The Corporation of the
Town of Tecumseh

Public Works & Environmental Services

To: Mayor and Members of Council

From: Phil Bartnik, Director Public Works & Environmental Services

Date to Council: June 25, 2019

Report Number: PWES-2019-35

Subject: Storm Drainage Master Plan
Filing the Notice of Study Completion

Recommendations

It is recommended:

That the Public Works & Environmental Services Report PWES-2019-35 Storm Drainage Master Plan, Filing the Notice of Study Completion **be received**;

And that the Notice of Study Completion **be advertised** in the local newspaper and the Town's social media accounts to initiate the mandatory 30-day public review period.

Background

At the December 13, 2016 Regular Council Meeting, Council approved the recommendations (Motion RCM-442/16) of PWES Report No. 54/16 titled "2017-2021 Public Works & Environmental Services Capital Works Plan" that authorized Administration to proceed with the Storm Drainage Master Plan.

This Storm Drainage Master Plan is one of three Storm Master Plans that are currently in progress within the Town, as outlined within the Town's Flood Mitigation Strategy (Report PWES-2018-17). The other two being the:

- Oldcastle Hamlet Storm Drainage Master Plan; and the
- Upper Little River Watershed Stormwater Master Plan

Comments

The purpose of the Storm Drainage Master Plan is to address the impacts of surface flooding on the mainly urbanized residential areas of the Town located along the northern and eastern limits of the municipality. This includes the assessment of storm pump stations, gravity outfalls and the respective service areas minor (sewer) and major (roadway) systems discharging to Lake St. Clair and Pike Creek. The Storm Drainage Master Plan will:

- Confirm the factors contributing to surface flooding from significant storms that exceeds the current guidelines;
- Determine surface flooding problem areas throughout the study area based on existing conditions;
- Identify areas of future development and incorporate the future level of service design into a future conditions model;
- Identify and evaluate alternative solutions within the future conditions model to reduce the risk and impacts of surface flooding;
- Identify recommended design solutions based on a traditional level of service for the design;
- Simulate the effects of climate change on the recommended solutions and further enhance the level of service, if warranted; and
- Outline a recommended long-term implementation strategy with preferred surface flooding solutions.

Municipal Class Environmental Assessment

The *Ontario Environmental Assessment (EA) Act* recognized that certain municipal undertakings occur frequently, are small in scale, have a generally predictable range of effects or have a relatively minor environmental significance. To ensure that a degree of standardization in the planning process is followed throughout the Province, the EA Act contemplated the use of the Class Environmental Assessment (Class EA) procedure for projects which require approval under the Act but which are not considered to be major environmental works. The Municipal Engineers Association (MEA) document titled Municipal Class Environmental Assessment (October 2000 as amended in 2007, 2011 and 2015), describes the procedure for undertaking a Class EA for municipal projects.

Projects undertaken by municipalities vary in their environmental impact, and are classified within the Class EA document in terms of Schedules:

- **Schedule A** projects are limited in scale, have minimal adverse environmental effects and include a number of municipal maintenance and operational activities. These projects are preapproved and may proceed to implementation without following the full

Class EA planning process. Schedule A projects generally include normal or emergency operational and maintenance activities.

- **Schedule A+** projects are similar to Schedule A projects in that they are considered pre-approved; however, the public is to be advised prior to project implementation.

- **Schedule B** projects have potential for some adverse environmental effects. The proponent is required to undertake a screening process, involving mandatory contact with directly affected public and relevant review agencies, to ensure that they are aware of the project and that their concerns are addressed. If there are no outstanding concerns, then the proponent may proceed to implementation. Schedule B projects generally include improvements and minor expansions to existing facilities.

- **Schedule C** projects have the potential for significant environmental effects and must proceed under the full planning and documentation procedures specified in the Municipal Class EA document. Schedule C projects require that an Environmental Study Report (ESR) be prepared and filed for review by the public and review agencies. Schedule C projects generally include the construction of new facilities and major expansions to existing facilities.

The main elements of the Class EA planning process are incorporated in the following five phases, and further depicted on Attachment No.3:

Phase 1: Identify the problem or opportunity.

Phase 2: Identification and evaluation of alternative solutions to determine a preferred solution.

Phase 3: Examination of alternative methods of implementation of the preferred solution.

Phase 4: Documentation of the planning, design and consultation process.

Phase 5: Implementation and monitoring.

The Municipal Class EA process includes an appeal period of 30-days for the public to review the EA document once it has been completed. The proponent is encouraged to work in cooperation with any member of the public who may have a concern to determine the preferred means of addressing a problem. If the concerns of the project cannot be resolved through discussions with the proponent, the member of the public may request the Minister of the Environment to require the proponent to comply with Part II of the EA Act before proceeding with the proposed undertaking. If no request is received by the Minister or delegate, the proponent is free to proceed with the implementation and construction.

The Master Plan Process

Master Plans are long range plans which integrate infrastructure requirements for existing and future land use with environmental assessment planning principles. The plans examine an infrastructure system(s) or group of related projects to outline a framework for planning for

subsequent projects and/or developments. At a minimum, Master Plans address Phase 1 (Identify Problem/Opportunity) and Phase 2 (Alternative Solutions) of the Municipal Class EA process. Master Plans typically outline a set of specific projects across a geographic area that will be implemented over a period of time.

There are four different Approaches to undertaking a Master Plan, which include:

- Approach No.1
  - Preparation of a Master Plan document at the conclusion of Phases 1 and 2 of the Municipal Class EA process.
  - Broad level of assessment thereby requiring more detailed investigations at the project-specific level in order to fulfil the Municipal Class EA documentation requirements for the specific Schedule B and C projects identified within the Master Plan.
  - Schedule B projects would require filing of the Project File for public review.
  - Schedule C projects would have to fulfil Phases 3 and 4 of the Municipal Class EA prior to filing an Environmental Study Report (ESR) for public review.

- Approach No.2
  - Preparation of a Master Plan document at the conclusion of Phases 1 and 2 of the Municipal Class EA process.
  - Level of investigation, consultation and documentation are sufficient to fulfil the requirements for Schedule B projects.
  - The public notice for the Master Plan becomes the Notice of Completion for the Schedule B projects within it.
  - Schedule C projects would have to fulfil Phases 3 and 4 of the Municipal Class EA prior to filing an ESR for public review.
  - The Master Plan would provide the basis for future investigations for specific Schedule C projects identified within it.

- Approach No.3
  - Preparation of a Master Plan document at the conclusion of Phase 4 of the Municipal Class EA process.
  - The Master Plan would document Phases 1 to 4 of the Class EA process for Schedule B and/or Schedule C projects.
  - The final notice for the Master Plan becomes the Notice of Completion for the Schedule B and C projects within it.

- Approach No.4
  - Possible integration with approvals under the Planning Act (i.e. Official Plans, Official Plan Amendments).
  - A master servicing plan prepared in this fashion establishes need and justification in a very broad context.
  - This approach would satisfy early phases of the Class EA including Phases 1 and 2 for Schedule B projects and may satisfy, in addition, Phases 3 and 4 for Schedule C projects.
  - This approach is best suited when planning for a significant geographical area in the long term.

This Storm Drainage Master Plan was completed following Approach No.2. to ensure that the level of investigation, consultation and documentation were sufficient to fulfil the requirements for Schedule B projects.

Modelling and Design Criteria

The Storm Drainage Master Plan utilized the latest in 1-Dimensional and 2-Dimensional stormwater modelling technologies to assess both existing and future conditions within the study area. The model was used to simulate the existing flow conditions of the minor (sewers) and major (overland) systems. The minor system was modelled using a 1-Dimensional (1D) linear model network, while the major (overland) system was modelled using a 2-Dimensional (2D) approach.

The study took into consideration all applicable guidelines identified within the released Windsor/Essex Stormwater Management Standards Manual (December 2018). The analysis of both the existing and future development conditions used Environment Canada's Windsor Airport (Windsor_A) rainfall data to evaluate the stormwater infrastructure throughout the study area. This Intensity-Duration-Frequency (IDF) data was used to generate the following storm events using the Chicago Storm Distribution:

- Chicago 1:2 year 4 Hour Storm Event;
- Chicago 1:5 year 4 Hour Storm Event;
- Chicago 1:10 year 4 Hour Storm Event;
- Chicago 1:100 year 4 Hour Storm Event;

To take into consideration Climate Change, two rainfall events were used as an "Urban Stress Test" to assess the resiliency and vulnerability of the designed and/or pre-existing storm system. This included the following:

1. **High Intensity Climate Change Event:** Chicago 1:100 year 4 hour storm event distribution + 40% incremental intensity. This rainfall event produced a total rainfall volume of 115 mm with a maximum 10 minute intensity of 241 mm/hr.

2. **High Volume Climate Change Event (as per the Windsor/Essex Stormwater Management Standards Manual):** 150mm rainfall event with a 15 minute time step, representing a 39% increase in volume uniformly distributed across the rainfall event, as compared to the Windsor Airport 1:100 year 24-hour rainfall of 108mm. Maximum intensity of 145 mm/hr.

The high intensity climate change event was used to design the recommended surface flooding solutions and the high volume climate change event was then used to validate and confirm the design.

In development of the solutions within the study, the design level of service applied is based on local surface flooding conditions that were identified. In some instances, a traditional engineering approach is applied, which involves a static design criteria meeting the regulatory requirements. In other instances an enhanced approach is applied that accounts for climate change considerations, adding more resiliency to the storm system.

Alternative Solutions and Evaluation Criteria

Alternative solutions were developed to improve the resiliency of the storm drainage infrastructure, taking into consideration the impacts of climate change. A surface flooding solution decision framework was developed to outline an approach to developing solutions that address both the required level of service and added resiliency for each surface flooding problem area, as appropriate.

The decision framework was developed to determine the scope of the preferred design solution and identify areas that require either a traditional or an enhanced level of service to suit the risks and vulnerability of the area. The framework is detailed within the Executive Summary (see page 6 of Attachment No. 5).

As part of the decision making process, a comparative evaluation of the alternative solutions was completed for each problem area identified. The evaluation criteria included:

- Meets Study Objective:
    - **Addresses Study Problem/Opportunity Statement**: If the alternative does not address the objective, it was not considered further.

- Technical Factors:
    - **Impact on Minor System (sewers) drainage**: Ability to increase flow conveyance during minor storm events.
    - **Impact on Major system (roadway) drainage**: Ability to enhance major system flow routing and reduce ponding to provincially accepted standards during major storm events.
    - **Ease of construction and implementation**: Ease of construction based on a technical, regulatory and practical basis. Alternatives that are easier to construct/implement are preferred.

- Social/Economic Factors:
    - **Future land uses**: Potential to influence infill development in currently developed areas.
    - **Impact on Urban Community**: Potential for disruption or displacement of existing residents, greenspace/recreational uses (streets, trees, parks, open spaces).

- Environmental Factors:
    - **Natural Environment**: Potential for significant negative impacts on terrestrial and aquatic resources, including Species at Risk habitat

- Cultural Factors:
    - **Archaeological resources**: Potential to impact lands with archaeological resources.
    - **Built heritage and/or cultural heritage resources**: Potential impacts on built heritage and/or cultural heritage resources.

- Cost Factors:
    - **Relative capital cost**: Relative overall capital costs, including restoration/enhancement costs for the alternative. Lower cost alternatives are preferred.

Recommended Solutions, Schedule B Projects and Estimated Capital Costs

The recommended surface flooding solutions outlined within the Storm Drainage Master Plan have been designed to a functional level of detail, and further specifics of these solutions can be found within Recommended Solutions Summary Map (Attachment No.4) as well as the Executive Summary (starting on page 10 of Attachment No. 5).

The Schedule B projects included for approval as part of this Master Plan are designed to be functional in nature and provide sound direction on the nature of the designs that would be effective in addressing surface flooding concerns. These projects have been identified as:

1) Lesperance Road Storm Pump Station Improvements
2) West St. Louis Storm Pump Station Improvements
3) New Consolidated Scully/St. Mark's Storm Pump Station
4) PJ Cecile Storm Pump Station Improvements
5) New Southwind Crescent Storm Pump Station
6) Surface Storage within 'Tecumseh Soccer Fields' Park at Ecole Secondaire L'Essor
7) Surface Storage within Buster Reaume Park
8) Surface and Underground Storage within Tecumseh Centre Park

Estimated capital costs and implementation phasing for all of the recommended solutions are detailed within the Executive Summary (starting on page 22 of Attachment No. 5). A summary of the capital costs is as follows:

Service Area	Estimated Construction Cost & Contingency ($M)	Engineering ($M)	Total ($M)
Lesperance Pump Station	$26.09	$4.44	$30.53
Consolidated Scully/St. Mark's Pump Station	$19.39	$3.31	$22.70
West St. Louis Pump Station	$17.96	$2.99	$20.95
East St. Louis Pump Station	$0.62	$0.10	$0.72
East Townline Drain	$5.34	$0.91	$6.25
Baillargeon Drain	$6.60	$1.13	$7.73
PJ Cecile Pump Station	$10.98	$1.88	$12.86
Southwind/Starwood Area	$0.90	$0.15	$1.05
Brighton Pump Station	$3.25	$0.55	$3.80
Totals	**$91.13**	**$15.46**	**$106.59**

Implementation phasing for all of the recommended solutions was provided for each of the storm service areas. Works would typically precede starting downstream and working

upstream in the system. However with utilizing the 2D Model, we now have the capability of reviewing the effects on the system if upstream works were constructed first (i.e. can the Town install trunk sewers in advance of pump station upgrades without adversely affecting the existing level of service).

As identified within the Town's 2018 Asset Management Plan (v2.0), the recommended solutions will be incorporated into the annual Public Works & Environmental Services Capital Works Plan moving forward. It is intended to consolidate various infrastructure improvements into a singular tender package for efficiencies and economies of scale benefits (i.e. storm sewer improvements would be consolidated with a watermain replacement and road reconstruction).

Public Consultation

There was extensive public consultation throughout the Master Plan process which exceeded the requirements of the Municipal Class EA. These included:

1. Notice of Study Commencement

   The Notice of Study Commencement was mailed to the study contact list, which consists of interested property owners, stakeholders, indigenous communities, and regulatory agencies. It was also published in the April 28th and May 5th, 2017 editions of the Shoreline and placed on the Town's website and social media accounts.

2. Public Information Centre (PIC) No.1

   The Notice of PIC No.1 was mailed to the study contact list on July 12, 2018. It was also published in the July 13th and July 20th, 2018 editions of the Shoreline and placed on the Town's website and social media accounts.

   PIC No.1 was held on July 25, 2018 from 3:00 p.m. to 5:00 p.m. and 6:00 p.m. to 8:00 p.m. at the Royal Canadian Legion Branch 261 on Lanoue Street. A total of 33 people attended PIC No.1 and any comments received have been documented and addressed within the Master Plan document. The purpose of the PIC was to present:
   - Project need, including information on why surface flooding occurs;
   - Problem areas identified in the storm sewer overland drainage systems; and
   - Alternative storm drainage solutions considered and recommended regional solutions.

3. Public Information Centre (PIC) No.2

   The Notice of PIC No.2 was mailed to the study contact list on January 22, 2019. It was also published in the January 25th and February 1st, 2019 editions of the Shoreline and placed on the Town's website and social media accounts.

   PIC No.2 was held on February 6, 2019 from 3:00 p.m. to 5:00 p.m. and 6:00 p.m. to 8:00 p.m. at the Royal Canadian Legion Branch 261 on Lanoue Street. A total of 27 people attended PIC No.2 and any comments received have been documented and addressed within the Master Plan document. The purpose of the PIC was to present:

- Recommended solutions to reduce surface flooding for each problem area; and
- Information on recommended Schedule B projects.

4. Indigenous Communities Consultation Engagement

   The Indigenous Communities identified as potentially interested in the study included Walpole Island, Caldwell, Aamjiwnaang, Chippewas of the Thames, and Moravian of the Thames (Delaware Nation). All project Notices were sent to the Indigenous Communities along with cover letters. Correspondence was only received from the Aamjiwnaang First Nations.

   Prior to PIC No.2, a presentation was made by Dillon Consulting Limited and Administration to the Aamjiwnaang First Nation Environmental Committee on February 5, 2019 in Sarnia.

5. Direct Property Owner Consultation Regarding Schedule B Projects

   Additional consultation and meetings were held with property owners who were directly affected or adjacent to the identified Schedule B projects. Alternatives and preferred solutions for each project were discussed. Notifications were mailed out on January 23, 2019, and the following efforts were undertaken:

   - Lesperance Road Storm Pump Station Improvements (PS-1)
     - A meeting was held on January 30, 2019 and attended by two property owners.
   - West St. Louis Storm Pump Station Improvements (PS-3)
     - A notice to the adjacent property owners was mailed January 23, 2019. The property owners did not request a meeting with the project team.
   - Scully & St. Mark's Storm Pump Stations Improvements (PS-2)
     - A notice to the adjacent property owners was mailed January 23, 2019. The property owners did not request a meeting with the project team.
   - PJ Cecile Storm Pump Station Improvements (PS-4)
     - A meeting was held on January 22, 2019 with the Beach Grove and Country Club and attended by two representatives from the Club. A second meeting was held on January 30, 2019 with the Kensington Beach Owners Group, where six individuals attended.
   - New Southwind/Starwood Storm Pump Station (PS-5)
     - A meeting was held on January 28, 2019 and attended by four property owners. A second meeting was held on January 30, 2019 with the Southport Sailing Club where one representative attended.

- Tecumseh Soccer Fields Surface Storage (SM-3)
    - A meeting was held on January 11, 2019 with two representatives from Conseil Scolaire Catholique (CSC) Providence. Dillon Consulting and Administration also gave a presentation to their Board on February 11, 2019.
- Tecumseh Centre Park – Underground & Aboveground Storage (LE-5)
    - A meeting was held on December 20, 2018 with the Director Parks & Recreation Services to review the proposed works.
- Buster Reaume Park – Aboveground Storage (ETD-1)
    - A meeting was held on December 20, 2018 with the Director Parks & Recreation Services to review the proposed works.

6. Policies & Priorities Committee Meeting – 6:00 p.m. November 27, 2018

   The Director of Public Works & Environmental Services provided an overview of the Storm Drainage Master Plan, and the progress on the study to date. A detailed summary of the required works and alternatives identified at PIC No.1 for the Baillargeon Drain area west of Manning Road was also provided.

Presentation

The Town's consultant, Dillon Consulting Limited, will be in attendance at the 4:30 p.m. June 25, 2019 Special Meeting of Council to make a presentation that summarizes the Master Plan process, details the modelling results of the existing conditions, outlines the alternative solutions and the evaluation criteria, and identifies the preferred solutions and associated estimated costs.

Next Steps

The Notice of Study Completion will be published in the local newspaper and on the Town's website and social media accounts, and will also be mailed to landowners, stakeholders and regulatory authorities on the contact list for the Master Plan.

A copy of the Notice of Completion will also be included as a Communication Item at the following regularly scheduled meeting of council following publication.

A hard copy of the Storm Drainage Master Plan will be made available at Town Hall through the Clerk's Office during the 30-day review period, along with a digital copy being made available on the Town's website.

Following the 30-day review period, and considering that all of the comments received have been addressed and that no Part II Orders were submitted to the Minister of the Environment, Conservation and Parks, Administration will bring forward a separate report to Council to have the Storm Drainage Master Plan formally adopted.

Consultations

Financial Services
Planning & Building Services
Dillon Consulting Limited

Financial Implications

In 2017 the Town was successful in receiving approval from the Federation of Canadian Municipalities (FCM) for funding in the amount of up to $175,000 under the Municipalities for Climate Innovation Program (MCIP) for the Town's Storm Drainage Master Plan study.

The 2D modelling and resulting recommended solutions to improve the level of service for the storm infrastructure is anticipated to cost **$106.59M.**

The current allocation to the Storm Sewer Reserves ($902,700) is intended for the replacement of the existing assets and not meant for 'level of service improvements'. There was no significant increase in the Storm Sewer Reserves within the 2019 budget, however it was intended that the 'level of service improvements' may be funded from the New Infrastructure Reserve in the interim. This approach may find storm infrastructure projects competing for funding with other Council initiatives such as the Multi-Use Sportsplex and the Main Street CIP Streetscape project.

Administration has, and will continue to explore other grant funding opportunities for funding of the storm infrastructure projects, including the anticipated second Intake for the Disaster Mitigation and Adaptation Fund (DMAF), the Green Infrastructure Stream under the Investing in Canada Infrastructure Program (ICIP), and the Green Municipal Fund through FCM.

Now that the Storm Drainage Master Plan has been finalized and the recommendations identified, a subsequent report to council will be prepared outlining a funding and phasing strategy.

Link to Strategic Priorities

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

Communications

Not applicable ☒

Website ☐ Social Media ☐ News Release ☐ Local Newspaper ☐

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

Prepared by:

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

Reviewed by:

Tom Kitsos, CPA, CMA, BComm
Director Financial Services & Chief Financial Officer

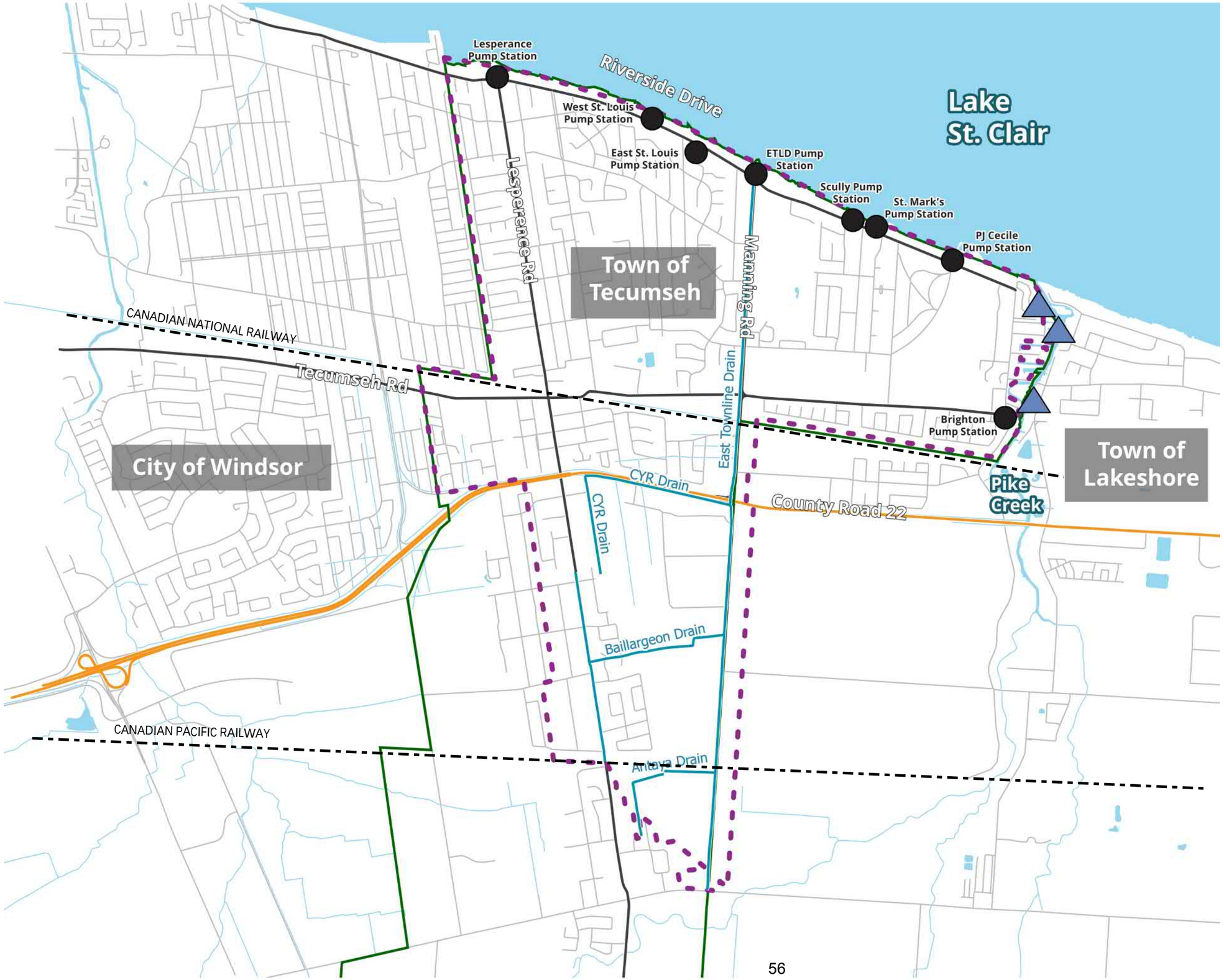
Reviewed by:

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

Recommended by:

Margaret Misek-Evans, MCIP, RPP
Chief Administrative Officer

Attachment Number	**Attachment Name**
1	Study Area and Municipal Drainage Map
2	Storm Pump Station Service Area and Gravity Outfall Map
3	Municipal Class EA Planning and Design Process (Flow Chart)
4	Recommended Solutions Summary Map
5	Storm Drainage Master Plan, Executive Summary
6	June 25, 2019 Special Council Meeting Presentation



TOWN OF TECUMSEH
STORM DRAINAGE MASTER PLAN

STUDY AREA AND MUNICIPAL DRAINAGE MAP
FIGURE 1.1

- SEWER GRAVITY OUTFALLS
- PUMP STATION (PS)
- STUDY BOUNDARY
- RAILWAY
- MUNICIPAL DRAIN
- MUNICIPAL BOUNDARY
- MINOR STREET
- MAJOR STREET
- HIGHWAY

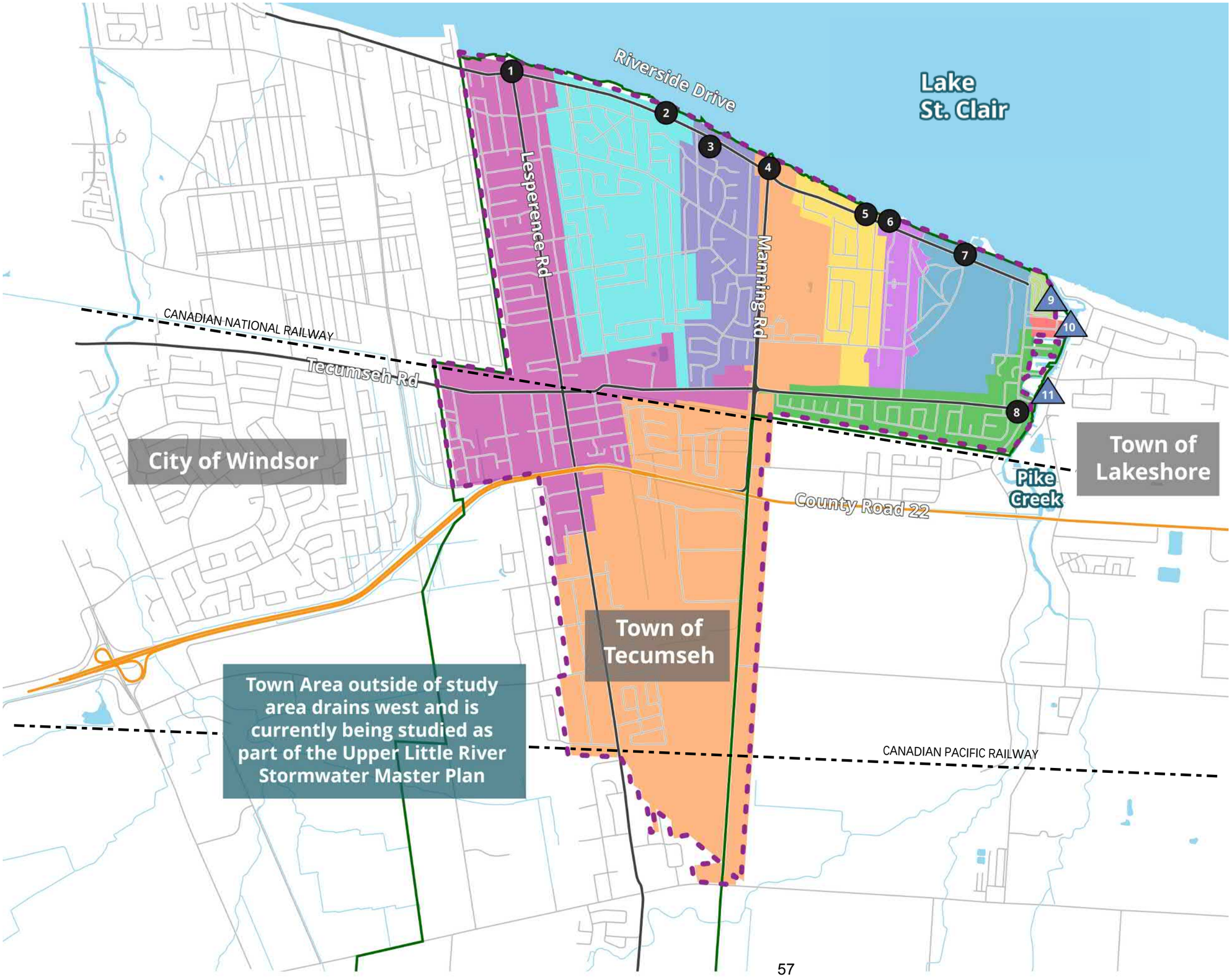
SCALE 1:NTS 2

MAP CREATED BY: SZ
MAP CHECKED BY: RTL
MAP PROJECTION: NAD 1983 UTM Zone 17N

FILE LOCATION: \\DILLON.CA\DILLON_DFS\LONDON\LONDON CAD\GIS\VISUAL COMMUNICATIONS D\MXD TEMPLATES\BEIGE - 11X17 LANDSCAPE - LEGEND RIGHT.MXD

DILLON CONSULTING

PROJECT: 16-4880
STATUS: FINAL
DATE: JUNE 2019



TOWN OF TECUMSEH
STORM DRAINAGE MASTER PLAN

STORM PUMP STATION SERVICE AREA AND GRAVITY OUTFALL MAP
FIGURE 1.2

- SEWER GRAVITY OUTFALLS
- PUMP STATION (PS)
- STUDY BOUNDARY
- RAILWAY
- MUNICIPAL DRAIN
- MUNICIPAL BOUNDARY
- MINOR STREET
- MAJOR STREET
- HIGHWAY

PUMP STATION CATCHMENT AREAS

- 1. LESPERANCE PUMP STATION
- 2. WEST ST. LOUIS PUMP STATION
- 3. EAST ST. LOUIS PUMP STATION
- 4. EAST TOWNLINE DRAIN PUMP STATION
- 5. SCULLY PUMP STATION
- 6. ST. MARK'S PUMP STATION
- 7. PJ CECILE PUMP STATION
- 8. BRIGHTON PUMP STATION

OUTFALL CATCHMENT AREAS

- 9. PILOTS COVER OUTFALL
- 10. SOUTHWIND/STARWOOD OUTFALL
- 11. MEI-LIN OUTFALL

SCALE 1:NTS 2

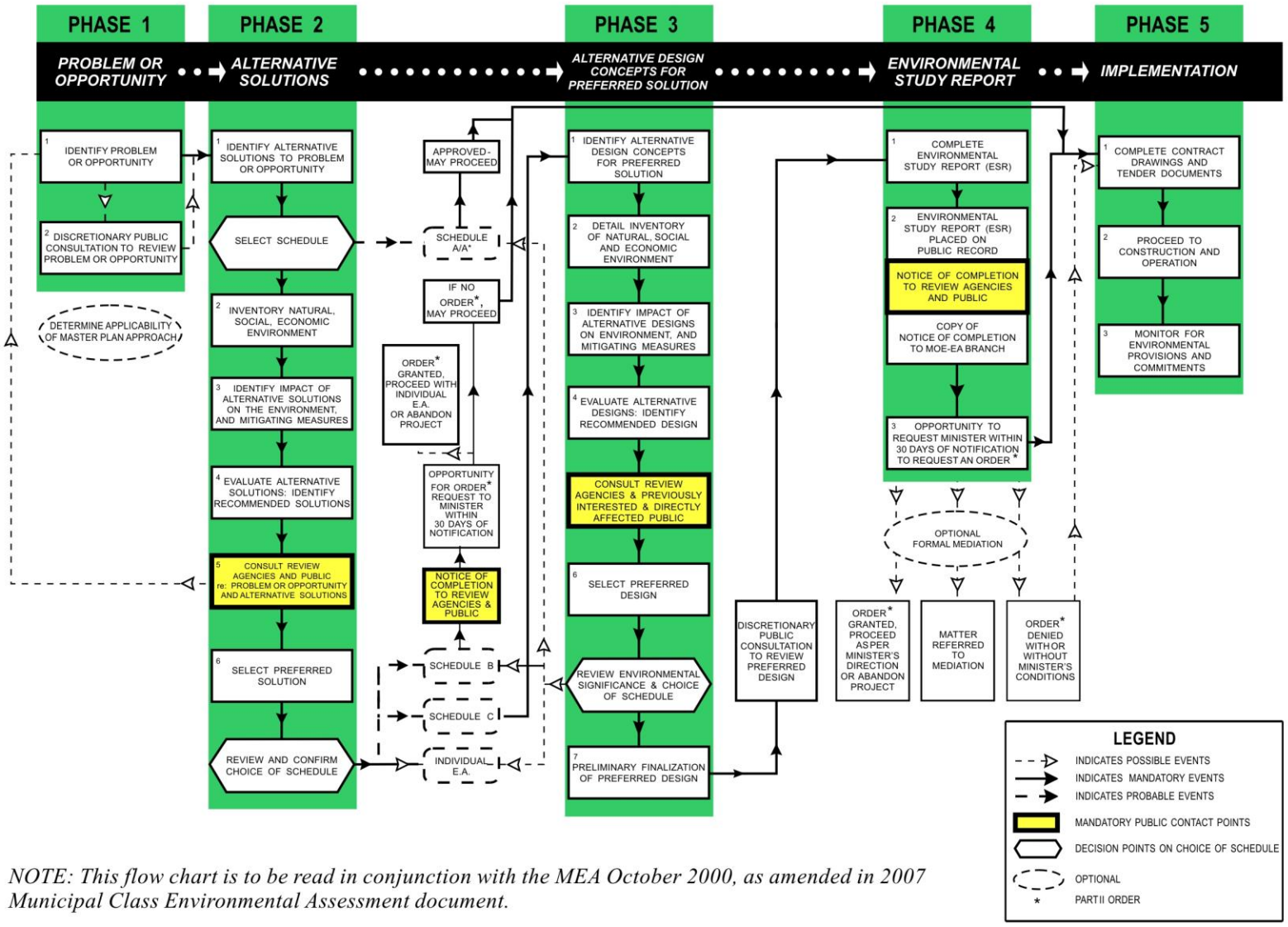
MAP CREATED BY: SZ
MAP CHECKED BY: RTL
MAP PROJECTION: NAD 1983 UTM Zone 17N

FILE LOCATION: \\DILLON.CA\DILLON_DFS\LONDON\LONDON CAD\GIS\VISUAL COMMUNICATIONS D\MXD TEMPLATES\BEIGE - 11X17 LANDSCAPE - LEGEND RIGHT.MXD

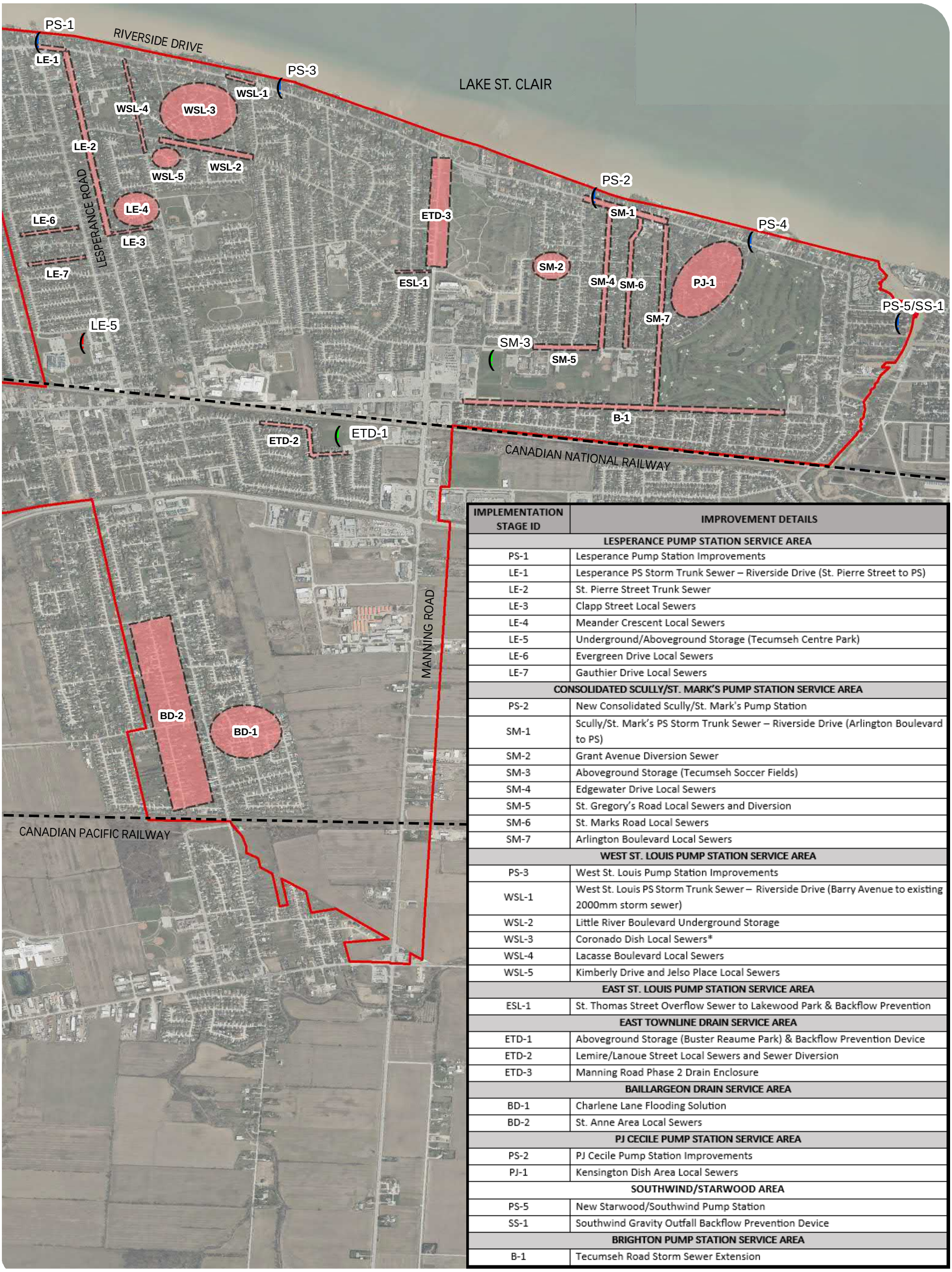
DILLON CONSULTING

PROJECT: 16-4880
STATUS: FINAL
DATE: JUNE 2019

MUNICIPAL CLASS EA PLANNING AND DESIGN PROCESS



NOTE: This flow chart is to be read in conjunction with the MEA October 2000, as amended in 2007 Municipal Class Environmental Assessment document.



IMPLEMENTATION STAGE ID	IMPROVEMENT DETAILS
LESPERANCE PUMP STATION SERVICE AREA	
PS-1	Lesperance Pump Station Improvements
LE-1	Lesperance PS Storm Trunk Sewer – Riverside Drive (St. Pierre Street to PS)
LE-2	St. Pierre Street Trunk Sewer
LE-3	Clapp Street Local Sewers
LE-4	Meander Crescent Local Sewers
LE-5	Underground/Aboveground Storage (Tecumseh Centre Park)
LE-6	Evergreen Drive Local Sewers
LE-7	Gauthier Drive Local Sewers
CONSOLIDATED SCULLY/ST. MARK'S PUMP STATION SERVICE AREA	
PS-2	New Consolidated Scully/St. Mark's Pump Station
SM-1	Scully/St. Mark's PS Storm Trunk Sewer – Riverside Drive (Arlington Boulevard to PS)
SM-2	Grant Avenue Diversion Sewer
SM-3	Aboveground Storage (Tecumseh Soccer Fields)
SM-4	Edgewater Drive Local Sewers
SM-5	St. Gregory's Road Local Sewers and Diversion
SM-6	St. Marks Road Local Sewers
SM-7	Arlington Boulevard Local Sewers
WEST ST. LOUIS PUMP STATION SERVICE AREA	
PS-3	West St. Louis Pump Station Improvements
WSL-1	West St. Louis PS Storm Trunk Sewer – Riverside Drive (Barry Avenue to existing 2000mm storm sewer)
WSL-2	Little River Boulevard Underground Storage
WSL-3	Coronado Dish Local Sewers*
WSL-4	Lacasse Boulevard Local Sewers
WSL-5	Kimberly Drive and Jelso Place Local Sewers
EAST ST. LOUIS PUMP STATION SERVICE AREA	
ESL-1	St. Thomas Street Overflow Sewer to Lakewood Park & Backflow Prevention
EAST TOWNLINE DRAIN SERVICE AREA	
ETD-1	Aboveground Storage (Buster Reaume Park) & Backflow Prevention Device
ETD-2	Lemire/Lanoue Street Local Sewers and Sewer Diversion
ETD-3	Manning Road Phase 2 Drain Enclosure
BAILLARGEON DRAIN SERVICE AREA	
BD-1	Charlene Lane Flooding Solution
BD-2	St. Anne Area Local Sewers
PJ CECILE PUMP STATION SERVICE AREA	
PS-2	PJ Cecile Pump Station Improvements
PJ-1	Kensington Dish Area Local Sewers
SOUTHWIND/STARWOOD AREA	
PS-5	New Starwood/Southwind Pump Station
SS-1	Southwind Gravity Outfall Backflow Prevention Device
BRIGHTON PUMP STATION SERVICE AREA	
B-1	Tecumseh Road Storm Sewer Extension

TOWN OF TECUMSEH
STORM DRAINAGE MASTER PLAN

RECOMMENED SOLUTIONS SUMMARY MAP
FIGURE 12.1

PUMP STATION IMPROVEMENTS
ABOVE GROUND STORAGE
ABOVE/ UNDERGROUND STORAGE
STUDY AREA
STORM DRAINAGE AND INFRASTRUCTURE IMPROVEMENTS
RAILWAY

MAP CREATED BY: SZ
MAP CHECKED BY: RTL
MAP PROJECTION: NAD 1983 UTM Zone 17N

FILE LOCATION: \\DILLON.CA\DILLON_DFS\LONDON\LONDON CAD\GIS\VISUAL COMMUNICATIONS DI\MXD TEMPLATES\BEIGE - 11X17 LANDSCAPE - LEGEND BOTTOM.MXD

SCALE 1:NTS

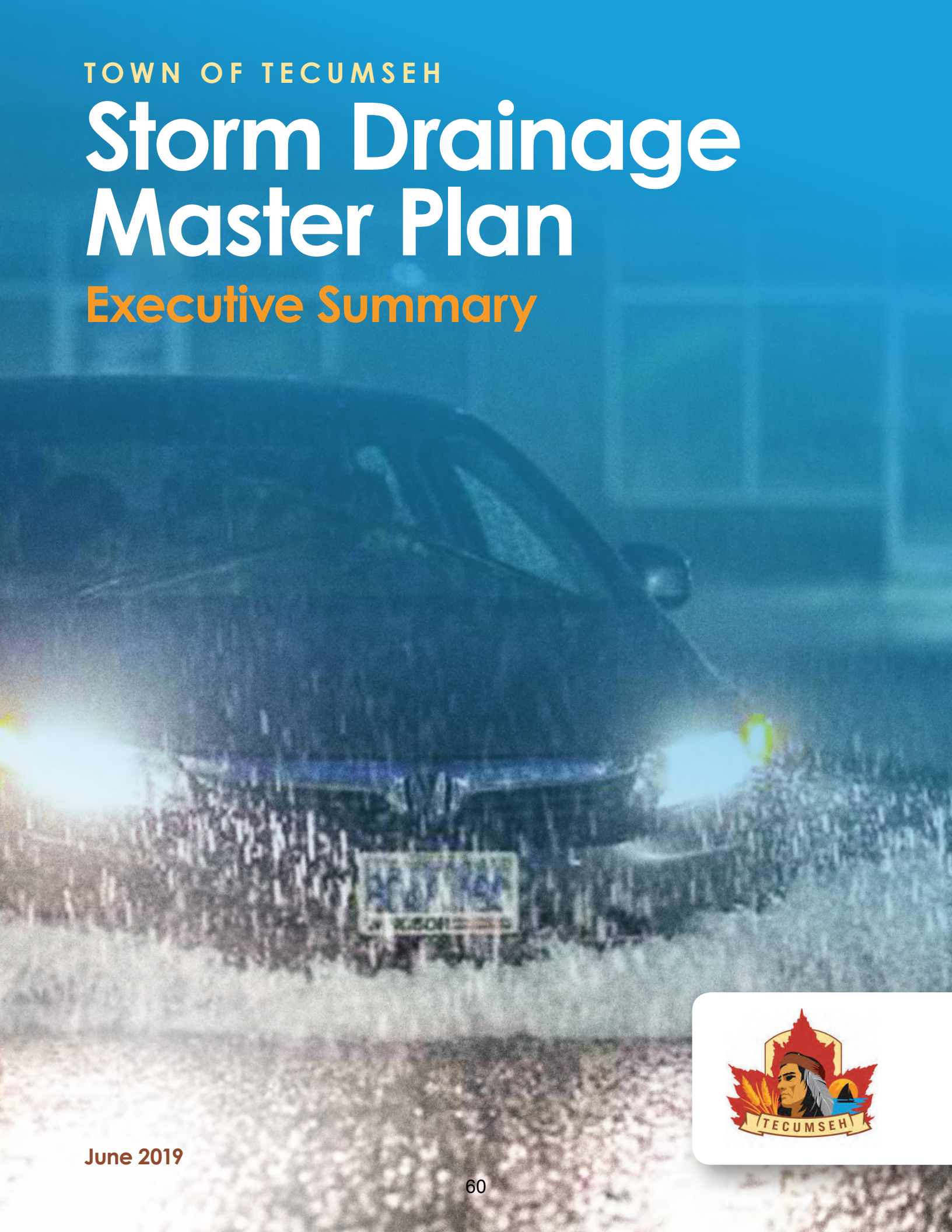
2

PROJECT: 16-4880 STATUS: FINAL DATE: JUNE 2019

TOWN OF TECUMSEH

Storm Drainage Master Plan

Executive Summary



June 2019

Welcome to the Storm Drainage Master Plan

The Town of Tecumseh has experienced several significant storm events over the years that have resulted in widespread surface and basement flooding. In order to build on the Town's previous studies and the ongoing infrastructure improvements that have been completed, the Town has undertaken this storm drainage Master Plan to confirm the long-term storm drainage infrastructure solutions that are required to address the risks of surface flooding in the northern urban communities, as shown below.

This storm drainage Master Plan followed an approach that allowed several specific projects to meet the applicable Schedule B Municipal Class Environmental Assessment requirements.

This executive summary document is intended to provide a summary of the findings and recommendations of the Town's storm drainage Master Plan. Further details are available in the Master Plan Environmental Assessment report, to which the blue dots with page numbers included below refer for each related section.

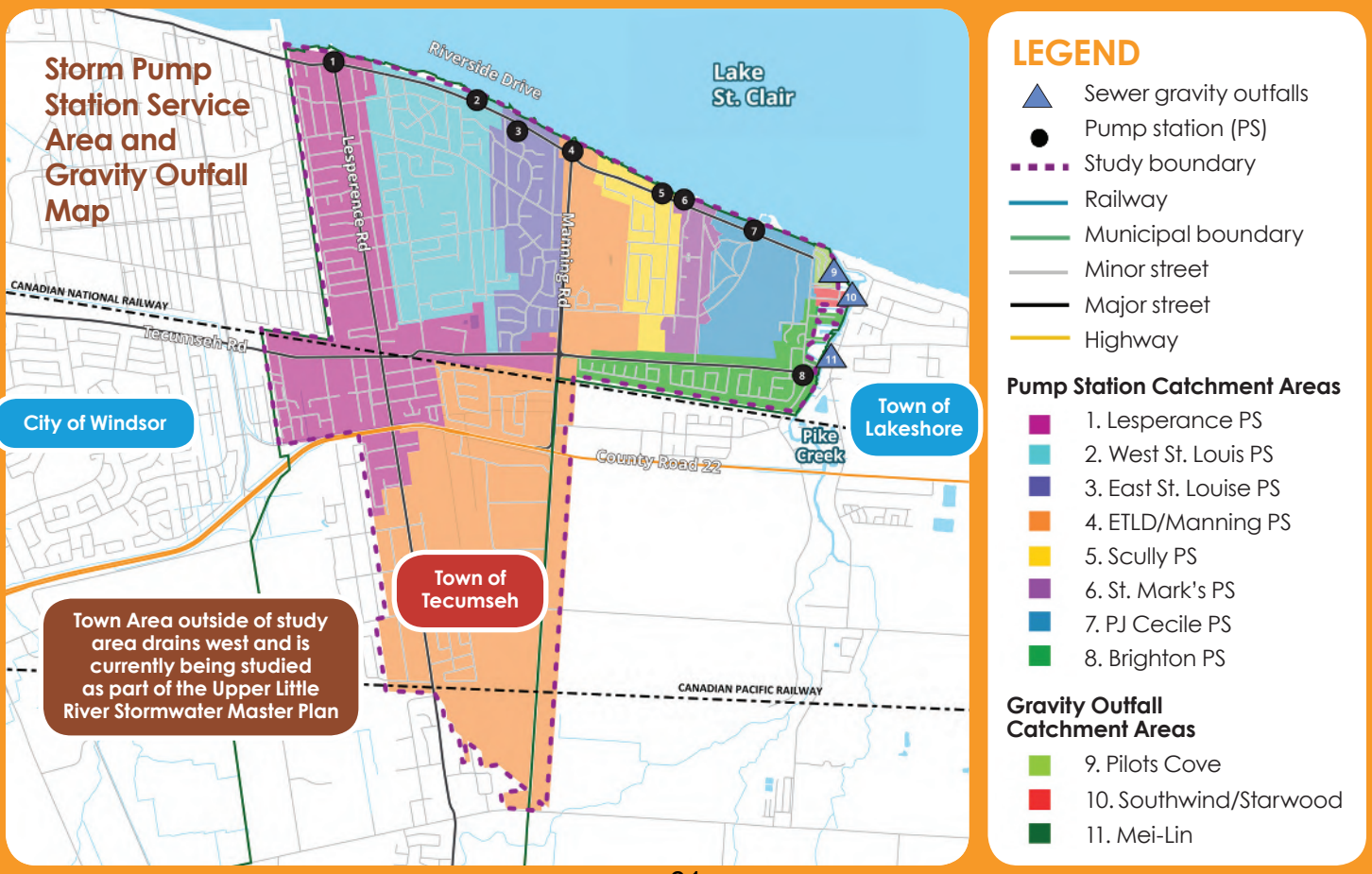


Table of Contents

Background

Page 1, 6

Over a 24-hour period, between September 28 and 29, 2016, an extreme rainfall event hit the region, which overwhelmed the existing storm sewer system and storm pump stations. This led to widespread surface flooding along roadways and private property. The surface flooding made vehicular traffic impassable in many areas. The flooding also overwhelmed the municipal sanitary system, leading to extensive basement flooding. **Following this extreme rainfall event, the Town initiated this Storm Drainage Master Plan process.**

Why a Master Plan?

Page 10

The Master Plan **identifies impacts of surface flooding on the mainly urbanized residential areas of the Town, and outlines a strategy to improve municipal infrastructure to better handle similar events in the future**. This includes reviewing storm pump stations, gravity outfalls and the respective service areas minor (sewer) and major (roadway) systems discharging to Lake St. Clair and Pike Creek. The Master Plan process includes the following:

- Confirm factors contributing to surface flooding
- Determine surface flooding problem areas
- Identify future development and incorporate into modelling
- Identify and evaluate alternative solutions
- Simulate effects of climate change to develop resilient solutions
- Confirm recommended solutions
- Develop long-term implementation strategy

Municipal Class Environmental Assessment (EA) Process

Page 5

Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Problem or Opportunity	Alternative Solutions	Alternative Design Concepts for Preferred Solution	Environmental Study Report	Implementation
Optional Consultation	*Mandatory Consultation*	*Mandatory Consultation*	*Mandatory Consultation*	*Optional Consultation*
Schedule B Projects Master Plans	Schedule B Projects Master Plans			Schedule B Projects

Phases 1 and 2 of the Master Plan are being completed following Approach No. 2 of the Municipal Class Environmental Assessment (EA) master planning process to address any Schedule B projects (2000, as amended). The purpose of a Master Plan is to outline long-term servicing objectives for a geographic area that will be implemented over a period of time. This Storm Drainage Master Plan identifies a number of projects that are classified as Schedule B projects under the Class EA process. Schedule B projects include "improvements and minor expansions to existing facilities" on public or private property that have "potential for adverse environmental impacts" and require consultation with those potentially affected by the project.

Public Engagement at a Glance

Page 42

Engagement Opportunities

- Email updates
- Website
- Public, agency & Indigenous Community consultation events & meetings
- Social Media

60 attendees at two Public Information Centres

Indigenous Community Consultation, including one meeting with Aamjiwnaang First Nation

Comments include concerns over localized surface/ basement flooding, and water quality, and comments in support of the solutions proposed.

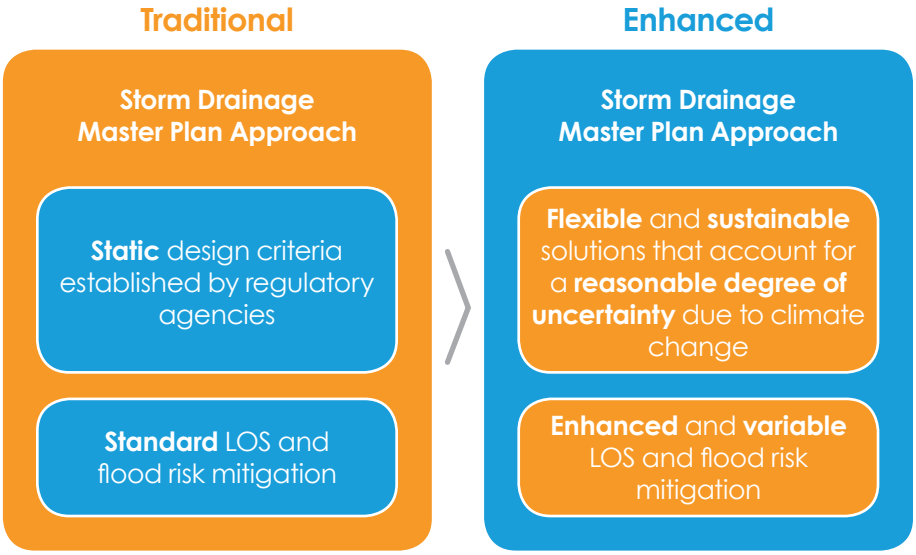
26 comments received from the public

7 meetings held with residents directly impacted by pump station improvements and surface flooding solutions which impact private property

Levels of Service (LOS)

Page 15

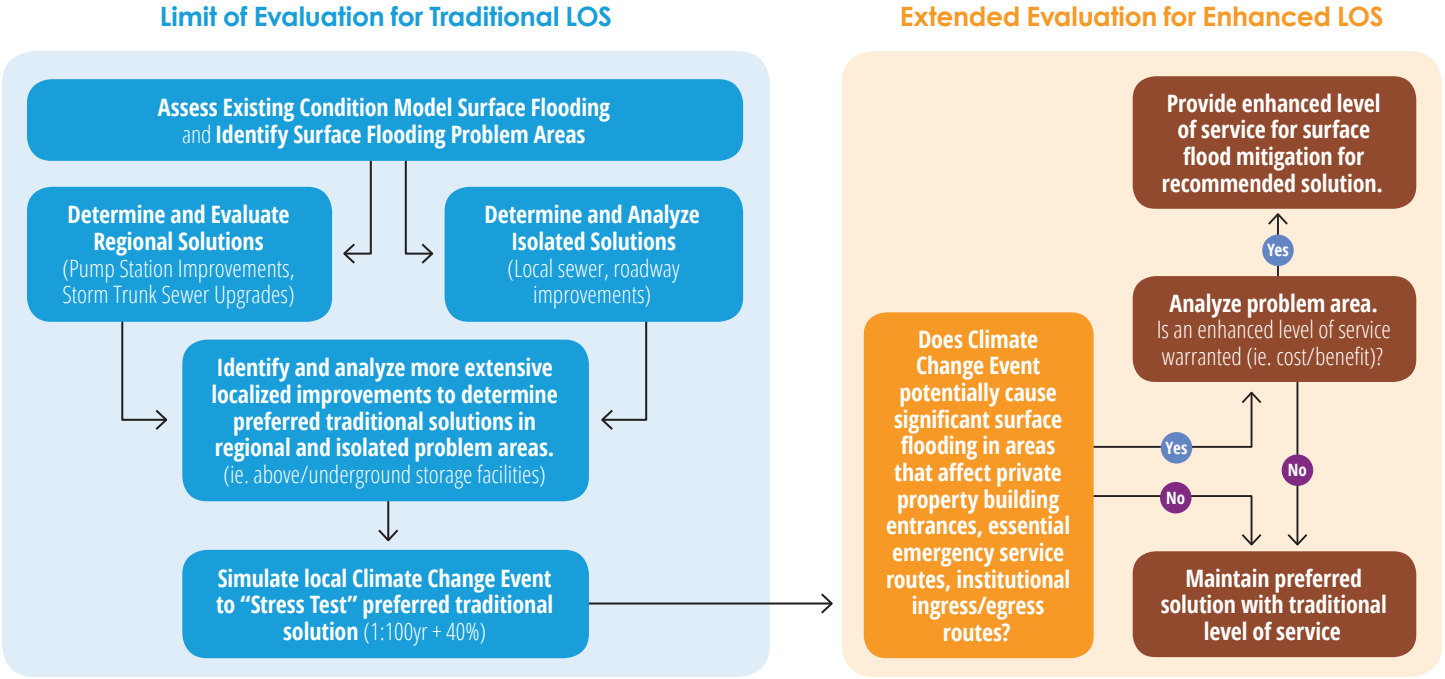
In developing alternative solutions, the design level of service applied is based **on local surface flooding conditions**. In some instances, a traditional approach is applied, which involves meeting the requirements of regulatory agencies. In other instances, an enhanced approach is applied that accounts for climate change considerations, adding more resiliency to the storm system.

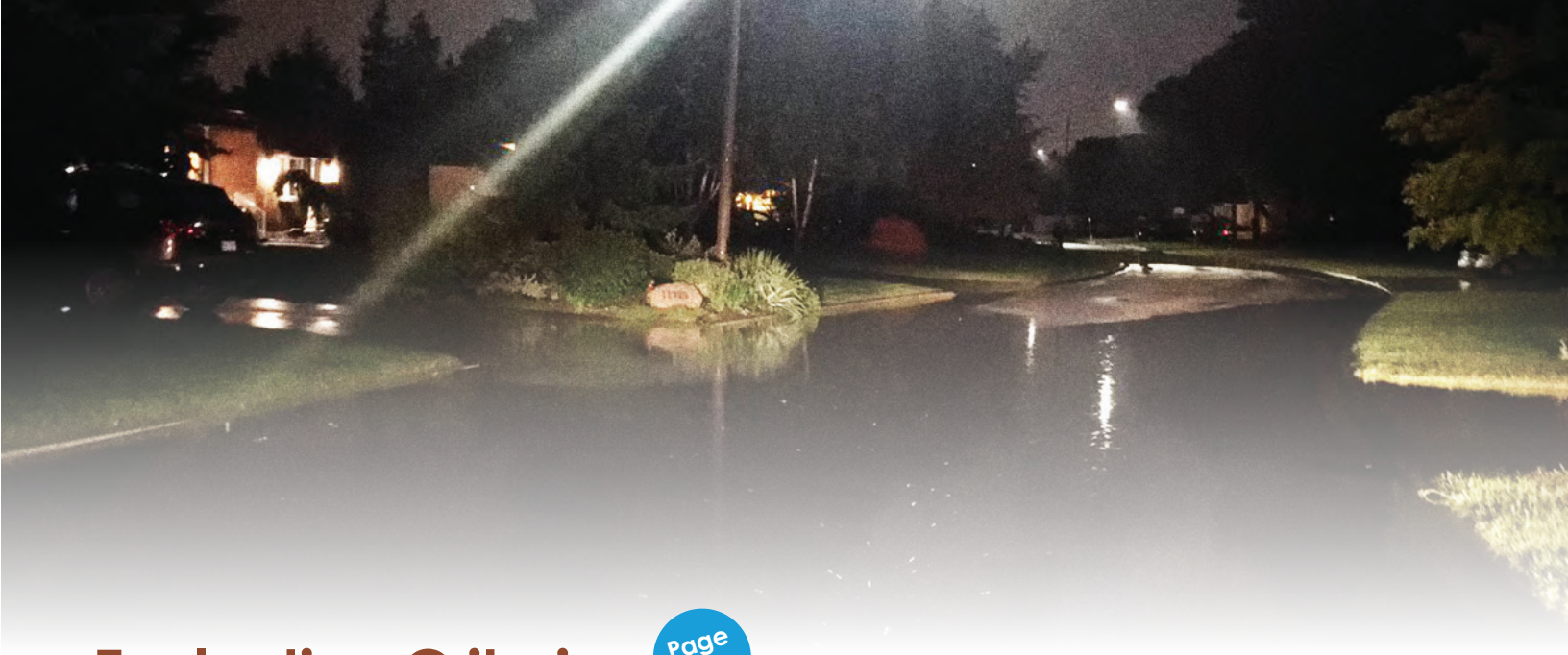


Decision-making Framework

Page 16

A surface flooding solution decision framework outlines an approach to developing solutions that **address both the required LOS and added resiliency for each surface flooding problem area**, as appropriate. It determines the scope of the preferred design solution and identifies the appropriate LOS to suit the risks and vulnerability of the area. Below illustrates the decision process used to determine the level of design for the preferred solutions. The design process includes a climate change analysis of the proposed design in areas where surface flooding is more problematic.





Evaluation Criteria

Page 17

As part of the decision making process, a comparative evaluation of the alternative solutions was completed for each problem area identified. The evaluation criteria included:

Addresses Study Problem/ Opportunity Statement

If the alternative does not address the objective, it was not considered further.

Impact on Minor System (sewers) drainage

Ability to increase flow conveyance during minor storm events.

Impact on Major system (overland) drainage

Ability to enhance flow routing and reduce ponding.

Ease of construction and implementation

Based on technical, regulatory and constructability considerations. Alternatives that are easier to construct/ implement are preferred.

Future land uses

Potential to accommodate infill development in developed areas.

Impact on urban community

Potential for disruption or displacement of existing residents, greenspace/ recreational use.

Natural Environment

Potential for significant negative impacts on terrestrial and aquatic resources, including Species at Risk.

Archaeological resources

Potential to impact lands with archaeological resources.

Built Heritage resources

Potential impacts on built heritage and/or cultural heritage resources

Capital cost

Relative capital costs, including restoration/enhancement for alternative. Cost effective alternatives are preferred.

Alternative Solutions & Roadway/Sewer Reconstruction Improvement Areas

Page 20

The study area was divided into smaller service areas based on existing storm pump station areas. After analysis of the regional surface problem areas, a number of alternatives were developed.

1) Lesperance Pump Station Service Area

1) Do nothing
2) Improve Lesperance Trunk Sewer & Pump Station
3) New St. Pierre Trunk Sewer & improve Pump Station
4) New St. Pierre Trunk Sewer and improve existing Lesperance Trunk Sewer and Pump Station

2) West St. Louis Pump Station Service Area

1) Do nothing
2) West St. Louis Pump Station improvements

3) Scully, St. Mark's Pump Station Service Area

1) Do nothing
2) Scully, St. Mark's & PJ Cecile Pump Station upgrades
3) Consolidated Scully/St. Mark's Pump Station & PJ Cecile Pump Station upgrades
4) Consolidated Scully/ St. Mark's/PJ Cecile Pump Station upgrades

4) PJ Cecile Pump Station Service Area

1) Do nothing
2) Improve existing pump station with alternative locations

5) New Southwind Cres. Pump Station

1) Do nothing
2) Construct a new pump station with alternative locations

6) St. Gregory's Road

1) Do nothing
2) Create surface storage area at the existing northern soccer fields
3) Underground storage along St. Gregory's Rd. within the municipal right-of-way

7) Buster Reaume Park

1) Do nothing
2) Create surface storage area within Buster Reaume Park and redirect Lemire/ Lanoue storm sewers to parkland stormwater system and maintain outlet into existing CN Railway Ditch.
3) Underground storage along Lemire St. and Lanoue St. within the right-of-way

8) Tecumseh Centre Park

1) Do nothing
2) Create surface storage area in existing green space within Tecumseh Centre Park and construct an underground storage system

9) East St. Louis/East Townline Drain Pump Station Service Areas

1) Do nothing
2) Connect storm sewer overflow along St. Thomas Street to Lakewood Park Drainage Channel
3) Connect storm sewer overflow along St. Thomas Street to proposed local Manning Road sewer
4) East St. Louis Pump Station improvements and trunk storm sewer upgrades

11) Baillargeon Drain Service Area

1) Do nothing
2) Create storm relief sewer along Charlene Lane connecting to future development area trunk sewer
3) Underground storage along Charlene Lane, St Martin Crescent and St Agnes Crescent municipal right-of-way

Future Areas for Roadway and Sewer Reconstruction

1) Coronado Dish Area
3) Arlington Boulevard, Edgewater Boulevard and St. Marks Road
4) Kensington Dish Area
9) Manning Road Phase 2 Drain Enclosure
10) Tecumseh Road Storm Sewer Extension
11) St. Anne Area

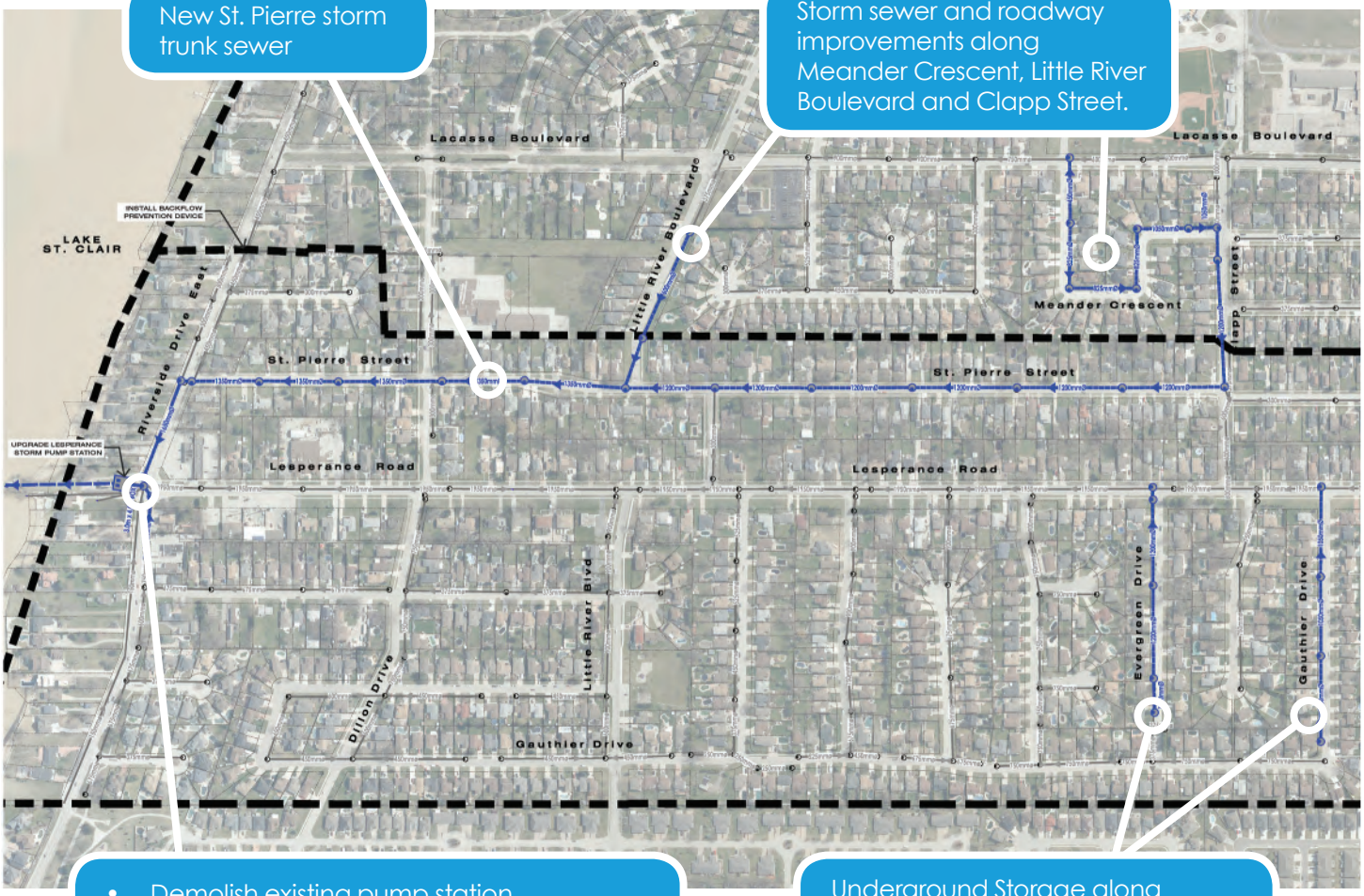
Alternative Solutions Location Map

Preferred Solutions

Page 33

The following summarizes the preferred solutions to address regional surface flooding.

1) Lesperance Pump Station Service Area



- Demolish existing pump station
- New larger capacity pump station equipped with vertical submersible axial flow pumps
- Modify existing outfall to accommodate increased pump station capacity
- Install backflow prevention device at Lesperance/West St. Louis service area storm interconnection

Underground Storage along Evergreen Drive and Gauthier Drive

LEGEND

- Proposed manhole
- 450mmØ — Proposed storm sewer
- Proposed catch basin
- Existing manhole
- 1200mm — Existing storm sewer
- Pump Station service area boundary

2) West St. Louis Pump Station Service Area

- Leave existing pump station in service
- Increase capacity of the pump station with an expansion to the east

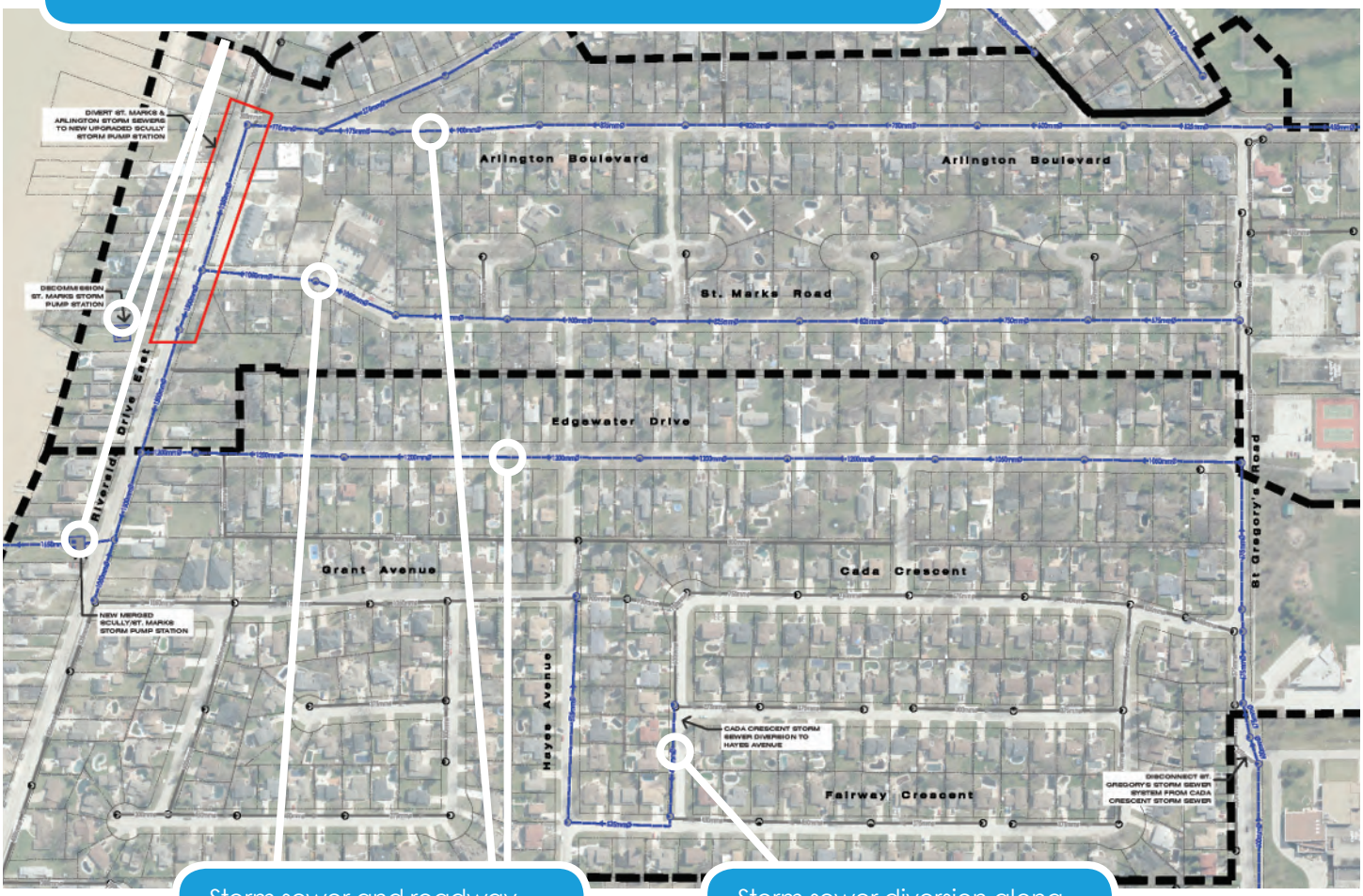
Storm sewer and roadway improvements along Coronado Dish area, Lacasse Boulevard, Little River Boulevard and Kimberly Drive and Jelso Place

LEGEND

- Proposed manhole
- 450mmØ — Proposed storm sewer
- Proposed catch basin
- Existing manhole
- 1200mm — Existing storm sewer
- Pump Station service area boundary

3) Scully, St. Mark's Pump Station Service Area

- Decommission St. Mark's pump station and construct a new pump station at the Scully pump station site to handle flow from a consolidated service area
- Locate station north of the existing structure. New inlet, outfall pipe, and expanded outfall structure required.



Storm sewer and roadway improvements along Arlington Boulevard, St. Mark's Road, Edgewater Drive, St.Gregory's Road and Riverside Drive.

Storm sewer diversion along Cada Crescent to Hayes Avenue.

LEGEND

- Proposed manhole
- 450mmØ — Proposed storm sewer
- Proposed catch basin
- Existing manhole
- 100mmØ — Existing storm sewer
- Pump Station service area boundary

4) PJ Cecile Pump Station Service Area

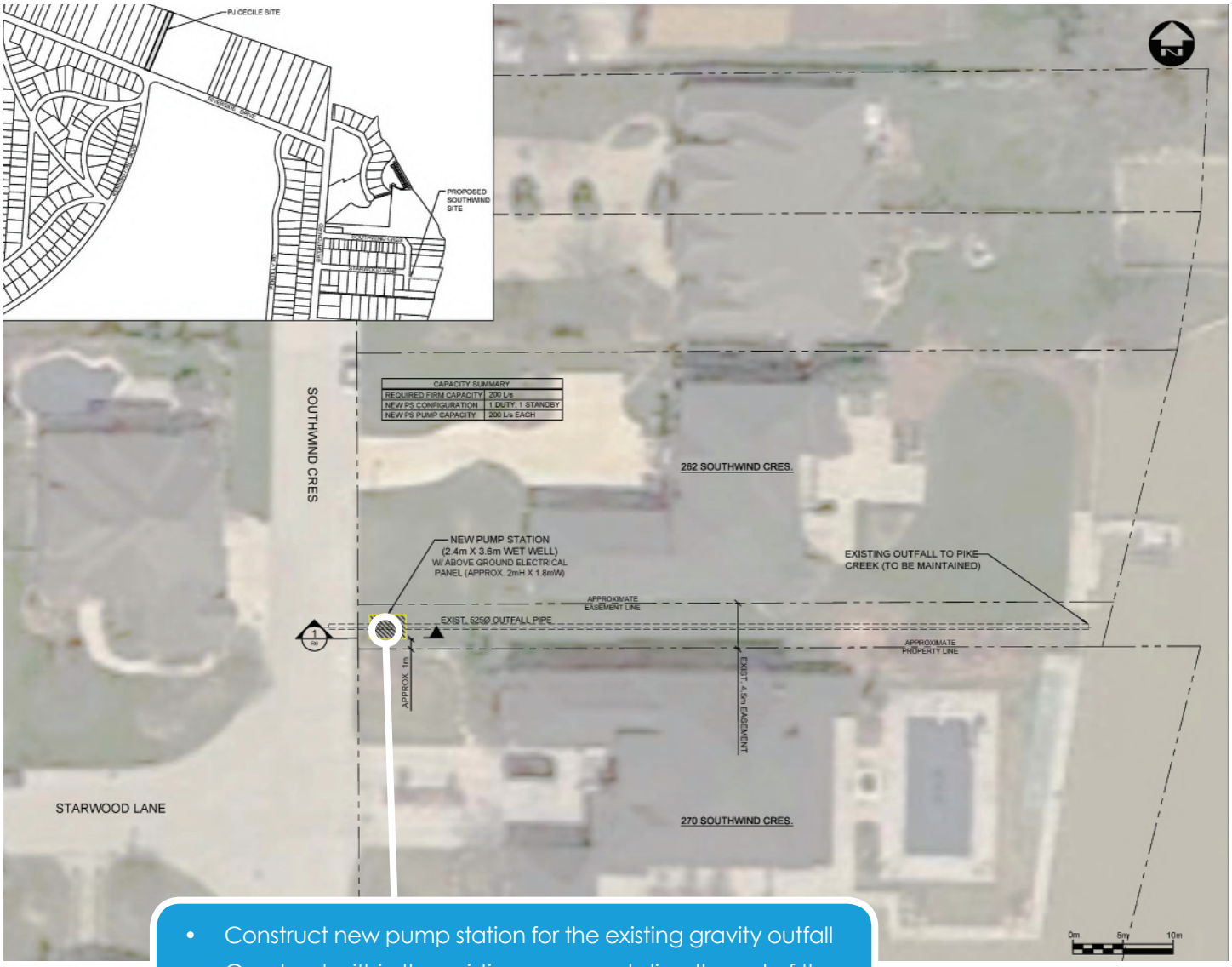
- Construct a new pump station at the PJ Cecile site over the footprint of the existing structure
- Install new outfall pipe to increase flow capacity
- Extend new outfall to northern end of the jetty bank
- Replace inlet pipe with a larger diameter pipe in the existing alignment

Storm sewer and roadway improvements along Kensington Dish Area

LEGEND

- Proposed manhole
- 450mmØ — Proposed storm sewer
- Proposed catch basin
- Existing manhole
- 1200mmØ — Existing storm sewer
- Pump Station service area boundary

5) New Southwind Crescent Pump Station



- Construct new pump station for the existing gravity outfall
- Construct within the existing easement directly east of the Southwind right-of-way
- Maintain existing outfall pipe

6) St. Gregory's Road

Depress northern portion of Tecumseh Soccer Fields Park by 0.70m to provide approximately 3,200 m^3 of aboveground surface storage

LEGEND

- Proposed manhole
- 450mmø — Proposed storm sewer
- Proposed catch basin
- Existing manhole
- 100mmø — Existing storm sewer
- Pump Station service area boundary
- Roadway grading improvements
- Depressed area

7) Buster Reaume Park

Redirect Lemire and Lanoue Street storm sewers to Buster Reaume Park stormwater facility.

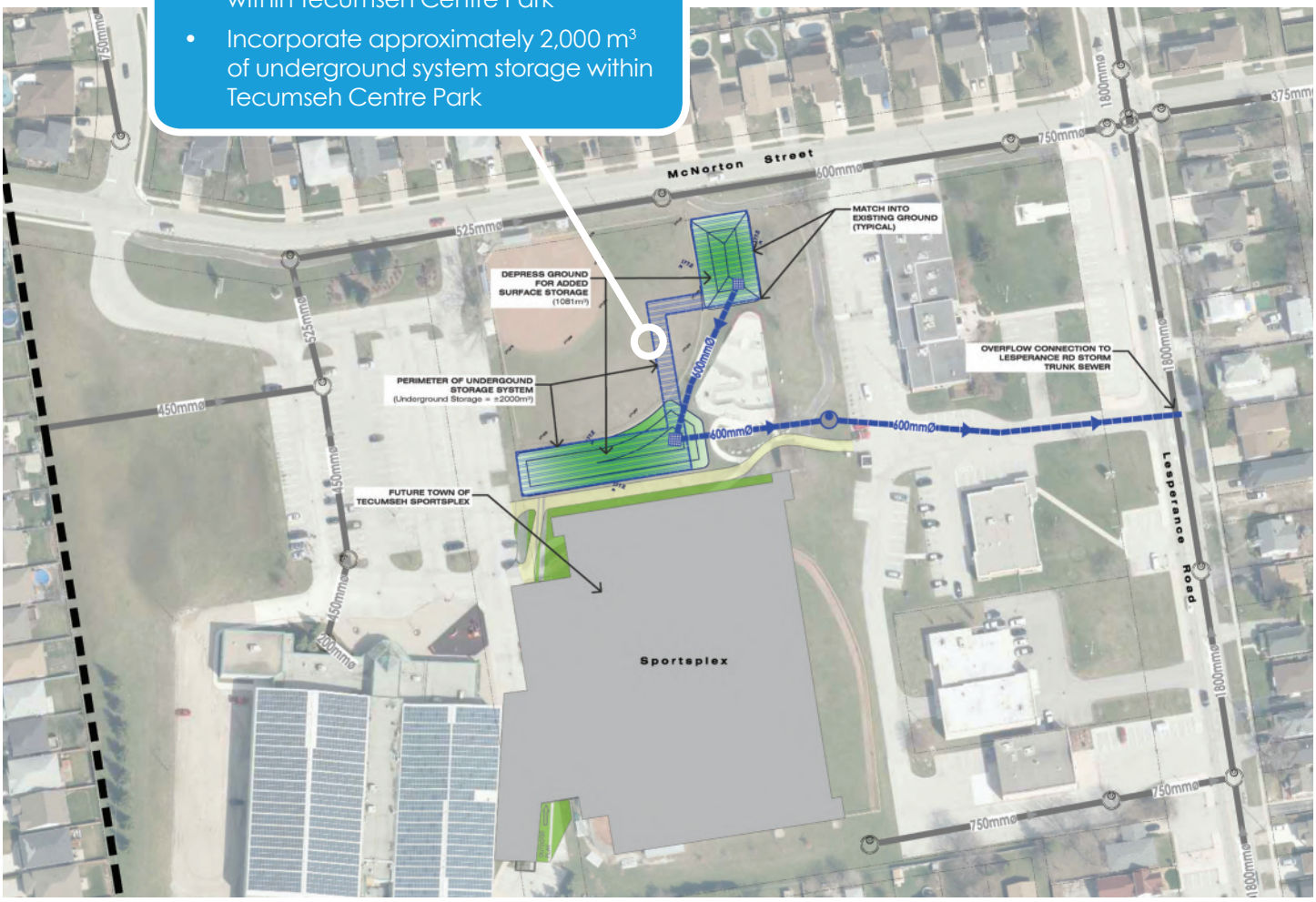
Depress southwestern portion of Buster Reaume Park by 0.80m to provide approximately 4,100 m3 of aboveground surface storage with a connection to the upgraded municipal storm sewers.

LEGEND

- Proposed manhole
- 450mmØ — Proposed storm sewer
- Proposed catch basin
- Existing manhole
- 100mmØ — Existing storm sewer
- Pump Station service area boundary
- Roadway grading improvements
- Depressed area

8) Tecumseh Centre Park

- Construct a depression for approximately 1,080 m^3 of surface storage behind Tecumseh Town Hall within Tecumseh Centre Park
- Incorporate approximately 2,000 m^3 of underground system storage within Tecumseh Centre Park



LEGEND

- Proposed manhole
- 450mmØ — Proposed storm sewer
- Proposed catch basin
- Existing manhole
- 100mmØ — Existing storm sewer
- Pump Station service area boundary
- Roadway grading improvements
- Depressed area
- Underground Storage Chambers

9) East St. Louis/East Townline Drain Pump Station Service Areas

Incorporate storm sewer overflow for existing storm sewer along St. Thomas Street to Lakewood Park Drainage Channel via proposed box culvert (to be constructed as part of Manning Road Phase 2 Drain Enclosure).

- Enclosure of East Townline Drain between existing culvert outlet north of St. Gregory's Road to proposed outlet at St. Thomas Street to Lakewood Park Drainage Channel.
- Construction of a local storm sewer system servicing Manning Road residential properties, between Riverside Drive and St. Thomas Street.

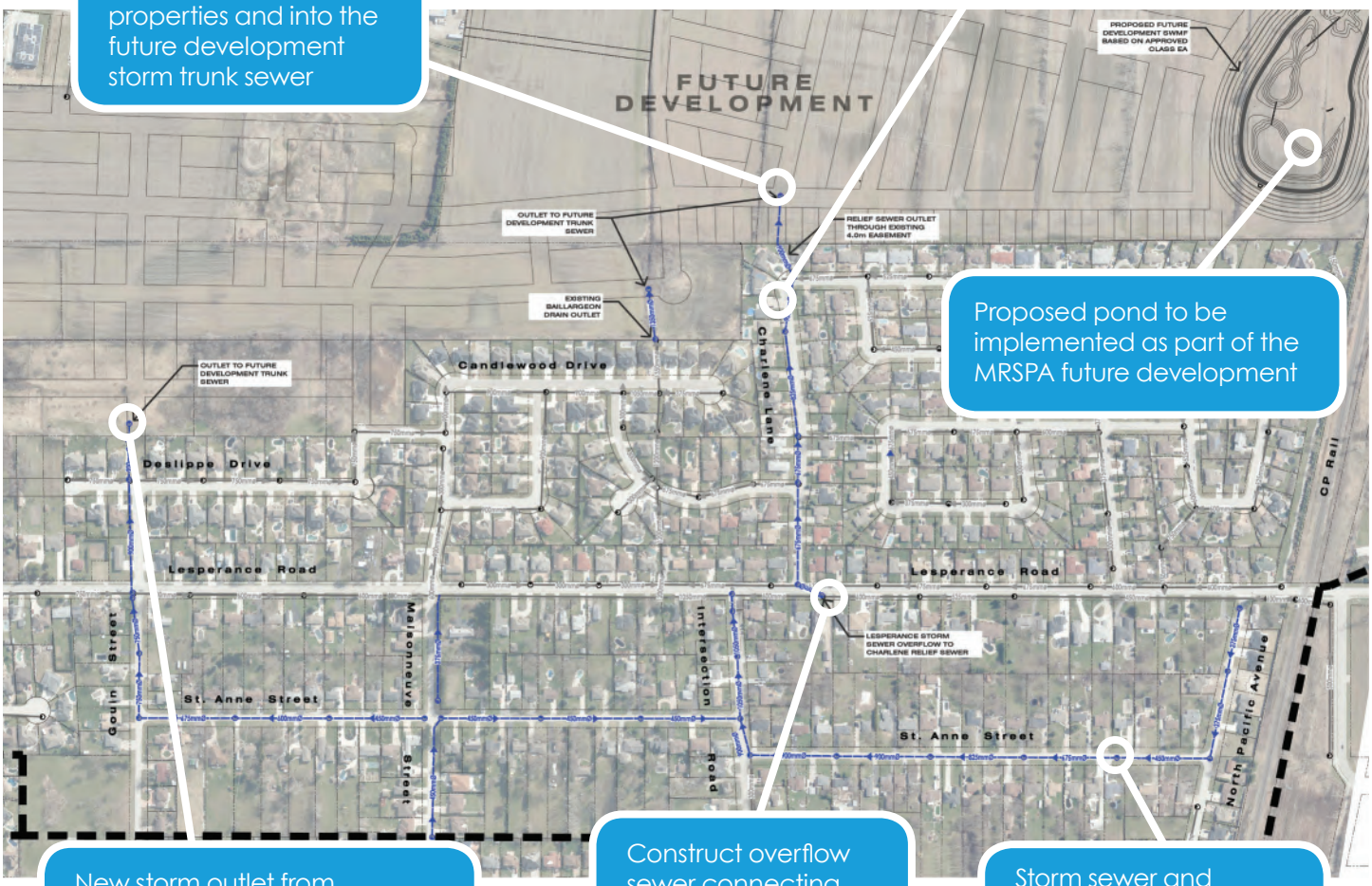
10) Tecumseh Road Storm Sewer Extension

Enclosure of the Tecumseh Road Ditch and Storm Sewer Extension from existing stub west of D.M. Eagle School.

11) Baillargeon Drain Service Area (Option 1)

Construct relief sewer outlet through the existing storm easement between two residential properties and into the future development storm trunk sewer

Construct storm sewer along Charlene Lane to intercept storm sewer runoff east of Lesperance Road and south of Charlene Lane from the existing residential lands



Proposed pond to be implemented as part of the MRSPA future development

New storm outlet from Gouin Street into the future development storm trunk sewer

Construct overflow sewer connecting Charlene relief sewer from the Lesperance storm sewer system

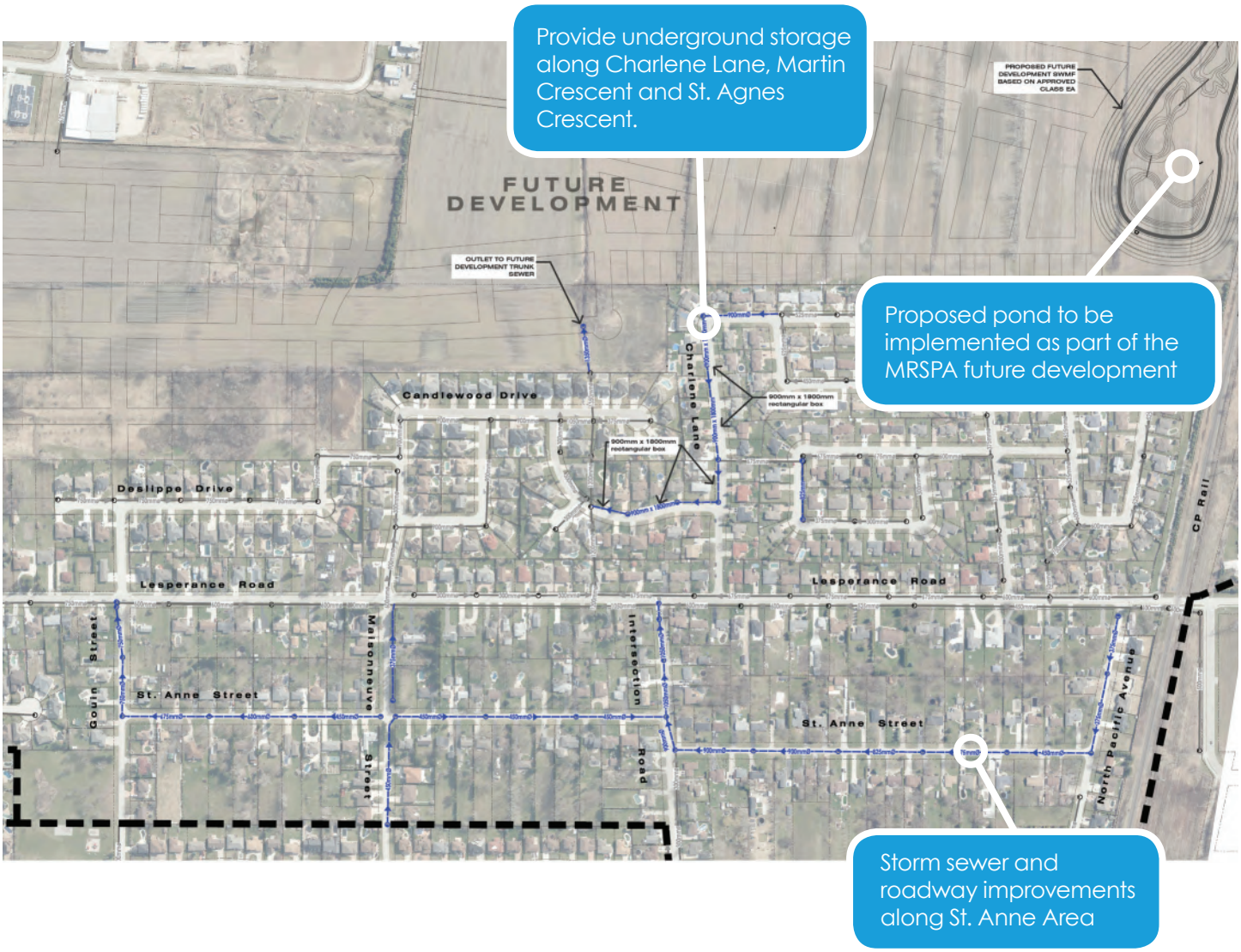
Storm sewer and roadway improvements along St. Anne Area

LEGEND

- Proposed manhole
- 450mmØ — Proposed storm sewer
- Proposed catch basin
- Existing manhole
- 100mm — Existing storm sewer
- Pump Station service area boundary

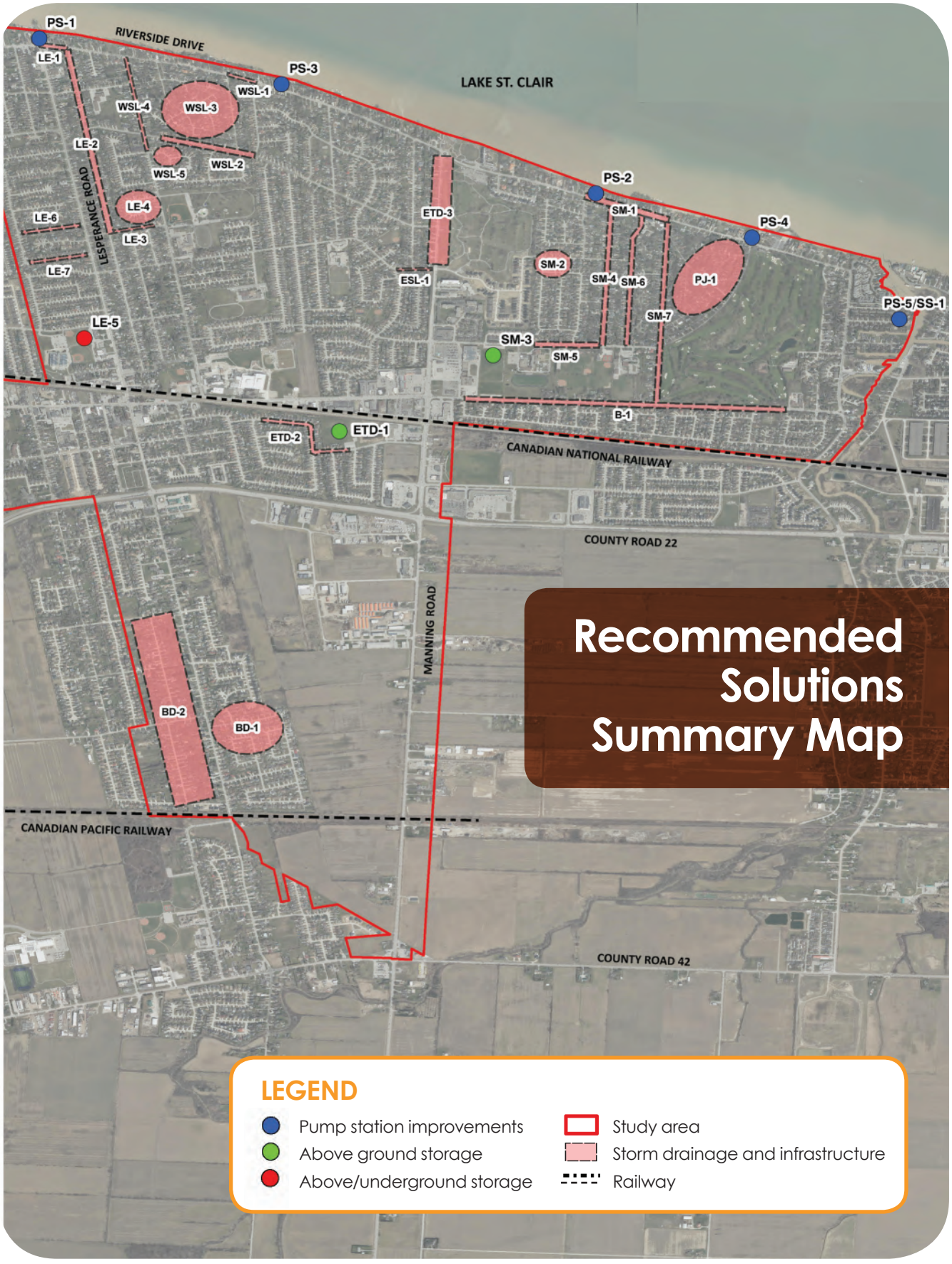
11) Baillargeon Drain Service Area (Option 2)

Alternative 1 is considered the preferred for this area, but is entirely dependent on agreements with the land owners and developers of the future development lands. Alternative 2 is presented as a secondary recommended option.



LEGEND

- Proposed manhole
- 450mmØ — Proposed storm sewer
- Proposed catch basin
- Existing manhole
- 1200mm — Existing storm sewer
- Pump Station service area boundary



Recommended Solutions Summary Map

Estimated Capital Costs

Page 38

The recommended surface flooding solutions outlined within this document have been designed to a functional level of detail. Cost estimates for all the recommended infrastructure solutions are outlined below.

Project Code	Recommended Solution	Estimated Construction Cost & Contingency	Engineering	Total
LESPERANCE PUMP STATION SERVICE AREA				
PS-1	Lesperance Pump Station Improvements+	$14.30M	$2.43M	$16.73M
LE-1	Lesperance PS Storm Trunk Sewer – Riverside Drive (St. Pierre Street to PS)	$1.30M	$0.22M	$1.52M
LE-2	St. Pierre Street Trunk Sewer	$3.93M	$0.67M	$4.60M
LE-3	Clapp Street Local Sewers	$0.64M	$0.11M	$0.75M
LE-4	Meander Crescent Local Sewers	$0.90M	$0.15M	$1.05M
LE-5	Underground/Aboveground Storage (Tecumseh Centre Park)+	$3.21M	$0.55M	$3.76M
LE-6	Evergreen Drive Local Sewers	$0.93M	$0.16M	$1.09M
LE-7	Gauthier Drive Local Sewers	$0.88M	$0.15M	$1.03M
	SUBTOTAL =	**$26.09M**	**$4.44M**	**$30.53M**
CONSOLIDATED SCULLY/ST. MARK'S PUMP STATION SERVICE AREA				
PS-2	New Consolidated Scully/St. Mark's Pump Station+	$9.88 M	$1.68M	$11.56M
SM-1	Scully/St. Mark's PS Storm Trunk Sewer – Riverside Drive (Arlington Boulevard to PS)	$1.63M	$0.28M	$1.91M
SM-2	Grant Avenue Diversion Sewer	$0.58M	$0.10M	$0.68M
SM-3	Aboveground Storage (Tecumseh Soccer Fields)+	$0.25M	$0.04M	$0.29M
SM-4	Edgewater Drive Local Sewers	$2.22M	$0.38M	$2.60M
SM-5	St. Gregory's Road Local Sewers and Diversion	$0.68M	$0.12M	$0.80M
SM-6	St. Marks Road Local Sewers	$1.83M	$0.31M	$2.14M
SM-7	Arlington Boulevard Local Sewers	$2.34M	$0.40M	$2.74M
	SUBTOTAL =	**$19.39M**	**$3.31M**	**$22.70M**
WEST ST. LOUIS PUMP STATION SERVICE AREA				
PS-3	West St. Louis Pump Station Improvements+	$7.15M	$1.21M	$8.36M
WSL-1	West St. Louis PS Storm Trunk Sewer – Riverside Drive (Barry Avenue to existing 2000mm storm sewer)	$1.72M	$0.30M	$2.02M
WSL-2	Little River Boulevard Underground Storage	$2.24M	$0.38M	$2.62M
WSL-3	Coronado Dish Local Sewers*	$5.14M	$0.88M	$6.02M
WSL-4	Lacasse Boulevard Local Sewers	$0.98M	$0.17M	$1.15M
WSL-5	Kimberly Drive and Jelso Place Local Sewers	$0.73M	$0.05M	$0.78M
	SUBTOTAL =	**$17.96M**	**$2.99M**	**$20.95M**
EAST ST. LOUIS PUMP STATION SERVICE AREA				
ESL-1	St. Thomas Street Overflow Sewer to Lakewood Park & Backflow Prevention	$0.62M	$0.10M	$0.72M
	SUBTOTAL =	**$0.62M**	**$0.10M**	**$0.72M**

Project Code	Recommended Solution	Estimated Construction Cost & Contingency	Engineering	Total
EAST TOWNLINE DRAIN SERVICE AREA				
ETD-1	Aboveground Storage (Buster Reaume Park)+ and Backflow Prevention Device	$0.18M	$0.03M	$0.21M
ETD-2	Lemire/Lanoue Street Local Sewers and Sewer Diversion	$1.46M	$0.25M	$1.71M
ETD-3	Manning Road Phase 2 Drain Enclosure	$3.70M	$0.63M	$4.33M
	SUBTOTAL =	**$5.34M**	**$0.91M**	**$6.25M**
BAILLARGEON DRAIN SERVICE AREA (OPTION 1)				
BD-1	Charlene Lane Flooding Solution (Governing Cost - Option 2)	$3.00M	$0.51M	$3.51M
BD-2	St. Anne Area Local Sewers*	$3.60M	$0.62M	$4.22M
	SUBTOTAL =	**$6.60M**	**$1.13M**	**$7.73M**
PJ CECILE PUMP STATION SERVICE AREA				
PS-4	PJ Cecile Pump Station Improvements+	$7.02M	$1.20M	$8.22M
PJ-1	Kensington Dish Area Local Sewers	$3.96M	$0.68M	$4.64M
	SUBTOTAL =	**$10.98 M**	**$1.88M**	**$12.86M**
SOUTHWIND/STARWOOD AREA				
PS-5/SS-1	New Starwood/Southwind Pump Station+ and Backflow Prevention Device	$0.90M	$0.15M	$1.05M
	SUBTOTAL =	**$0.90M**	**$0.15M**	**$1.05M**
BRIGHTON PUMP STATION SERVICE AREA				
B-1	Tecumseh Road Storm Sewer Extension	$3.25M	$0.55M	$3.80M
	SUBTOTAL =	**$3.25M**	**$0.55M**	**$3.80M**
	TOTAL =	**$91.13M**	**$15.46M**	**$106.59M**

Costing Notes:

Storm Sewer Infrastructure Improvements

- Include removal and restoration of one lane width.
- Exclude full roadway reconstruction and the potential for utility relocation.

Pump Station Improvements

- Include costs for flow control chambers, temporary pipes and pumps, decommissioning and demolishing of old stations and costing for new outfalls or improvements to existing outfalls.

Construction costs include 30% contingency, Engineering costs include 15% engineering and 2% Geotechnical Investigations

All estimated costs above exclude applicable taxes

*Lumped areas for storm sewer reconstruction have the potential to be phased to implement upstream solutions earlier

No Property Acquisition is expected at this time for any improvements listed above

Schedule B Class EA Projects *(indicated above with +)*
1. Lesperance Storm Pump Station Improvements
2. West St. Louis Storm Pump Station Improvements
3. New Consolidated Scully/St. Mark's Storm Pump Station
4. PJ Cecile Storm Pump Station Improvements
5. New Southwind Crescent Storm Pump Station
6. Surface storage within the "Tecumseh Soccer Fields" Park at École Secondaire L'Essor
7. Surface Storage within Buster Reaume Park
8. Surface and Underground Storage within Tecumseh Centre Park

Next Steps

Page 53

The following studies, design and approval requirements will be required for the implementation of the recommended solutions:

- **Updates to the recommended solutions based on any future developments (greenfield or infill) not assessed within this study that could impact the design of each solution;**
- **Detailed design of all recommended improvements;**
- **Environmental Compliance Approvals from the Ministry of Environment, Conservation and Parks (MECP);**
- **Essex Region Conservation Authority and municipal permitting and approvals; and**
- **Other regulatory approvals, as required.**

For more information contact:

Phil Bartnik, P.Eng.
Director Public Works
& Environmental Services
Ph: (519) 735-2184 ext. 148
Fax: (519) 735-6712
Email: pbartnik@tecumseh.ca

Town of Tecumseh
917 Lesperance Road
Tecumseh, Ontario, N8N 1W9

TECUMSEH STORM DRAINAGE MASTER PLAN

Presentation To Town of Tecumseh Council

Tuesday, June 25, 2019

DILLON CONSULTING

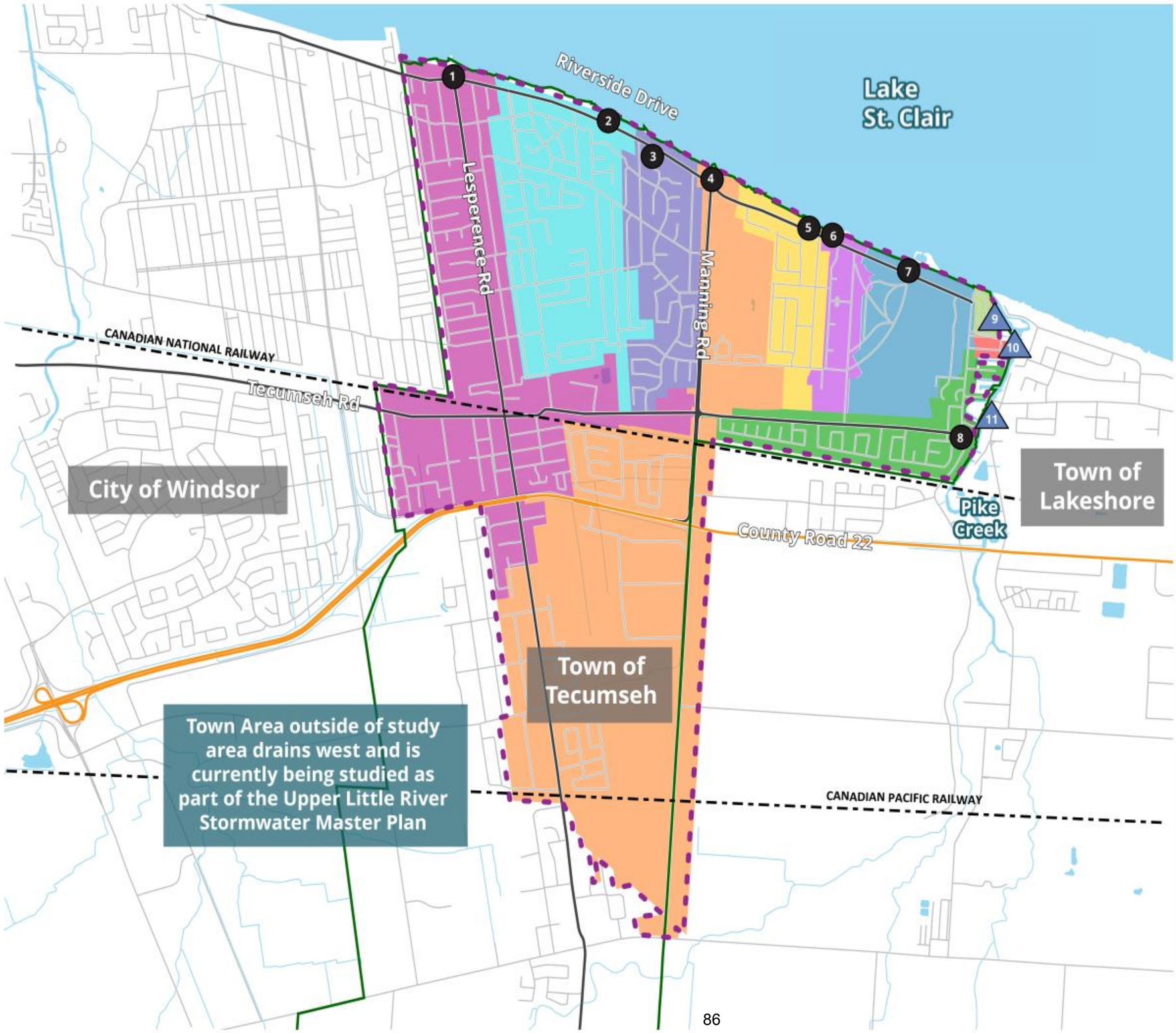
TECUMSEH OM

Welcome

Council Presentation Objectives

- **IDENTIFY AND OUTLINE** why and how the study was completed
- **PROVIDE** background information and existing condition surface flooding results
- **PRESENT** the decision making process and preferred surface flooding solutions
- **SUMMARIZE** the next steps in finalizing the study

Study Storm Outlets and Service Areas



TOWN OF Tecumseh
ONTARIO · CANADA

TOWN OF TECUMSEH
STORM DRAINAGE MASTER PLAN

STORM PUMP STATION SERVICE AREA AND GRAVITY OUTFALL MAP
FIGURE 1.2

- SEWER GRAVITY OUTFALLS
- PUMP STATION (PS)
- STUDY BOUNDARY
- RAILWAY
- MUNICIPAL DRAIN
- MUNICIPAL BOUNDARY
- MINOR STREET
- MAJOR STREET
- HIGHWAY

PUMP STATION CATCHMENT AREAS

1. LESPERANCE PUMP STATION
2. WEST ST. LOUIS PUMP STATION
3. EAST ST. LOUIS PUMP STATION
4. ETLD/MANNING PUMP STATION
5. SCULLY PUMP STATION
6. ST. MARK'S PUMP STATION
7. PJ CECILE PUMP STATION
8. BRIGHTON PUMP STATION

OUTFALL CATCHMENT AREAS

9. PILOTS COVER OUTFALL
10. SOUTHWIND/STARWOOD OUTFALL
11. MEI-LIN OUTFALL

SCALE 1:NTS

MAP CREATED BY: SZ
MAP CHECKED BY: RTL
MAP PROJECTION: NAD 1983 UTM Zone 17N

FILE LOCATION: \\DILLON.CA\DILLON_DFS\LONDON\LONDON CAD\GIS\VISUAL COMMUNICATIONS D\MXD TEMPLATES\BEIGE - 11X17 LANDSCAPE - LEGEND RIGHT.MXD

DILLON CONSULTING

PROJECT: 16-4880
STATUS: FINAL
DATE: JUNE 2019

Problem and Opportunity Statement

The Town of Tecumseh completed a Storm Drainage Master Plan to address the impacts of **surface flooding** on the communities that currently discharge storm water to Lake St. Clair and Pike Creek.

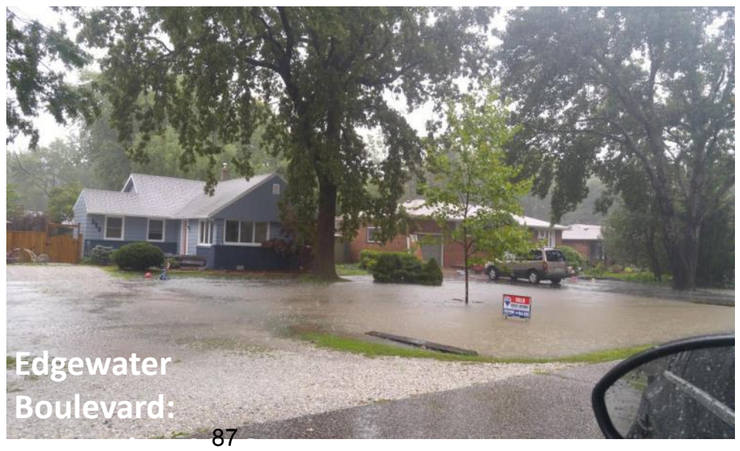
The Master Plan was developed to:

- Confirm the factors contributing to excess surface flooding resulting from significant storm events;
- Identify and evaluate alternative solutions to reduce the risk and impacts of surface flooding;
- Confirm the recommended solutions; and
- Prepare cost estimates and outline a recommended long-term implementation strategy.

Little River Boulevard:
September 2016

Pentilly Road:
September 2016

St. Gregory's Road:
September 2016



Edgewater
Boulevard:

Grace Road:
September 2016

Study Process, Schedule, and Scope

Master Plan

The Master Plan followed the requirements of **Approach 2** of the Municipal Class Environmental Assessment (EA) (2000, as amended), which satisfies the requirements for specific **Schedule B** projects.

The Class EA process ensures:

- All relevant social, environmental and engineering factors are considered in the planning and design process; and
- Public and agency input is integrated into the decision making process.

This study does not address:

- Basement flooding resulting from sanitary sewer surcharging, which the Town of Tecumseh has been addressing separately through other studies, initiatives, and subsidy programs; and
- Surface flooding due to high Lake Levels, which is to be addressed in a future study outlined within the Town's Flood Mitigation Strategy.

Public and Agency Consultations

Engagement Opportunities

- Email updates
- Website
- Public, agency & Indigenous Community consultation events & meetings
- Social Media

60 attendees at two Public Information Centres

Indigenous Community Consultation, including one meeting with Aamjiwnaang First Nation

Comments include concerns over localized surface/ basement flooding, and water quality, and comments in support of the solutions proposed.

26 comments received from the public

7 meetings held with residents directly impacted by pump station improvements and surface flooding solutions which impact private property

Public Information Centre Summary

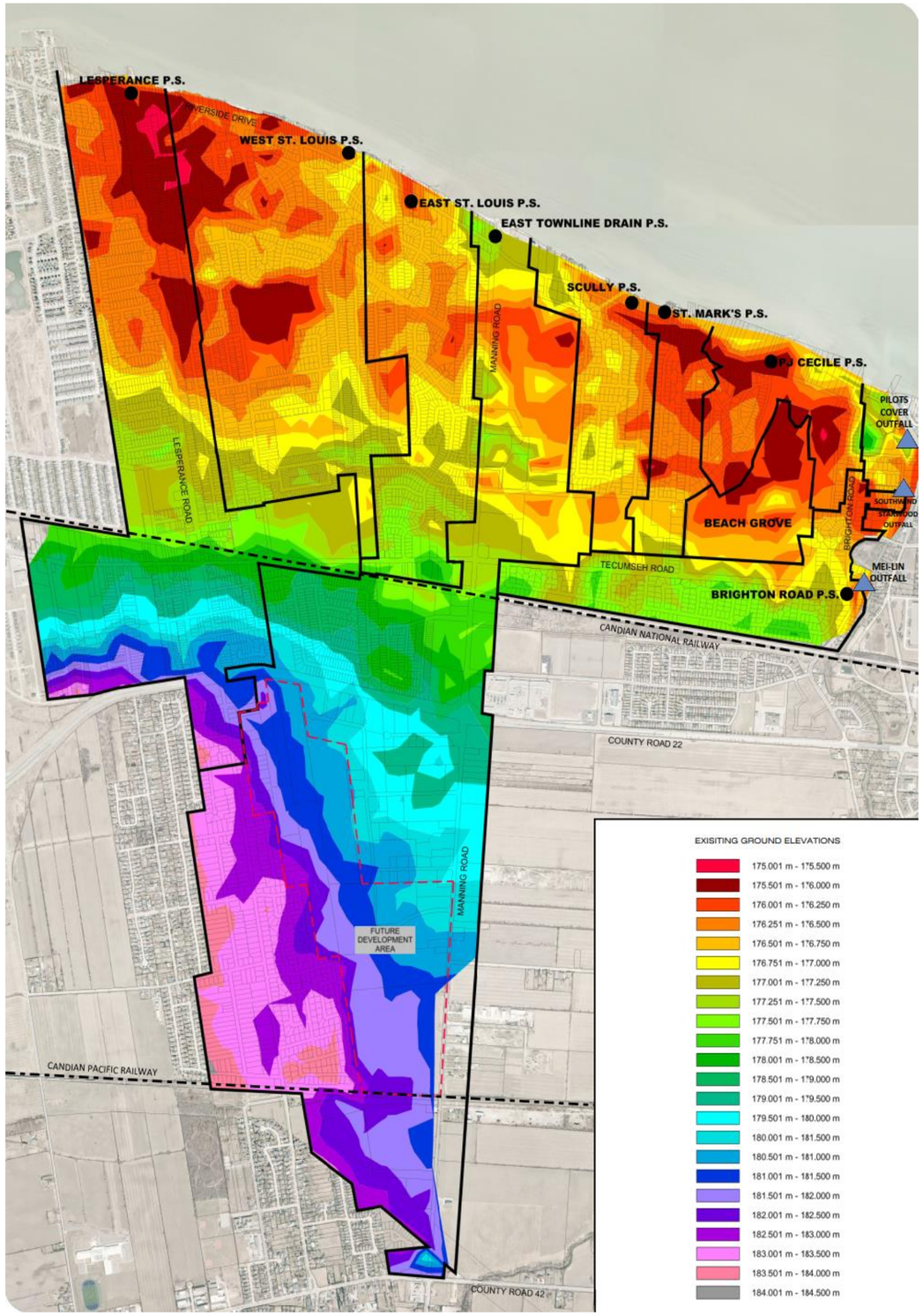
During Public Information Centre #1 & #2, residents were informed about:

- Causes of surface and basement flooding;
- Areas susceptible to surface flooding based on existing conditions;
- Steps being taken to resolve surface flooding;
- Identification of alternative and preferred solutions;

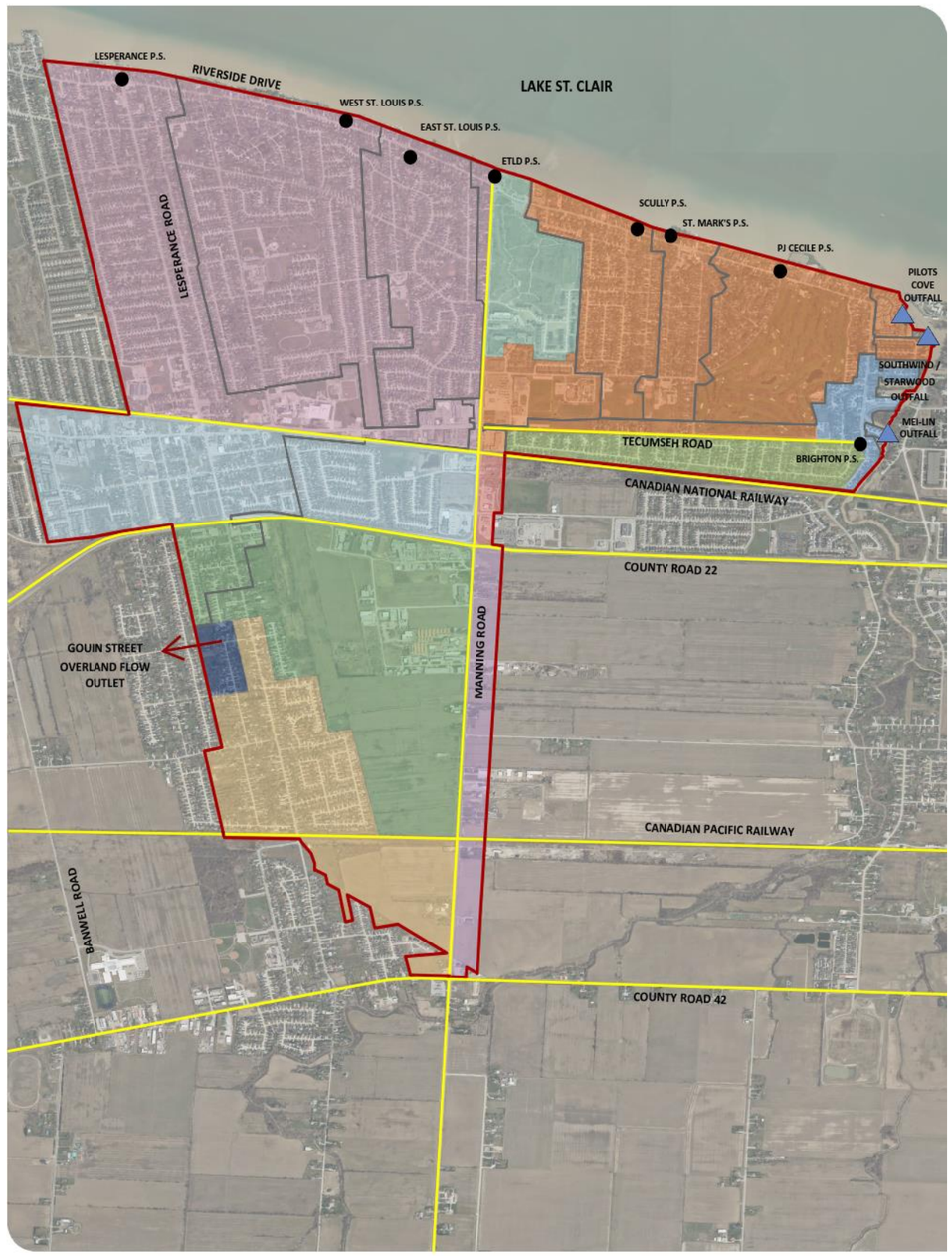
Strategies to alleviate surface flooding include:

- Above ground and underground storage;
- Improved pump station capacity;
- Improved storm sewer capacity; and
- Surface grading improvements.

Topography/Overland Drainage



Topographic LiDAR Map



Overland Flow Barrier Landforms

Model Development Overview

Dillon developed a 1-Dimensional/2-Dimensional storm drainage model of the study area using PCSWMM software and state of the art topographic ground point technology to:

- Identify the extent of surface flooding under extreme rainfall events; and
- Determine alternative solutions to reduce the risk and impact of surface flooding.

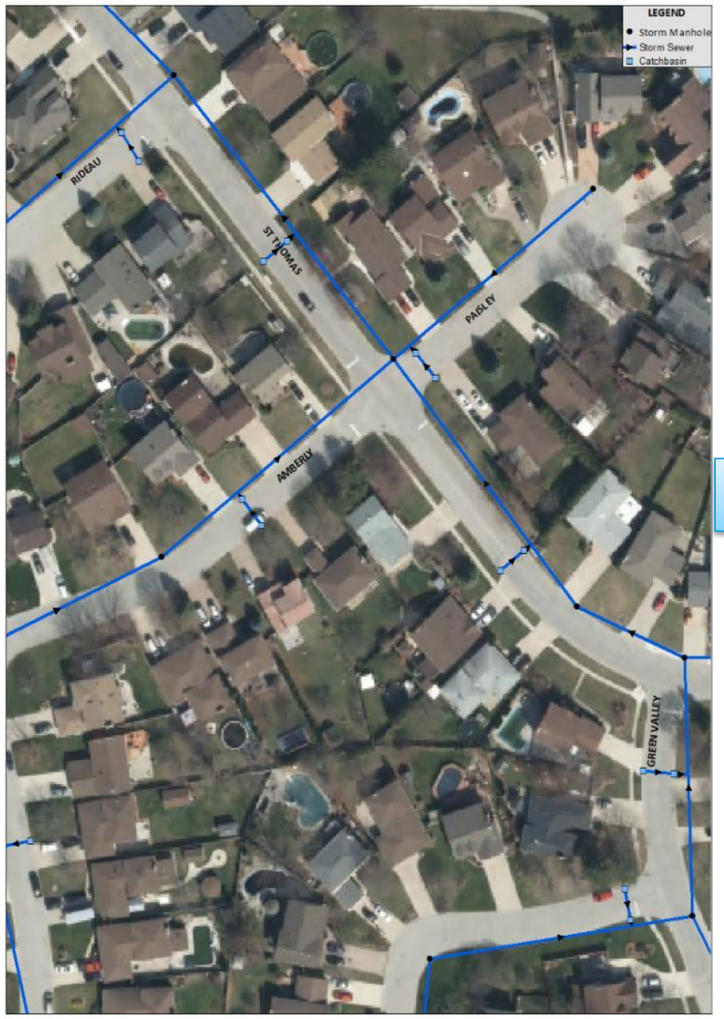
1-Dimensional Model Development

- Study area storm infrastructure modelled to a catchbasin level of detail;
- Incorporated existing storm infrastructure (catchbasins, manholes, sewers > 375mm diameter, pump stations, open drains); and
- Analyzed minor system storm sewer and pump station conveyance capacity.

2-Dimensional Model Development

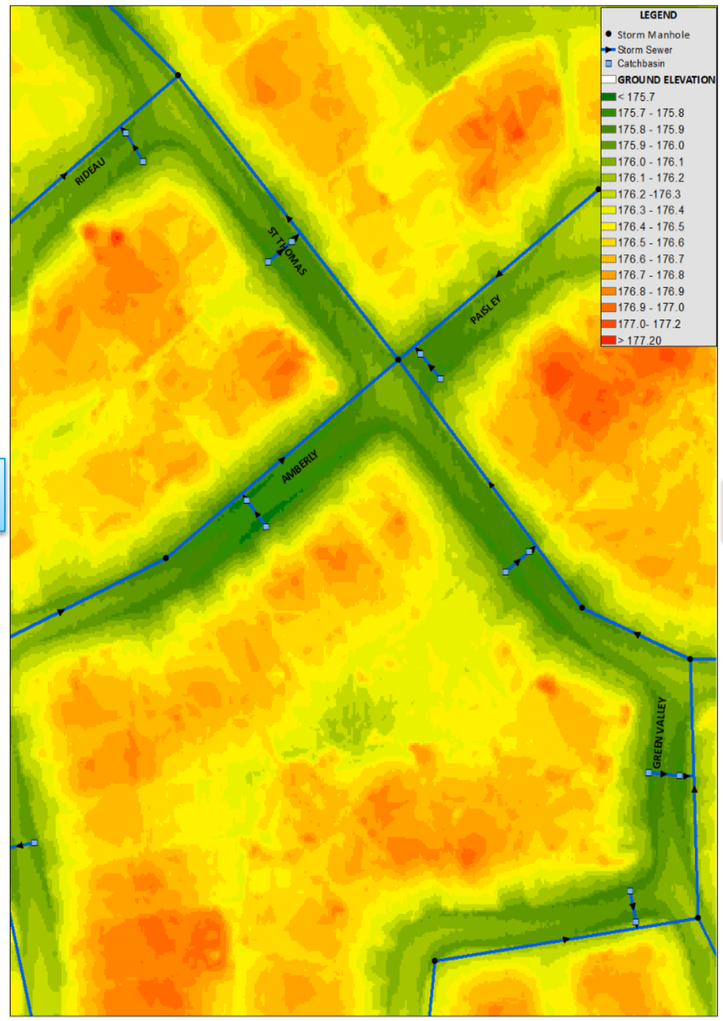
- Advanced 2-Dimensional modelling of the ground surface using Light Detection and Ranging (LiDAR) aerial survey data, including integration with the 1-D storm sewer system model;
- Incorporated building obstructions based on 2017 Aerial GIS Mapping into the 2-D adaptive mesh; and
- Analyzed major overland drainage network by dynamically simulating surface flooding during extreme rainfall events, including interaction with the minor storm sewer system to determine surface ponding depths.

Hydrodynamic 1-D/2-D Modelling



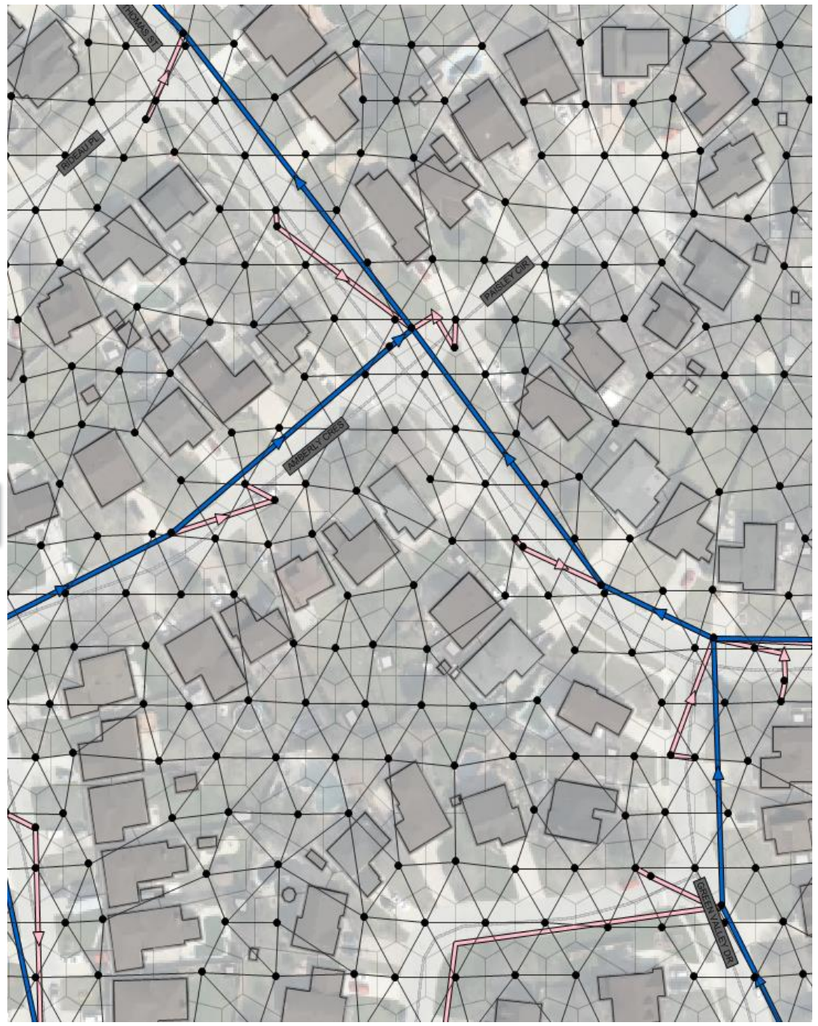
1-D Infrastructure Elements

+



Digital Elevation Mapping

=



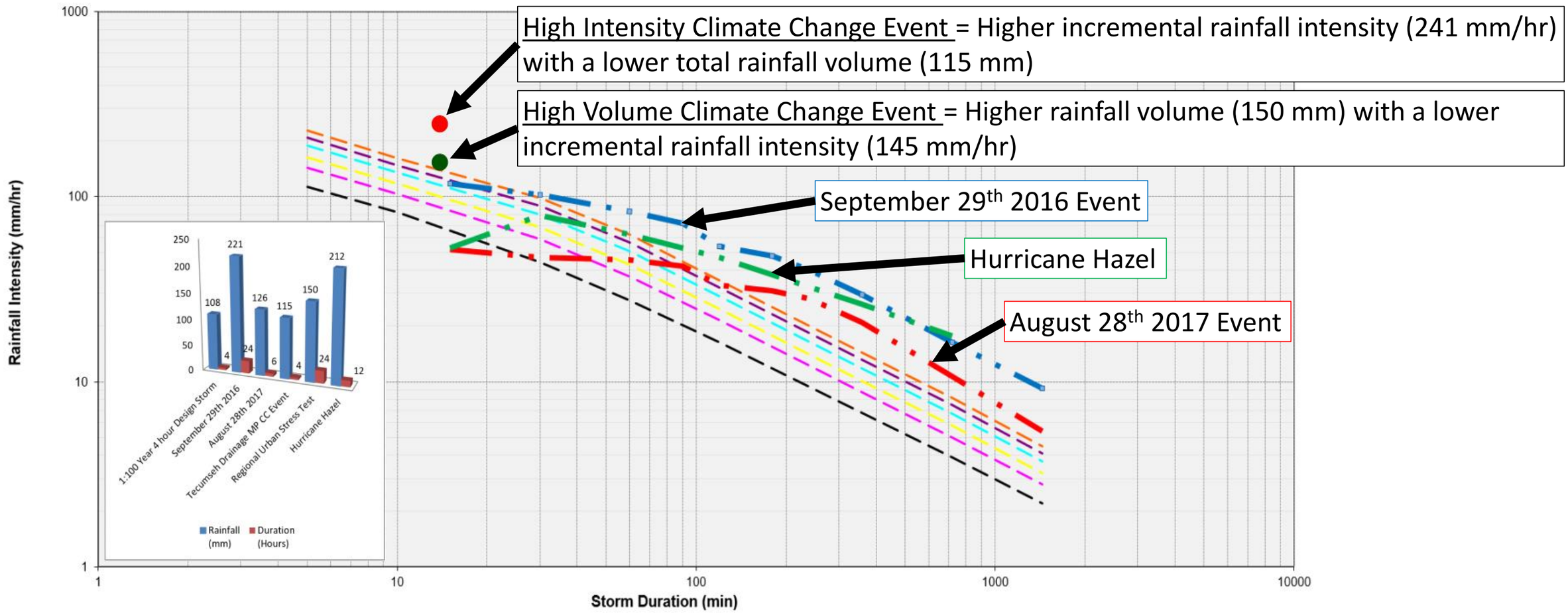
1-D/2-D PCSWMM MODEL

Design Storm Criteria

Traditional Design Storms taken from the Windsor/Essex Region Stormwater Management Standards Manual using Environment Canada Windsor Airport Data.

Climate Change Analysis took into consideration two extreme rainfall simulations:

1. *Extreme High Intensity Event (developed as part of this study); and*
2. *Extreme High Volume Event (as per the Windsor/Essex Stormwater Management Standards Manual).*



Existing Condition 1:100 Year Surface Flooding West of Manning Road

TOWN OF Tecumseh
ONTARIO · CANADA

TOWN OF TECUMSEH
STORM DRAINAGE MASTER PLAN

SURFACE FLOODING PROBLEM AREAS - W-1 & W-2
FIGURE 8.2

- PUMP STATION (P.S.)
- ISOLATED SURFACE FLOODING PROBLEM AREAS
- STUDY AREA
- PARKLAND/ PRIVATE PROPERTY NOT TO BE ANALYZED
- STREETS
- REGIONAL SURFACE FLOODING PROBLEM AREAS

1:100 SURFACE PONDING
- LESS THAN 0.15m DEPTH
- BETWEEN 0.15m - 0.30 m DEPTH
- OVER 0.30m DEPTH

SCALE 1:NTS

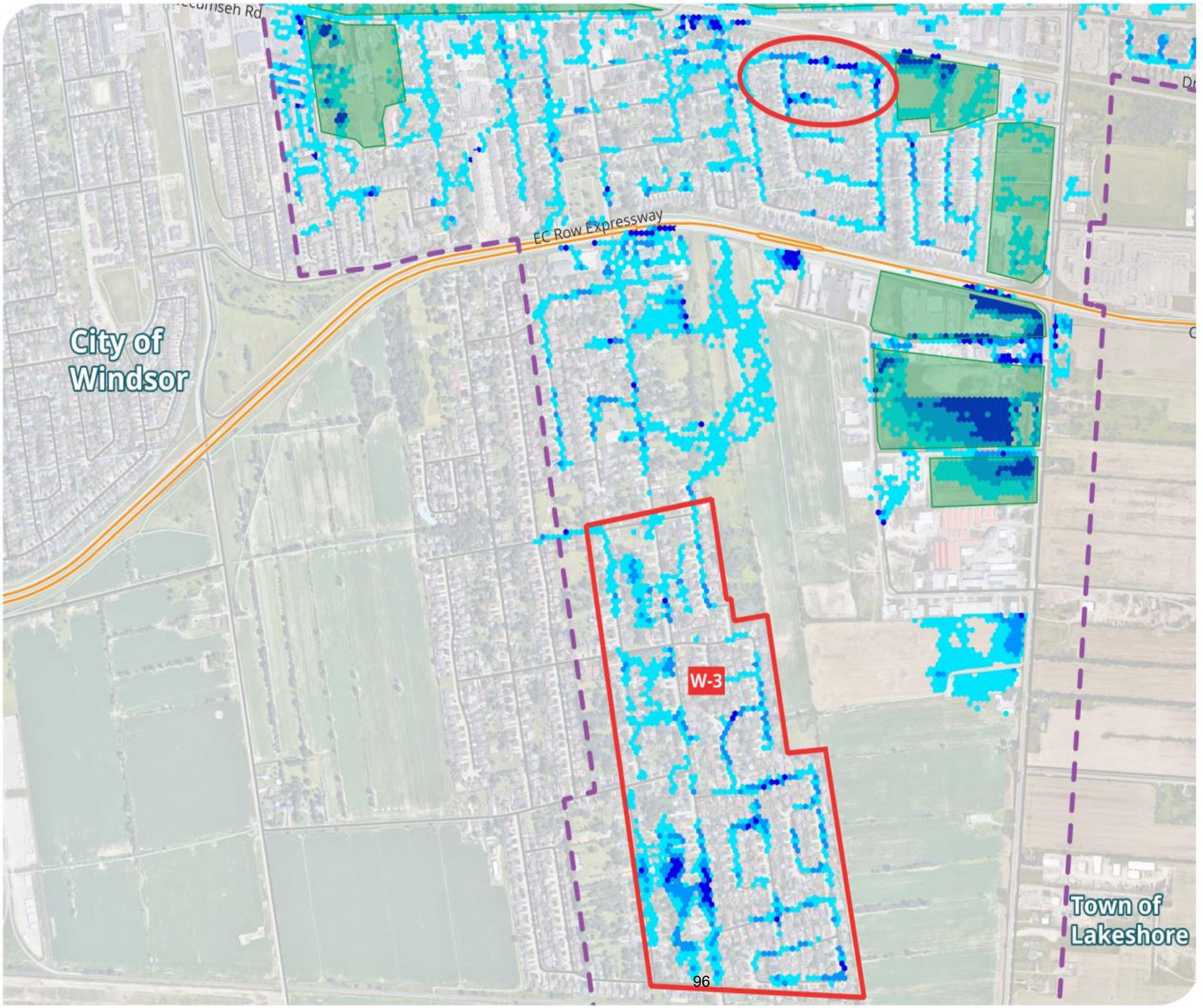
MAP CREATED BY: SZ
MAP CHECKED BY: RTL
MAP PROJECTION: NAD 1983 UTM Zone 17N

FILE LOCATION: \\DILLON.CA\DILLON_DFS\LONDON\LONDON CAD\GIS\VISUAL COMMUNICATIONS DI\MXD TEMPLATES\BEIGE - 11X17 LANDSCAPE - LEGEND RIGHT.MXD

DILLON CONSULTING

PROJECT: 16-4880
STATUS: FINAL
DATE: JUNE 2019

Existing Condition 1:100 Year Surface Flooding West of Manning Road



TOWN OF Tecumseh
ONTARIO · CANADA

TOWN OF TECUMSEH
STORM DRAINAGE MASTER PLAN

SURFACE FLOODING PROBLEM AREAS - W-3
FIGURE 8.3

- ISOLATED SURFACE FLOODING PROBLEM AREAS
- STUDY AREA
- PARKLAND/ PRIVATE PROPERTY NOT TO BE ANALYZED
- STREETS
- REGIONAL SURFACE FLOODING PROBLEM AREAS

1:100 SURFACE PONDING

- LESS THAN 0.15m DEPTH
- BETWEEN 0.15m - 0.30 m DEPTH
- OVER 0.30m DEPTH

SCALE 1:NTS

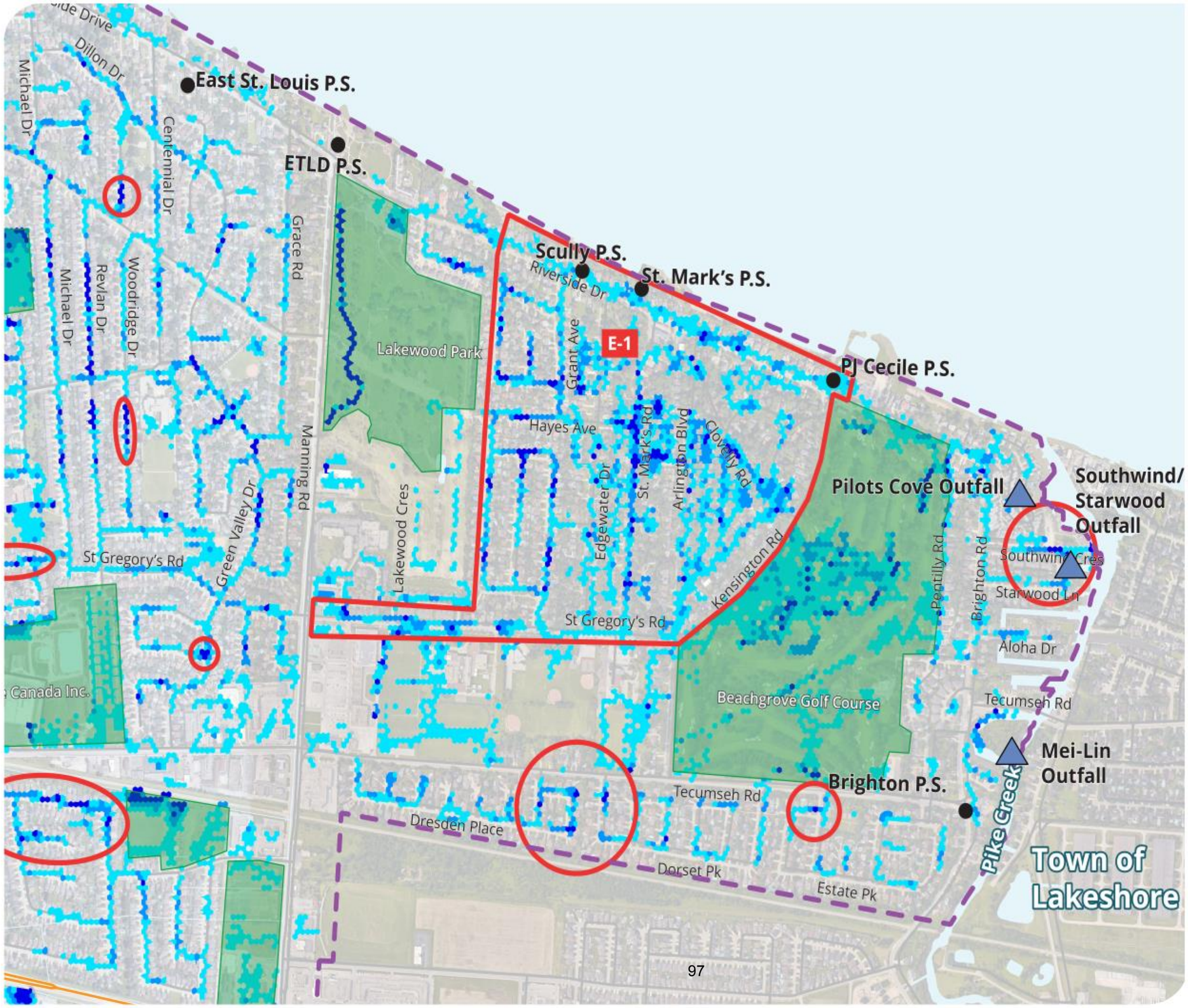
MAP CREATED BY: SZ
MAP CHECKED BY: RTL
MAP PROJECTION: NAD 1983 UTM Zone 17N

FILE LOCATION: \\DILLON.CA\DILLON_DFS\LONDON\LONDON CAD\GIS\VISUAL COMMUNICATIONS\DMXD TEMPLATES\BEIGE - 11X17 LANDSCAPE - LEGEND RIGHT.MXD

DILLON CONSULTING

PROJECT: 16-4880
STATUS: FINAL
DATE: JUNE 2019

Existing Condition 1:100 Year Surface Flooding East of Manning Road



TOWN OF Tecumseh
ONTARIO · CANADA

TOWN OF TECUMSEH
STORM DRAINAGE MASTER PLAN

SURFACE FLOODING PROBLEM AREAS - E-1
FIGURE 8.5

- PUMP STATION (P.S.)
- SEWER GRAVITY OUTFALLS
- ISOLATED SURFACE FLOODING PROBLEM AREAS
- STUDY AREA
- PARKLAND/ PRIVATE PROPERTY NOT TO BE ANALYZED
- STREETS
- REGIONAL SURFACE FLOODING PROBLEM AREAS

1:100 SURFACE PONDING
- LESS THAN 0.15m DEPTH
- BETWEEN 0.15m - 0.30 m DEPTH
- OVER 0.30m DEPTH

SCALE 1:NTS

MAP CREATED BY: SZ
MAP CHECKED BY: RTL
MAP PROJECTION: NAD 1983 UTM Zone 17N

FILE LOCATION: \\DILLON.CA\DILLON_DFS\LONDON\LONDON CAD\GIS\VISUAL COMMUNICATIONS\DMXD TEMPLATES\BEIGE - 11X17 LANDSCAPE - LEGEND RIGHT.MXD

DILLON CONSULTING

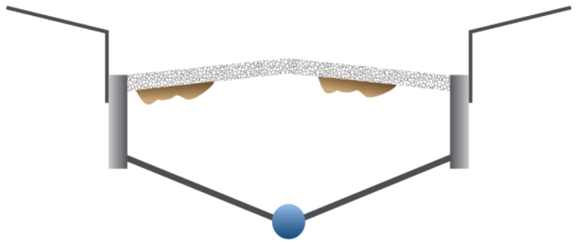
PROJECT: 16-4880
STATUS: FINAL
DATE: JUNE 2019

Design Criteria and Level of Service

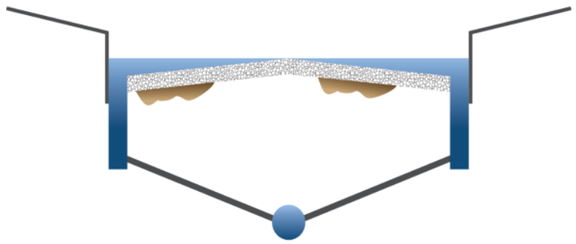
Sewer Drainage Design (Minor System)

Storm Sewer Systems are designed to convey more frequent storm events without surface flooding, which typically range from a 1:2 year storm (50% chance of occurrence in a year) to a 1:5 year storm (20% change of occurrence in a year).

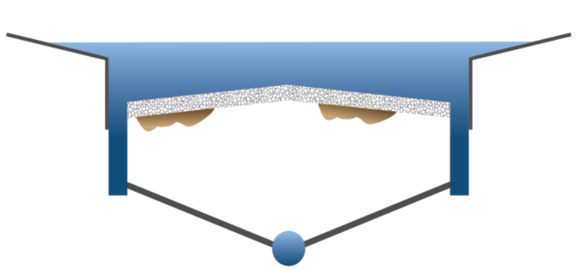
Storm Pump Stations are designed to convey the expected storm sewer flows, but may also have increased capacity to limit surface flooding during larger 1:100 year storms (1% chance of occurrence in a year).



2 Year Storm



10 Year Storm



100 Year Storm

Overland Drainage Design (Major System)

Overland Drainage Systems (surface drainage in roads and low lying areas) are designed to limit the depth of surface flooding from a 1:100 year storm to less than 0.30 m.

Increasing Level of Service reduces risk, but typically comes at a higher cost

Design Criteria and Level of Service

Design criteria for this study is based on the Windsor/Essex Region Stormwater Management Standards Manual (December 2018)

	PROPOSED LEVEL OF SERVICE Storm Drainage (Public Right-of-Way)	
	Existing Developed Areas	**New Development**
MINOR SYSTEM	1:2 year storm Goal: Reduce surface flooding where practical	1:5 year storm Goal: No surface flooding
MAJOR SYSTEM	1:100 year storm Goal: Reduce surface flooding to less than 0.30 m where practical	1:100 year storm Goal: No more than 0.30 m surface flooding depths
	Climate Change* Goal: Review resiliency and apply an enhanced/variable level of service for higher-risk areas where practical	Climate Change* Goal: Review resiliency and apply an enhanced/variable level of service for all new development

* Climate Change simulation took into consideration both the Extreme High Intensity Rainfall Event generated for this study and the Extreme High Volume Rainfall Event taken from the Windsor/Essex Region Stormwater Management Standards Manual (December, 2018)

Adaptive Design Approach

Climate Change

- The Storm Drainage Master Plan took an adaptive approach to consider the resiliency of drainage infrastructure in accommodating the risks of climate change.
- A decision matrix was developed to determine the level of service that was best suited to address the surface flooding risks in each area that was susceptible to surface flooding.

TRADITIONAL
Engineering Approach

Static design criteria established by regulatory agencies

Standard level of service and flood risk mitigation

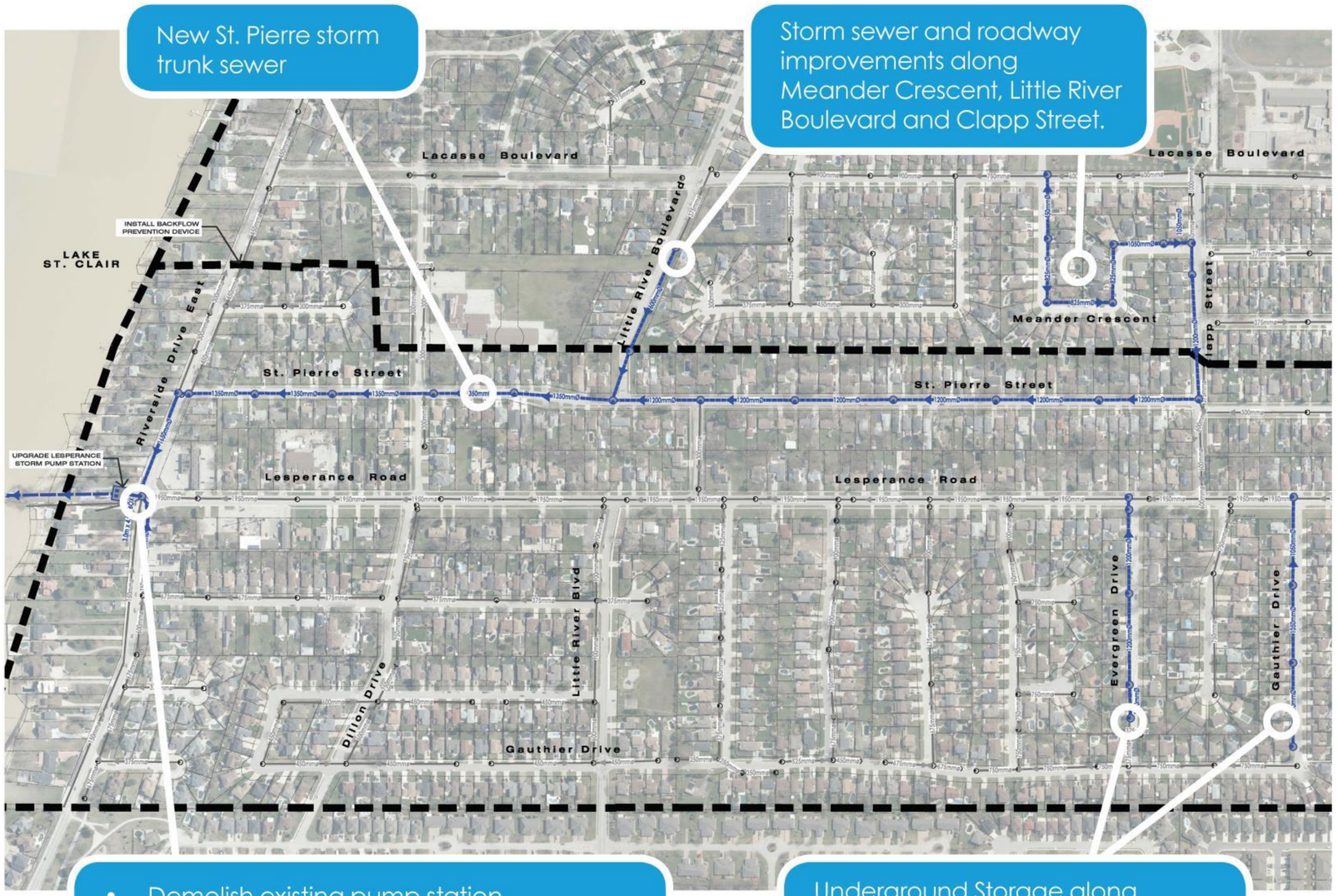
ADAPTIVE
Storm Drainage Master Plan Approach

Flexible and **sustainable** solutions that account for a **reasonable degree of uncertainty** due to climate change

Enhanced and variable level of service and flood risk mitigation

Recommended Surface Flooding Solutions

1) Lesperance Pump Station Service Area



- Demolish existing pump station
- New larger capacity pump station equipped with vertical submersible axial flow pumps
- Modify existing outfall to accommodate increased pump station capacity
- Install backflow prevention device at Lesperance/West St. Louis service area storm interconnection

Underground Storage along Evergreen Drive and Gauthier Drive

LEGEND

- Proposed manhole
- 450mmØ — Proposed storm sewer
- Proposed catch basin
- Existing manhole
- 100mmØ — Existing storm sewer
- Pump Station service area boundary

Recommended Surface Flooding Solutions

2) West St. Louis Pump Station Service Area

- Leave existing pump station in service
- Increase capacity of the pump station with an expansion to the east

LEGEND

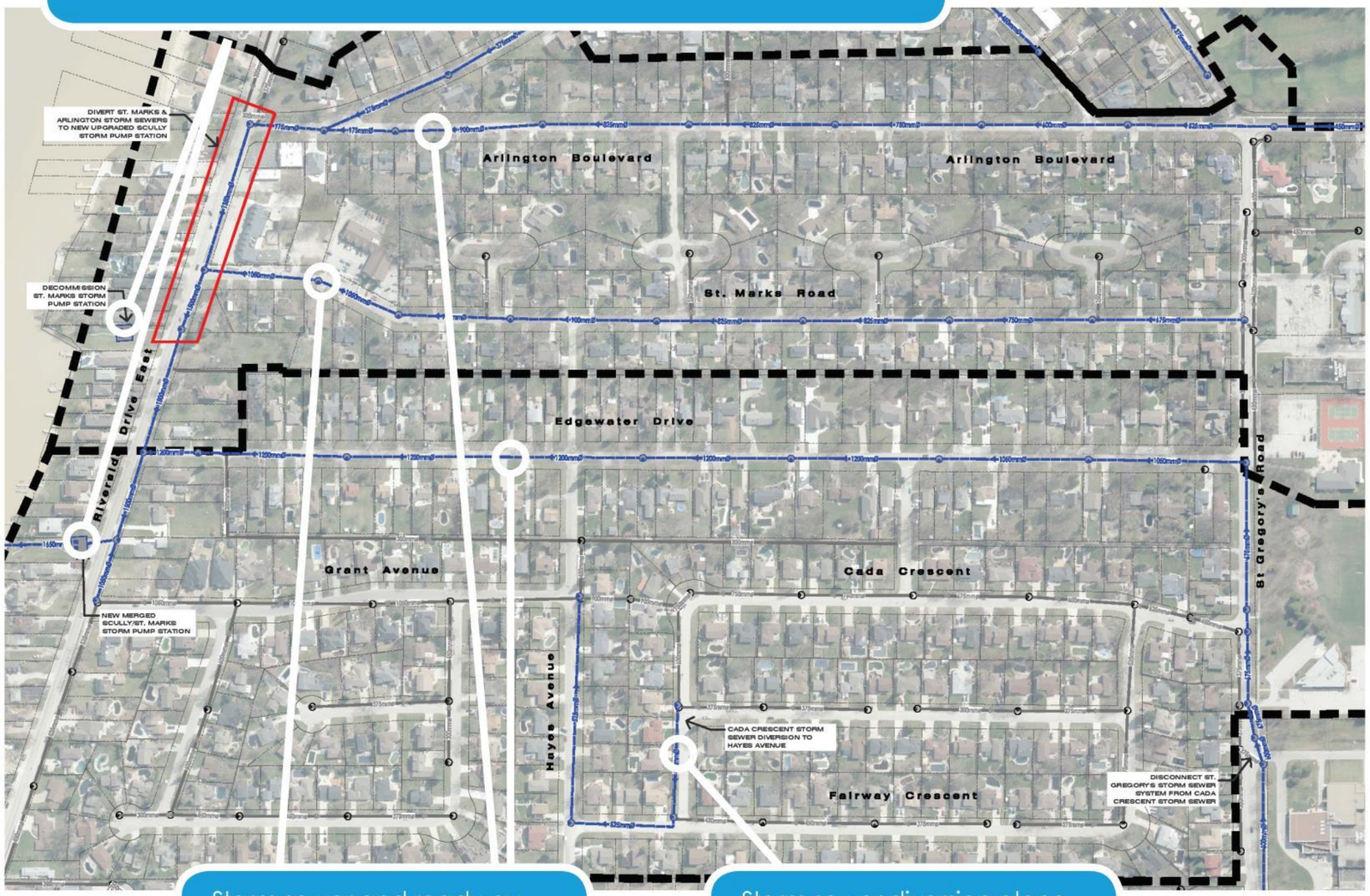
- Proposed manhole
- 450mmØ — Proposed storm sewer
- Proposed catch basin
- Existing manhole
- 100mmØ — Existing storm sewer
- Pump Station service area boundary

Storm sewer and roadway improvements along Coronado Dish area, Lacasse Boulevard, Little River Boulevard and Kimberly Drive and Jelso Place

Recommended Surface Flooding Solutions

3) Scully, St. Mark's Pump Station Service Area

- Decommission St. Mark's pump station and construct a new pump station at the Scully pump station site to handle flow from a consolidated service area
- Locate station north of the existing structure. New inlet, outfall pipe, and expanded outfall structure required.



LEGEND

- Proposed manhole
- 450mmØ Proposed storm sewer
- Proposed catch basin
- Existing manhole
- 100mm Existing storm sewer
- Pump Station service area boundary

Storm sewer and roadway improvements along Arlington Boulevard, St. Mark's Road, Edgewater Drive, St.Gregory's Road and Riverside Drive.

Storm sewer diversion along Cada Crescent to Hayes Avenue.

Recommended Surface Flooding Solutions

4) PJ Cecile Pump Station Service Area

- Construct a new pump station at the PJ Cecile site over the footprint of the existing structure
- Install new outfall pipe to increase flow capacity
- Extend new outfall to northern end of the jetty bank
- Replace inlet pipe with a larger diameter pipe in the existing alignment

Storm sewer and roadway improvements along Kensington Dish Area

LEGEND

- Proposed manhole
- 450mmØ Proposed storm sewer
- Proposed catch basin
- Existing manhole
- 100mmØ Existing storm sewer
- Pump Station service area boundary

Recommended Surface Flooding Solutions

5) New Southwind Crescent Pump Station

- Construct new pump station for the existing gravity outfall
- Construct within the existing easement directly east of the Southwind right-of-way
- Maintain existing outfall pipe

Recommended Surface Flooding Solutions

6) St. Gregory's Road

LEGEND

- Proposed manhole
- 450mmØ Proposed storm sewer
- Proposed catch basin
- Existing manhole
- 100mmø Existing storm sewer
- Pump Station service area boundary
- Roadway grading improvements
- Depressed area

Depress northern portion of Tecumseh Soccer Fields Park by 0.70m to provide approximately 3,200 m^3 of aboveground surface storage

Recommended Surface Flooding Solutions

7) Buster Reaume Park

Redirect Lemire and Lanoue Street storm sewers to Buster Reaume Park stormwater facility.

Depress southwestern portion of Buster Reaume Park by 0.80m to provide approximately 4,100 m3 of aboveground surface storage with a connection to the upgraded municipal storm sewers.

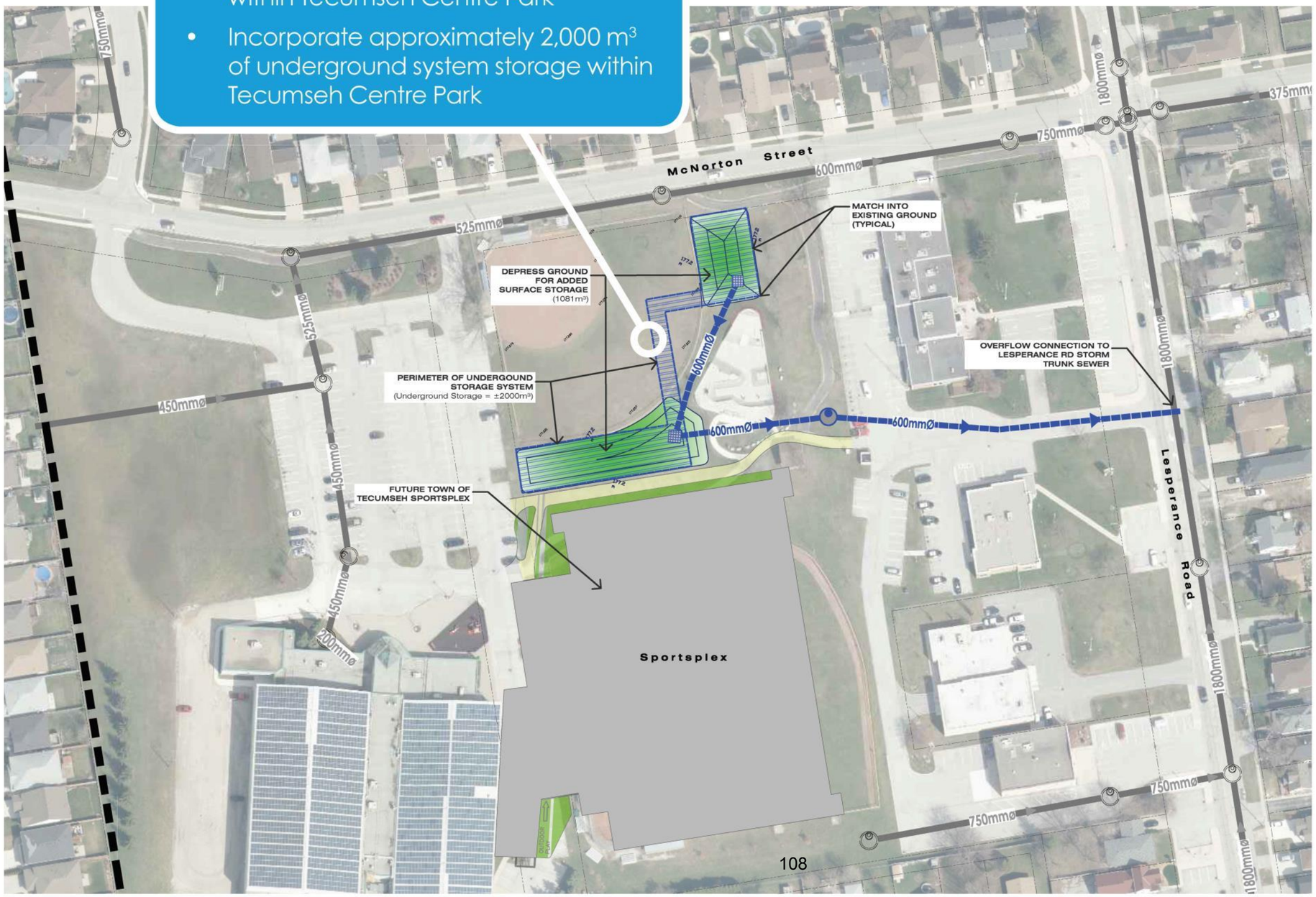
LEGEND

- Proposed manhole
- 450mmØ — Proposed storm sewer
- Proposed catch basin
- Existing manhole
- 100mmØ — Existing storm sewer
- Pump Station service area boundary
- Roadway grading improvements
- Depressed area

Recommended Surface Flooding Solutions

8) Tecumseh Centre Park

- Construct a depression for approximately 1,080 m^3 of surface storage behind Tecumseh Town Hall within Tecumseh Centre Park
- Incorporate approximately 2,000 m^3 of underground system storage within Tecumseh Centre Park



LEGEND

- Proposed manhole
- 450mmø Proposed storm sewer
- Proposed catch basin
- Existing manhole
- 100mmø Existing storm sewer
- Pump Station service area boundary
- Roadway grading improvements
- Depressed area
- Underground Storage Chambers

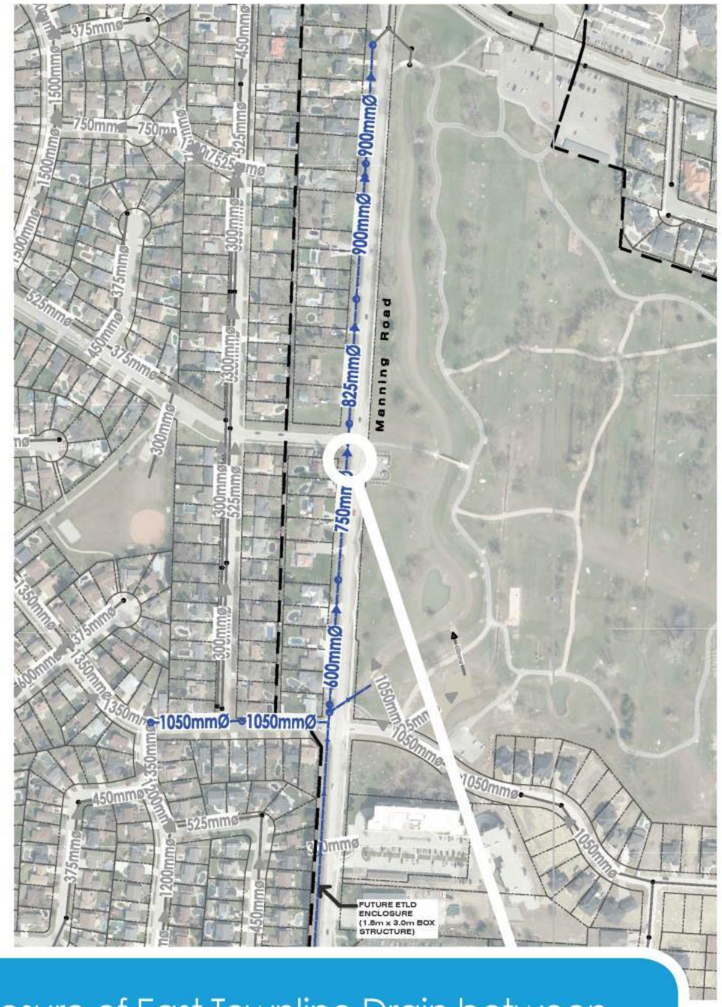
Recommended Surface Flooding Solutions

9) East St. Louis/East Townline Drain Pump Station Service Areas

EAST ST. LOUIS PS SERVICE AREA RECOMMENDED SOLUTION

Incorporate storm sewer overflow for existing storm sewer along St. Thomas Street to Lakewood Park Drainage Channel via proposed box culvert (to be constructed as part of Manning Road Phase 2 Drain Enclosure).

MANNING ROAD PHASE 2 DRAIN ENCLOSURE DESIGN



- Enclosure of East Townline Drain between existing culvert outlet north of St. Gregory's Road to proposed outlet at St. Thomas Street to Lakewood Park Drainage Channel.
- Construction of a local storm sewer system servicing Manning Road residential properties, between Riverside Drive and St. Thomas Street.

LEGEND

- Proposed manhole
- 450mmØ — Proposed storm sewer
- Proposed catch basin
- Existing manhole
- Existing storm sewer
- Pump Station service area boundary

Recommended Surface Flooding Solutions

10) Tecumseh Road Storm Sewer Extension

LEGEND

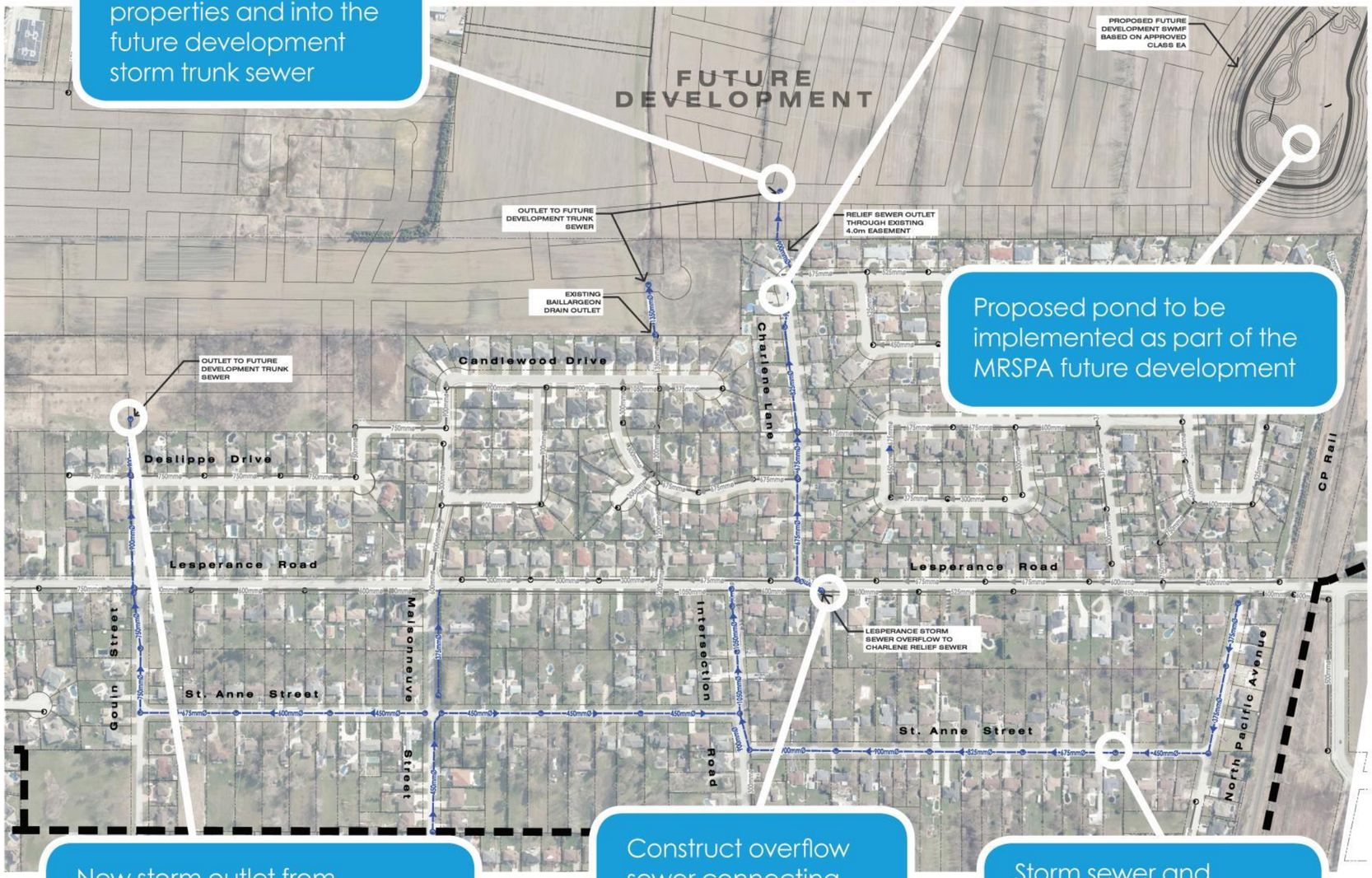
- Proposed manhole
- 450mmØ Proposed storm sewer
- Proposed catch basin
- Existing manhole
- 100mmØ Existing storm sewer
- Pump Station service area boundary

Recommended Surface Flooding Solutions

11) Baillargeon Drain Service Area (Option 1)

Construct relief sewer outlet through the existing storm easement between two residential properties and into the future development storm trunk sewer

Construct storm sewer along Charlene Lane to intercept storm sewer runoff east of Lesperance Road and south of Charlene Lane from the existing residential lands



Proposed pond to be implemented as part of the MRSPA future development

New storm outlet from Gouin Street into the future development storm trunk sewer

Construct overflow sewer connecting Charlene relief sewer from the Lesperance storm sewer system

Storm sewer and roadway improvements along St. Anne Area

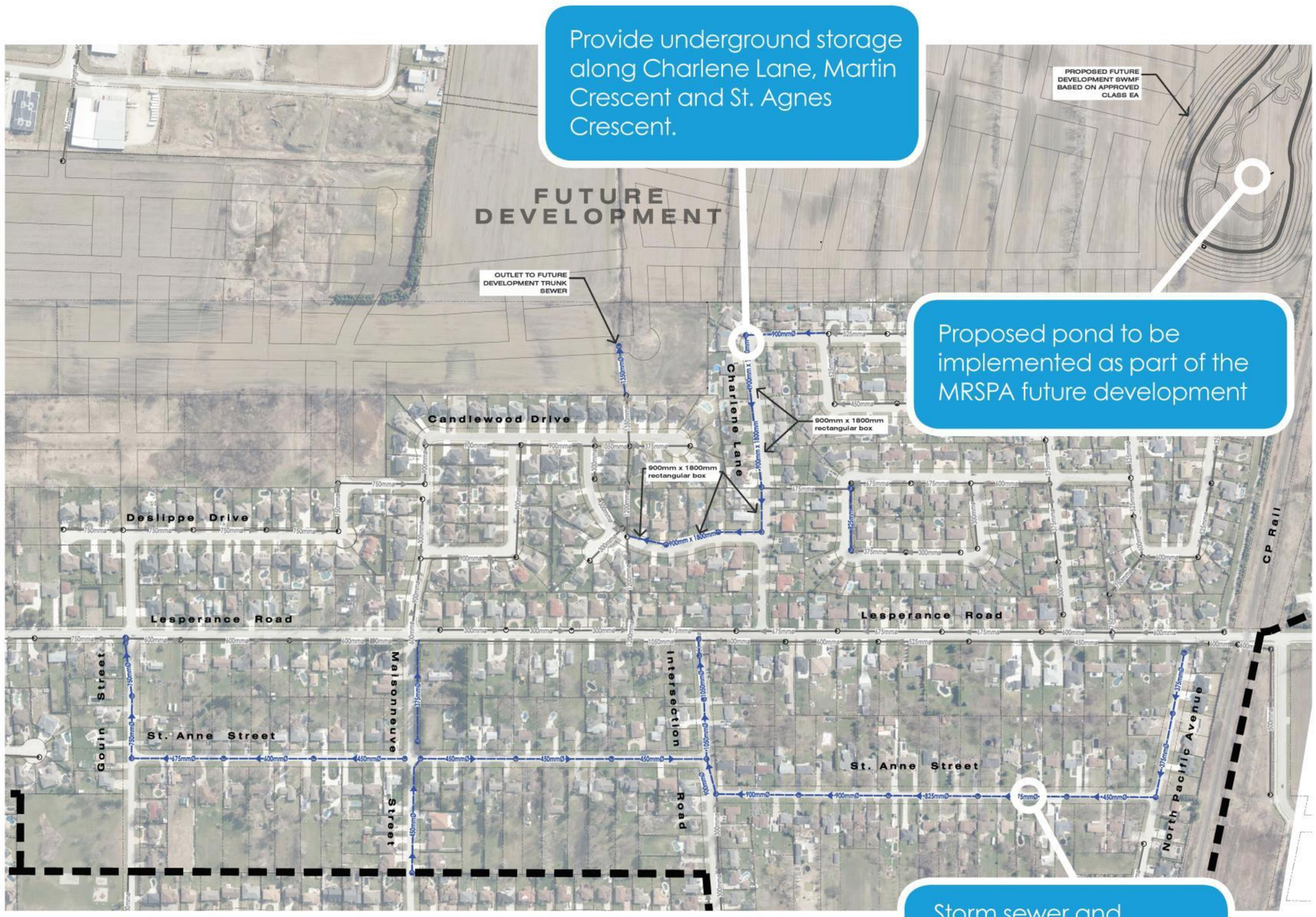
LEGEND

- Proposed manhole
- 450mmØ Proposed storm sewer
- Proposed catch basin
- Existing manhole
- 100mmØ Existing storm sewer
- Pump Station service area boundary

Recommended Surface Flooding Solutions

11) Baillargeon Drain Service Area (Option 2)

Alternative 1 is considered the preferred for this area, but is entirely dependent on agreements with the land owners and developers of the future development lands. Alternative 2 is presented as a secondary recommended option.



LEGEND

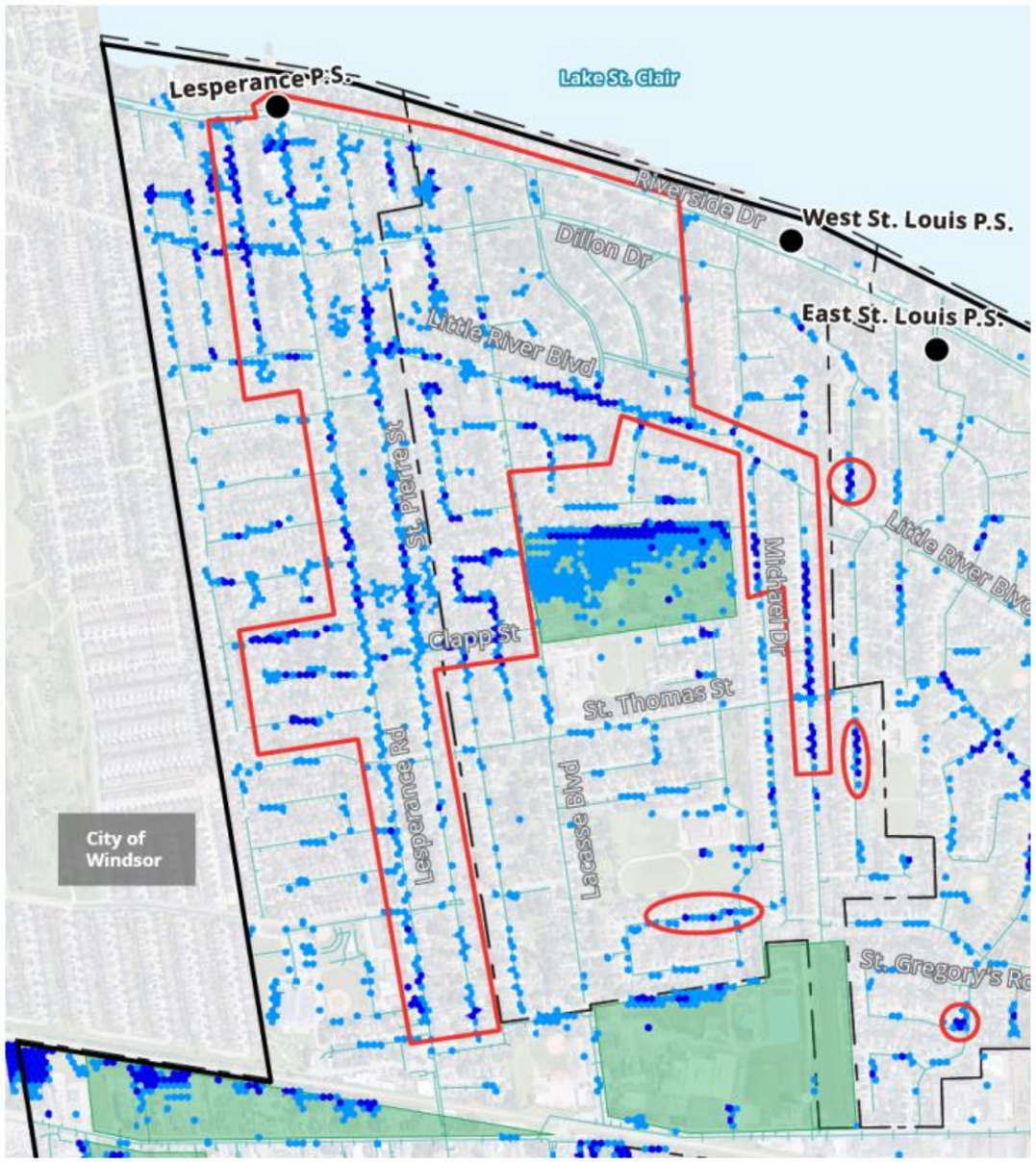
- Proposed manhole
- 450mmØ Proposed storm sewer
- Proposed catch basin
- Existing manhole
- 100mmØ Existing storm sewer
- Pump Station service area boundary

Future Surface Flooding Comparisons
West of Manning Road – Problem Area W1

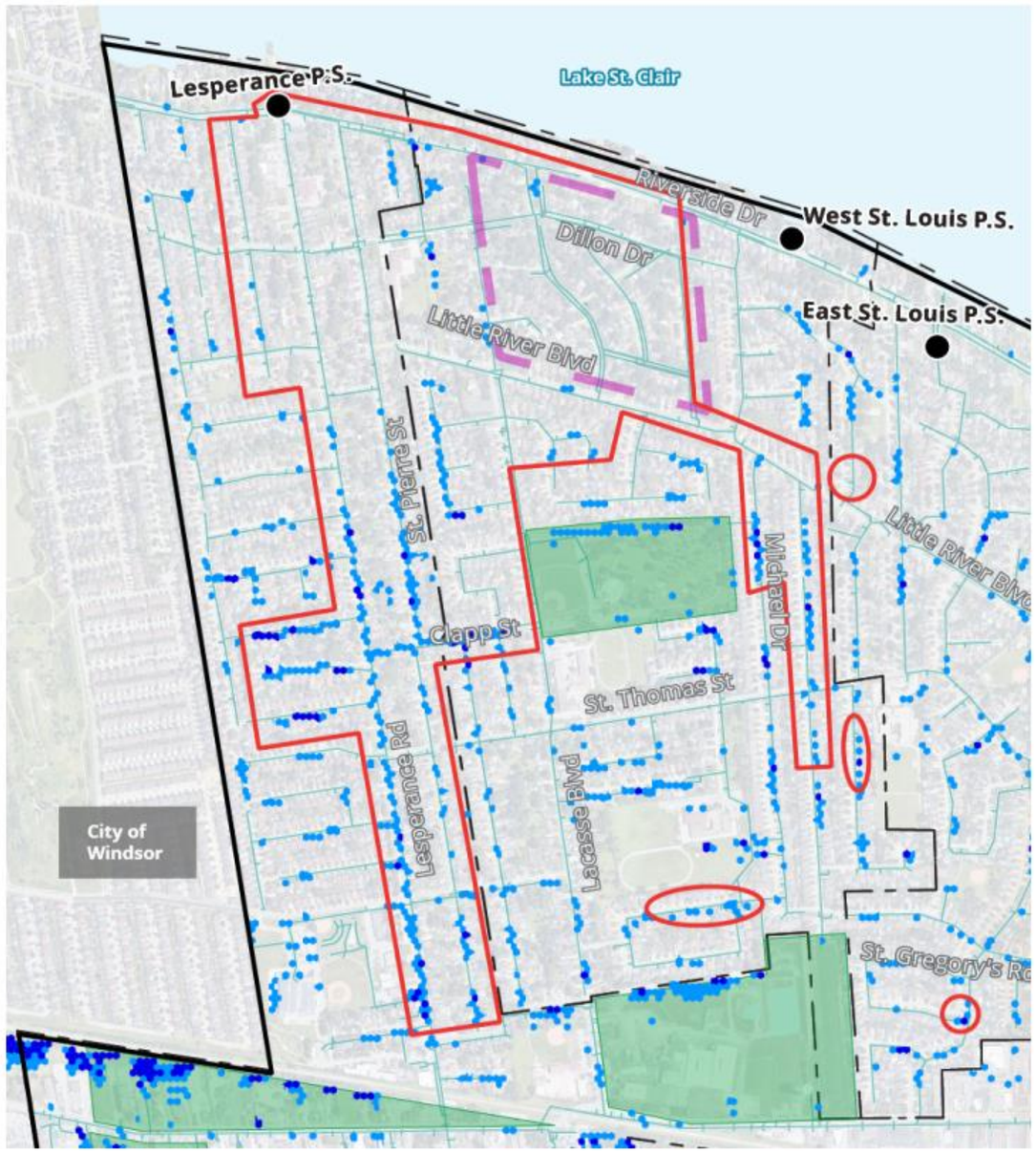
DILLON CONSULTING

TECUMSEH ON

EXISTING CONDITION (1:100 YEAR SURFACE PONDING SIMULATION)



FUTURE CONDITION (1:100 YEAR SURFACE PONDING SIMULATION)



TOWN OF TECUMSEH
STORM DRAINAGE MASTER PLAN

1:100 YEAR EXISTING VS FUTURE CONDITION SURFACE FLOODING - PROBLEM AREA W-1
FIGURE 11.15

TOWN OF Tecumseh ONTARIO · CANADA

- PUMP STATION (P.S.)
- PUMP STATION SERVICE AREA
- STUDY AREA
- SURFACE PONDING WITHIN AREA MAINTAINED BELOW 0.30m
- REGIONAL SURFACE FLOODING PROBLEM AREAS
- ISOLATED SURFACE FLOODING PROBLEM AREAS
- PARKLAND / PRIVATE PROPERTY NOT TO BE ANALYZED
- SURFACE PONDING BETWEEN 0.15m - 0.30m DEPTH
- SURFACE PONDING > 0.30m DEPTH

DILLON CONSULTING

MAP CREATED BY: SZ
MAP CHECKED BY: RTL
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE 1:NTS

FILE LOCATION: \\DILLON.CA\DILLON_DFS\LONDON\LONDON CAD\GIS\VISUAL COMMUNICATIONS\MXD TEMPLATES\GREY - 11X17 LANDSCAPE - LEGEND BOTTOM.MXD

PROJECT: 16-4880 STATUS: FINAL DATE: JUNE 2019

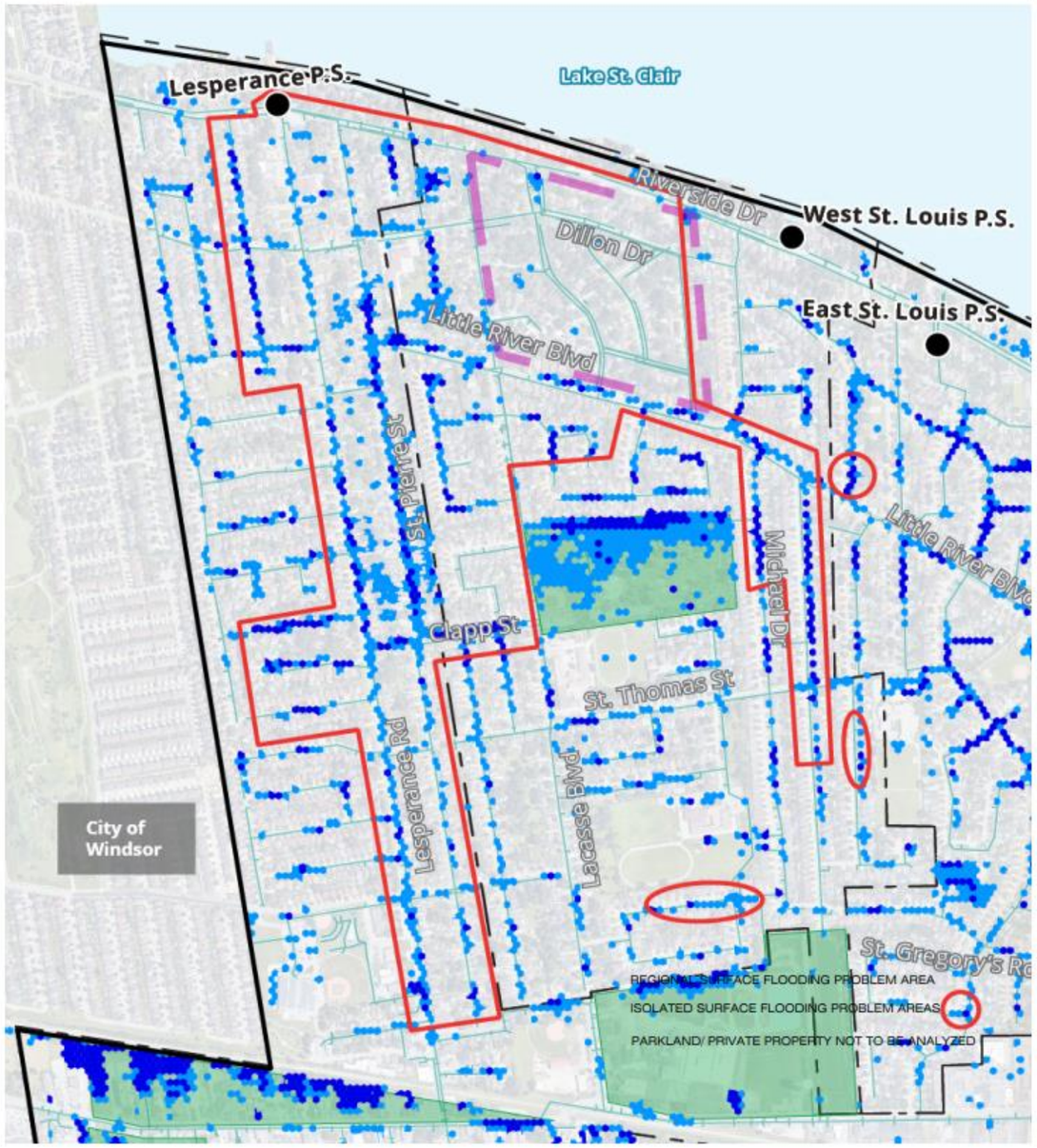
Future Surface Flooding Comparisons
West of Manning Road – Problem Area W1

DILLON CONSULTING

TECUMSEH ON

EXISTING CONDITION (1:100 YEAR + 40% SURFACE PONDING SIMULATION)

FUTURE CONDITION (1:100 YEAR + 40% SURFACE PONDING SIMULATION)



TOWN OF TECUMSEH
STORM DRAINAGE MASTER PLAN

1:100 YEAR + 40% EXISTING VS FUTURE CONDITION SURFACE FLOODING - PROBLEM AREA W-1
FIGURE 11.16

TOWN OF Tecumseh ONTARIO - CANADA

- PUMP STATION (P.S.)
- PUMP STATION SERVICE AREA
- STUDY AREA
- SURFACE PONDING WITHIN AREA MAINTAINED BELOW 0.30m
- REGIONAL SURFACE FLOODING PROBLEM AREAS
- ISOLATED SURFACE FLOODING PROBLEM AREAS
- PARKLAND / PRIVATE PROPERTY NOT TO BE ANALYZED
- SURFACE PONDING BETWEEN 0.15m - 0.30m DEPTH
- SURFACE PONDING > 0.30m DEPTH

DILLON CONSULTING

MAP CREATED BY: SZ
MAP CHECKED BY: RTL
MAP PROJECTION: NAD 1983 UTM Zone 17N

SCALE 1:NTS

FILE LOCATION: \\DILLON.CA\DILLON_DFS\LONDON\LONDON CAD\GIS\VISUAL COMMUNICATIONS\DWG\MXD TEMPLATES\GREY - 11X17 LANDSCAPE - LEGEND BOTTOM.MXD

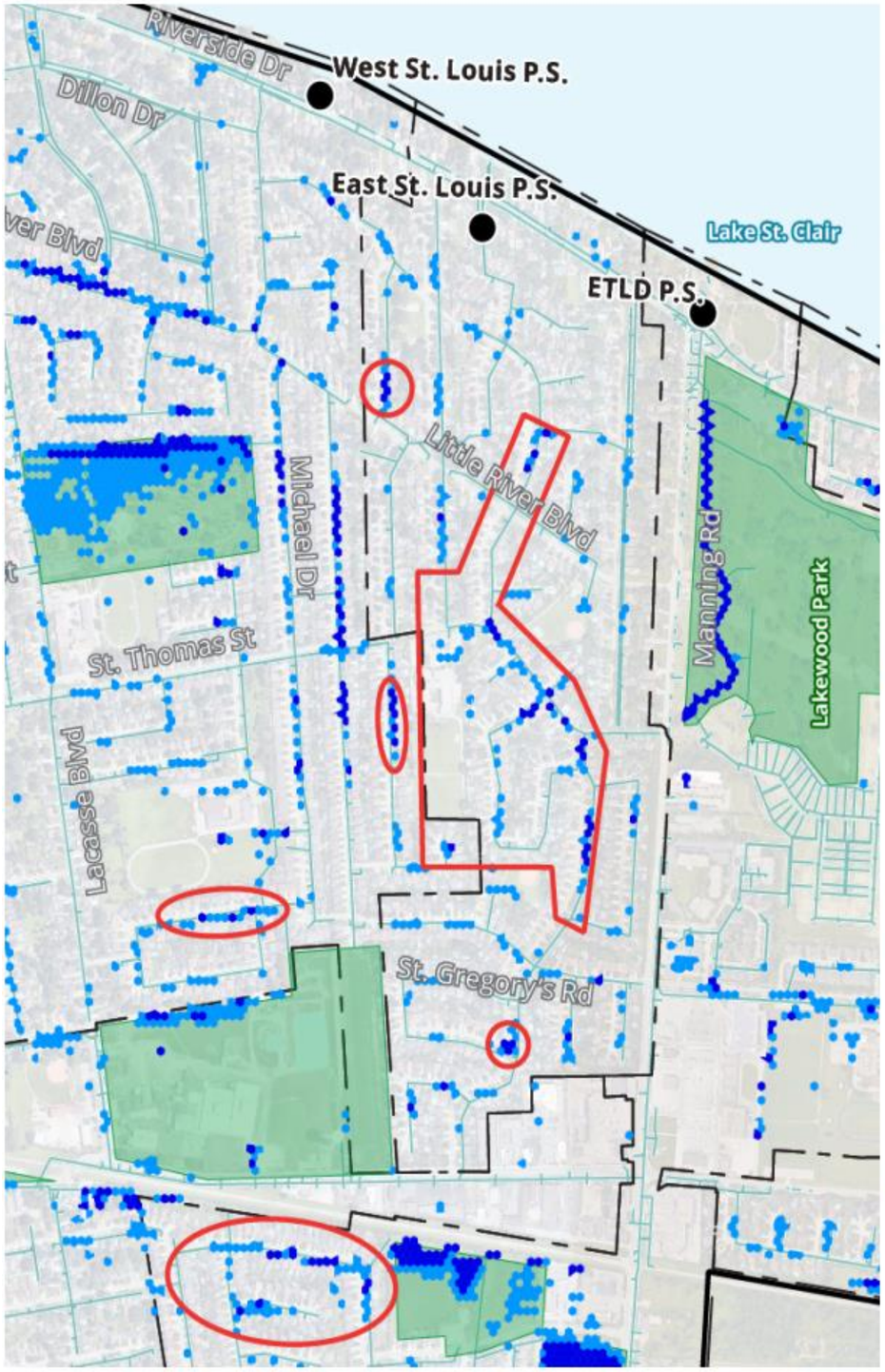
PROJECT: 16-4880 STATUS: FINAL DATE: JUNE 2019

Future Surface Flooding Comparisons
West of Manning Road – Problem Area W2

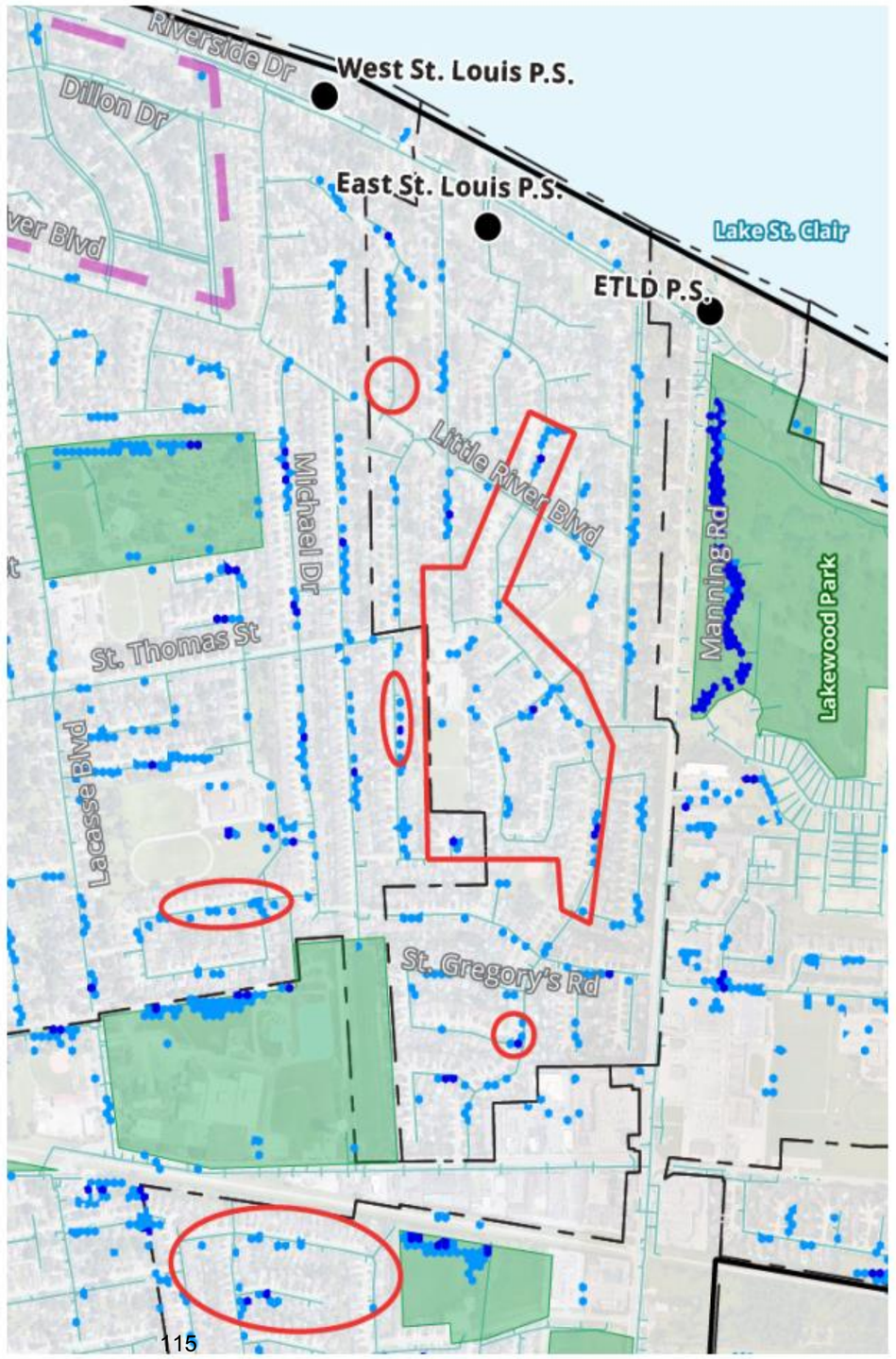
DILLON CONSULTING

TECUMSEH ON

EXISTING CONDITION
(1:100 YEAR SURFACE PONDING SIMULATION)



FUTURE CONDITION
(1:100 YEAR SURFACE PONDING SIMULATION)



TOWN OF Tecumseh
ONTARIO · CANADA

TOWN OF TECUMSEH
STORM DRAINAGE MASTER PLAN

1:100 YEAR EXISTING VS FUTURE CONDITION SURFACE FLOODING - PROBLEM AREA W-2
FIGURE 11.17

- PUMP STATION (P.S.)
- PUMP STATION SERVICE AREA
- STUDY AREA
- SURFACE PONDING WITHIN AREA MAINTAINED BELOW 0.30m
- REGIONAL SURFACE FLOODING PROBLEM AREAS
- ISOLATED SURFACE FLOODING PROBLEM AREAS
- PARKLAND / PRIVATE PROPERTY NOT TO BE ANALYZED
- SURFACE PONDING BETWEEN 0.15m - 0.30m DEPTH
- SURFACE PONDING > 0.30m DEPTH

SCALE 1:NTS

MAP CREATED BY: SZ
MAP CHECKED BY: RTL
MAP PROJECTION: NAD 1983 UTM Zone 17N

FILE LOCATION: \\DILLON.CA\DILLON_DFS\LONDON\LONDON CAD\GIS\VISUAL COMMUNICATIONS D\MXD TEMPLATES\BEIGE - 11X17 LANDSCAPE - LEGEND RIGHT.MXD

DILLON CONSULTING

PROJECT: 16-4880
STATUS: FIANL
DATE: JUNE 2019

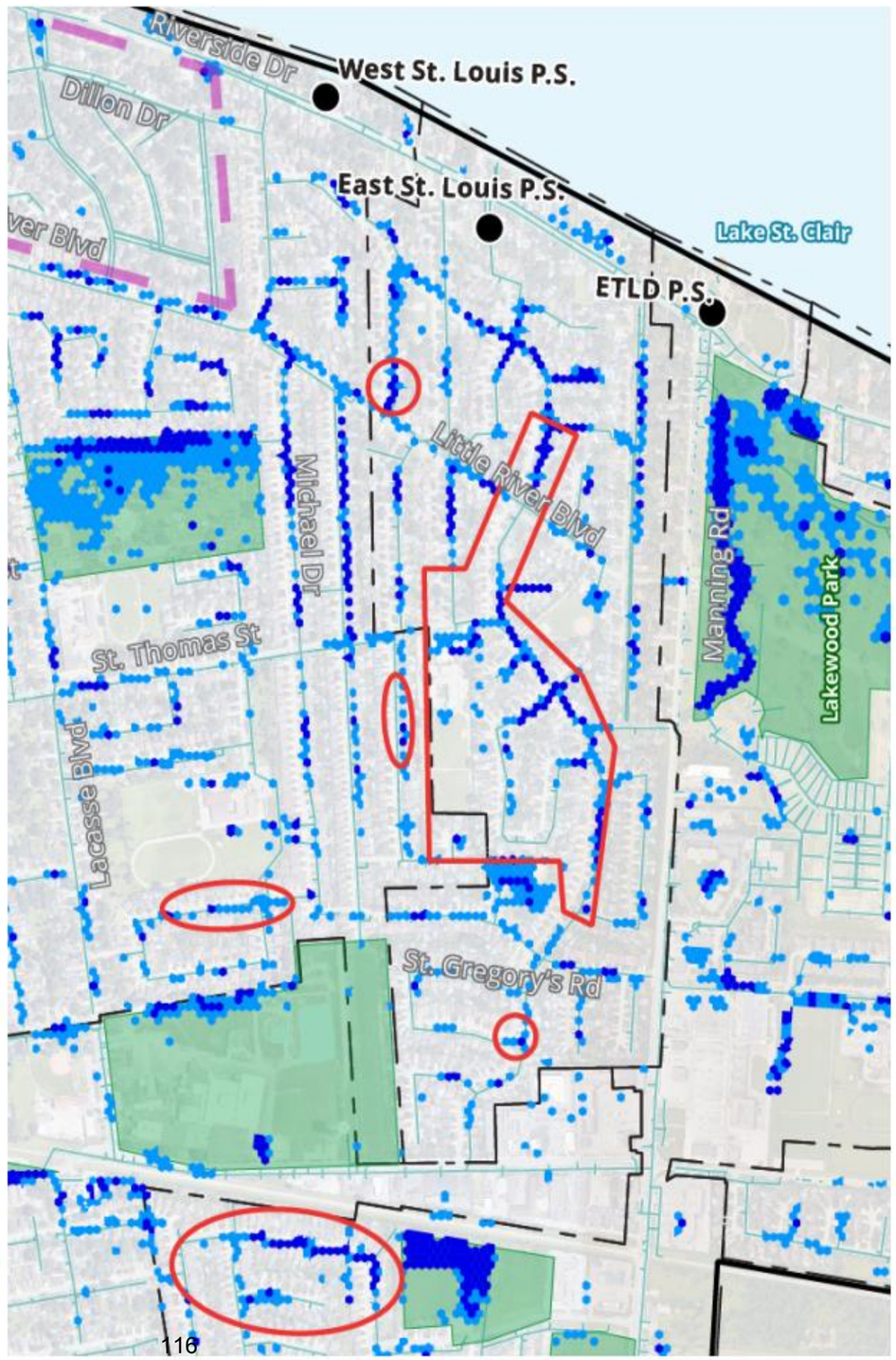
Future Surface Flooding Comparisons
West of Manning Road – Problem Area W2

DILLON CONSULTING

TECUMSEH ON

EXISTING CONDITION
(1:100 YEAR + 40% SURFACE PONDING SIMULATION)

FUTURE CONDITION
(1:100 YEAR + 40% SURFACE PONDING SIMULATION)



TOWN OF Tecumseh
ONTARIO · CANADA

TOWN OF TECUMSEH
STORM DRAINAGE MASTER PLAN

1:100 YEAR + 40% EXISTING VS FUTURE CONDITION SURFACE FLOODING -PROBLEM AREA W-2
FIGURE 11.18

- PUMP STATION (P.S.)
- PUMP STATION SERVICE AREA
- STUDY AREA
- SURFACE PONDING WITHIN AREA MAINTAINED BELOW 0.30m
- REGIONAL SURFACE FLOODING PROBLEM AREAS
- ISOLATED SURFACE FLOODING PROBLEM AREAS
- PARKLAND / PRIVATE PROPERTY NOT TO BE ANALYZED
- SURFACE PONDING BETWEEN 0.15m - 0.30m DEPTH
- SURFACE PONDING > 0.30m DEPTH

SCALE 1:NTS

MAP CREATED BY: SZ
MAP CHECKED BY: RTL
MAP PROJECTION: NAD 1983 UTM Zone 17N

FILE LOCATION: \\DILLON.CA\DILLON_DFS\LONDON\LONDON CAD\GIS\VISUAL COMMUNICATIONS D\MXD TEMPLATES\BEIGE – 11X17 LANDSCAPE - LEGEND RIGHT.MXD

DILLON CONSULTING

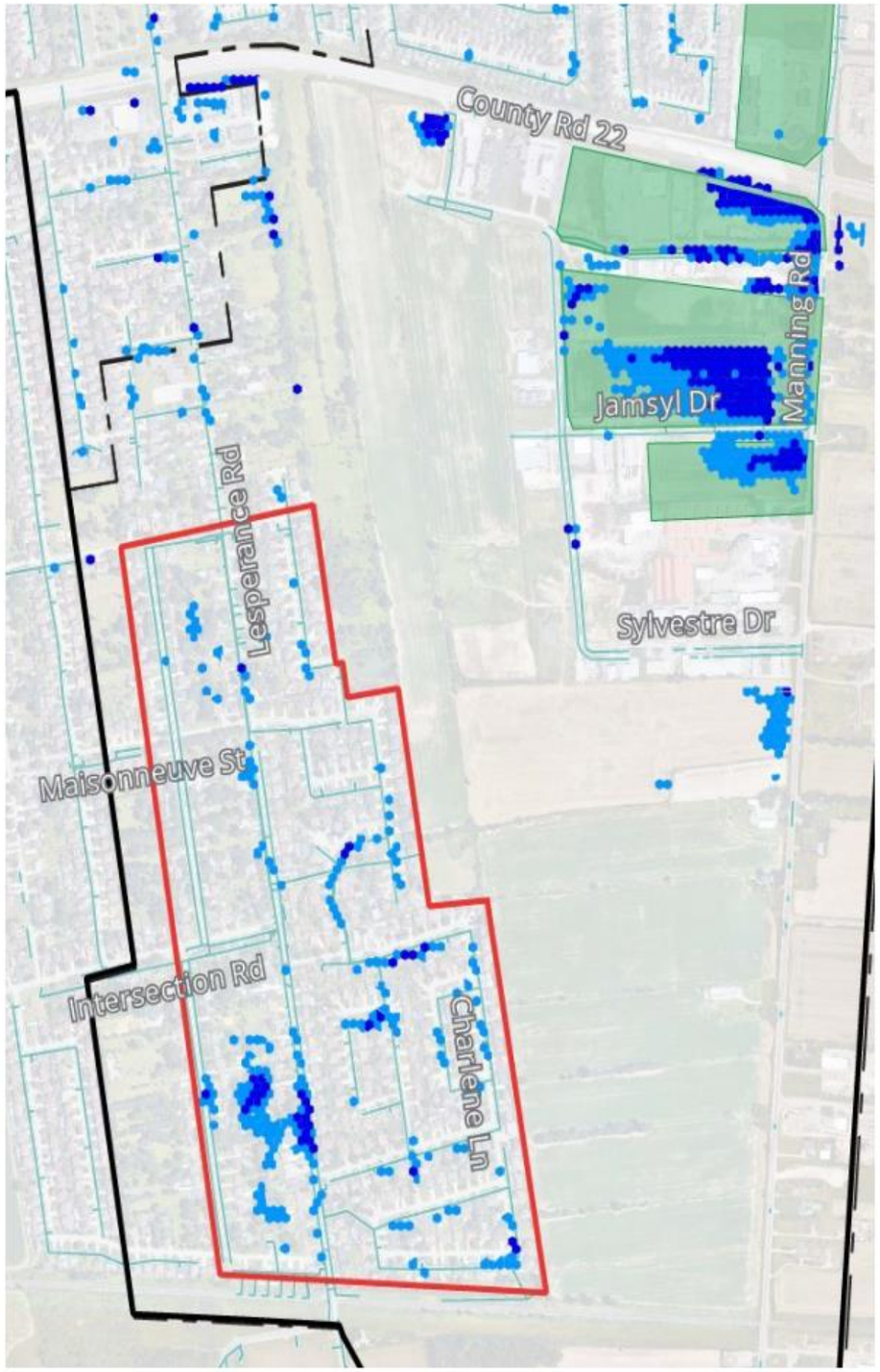
PROJECT: 16-4880
STATUS: FINAL
DATE: JUNE 2019

Future Surface Flooding Comparisons
West of Manning Road – Problem Area W3

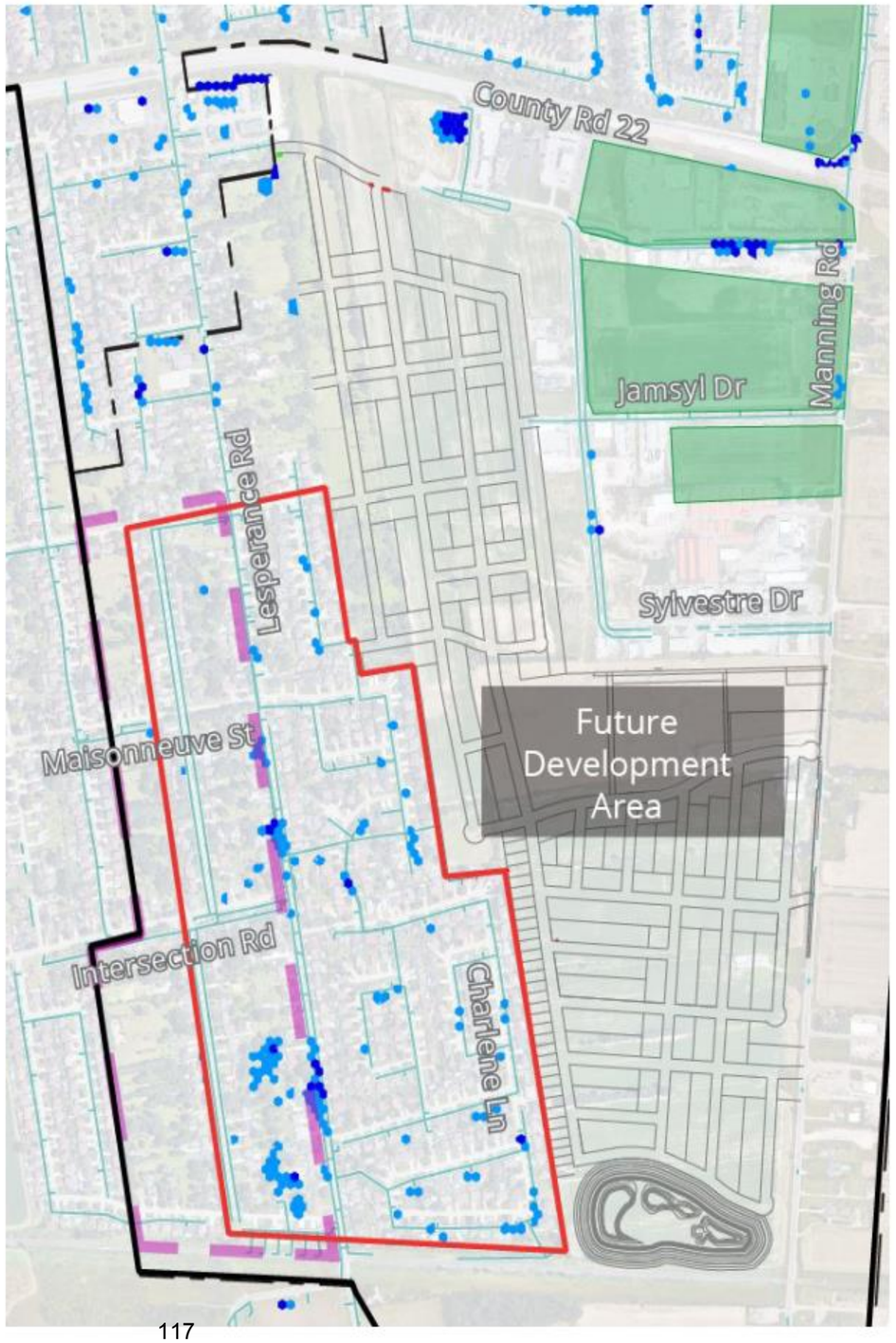
DILLON CONSULTING

TECUMSEH ON

EXISTING CONDITION
(1:100 YEAR SURFACE PONDING SIMULATION)



FUTURE CONDITION
(1:100 YEAR SURFACE PONDING SIMULATION)



TOWN OF Tecumseh
ONTARIO · CANADA

TOWN OF TECUMSEH
STORM DRAINAGE MASTER PLAN

1:100 YEAR EXISTING VS FUTURE CONDITION SURFACE FLOODING - PROBLEM AREA W-3
FIGURE 11.19

- PUMP STATION SERVICE AREA
- STUDY AREA
- SURFACE PONDING WITHIN AREA MAINTAINED BELOW 0.30m
- REGIONAL SURFACE FLOODING PROBLEM AREAS
- ISOLATED SURFACE FLOODING PROBLEM AREAS
- PARKLAND / PRIVATE PROPERTY NOT TO BE ANALYZED
- SURFACE PONDING BETWEEN 0.15m - 0.30m DEPTH
- SURFACE PONDING > 0.30m DEPTH

SCALE 1:NTS

MAP CREATED BY: SZ
MAP CHECKED BY: RTL
MAP PROJECTION: NAD 1983 UTM Zone 17N

FILE LOCATION: \\DILLON.CA\DILLON_DFS\LONDON\LONDON CAD\GIS\VISUAL COMMUNICATIONS D\MXD TEMPLATES\BEIGE - 11X17 LANDSCAPE - LEGEND RIGHT.MXD

DILLON CONSULTING

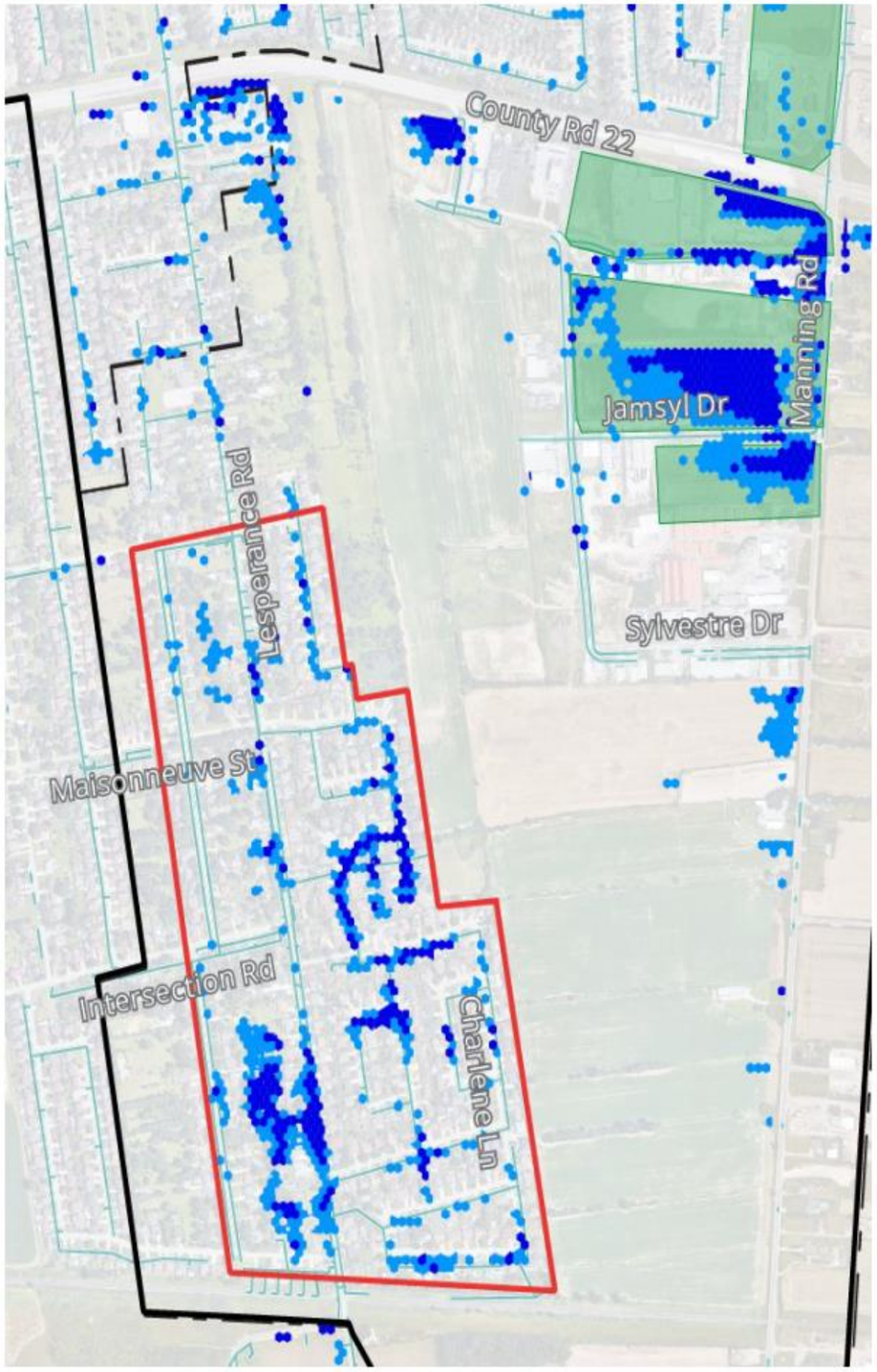
PROJECT: 16-4880
STATUS: FINAL
DATE: JUNE 2019

Future Surface Flooding Comparisons
West of Manning Road – Problem Area W3

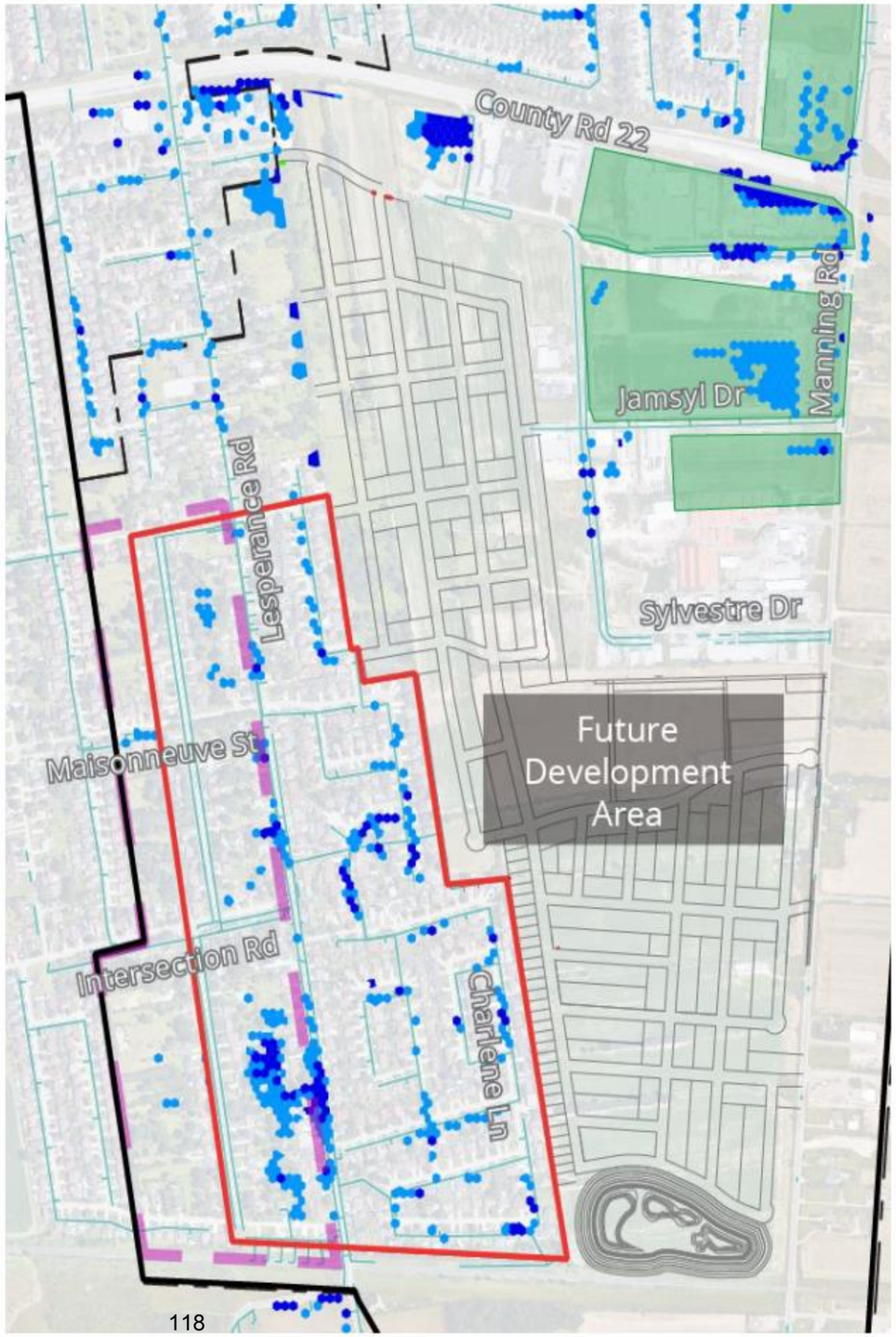
DILLON CONSULTING

TECUMSEH ON

EXISTING CONDITION
(1:100 YEAR + 40% SURFACE PONDING SIMULATION)



FUTURE CONDITION
(1:100 YEAR + 40% SURFACE PONDING SIMULATION)



TOWN OF Tecumseh
ONTARIO · CANADA

TOWN OF TECUMSEH
STORM DRAINAGE MASTER PLAN

1:100 YEAR + 40% EXISTING VS FUTURE CONDITION SURFACE FLOODING - PROBLEM AREA W-3
FIGURE 11.20

- PUMP STATION SERVICE AREA
- STUDY AREA
- SURFACE PONDING WITHIN AREA MAINTAINED BELOW 0.30m
- REGIONAL SURFACE FLOODING PROBLEM AREAS
- ISOLATED SURFACE FLOODING PROBLEM AREAS
- PARKLAND / PRIVATE PROPERTY NOT TO BE ANALYZED
- SURFACE PONDING BETWEEN 0.15m - 0.30m DEPTH
- SURFACE PONDING > 0.30m DEPTH

SCALE 1:NTS

MAP CREATED BY: SZ
MAP CHECKED BY: RTL
MAP PROJECTION: NAD 1983 UTM Zone 17N

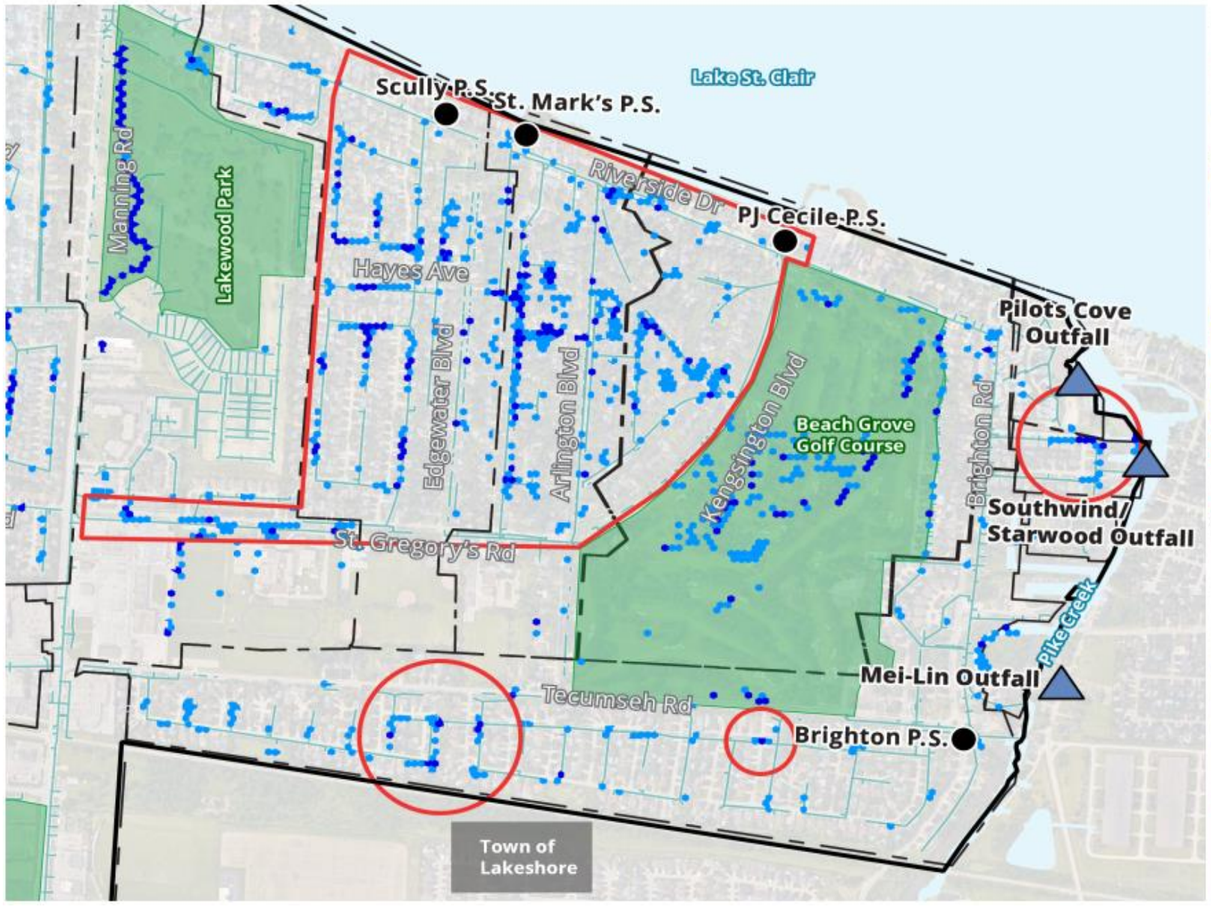
FILE LOCATION: \\DILLON.CA\DILLON_DFS\LONDON\LONDON CAD\GIS\VISUAL COMMUNICATIONS D\MXD TEMPLATES\BEIGE - 11X17 LANDSCAPE - LEGEND RIGHT.MXD

DILLON CONSULTING

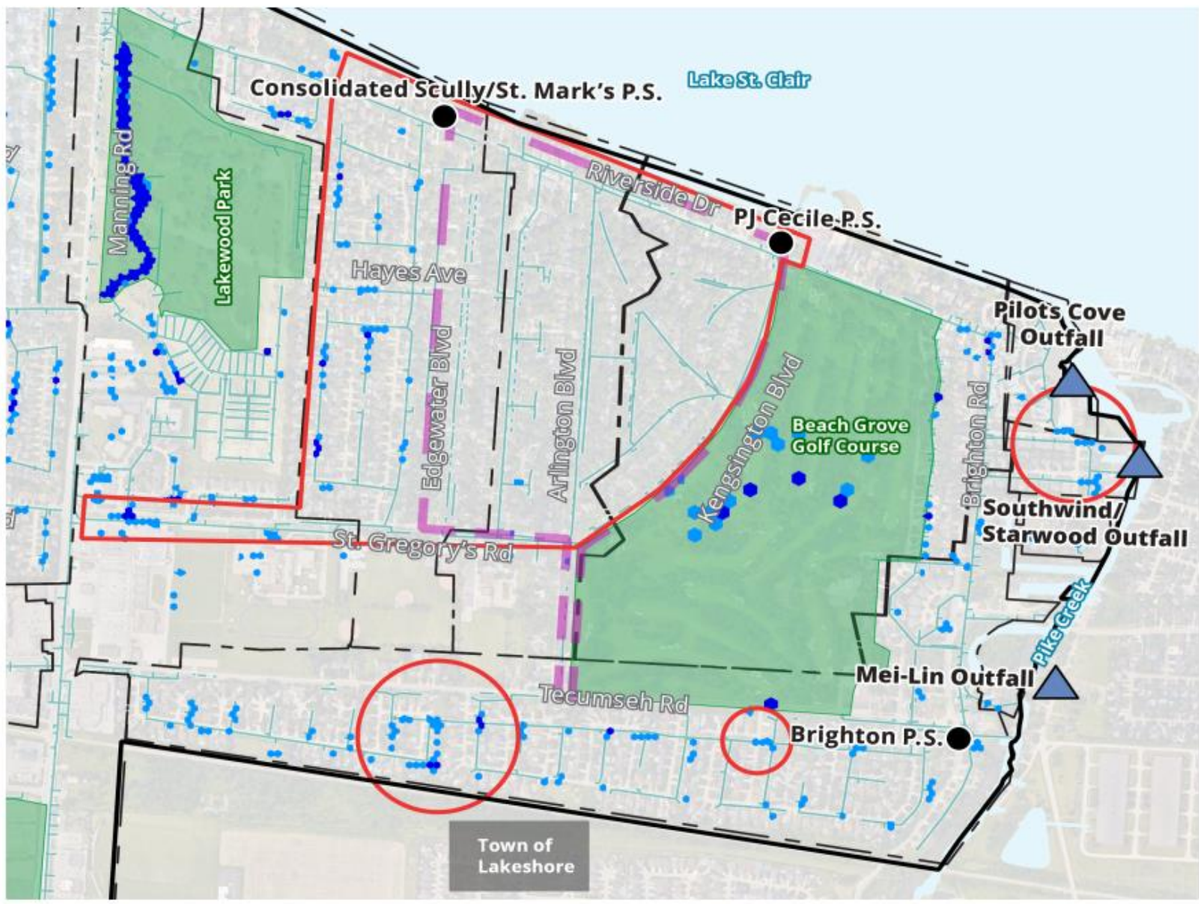
PROJECT: 16-4880
STATUS: FINAL
DATE: JUNE 2019

Future Surface Flooding Comparisons
East of Manning Road – Problem Area E1

EXISTING CONDITION (1:100 YEAR SURFACE PONDING SIMULATION)



FUTURE CONDITION (1:100 YEAR SURFACE PONDING SIMULATION)



TOWN OF TECUMSEH
STORM DRAINAGE MASTER PLAN

1:100 YEAR EXISTING VS FUTURE CONDITION SURFACE FLOODING - PROBLEM AREA E-1
FIGURE 11.21

- SEWER GRAVITY OUTFALL
- PUMP STATION (P.S.)
- PUMP STATION SERVICE AREA
- STUDY AREA
- SURFACE PONDING WITHIN AREA MAINTAINED BELOW 0.30m
- REGIONAL SURFACE FLOODING PROBLEM AREAS
- ISOLATED SURFACE FLOODING PROBLEM AREAS
- PARKLAND / PRIVATE PROPERTY NOT TO BE ANALYZED
- SURFACE PONDING BETWEEN 0.15m - 0.30m DEPTH
- SURFACE PONDING > 0.30m DEPTH

MAP CREATED BY: SZ
MAP CHECKED BY: RTL
MAP PROJECTION: NAD 1983 UTM Zone 17N
FILE LOCATION: \\DILLON.CA\DILLON_DFS\LONDON\LONDON CAD\GIS\VISUAL COMMUNICATIONS DI\MXD TEMPLATES\BEIGE - 11X17 LANDSCAPE - LEGEND BOTTOM.MXD

SCALE 1:NTS

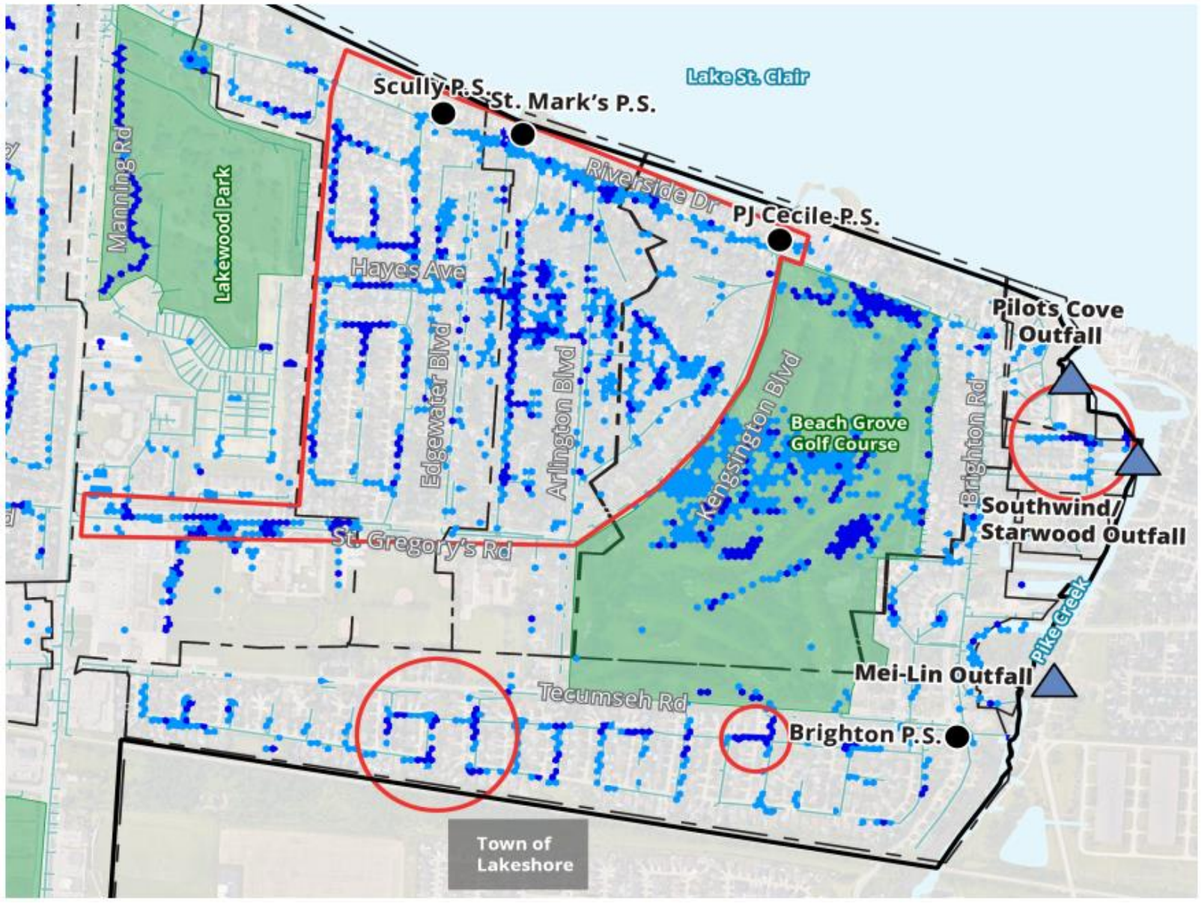
PROJECT: 16-4880 STATUS: FINAL DATE: JUNE 2019

Future Surface Flooding Comparisons
East of Manning Road – Problem Area E1

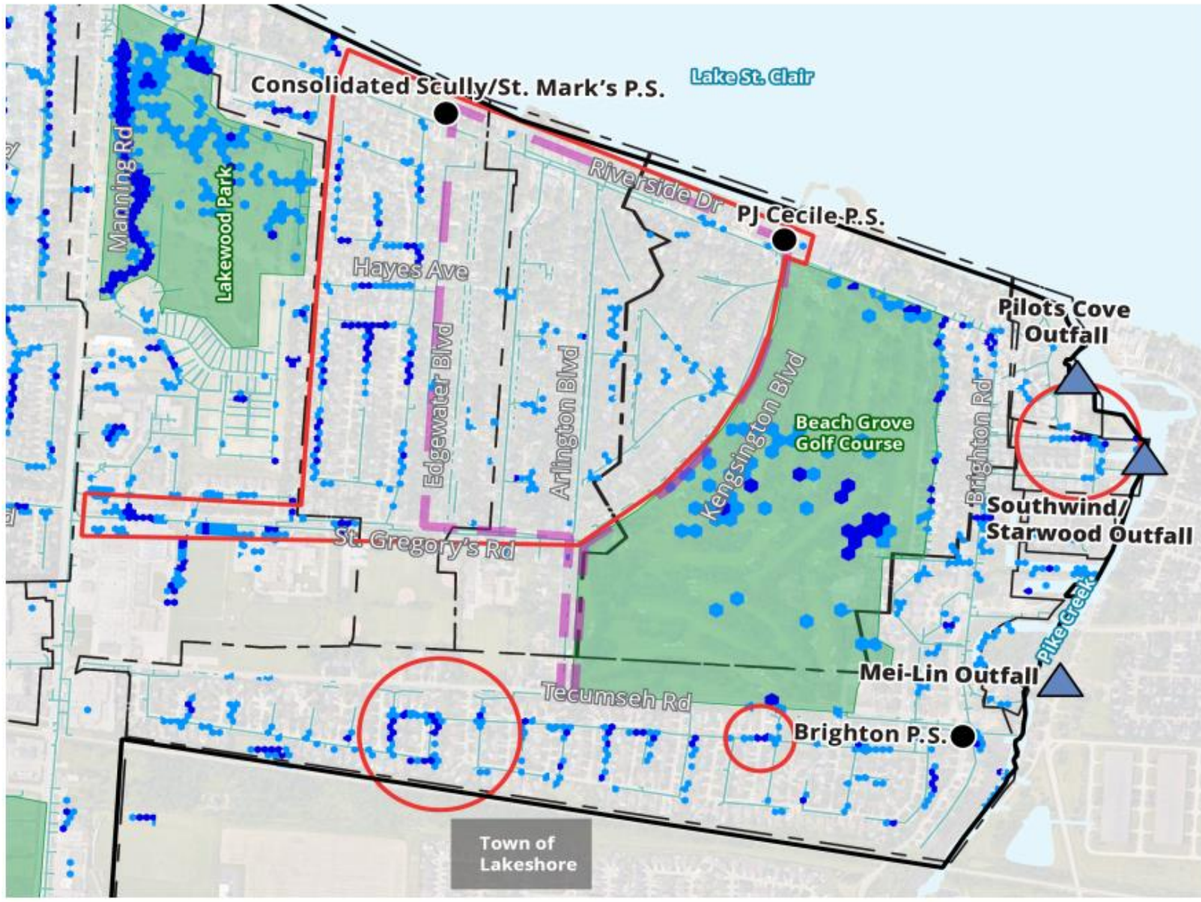
DILLON CONSULTING

TECUMSEH ON

EXISTING CONDITION (1:100 YEAR + 40% SURFACE PONDING SIMULATION)



FUTURE CONDITION (1:100 YEAR + 40% SURFACE PONDING SIMULATION)



TOWN OF TECUMSEH
STORM DRAINAGE MASTER PLAN

1:100 YEAR +40% EXISTING VS FUTURE CONDITION SURFACE FLOODING - PROBLEM AREA E-1
FIGURE 11.22

TOWN OF Tecumseh ONTARIO · CANADA

- SEWER GRAVITY OUTFALL
- PUMP STATION (P.S.)
- PUMP STATION SERVICE AREA
- STUDY AREA
- SURFACE PONDING WITHIN AREA MAINTAINED BELOW 0.30m
- REGIONAL SURFACE FLOODING PROBLEM AREAS
- ISOLATED SURFACE FLOODING PROBLEM AREAS
- PARKLAND / PRIVATE PROPERTY NOT TO BE ANALYZED
- SURFACE PONDING BETWEEN 0.15m - 0.30m DEPTH
- SURFACE PONDING > 0.30m DEPTH

DILLON CONSULTING

MAP CREATED BY: SZ
MAP CHECKED BY: RTL
MAP PROJECTION: NAD 1983 UTM Zone 17N

FILE LOCATION: \\DILLON.CA\DILLON_DFS\LONDON\LONDON CAD\GIS\VISUAL COMMUNICATIONS DI\MXD TEMPLATES\BEIGE - 11X17 LANDSCAPE - LEGEND BOTTOM.MXD

SCALE 1:NTS

PROJECT: 16-4880 STATUS: FINAL DATE: JUNE 2019

Schedule B Project Summary

The Tecumseh Storm Drainage Master Plan followed the requirements of Approach 2 of the Class EA, which addresses the requirements for specific Schedule B projects.

The following **Schedule B** projects were identified in this study:

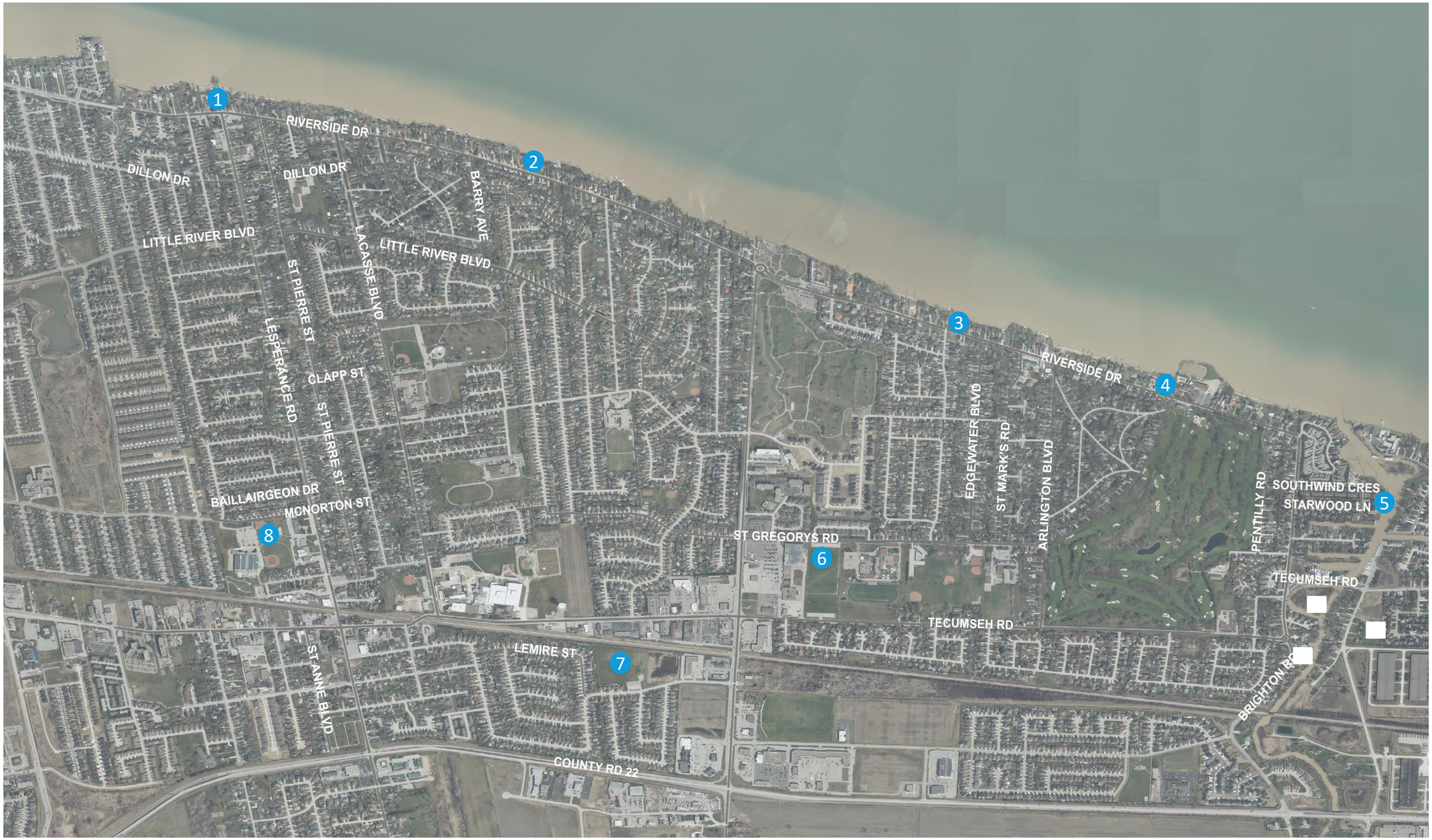
Pump Station Improvements

- Upgrade and replace the existing Lesperance Road pump station with a new pump station and outlet;
- Expand the West St. Louis pump station;
- Upgrade and replace the St. Mark's and Scully pump stations with a new consolidated pump station at the existing Scully pump station site;
- Upgrade and replace the existing PJ Ceceile pump station with a new pump station and outlet; and
- Construct a new storm pump station on Southwind Crescent.

Underground/Aboveground Storage

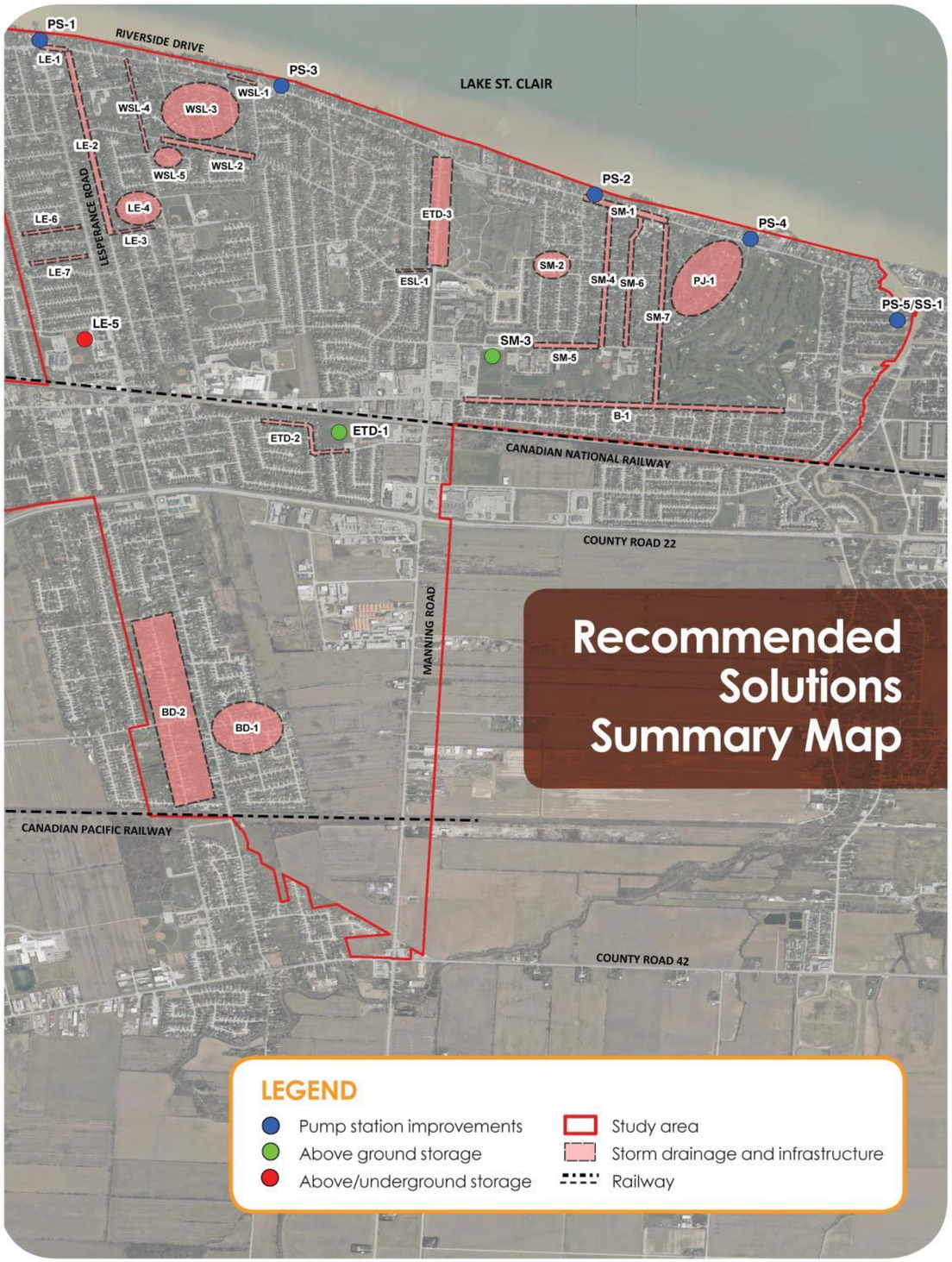
- Incorporate surface storage within the "Tecumseh Soccer Fields" owned by École Secondaire L'Essor;
- Incorporate surface storage within Buster Reaume Park; and
- Incorporate underground/surface storage behind the Tecumseh Town Hall property.

Schedule B Project Location Map



1. Lesperance Storm Pump Station
2. West St. Louis Storm Pump Station
3. Consolidated Scully/St. Marks Storm Pump Station
4. PJ Cecile Storm Pump Station
5. Southwind Crescent Storm Pump Station
6. Surface Storage in Tecumseh Soccer Field
7. Surface Storage in Buster Reaume Park
8. Surface and Underground Storage in Tecumseh Centre Park

Estimated Costs of Recommended Surface Flooding Solutions



RECOMMENDED IMPROVEMENTS	ESTIMATED COST
Lesperance Pump Station Service Area	$30.53 MILLION
West St. Louis Pump Station Service Area	$20.95 MILLION
East St. Louis And East Townline Drain Pump Station Service Area	$6.97 MIILLION
Baillargeon Drain Service Area	$7.73 MILLION
Consolidated Scully/St. Mark's Pump Station Service Area	$22.70 MILLION
P. J. Cecile Pump Station Service Area	$12.86 MILLION
Brighton Pump Station Service Area	$3.80 MILLION
Southwind/Starwood Service Area	$1.05 MILLION
TOTAL	**$106.59 MILLION**

Notes:

- *Cost estimates include:*
  - *Removal and restoration of one pavement lane width.*
  - *Flow control chambers, temporary pipes and pumps, decommissioning and demolishing of old pump stations, and new outfalls or improvements to existing outfalls.*

- *Cost estimates do not include:*
  - *Other infrastructure improvements and utility relocations.*
  - *Applicable taxes*
  - *Property acquisitions*

Next Steps

- UPDATE the Final Storm Drainage Master Plan documents based on Town Council Comments;
- RECEIVE Town Council Approval to issue Notice of Completion; and
- PUBLISH the Executive Summary, Environmental Assessment Document (VOLUME 1) and Technical Modelling Report (VOLUME 2) for a 30-day public review period.

THANK YOU