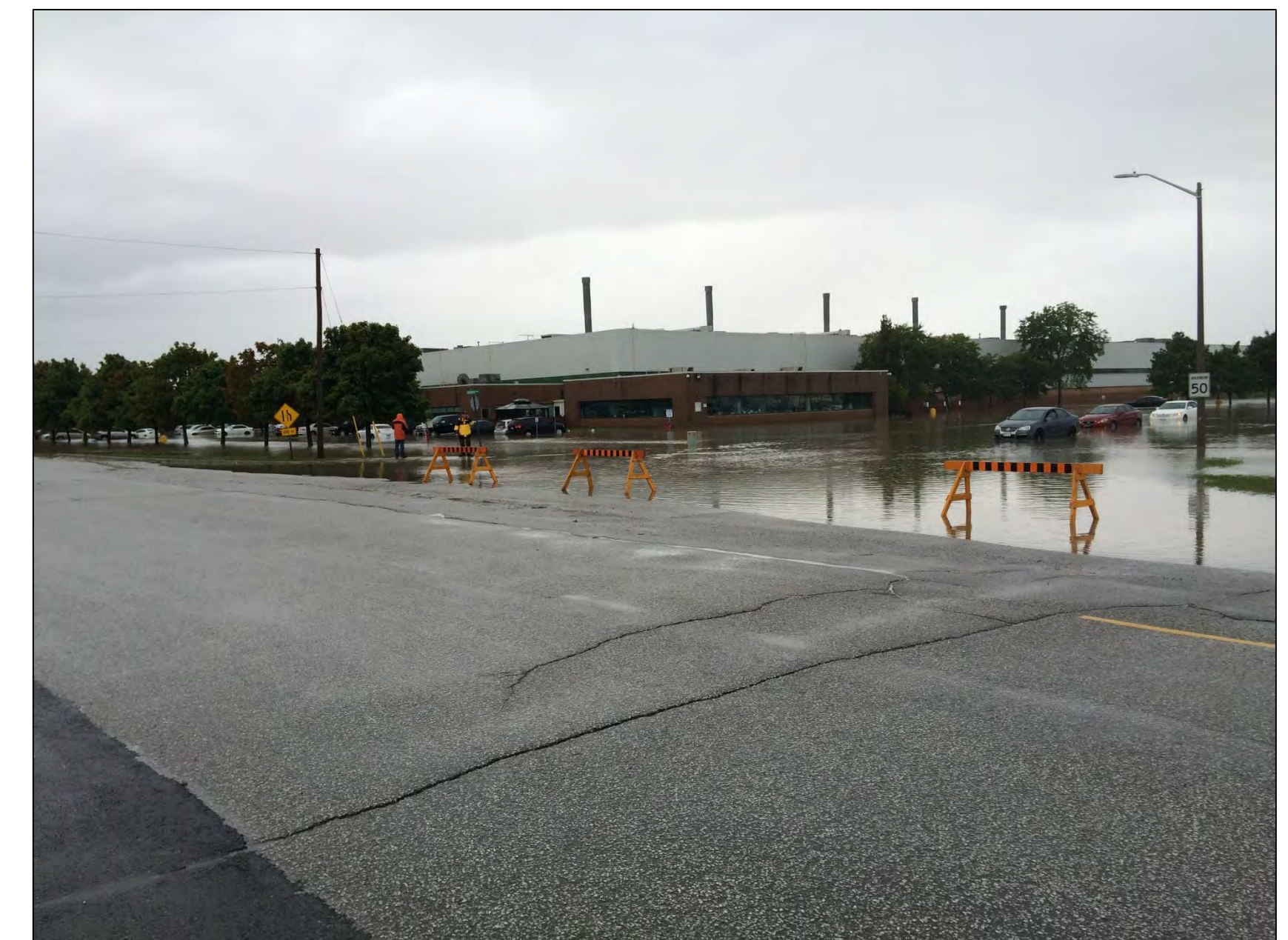
Public Information Centre #1 (PIC)

View displays and discuss the study with project staff

Feel free to ask questions and fill out a comment sheet

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*.

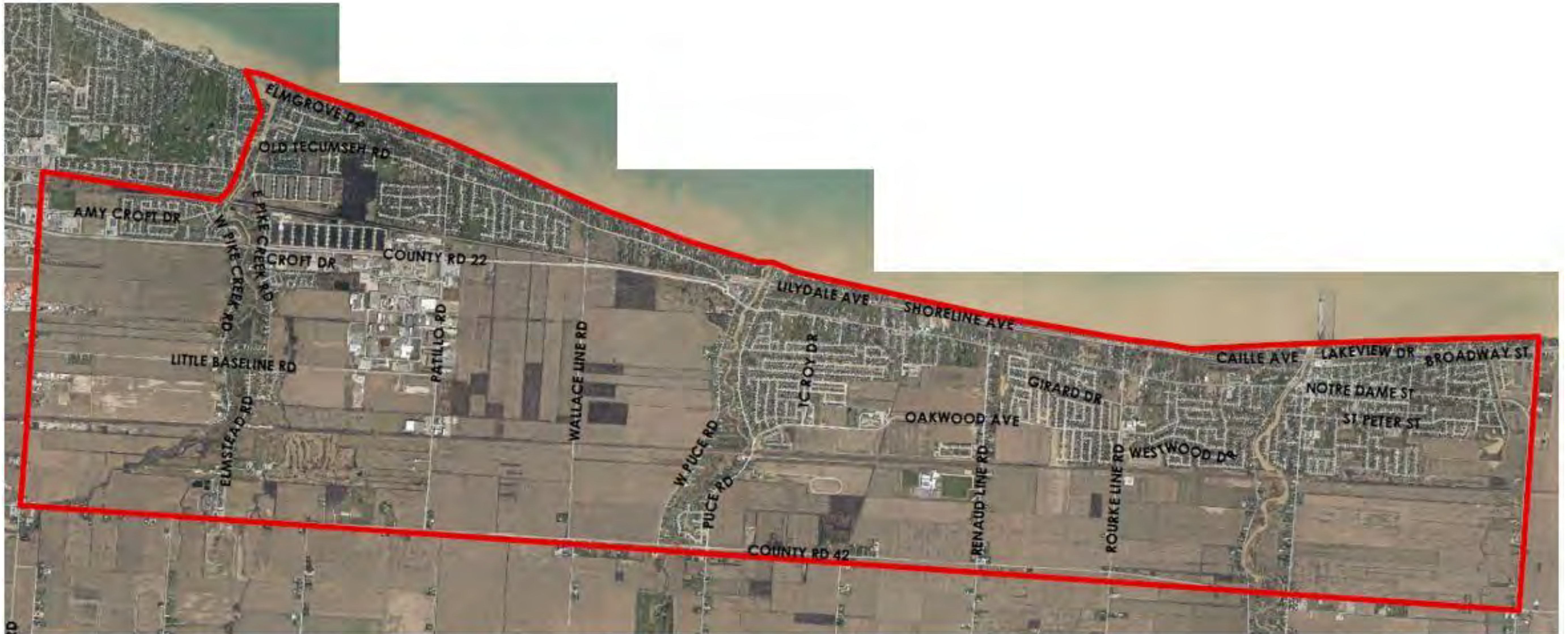


Purpose of Our Study

- 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

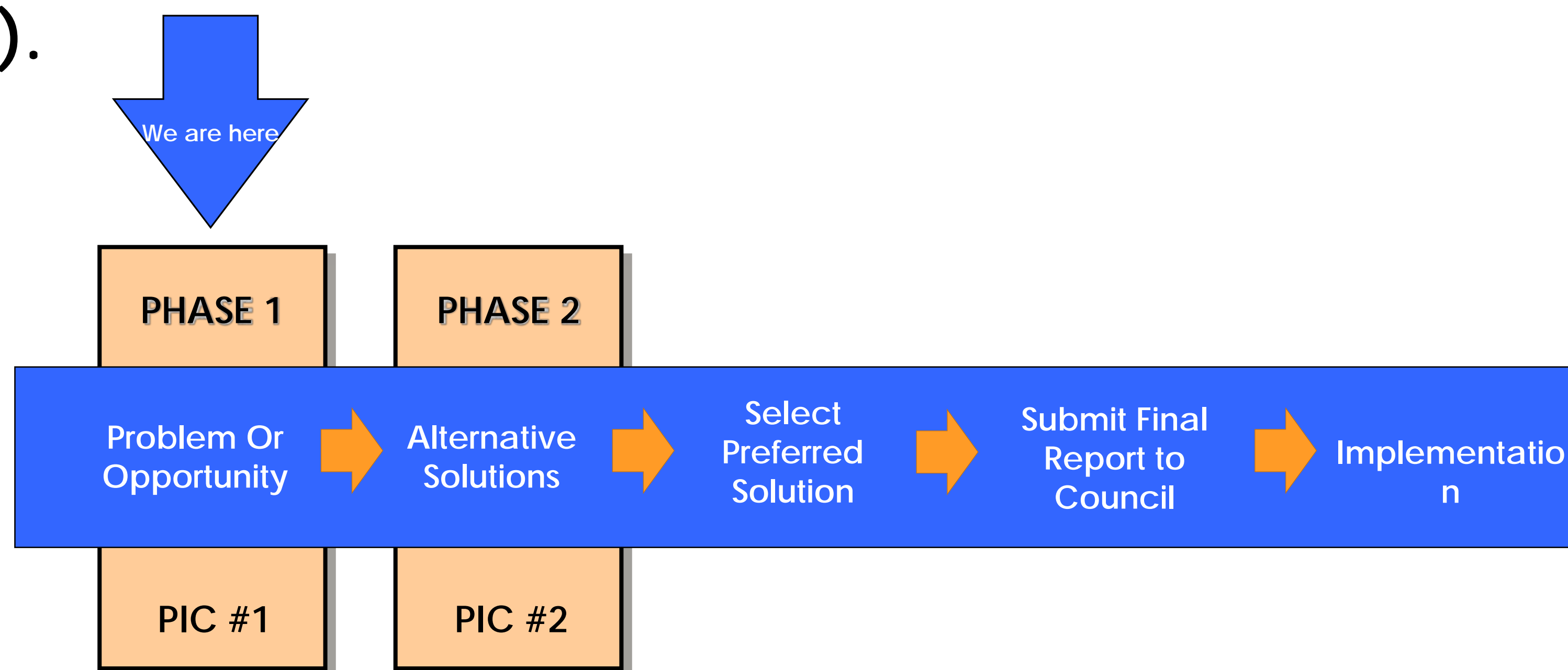


Study Area



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)**.



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

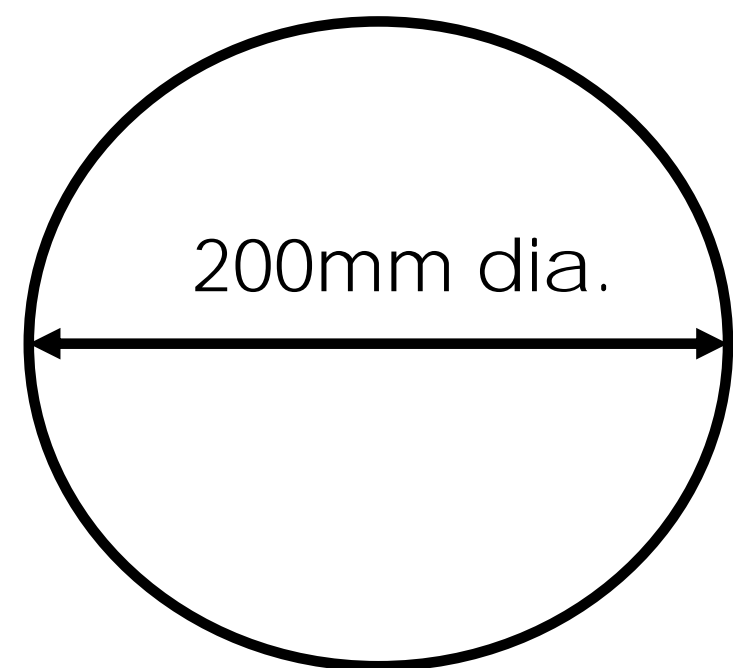
Potential Basement Flooding Factors

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

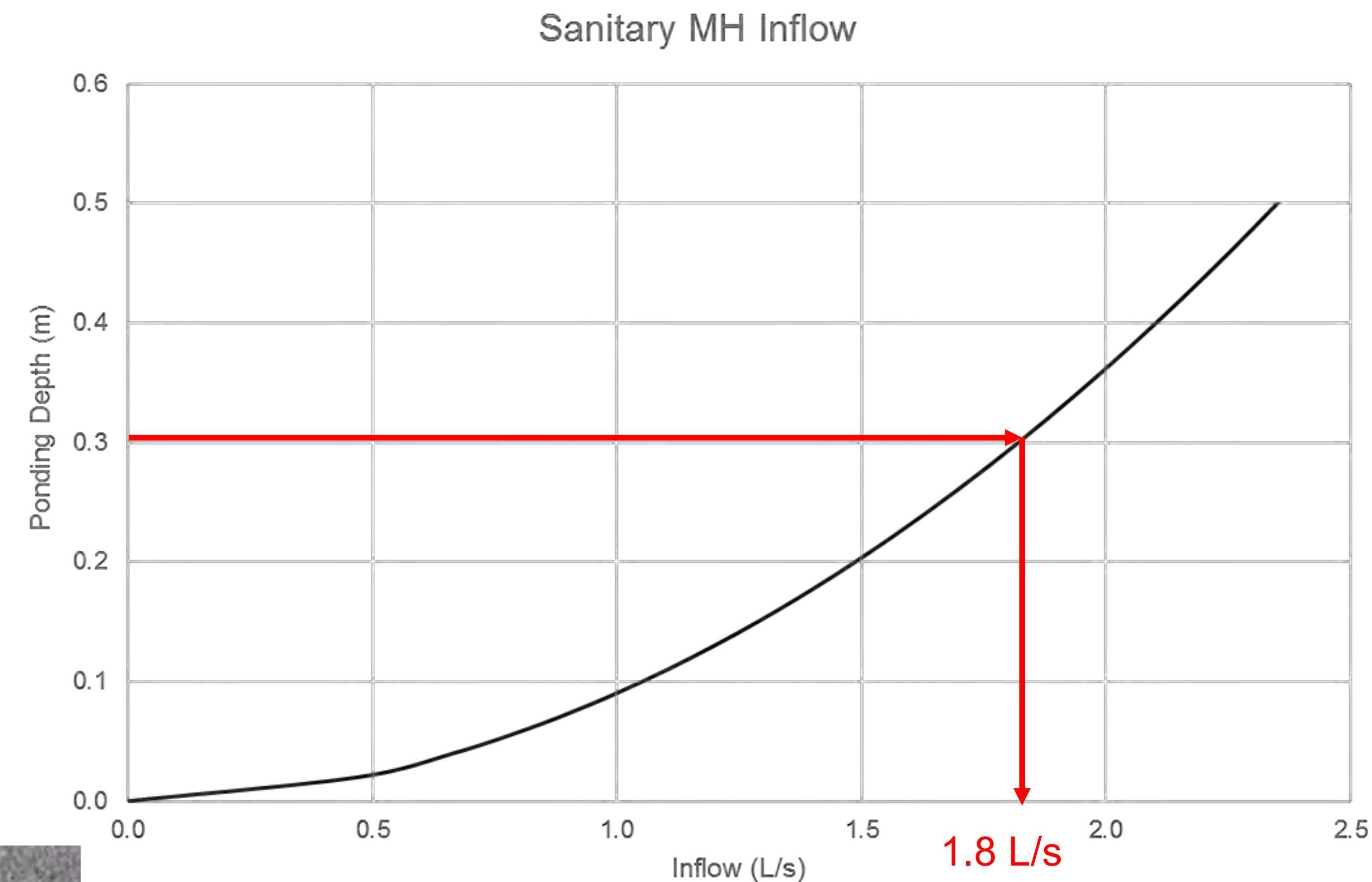
- Stormwater flow exceeds the storm sewer capacity and overloads the system.
- Private drainage systems can become surcharged – backfill areas surrounding foundation walls become saturated with water.
- Private drainage systems are potentially deficient (i.e. – cracked pipes, sump pump failure, tree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

Sanitary Sewer Inflow & Infiltration

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

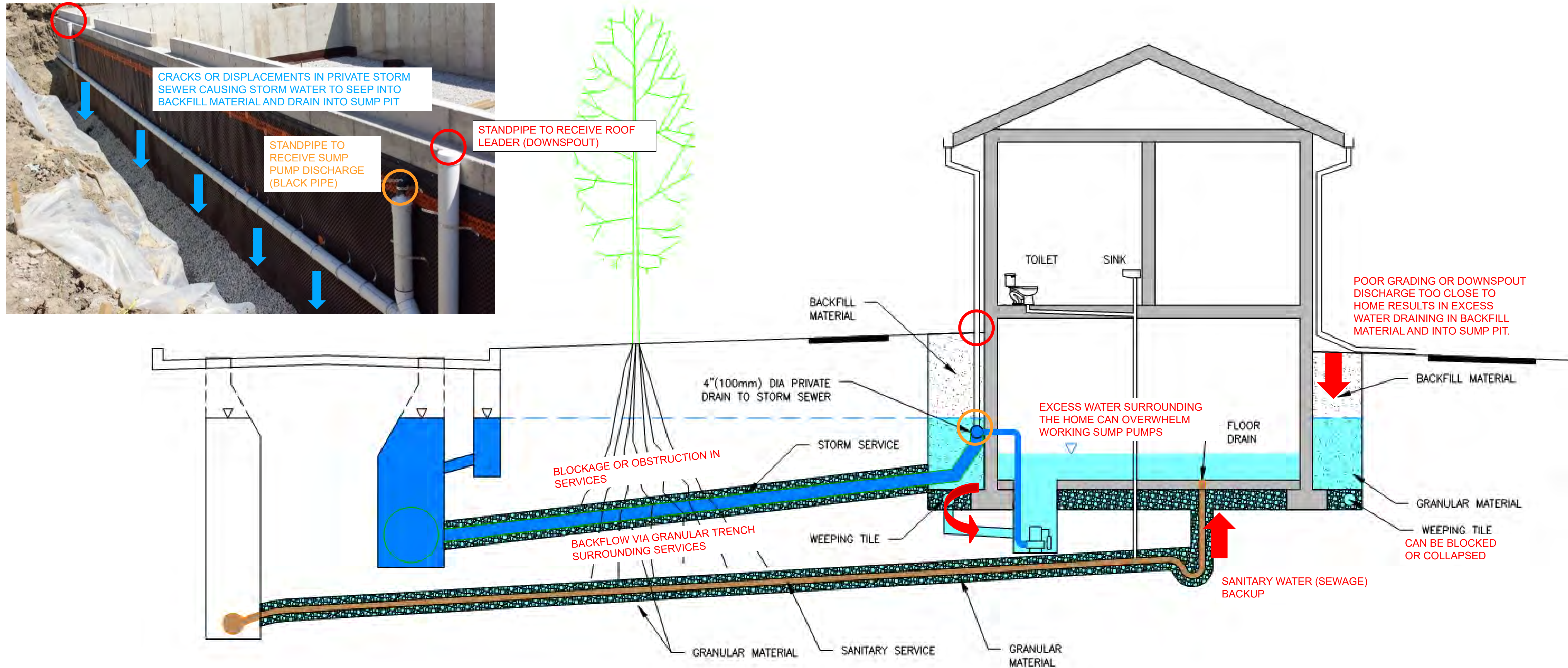


- A typical 200mm dia. sanitary sewer has an approximate capacity of **18 litres per second (L/s)**
- At an inflow rate of 1.8 L/s for one manhole, it would only take 10 manholes with 0.3 metres of ponding to use up the sewer capacity.



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

Potential Causes of Basement Flooding



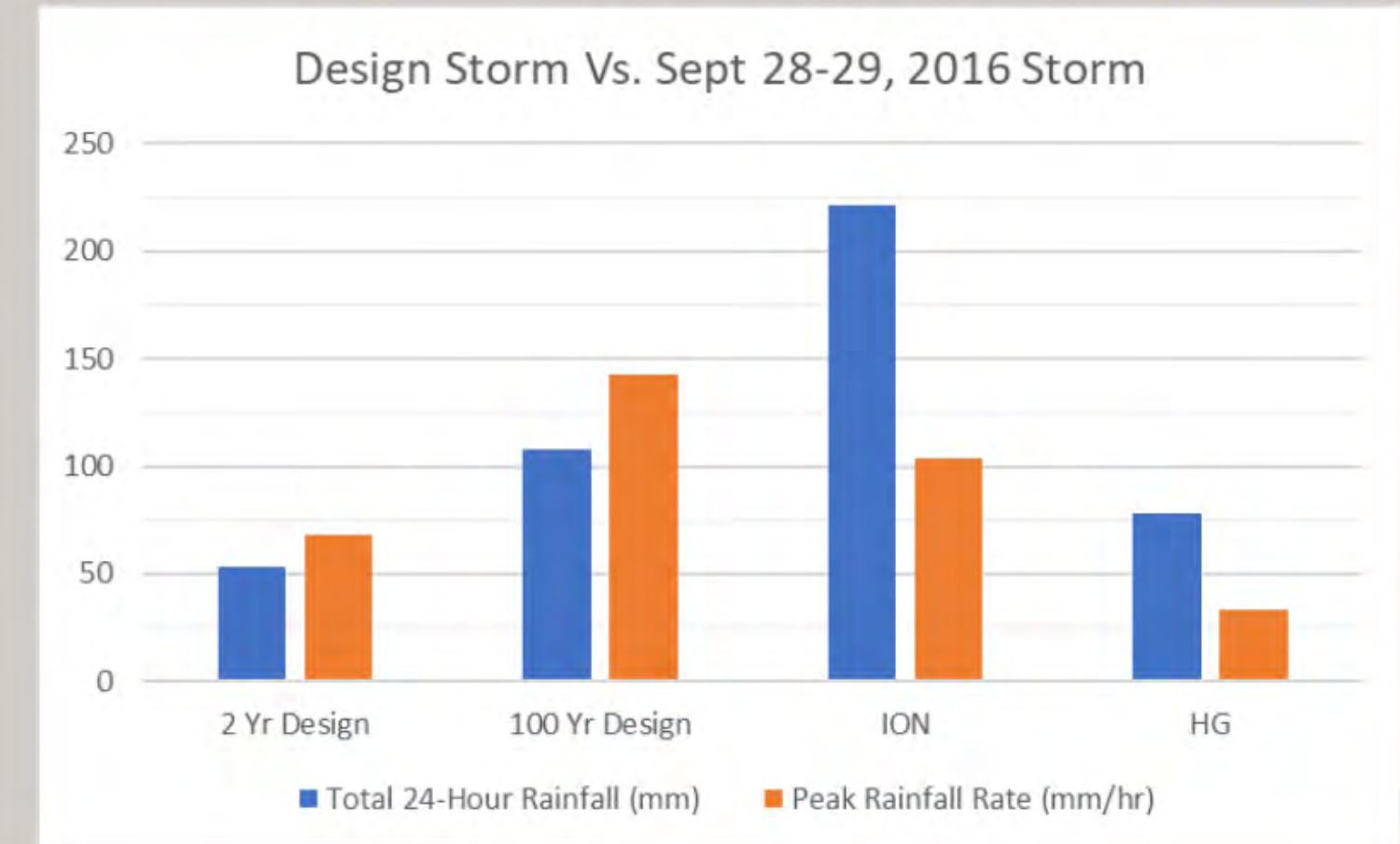
NOTE:

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.

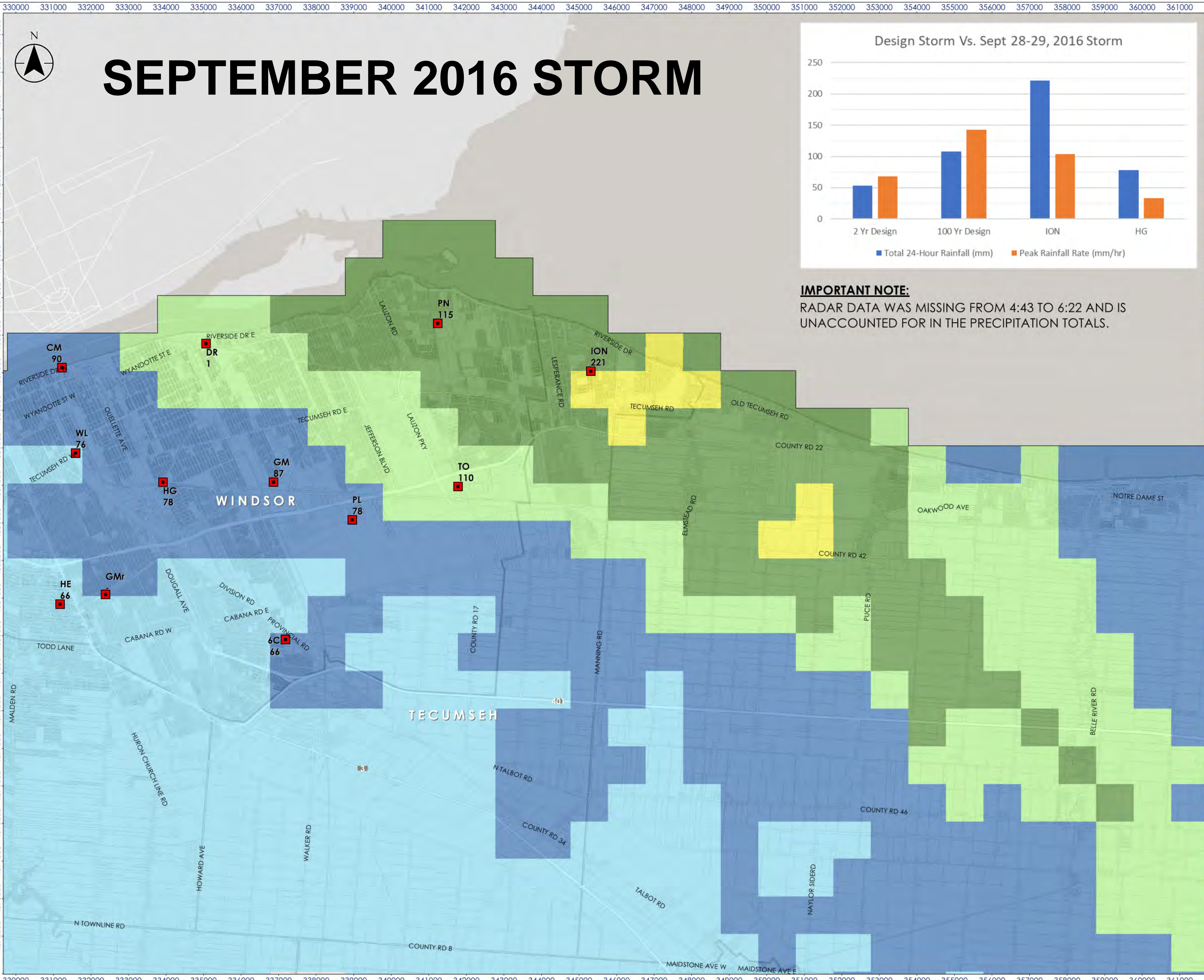
LEGEND

- STORM WATER
- SANITARY WATER

SEPTEMBER 2016 STORM

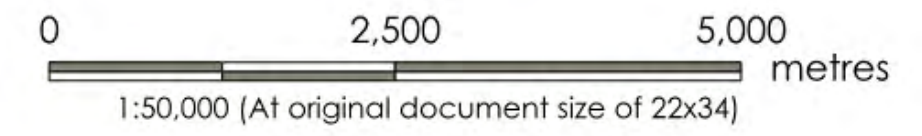


IMPORTANT NOTE:
RADAR DATA WAS MISSING FROM 4:43 TO 6:22 AND IS UNACCOUNTED FOR IN THE PRECIPITATION TOTALS.



- 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



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

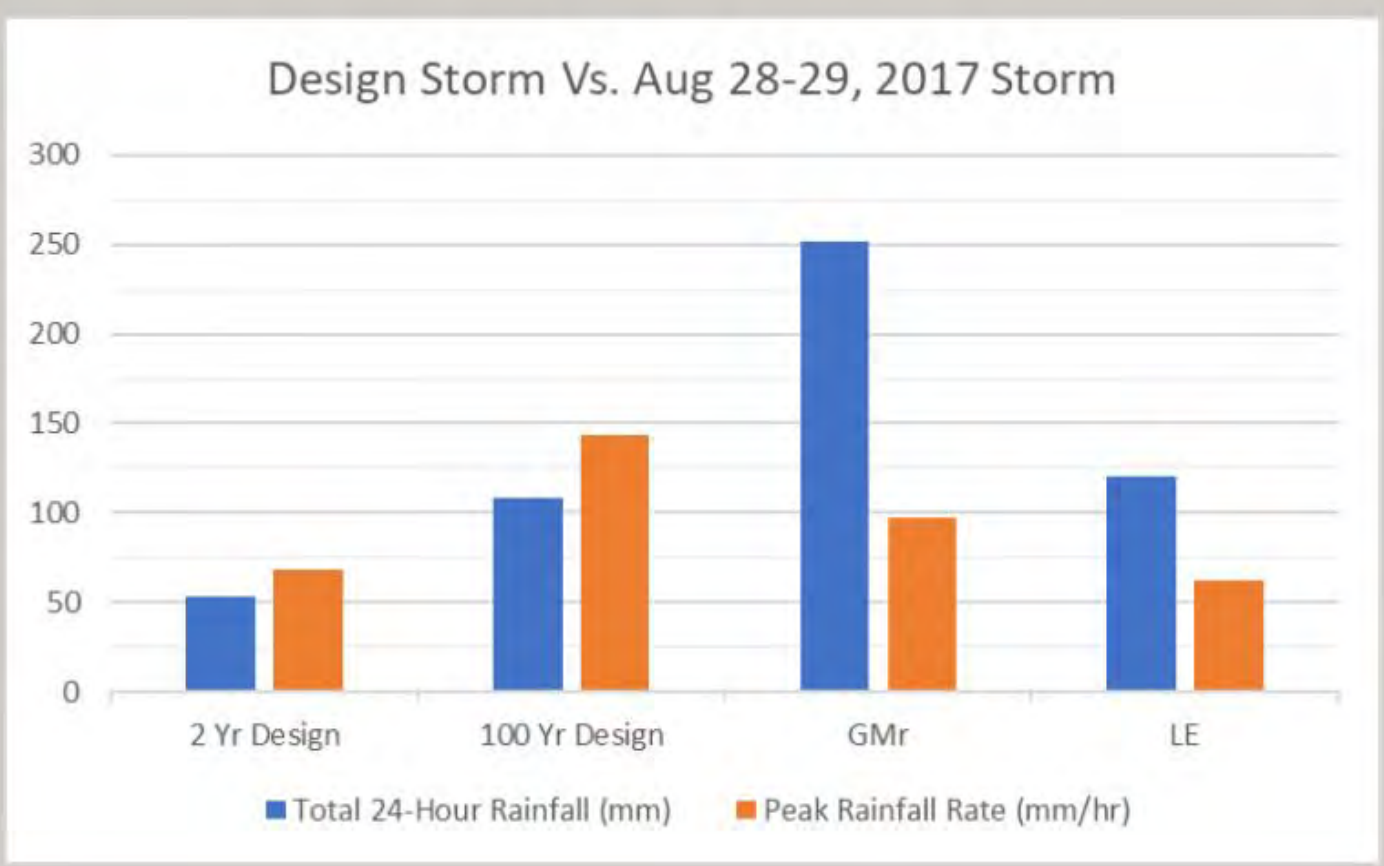
Figure No.

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

330000 340000 350000 360000



AUGUST 2017 STORM

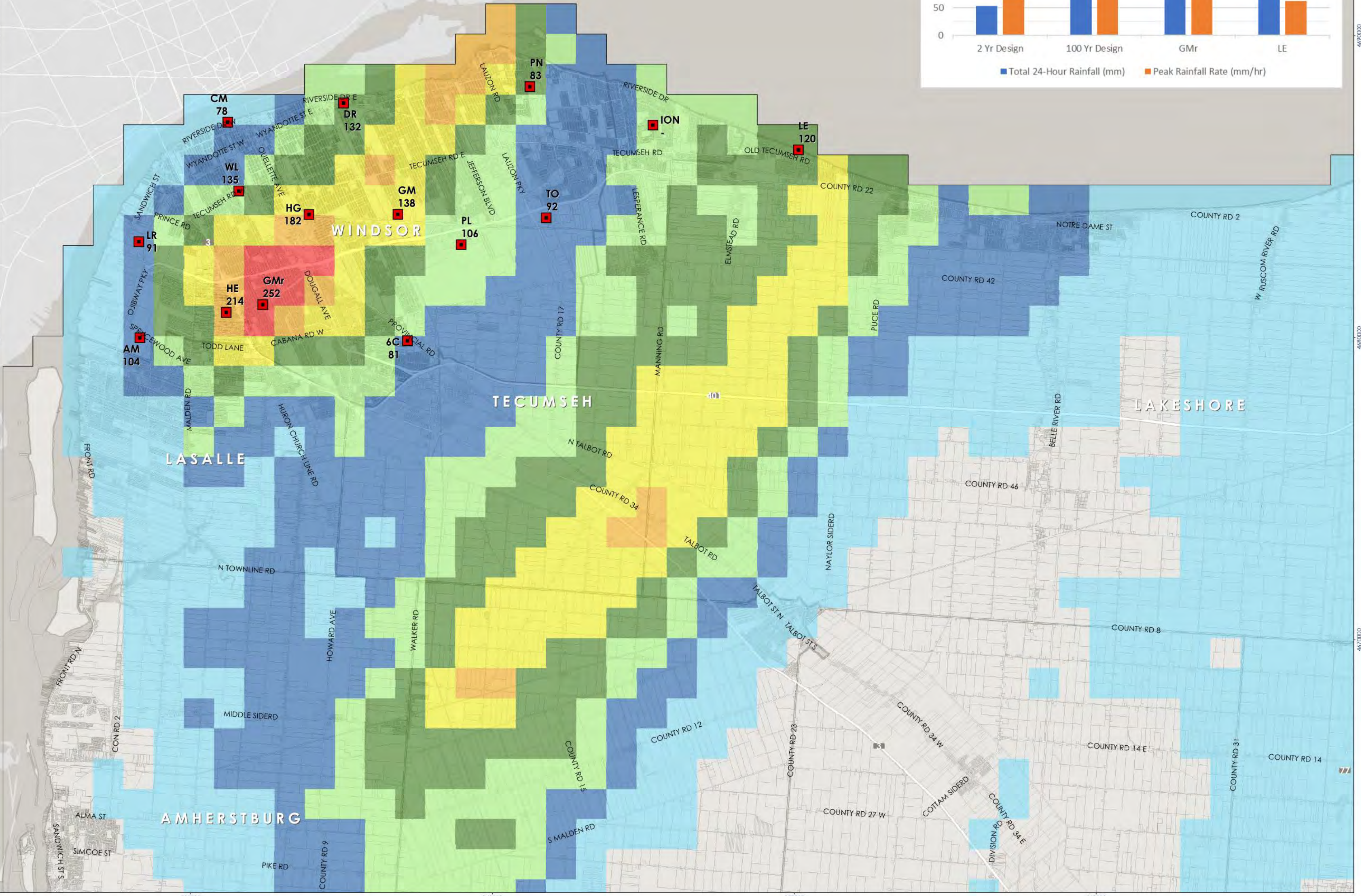


4670000

4680000

4690000

4700000



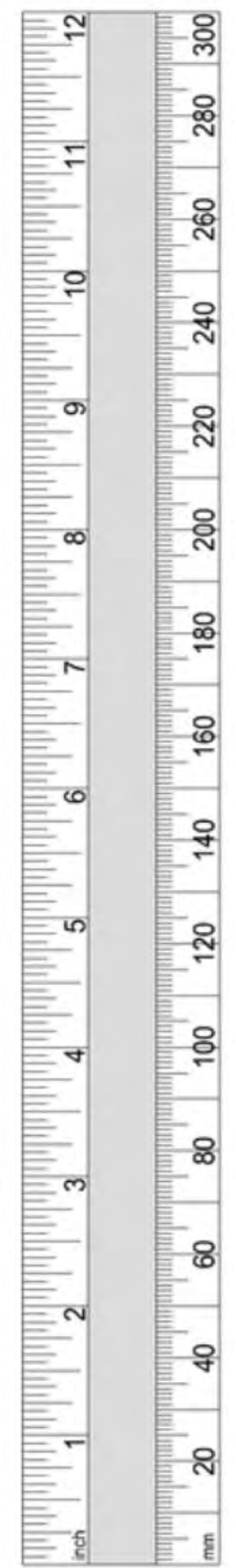
Legend
 □ Analysis Area
 ■ Rain Gauge and Observed Precipitation Amount (mm)

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



Notes

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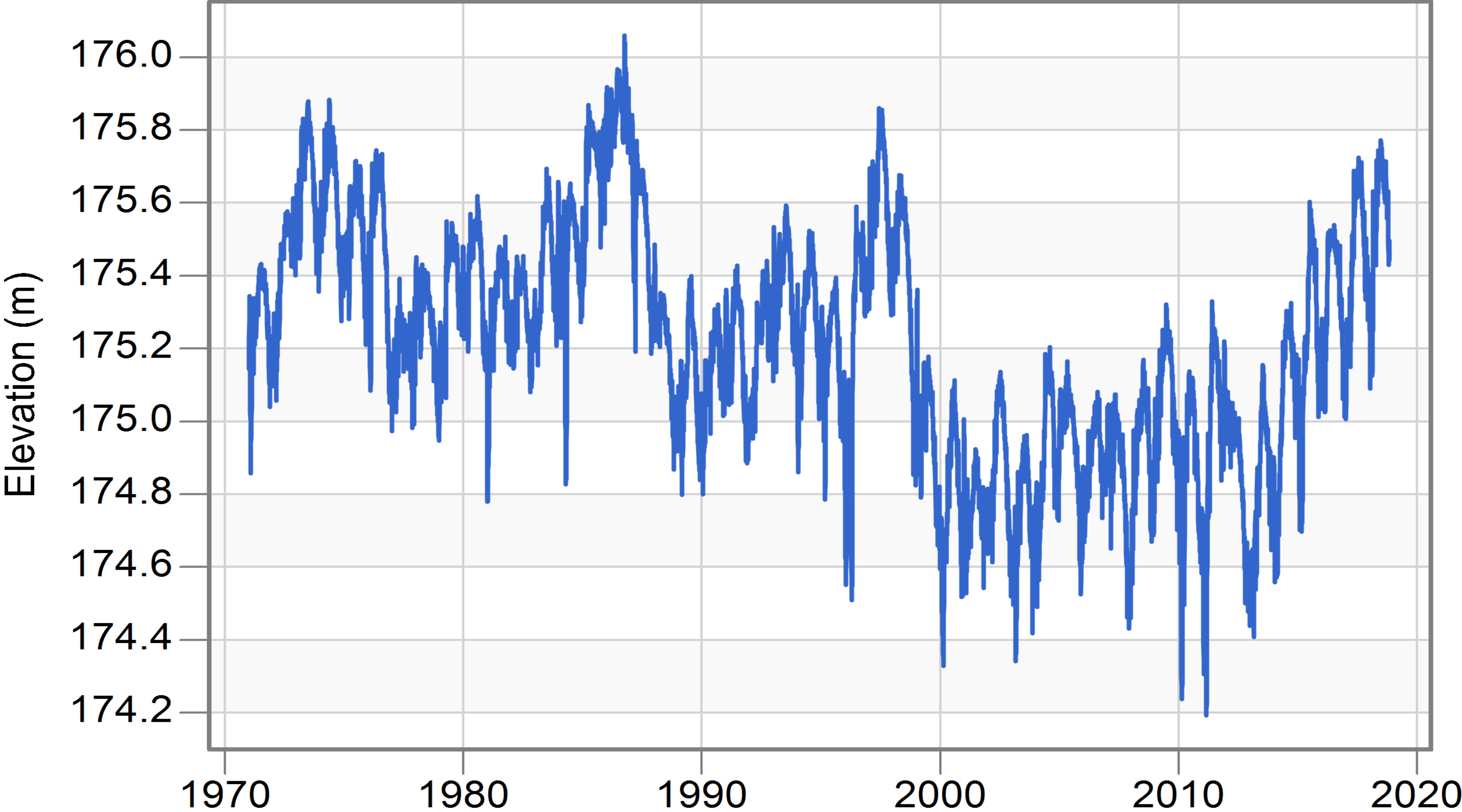
Project Location
 Essex County
 Prepared by KDB on 2017-10-10
 Reviewed by LMF on 2018-11-23

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

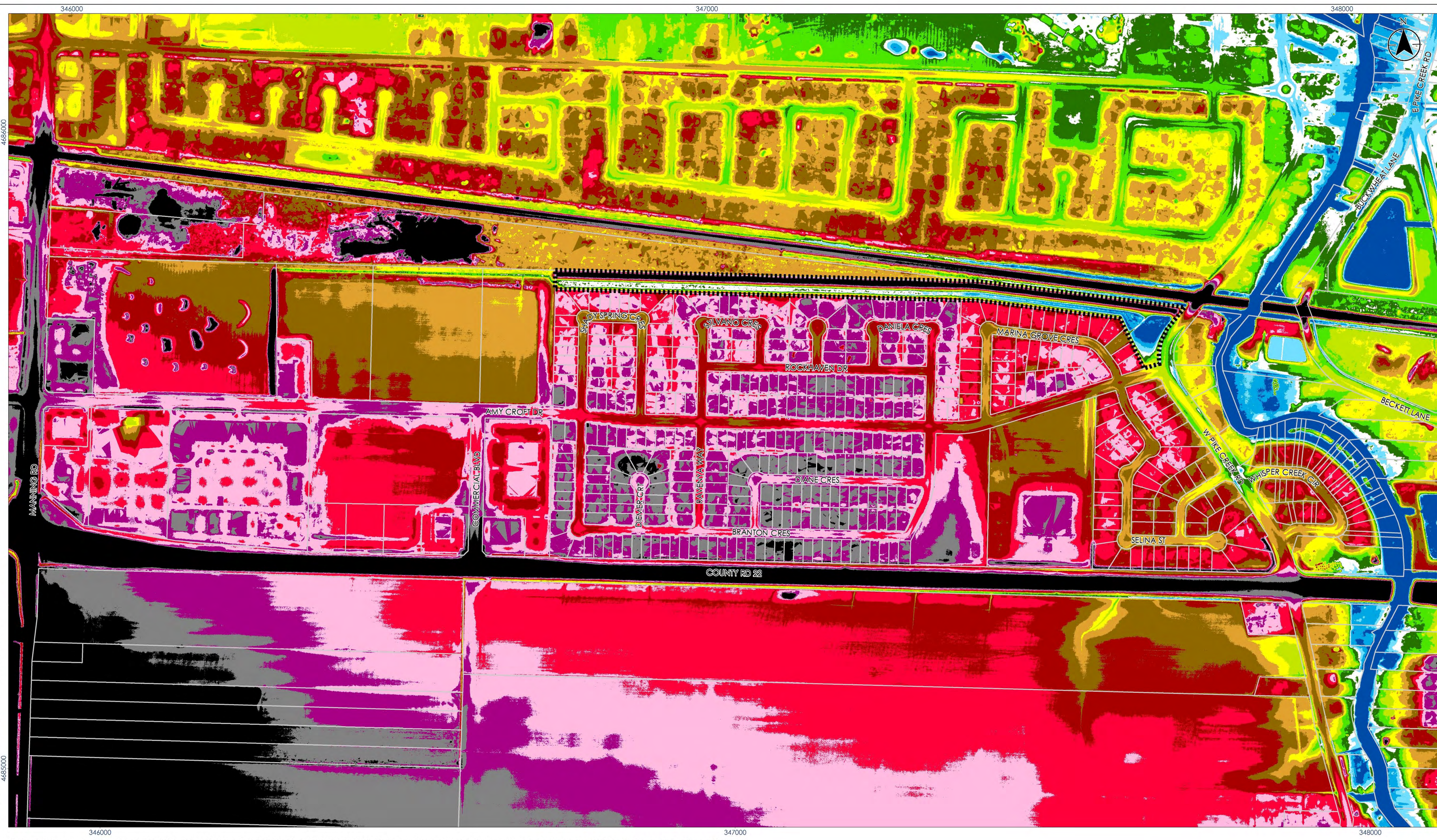
Figure No.

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

Historical Lake St. Clair Levels

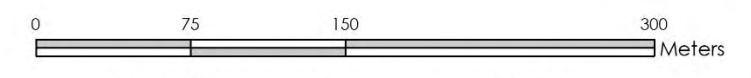


Topography Area 1 – Manning Rd to Pike Creek



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



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

Client/Project
Lakeshore SWM Master Plan

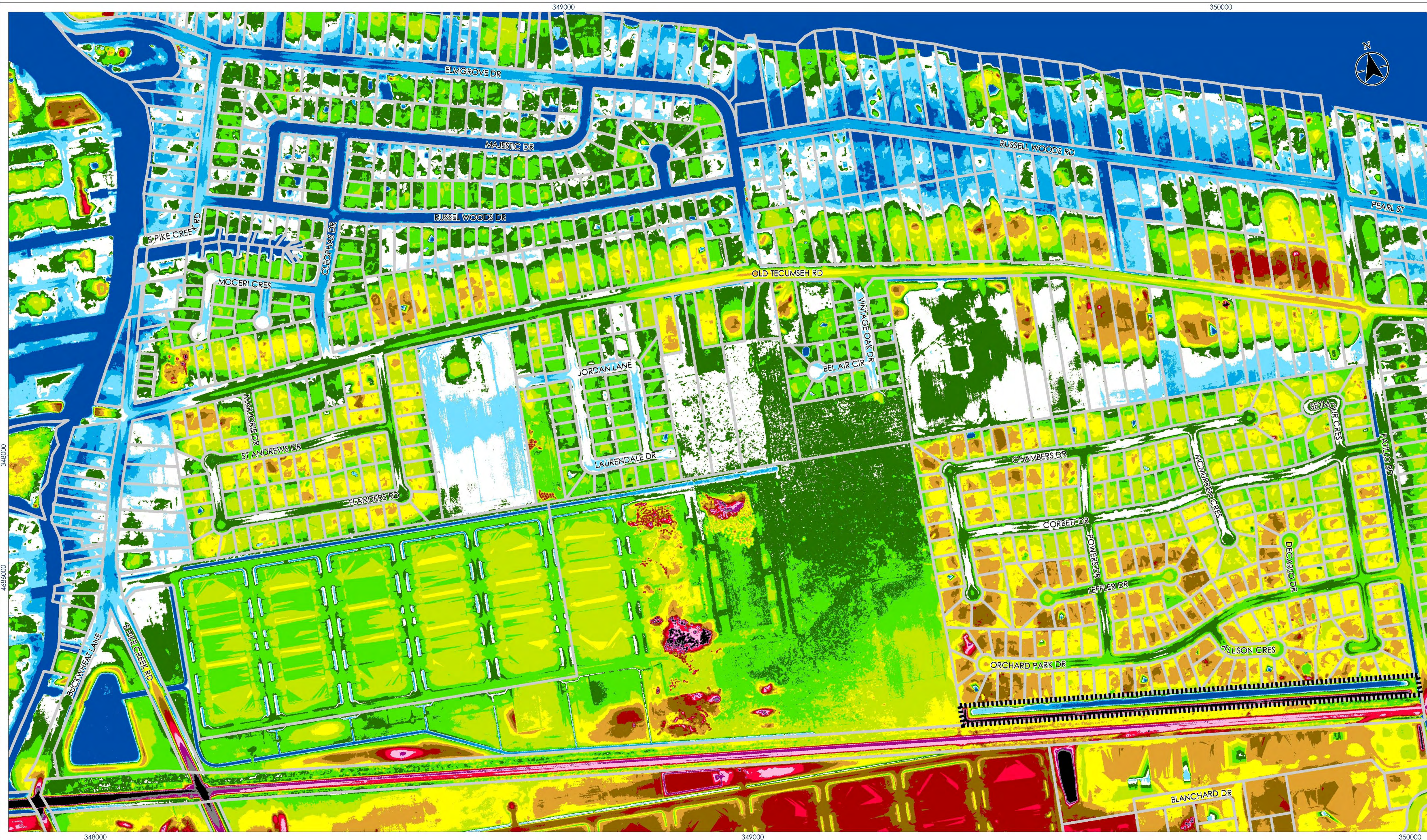
Figure No.
A-1

Title
Area 1 - Topography

W:\active\165620165\proj\165620165\Topography\165620165_Area_1_Topography.dwg
 165620165
 2016-11-26 By: RYAN

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Topography Area 2 – Pike Creek to Patillo Rd



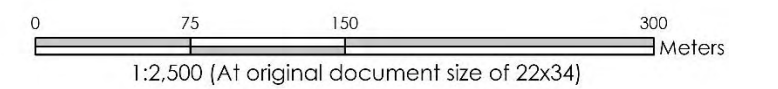
Legend

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



- ### 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.

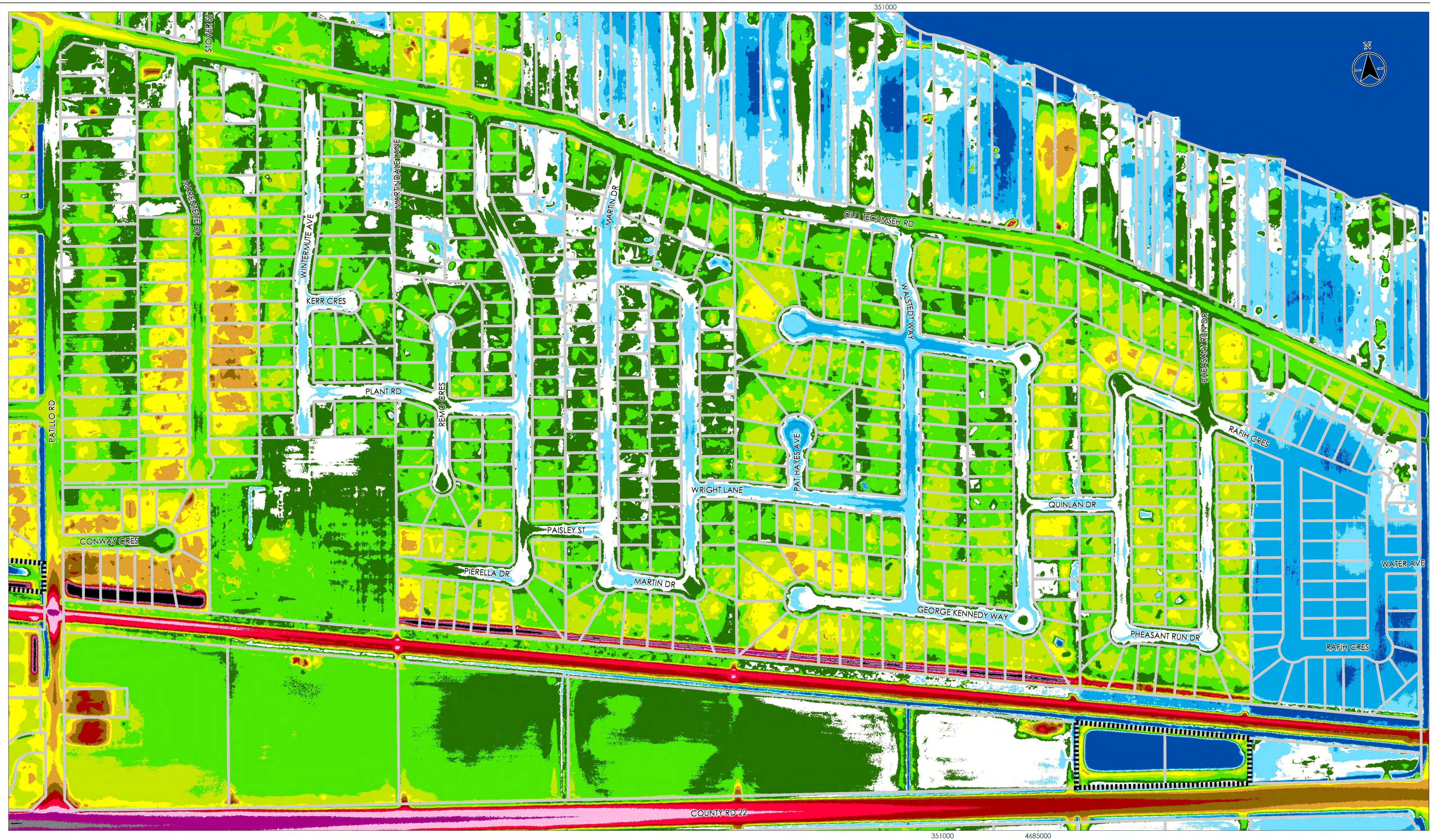


Project Location
Municipality of Lakeshore
165681084
Prepared by LMF
on 2018-07-13

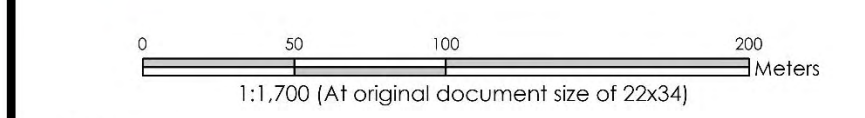
Client/Project
Lakeshore SWM Master Plan

Figure No.
A-2
Title
Area 2 - Topography

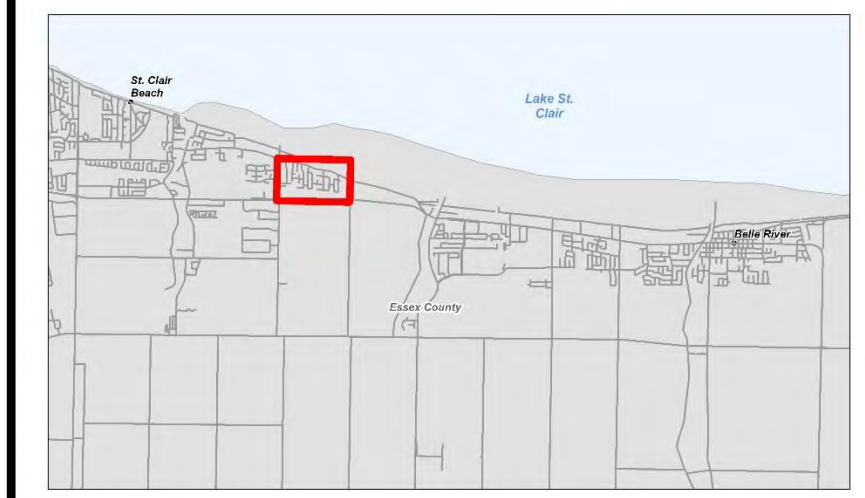
Topography Area 3 – Patillo Rd to Wallace Line Rd



- 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



- Notes**
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 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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4685000

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.

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.



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;

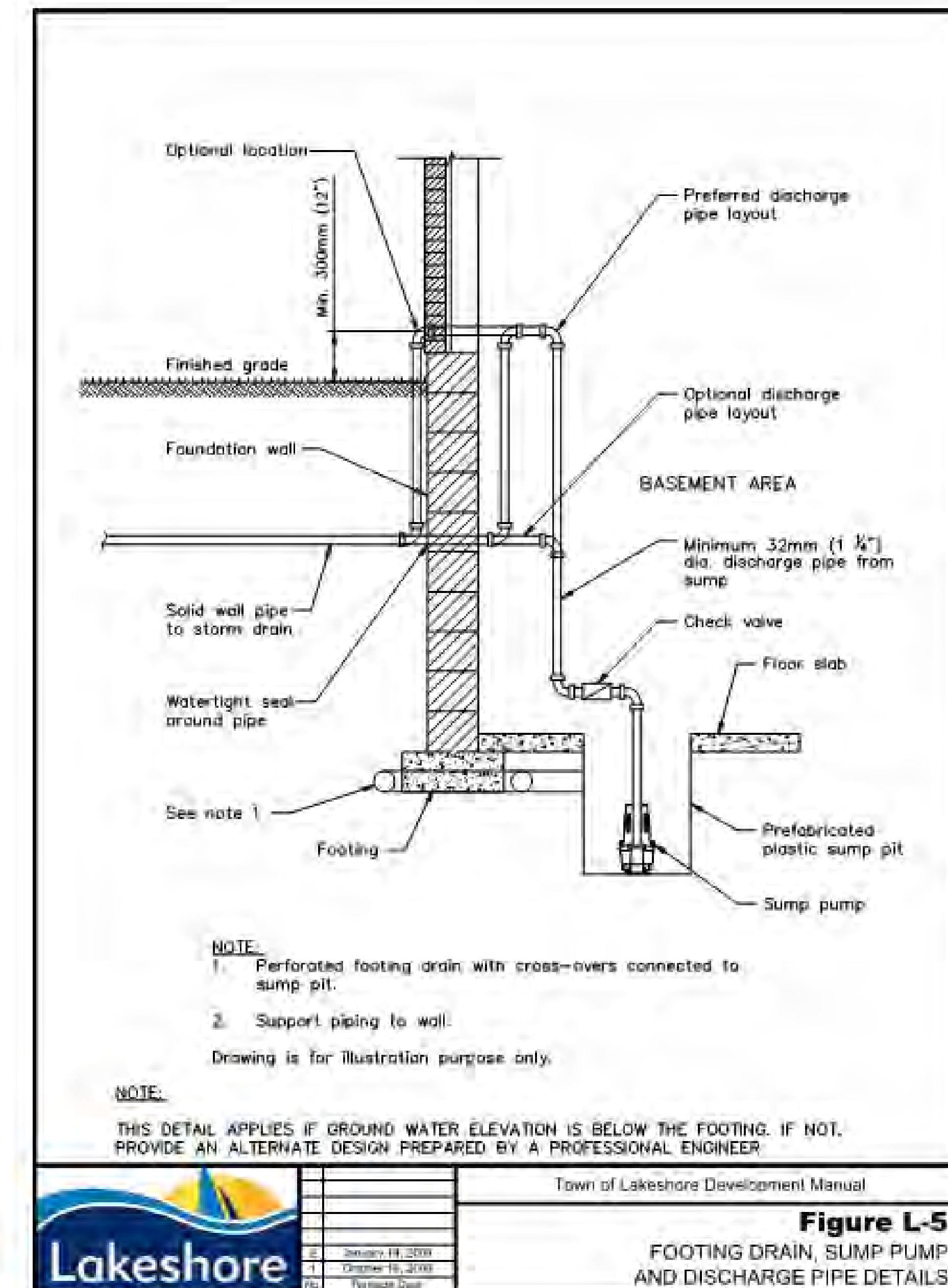
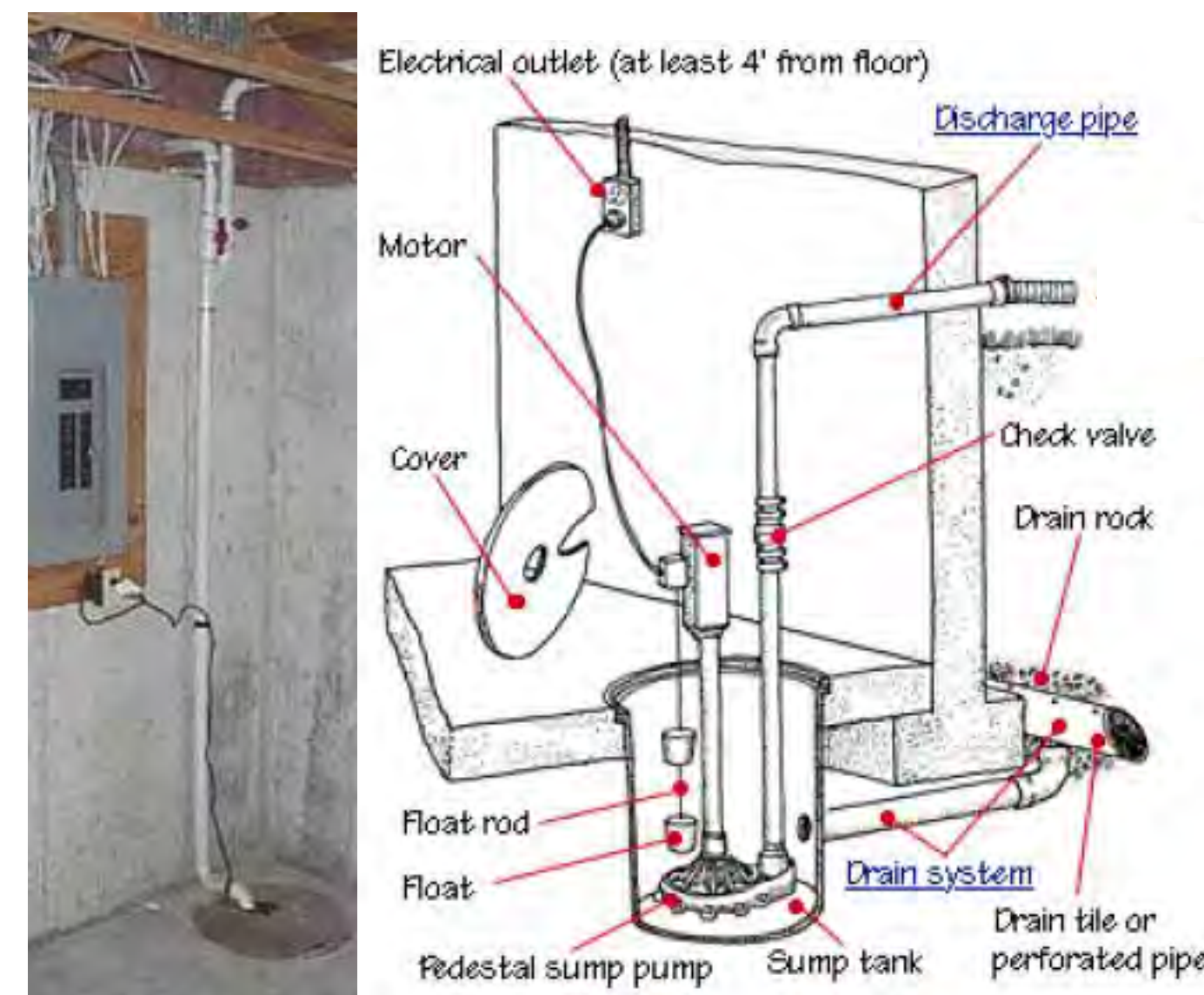
- cracked pipes, cracked basement walls, **sump pump system**, blockages from tree roots, **sanitary backflow valve**, poor grading around the house, etc.

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



Recommended Solution A

IMPROVING PRIVATE DRAINAGE SYSTEMS

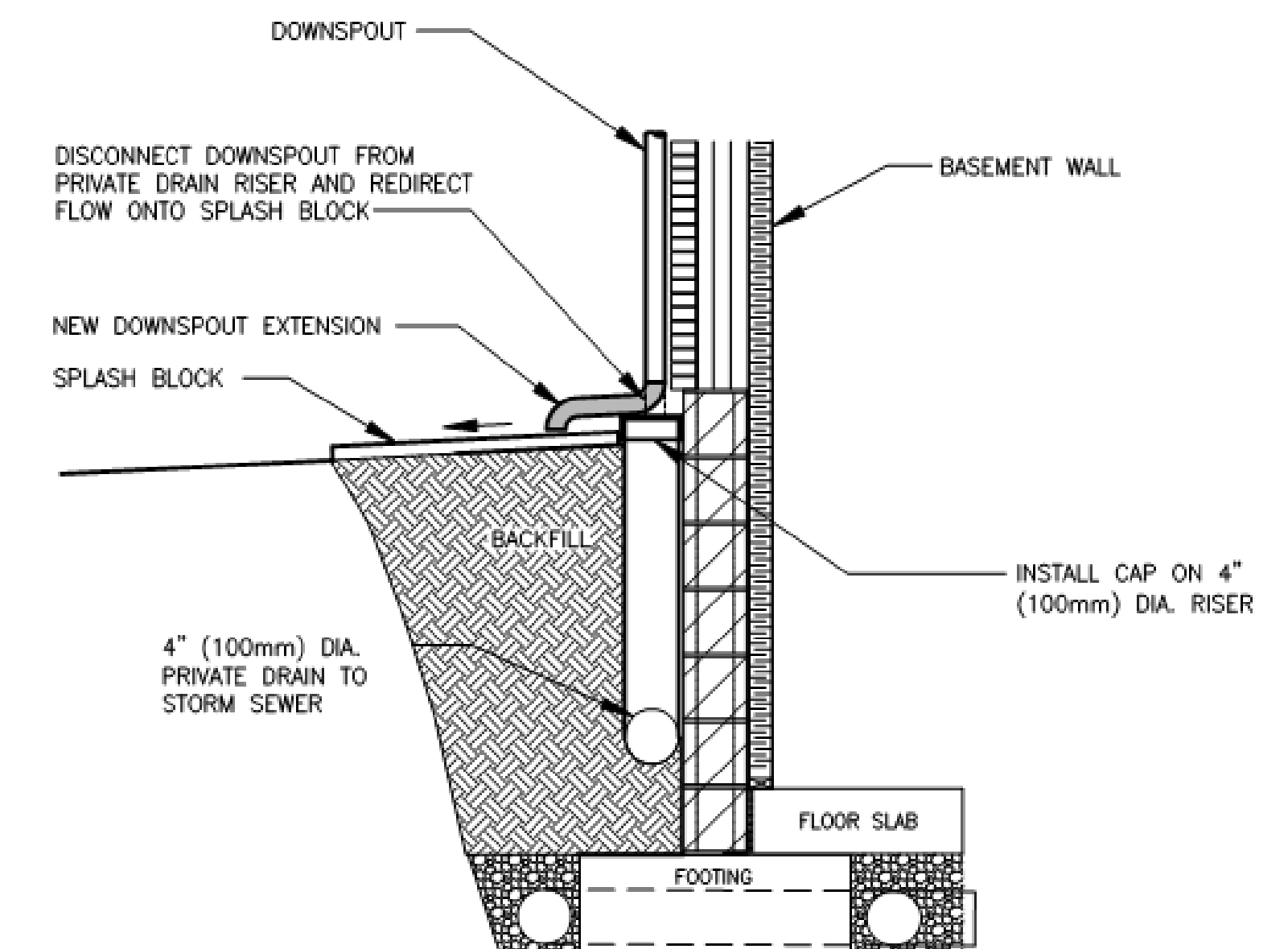
Downspout Disconnection

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 not 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

CHALLENGES:

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



EAVESTROUGH DOWNSPOUT DISCONNECTION DETAIL

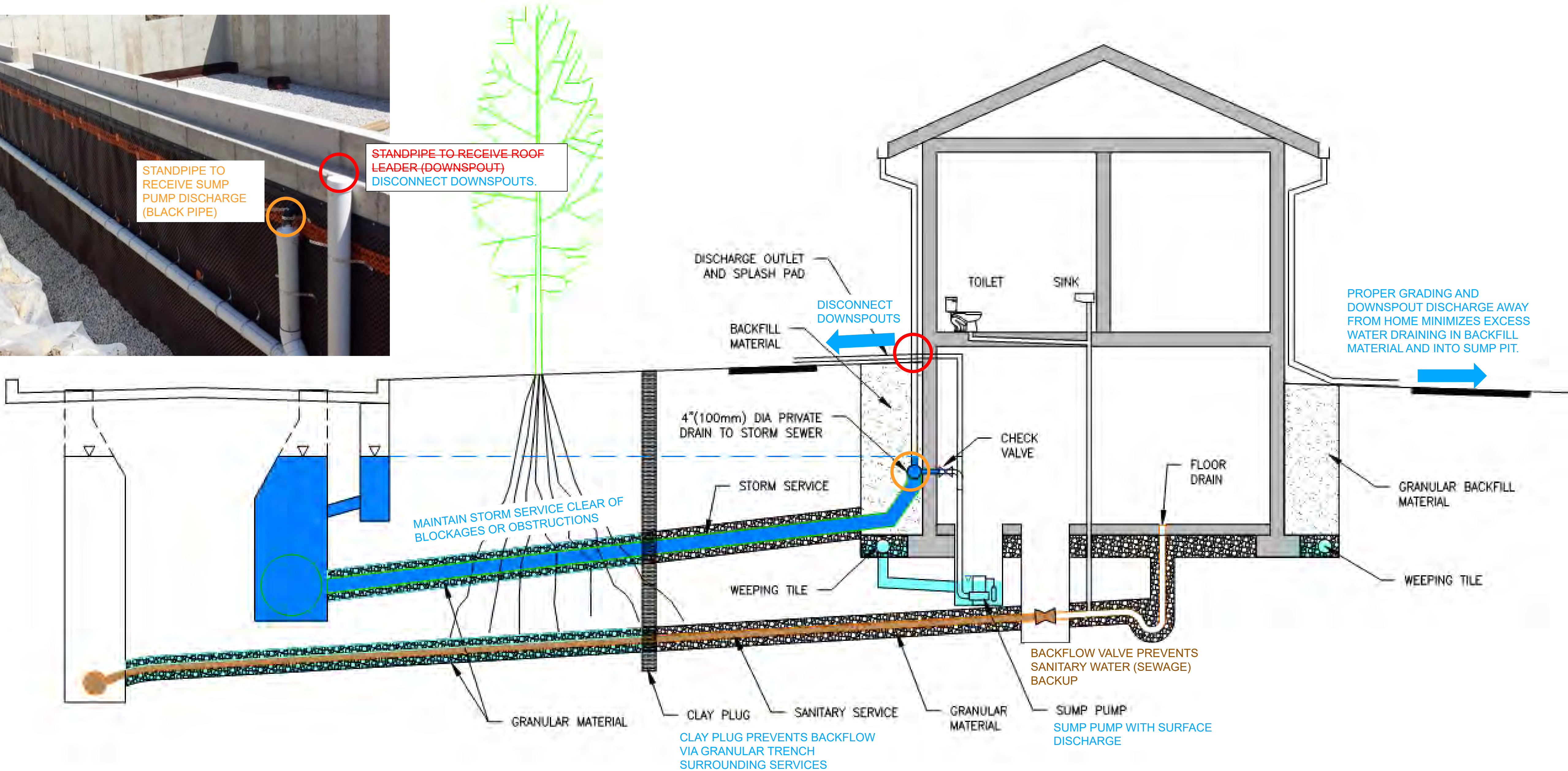
Recommended Solution A

BASEMENT FLOODING MITIGATION MEASURES



STANDPIPE TO RECEIVE SUMP PUMP DISCHARGE (BLACK PIPE)

STANDPIPE TO RECEIVE ROOF LEADER (DOWNSPOUT) DISCONNECT DOWNSPOUTS.



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



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

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

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

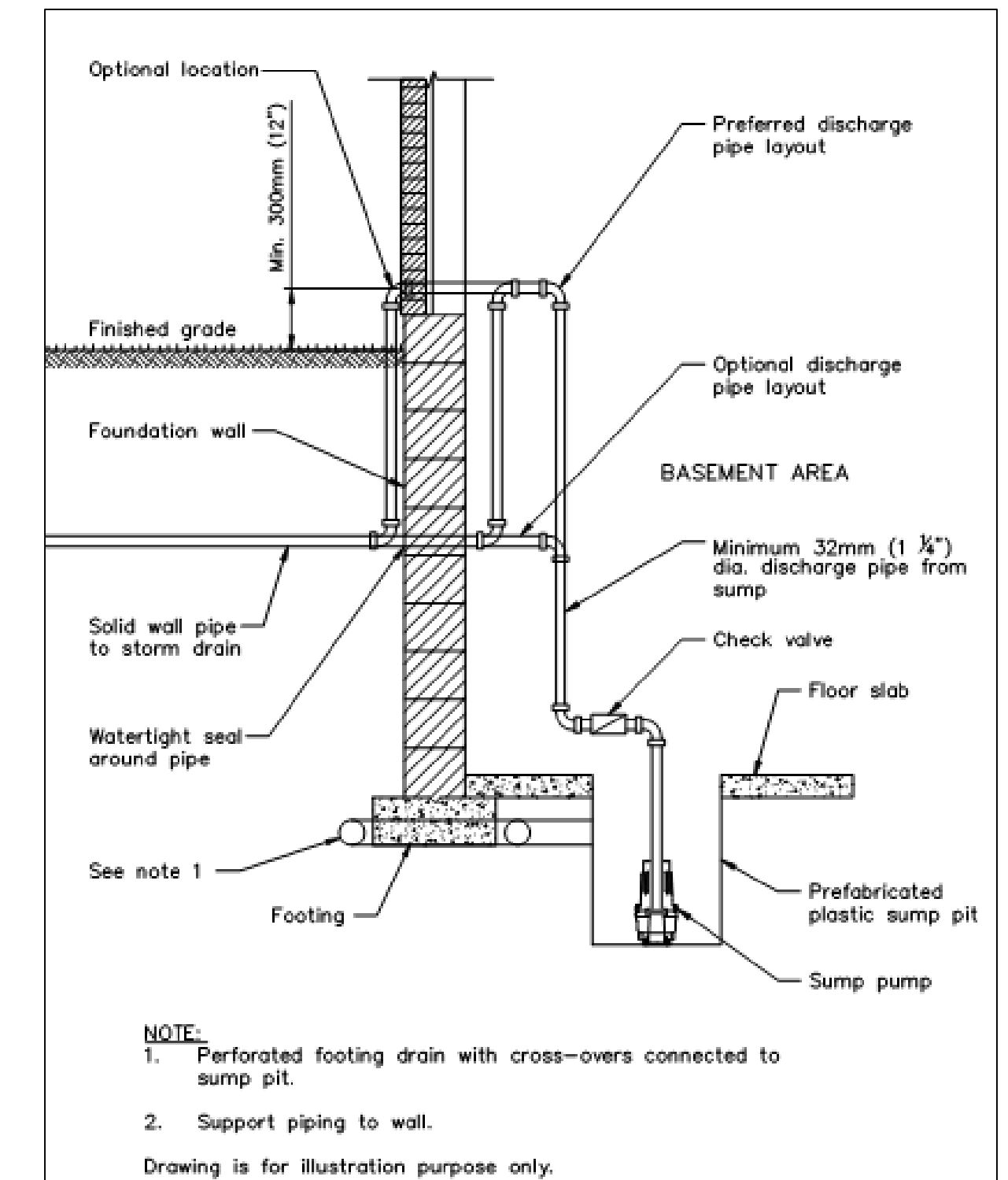
What Does it Involve?

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

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



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

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.

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](tel:519-728-2700)

Toll Free: [1-877-249-3367](tel:1-877-249-3367)



LAKESHORE STORMWATER
MASTER PLAN STUDY - PHASE 1
PUBLIC INFORMATION CENTRE

November 27 from 4:00 p.m. to 7:00 p.m.

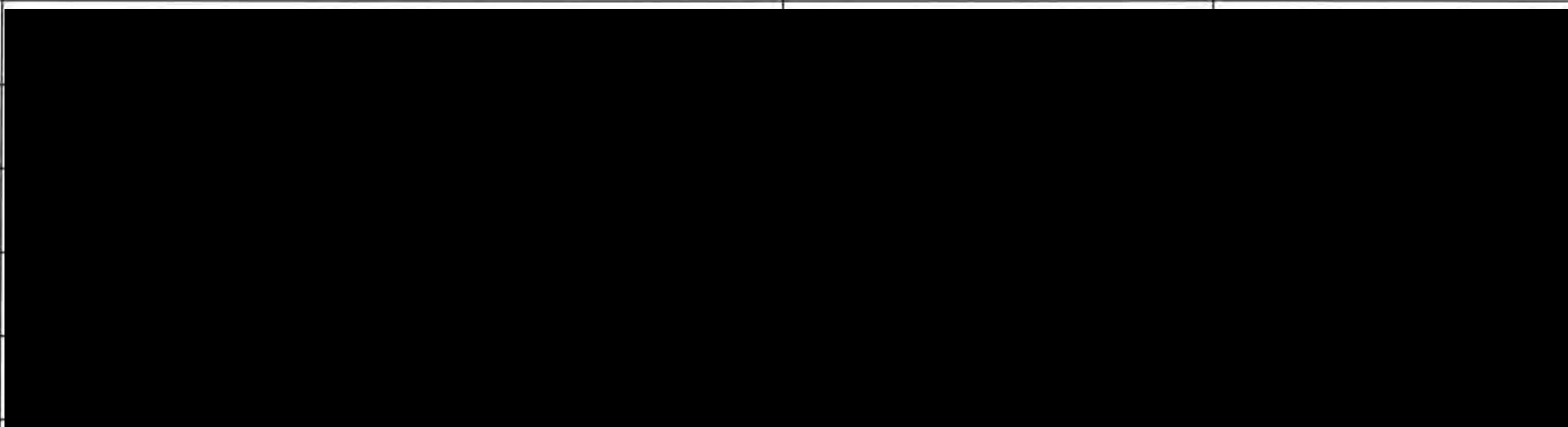
ATC - Lobby

NAME	ADDRESS	[REDACTED]	[REDACTED]
David Amelio	[REDACTED]		
Pam Shepherd			
Vivian Bellon			
Jon Bai			
Kyle Reid			
Simonne McAuley			
Sylvia Langton			
LEN JAVISSE			
DAVE HANNA			
LINDA WALKINLEY			
JOHN KERR			

LAKESHORE STORMWATER
MASTER PLAN STUDY - PHASE 1
PUBLIC INFORMATION CENTRE

November 27 from 4:00 p.m. to 7:00 p.m.

ATC - Lobby

NAME	ADDRESS	EMAIL	PHONE NUMBER
BRIAN LARAMIE			
HARRY RAMSDEN			
IAN SPENCER			
Ken Poisson			
JOHN BROWN			

LAKESHORE STORMWATER
MASTER PLAN STUDY - PHASE 1
PUBLIC INFORMATION CENTRE

November 27 from 4:00 p.m. to 7:00 p.m.

ATC - Lobby

NAME	ADDRESS	EMAIL	PHONE NUMBER		
B. McLAUGHLIN					
Ed ; Sherry Garron					
Ron PRACEY					
IRENE OSSINGTON					
Angelo Aversa					
J Purvi's					
Kirk Walstedt					
Wayne Smith					
Nicole Goodyear					

LAKESHORE STORMWATER
MASTER PLAN STUDY - PHASE 1
PUBLIC INFORMATION CENTRE

November 27 from 4:00 p.m. to 7:00 p.m.

ATC - Lobby

NAME	ADDRESS	EMAIL	PHONE NUMBER
ADRIAN DUFRESNE			
Pat & Ted Ackland			
GIBSON'S			
SANDRA MURRAY			
Fabio Volante			
WAYNE THOMAS			
BILL NOAKES			
Ron BARRETTE			
Richard BLANCHARD			
Dianner-William Paterson			
GERARD EMERY			

Town of Lakeshore
Storm Water Master Plan Study – Phase 1
Public Information Centre
Atlas Tube Centre (ATC), Lobby
November 27, 2018
Comment Form

DOES NOT
RESIDE IN
LAKESHORE

You are invited to give comments or express your concerns about Storm Water Management and Climate Change.

Please complete and leave this form today (or later by mail or fax) so that your opinions and concerns on this project can be considered. All comments are to be directed to:

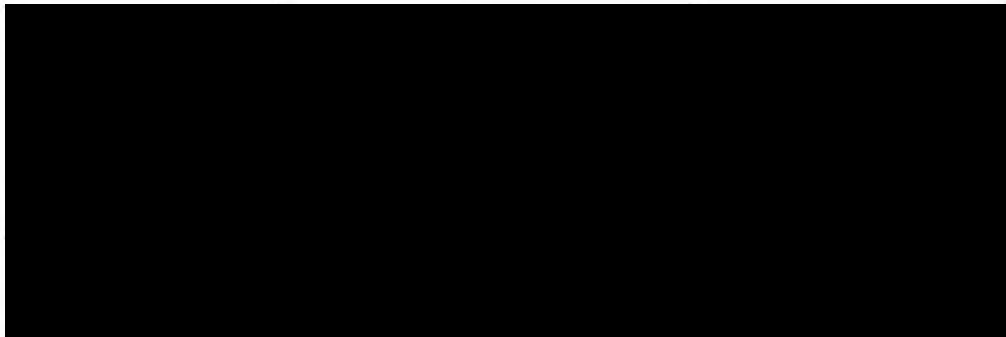
Town of Lakeshore
415 Notre Dame Street
Belle River, ON N0R 1A0
Tel: (519) 728-2488
Fax: (519) 728-4577
Email: info@lakeshore.ca

Comments or Concerns:

- LESS SPRAWL = LESS HARDSCAPE AND MORE (BETTER PLANNING) OPPORTUNITY FOR TRADITIONAL WETLANDS + FOREST COVER
- REQUIREMENT OF TREE / LOT IS FAR TOO LOW A STANDARD
- NEED SOLID "GREEN INFRASTRUCTURE" STANDARDS
- GREEN ROOF (POLICY)
- FRENCH DRAINS + SOAK PITS
- RAIN GARDENS (SERVE TO DISINTEGRATE AND BEAUTIFY)
- SMALLER BUILDING FOOTPRINT
- DON'T BUILD ON TRADITIONAL WETLAND AREAS ALLOW FOR MORE WETLANDS
- MINIMALLY NEW DEVELOPMENT REQUIRE STORMWATER SURCHARGE COSTS TO BE PAID BY DEVELOPER

(Use reverse side or additional sheets for additional comments if needed)

Name:
Address:
Telephone / Fax:
E-mail:
Date:
Signature:



**Town of Lakeshore
Storm Water Master Plan Study – Phase 1
Public Information Centre
Atlas Tube Centre (ATC), Lobby
November 27, 2018
Comment Form**

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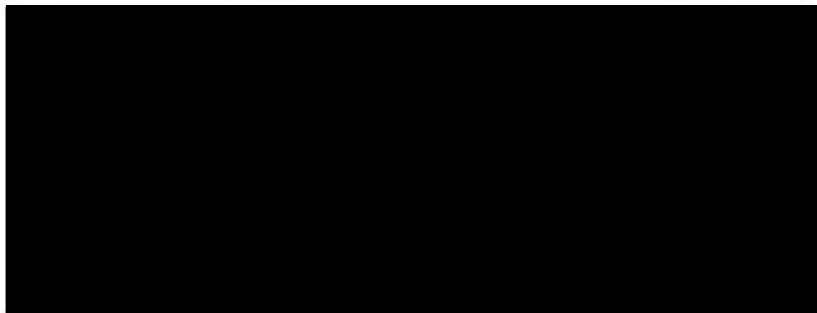
Town of Lakeshore
415 Notre Dame Street
Belle River, ON N0R 1A0
Tel: (519) 728-2488
Fax: (519) 728-4577
Email: info@lakeshore.ca

Comments or Concerns:

LOOKING FORWARD TO SEEING DETAILS ON THE
FUTURE PLANS FOR WALLACE LINE DEVELOPMENT.
WHAT CHANGES / ADDITIONS ARE BEING CONSIDERED?

(Use reverse side or additional sheets for additional comments if needed)

Name:
Address:
Telephone / Fax:
E-mail:
Date:
Signature:



**Town of Lakeshore
Storm Water Master Plan Study – Phase 1
Public Information Centre
Atlas Tube Centre (ATC), Lobby
November 27, 2018
Comment Form**

You are invited to give comments or express your concerns about Storm Water Management and Climate Change.

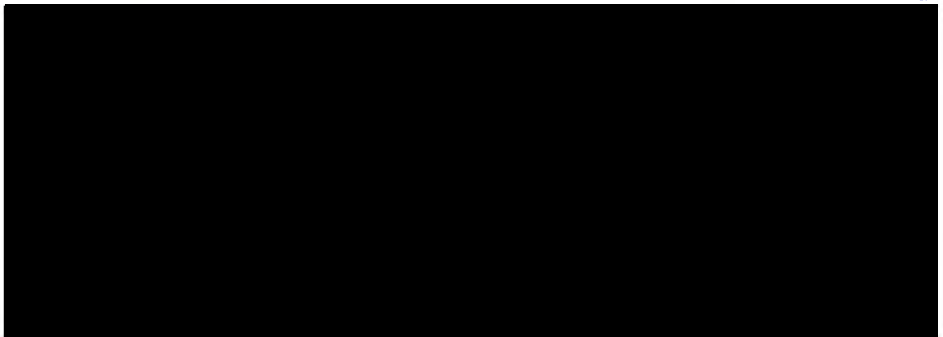
Please complete and leave this form today (or later by mail or fax) so that your opinions and concerns on this project can be considered. All comments are to be directed to:

Town of Lakeshore
415 Notre Dame Street
Belle River, ON N0R 1A0
Tel: (519) 728-2488
Fax: (519) 728-4577
Email: info@lakeshore.ca

Comments or Concerns:

- I WAS EXPECTING TO SEE MORE SOLUTIONS TO THE FLOODING PROBLEMS
 - CONSIDER PURCHASING PROPERTY SOUTH OF CN TRACKS NORTH OF HIGHWAY 72 IN BETWEEN WALLACE LIND AND PATTILLO TO EXPAND HOLDING POND / PARK AREA, AND WOULD FACILITATE FUTURE DEVELOPMENT SOUTH OF HIGHWAY 72.
 - WHY ARE FARM LANDS NOT TAXED FOR PUMPING STATION IMPROVEMENTS?
 - WHEN BIG HOMES BUILD TO MAXIMUM SIZE ALLOWED ON LOTS, THEN YOU ADD CEMENT DRIVE PATIOS, POOLS THERE IS NO PLACE FOR WATER TO GO. ALL THAT CEMENT SHOULD BE INCLUDED IN THAT MAXIMUM BUILD AREA SQ.
- (Use reverse side or additional sheets for additional comments if needed)

Name:
Address:
Telephone / Fax:
E-mail:
Date:
Signature:



**Town of Lakeshore
Storm Water Master Plan Study – Phase 1
Public Information Centre
Atlas Tube Centre (ATC), Lobby
November 27, 2018
Comment Form**

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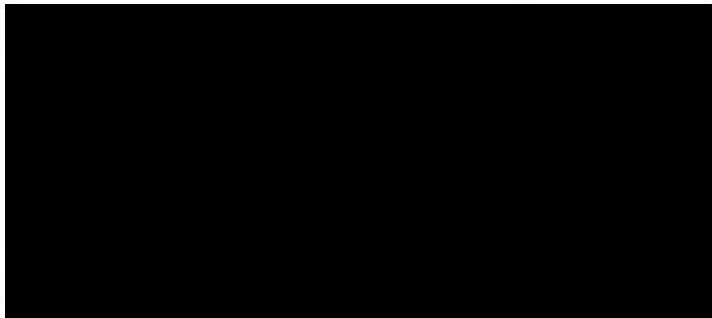
Town of Lakeshore
415 Notre Dame Street
Belle River, ON N0R 1A0
Tel: (519) 728-2488
Fax: (519) 728-4577
Email: info@lakeshore.ca

Comments or Concerns:

SURFACE RAIN WATER ACCUMULATION DOES NOT SEEM TO
BE ADDRESSED IN THIS STUDY, EXCEPT WHERE BASEMENTS
ARE AFFECTED. I HAVE A SERIOUS PROBLEM OF
RAIN WATER ACCUMULATIONS WHICH SHOULD BE ADDRESSED
GOOD PRESENTATION OTHERWISE.

(Use reverse side or additional sheets for additional comments if needed)

Name:
Address:
Telephone / Fax:
E-mail:
Date:
Signature:



**Town of Lakeshore
Storm Water Master Plan Study – Phase 1
Public Information Centre
Atlas Tube Centre (ATC), Lobby
November 27, 2018
Comment Form**

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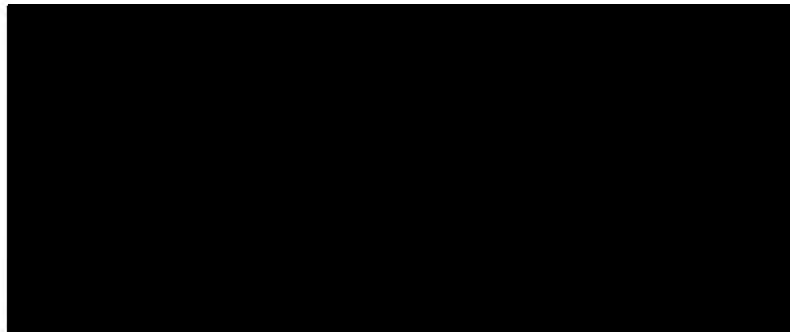
Town of Lakeshore
415 Notre Dame Street
Belle River, ON N0R 1A0
Tel: (519) 728-2488
Fax: (519) 728-4577
Email: info@lakeshore.ca

Comments or Concerns:

I LIVE ON THE HIGHWAY BETWEEN THE 4TH CONCESSION DRAIN AND EMERY DRIVE - I DON'T EVER REMEMBER THE DIDTCH ON THE S/SIDE OF THE TRACKS BEING CLEARED OUT. THE N/SIDE HAD EXTENSIVE WORK DONE ON IT RECENTLY COULD WE HAVE THIS AREA CLEARED OUT IN THE NEAR FUTURE

(Use reverse side or additional sheets for additional comments if needed)

Name:
Address:
Telephone / Fax:
E-mail:
Date:
Signature:



**Town of Lakeshore
Storm Water Master Plan Study – Phase 1
Public Information Centre
Atlas Tube Centre (ATC), Lobby
November 27, 2018
Comment Form**

You are invited to give comments or express your concerns about Storm Water Management and Climate Change.

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Town of Lakeshore
415 Notre Dame Street
Belle River, ON N0R 1A0
Tel: (519) 728-2488
Fax: (519) 728-4577
Email: info@lakeshore.ca

Comments or Concerns:

Good information & assistance.

(Use reverse side or additional sheets for additional comments if needed)

Name:
Address:
Telephone / Fax:
E-mail:
Date:
Signature:





planning@erca.org

P.519.776.5209

F.519.776.8688

360 Fairview Avenue West
Suite 311, Essex, ON N8M 1Y6

December 20, 2018

Town of Lakeshore
419 Notre Dame Street
Belle River, Ontario
N0r 1A0

Dear Mr. Peyman Raji:

RE: Lakeshore Stormwater Master Plan Study - Phase 1 Municipal Class EA Notice of Public Meeting

This letter is in response to our receipt and review of the following Notice of Public Meeting for the Lakeshore Stormwater Master Plan Study - Phase 1. It is our understanding that this process is following the Municipal Class EA in accordance with the planning and design process for "Schedule B" projects as outlined in the Municipal Class Environmental Assessment (June 2000, as amended in 2007, 2011 and 2015) under the Ontario Environmental Assessment Act.

Staff from our office are supportive of this endeavour and are interested in continuing to provide support to the Town to provide input to this important problem. We have received a copy of the slides presented at the Public Information Centre and have reviewed the information related to the problem of basement flooding and the proposed preliminary solutions. At this time we would like to offer our general support to the Town of Lakeshore to provide advice and input as the study progresses.

ERCA would also like to bring to the Town's attention that on December 13, 2018 the ERCA Board of Director's approved for implementation the Windsor-Essex Region Stormwater Management Standards Manual. This manual provides consistent and practical design criteria for stormwater management and guidance and should be considered as the Town reviews and develops solutions for recommended improvements. ERCA will be applying these standards to new design solutions.

ERCA also would like to bring to the Town of Lakeshore's attention that the characterization of natural hazards associated with floodplains and the shoreline have not been updated since the late 1970s (for the shorelines) and early 1980s (for riverine systems including Pike Creek, Belle River, Duck Creek, Moison Creek and Puce River): see attached ERCA Board report from October of 2018 for additional context. Updating floodplain mapping for areas that meet the provincial criteria is recommended as a consideration for reviewing and assessing potential solutions to mitigate basement and overland flooding.

We look forward to future discussions on this important study.

December 20, 2018

Thank you,

A handwritten signature in blue ink that reads "Mike Nelson". The signature is written in a cursive style and is set against a light yellow rectangular background.

Michael Nelson, BSc, MSc (Planning)

Watershed Planner

/mn

C: Alain Michaud, Stantec Consulting

Town of Lakeshore Stormwater Master Plan – Phase 2

PIC 1 Comment Response – Comment Sheets

Date/Method	Comment/Concern	Response
November 28, 2018, Comment Sheet	<ul style="list-style-type: none"> • Less sprawl, less hardscape and more opportunities for traditional wetlands and forest cover • Requirement of 1 tree/lot is far too low a standard • Need solid green infrastructure standards <ul style="list-style-type: none"> ○ Green roof policy ○ French drains and soak pits ○ Rain gardens (serve to dissipate and beautify) ○ Smaller building footprint ○ Don't build on traditional wetland areas allow for more wetlands ○ Minimally new development require stormwater surcharge costs to be paid by developer 	<ul style="list-style-type: none"> • Development limits are presented in the Official Plan and it was beyond the scope of this study to reevaluate them. • Reevaluating Town landscaping requirements was beyond the scope of this study. • Green infrastructure measures, including those noted, were not considered feasible to mitigate flooding in the study area due to low local soil permeability and high groundwater conditions. ERCA regulates activities in potential wetland areas. Developing stormwater funding models was beyond the scope of this study.
November 28, 2018, Comment Sheet	<ul style="list-style-type: none"> • Looking forward to seeing details on the future plans for Wallace Line development. • What changes/additions are being considered? 	<ul style="list-style-type: none"> • A SWM servicing strategy for future development south of Highway 22 was previously presented in the Wallace Line Drain Watershed Report (Stantec 2017). • No changes to the proposed strategy are proposed in the SMP.
November 28, 2018, Comment Sheet	<ul style="list-style-type: none"> • I was expecting to see more solutions to the flooding problems • Consider purchasing property south of CN tracks north of Highway 22 in between Wallace Line and Pattillo to expand holding pond/park area, and would facilitate future development south of Highway 22 • Why are farm lands not taxed for pumping station improvements? • When big homes build to maximum size allowed on lots, then you add cement drive, patios, pools, there is no place for water to go. All that cement should be included in that maximum build area sq. 	<ul style="list-style-type: none"> • Section 7 describes the proposed flooding mitigation solutions. • Improvements to the Country Walk SWM pond are proposed to mitigate flooding, as described in Section 7.2.14. A SWM pond at the proposed location was considered to improve the Leffler Drain system performance, as described in Section 6.3.13.2. A SWM servicing strategy for future development south of Highway 22 was previously presented in the Wallace Line Drain Watershed Report (Stantec 2017). • Assessments for municipal drain pump station improvements are completed in accordance with the Drainage Act. • The design impervious rates presented in the WERSMSM account for typical impervious lot coverages.
November 28, 2018, Comment Sheet	<ul style="list-style-type: none"> • Surface rain water accumulation does not seem to be addressed in this study, except where basements are effected. I have a serious problem of rain water accumulations which should be addressed. 	<ul style="list-style-type: none"> • Insufficient information to provide a response.

<p>November 28, 2018, Comment Sheet</p>	<ul style="list-style-type: none">• I live on the highway between the 4th Concession Drain and Emery Drive. I don't even remember the ditch on the south side of the tracks being cleaned out. The north side had extensive work done on it recently could we have this area cleaned out in the near future	<ul style="list-style-type: none">• Addressing roadside ditch maintenance is beyond the scope of this study. Concerns regarding highway ditches should be directed to Essex County.
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September 9, 2019
File: 165620165

Attention: «First» «Last», «Title1»
«Agency»
«Branch»
«Address1», «Address2»
«City» «Prov» «Postal_Code»

Dear «Title» «Last»,

Reference: Lakeshore Stormwater Master Plan Study Phase 1 – Project Information Update

The Town of Lakeshore retained Stantec Consulting Ltd. to complete a Stormwater Master Plan (SWMP) study to investigate the cause and solutions to basement flooding resulting from rainfall events that occurred in September 2016 and August 2017.

The study is being conducted in accordance with the Master Plan Process and Approach as described in the Municipal Class Environmental Assessment (Class EA) document (Municipal Engineers Association, 2000, as amended). This study is following Approach #2 as outlined in the Class EA document. Approach #2 will fulfill Phases 1 and 2 Class EA documentation requirements for specific Schedule B projects identified within the SWMP.

The study area of the SWMP Phase 1 is shown in the key map below and includes County Road 42 to the south, Lake St. Clair to the north, County Road 19 (Manning Road) to the west and County Road 22 (near Duck Creek) to the east. SWMP Phase 2 will review the balance of urban and settlement areas to the east and south of Phase 1 upon securing funding.



Purpose of Study

The main purpose of the SWMP study is to identify opportunities for potential enhancements and improvements to protect public and private property from flooding. The study will review how the Town's stormwater infrastructure functions during minor rainfall events (what can be contained within the storm sewer network), and major rainfall events (which may include overland flood routes). The storm pumping stations will also be reviewed to determine if any modifications or improvements are required based on any of the recommended storm sewer network improvements (i.e., capacity upgrades). The SWMP will identify short-term, mid-term and long-term recommendations of infrastructure enhancements along with the development of policies and standards to mitigate flooding.

Next Steps

The first of two Public Information Centre (PIC) was held on Tuesday, November 27, 2018, to solicit feedback from the public on initial findings of the study and potential solutions. A copy of the display boards presented at the PIC are available upon request.

The second PIC will be held during autumn 2019 to present the analysis, key findings and an evaluation of alternative solutions. A subsequent notice will be provided with the date, time and location for the PIC.

Please forward any questions or comments to the study contacts:

Mr. Peyman Raji
Project Manager, Town of Lakeshore
Floodwater Defence Action Strategy and Plan
(519) 728-1975 x240
praji@lakeshore.ca

Mr. Nick Emery
Water Resources Engineer, Stantec Consulting Ltd.
Phone: 519-675-6619
nick.emery@stantec.com

Regards,

Stantec Consulting Ltd.

Nick Emery

Water Resources Engineer
Phone: 519 675 6619
nick.emery@stantec.com

- c. Peyman Raji, Project Manager, Town of Lakeshore
Paula Burnard, Senior Environmental Planner, Stantec Consulting Ltd.

PIC#2



LAKESHORE STORMWATER MASTER PLAN STUDY – PHASE 1

NOTICE OF PUBLIC INFORMATION CENTRE NO. 2

THE STUDY

The Town of Lakeshore retained Stantec Consulting Ltd. to complete a Stormwater Master Plan (SWMP) study to investigate the cause and solutions to basement flooding resulting from rainfall events that occurred in September 2016 and August 2017. The study is being conducted in accordance with the Master Plan Process and Approach as described in the Municipal Class Environmental Assessment (Class EA) document (Municipal Engineers Association, 2000, as amended). This study is following Approach #2 as outlined in the Class EA document. Approach #2 will fulfill Phases 1 and 2 Class EA documentation requirements for specific Schedule B projects identified within the SWMP.

The study area of the SWMP Phase 1 is shown in the key map below and includes County Road 42 to the south, Lake St. Clair to the north, County Road 19 (Manning Road) to the west and County Road 22 (near Duck Creek) to the east. SWMP Phase 2 will review the balance of urban and settlement areas to the east and south of Phase 1 upon securing funding.



THE PROCESS

We need your help. A Public Information Centre (PIC) is planned to solicit feedback from the public on the findings of the study and potential solutions. Your participation will form an integral part of this study to ensure that your concerns, and those of affected residents within the study area, are identified, documented and assessed.

PUBLIC CONSULTATION

Public Information Centre No. 2

Purpose: The PIC will present the draft Master Plan key findings and an evaluation of alternative solutions.

Date: **Wednesday, October 23, 2019**

Time: Open House from 6:00 pm to 8:00 pm

Location: Atlas Tube Centre Lobby (447 Renaud Line Rd, Belle River, ON)

Any parties that wish to provide comments about this study at this time should do so, preferably in writing, by contacting the individuals identified below.

Town of Lakeshore

Mr. Peyman Raji
Project Manager,
Floodwater Defence Action Strategy and Plan
(519) 728-1975 x240
praji@lakeshore.ca

Stantec Consulting

Mr. Nick Emery
Water Resources Engineer
Phone: 519-675-6619
nick.emery@stantec.com

Under the Municipal Freedom of Information and Protection of Privacy Act and the Ontario Environmental Assessment Act, unless otherwise stated in the submission, with the exception of personal information, all comments will become part of the public record.

This Notice issued 9th October, 2019

CLASSIFIEDS



CLASSIFIEDS.WINDSORSTAR.COM

PHONE 1-800-603-7104 • FAX 1-604-707-0227 • EMAIL CLASSIFIEDS@WINDSORSTAR.COM



Celebrating

Birthdays

Birthday



Danni Madigan
Happy 11th Birthday Danni
Love Mom, Dad, Kate and Abi

Births & Adoptions

New Arrival



Public Notices

ATTENTION RESIDENTS OF
LAKESHORE
NOTICE OF PUBLIC MEETING

MUNICIPAL CLASS ENVIRONMENTAL
ASSESSMENT STORMWATER MASTER
PLAN PUBLIC INFORMATION CENTRE

The Town of Lakeshore invites residents to an information/progress update meeting on the flooding issues resulting from recent extreme rainfall events. Visit the Town's website at www.lakeshore.ca under "Featured News" for more details.

Wednesday, October 23, 2019 -Open House from 6:00 pm to 8:00 pm at Atlas Tube Centre Lobby (447 Rensud Line Rd)

Mortgages & Loans

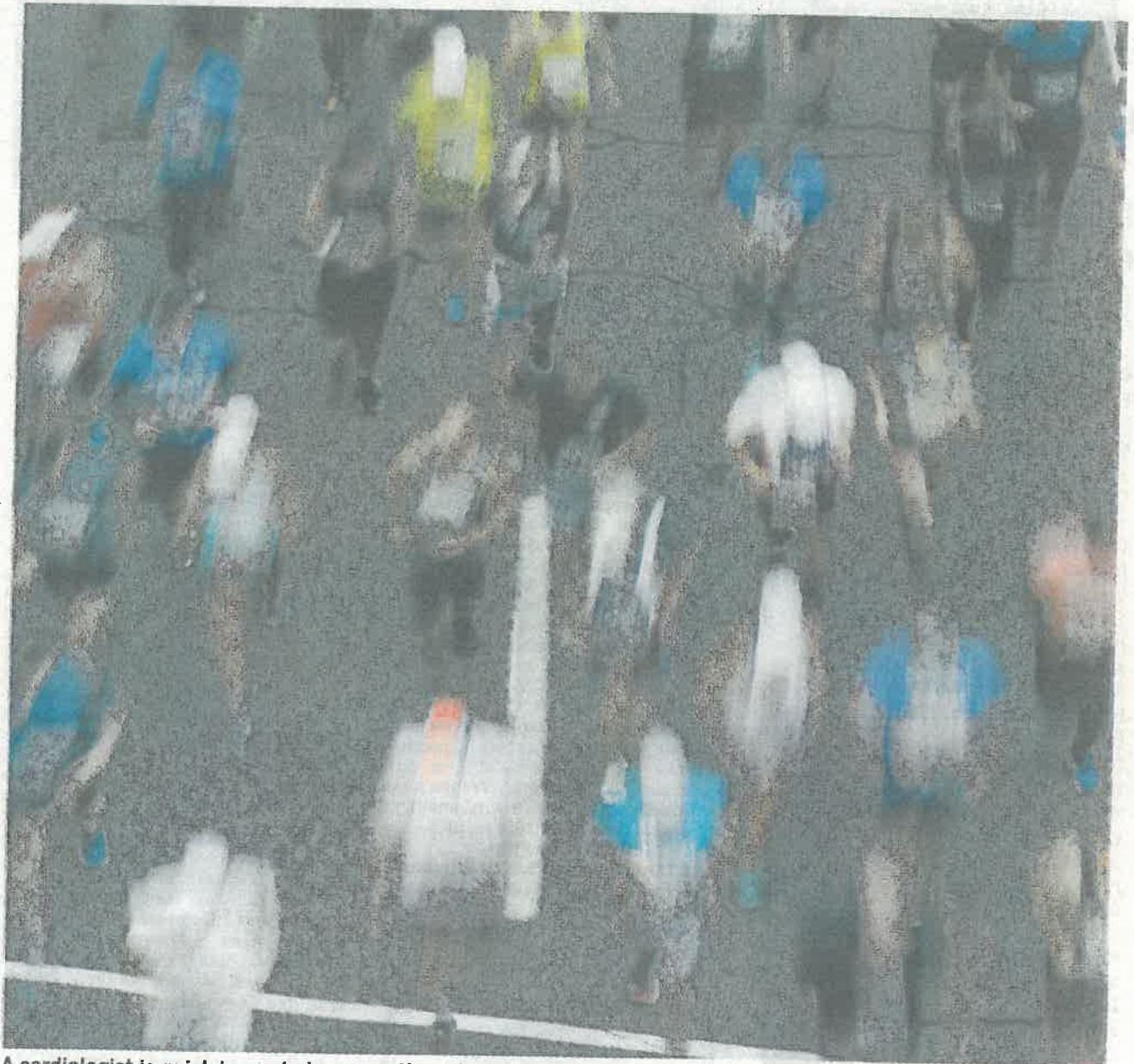
MONEY TO LOAN!!!
USE YOUR HOME EQUITY!
WE DO WHAT THE BANKS WON'T
1-888-307-7799
WWW.ONTARIO-WIDEFINANCIAL.COM
1801 347 ONTARIO INC.
FSCD LIC # 12456

Legal

Legal Assistant required for personal injury law firm. Litigation experience necessary. Email to dw@katzman-wylupek.com.

Food & Markets

Melegs Lakeview Orchard U-pick and ready picked apples now. Blue plums in store. www.melegsorcharld.com 5197334857



A cardiologist is quick to remind runners that it's heart disease or pre-existing structural abnormalities of the heart that cause cardiac arrest.

Welcome

Lakeshore Stormwater Master Plan Study Phase 1

Public Information Centre #2 (PIC)

View displays and discuss the study with project staff

Feel free to ask questions and fill out a comment sheet

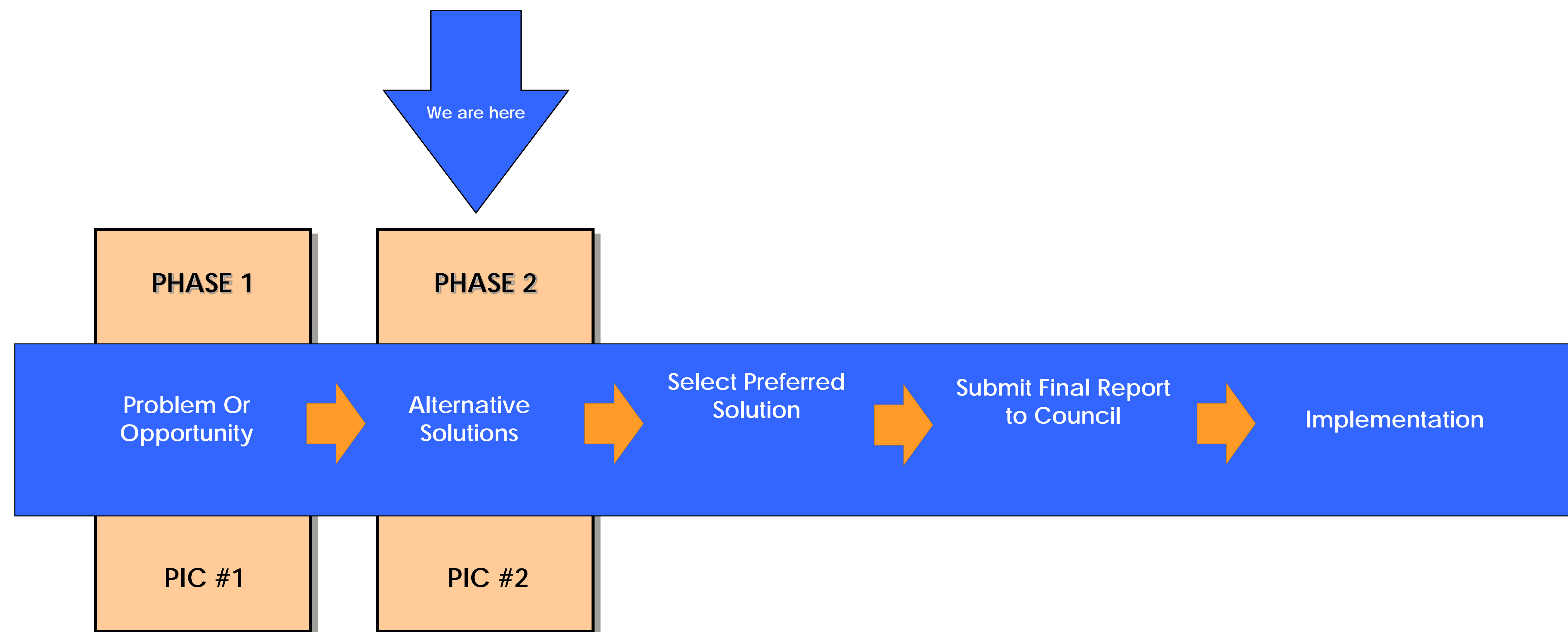
Purpose of This Study

- Goal is to reduce the risk of basement flooding and property damage caused by significant rainfall events, such as the September 2016 and August 2017 storms.
- 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.



Municipal Class Environmental Assessment Process

- The Town will meet the requirements of Ontario's Environmental Assessment (EA) Act for infrastructure projects.
- The project is being completed as a Master Plan - Approach 2 which includes 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 2 stage.
- The EA process is an opportunity for the public and agencies to provide input.



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, cleanouts, and pipe joints.

Problems and Opportunities

The cause of basement flooding at each individual home can be the result of one or many factors. The findings of our study suggest the following:

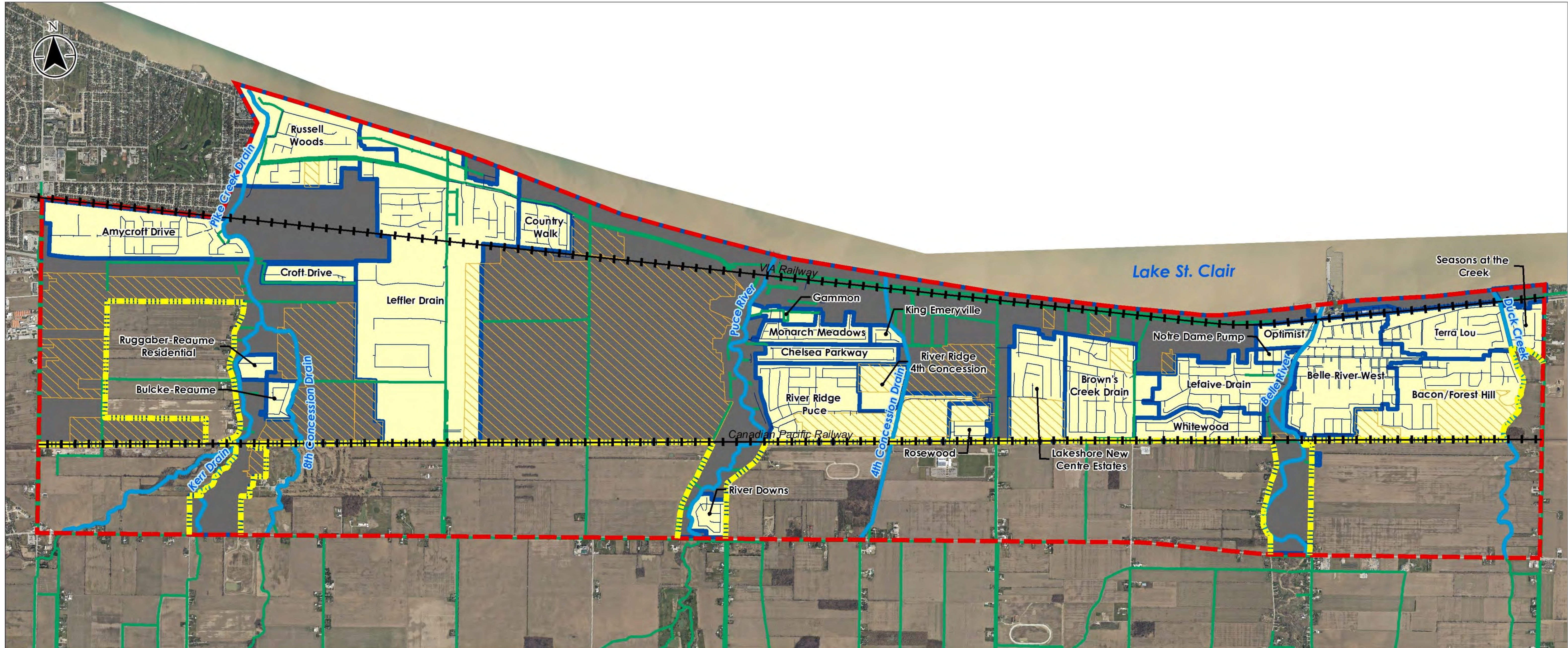
- The **primary cause** of basement flooding is **deficient private drainage** systems (i.e. – cracked pipes, sump pump failure, sanitary backflow valve failure, tree roots, grading around the house, etc.)
- The rainfall intensities that were experienced at the study area for September 2016 and August 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**, but it can challenge the private drainage system and expose any existing deficiencies.

Reducing the possibility of basement flooding requires a two-part solution:

Part 1. Maintain and **improve private drainage systems** to ensure adequate drainage of surface, roof and groundwater around the home; and

Part 2. **Improve the public drainage system** (i.e. the Town's stormwater system) to reduce the duration and frequency of storm sewer surcharging during intense rainfall events.

Study Area Catchments



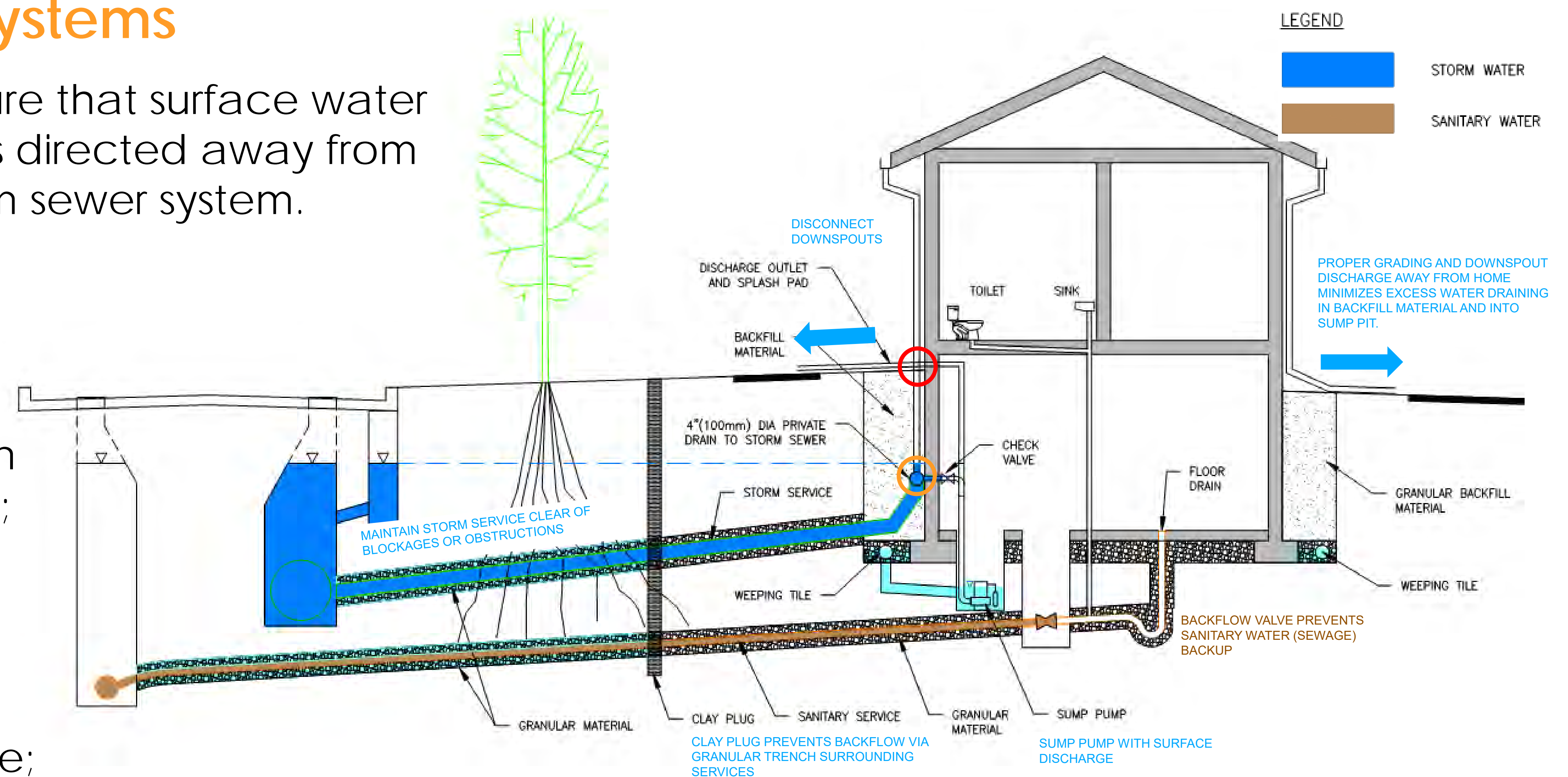
Solution Part 1

PRIVATE DRAINAGE SYSTEM MAINTENANCE AND IMPROVEMENTS

Maintaining Private Drainage Systems

Maintain 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. Potential improvements may include:

- Ensure ground surface is graded away from home;
- Disconnect downspouts from foundation drain and direct them away from house;
- Verify that sump pump is in proper working order;
- Provide backup power for sump pump;
- Discharge sump pump to ground surface;
- Install sanitary backflow preventor and verify that it is in proper working order;
- Inspect private drains (storm and sanitary) for cracks or roots; and
- Install clay plugs in private drain trenches.



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.

Solution Part 2

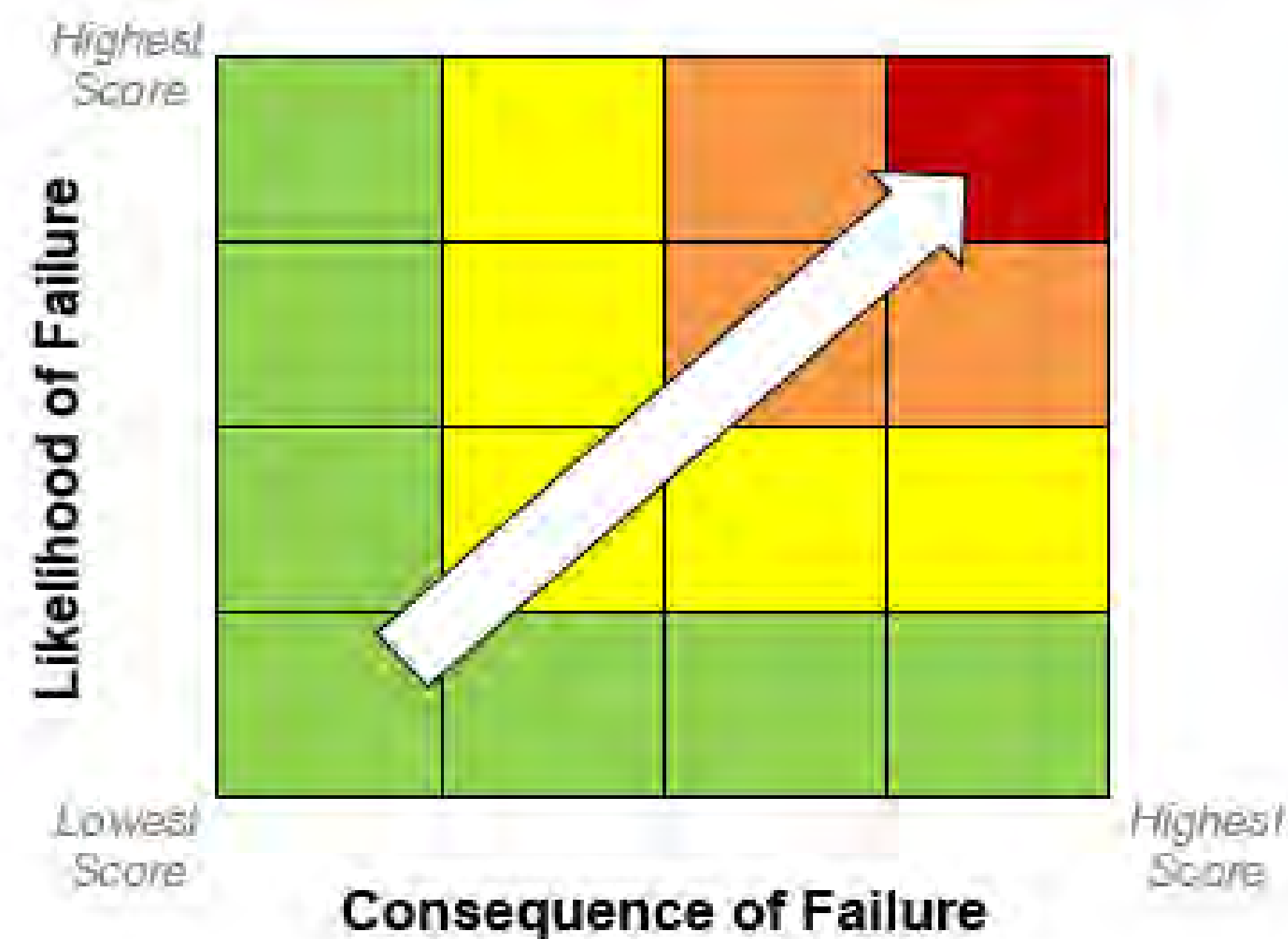
PUBLIC DRAINAGE SYSTEM IMPROVEMENTS

Storm Sewer Improvements

- The study area consists of approximately 112.2 kilometres of storm sewers and 1,135 storm manholes.
- Storm sewers provide quick and efficient drainage of urbanized areas to limit the inconvenience of stormwater ponding for most storm events. They are not designed to handle infrequent events such as those experienced in September 2016 and August 2017.

The performance of each storm sewer in the study area was evaluated based on its age, material, capacity, and the flooding that results if it fails.

Each storm sewer was assigned a score based on its performance to prioritize replacement.



Total Score	Prioritization Grade
8-10	Very Poor
6-8	Poor
4-6	Fair
2-4	Good
0-2	Very Good

Approximately 7.6 km of storm sewer received scores of “poor” or “very poor” and will be prioritized for future replacement.

Solution Part 2

PUBLIC DRAINAGE SYSTEM IMPROVEMENTS

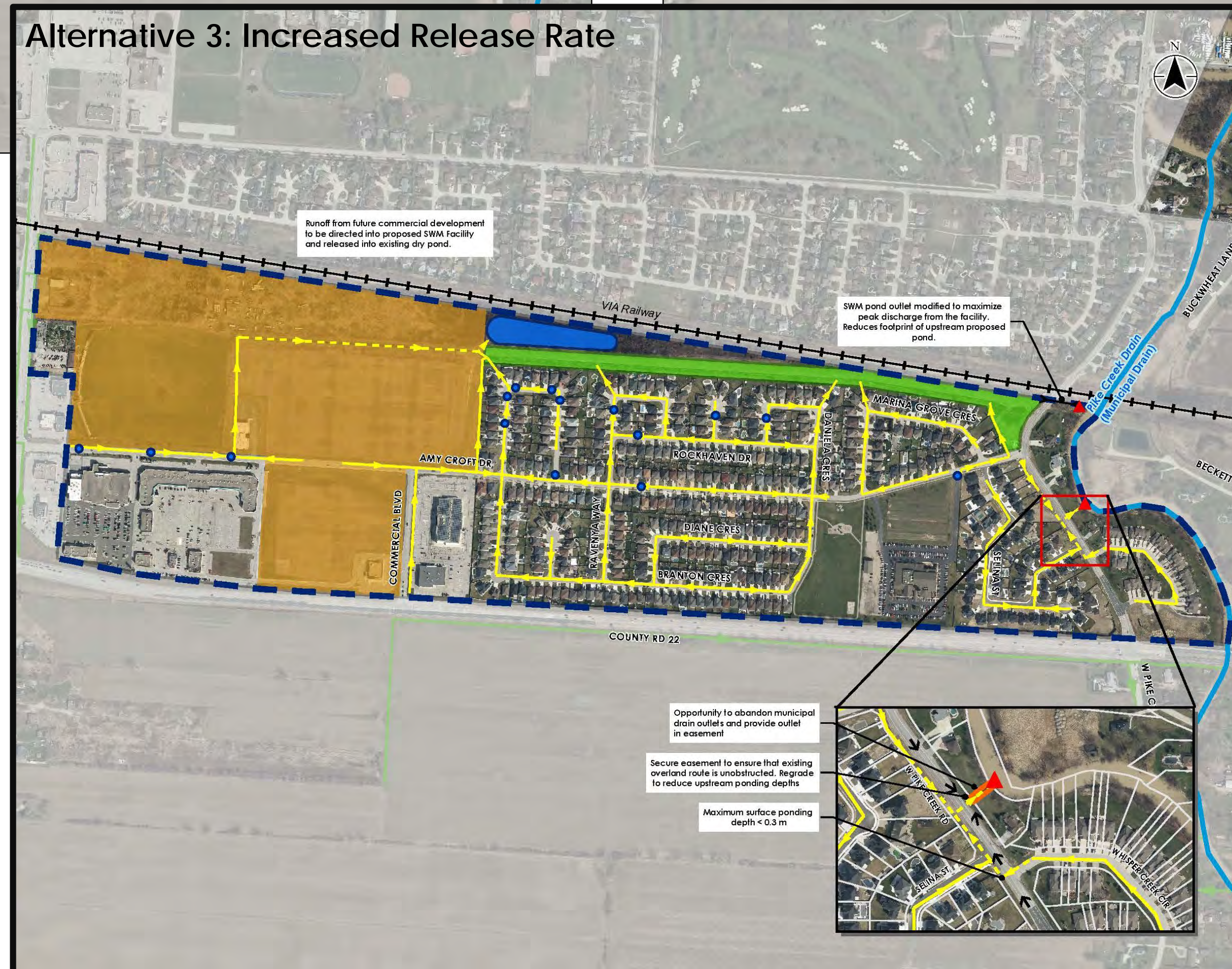
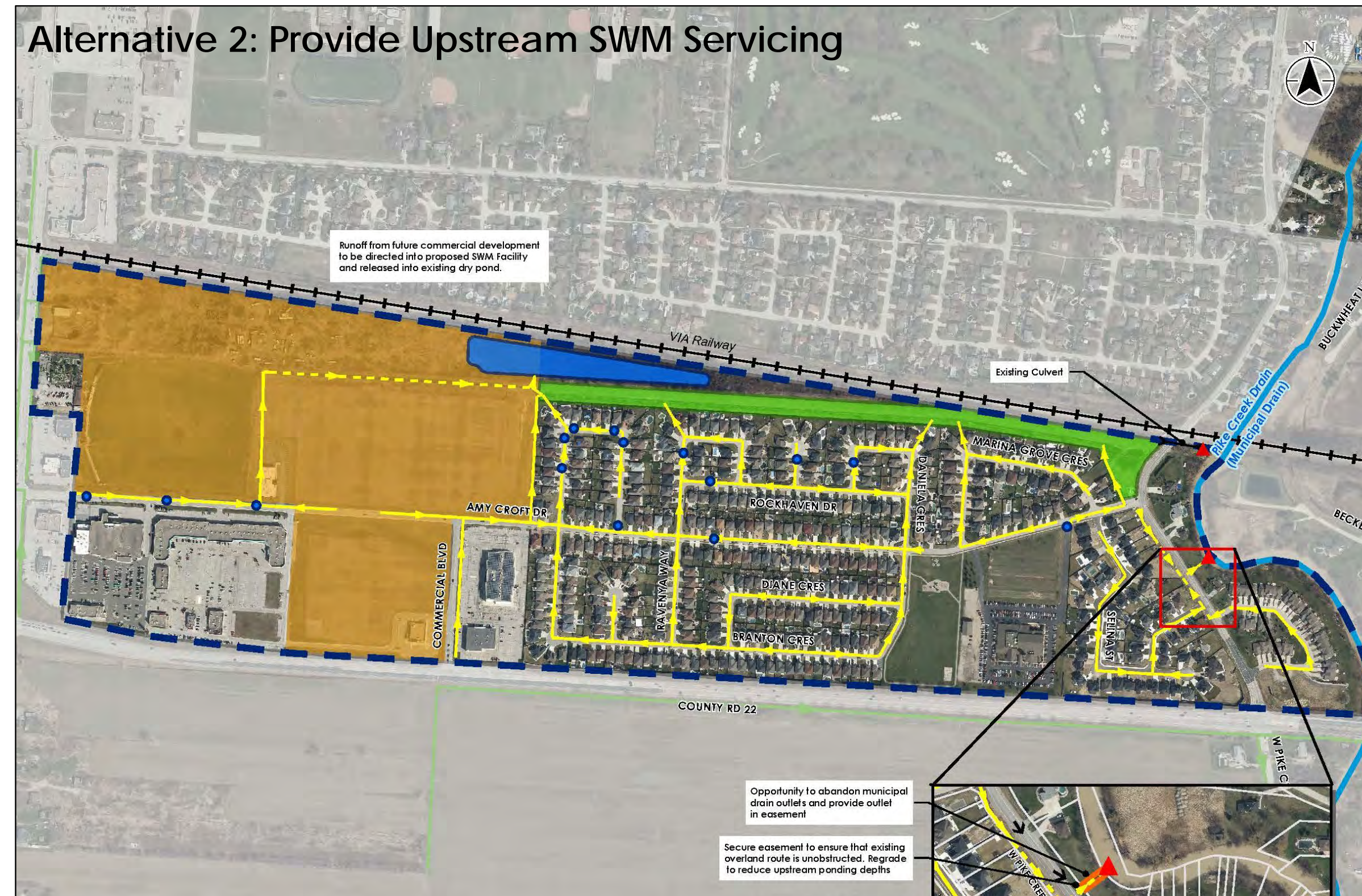
Catchment Improvements

A catchment screening exercise was undertaken to identify catchments where the public drainage system does not provide adequate service. Alternative solutions were developed and evaluated in accordance with the environmental assessment process for catchments where the following key issues were noted:

- Minor System Capacity – Systems with insufficient capacity to provide an adequate level of service during the 2-year storm event;
- Pump Station Capacity – Areas that do not receive an adequate level of service during minor storm events;
- Major System Capacity – Locations where buildings are likely vulnerable to flooding due to the capacity of the local major system and/or maximum road ponding depths are greater than 0.5 m;
- Drainage infrastructure or overland flow routes located outside of the municipal right-of-way and/or drainage easement; and
- Stormwater Management (SWM) Pond Capacity – Areas where the existing SWM pond does not have sufficient capacity to accommodate the 100-year design event.

Solution Part 2

AMY CROFT CATCHMENT IMPROVEMENT ALTERNATIVES

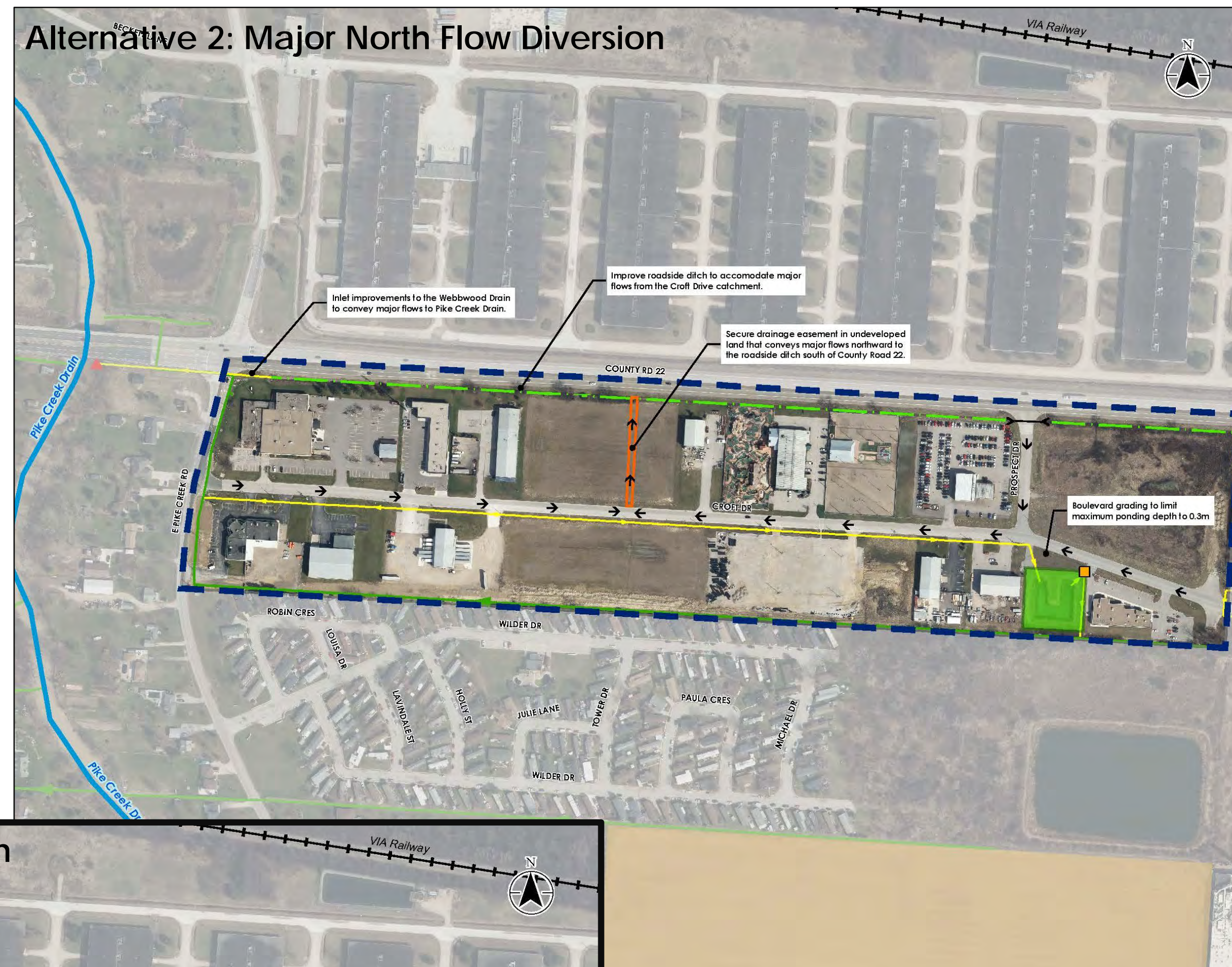


Criteria	Alternative 1 – Do Nothing	Alternative 2 – Provide Upstream SWM Servicing	Alternative 3 – Provide Upstream SWM Servicing and Increase Release Rate
Socio-Economic/ Cultural	Existing maximum surface ponding limits do not encroach into existing homes, but uncontrolled discharges from future development could cause downstream flooding.	Maximum surface ponding does not encroach into existing homes. Easement on private land is required for proposed overland flow route to Pike Creek. Approximately 1.4 ha required for proposed SWM pond.	Maximum surface ponding does not encroach into existing homes. Easement on private land is required for proposed overland flow route to Pike Creek. Approximately 0.8 ha required for proposed SWM pond.
Impacts to Existing and Future Land Uses	Maximum surface ponding >0.3 m deep occurs on local roads west of West Pike Creek Road. Anticipated maximum ponding depths may prevent passenger vehicle access to residences. Anticipated maximum ponding depths do not prevent safe pedestrian access/egress. Maximum surface ponding >0.5 m deep on West Pike Creek Road presents significant traffic hazard.	Maximum surface ponding >0.3 m deep occurs on local roads west of West Pike Creek Road. Anticipated maximum ponding depths may prevent passenger vehicle access to residences. Anticipated maximum ponding depths do not prevent safe pedestrian access/egress. Surface ponding hazard on West Pike Creek Road is significantly reduced.	Maximum surface ponding >0.3 m deep occurs on local roads west of West Pike Creek Road. Anticipated maximum ponding depths may prevent passenger vehicle access to residences. Anticipated maximum ponding depths do not prevent safe pedestrian access/egress. Surface ponding hazard on West Pike Creek Road is significantly reduced.
Public Safety	Potential risk of flood damage to vehicles parked near low points on local roads during severe storm events.	Potential risk of flood damage to vehicles parked near low points on local roads during severe storm events.	Potential risk of flood damage to vehicles parked near low points on local roads during severe storm events.
Property Impacts	Potential risk of flood damage to vehicles parked near low points on local roads during severe storm events.	Potential risk of flood damage to vehicles parked near low points on local roads during severe storm events.	Potential risk of flood damage to vehicles parked near low points on local roads during severe storm events.
Socio-Economic Summary	Maximum surface ponding depths west of West Pike Creek Road result in nuisance flooding but do not present a significant risk to safety or property. Maximum surface ponding depth on West Pike Creek Road presents a significant safety risk.	Maximum surface ponding depths west of West Pike Creek Road result in nuisance flooding but do not present a significant risk to safety or property. Reducing West Pike Creek Road maximum ponding depths requires easement on private land.	Maximum surface ponding depths west of West Pike Creek Road result in nuisance flooding but do not present a significant risk to safety or property. Reducing West Pike Creek Road maximum ponding depths requires easement on private land.
Natural Environment	No significant anticipated impacts on existing aquatic resources. No significant anticipated impacts on existing terrestrial resources.	No significant anticipated impacts on existing aquatic resources. Regrading of West Pike Creek Road east ditch may impact several trees located on property line, as grading within the dripline may be necessary. Creation of overland flow route to Pike Creek will require removal of approximately 8 m of riparian vegetation. No significant impacts on the natural environment are anticipated due to the loss of riparian vegetation. Impacts on existing trees can be mitigated by minimizing grading within dripline.	No significant anticipated impacts on existing aquatic resources. Regrading of West Pike Creek Road east ditch may impact several trees located on property line, as grading within the dripline may be necessary. Creation of overland flow route to Pike Creek will require removal of approximately 8 m of riparian vegetation. No significant impacts on the natural environment are anticipated due to the loss of riparian vegetation. Impacts on existing trees can be mitigated by minimizing grading within dripline.
Aquatic Resources	No significant anticipated impacts on existing aquatic resources.	No significant anticipated impacts on existing aquatic resources.	No significant anticipated impacts on existing aquatic resources.
Terrestrial Resources	No significant anticipated impacts on existing terrestrial resources.	No significant impacts on the natural environment are anticipated due to the loss of riparian vegetation. Impacts on existing trees can be mitigated by minimizing grading within dripline.	No significant impacts on the natural environment are anticipated due to the loss of riparian vegetation. Impacts on existing trees can be mitigated by minimizing grading within dripline.
Natural Environment Summary	No significant impacts on aquatic or terrestrial resources are anticipated.	No significant impacts on the natural environment are anticipated due to the loss of riparian vegetation. Impacts on existing trees can be mitigated by minimizing grading within dripline.	No significant impacts on the natural environment are anticipated due to the loss of riparian vegetation. Impacts on existing trees can be mitigated by minimizing grading within dripline.
Technical	No construction proposed.	West Pike Creek Road ditch improvements require construction in right-of-way with appropriate traffic controls. Proposed overland flow route may require hydro pole relocation.	West Pike Creek Road ditch improvements require construction in right-of-way with appropriate traffic controls. Replacement of existing SWM pond outlet to Pike Creek will likely require open cut construction within the West Pike Creek Road right-of-way.
Constructability	No construction proposed.	West Pike Creek Road ditch improvements require construction in right-of-way with appropriate traffic controls. Proposed overland flow route may require hydro pole relocation.	West Pike Creek Road ditch improvements require construction in right-of-way with appropriate traffic controls. Replacement of existing SWM pond outlet to Pike Creek will likely require open cut construction within the West Pike Creek Road right-of-way.
Minor System Performance	Higher ponding depths in existing linear SWM pond will likely reduce performance of existing upstream storm sewers.	No anticipated impacts on minor system performance. Opportunity to locate new pipe outfall to Pike Creek in proposed drainage easement and abandon municipal drain outlets.	No anticipated impacts on minor system performance. Opportunity to locate new pipe outfall to Pike Creek in proposed drainage easement and abandon municipal drain outlets.
Major System Performance	Maximum road ponding >0.3 m deep at approximately 16 locations west of West Pike Creek Road, to be exacerbated by uncontrolled discharges from proposed future development. Maximum road ponding >0.5 m deep on West Pike Creek Road. Risk that property owner could alter the existing overland flow route, resulting in greater surface ponding depths.	Maximum road ponding >0.3 m deep at approximately 16 locations west of West Pike Creek Road. Proposed SWM controls for future development provide peak flow attenuation. Anticipated pond volume of approximately 12,000 m ³ .	Maximum road ponding >0.3 m deep at approximately 16 locations west of West Pike Creek Road. No significant increases to the existing Pike Creek floodlines are anticipated due to increased peak stormwater discharges from the revised pond outlet. Anticipated pond volume of approximately 8,000 m ³ .
Approvals and Regulatory Requirements	No approval requirements since so stormwater management or drainage improvement works are proposed. Does not meet the requirements of the CWRA.	Negotiation of drainage easement with landowner required. Consultation with ERCA and Section 26 Permit required for proposed overland flow route located in regulated area. MECP ECA required for proposed SWM pond to service future development. Proposed drainage works within West Pike Creek Road right-of-way require approval of Essex County.	Negotiation of drainage easement with landowner required. Consultation with ERCA and Section 26 Permit required for proposed overland flow route located in regulated area. MECP ECA required for proposed SWM pond to service future development and ECA amendment required for outlet improvements to existing pond. Consultation with ERCA and Section 26 Permit required for proposed pond outlet improvements. Proposed drainage works within West Pike Creek Road right-of-way require approval of Essex County.
Technical Summary	Maximum anticipated ponding depths west of West Pike Creek Road are greater than Town standard. Drainage system performance will be negatively affected by uncontrolled flows from future development. Maximum ponding depth on West Pike Creek Road is greater than Town standard.	Maximum ponding depths west of West Pike Creek Road are greater than Town standard. Proposed SWM controls provide all necessary stormwater treatment for future development.	Maximum ponding depths west of West Pike Creek Road are greater than Town standard. Proposed SWM controls provide water quality treatment and some peak flow attenuation.
Economic	No associated construction costs since no new stormwater management works are proposed.	High capital costs associated with proposed SWM pond and overland flow route improvements.	High capital costs associated with proposed SWM pond, overland flow route improvements, and existing pond outlet improvements. Cost of outlet improvements is mitigated by reduction in proposed pond size.
Capital Construction Cost	No associated construction costs since no new stormwater management works are proposed.	High capital costs associated with proposed SWM pond and overland flow route improvements.	High capital costs associated with proposed SWM pond, overland flow route improvements, and existing pond outlet improvements. Cost of outlet improvements is mitigated by reduction in proposed pond size.
Operations and Maintenance Costs (Long Term)	O&M costs for single SWM facility.	O&M costs for two SWM facilities.	O&M costs for single SWM facilities.
Economic Summary	Lowest cost	High Cost	High Cost

Indicates Preliminary Recommended Alternative

Solution Part 2

CROFT DRIVE CATCHMENT IMPROVEMENT ALTERNATIVES

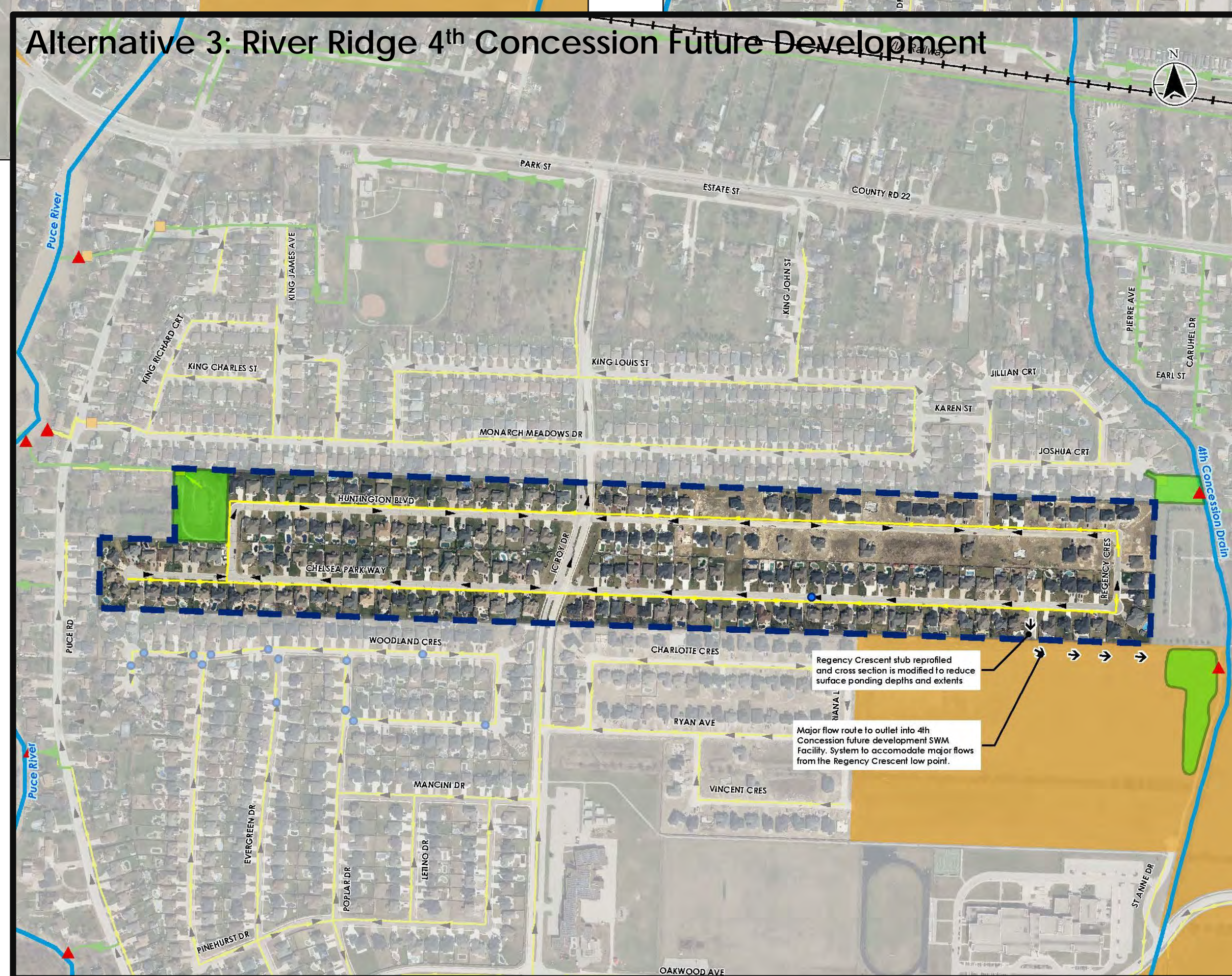
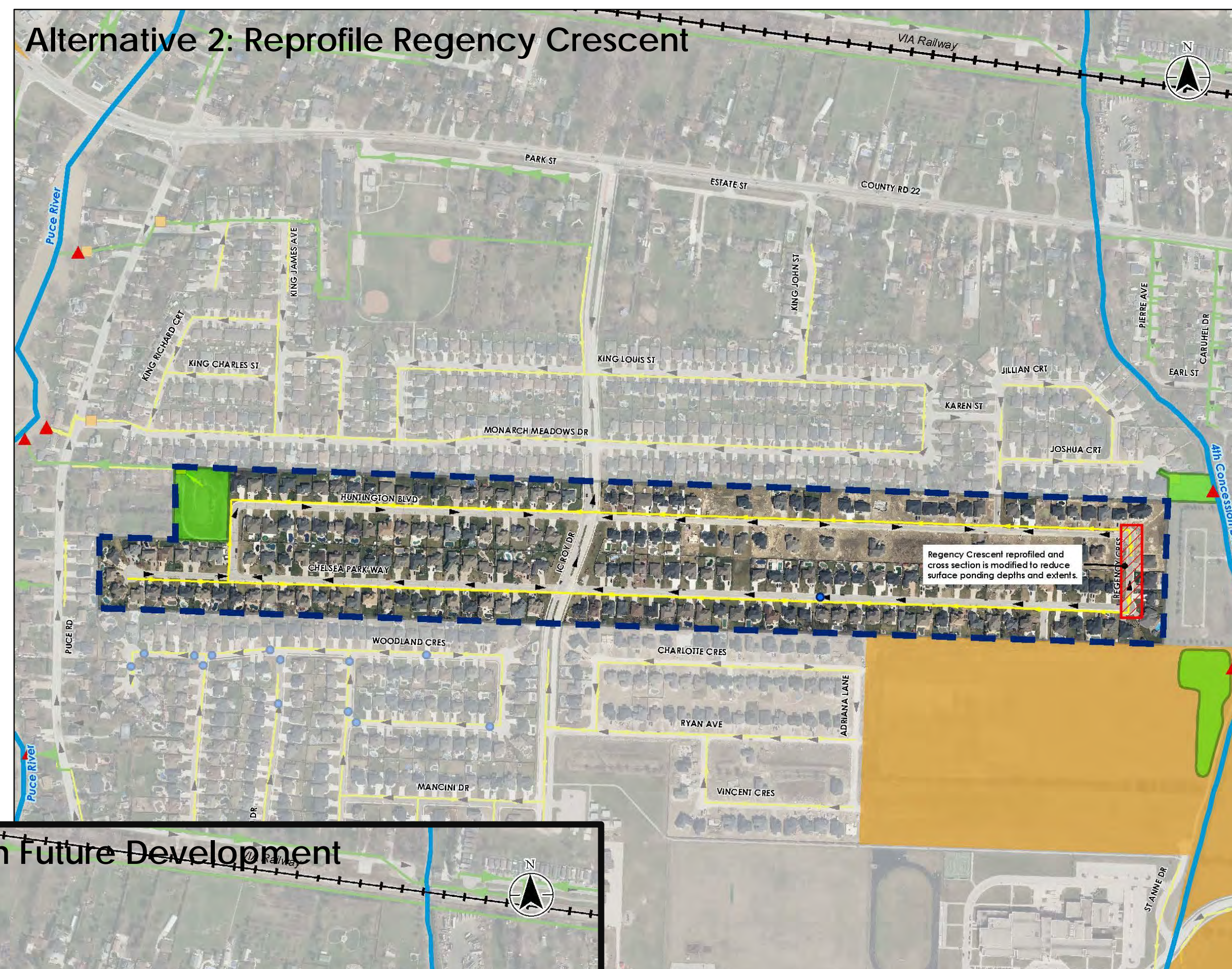
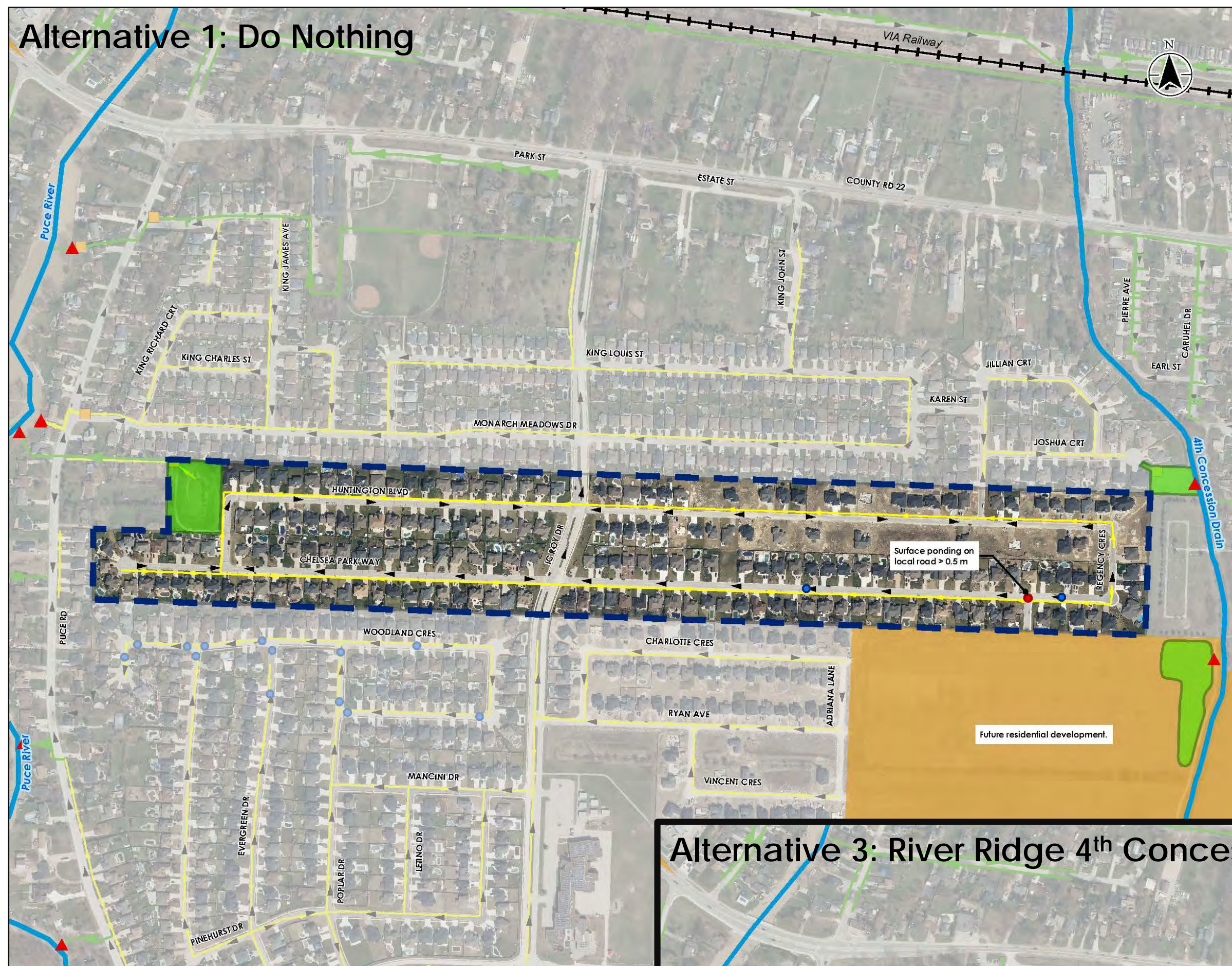


Criteria	Alternative 1 – Do Nothing	Alternative 2 – Provide Major Flow Route to CR 22	Alternative 3 – Provide Major Flow Route to Webbwood Drain
Socio-Economic/Cultural	Overland flows from the Croft Drive right-of-way cross the parking lot at 204 East Pike Creek Road.	Easement on private land is required for proposed overland flow route to CR 22 ditch.	Easement on private land is required for proposed overland flow route to Webbwood Drain.
Impacts to Existing and Future Land Uses	Anticipated maximum ponding depths may prevent both emergency and passenger vehicle access to local businesses during severe storm events. Major overland flow route crosses parking lot on East Pike Creek Road.	Maximum estimated surface ponding depths on Croft Drive do not present a significant hazard to public safety.	Maximum estimated surface ponding depths on Croft Drive do not present a significant hazard to public safety.
Public Safety	Maximum estimated surface ponding depths >0.5 m on Croft Drive may limit emergency vehicle access to local businesses and present a significant traffic hazard. The maximum anticipated ponding limits encroach into approximately 7 existing buildings.	Proposed overland flow route provides spill relief at an elevation lower than the existing local building estimated FFEs.	Proposed overland flow route provides spill relief at an elevation lower than the existing local building estimated FFEs.
Property Impacts	Maximum surface ponding depths on Croft Drive present a risk to both property and public safety.	Lowered anticipated maximum ponding depths reduce risks to both properties and public safety. Site access is improved during severe storm events.	Lowered anticipated maximum ponding depths reduce risks to both properties and public safety. Site access is improved during severe storm events.
Socio-Economic Summary			
Natural Environment			
Aquatic Resources	No significant anticipated impacts on existing aquatic resources.	No significant anticipated impacts on existing aquatic resources.	No significant anticipated impacts on existing aquatic resources.
Terrestrial Resources	No significant anticipated impacts on existing terrestrial resources.	No significant anticipated impacts on existing terrestrial resources.	No significant anticipated impacts on existing terrestrial resources.
Natural Environment Summary	No significant impacts on aquatic or terrestrial resources are anticipated.	No significant impacts on aquatic or terrestrial resources are anticipated.	No significant impacts on aquatic or terrestrial resources are anticipated.
Technical			
Constructability	No construction proposed.	CR 22 roadside ditch improvements and Webbwood Drain inlet improvements require construction in right-of-way with appropriate traffic controls. Regrading of overland flow route to existing SWM pond requires construction in Croft Drive right-of-way with appropriate traffic controls.	Regrading of overland flow route to existing SWM pond requires construction in Croft Drive right-of-way with appropriate traffic controls.
Minor System Performance	Minor system has sufficient capacity to convey the runoff from the 5-year design storm event without surcharging above the ground surface.	Minor system has sufficient capacity to convey the runoff from the 5-year design storm event without surcharging above the ground surface.	Minor system has sufficient capacity to convey the runoff from the 5-year design storm event without surcharging above the ground surface.
Major System Performance	Maximum road ponding >0.5 m deep at 2 locations on Croft Drive.	Maximum road ponding <0.3 m deep on Croft Drive. Additional surface flows are directed to the CR 22 roadside ditch.	Maximum road ponding <0.3 m deep on Croft Drive. Additional surface flows are directed to the open portion of Webbwood Drain.
Approvals and Regulatory Requirements	No approval requirements since no stormwater management or drainage improvement works are proposed.	Negotiation of drainage easement with landowner required. Proposed improvements to the Webbwood Municipal Drain must be completed in accordance with the Drainage Act. Discharges to CR 22 must be accepted by Essex County. Proposed drainage works within CR 22 right-of-way require approval of Essex County. MECP ECA amendment probably not required for proposed overland flow route to existing SWM pond.	Negotiation of drainage easement with landowner required. MECP ECA amendment probably not required for proposed overland flow route to existing SWM pond. Proposed Webbwood Drain inlet to be constructed in accordance with the provisions of the Drainage Act.
Technical Summary	Maximum anticipated ponding depths on Croft Drive are greater than Town standard. Overland flows are conveyed across private properties.	Maximum anticipated ponding depths on Croft Drive meet Town standard. Overland flows are conveyed by right-of-ways and drainage easements.	Maximum anticipated ponding depths on Croft Drive meet Town standard. Overland flows are conveyed by right-of-ways and drainage easements.
Economic			
Capital Construction Cost	No associated construction costs since no new stormwater management works are proposed.	Moderate capital costs associated with proposed overland flow route improvements and Webbwood Drain inlet improvements.	Moderate capital costs associated with proposed overland flow route improvements.
Operations and Maintenance Costs (Long Term)	No significant associated O&M costs.	Low O&M costs associated with periodic inspection and removal of debris at Webbwood Drain CR 22 inlet.	Low O&M costs associated with periodic inspection and removal of debris at Webbwood Drain inlet.
Economic Summary	Lowest cost	Moderate Cost	Moderate Cost

Indicates Preliminary Recommended Alternative

Solution Part 2

CHELSEA PARKWAY CATCHMENT IMPROVEMENT ALTERNATIVES

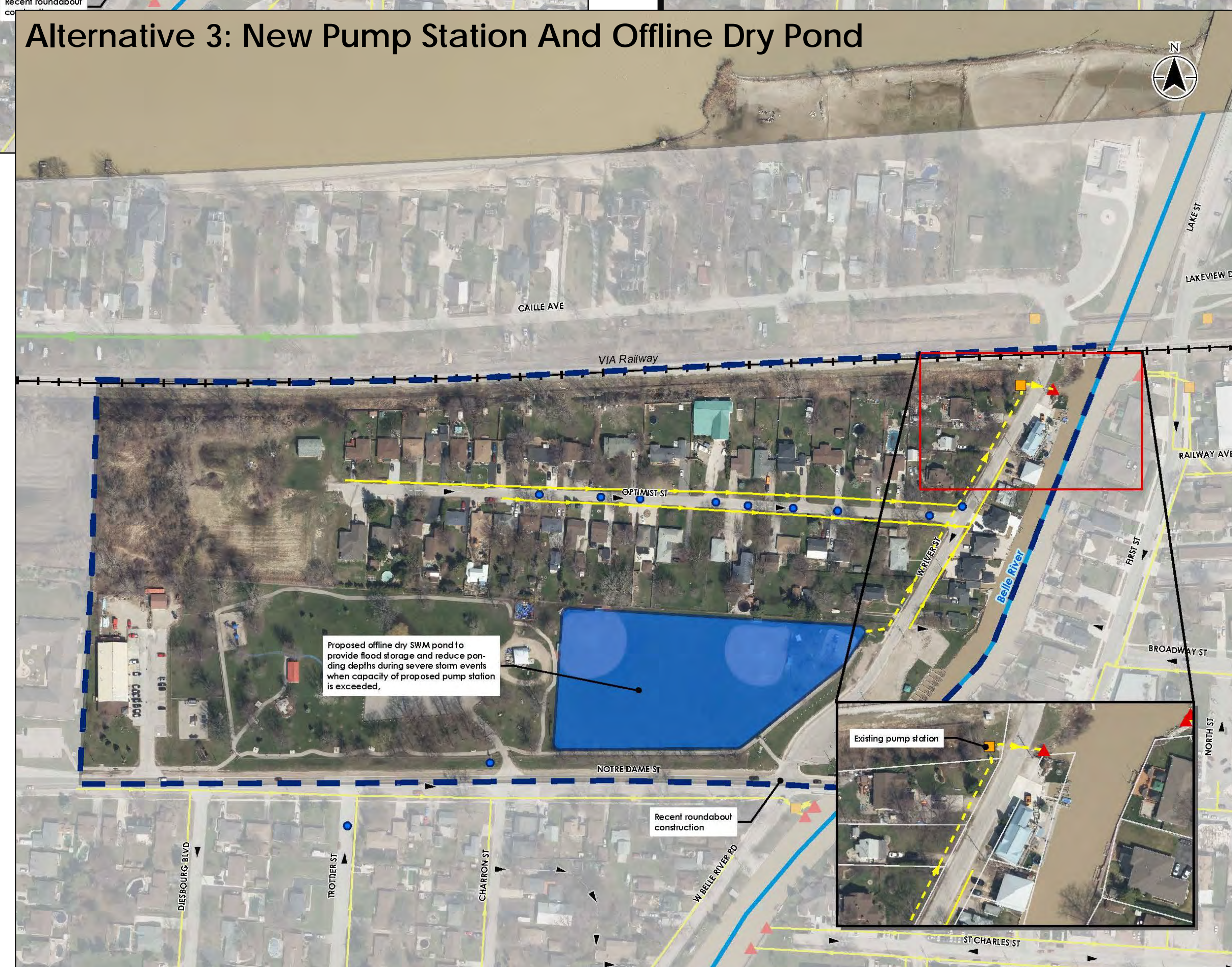
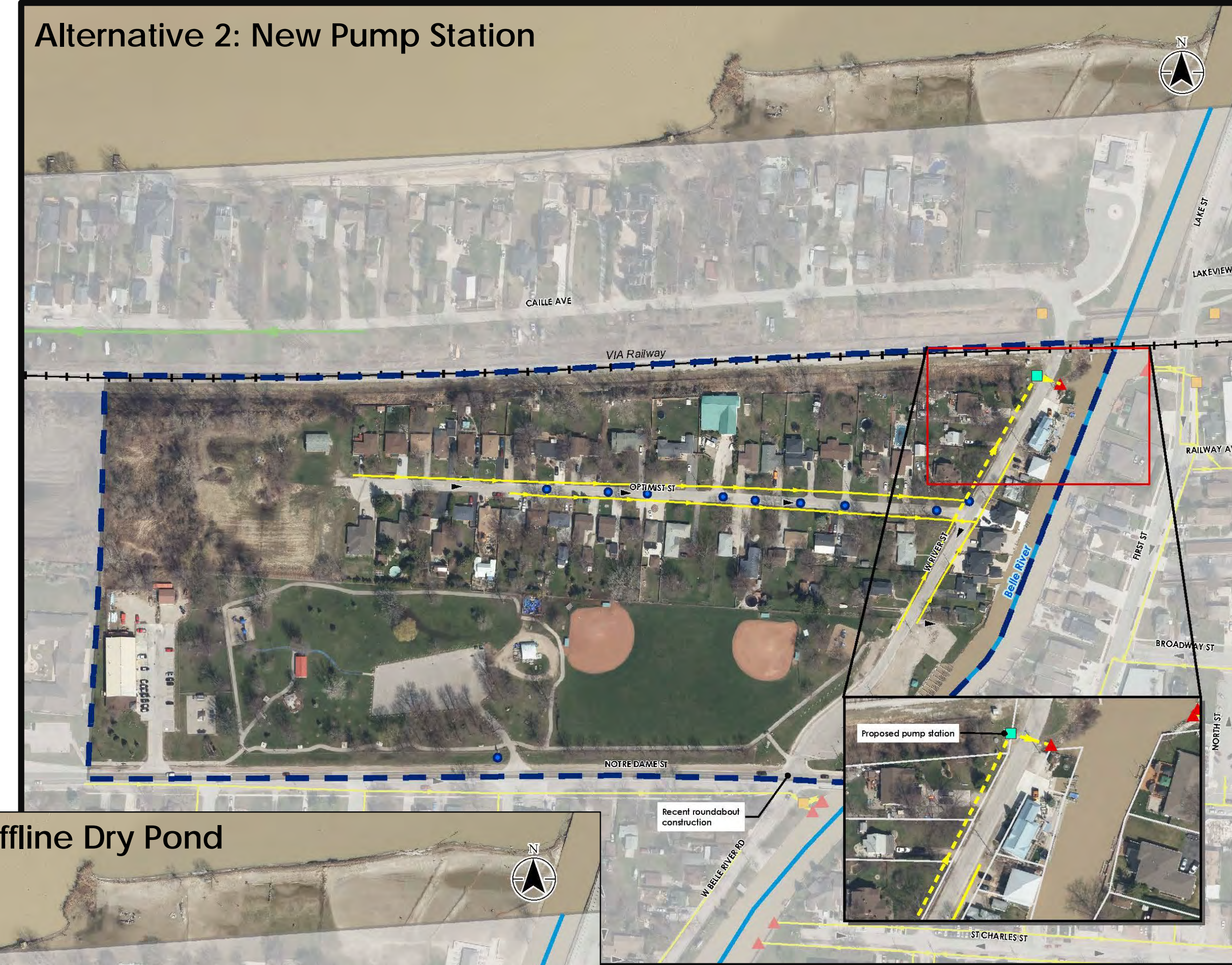


Criteria	Alternative 1 – Do Nothing	Alternative 2 – Reprofile Regency Crescent	Alternative 3 – Provide Overland Flow Route Through Future Development
Socio-Economic/ Cultural Impacts to Existing and Future Land Uses	Existing maximum surface ponding limits do not encroach into existing homes. Anticipated maximum ponding depths may prevent both emergency and passenger vehicle access to local residences during severe storm events.	Maximum surface ponding does not encroach into existing homes. Access to properties may be temporarily affected during construction.	Maximum surface ponding does not encroach into existing homes. Future development grading must convey overland flows from Regency Crescent low point.
Public Safety	Maximum estimated surface ponding depths >0.5 m on Regency Crescent may limit emergency vehicle access to residences and presents a significant traffic hazard. Anticipated maximum ponding depths do not prevent safe pedestrian access/egress.	Maximum estimated surface ponding depths on Regency Crescent do not present a significant hazard to public safety.	Maximum estimated surface ponding depths on Regency Crescent do not present a significant hazard to public safety.
Property Impacts	Potential risk of flood damage to vehicles parked near low points on local roads during severe storm events.	Reduced risk of flood damage to vehicles parked near low points on local roads during severe storm events.	Reduced risk of flood damage to vehicles parked near low points on local roads during severe storm events.
Socio-Economic Summary	Maximum surface ponding depths on Regency Crescent present an obstruction to property access and emergency vehicles.	Proposed overland flow route improves property access and reduces safety risk.	Proposed overland flow route improves property access and reduces safety risk.
Natural Environment	No significant anticipated impacts on existing aquatic resources.	No significant anticipated impacts on existing aquatic resources.	No significant anticipated impacts on existing aquatic resources.
Aquatic Resources	No significant anticipated impacts on existing terrestrial resources.	No significant anticipated impacts on existing terrestrial resources.	No significant anticipated impacts on existing terrestrial resources.
Terrestrial Resources	No significant impacts on aquatic or terrestrial resources are anticipated.	No significant impacts on aquatic or terrestrial resources are anticipated.	No significant impacts on aquatic or terrestrial resources are anticipated.
Natural Environment Summary	No construction proposed.	Regrading of overland flow route requires construction in Regency Crescent right-of-way with appropriate traffic controls.	Regrading of overland flow route requires construction in Regency Crescent Slub with appropriate traffic controls.
Technical Constructability	Minor system has sufficient capacity to convey the runoff from the 5-year design storm event without surcharging above the ground surface.	Minor system has sufficient capacity to convey the runoff from the 5-year design storm event without surcharging above the ground surface.	Minor system has sufficient capacity to convey the runoff from the 5-year design storm event without surcharging above the ground surface.
Minor System Performance	Maximum road ponding >0.5 m deep at 2 locations on Regency Crescent.	Maximum road ponding <0.3 m deep on Regency Crescent.	Maximum road ponding <0.3 m deep on Regency Crescent.
Major System Performance	No approval requirements since so stormwater management or drainage improvement works are proposed.	Consultation with ERCA may be required since proposed overland flow route grading is located within the Regulation Limits.	Consultation with ERCA may be required since proposed overland flow route grading is located within the Regulation Limits.
Approvals and Regulatory Requirements	Maximum anticipated ponding depths on Regency Crescent are greater than Town standard.	Maximum anticipated ponding depths on Regency Crescent meet Town standard. Overland flows are conveyed by right-of-ways and drainage easements.	Maximum anticipated ponding depths on Croft Drive meet Town standard. Overland flows are conveyed by right-of-ways and drainage easements.
Technical Summary	No associated construction costs since no new stormwater management works are proposed. No significant anticipated O&M costs.	High capital costs associated with modifying Regency Crescent profile. No significant anticipated O&M costs.	Moderate cost associated with modifying Regency Crescent street slab profile. No significant anticipated O&M costs.
Economic Capital Construction Cost	Lowest cost	Highest Cost	Moderate Cost
Operations and Maintenance Costs (Long Term)	Lowest cost	Highest Cost	Moderate Cost
Economic Summary	Lowest cost	Highest Cost	Moderate Cost

Indicates Preliminary Recommended Alternative

Solution Part 2

OPTIMIST CATCHMENT IMPROVEMENT ALTERNATIVES

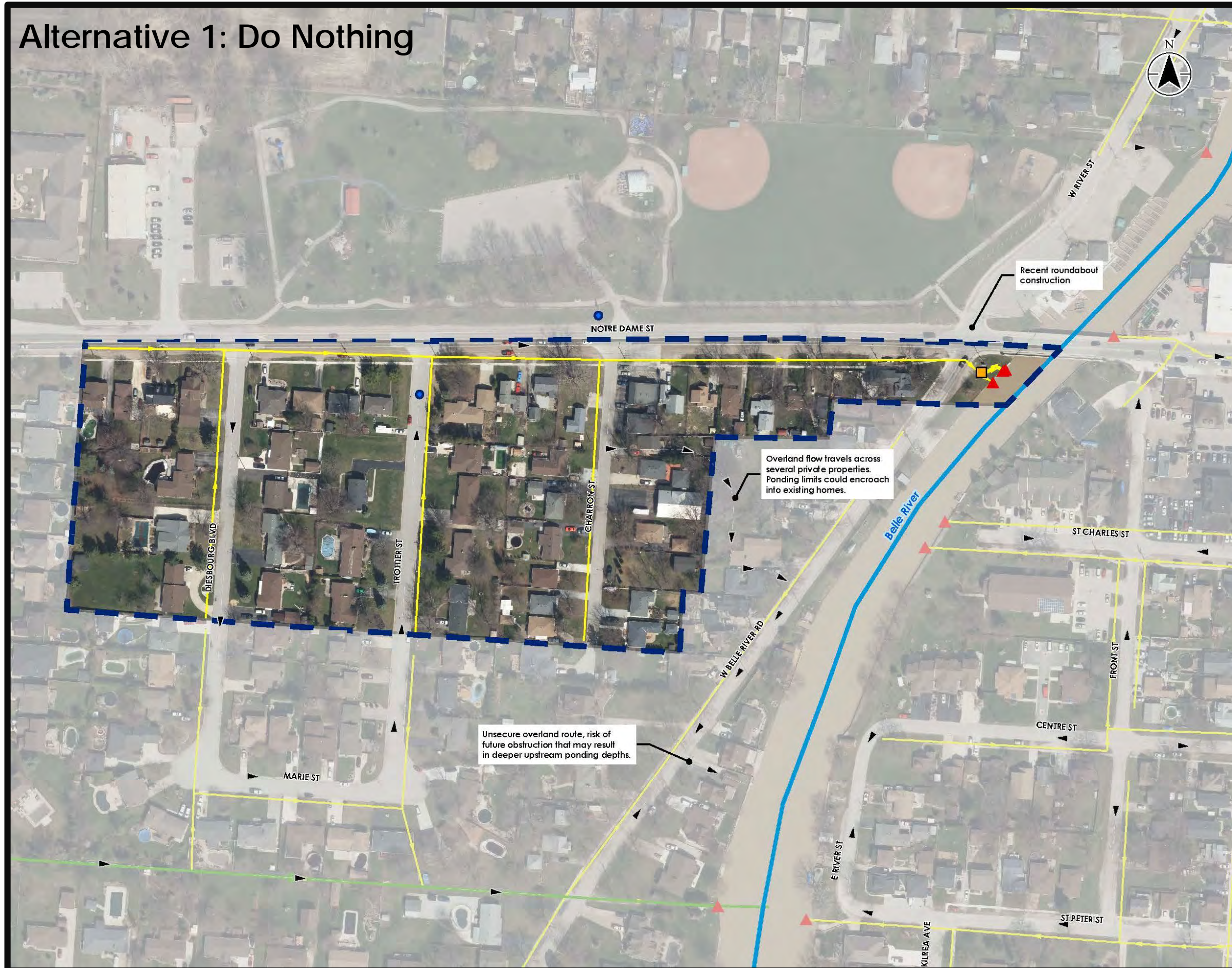


Criteria	Alternative 1 – Do Nothing	Alternative 2 – New Pump Station	Alternative 3 – New Pump Station and SWM Pond
Socio-Economic/Cultural Impacts to Existing and Future Land Uses	Existing maximum surface ponding limits encroach into existing homes.	Risk of flooding caused by surface ponding is reduced. Access to properties may be temporarily affected during construction.	Risk of flooding caused by surface ponding is reduced. Access to properties may be temporarily affected during construction. Use of a portion of Optimist Park is limited during severe storm events is limited by temporary stormwater storage. The portion of the park within the proposed stormwater storage area will be closed for approximately one year for construction and restoration. Optimist Park has been previously identified as being archeologically sensitive.
Public Safety	Anticipated maximum ponding depths may interfere with passenger vehicle access to local residences during severe storm events. Anticipated maximum ponding depths do not prevent safe pedestrian access/egress.	Maximum estimated surface ponding depths on Optimist Street do not present a significant hazard to public safety.	Maximum estimated surface ponding depths on Optimist Street do not present a significant hazard to public safety. Proposed stormwater storage in Optimist Park may present a hazard to park users during and immediately after severe storm events.
Property Impacts	Potential risk of flood damage to vehicles parked near low points on local roads during severe storm events. Future maintenance or replacement of storm sewer outfall to Belle River will have significant impacts on 153 and 157 West River Street.	Reduced risk of flood damage to vehicles parked near low points on local roads during severe storm events.	Reduced risk of flood damage to vehicles parked near low points on local roads during severe storm events.
Socio-Economic Summary	Maximum surface ponding depths on Optimist Street present a significant risk to local residences.	Proposed pumping station reduces surface flooding risk to existing Optimist Street homes during frequent storm events.	Proposed pumping station reduces surface flooding risk to existing Optimist Street homes during frequent storm events. Proposed stormwater storage in Optimist Park may occasionally disrupt park use. Stormwater storage construction will limit park use for an approximately one year period. Archeological concerns within proposed stormwater storage footprint.
Natural Environment			
Aquatic Resources	No significant anticipated impacts on existing aquatic resources.	No significant anticipated impacts on existing aquatic resources since existing riverbank at proposed outfall is a sheetpile wall.	No significant anticipated impacts on existing aquatic resources since existing riverbank at proposed outfall is a sheetpile wall.
Terrestrial Resources	No significant anticipated impacts on existing terrestrial resources.	No significant anticipated impacts on existing terrestrial resources.	Proposed stormwater storage may require tree removal in Optimist Park.
Natural Environment Summary	No significant impacts on aquatic or terrestrial resources are anticipated.	No significant impacts on aquatic or terrestrial resources are anticipated.	No significant impacts on aquatic resources are anticipated. Impacts of tree removal can likely be addressed through replanting.
Technical Constructability	No construction proposed.	Reconstruction of the proposed storm sewers in right-of-ways requires appropriate traffic controls.	Reconstruction of the proposed storm sewers in right-of-ways requires appropriate traffic controls. Local groundwater conditions may interfere with construction of proposed stormwater storage.
Minor System Performance	Minor system does not have sufficient capacity to convey the runoff from the 2-year design storm event without surcharging above the ground surface.	Proposed minor system has sufficient capacity to convey the runoff from the 5-year design storm event without surcharging above the ground surface. Proposed pump station includes backup pump to provide redundancy pump fails during a severe storm event.	Proposed minor system has sufficient capacity to convey the runoff from the 5-year design storm event without surcharging above the ground surface. Proposed pump station includes backup pump to provide redundancy pump fails during a severe storm event.
Major System Performance	Maximum road ponding >0.3 m deep at ___ locations on Optimist Street.	Maximum road ponding <0.3 m deep on Optimist Street.	Maximum road ponding <0.3 m deep on Optimist Street.
Approvals and Regulatory Requirements	No approval requirements since no stormwater management or drainage improvement works are proposed.	ERCA Section 28 permit may be required since proposed overland flow route grading and proposed outfall is located within the Regulation Limits. MECP ECA required for proposed storm sewer improvements, pump station, and stormwater facility. Archeological assessment required for proposed stormwater facility.	ERCA Section 28 permit may be required since proposed works are located within the Regulation Limits. MECP ECA required for proposed storm sewer improvements, pump station, and stormwater facility. Archeological assessment required for proposed stormwater facility.
Technical Summary	Maximum anticipated ponding depths on Optimist Street are greater than Town standard. Overland flows are conveyed across private properties.	Maximum anticipated ponding depths are reduced.	Maximum anticipated ponding depths are reduced. Overland flows are conveyed by right-of-ways and drainage easement. Proposed stormwater storage mitigates the risk of local surface flooding.
Economic Capital Construction Cost	No associated construction costs since no new stormwater management works are proposed.	High anticipated capital costs associated with proposed storm sewer improvements, associated restoration, and pump station.	Highest anticipated capital costs associated with anticipated archeological investigation, proposed storm sewer improvements, associated restoration, pump station, overland flow improvements, and stormwater storage area. O&M costs associated with periodic pump station inspection and maintenance, and debris removal from stormwater storage area inlets/outlets. Highest Cost
Operations and Maintenance Costs (Long Term)	No significant anticipated O&M costs.	O&M costs associated with periodic pump station inspection and maintenance.	O&M costs associated with periodic pump station inspection and maintenance, and debris removal from stormwater storage area inlets/outlets.
Economic Summary	Lowest cost	High Cost	Highest Cost

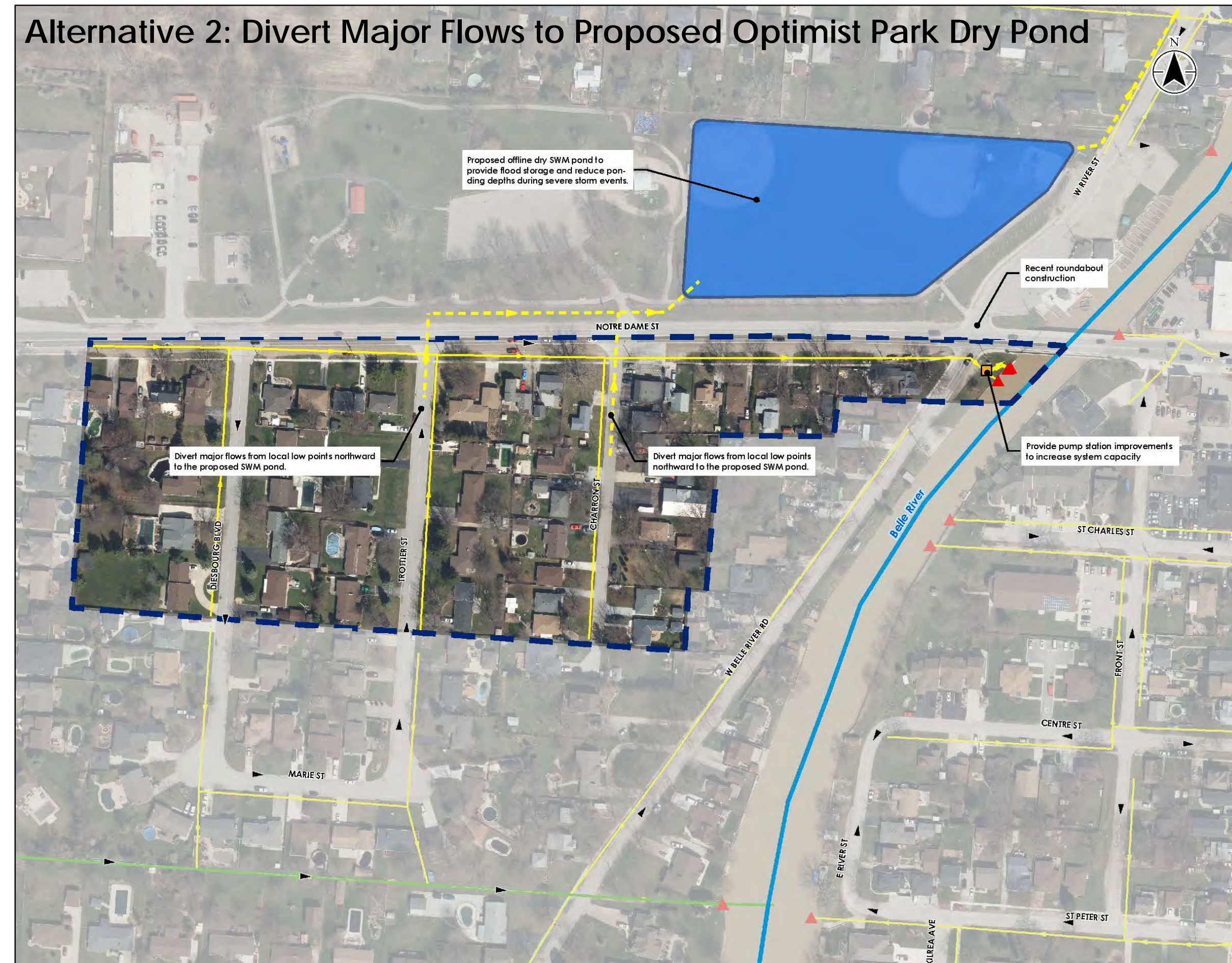
Indicates Preliminary Recommended Alternative

Solution Part 2

NOTRE DAME PUMP CATCHMENT IMPROVEMENT ALTERNATIVES



Alternative 2: Divert Major Flows to Proposed Optimist Park Dry Pond



Criteria	Alternative 1 – Do Nothing	Alternative 2 – Stormwater Storage
Socio-Economic/Cultural		
Impacts to Existing and Future Land Uses	Existing maximum surface ponding limits encroach into existing homes. Overland flows are conveyed to West River Road across private properties.	Maximum surface ponding durations are reduced. Use of a portion of Optimist Park is limited during severe storm events by temporary stormwater storage. The portion of the park within the proposed stormwater storage area will be closed for approximately one year for construction and restoration. Archeological concerns for proposed works in Optimist Park.
Public Safety	Anticipated maximum ponding depths may interfere with passenger vehicle access to local residences on Trotter Street during severe storm events. Anticipated maximum ponding depths do not prevent safe pedestrian access/egress.	Maximum estimated surface ponding depths on Trotter Street do not present a significant hazard to public safety. Proposed stormwater storage in Optimist Park may present a hazard to park users during and immediately after severe storm events.
Property Impacts	Potential risk of flood damage to vehicles parked near low points on local roads during severe storm events.	Reduced risk of flood damage to vehicles parked near low points on local roads during severe storm events. Access to properties may be temporarily affected during construction.
Socio-Economic Summary	Overland flow route from Charron Street to Belle river presents a surface flood risk to local residences.	Proposed stormwater storage in Optimist Park may occasionally disrupt park use. Stormwater storage construction will limit park use for an approximately one year period.
Natural Environment		
Aquatic Resources	No significant anticipated impacts on existing aquatic resources.	No significant anticipated impacts on existing aquatic resources.
Terrestrial Resources	No significant anticipated impacts on existing terrestrial resources.	Proposed stormwater storage may require tree removal in Optimist Park.
Natural Environment Summary	No significant impacts on aquatic or terrestrial resources are anticipated.	No significant impacts on aquatic resources are anticipated. Impacts of tree removal can likely be addressed through replanting.
Technical		
Constructability	No construction proposed.	Construction on Notre Dame Road requires appropriate traffic controls. Local groundwater conditions may interfere with construction of proposed stormwater storage.
Minor System Performance	Minor system has sufficient capacity to convey the runoff from the 2-year design storm event without surcharging above the ground surface.	Proposed minor system has sufficient capacity to convey the runoff from the 2-year design storm event without surcharging above the ground surface.
Major System Performance	Maximum road ponding >0.3 m on Trotter Crescent. Risk that property owners could alter the existing overland flow route, resulting in greater surface ponding depths.	Major flow diverted to stormwater storage in Optimist Park.
Approvals and Regulatory Requirements	No approval requirements since so stormwater management or drainage improvement works are proposed.	ERCA Section 28 permit may be required since proposed works are located within the Regulation Limits. MECP ECA required for proposed storm sewer improvements, pump station improvements, and stormwater facility. Essex County approval required for construction on Notre Dame Street. Archeological assessment required for works located in Optimist Park.
Technical Summary	Maximum anticipated ponding depths on Trotter Street are greater than Town standard. Overland flows are conveyed across private properties.	Maximum anticipated ponding depths on Trotter Street meet Town standard. Overland flows are conveyed by right-of-ways and drainage easements. Proposed stormwater storage mitigates the risk of local surface flooding.
Economic		
Capital Construction Cost	No associated construction costs since no new stormwater management works are proposed.	High cost associated with anticipated archeological investigation, proposed stormwater storage area in Optimist Park and proposed inlets.
Operations and Maintenance Costs (Long Term)	No significant anticipated O&M cost.	Low O&M cost associated with periodic removal of debris from proposed stormwater storage area inlets/outlets.
Economic Summary	Lowest cost	Highest Cost

Indicates Preliminary Recommended Alternative

Solution Part 2

SEASONS AT THE CREEK CATCHMENT IMPROVEMENT ALTERNATIVES

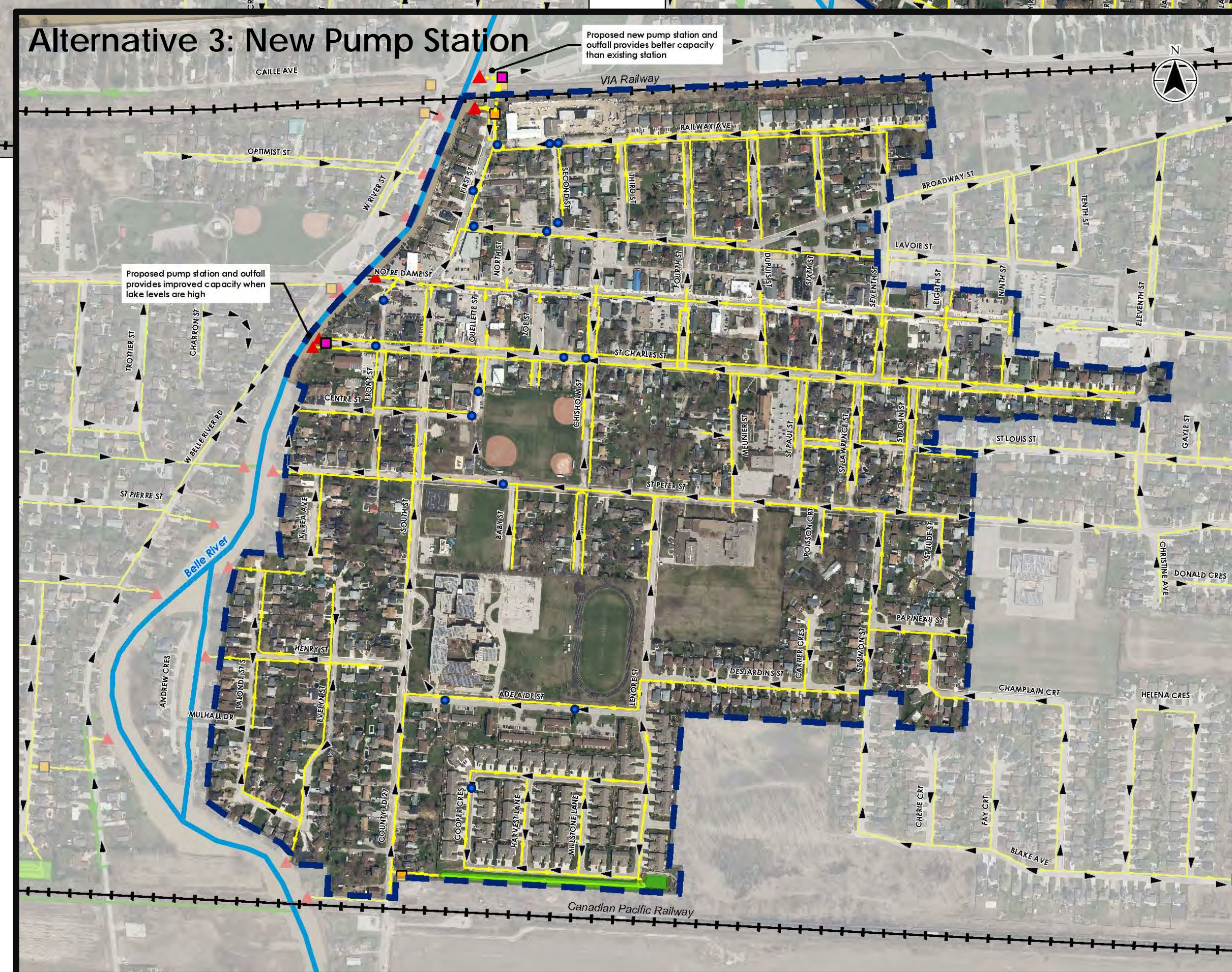
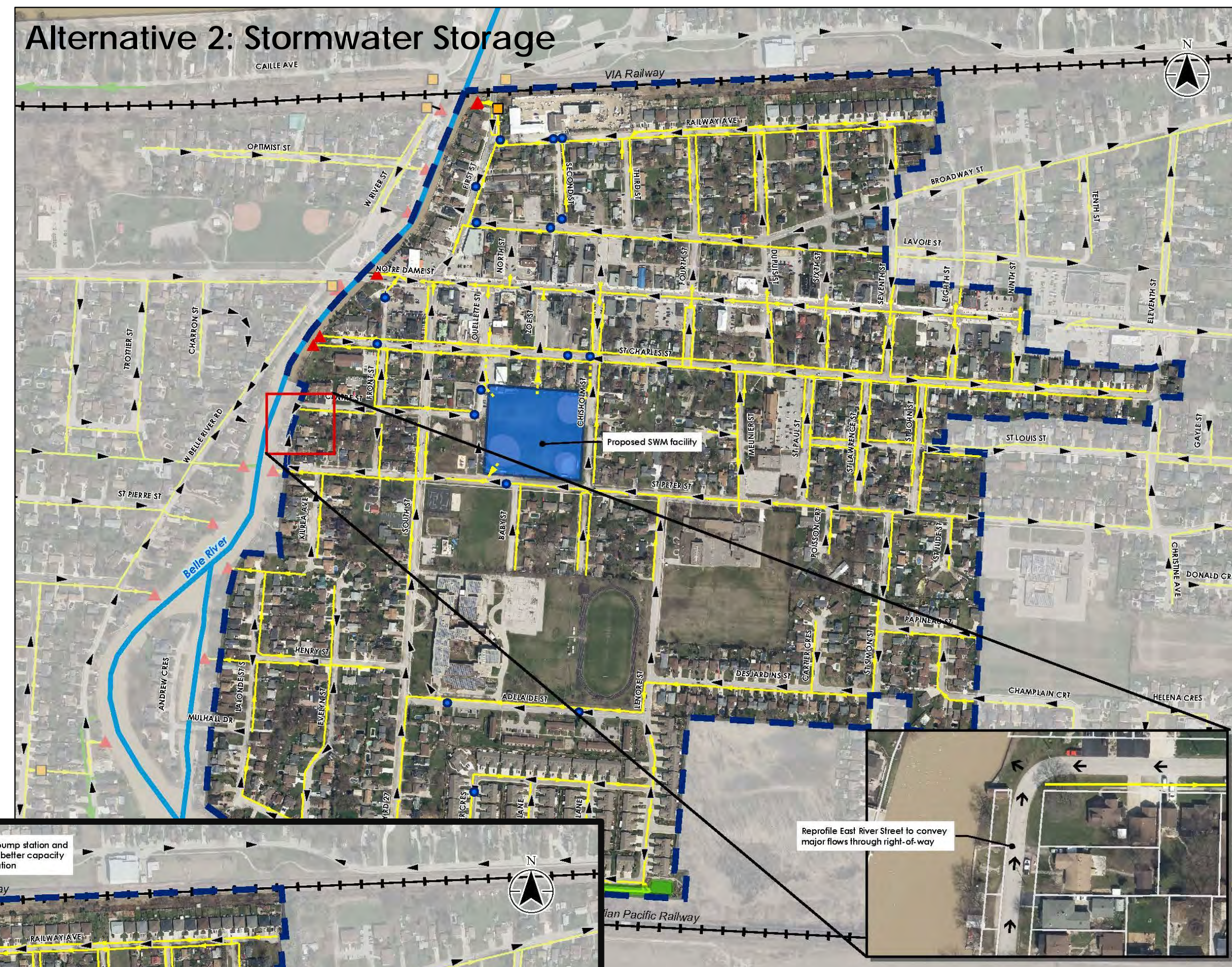
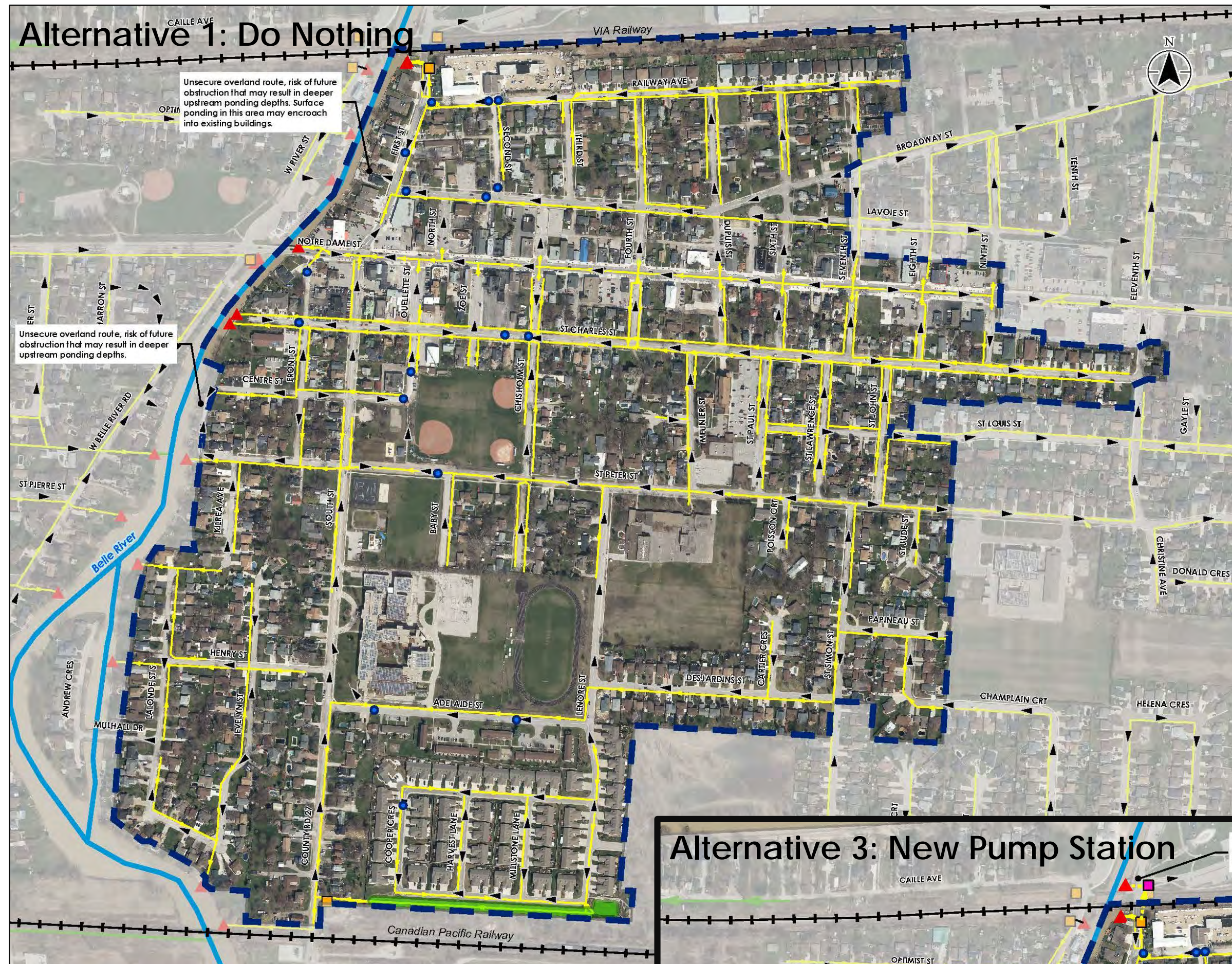


Criteria	Alternative 1 - Do Nothing	Alternative 2 - Pond Outlet Improvements	Alternative 3 - Pump and Outlet Improvements
Socio-Economic/Cultural			
Impacts to Existing and Future Land Uses	No anticipated impacts to existing and future land uses.	Property access may be temporarily affected during construction.	Property access may be temporarily affected during construction.
Public Safety	Prolonged high water levels in existing SWM pond may present additional risk to public safety.	Faster drawdown time reduces risk of high water levels to public safety.	Faster drawdown time presents lowest risk to public safety.
Property Impacts	Potential risk of property damage due to higher risk of pond overtopping.	Reduced risk of pond overtopping and associated property damage.	Lowest risk of pond overtopping and associated property damage.
Socio-Economic Summary	The additional risk to public safety due to prolonged high water levels is relatively low. The additional risk of property damage due to pond overtopping is relatively low since the downstream major system conveys overland flows to Duck Creek.	Faster drawdown time reduces both public safety and property damage risks.	Faster drawdown time results in lowest public safety and property damage risks.
Natural Environment			
Aquatic Resources	No significant anticipated impacts on existing aquatic resources.	No significant anticipated impacts on existing aquatic resources.	No significant anticipated impacts on existing aquatic resources.
Terrestrial Resources	No significant anticipated impacts on existing terrestrial resources.	No significant anticipated impacts on existing terrestrial resources.	No significant anticipated impacts on existing terrestrial resources.
Natural Environment Summary	No significant impacts on aquatic or terrestrial resources are anticipated.	No significant impacts on aquatic or terrestrial resources are anticipated.	No significant impacts on aquatic or terrestrial resources are anticipated.
Technical			
Constructability	No construction proposed.	Construction in the Summer Street right-of-way requires appropriate traffic controls.	Construction on Notre Dame Road requires appropriate traffic controls.
Minor System Performance	Significant operation and maintenance, as frequent pump replacement is required.	Proposed outlet improvements improves pump performance and reduces pump maintenance frequency.	Additional pump increases pump station complexity and maintenance requirements. Additional pump should improve service life of all pumps. Additional pump provides redundancy in the event of a pump failure.
Major System Performance	Maximum calculated pond drawdown time is approximately 10 days.	Maximum pond drawdown time is approximately 2 days.	Maximum pond drawdown time is less than 48 hours.
Approvals and Regulatory Requirements	No approval requirements since so stormwater management or drainage improvement works are proposed.	MECP ECA amendment required for proposed pump station outlet improvements.	MECP ECA amendment required for proposed pump station improvements.
Technical Summary	The maximum pond drawdown time is significantly longer than the design duration under high lake level conditions. Frequent pump maintenance is anticipated.	The maximum pond drawdown time is approximately 48 hours under high lake level conditions, which should be sufficient time to dewater the facility between significant rainfall events. The pump maintenance frequency is reduced.	The maximum pond drawdown time is less than 48 hours under high lake level conditions, which should be sufficient time to dewater the facility between significant rainfall events. The additional pumps
Economic			
Capital Construction Cost	No associated construction costs since no new stormwater management works are proposed.	Moderate capital costs associated with replacing proposed pump outlet pipe and associated restoration.	Highest capital cost associated with replacing proposed pump outlet pipe, associated restoration, and new pump installation.
Operations and Maintenance Costs (Long Term)	Highest O & M costs due to poor pump performance and frequent pump replacement.	Lowest O & M costs as pump should operate within its design range.	Moderate O & M costs due to additional pump.
Economic Summary	Moderate Cost	Moderate Cost	Moderate Cost

Indicates Preliminary Recommended Alternative

Solution Part 2

BELLE RIVER WEST CATCHMENT IMPROVEMENT ALTERNATIVES



Criteria	Alternative 1 - Do Nothing	Alternative 2 - Stormwater Storage	Alternative 3 - New Pump Station
Socio-Economic/ Cultural Impacts to Existing and Future Land Uses	Existing maximum surface ponding limits encroach into existing homes.	Surface ponding duration and frequency is reduced. Access to properties may be temporarily affected during construction. Use of a portion of Ladouceur-Lions Park is limited by frequent temporary surface ponding. The portion of the park within the proposed stormwater storage area will be closed for approximately one year for construction and restoration.	Surface ponding duration and frequency is reduced. Access to properties may be temporarily affected during construction.
Public Safety	Anticipated maximum ponding depths may interfere with property access during severe storm events. Anticipated maximum ponding depths do not prevent safe pedestrian access/egress.	Anticipated maximum ponding depths may interfere with property access during severe storm events but the frequency of significant ponding is reduced. Proposed stormwater storage in Ladouceur-Lions Park may present a hazard to park users during and immediately after severe storm events.	Anticipated maximum ponding depths may interfere with property access during severe storm events but the frequency of significant ponding is reduced.
Property Impacts	Risk of flood damage to vehicles parked near low points on local roads during severe storm events.	Reduced risk of flood damage to vehicles parked near low points on local roads during severe storm events.	Reduced risk of flood damage to vehicles parked near low points on local roads during severe storm events.
Socio-Economic Summary	Maximum surface ponding depths present a significant flood risk to local residences.	Proposed storage reduces frequency of surface ponding and corresponding impacts to property access. Maximum ponding depths during severe storm events and corresponding flood risks are not significantly reduced.	Proposed pump stations reduce frequency of surface ponding and corresponding impacts to property access. Maximum ponding depths during severe storm events and corresponding flood risks are not significantly reduced.
Natural Environment Aquatic Resources	No significant anticipated impacts on existing aquatic resources.	No significant anticipated impacts on existing aquatic resources.	No significant anticipated impacts on existing aquatic resources.
Natural Environment Terrestrial Resources	No significant anticipated impacts on existing terrestrial resources.	No significant anticipated impacts on existing terrestrial resources.	No significant anticipated impacts on existing terrestrial resources.
Natural Environment Summary	No significant impacts on aquatic or terrestrial resources are anticipated.	No significant impacts on aquatic or terrestrial resources are anticipated.	No significant impacts on aquatic or terrestrial resources are anticipated.
Technical Constructability	No constructability issues anticipated.	Groundwater may need to be managed during construction of proposed SWM pond. Storm sewer improvements within the local right-of-ways require appropriate traffic controls.	Construction of proposed outfalls will require in-water work. Construction of proposed First Street pump station requires crossing VIA railway. Improvements within the local right-of-ways require appropriate traffic controls.
Minor System Performance	Minor system does not provide sufficient capacity to convey the 2-year peak discharge.	Minor system provides sufficient capacity to convey the 2-year peak discharge.	Minor system provides sufficient capacity to convey the 2-year peak discharge.
Major System Performance	Maximum surface ponding >0.3 m deep at several locations.	Maximum surface ponding >0.3 m deep at several locations. Frequency and duration of surface ponding is reduced.	Maximum surface ponding >0.3 m deep at several locations. Frequency and duration of surface ponding is reduced.
Approvals and Regulatory Requirements	No approval requirements since no stormwater management or drainage improvement works are proposed.	MECP ECA required for proposed SWM pond. Consultation with ERCA required since proposed pond is located within regulated limits.	MECP ECA required for proposed pumping stations. ERCA Section 28 permits required for proposed pumping station outfalls.
Technical Summary	Maximum anticipated surface ponding depths are greater than Town standard.	Maximum anticipated surface ponding depths are greater than Town standard but the frequency and duration of ponding are reduced. Ponding only occurs during storms more severe than the 2-year design event.	Maximum anticipated surface ponding depths are greater than Town standard but the frequency and duration of ponding are reduced. Ponding only occurs during storms more severe than the 2-year design event.
Economic Capital Construction Cost	No associated construction costs since no new stormwater management works are proposed.	High capital costs associated with proposed SWM storage area, associated storm sewer improvements, and overland flow route improvements.	High capital costs associated with proposed pumping stations and overland flow route improvements.
Operations and Maintenance Costs (Long Term)	No significant O&M costs anticipated.	Low O&M costs associated with periodic inspection of proposed stormwater storage area pipe inlet and debris removal.	Moderate O&M costs associated with periodic inspection and maintenance of proposed pump stations.
Economic Summary	Lowest Cost	High Cost	High Cost

Indicates Preliminary Recommended Alternative

Solution Part 2

TERRA LOU CATCHMENT IMPROVEMENT ALTERNATIVES

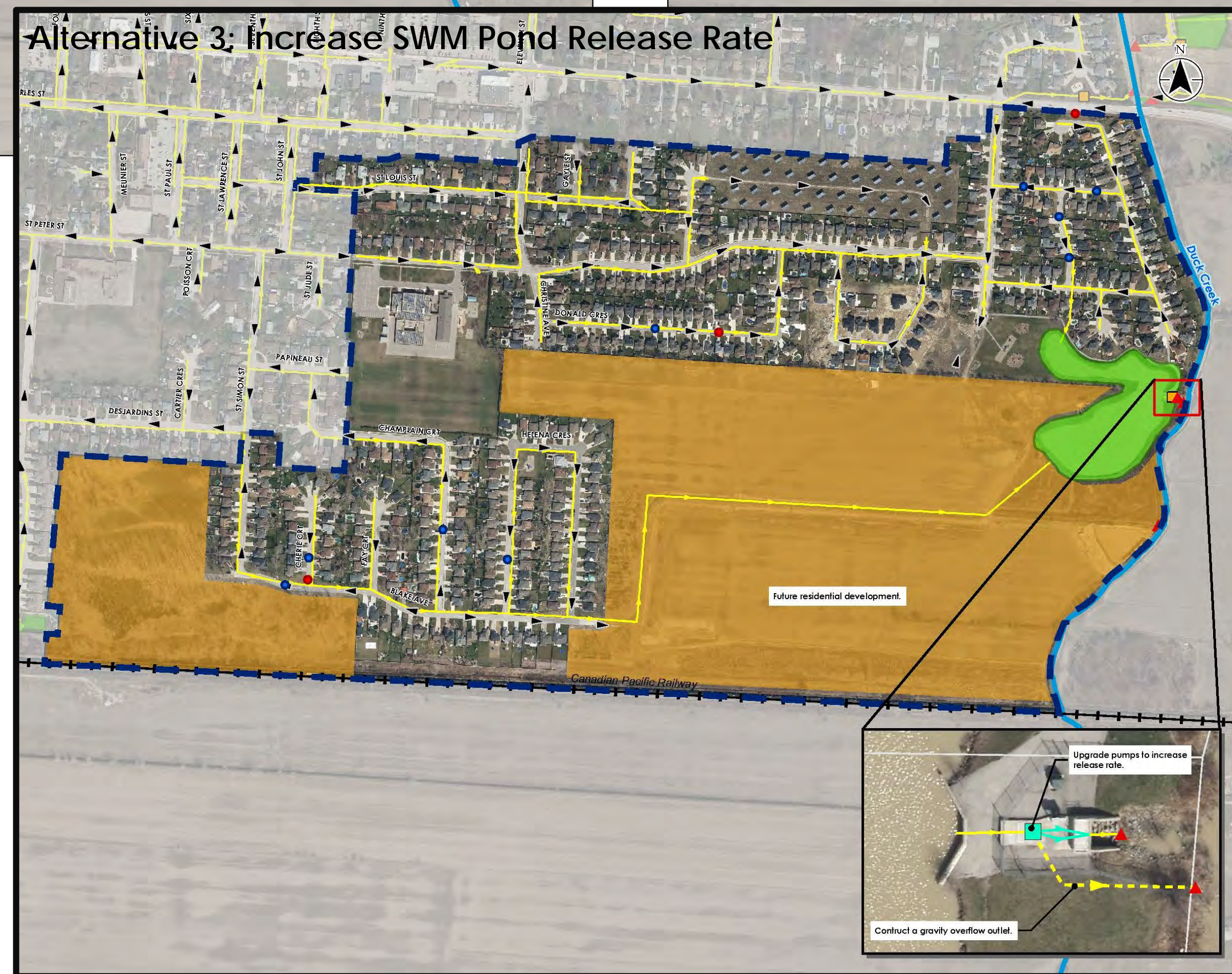
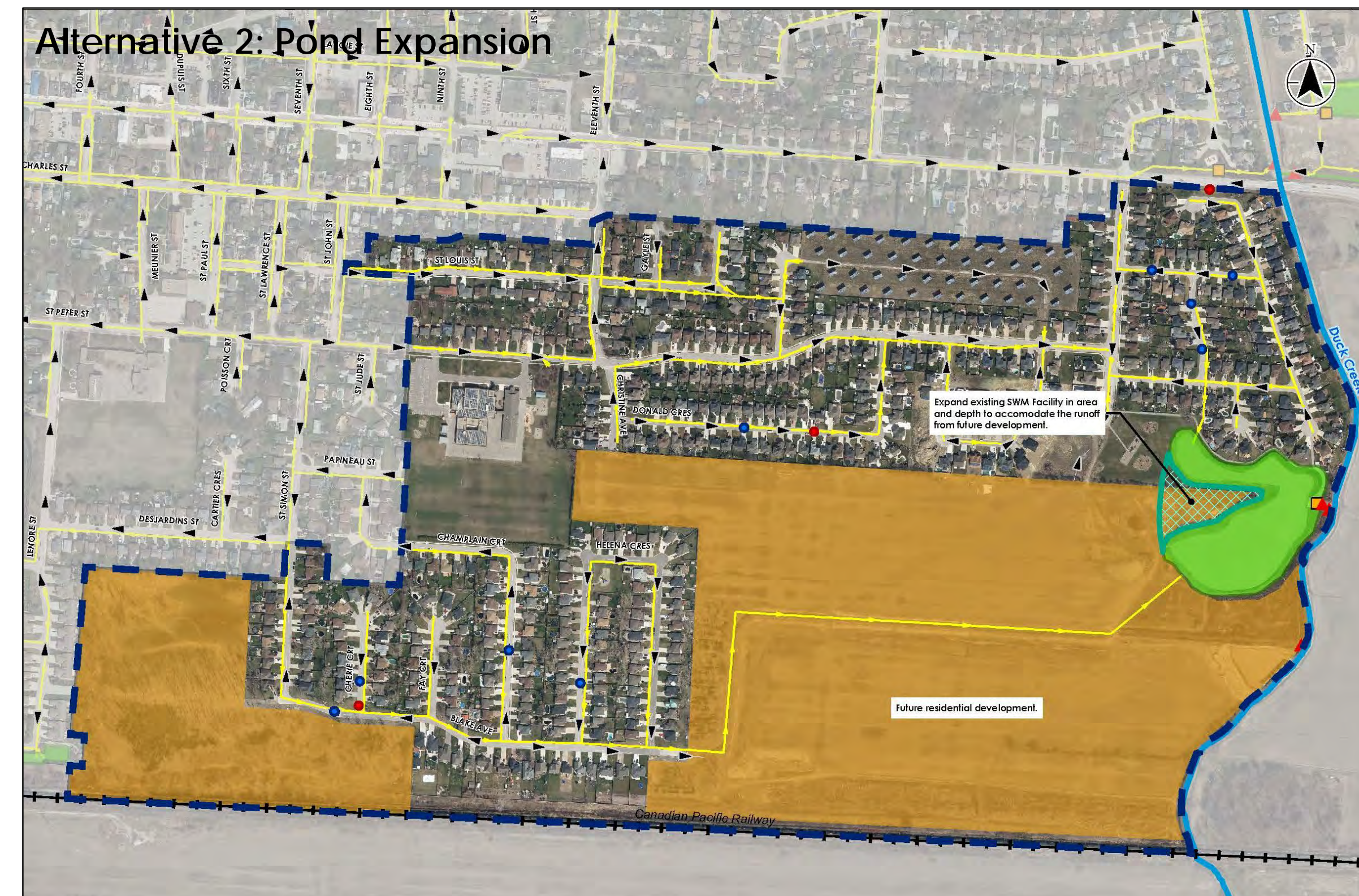


Criteria	Alternative 1 – Do Nothing	Alternative 2 – Overflow Pipe
Socio-Economic/ Cultural		
Impacts to Existing and Future Land Uses	Overland flows travel from Terra Lou Drive to Duck Creek across private properties.	Risk of maximum surface ponding encroaching into existing homes is reduced. Overland flows across private properties are reduced. Proposed overflow pipe is located in Terra Lou Park. Park use will likely be restricted during construction.
Public Safety	Maximum surface ponding >0.5 m deep occurs extensively on local roads. Anticipated maximum ponding depths may prevent passenger vehicle access to residences. Anticipated maximum ponding depths do not prevent safe pedestrian access/egress.	Depths and limits of maximum surface ponding are significantly reduced, and reduce public safety risk.
Property Impacts	Potential risk of flood damage to vehicles parked near low points on local roads during severe storm events.	No additional property impacts identified.
Socio-Economic Summary	Maximum surface ponding depths present both a surface flooding risk to homes and a hazard to public safety.	Proposed overflow pipe mitigates flood risks to existing homes and reduces safety hazard associated with deep ponding on streets.
Natural Environment		
Aquatic Resources	No significant anticipated impacts on existing aquatic resources.	No significant anticipated impacts on existing aquatic resources.
Terrestrial Resources	No significant anticipated impacts on existing terrestrial resources.	Tree removal in Terra Lou park may be required to construct proposed overflow pipe.
Natural Environment Summary	No significant impacts on aquatic or terrestrial resources are anticipated.	No significant impacts on aquatic resources are anticipated. Impacts on existing trees can be mitigated by replanting outside of proposed pipe alignment.
Technical		
Constructability	No construction proposed.	No significant construction challenges are anticipated.
Minor System Performance	Minor system discharges to Duck Creek via a pumping station. The system is vulnerable to power outages and pump failure.	A connection from the existing storm sewer to the proposed overflow pipe could provide a minor system gravity outlet in the event of Terra Lou pump station failure.
Major System Performance	Maximum road ponding >0.5 m deep at several locations. Risk that property owner could alter the existing overland flow route, resulting in greater surface ponding depths.	Maximum road ponding <0.3 m deep at most locations.
Approvals and Regulatory Requirements	No approval requirements since no stormwater management or drainage improvement works are proposed.	Consultation with ERCA and Section 28 Permit required for proposed overflow pipe. MECP ECA required for proposed overflow pipe.
Technical Summary	Maximum anticipated ponding depths are greater than Town standard.	Maximum ponding depths at most locations meet Town standard. Proposed overflow pipe provides redundancy in the event of a system failure.
Economic		
Capital Construction Cost	No associated construction costs since no new stormwater management works are proposed.	Moderate capital costs associated with proposed overflow pipe and associated inlet.
Operations and Maintenance Costs (Long Term)	No significant O&M costs anticipated.	Low O&M costs associated with periodic inspection of proposed overflow pipe inlet and debris removal.
Economic Summary	Lowest cost	Moderate Cost

Indicates Preliminary Recommended Alternative

Solution Part 2

BACON/FOREST HILL CATCHMENT IMPROVEMENT ALTERNATIVES



Criteria	Alternative 1 – Do Nothing	Alternative 2 – Pond Expansion	Alternative 3 – Increase Release Rate
Socio-Economic/ Cultural	Future development without sufficient SWM controls will result in poor local drainage, possibly causing frequent surface flooding.	Proposed pond expansion provides adequate drainage servicing to future development. Additional pond footprint reduces existing park area.	Increased pond release rate results in adequate drainage servicing for future development.
Impacts to Existing and Future Land Uses	Frequent surface flooding caused by insufficient SWM controls may present risks to both passenger and emergency vehicles.	Adequate drainage servicing provided by expanded SWM pond mitigates public safety risks.	Adequate drainage servicing provided by increased pond release rate mitigates public safety risks.
Public Safety	Frequent surface flooding caused by insufficient SWM controls may cause damage to vehicles and infrastructure.	No significant anticipated property impacts.	No significant anticipated property impacts.
Property Impacts	Frequent surface flooding caused by inadequate SWM controls may cause property damage and present a risk to public safety.	Proposed pond expansion addresses property and public safety risks of additional runoff caused by future development. Proposed pond expansion reduces parkland area.	Proposed increased pond release rate addresses property and public safety risks of additional runoff caused by future development.
Socio-Economic Summary			
Natural Environment			
Aquatic Resources	No significant anticipated impacts on existing aquatic resources.	No significant anticipated impacts on existing aquatic resources.	No significant anticipated impacts on existing aquatic resources.
Terrestrial Resources	No significant anticipated impacts on existing terrestrial resources.	No significant anticipated impacts on existing terrestrial resources.	No significant anticipated impacts on existing terrestrial resources.
Natural Environment Summary	No significant impacts on aquatic or terrestrial resources are anticipated.	No significant impacts on aquatic or terrestrial resources are anticipated.	No significant impacts on aquatic or terrestrial resources are anticipated.
Technical			
Constructability	No construction proposed.	Proposed pond expansion requires temporary coffer dams and dewatering during construction. Minor system provides a level of service that meets Town standards.	No difficulties anticipated with proposed pump station improvements. Minor system provides a level of service that meets Town standards.
Minor System Performance	Proposed minor system is not anticipated to provide a level of service that meets Town standards.	Major system anticipated to perform in accordance with Town standards.	Major system anticipated to perform in accordance with Town standards.
Major System Performance	Frequent deep surface ponding on local roads is anticipated.	MECP ECA amendment required for proposed SWM pond expansion. Consultation with ERCA required, as proposed pond expansion is located with the Regulation Limits.	MECP ECA amendment required for modifications to pumping station. Consultation with ERCA required to increase peak discharges to Duck Creek.
Approvals and Regulatory Requirements	No approval requirements since no stormwater management or drainage improvement works are proposed.	MECP ECA amendment required for proposed SWM pond expansion. Consultation with ERCA required, as proposed pond expansion is located with the Regulation Limits.	MECP ECA amendment required for modifications to pumping station. Consultation with ERCA required to increase peak discharges to Duck Creek.
Technical Summary	Existing pond does not have sufficient capacity to accommodate the runoff from future development, resulting in a drainage system that does not meet Town standards.	Proposed SWM pond expansion adequately services future development. Town drainage design standards are met.	Higher peak discharges from SWM pond to Duck Creek are not anticipated to have significant downstream impacts. Proposed SWM pond expansion adequately services future development. Town drainage design standards are met.
Capital Construction Cost	No associated construction costs since no new stormwater management works are proposed.	High construction costs anticipated for excavation of pond expansion.	High construction costs anticipated for pump station improvements.
Operations and Maintenance Costs (Long Term)	No significant associated O&M costs.	No significant additional O&M costs anticipated.	No significant additional O&M costs anticipated.
Economic Summary	Lowest cost	High cost	High cost

Solution Part 2

RUSSELL WOODS CATCHMENT IMPROVEMENT ALTERNATIVES

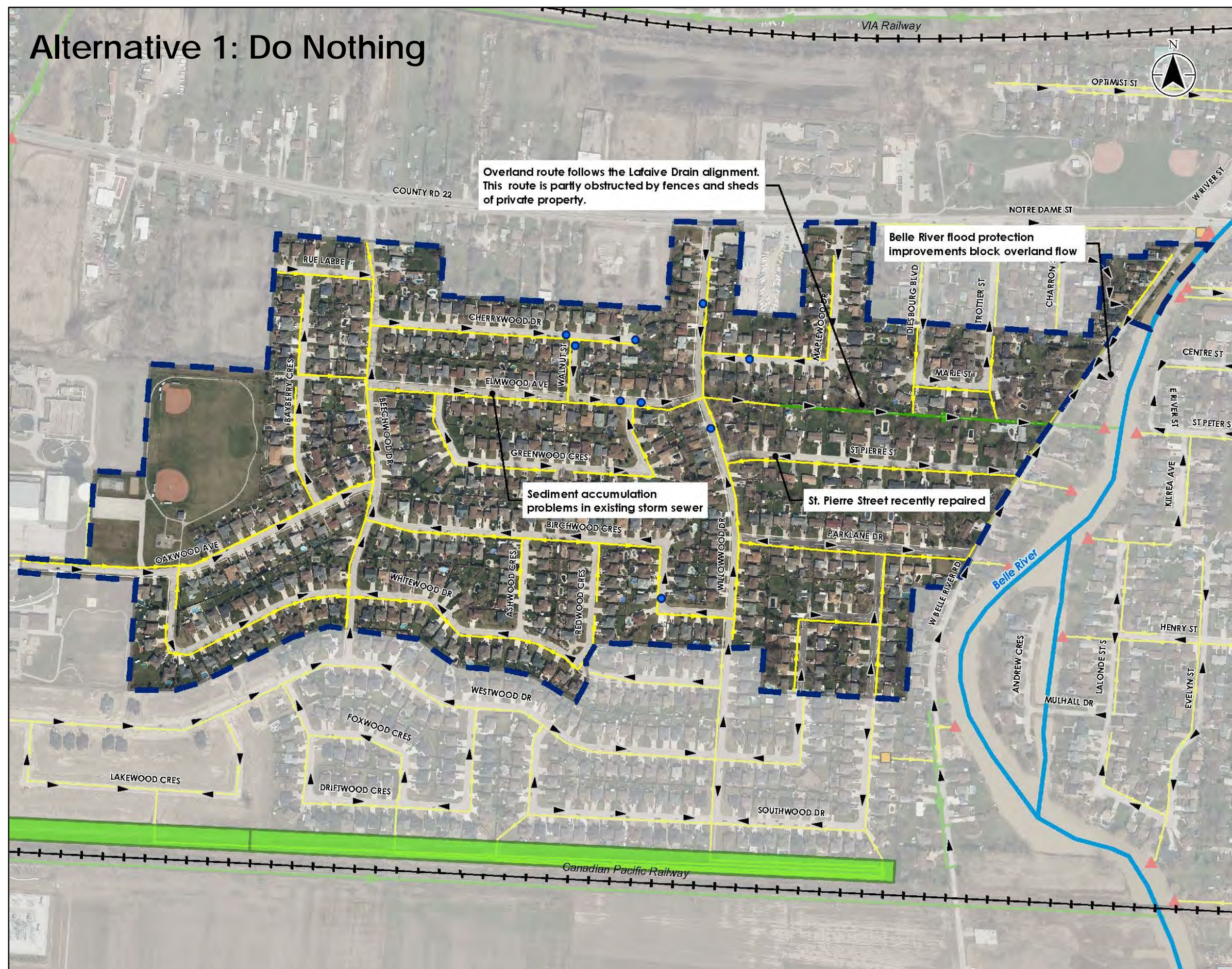


Criteria	Alternative 1 - Do Nothing	Alternative 2 - Pump Station Improvements	Alternative 3 - New Pump Station
Socio-Economic/Cultural Impacts to Existing and Future Land Uses	Maximum anticipated surface ponding depths north of Old Tecumseh Road are not anticipated to encroach into existing homes. Property access is likely limited during severe storm events by maximum anticipated ponding depths.	Property access is likely limited during severe storm events, but the duration of disruption is reduced. Risk of surface ponding encroachment into Laurendale and Jordan subdivision homes is reduced.	Property access is likely limited during severe storm events, but the duration of disruption is reduced. Risk of surface ponding encroachment into Laurendale and Jordan subdivision homes is reduced. Proposed pump station is located in municipal right-of-way.
Public Safety	Maximum anticipated surface ponding depths may encroach into existing homes in Laurendale and Jordan subdivisions. Maximum surface ponding >0.5 m deep occurs extensively on local roads. Anticipated maximum ponding depths may prevent both emergency vehicle and passenger vehicle access to residences. Anticipated maximum ponding depths do not prevent safe pedestrian access/egress.	Maximum surface ponding >0.5 m deep occurs extensively on local roads. Anticipated maximum ponding depths may prevent both emergency vehicle and passenger vehicle access to residences. Anticipated maximum ponding depths do not prevent safe pedestrian access/egress. Surface ponding durations are reduced.	Maximum surface ponding >0.5 m deep occurs extensively on local roads. Anticipated maximum ponding depths may prevent both emergency vehicle and passenger vehicle access to residences. Anticipated maximum ponding depths do not prevent safe pedestrian access/egress. Surface ponding durations are further reduced.
Property Impacts	Potential risk of flood damage to vehicles parked near low points on local roads during severe storm events.	Potential risk of flood damage to vehicles parked near low points on local roads during severe storm events.	Potential risk of flood damage to vehicles parked near low points on local roads during severe storm events.
Socio-Economic Summary	Maximum surface ponding depths present both a surface flooding risk to homes and a hazard to public safety.	Proposed pump station improvements reduce the frequency and duration of risks to property and public safety.	Proposed pump station improvements reduce the frequency and duration of risks to property and public safety.
Natural Environment			
Aquatic Resources	No significant anticipated impacts on existing aquatic resources.	No significant anticipated impacts on existing aquatic resources.	No significant anticipated impacts on existing aquatic resources.
Terrestrial Resources	No significant anticipated impacts on existing terrestrial resources.	No significant anticipated impacts on existing terrestrial resources.	No significant anticipated impacts on existing terrestrial resources.
Natural Environment Summary	No significant impacts on aquatic or terrestrial resources are anticipated.	No significant impacts on aquatic or terrestrial resources are anticipated.	No significant impacts on aquatic or terrestrial resources are anticipated.
Technical Constructability	No construction proposed.	No significant construction challenges are anticipated.	Existing pipe below canal to be abandoned. Proposed pump station outlet construction will likely require some in-water work.
Minor System Performance	Road ponding frequently occurs during storms less severe than the 2-year event.	The proposed pump station improvements reduce the frequency and duration of road ponding. Removal of restriction at Laurendale pump station significantly improves local minor system performance.	Minor system capacity is significantly increased by the proposed pump station. Removal of restriction at Laurendale pump station significantly improves local minor system performance.
Major System Performance	Maximum road ponding >0.5 m deep at many locations. Negligible risk that existing overland flow route from East Pike Creek Road could be altered, resulting in greater surface ponding depths.	Maximum road ponding >0.5 m deep at many locations but duration is reduced.	Maximum road ponding >0.5 m deep at many locations but duration is reduced.
Approvals and Regulatory Requirements	No approval requirements since no stormwater management or drainage improvement works are proposed.	Consultation with ERCA may be required for proposed pump station improvements. Pump station improvements must be completed in accordance with the provisions of the Drainage Act.	ERCA Section 28 permit will be required for proposed pump station. Pump station improvements and new pump station must be completed in accordance with the provisions of the Drainage Act.
Technical Summary	Maximum anticipated ponding depths are greater than Town standard.	Maximum ponding durations are reduced. Proposed automatic gate provides gravity outlet in the event of a system failure.	Reduced drainage area to existing pump station results in reduced ponding durations. New pump station provides higher peak outlet rate to flows from Tecumseh Road Drainage System. Proposed automatic gate provides gravity outlet in the event of a system failure.
Economic Capital Construction Cost	No associated construction costs since no new stormwater management works are proposed. No significant O&M costs anticipated.	Moderate capital costs associated with proposed pump station improvements. Low O&M costs associated with periodic inspection of proposed automated gate.	Significant capital cost associated with new pump station and pipe abandonment. Moderate O&M costs associated with periodic inspection of proposed pump station and automated gate. Reduced O&M costs at existing pump station due to shorter run times.
Operations and Maintenance Costs (Long Term)			
Economic Summary	Lowest cost	Moderate cost	Highest cost

Indicates Preliminary Recommended Alternative

Solution Part 2

LEFAIVRE DRAIN CATCHMENT IMPROVEMENT ALTERNATIVES



Criteria	Alternative 1 – Do Nothing	Alternative 2 – St. Pierre Street Storm Sewer
Socio-Economic/ Cultural		
Impacts to Existing and Future Land Uses	Future maintenance of the Lefaire Drain in its current alignment will have significant impacts on residential rear yards. Major flows are conveyed through rear yards. Existing maximum surface ponding limits do not encroach into existing homes.	Abandonment of the Lefaire Drain mitigates risk of future maintenance impacts on residential rear yards. Major flows are contained within the municipal right-of-ways. Property access temporarily disrupted during construction. St. Pierre Street was recently repaved.
Public Safety	Anticipated maximum surface ponding depths may prevent passenger vehicle access to residences. Anticipated maximum ponding depths do not prevent safe pedestrian access/egress.	Property access is improved during severe storm events, as number of locations with maximum surface ponding depths is reduced. Anticipated maximum ponding depths do not prevent safe pedestrian access/egress.
Property Impacts	Potential risk of flood damage to vehicles parked near low points on local roads during severe storm events.	Potential risk of flood damage to vehicles parked near low points on local roads during severe storm events.
Socio-Economic Summary	Significant impacts on rear yards are anticipated for future Lefaire Drain maintenance. Maximum surface ponding depths result in nuisance flooding but do not present a significant risk to safety or property.	Proposed drain abandonment and storm sewer relocation mitigates risk of impacts on private properties. Extents of nuisance flooding are reduced.
Natural Environment		
Aquatic Resources	No significant anticipated impacts on existing aquatic resources.	No significant anticipated impacts on existing aquatic resources.
Terrestrial Resources	Tree removal will likely be required for future drain maintenance.	No significant anticipated impacts on existing terrestrial resources.
Natural Environment Summary	No significant impacts on aquatic resources are anticipated. Tree removal can be mitigated by replanting.	No significant impacts on aquatic or terrestrial resources are anticipated.
Technical		
Constructability	Access to the existing Lefaire Drain for future maintenance is limited.	Access to Lefaire Drain for drain abandonment is limited. Proposed drainage improvements require construction in right-of-ways with appropriate traffic controls.
Minor System Performance	Minor system assessment suggests that the Lefaire Drain is in poor condition.	Proposed St. Pierre Street storm sewer designed in accordance with Town standards to convey the 5-year peak discharge. Opportunity to reduce the number of outfalls to Belle River.
Major System Performance	Major flows conveyed over residential rear yards through a route that is partially obstructed by fencing, pools, and landscaping. Risk that property owners could alter the existing overland flow route, resulting in greater surface ponding depths. Maximum surface ponding depths >0.3 m.	Major flows are conveyed by the municipal right-of-ways. Maximum surface ponding depths and extents are reduced.
Approvals and Regulatory Requirements	No approval requirements since no stormwater management or drainage improvement works are proposed.	Lefaire Drain must be abandoned in accordance with the provisions of the drainage act. ERCA Section 28 permit required for improved Belle River outfall. MECP ECA required for new storm sewer.
Technical Summary	The minor system assessment suggests that the Lefaire Drain is in poor condition and is should be a priority for future maintenance/replacement. The major flow route is located on private properties and is partially obstructed by fences, sheds, etc. The maximum surface ponding depths are greater than the Town standard.	The proposed drainage improvements move both the local minor system and major flow route to the municipal right-of-way. The proposed minor system provides sufficient capacity to meet current Town standards. Upstream maximum surface ponding depths and extents are reduced.
Economic		
Capital Construction Cost	No associated construction costs since no new stormwater management works are proposed.	High anticipated construction costs for proposed drain abandonment storm sewer relocation, street repaving, restoration, and pump station improvements.
Operations and Maintenance Costs (Long Term)	High anticipated O&M costs anticipated due to poor condition of Lefaire Drain.	No significant O&M costs anticipated.
Economic Summary	Lowest cost	High cost

Indicates Preliminary Recommended Alternative

Solution Part 2

BROWN'S CREEK DRAIN CATCHMENT IMPROVEMENT ALTERNATIVES

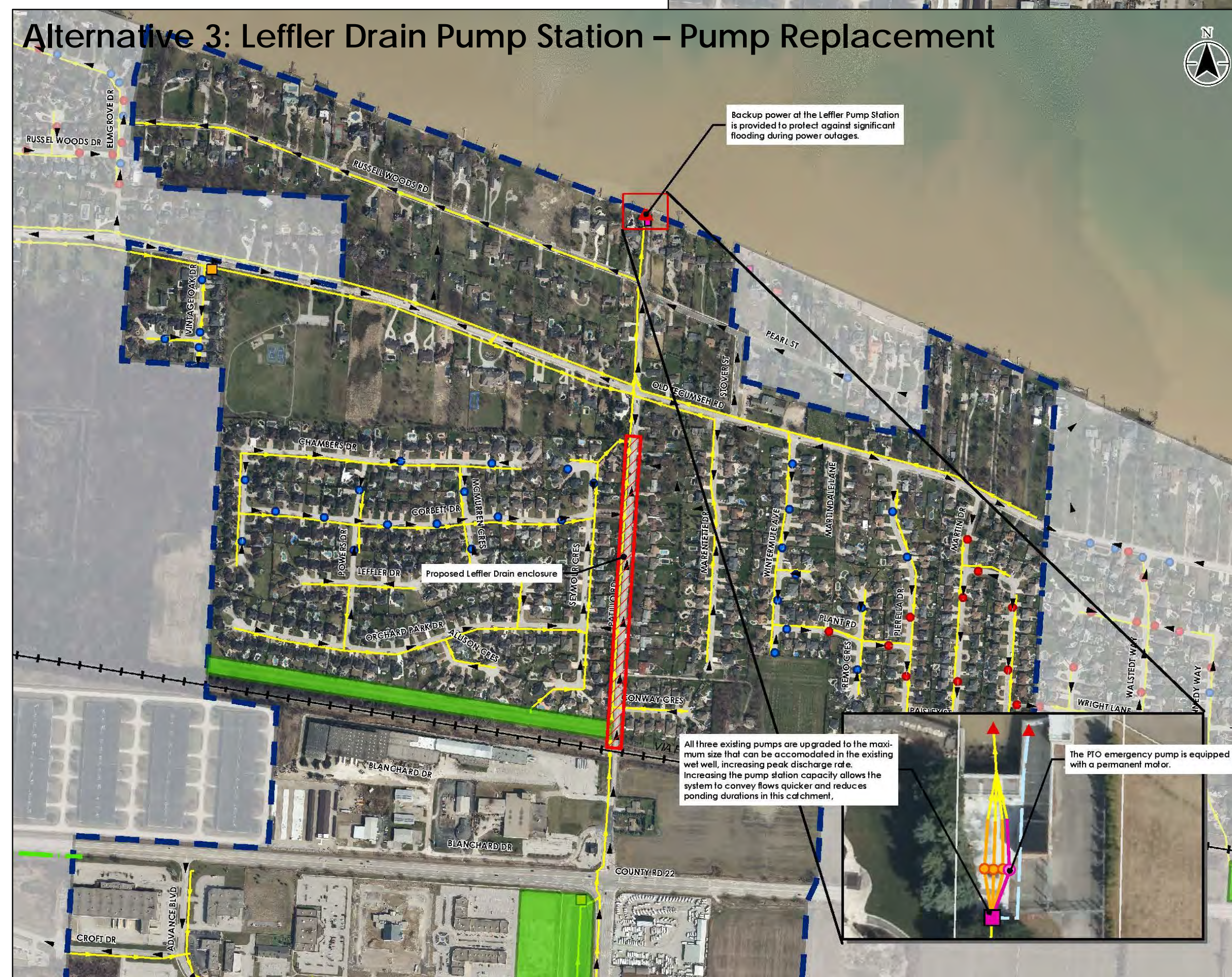
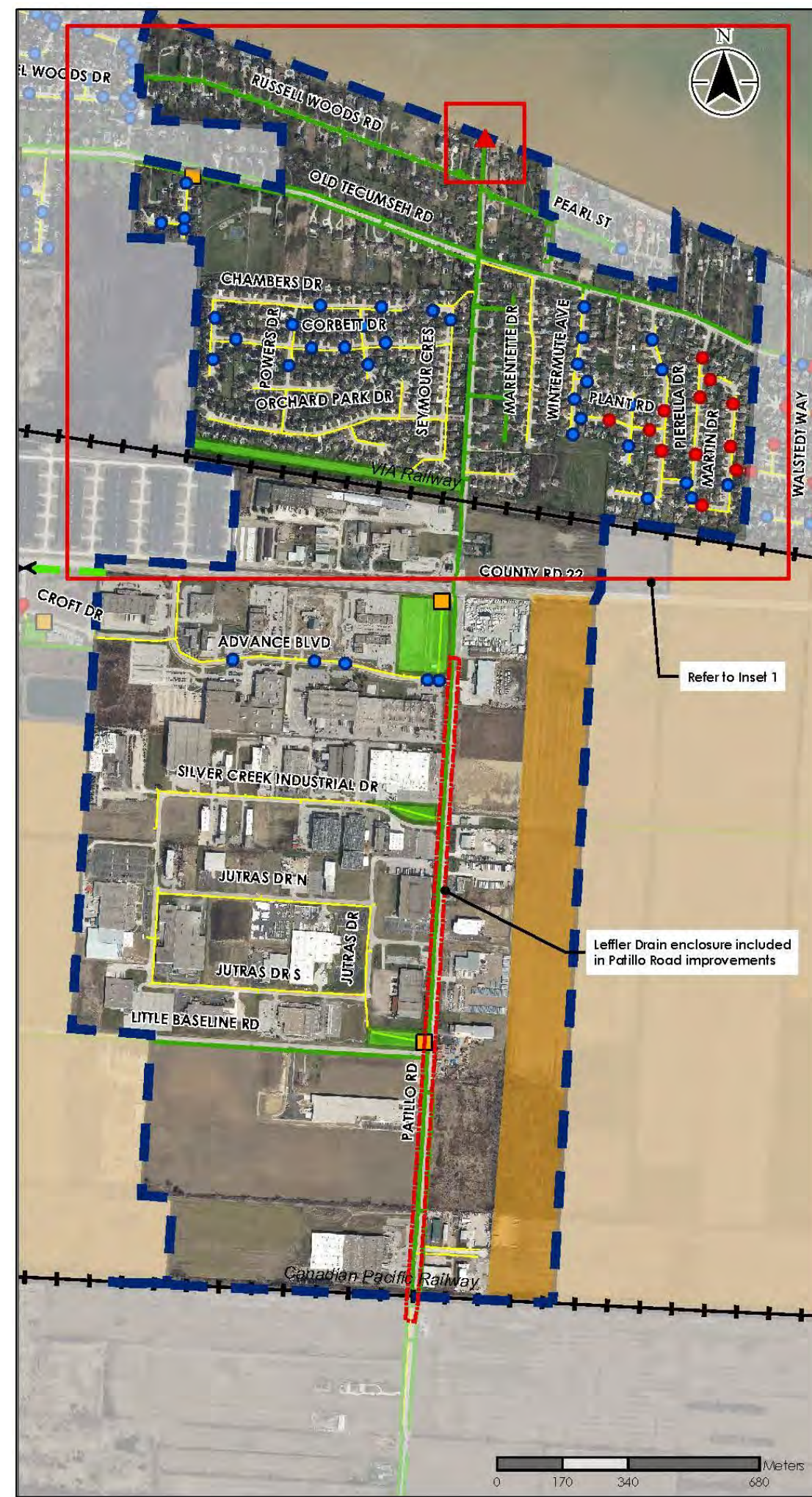


Criteria	Alternative 1 – Do Nothing	Alternative 2 – Road Reprofiting
Socio-Economic/ Cultural		
Impacts to Existing and Future Land Uses	Existing maximum surface ponding limits do not encroach into existing homes. Anticipated maximum surface ponding depth north of Girard Drive could interfere with passenger vehicle access to residences during severe storm events. Anticipated maximum ponding depth south of Girard Drive could interfere with both emergency and passenger vehicle access to local residences during severe storm events.	Maximum anticipated surface ponding does not encroach into existing homes. Access to properties may be temporarily affected during construction.
Public Safety	Maximum estimated surface ponding depths >0.5 m on Traditional Trail may limit emergency vehicle access to residences and presents a traffic hazard. Anticipated maximum ponding depths do not prevent safe pedestrian access/egress.	Maximum estimated surface ponding depths may limit passenger vehicle access to residences during severe storm events but do not present a significant hazard to public safety.
Property Impacts	Potential risk of flood damage to vehicles parked near low points on local roads during severe storm events.	Potential risk of flood damage to vehicles parked near low points on local roads during severe storm events.
Socio-Economic Summary	Maximum anticipated surface ponding depths on Traditional Trail present an obstruction to property access and emergency vehicles.	Proposed street reprofiling improves property access during severe storms and reduces safety risk.
Natural Environment		
Aquatic Resources	No significant anticipated impacts on existing aquatic resources.	No significant anticipated impacts on existing aquatic resources.
Terrestrial Resources	No significant anticipated impacts on existing terrestrial resources.	No significant anticipated impacts on existing terrestrial resources.
Natural Environment Summary	No significant impacts on aquatic or terrestrial resources are anticipated.	No significant impacts on aquatic or terrestrial resources are anticipated.
Technical		
Constructability	No construction proposed.	Proposed road reprofiling requires construction in right-of-ways with appropriate traffic controls.
Minor System Performance	Minor system has sufficient capacity to meet the Town design standards.	Minor system has sufficient capacity to meet the Town design standards.
Major System Performance	Maximum road ponding >0.5 m deep on Traditional Trail.	Maximum road ponding <0.3 m deep at several locations.
Approvals and Regulatory Requirements	No approval requirements since no stormwater management or drainage improvement works are proposed.	Consultation with ERCA may be required since proposed overland flow route regrading is located within the Regulation Limits. Future development agreement for lands east of Garden Crescent will need to identify the need to safely external overland flows.
Technical Summary	Maximum anticipated ponding depths on Traditional Trail are greater than Town standard.	Maximum ponding depths reduced but are greater than town standard. Proposed road reprofiling design will be challenging and will significantly impact the local streetscape.
Economic		
Capital Construction Cost	No associated construction costs since no new stormwater management works are proposed.	High anticipated construction costs for proposed road reprofiling.
Operations and Maintenance Costs (Long Term)	No significant O&M costs anticipated.	No significant O&M costs anticipated.
Economic Summary	Lowest cost	High cost

Indicates Preliminary Recommended Alternative

Solution Part 2

HOOD AND LEFFLER DRAIN CATCHMENT IMPROVEMENT ALTERNATIVES 1-3

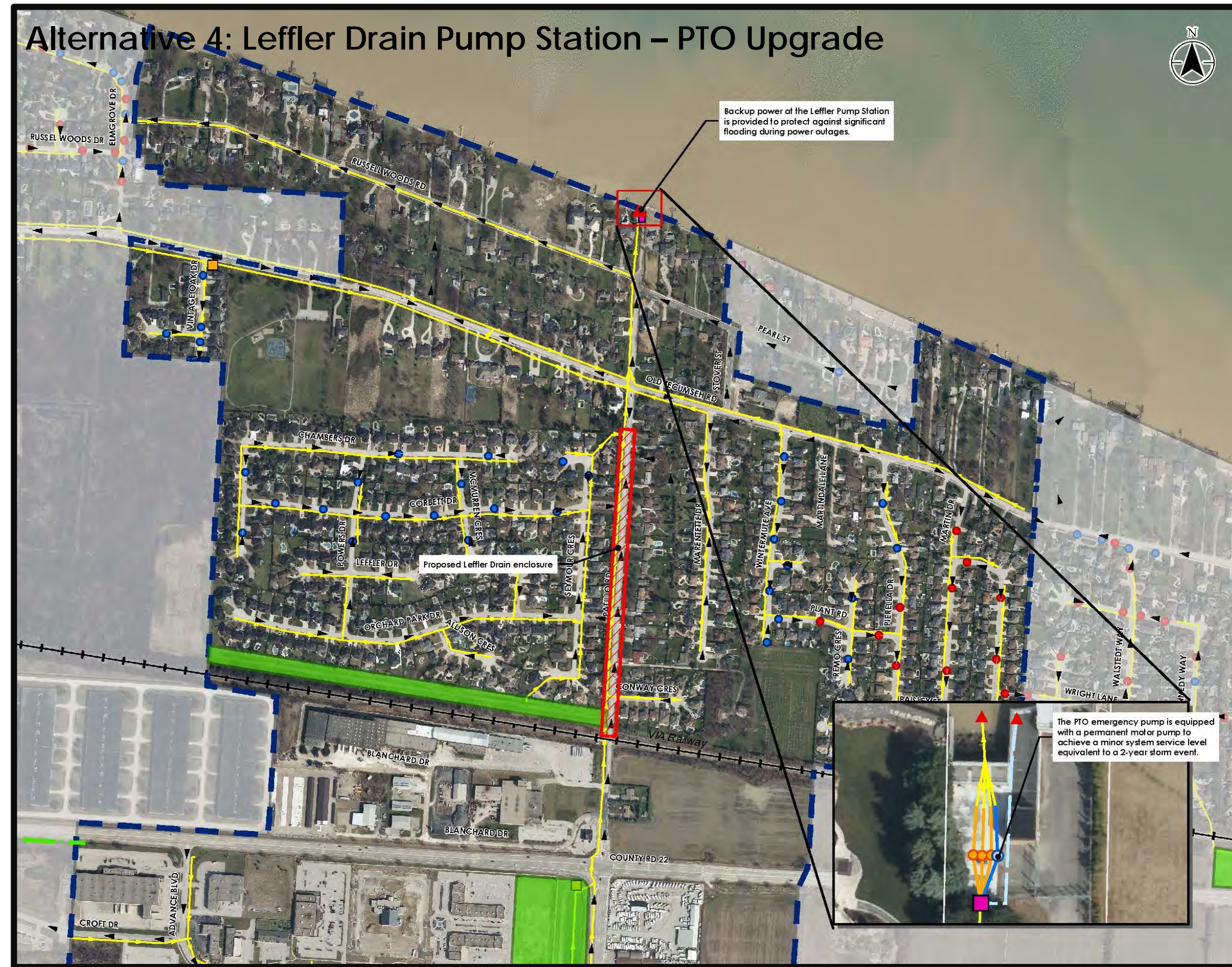


Criteria	Alternative 1 – Do Nothing	Alternative 2 – Regional Pond at CR 22	Alternative 3 – Pump Station Improvements – Pump Replacement
Socio-Economic/ Cultural Impacts to Existing and Future Land Use	Risk of anticipated maximum surface ponding limits encroaching into existing homes north of VIA railway.	Proposed improvements reduce the risk of surface ponding limits encroaching into existing homes north of VIA railway. Approximately 2.4 ha of private land required for proposed SWM pond.	Proposed improvements reduce the risk of surface ponding limits encroaching into existing homes north of VIA railway.
Public Safety	Maximum surface ponding >0.5 m deep occurs on local roads. Anticipated maximum surface ponding depths may prevent both emergency and passenger vehicle access to residences. Anticipated maximum ponding depths do not prevent safe pedestrian access/egress.	Surface ponding frequency and durations are reduced. Maximum surface ponding >0.5 m deep may occur on local roads. Anticipated maximum surface ponding depths may prevent both emergency and passenger vehicle access to residences. Anticipated maximum ponding depths do not prevent safe pedestrian access/egress.	Surface ponding frequency and durations are reduced. Maximum surface ponding >0.5 m deep may occur on local roads. Anticipated maximum surface ponding depths may prevent both emergency and passenger vehicle access to residences. Anticipated maximum ponding depths do not prevent safe pedestrian access/egress.
Property Impacts	Potential risk of flood damage to vehicles parked near low points on local roads during severe storm events.	Potential risk of flood damage to vehicles parked near low points on local roads during severe storm events.	Potential risk of flood damage to vehicles parked near low points on local roads during severe storm events.
Socio-Economic Summary	Maximum surface ponding depths and durations present risks to both property and a public safety and limit property access during severe storm events.	Proposed regional SWM pond reduces risks to property and public safety by reducing surface ponding frequency and duration.	Proposed pump station improvements reduce risks to property and public safety by reducing surface ponding frequency and duration.
Natural Environment	Aquatic Resources No significant anticipated impacts on existing aquatic resources.	No significant anticipated impacts on existing aquatic resources.	No significant anticipated impacts on existing aquatic resources.
Terrestrial Resources	No significant anticipated impacts on existing terrestrial resources.	No significant anticipated impacts on existing terrestrial resources.	No significant anticipated impacts on existing terrestrial resources.
Natural Environment Summary	No significant impacts on aquatic or terrestrial resources are anticipated.	No significant impacts on aquatic or terrestrial resources are anticipated.	No significant impacts on aquatic or terrestrial resources are anticipated.
Technical Constructability	No construction proposed.	Groundwater may need to be managed during construction of proposed SWM pond. Proposed pond connection to Leffler Drain crosses Patillo Road and will likely require open cut construction within the right-of-way with appropriate traffic controls.	No constructability issues anticipated.
Minor System Performance	Minor system provides less than a 2-year level of service.	Minor system provides sufficient capacity to convey the 2-year peak discharge.	Minor system provides sufficient capacity to convey the 2-year peak discharge.
Major System Performance	Maximum surface ponding >0.5 m deep at many locations north of VIA rail line.	Duration and frequency of maximum surface ponding significantly reduced, but maximum ponding depth remains >0.5 m.	Duration and frequency of maximum surface ponding significantly reduced, but maximum ponding depth remains >0.5 m.
Approvals and Regulatory Requirements	No approval requirements since so stormwater management or drainage improvement works are proposed.	Negotiation of land for proposed SWM pond required. MECP ECA required for proposed SWM pond. Consultation with ERCA required for proposed pond outlet to Leffler Drain and proposed drain enclosure. Proposed Leffler Drain enclosure must be completed in accordance with the provisions of the Drainage Act.	Consultation with ERCA required for proposed Leffler Drain enclosure. Proposed pump station improvements and Leffler Drain enclosure must be completed in accordance with the provisions of the Drainage Act.
Technical Summary	Maximum anticipated surface ponding depths are greater than Town standard.	Maximum anticipated surface ponding depths are greater than Town standard but the frequency and duration of ponding are significantly reduced. Ponding only occurs during storms more severe than the 2-year design event.	Maximum anticipated surface ponding depths are greater than Town standard but the frequency and duration of ponding are significantly reduced. Ponding only occurs during storms more severe than the 2-year design event.
Economic Capital Construction Cost	No associated construction costs since no new stormwater management works are proposed.	High capital costs associated with proposed SWM pond, associated pump station and outlet works, and land acquisition.	High capital costs associated with proposed pump station improvements.
Operations and Maintenance Costs (Long Term)	No additional anticipated O&M costs.	O&M costs for additional SWM facility.	No additional anticipated O&M costs.
Economic Summary	Lowest cost	High Cost	High Cost

Indicates Preliminary Recommended Alternative

Solution Part 2

HOOD AND LEFFLER DRAIN CATCHMENT IMPROVEMENT ALTERNATIVES 4-5

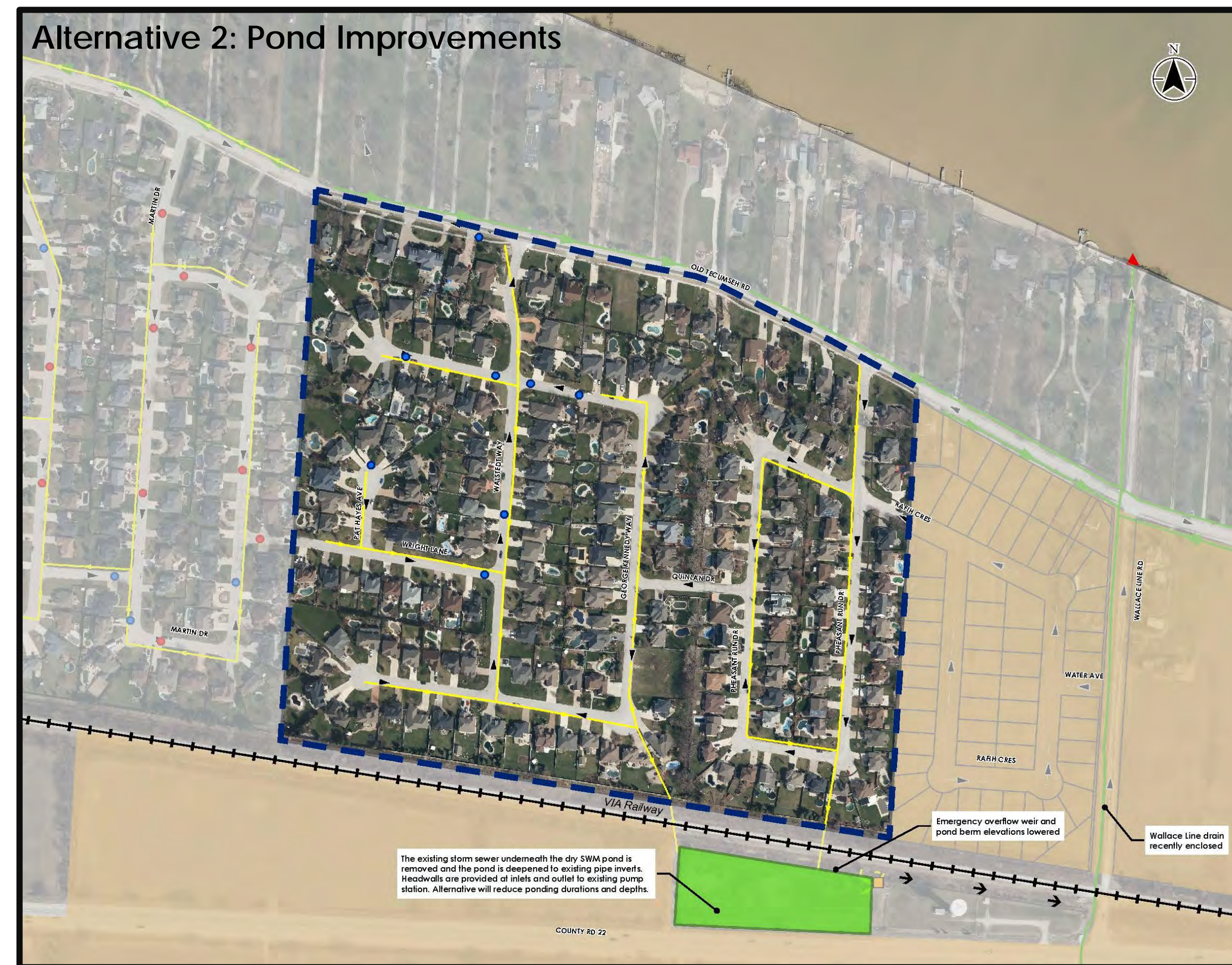


Criteria	Alternative 4 – Pump Station Improvements – PTO Upgrade	Alternative 5 – Magna SWM Pond Expansion
Socio-Economic/ Cultural		
Impacts to Existing and Future Land Uses	Proposed improvements reduce the risk of surface ponding limits encroaching into existing homes north of VIA railway.	Proposed improvements reduce the risk of surface ponding limits encroaching into existing homes north of VIA railway. Approximately 1.4 ha of private land required for proposed SWM pond expansion. The Town has received a development application for the lands required for the proposed SWM pond expansion.
Public Safety	Surface ponding frequency and durations are reduced. Maximum surface ponding >0.5 m deep may occur on local roads. Anticipated maximum surface ponding depths may prevent both emergency and passenger vehicle access to residences. Anticipated maximum ponding depths do not prevent safe pedestrian access/egress.	Surface ponding frequency and durations are reduced. Maximum surface ponding >0.5 m deep may occur on local roads. Anticipated maximum surface ponding depths may prevent both emergency and passenger vehicle access to residences. Anticipated maximum ponding depths do not prevent safe pedestrian access/egress.
Property Impacts	Potential risk of flood damage to vehicles parked near low points on local roads during severe storm events.	Potential risk of flood damage to vehicles parked near low points on local roads during severe storm events.
Socio-Economic Summary	Proposed pump station improvements reduce the frequency of nuisance flooding caused by typical storm events but do not significantly reduce risks to property and public safety.	Proposed regional SWM pond reduces risks to property and public safety by reducing surface ponding frequency and duration. Active development application on the property required for the proposed pond expansion.
Natural Environment		
Aquatic Resources	No significant anticipated impacts on existing aquatic resources.	No significant anticipated impacts on existing aquatic resources.
Terrestrial Resources	No significant anticipated impacts on existing terrestrial resources.	No significant anticipated impacts on existing terrestrial resources.
Natural Environment Summary	No significant impacts on aquatic or terrestrial resources are anticipated.	No significant impacts on aquatic or terrestrial resources are anticipated.
Technical		
Constructability	No constructability issues anticipated.	Groundwater may need to be managed during construction of proposed SWM pond. Proposed pond expansion requires temporary coffer dams and dewatering during construction.
Minor System Performance	Minor system provides sufficient capacity to convey the 2-year peak discharge.	Minor system provides sufficient capacity to convey the 2-year peak discharge.
Major System Performance	Maximum surface ponding >0.5 m deep at many locations north of VIA rail line. No significant reduction in maximum ponding duration.	Duration and frequency of maximum surface ponding significantly reduced, but maximum ponding depth remains >0.5 m.
Approvals and Regulatory Requirements	Consultation with ERCA required for proposed Leffler Drain enclosure. Proposed pump station improvements and Leffler Drain enclosure must be completed in accordance with the provisions of the Drainage Act.	Negotiation of land for proposed SWM pond expansion required. MECP ECA amendment required for proposed SWM pond. Consultation with ERCA required for proposed Leffler Drain enclosure. Proposed Leffler Drain enclosure must be completed in accordance with the provisions of the Drainage Act.
Technical Summary	Maximum anticipated surface ponding depths are greater than Town standard. Ponding only occurs during storms more severe than the 2-year design event.	Maximum anticipated surface ponding depths are greater than Town standard but the frequency and duration of ponding are reduced. Ponding only occurs during storms more severe than the 2-year design event.
Economic		
Capital Construction Cost	Moderate capital costs associated with installation of proposed permanent pump.	High capital costs associated with proposed SWM pond expansion, and land acquisition.
Operations and Maintenance Costs (Long Term)	No significant additional O&M costs anticipated.	No significant additional O&M costs anticipated.
Economic Summary	Moderate Cost	High Cost

Indicates Preliminary Recommended Alternative

Solution Part 2

COUNTRY WALK CATCHMENT IMPROVEMENT ALTERNATIVES



Criteria	Alternative 1 – Do Nothing	Alternative 2 – Pond Improvements
Socio-Economic/ Cultural		
Impacts to Existing and Future Land Uses	Maximum estimated surface ponding limits do not appear to encroach into existing homes. Maximum ponding depths limit property access. Major flows are conveyed across private properties to Lake St. Clair.	Reduced ponding depths improve property access. Possibility of overland flows across private properties is reduced.
Public Safety	Anticipated maximum surface ponding depths >0.5 m may prevent both passenger vehicle and emergency vehicle access to residences. Anticipated maximum ponding depths do not prevent safe pedestrian access/egress.	Anticipated maximum ponding depths <0.3 m should not present a significant risk to public safety. Existing fence around SWM pond mitigates risk to public safety associated with greater pond depth.
Property Impacts	Potential risk of flood damage to vehicles parked near low points on local roads during severe storm events.	No significant property impacts anticipated.
Socio-Economic Summary	Maximum surface ponding depths and durations present a public safety risk and limit property access during severe storm events.	Reduced surface ponding depths mitigate public safety risk and improve property access during severe storm events.
Natural Environment		
Aquatic Resources	No significant anticipated impacts on existing aquatic resources.	No significant anticipated impacts on existing aquatic resources.
Terrestrial Resources	No significant anticipated impacts on existing terrestrial resources.	Tree removal in existing pond footprint may be required to complete grading.
Natural Environment Summary	No significant impacts on aquatic or terrestrial resources are anticipated.	No significant impacts on aquatic resources are anticipated. Impacts on existing trees can be mitigated by replanting within the existing pond block.
Technical		
Constructability	No construction proposed.	Groundwater challenges are anticipated due to the depth of the proposed pond.
Minor System Performance	Minor system has sufficient capacity to accommodate the 2-year peak discharge.	Proposed pond storage should improve minor system performance, resulting in less frequent street ponding. Sediment accumulation within the storm sewer should be reduced.
Major System Performance	Maximum road ponding >0.5 m deep at many locations. Risk that property owner could alter the existing overland flow route, resulting in greater surface ponding depths.	Maximum road ponding <0.3 m deep at most locations.
Approvals and Regulatory Requirements	No approval requirements since no stormwater management or drainage improvement works are proposed.	Consultation with ERCA likely required for proposed pond improvements, as the site is located within the regulation limits. MECP ECA amendment required for proposed pond improvements.
Technical Summary	Maximum anticipated ponding depths are greater than Town standard.	Maximum ponding depths at most locations meet Town standard. Removal of existing storm sewer under pond should reduce O&M requirements.
Economic		
Capital Construction Cost	No associated construction costs since no new stormwater management works are proposed.	High capital costs associated with storm sewer removal and SWM pond deepening.
Operations and Maintenance Costs (Long Term)	No significant O&M costs anticipated.	Lower O&M costs anticipated since storm sewer removal should reduce the need for frequent sediment cleanout. Proposed pond slopes may prevent grass mowing, resulting in lower O&M costs.
Economic Summary	Low cost	High cost

 Indicates Preliminary Recommended Alternative

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.

Contact Information

For more information on this study or to provide your comments, please contact:

TOWN OF LAKESHORE

Town Hall: [519-728-2700](tel:519-728-2700) Toll Free: [1-877-249-3367](tel:1-877-249-3367)

**STORM WATER MASTER PLAN STUDY - PHASE 1
PUBLIC INFORMATION CENTRE NO. 2
SIGN-IN SHEET**

October 23, 2019 from 6:00 P.M. to 8:00 P.M.

Atlas Tube Centre Lobby

NAME	ADDRESS	EMAIL	PHONE NUMBER
Julie Ofner			
JoAnn Anderson			
Paolo Eugeni			
Josette Eugeni			
Kelsey Santavosse			
Tom Bain			
Ryan Langlois			
Joel Bezaire			
Jeff + Joane Rivest			
Vinnny + Marcy Andrade			

STORM WATER MASTER PLAN STUDY - PHASE 1
PUBLIC INFORMATION CENTRE NO. 2
SIGN-IN SHEET

October 23, 2019 from 6:00 P.M. to 8:00 P.M.

Atlas Tube Centre Lobby

NAME	ADDRESS	EMAIL	PHONE NUMBER
D. LIPPART			
N. MIRON			
D. MIRON			
PHIL DORNER			
DAWN KIRCHNER			
Danny Marentette			
Kevin Bieth			
A.M. Macellan-Harcus			
Kirk W. Telt			
JOHN KERR			
LEN JAWISSE			
FRANCIS KENNEDY			

**Town of Lakeshore
Storm Water Master Plan Study – Phase 1
Public Information Centre No. 2
Atlas Tube Centre Lobby
October 23, 2019 – 6:00pm to 8:00pm**

COMMENT FORM

You are invited to give comments or express your concerns about Storm Water Management and Climate Change.

Please complete and leave this form today (or later by mail or fax) so that your opinions and concerns on this project can be considered. All comments are to be directed to:

Town of Lakeshore
419 Notre Dame Street
Belle River, ON N0R 1A0
Tel: (519) 728-2488
Fax: (519) 728-4577
Email: info@lakeshore.ca

Comments or Concerns:

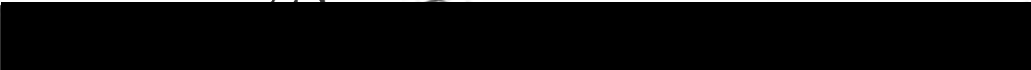
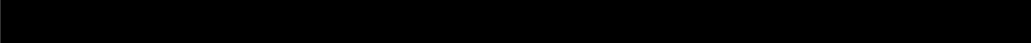
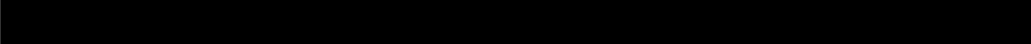
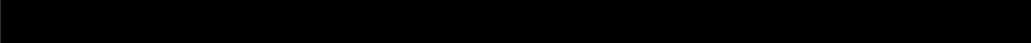
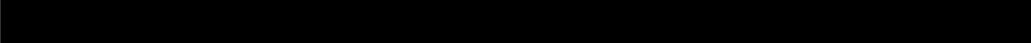

When Lake water is high the private launch on East Pike creek rd & Tecumseh allows lake water to dump into the storm sewer for days and weeks at a time despite the use of sand bags. This adds extra stress on the storm sewer and pump station.

What is being done to resolve this when the lake water rises again.

Thank you

Also the way the road is graded and the the adjacent culdesac being lower the street floods.

(Use reverse side or additional sheets for additional comments if needed)

Name: 
Address: 
Telephone / Fax: 
E-mail: 
Date: 
Signature: 

Town of Lakeshore Stormwater Master Plan – Phase 2

PIC 2 Comment Response – Comment Sheets

Date/Method	Comment/Concern	Response
October 23, 2019, Comment Sheet	<ul style="list-style-type: none">• When lake water is high the private launch on East Pike Creek Road & Tecumseh allows lake water to dump into the storm sewer for days and weeks at a time despite the use of sand bags. This adds extra stress on the storm sewer and pump station. What is being done to resolve this when the lake water rises again.• Also the way the road is graded and the adjacent cul de sac being lower the street floods.	<ul style="list-style-type: none">• As noted in Section 7.2.10, Stantec recommends continuing to manage this issue with temporary measures since the problem only occurs under high lake level conditions.• Local flooding should be mitigated by the proposed new pump station.



planning@erca.org

P.519.776.5209

F.519.776.8688

360 Fairview Avenue West
Suite 311, Essex, ON N8M 1Y6

November 14, 2019

Town of Lakeshore
419 Notre Dame Street
Belle River, Ontario
N0R 1A0

Dear Mr. Raji:

RE: Lakeshore Stormwater Master Plan Study - Phase 1 Municipal Class EA, Public Information Centre No. 2

This letter is in response to our receipt and review of the following Notice of Public Information Centre No. 2 for the Lakeshore Stormwater Master Plan Study - Phase 1. It is our understanding that this Master Plan - Approach 2 process is following the Municipal Class EA in accordance with the planning and design process for "Schedule B" projects as outlined in the Municipal Class Environmental Assessment (June 2000, as amended in 2007, 2011 and 2015) under the Ontario Environmental Assessment Act.

The following comments are provided as a result of our review of the Public Information Centre Number 2 display boards that were shared with us for review. In general, we support this intent of this study to proactively address and prioritize improvements to existing and new developments. The ongoing pressures related to the risks of intense rainfall events requires this type of a comprehensive review.

Slide 9 Catchment improvements

-This slide identifies that the Study is using a depth of 0.5 metres or greater on roadways to identify areas that are considered vulnerable to flooding. If the Town has completed modeling to identify areas where flooding is in excess of 0.3 metres, and 0.5 metres, we recommend that the final Project File identify that the areas that have greater than 0.5 metres be identified as the highest priority for improvements, with those areas between 0.3 metres and 0.5 metres be prioritized second. This is based on available information regarding the safe passage of passenger vehicles through flooded streets that supports the current Provincial Policy Statement, the supporting implementation Technical Guide for Natural Hazards and ERCA Board Approved Policy. Currently, the roadway ponding depth standard for safe access is 0.3 metres based on limitations imposed by typical passenger vehicle exhaust systems. Many of the emergency vehicles (i.e. fire trucks) have exhaust systems only 12 inches from the roadway which lends the same limitations as passenger vehicles in an emergency. While it was generally assumed that emergency vehicles would be able to enter flood waters up to 0.9 metres based supporting documents to the PPS (i.e., Technical Guides), it should be noted that this was an assumption based on elevated diesel exhaust systems. Further clarification on this matter is recommended.

November 14, 2019

-ERCA recommends, in relation to improvements related to access standards, locations with greater than 0.5 metres of flooding be prioritized first and then areas with greater than 0.3 metres be given second.

-Water over the road signs for > 0.3 meters? Or remaining locations with 0.5 m or greater? We recommend that the study identify a suite of options for advising of the depth of the water over the road. We support this concept and encourage the Town to detail addition options for each respective situation.

-the slide identifies that existing SWM ponds were evaluated to determine if they have sufficient capacity for the 1:100 year event. Will the final Project File include the details associated with this analysis, in terms of identifying which storms were used to complete the evaluation, any lumped model % impervious parameters etc. (i.e. SCS Type II, 24 hour based on the current Windsor-Essex SWM Standards Manual).

Slide 10 – Amy Croft Catchment Area

-The recommended solution includes increasing the discharge at the existing pond to “maximize peak discharge” with no anticipated impacts to the Pike Creek flood line. What are the anticipated modifications? The current outlet is gravity fed to the adjacent VIA rail ditch, which flows easterly under West Pike Creek Road into Pike Creek. Is there an opportunity to pump directly into Pike Creek and avoid the VIA Rail ditch?

-The recommended improvements do not address the ponding depths within the existing residential area. These areas are identified as having greater than 0.3 metres of ponding.

-There are significant developments proposed for this area within the Amy Croft Secondary Area that may be impacted by the information available through this study.

-With the municipality having ownership of the existing SWM facility, and proposing a “regional facility” immediately adjacent to the existing pond, has there been any consideration for evaluating the impacts of combining these ponds into a single larger system?

Slide 11 – Croft Catchment Area

-The recommended alternative includes an overland flow route within the Regulated Area of the Pike Creek. A permit under S.28 of the Conservation Authorities Act will be required for this and should be identified under “Approvals and Regulatory Requirements”.

-Has the capacity of the Webbwood drain been evaluated/assessed? The current recommended alternative includes directing overland flows from the major event into the Webbwood drain, which is an enclosed system. Sufficient capacity to convey this through the enclosed system must be confirmed along with sufficient inlet capacity. This information should be reflected in the Project File.

Slide 12 – Chelsey Parkway Catchment

-The current recommended improvements are to direct overland flows to the 4th Concession Drain pond located just west of the 4th Concession Drain. The design for this pond did not include overland



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flows from the development to the north. The pond would require reassessment to ensure the pond will operate within appropriate standards (e.g., addition of freeboard). Overland flows conveyed through the lands south of Chelsey Parkway may have impacts to the proposed future development (i.e. roadways to accommodate overland flows within the future development and flows from Regency Cres.). These impacts should be considered as the study and/or future development progresses.

Slide 14 – Notre Dame Pump Catchment

-Considering the ponding depths are greater than 0.3 metres in some locations with overland routes known to be conveyed through private lands, there should be some consideration for improvements here in the future even if the priority is lower than other areas. Perhaps the study can identified improvements will be considered here subject to available funding, etc.

Slide 23 – Hood and Leffler Drain Catchment

-Previous discussion with the Town of Lakeshore identified the need to ensure that the proposed enclosure of the Leffler Drain cannot have any impacts to the 1:100 year waters surface elevations. The Leffler Drain, in its current state, overtops during the major event. The enclosure will require ERCA approval. Submission for this type of approval will require analysis of the existing system and the proposed enclosure to determine the impacts to the 1:100 year WSEL, as previously outlined on December 20, 2018.

In general, any improvements that fall within a regulated area, including but not limited to overland flow routing, modifications to existing SWM facilities that alter the outlet condition of existing systems, and new outlets to watercourses will require our agency approval.

We would like to remain on the distribution list for this study and ask that you circulate further details to our office via planning@erca.org. If you have any questions please don't hesitate to contact me directly. ERCA staff will be available to discuss these comments or any other considerations as a result of this study.



Michael Nelson, BSc, MSc (Planning)
Watershed Planner
/mn

C: Nick Emery, Stantec

File Number: EA-8-2019



Town of Lakeshore Stormwater Master Plan – Phase 2

PIC 2 Comment Response – Essex Region Conservation Authority

Date/Name/Method	Comment/Concern	Response
November 14, 2019, Michael Nelson, Watershed Planner (letter)	<p>...the Study is using a depth of 0.5 metres or greater on roadways to identify areas that are considered vulnerable to flooding. If the Town has completed modeling to identify areas where flooding is in excess of 0.3 metres, and 0.5 metres, we recommend that the final Project File identify that the areas that have greater than 0.5 metres be identified as the highest priority for improvements, with those areas between 0.3 metres and 0.5 metres be prioritized second. This is based on available information regarding the safe passage of passenger vehicles through flooded streets that supports the current Provincial Policy Statement, the supporting implementation Technical Guide for Natural Hazards and ERCA Board Approved Policy.</p>	<p>As documented in Section 5.3.2, the maximum roadway ponding depths were estimated based on topographic information, rather than the effects of a particular design storm and provides the reasoning behind this approach. Section 5.3.5 notes that roadway ponding depths greater than 0.5 m were used to in the catchment screening process to prioritize areas for detailed evaluation, taking into account the guidance presented in the PPS, the Technical Guide for Natural Hazards, ERCA policy and Town standards. The alternative evaluation criteria identified in Section 6.2 identify a maximum ponding depth target of 0.3 m, in accordance with Town and ERCA standards.</p>
	<p>Water over the road signs for > 0.3 meters? Or remaining locations with 0.5 m or greater? We recommend that the study identify a suite of options for advising of the depth of the water over the road.</p>	<p>Signage was considered as a potential option to alert motorists of significant ponding depths. However, temporary road closures and detours are preferred to prevent motorists from entering a potential hazard.</p>
	<p>...existing SWM ponds were evaluated to determine if they have sufficient capacity for the 1:100 year event. Will the final Project File include the details associated with this analysis, in terms of identifying which storms were used to complete the evaluation, any lumped model % impervious parameters etc. (i.e. SCS Type II, 24 hour based on the current Windsor-Essex SWM Standards Manual).</p>	<p>The SWM pond analysis methodology is described in Section 5.3.3.</p>
	<p>Amy Croft Catchment Area</p> <ul style="list-style-type: none"> • The recommended solution includes increasing the discharge at the existing pond to “maximize peak discharge” with no anticipated impacts to the Pike Creek flood line. What are the anticipated modifications? • The recommended improvements do not address the ponding depths within the existing residential area. These areas are identified as having greater than 0.3 metres of ponding. • There are significant developments proposed for this area within the Amy Croft Secondary Area that may be impacted by the information available through this study. • With the municipality having ownership of the existing SWM facility, and proposing a “regional facility” immediately adjacent to the existing pond, has there been any consideration for evaluating the impacts of combining these ponds into a single larger system? 	<ul style="list-style-type: none"> • Section 7.2.1 describes the proposed outlet improvements, which include replacing the existing pipe with a larger diameter barrel. The proposed outlet arrangement and alignment will be confirmed during detailed design. • Section 6.3.1 addresses the challenges associated with mitigating roadway ponding in the existing residential area. • The proposed SWM strategy is intended to service the runoff from the proposed developments. Section 7.2.1 notes the need to include appropriate conditions in future development agreements. • Preliminary hydrologic/hydraulic modelling of the recommended alternative accounted for the interaction of the proposed and existing facilities. The proposed facility layout and combination with the existing pond will be further evaluated through detailed design.

	<p>Croft Catchment Area</p> <ul style="list-style-type: none"> • A permit under S.28 of the Conservation Authorities Act will be required for this and should be identified under “Approvals and Regulatory Requirements”. • The current recommended alternative includes directing overland flows from the major event into the Webbwood Drain, which is an enclosed system. Sufficient capacity to convey this through the enclosed system must be confirmed along with sufficient inlet capacity. 	<ul style="list-style-type: none"> • Table 6.4 identifies the need to obtain a Section 28 permit. • Since the subject area discharges to the Webbwood Drain service area, and the proposed drainage easement is only intended to provide overland flow relief, no significant impacts are anticipated on the Webbwood Drain. Detailed assessment of the Webbwood Drain capacity was beyond the scope of this project and will consequently be completed as design progresses.
	<p>Chelsea Parkway Catchment</p> <ul style="list-style-type: none"> • The design for this pond did not include overland flows from the development to the north. The pond would require reassessment to ensure the pond will operate within appropriate standards. Overland flows conveyed through the lands south of Chelsea Parkway may have impacts to the proposed future development. 	<ul style="list-style-type: none"> • The anticipated impacts of the additional proposed overland flows on the existing pond and downstream development are addressed in Section 7.2.3.
	<p>Notre Dame Pump Catchment</p> <ul style="list-style-type: none"> • Considering the ponding depths are greater than 0.3 metres in some locations with overland routes known to be conveyed through private lands, there should be some consideration for improvements here in the future even if the priority is lower than other areas. 	<ul style="list-style-type: none"> • The challenges associated with this catchment are discussed further in Section 7.2.5
	<p>Hood and Leffler Drain Catchment</p> <ul style="list-style-type: none"> • The enclosure will require ERCA approval. Submission for this type of approval will require analysis of the existing system and the proposed enclosure to determine the impacts to the 1:100 year WSEL, as previously outlined on December 20, 2018. 	<ul style="list-style-type: none"> • The requirement for ERCA approval of the proposed drain enclosure is identified in Section 7.2.13.