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LAWSS

Water Master Plan Update: Municipal Class Environmental Assessment Report

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List of Acronyms

CHAR	Cultural Heritage Assessment Report
CWA	Clean Water Act
DBH	Diameter at Breast Height
EA	Environmental Assessment
EAA	Environmental Assessment Act
ECA	Environmental Compliance Approval
EIS	Environmental Impact Study
ELC	Ecological Land Classification
END	Endangered
ESA	Endangered Species Act
ESR	Environmental Study Report
IPZ	Intake Protection Zone
HVA	Highly Vulnerable Area
KM	Kilometre
LOS	Level of Service
MECP	Ministry of the Environment, Conservation and Parks
MHSTCI	Ministry of Heritage, Sport, Tourism and Culture Industries (Formerly MTCS)
MCEA	Municipal Class Environmental Assessment
MEA	Ontario Municipal Engineers Association
MNRF	Ontario Ministry of Natural Resources & Forestry
NHRM	Natural Heritage Reference Manual
OP	Official Plan
O'Reg.	Ontario Regulation
PIC	Public Information Centre
PPS	Provincial Policy Statement
PS	Pump Station
PSW	Provincially Significant Wetland
PTTW	Permit to Take Water
PVC	Polyvinyl Chloride
ROW	Right-of-Way
SAR	Species at Risk
SARA	Species at Risk Act
SC	Special Concern
SGRA	Significant Groundwater Recharge Area
SCRCA	St Clair Region Conservation Authority
SPP	Source Protection Plan
SWP	Source Water Protection
SWH	Significant Wildlife Habitat
SWM	Stormwater Management
SWMF	Stormwater Management Facility
THR	Threatened
WHPA	Well Head Protection Area
WTP	Water Treatment Plant

Executive Summary

AECOM Canada Ltd. (AECOM) was retained by the Lambton Area Water Supply System (LAWSS) to review and update its 2015 LAWSS Master Plan. The LAWSS is owned by its member municipalities[1] and operated by the Ontario Clean Water Agency (OCWA) on behalf of the LAWSS Joint Board of Management. LAWSS currently supplies water to over 100,000 customers via three Supply Systems that service the City of Sarnia, Village of Point Edward, Township of St. Clair, Municipality of Lambton Shores (Forest), Town of Plympton-Wyoming, Village of Watford/Township of Warwick and Municipality of Brooke-Alvinston. The LAWSS also maintains connections with Chatham Kent (Wallaceburg), Petrolia, Alvinston and Lambton Shores (Ravenswood).

This Master Plan study is based on the 2015 water servicing strategy which identified the capital the project upgrades (e.g. new watermains, pumping or storage facilities) needed to provide sustainable municipal water and accommodate future growth in LAWSS member municipalities over the next 20 years and beyond.

This Master Plan Update addresses the requirements of the first two phases of the Municipal Class Environmental Assessment (MCEA) manual (October 2000, as amended in 2007, 2011 and 2015), which is approved under the Ontario Environmental Assessment Act. The Master Plan also fulfills requirements for select Schedule 'B' water supply improvement projects under the MCEA process.

Study Area

The LAWSS Master Plan Study Area encompasses the entire LAWSS water supply system, including all LAWSS infrastructure within three pressure zones, including:

Refer to **Table ES1** to see LAWSS member municipalities and their respective pressure zone.

- Lambton Water Treatment Plant;
- East Lambton Pumping Station and Reservoir;
- West Lambton Pumping Station and Reservoir;
- Forest Standpipe;
- Watford Standpipe;
- Port Lambton Standpipe; and

[1] Member Municipalities include: Point Edward, Sarnia, St. Clair, Chatham-Kent, Lambton Shores (Forest), Plympton Wyoming, Watford / Warwick, Petrolia, and Alvinston.

- Indian Road Elevated Storage Tank;
- All watermains and transmission mains of various sizes.

Table ES1: LAWSS Member Municipalities

Zone 1	Zone 2	Zone 3
• Point Edward • Sarnia • St. Clair • Chatham-Kent	• Lambton Shores (Forest) • Plympton / Wyoming	• Watford / Warwick • Plympton / Wyoming • Petrolia • Alvinston

Problem and Opportunity Statement

The Problem and Opportunity Statement is the principle starting point in the undertaking of a MCEA and becomes the central theme and integrating element of the Project. It also assists in setting the scope of the Project. The MCEA Problem and Opportunity Statement is as follows:

Problem:

- Near- and long-term growth is expected in specific areas of the LAWSS distribution system service area. As such, there is a need for improving water servicing in a sustainable manner that can be logically phased. Additional infrastructure and improvements to the existing system must be in place in a timely and orderly manner to service approved growth.
- A detailed cost phasing and implementation plan is required to allow the LAWSS Joint Management Board to develop a capital works program and budget.

Opportunity:

- To develop a water utility infrastructure master plan or “road map” that will support future capital works planning including funding opportunities and meet the needs of existing and future water customers.
- There is also the potential to reconfigure the West Lambton Pumping Station/Reservoir and avoid expensive rehabilitation.

Current Water Supply System Issues

The current water supply system has fill constraint and low-pressure issues at three locations, including the East Lambton Pump Station, the Watford Standpipe, and the West Lambton Pump Station (Refer to **Figure ES1**) A fill constraint refers to difficulty in getting the right amount of water to the reservoir or stand pipe /elevated tank which is

Legend

LAWSSPressure Zones

- ZONE 1
- ZONE 2
- ZONE 3
- Interconnect Points
- Existing LAWSSS Watermains
- LAWSS WTP
- Wyoming Standpipe
- Forest Standpipe
- Watford Standpipe
- Indian Road Tower
- Port Lambton Standpipe
- West Lambton Pumping Station
- East Lambton Reservoir and Pumping Station

Ravenswood (Lambton Shores) Interconnection

Issue #1 (Pressure Zone 1): East Lambton Pump Station Fill Constraint / Low Pressures

Issue #2 (Pressure Zone 3): Watford Standpipe Fill Constraint / Low Pressures

Issue #3 (Pressure Zone 1): West Lambton Pump Station Fill Constraint / Low Pressures

Petrollia Emergency Connection

Alvinston Connection

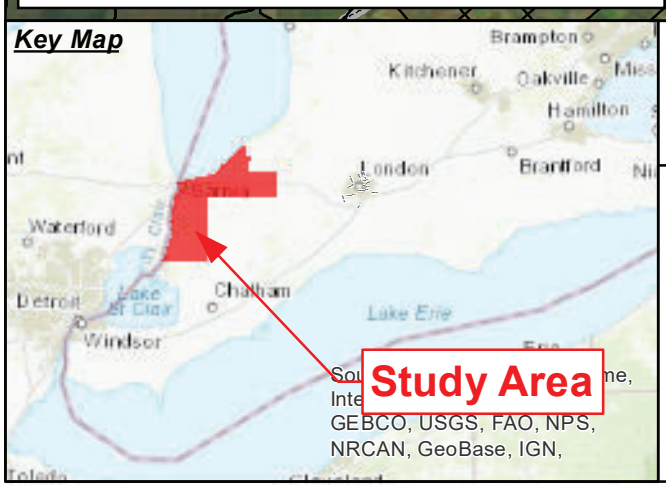
Wallaceburg Interconnection

Lakeshore Rd, King St, Thomson Line, Rawlings Rd, Northville Rd, Arkona Rd, Townsend Line, Nauvoo Rd, Egremont Rd, Highway 402, Oil Heritage Rd, Forest Rd, London Line, Broadway St, Confederation Line, Kerwood Rd, Front St, Indian Rd, Modeland Rd, Vidal St, Plank Rd, Churchill Line, Lasalle Line, Lyndoch St, Hill St, Petrolia Line, Highway 40, Kimball Rd, Mandaumin Rd, Marthaville Rd, Courtright Line, Inwood Rd, Calvert Dr, Dundonald Rd, St Clair Pky, Holt Line, Bentpath Line, Cairo Rd, Concession Dr, Hagerty Rd, Shetland Rd, Oakdale Rd, Florence Rd, Jane Rd, Peter Rd, Clachan Rd, Little John Rd, Irish School Rd, Croton Line, McCreary Line, Dufferin Ave, Murray St, Baseline, Centre Sideroad, Kent Bridge Rd, Longwoods Rd, Highway 401

0 4,100 8,200 16,400 Metres

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Key Map



Lambton Area Water Supply System Water Master Plan Update

Legend

Junction Pressures

- 0-40 psi
- 40 - 50 psi
- 50 - 80 psi
- 80 - 100 psi
- >100 psi

Figure ES1: System Issue Locations

Date:	PN:	Datum: NAD83 UTM17
June 2021	60624749	Source: LIO, LAWSS

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needed for water supply and system pressure. These are the issues that this Master Plan Update intended to address.

Phase 2 Alternative Solutions

1. **Do Nothing** – Assumes no improvements will be made beyond those already planned or approved. Regular maintenance activities will continue.

2. **Limit Growth** – Assumes no improvements will be made beyond those already planned or approved and includes measures to limit future development in the study area.

3. **Expand / Upgrade Existing System Components to Address Pressure and Fill Constraints –** Includes improving the system with new or upgraded transmission mains, watermains, storage facilities, booster pumping stations and other required projects to meet future demands and address existing issues.

4. **Continue to Implement Water Conservation and Efficiency Programs –** Primarily implemented by LAWSS member municipalities and includes public education, directing water conservation through the Building Code and repairs to leaking watermains.

The above identified alternative solutions were screened against the problem and opportunity statement. Do Nothing, Limit Growth and Continue to Implement Water Conservation and Efficiency Programs were screened out because it was determined that these solutions will not address the project needs or address the problem and opportunity statement.

System Upgrades / Expansion was carried forward for further examination. To meet the needs of the existing system and for future growth, system upgrade solutions are examined and evaluated in the next sections. While water conservation and efficiency programs can not address the problem and opportunity statement on their own, they will continue to be implemented, recognizing their benefits.

Alternatives for System Upgrades / Expansion

The system upgrades and improvements were separated into three different areas, one for each of the water supply systems fill constraint and low-pressure issues identified in the hydraulic modeling.

Issue 1

Four alternative solutions were identified to address the low pressures and fill constraints:

1. Repurposing an existing water transmission main from the Water Treatment Plant (WTP) in Sarnia to London Line just west of Telfer Road;

2. New Booster Pumping Station between the WTP and the East Lambton Booster Station;

3. New 600mm feedermain from the WTP to the East Lambton Booster Station and Reservoir; and

4. New local watermain from the East Lambton Booster Station to Mandaumin Road.

Based on the evaluation process, the preferred alternative is **Alternative 4 – New Local Watermain from East Lambton Pumping Station.** This alternative involves constructing a new 150mm watermain parallel to the existing transmission main from the East Lambton Pumping Station to Mandaumin Road. (Refer to **Figure ES2)**

Issue 2

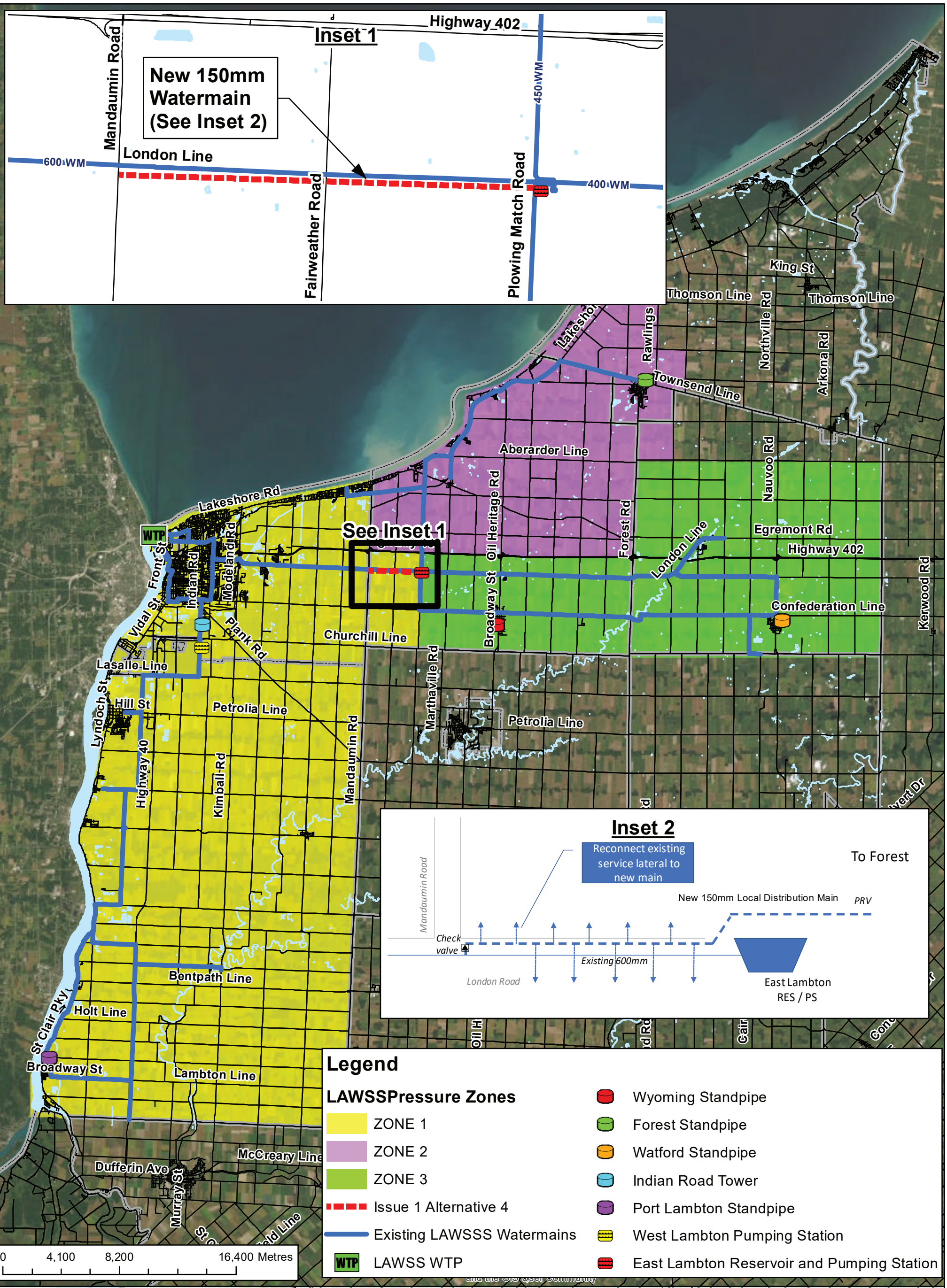
Three alternative solutions were identified to address the low pressures and fill constraints:

1. New transmission main along London Line from the East Lambton Pumping Station to the Watford Standpipe;

2. New Pressure Zone in East Lambton (Watford); and

3. New Pressure Zone in East Lambton (Watford) with a new booster station and transmission main along London Line. This would include siting a new booster pumping station in the Town of Plympton Wyoming.

Based on the evaluation process, the preferred alternative is **Alternative 3 – New Pressure Zone in East Lambton (Watford).** This alternative involves LAWSS acquiring the Wyoming Standpipe from the Town of Plympton Wyoming and constructing a new 350mm watermain from the Wyoming Standpipe to London Line (includes CPR crossing). This also includes constructing a new 350 transmission main on London Line from Oil Heritage Road to Zion Line with a connection to Confederation



Lambton Area Water Supply System Water Master Plan Update

Figure ES2: Issue 1 Preferred -New Local Watermain from East Lambton

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Line and constructing a new booster pumping station in the area of London Line and South Plympton Road. (Refer to **Figure ES3)**

Further evaluations were required to determine the routing of the 350mm watermain, the connection to Confederation Line and the location of the new booster pumping station.

Routing of Preferred Alternative Issue 2 350mm Watermain

There were two alternatives evaluated for the routing of the 350mm watermain from the Wyoming Standpipe to London Line:

1. From Wyoming Standpipe along Front Street to Broadway Street

2. From Wyoming Standpipe along London Street to Confederation Line to Broadway Street

Based on the evaluation process, the preferred alternative is **Alternative 2 – London Street Routing.** This alternative involves routing the 350mm watermain north along London Street (includes CPR crossing) to Front Street. It will follow Front Street easterly until Broadway Street where it will go north until connecting at Confederation Line. (Refer to **Figure ES4**)

Routing of Preferred Alternative Issue 2 200mm Watermain Connection

There were two alternatives evaluated for the routing of the 200mm watermain from London Line to Confederation Line:

1. Stewardson Road; and

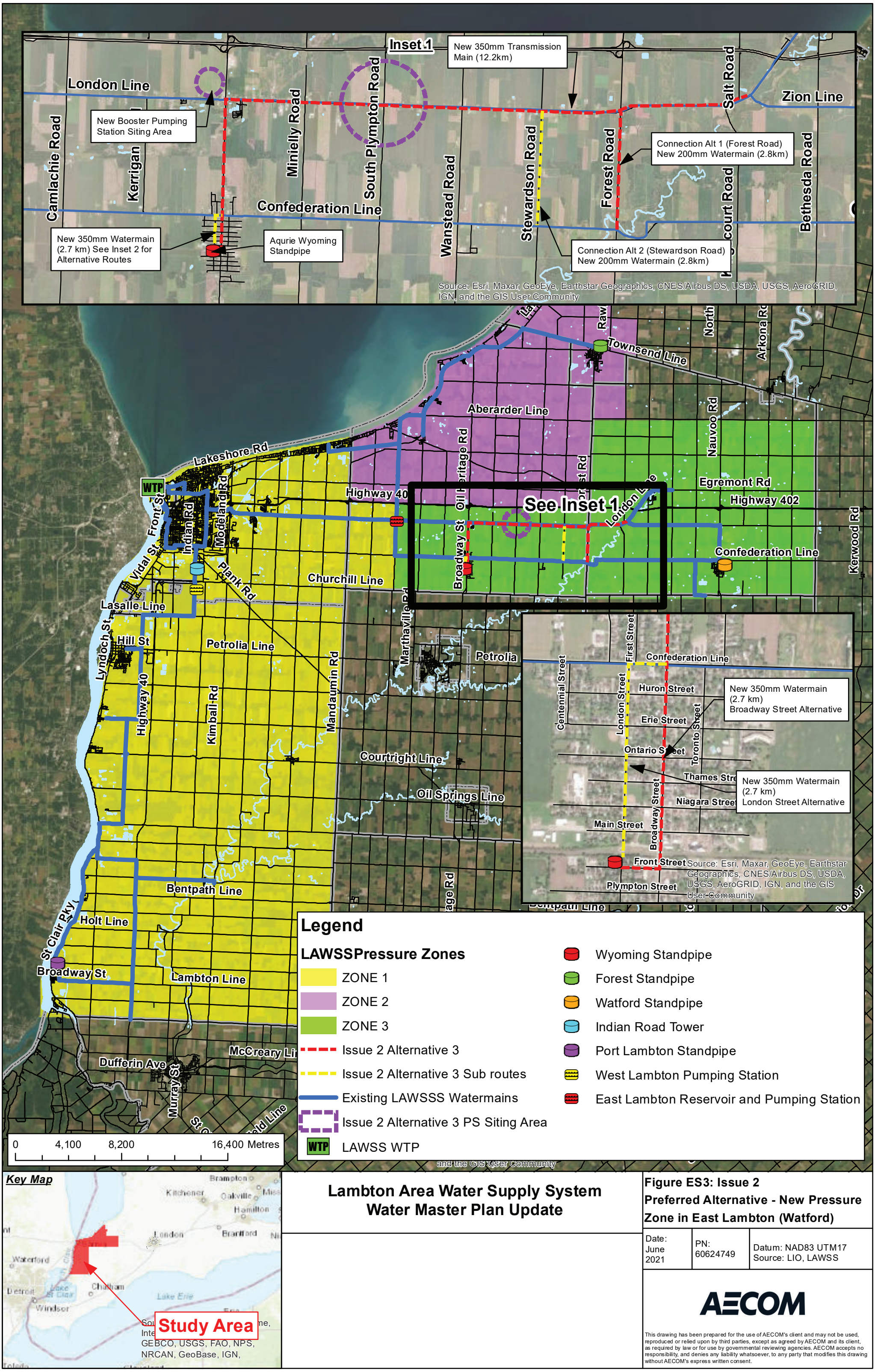
2. Forest Road.

Based on the evaluation process, the preferred alternative is **Alternative 2 – Stewardson Road Routing.** This alternative involves routing the 200mm watermain along Stewardson Road from London Line to Confederation Line. (Refer to **Figure ES4**)

Selection of Preferred Alternative Issue 2 Booster Pumping Station Site

There were four alternatives evaluated for the siting of the new booster pumping station:

1. Northwest corner of London Line and South Plympton Road;
2. Northeast corner of London Line and South Plympton Road;
3. Southeast corner of London Line and South Plympton Road; and



Lambton Area Water Supply System Water Master Plan Update

Figure ES3: Issue 2 Preferred Alternative - New Pressure Zone in East Lambton (Watford)

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Inset 1

New 350mm Transmission Main (12.2km)

London Line

New Booster Pumping Station Siting Area

Camlachie Road

Kerrigan

Minielly Road

South Plympton Road

Wanstead Road

Stewardson Road

Forest Road

Salt Road

Zion Line

Bethesda Road

court Road

Confederation Line

New 350mm Watermain (2.7 km) Preferred Route London Street (See Inset 2)

Aqurie Wyoming Standpipe

Preferred Watermain Connection Route (Stewardson Road) New 200mm Watermain (2.8km)

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Townsend Line

Aberarder Line

North

Arkona Rd

Nauvoo Rd

Lakeshore Rd

WTP

Highway 40

Egremont Rd

Highway 402

See Inset 1

Oil Heritage Rd

Broadway St

London Line

Confederation Line

Kerwood Rd

Front St

Indian Rd

Modeland Rd

Vidal St

Plank Rd

Churchill Line

Lasalle Line

Lyndoch St

Hill St

Petrolia Line

Marthaville Rd

Petrolia

Mandaumin Rd

Highway 40

Kimball Rd

Courtright Line

Oil Springs Line

Bentpath Line

Holt Line

St Clair Pky

Broadway St

Lambton Line

McCreary Line

Dufferin Ave

Murray St

Inset 2

First Street

Confederation Line

Centennial Street

London Street

Huron Street

Erie Street

Toronto Street

Ontario Street

Thames Street

Broadway Street

Niagara Street

Main Street

Front Street

Plympton Street

New 350mm Watermain (2.7 km) London Street Preferred Route

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

LAWSSPressure Zones

- ZONE 1
- ZONE 2
- ZONE 3
- Issue 2 Alternative 3
- Issue 2 Alternative 3 Sub routes
- Existing LAWSSS Watermains
- Issue 2 Alternative 3 PS Siting Area
- LAWSS WTP
- Wyoming Standpipe
- Forest Standpipe
- Watford Standpipe
- Indian Road Tower
- Port Lambton Standpipe
- West Lambton Pumping Station
- East Lambton Reservoir and Pumping Station

0 4,100 8,200 16,400 Metres

Key Map

Study Area

Source: Esri, Maxar, GeBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, and the GIS User Community

Lambton Area Water Supply System Water Master Plan Update

Figure ES4: Issue 2 Preferred Alternative Watermain Routes

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4. Town of Plympton Wyoming Works Yard at London Line and Oil Heritage Road

Based on the evaluation process, the preferred alternative is **Alternative 4 – Town of Plympton Wyoming Works Yard.** This alternative would place the booster pumping station within the works yard property limits. The exact location within the works yard will be determined during detailed design. (Refer to **Figure ES5**). The availability of the Booster Pumping Station lands will depend on the Towns ability to expand the existing Public Works Yard facility and lands.

Issue 3

For Issue 3, the 2011 LAWSS Grid Reinforcement and Transmission Main Twinning Municipal Class Environmental Assessment assessed the fill constraint issue and recommended twinning the transmission main. The recommendation of this EA has been confirmed in an addendum. To increase supply for St. Clair Township's planned growth and provide continuous supply while filling the reservoir, some pump modifications within the existing pump station will also take place which is a Schedule A+ project. These modifications will have St. Clair Township operated as a separate pressure zone (i.e. Zone 1B).

Project Descriptions

List of Schedule A+ Projects

Schedule A+ projects are considered pre-approved and apply to the following recommended projects:

1. Construction of a new 150mm watermain parallel to the existing transmission main from the East Lambton Pumping Station to Mandaumin Road.
2. Install new check valve on the transmission main on Confederation line east of Wyoming.
3. Install new check valve on the transmission main on London Line west of Oil Heritage Road
4. Acquire the Wyoming Standpipe
5. West Lambton Pumping Station and Reservoir pump modifications

6. Construct a new 350mm watermain from the Wyoming Standpipe to London Line. Routing will follow London Street to Front Street, Front Street to Broadway Street, Broadway Street to London Line. All works will be constructed within existing road allowances.

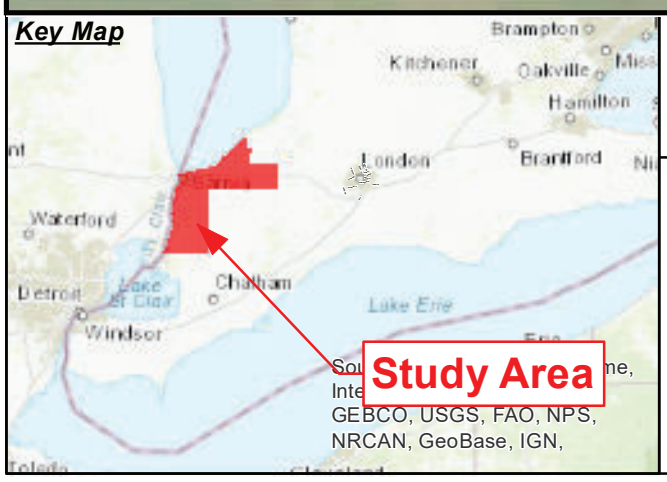
Option 4
~50mx50m
(Exact location to be
confirmed by the Town of Plympton Wyoming)

Town of Plympton Wyoming
Works Yard

Oil Heritage Road

London Line

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Lambton Area Water Supply System
Water Master Plan Update

Figure ES5: Issue 2
Preferred Alternative
Booster Pumping Station Site

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7. Construct a new 350mm transmission main on London Line from Oil Heritage Road to Zion Line. All works will be constructed within existing road allowances.

8. Construct a new 200mm watermain connection on Stewardson Road from London Line to Confederation Line. All works will be constructed within existing road allowances.

List of Schedule B Projects

Schedule B projects require the completion of Phase 1 and Phase 2 of the EA process before construction can begin. This Water Master Plan Update, satisfies Phases 1 and 2 of the EA process for the following project:

Construct a new Booster Pumping Station at the Town of Plympton Wyoming Works Yard. This requires land acquisition from the Town of Plympton Wyoming. Refer to Booster Pumping Station Technical Memo in **Appendix E**.

Summary

This Master Plan Project File Report outlines the process required to ensure that the proposed recommended solutions to the problem and opportunity statement meet the requirements of the *EAA*. The MCEA planning process has not identified any significant environmental concerns that cannot be addressed by incorporating established mitigation measures during construction.

The proposed projects resolve the problem and opportunity statement identified in this report. A preliminary evaluation of potential impacts has been included in the evaluation, which indicates minor and predictable impacts that can be addressed by recommended mitigation measures as presented in **Section 10** of the main report. The proposed mitigation measures will further be developed at detailed design and will form commitments that will be adhered to by the LAWSS. Appropriate public notification and opportunity for comment was provided and no comments were received that could not adequately be addressed. Subject to receiving MCEA clearance following the 30-day review period, the LAWSS can start the detailed design and permitting-approvals phase for selected projects and proceed to construction as outlined in this report.

Table of Contents

page

1 Introduction 6
1.1 Background 6
1.2 Objectives of the Water Master Plan Update 6
1.3 Study Area 7
1.4 Project Team Organization 9
1.5 Municipal Class Environmental Assessment Process 9
1.5.1 Overview 9
1.5.2 Project Planning Schedules 10
1.5.3 Municipal Class EA Master Planning Process 12
1.6 Public Review of Master Plan Project File and Next Steps 13

2 Existing Conditions 16
2.1 Lambton Area Water Supply System 16
2.1.1 Water Supply System Issues 20
2.2 Natural Environment 20
2.2.1 Aquatic 20
2.2.2 Terrestrial 20
2.2.3 Species at Risk 20
2.2.4 Significant Wildlife Habitat 22
2.3 Socio-Economic Environment 24
2.3.1 Existing Land Use 24
2.3.2 Future Land Use 24
2.4 Archaeological Assessment and Built and Cultural Heritage Features 24
2.4.1 Stage 1 Archaeological Assessment 24
2.4.2 Cultural Heritage 24

3 Provincial, Regional and Municipal Planning Context 27
3.1 Provincial Policy Statement 27
3.2 County of Lambton Official Plan 27
3.3 Thames-Sydenham and Region Source Protection Plan 28
3.4 Water Supply Projections 29

4 Phase 1: Problem and Opportunity Statement 33

5 Phase 2: Alternative Solutions 34
5.1 Identification of Phase 2 Solutions 34

6 Assessment of Water Infrastructure 36
6.1 Treatment Capacity Assessment 37
6.2 Storage Capacity Assessment 38
6.3 Pumping Capacity Assessment 39

6.4 Water Network Capacity Assessment 41

7 Identification of Alternatives for System Upgrades and Improvements 43

7.1 Issue 1 (Pressure Zone 1) – East Lambton Pump Station (ELPS) Fill Constraint and Low Pressures 43
7.2 Issue 2 (Pressure Zone 3) – Watford Standpipe Fill Constraint and Low Pressures 48
7.3 Issue 3 (Pressure Zone 1) – West Lambton Pump Station Fill Constraint and Low Pressures 48

8 Evaluation of Alternatives 49

8.1 Evaluation Criteria 49
8.2 Evaluation of Issue 1 Alternatives 50
8.2.1 Preferred Issue 1 Alternative 51
8.3 Evaluation of Issue 2 Alternatives 51
8.3.1 Preferred Issue 2 Alternative 53
8.3.1.1 Evaluation of 350mm watermain (Wyoming Routing) 56
8.3.1.2 Preferred 350mm Watermain Wyoming Routing 57
8.3.1.3 Evaluation of routing the 200mm connection from London Line to Confederation Line 60
8.3.1.4 Preferred 200mm Watermain Routing Alternative 62
8.3.1.5 Evaluation of Booster Pumping Station Siting Areas 62
8.3.1.6 Preferred Booster Pumping Station Siting Area 63
8.3.1.7 Existing East Lambton Pumping Station Upgrades 63
8.4 Issue 3 – Pump Station Modifications 63
8.5 Recommended Capital Works 63

9 Project Descriptions 68

9.1 List of Schedule A+ Pre-approved Projects 68
9.2 Schedule B Projects 68
9.3 Climate Change Considerations 69
9.4 Permits and Approvals 69
9.4.1 St. Clair Region Conservation Authority (SCRCA) 69
9.4.2 Ministry of Environment, Conservation and Parks (MECP) 70
9.4.3 Ministry of Natural Resources (MNRF) 70
9.4.4 Fisheries and Oceans Canada (DFO) 70
9.4.5 Ministry of Heritage, Sport, Tourism and Culture Industries 71
9.4.6 Lambton County and Local Municipality Road Occupancy Permits 71
9.4.7 MECP Amendment to Drinking Water Licence 71
9.4.8 Hydro One Networks Incorporated (HONI) 71
9.4.9 CPR 71

10 Potential Impacts, Recommended Mitigation Measures and Commitments 72

10.1 Potential Impacts and Mitigation Measures 72
10.2 MCEA Commitments 74

10.3 Lapse of Time 75

11 Consultation 76

11.1 Notifications 76
11.1.1 Notice of Commencement and Public Information Centre #1 76
11.1.2 Notice of Public Information Centre #2 76
11.1.3 Notice of Completion 77
11.1.4 PIC #1 77
11.1.5 PIC #2 78
11.2 Agency and Stakeholder Consultation 78
11.3 Indigenous Community Consultation 79

12 Conclusions and Next Steps 80

List of Figures

Figure 1-1: Study Area 8
Figure 1-2: MCEA Planning Process 12
Figure 2-1: Overview of LAWSS Water Distribution System 19
Figure 2-2: Water Supply System Issues 21
Figure 7-1: Issue 1 – Alternative 1 44
Figure 7-2: Issue 1 – Alternative 2 45
Figure 7-3: Issue 1 – Alternative 3 46
Figure 7-4: Issue 1 – Alternative 4 47
Figure 8-1: Issue 1 – Preferred Alternative 52
Figure 8-2: Issue 2 – Preferred Alternative 55
Figure 8-3: Issue 2 – Preferred Alternative Watermain Routing 59
Figure 8-4: Issue 2 – Preferred Alternative – Booster Pump Station Siting 65
Figure 8-5: Issue 2 – Preferred Booster Pump Station Siting Area 66

List of Tables

iv

Table 1-1: LAWSS Member Municipalities 7
Table 2-1: Water Supply Systems 16
Table 2-2: LAWSS Storage Facility Characteristics 17
Table 2-3: LAWSS Pumping Station Facilities Characteristics 18

Table 2-4: Identified Candidate Species at Risk 22
Table 2-5: Identified Candidate SWH 23
Table 2-6: Summary of Built Heritage Resources 25
Table 3-1: LAWSS Water Supply Projections (Average Daily Demand, m^3/day) 30
Table 3-2: LAWSS Water Supply Projections (Maximum Daily Demand, m^3/day) 31
Table 3-3: LAWSS Water Supply Projections (Peak Hour Demand, m^3/day) 32
Table 6-1: Treatment Capacity Assessment Results 37
Table 6-2: Storage Capacity Assessment Results for Zone 1 38
Table 6-3: Storage Capacity Assessment Results for Zone 2 38
Table 6-4: Storage Capacity Assessment Results for Zone 3 39
Table 6-5: Pumping Capacity Assessment Results for Zone 1 39
Table 6-6: Pumping Capacity Assessment Results for Zone 2 40
Table 6-7: Pumping Capacity Assessment Results for Zone 3 40
Table 8-1: Evaluation Criteria 49
Table 8-2: Evaluation of Issue 1 Alternatives Summary 50
Table 8-3: Evaluation Matrix of Issue 1 Alternatives 51
Table 8-4: Evaluation of Issue 2 Alternatives Summary 53
Table 8-5: Evaluation Matrix of Issue 2 Alternatives 54
Table 8-6: Evaluation of Issue 2 Alternatives Summary 57
Table 8-7: Evaluation Matrix of Issue 2 350mm watermain Wyoming Routing Alternatives 58
Table 8-8: Evaluation of Issue 2 200mm Watermain Routing Alternatives Summary 60
Table 8-9: Evaluation Matrix of Issue 2 200mm Watermain Routing Alternatives 61
Table 8-10: Evaluation of Issue 2 Booster Pumping station Locations Summary 62
Table 8-11: Evaluation of Issue 2 Booster Pumping station Locations 64
Table 8-12: Recommended Capital Works Summary 67
Table 10-1: Mitigation/Compensation and Enhancement Measures 72

Appendices

Appendix A. Consultation

A.1 – Notice of Commencement and PIC 1

A.2 – PIC 1

A.3 – PIC 2

A.4 – Indigenous Community Consultation

A.5 – Notice of Completion

Appendix B. Background Reports

B.1 – Hydraulic Modeling Report

B.2 – Stage 1 Archaeological Assessment

B.3 – Stage 1 Archaeological Assessment and Cultural Heritage Assessment Report

B.4 – Natural Heritage Background Report

Appendix C. Detailed Watermain Routing Drawings

Appendix D. Cost Estimates

Appendix E Schedule B Projects Technical Memo

1 Introduction

1.1 Background

AECOM Canada Ltd. (AECOM) was retained by the Lambton Area Water Supply System (LAWSS) to review and update its 2015 LAWSS Master Plan. The LAWSS is owned by its member municipalities[2] and operated by the Ontario Clean Water Agency (OCWA) on behalf of the LAWSS Joint Board of Management. LAWSS currently supplies water to over 100,000 customers via three Supply Systems that service the City of Sarnia, Village of Point Edward, Township of St. Clair, Municipality of Lambton Shores (Forest), Town of Plympton-Wyoming, Village of Watford/Township of Warwick and Municipality of Brooke-Alvinston. The LAWSS also maintains connections with Chatham Kent (Wallaceburg), Petrolia, Alvinston and Lambton Shores (Ravenswood).

This Master Plan study is based on the 2015 water servicing strategy which identified the capital the project upgrades (e.g. new watermains, pumping or storage facilities) needed to provide sustainable municipal water and accommodate future growth in LAWSS member municipalities over the next 20 years and beyond.

This Master Plan Update addresses the requirements of the first two phases of the Municipal Class Environmental Assessment (MCEA) manual (October 2000, as amended in 2007, 2011 and 2015), which is approved under the Ontario Environmental Assessment Act. The Master Plan also fulfills requirements for select Schedule 'B' water supply improvement projects under the MCEA process.

1.2 Objectives of the Water Master Plan Update

The purpose of this MCEA study is to provide a comprehensive and environmentally sound planning process, which is open to public participation, to identify capital project upgrades needed to provide sustainable water and accommodate future growth in LAWSS member municipalities over the next 20 years. The objectives of this study include:

[2] *Member Municipalities include: Point Edward, Sarnia, St. Clair, Chatham-Kent, Lambton Shores (Forest), Plympton Wyoming, Watford / Warwick, Petrolia, and Alvinston.*

- Provide an opportunity to identify supply issues within the existing LAWSS;
- Protect the environment, as identified in the Environmental Assessment Act (EAA), through wise management of resources;
- Consult with affected and interested agencies, Indigenous communities, key stakeholders, and the public;
- Identify a range of alternative solutions that can address system issues during the planning process;
- Identify the measures needed to mitigate any impacts associated with the recommended solutions; and
- Prepare a Master Plan Project File that documents the consultation process followed and complies with the requirements of the MCEA process for Schedule 'B' undertakings.

1.3 Study Area

The LAWSS Master Plan Study Area (Refer **to Figure 1.1**) encompasses the entire LAWSS water supply system, including all LAWSS infrastructure within three pressure zones, including:

▪ Lambton Water Treatment Plant; ▪ East Lambton Pumping Station and Reservoir; ▪ West Lambton Pumping Station and Reservoir; ▪ Indian Road Elevated Storage Tank;	▪ Forest Standpipe; ▪ Watford Standpipe; ▪ Port Lambton Standpipe; and ▪ All watermains and transmission mains of various sizes.

Refer to **Table 1.1** for LAWSS member municipalities and their respective pressure zone.

Table 1-1: LAWSS Member Municipalities

Zone 1	Zone 2	Zone 3
• Point Edward • Sarnia • St. Clair • Chatham-Kent	• Lambton Shores (Forest) • Plympton / Wyoming	• Watford / Warwick • Plympton / Wyoming • Petrolia • Alvinston

Legend

LAWSSPressure Zones

- ZONE 1
- ZONE 2
- ZONE 3
- Interconnect Points
- Existing LAWSSS Watermains
- LAWSS WTP
- Wyoming Standpipe
- Forest Standpipe
- Watford Standpipe
- Indian Road Tower
- Port Lambton Standpipe
- West Lambton Pumping Station
- East Lambton Reservoir and Pumping Station

Ravenswood (Lambton Shores) Interconnection

Petrollia Emergency Connection

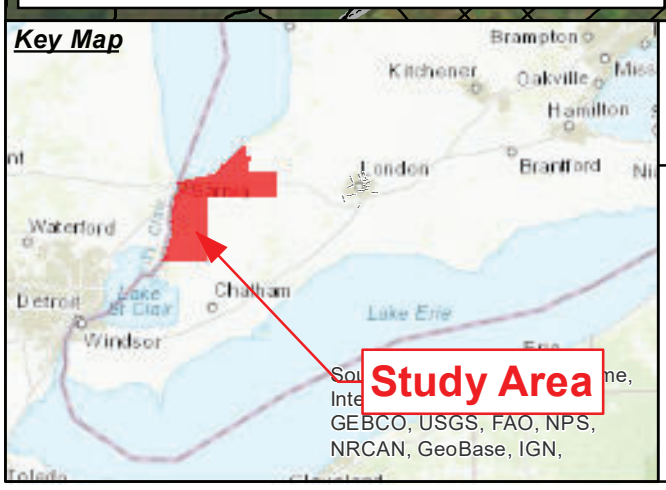
Alvinston Connection

Wallaceburg Interconnection

0 4,100 8,200 16,400 Metres

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Key Map



Lambton Area Water Supply System Water Master Plan Update

Figure 1-1: Study Area

Date:	PN:	Datum: NAD83 UTM17
May 2021	60624749	Source: LIO, LAWSS

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1.4 Project Team Organization

This MCEA Study was undertaken by LAWSS using consulting services provided by AECOM. General direction was provided by LAWSS Joint Board representatives, and Project Team meetings were held at key points throughout the planning process. The LAWSS and Consultant project managers are listed below.

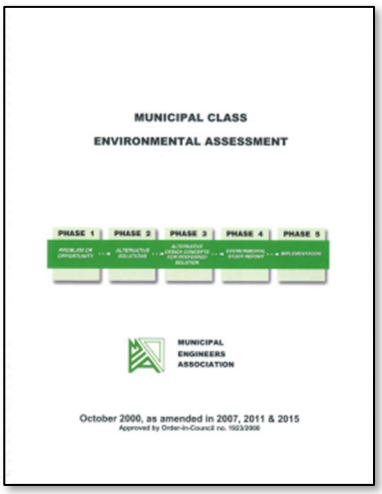
Clinton Harper, CET
General Manager
Lambton Area Water Supply System
1215 Fort Street
Sarnia, Ontario N7V 1M1
clinton.harper@lawss.org

John Haasen, CET, PMP
Consultant Project Manager
AECOM Canada Ltd.
410-250 York Street, Citi Plaza
London, Ontario N6A 6K2
John.Haasen@aecom.com

1.5 Municipal Class Environmental Assessment Process

1.5.1 Overview

All municipalities in Ontario, including the Lambton Area Water Supply System, are subject to the provisions of the Environmental Assessment Act (*EAA)* and its requirements to prepare an Environmental Assessment for applicable public works projects. The Ontario MEA "Municipal Class Environmental Assessment" document (October 2000, as amended in 2007, 2011 and 2015) provides municipalities with a five-phase planning procedure, approved under the *EAA*, to plan and undertake all municipal sewage, water, storm water management and transportation projects that occur frequently, are usually limited in scale and have a predictable range of environmental impacts and applicable mitigation measures.



In Ontario, infrastructure projects such as improvements to the LAWSS are subject to the MCEA process and must follow a series of steps as outlined in the MCEA guide. The MCEA consists of five phases as summarized below:

- ***Phase 1 – Problem or Opportunity:*** Identify the problems or opportunities to be addressed and the needs and justification;
- ***Phase 2 – Alternative Solutions:*** Identify alternative solutions to the problems or opportunities by taking into consideration the existing environment, and establish the preferred solution(s) considering public and agency review and input;
- ***Phase 3 – Alternative Design Concepts for the Preferred Solution:*** Examine alternative methods of implementing the preferred solution based upon the existing environment, public and agency input, anticipated environmental effects and methods of minimizing negative effects and maximizing positive effects;
- ***Phase 4 – Environmental Study Report:*** Document in an ESR, a summary of the rationale, planning, design and consultation process for the project as established through Phases 1 to 3 above and make such documentation available for scrutiny by review agencies and the public; and
- ***Phase 5 – Implementation:*** Complete contract drawings and documents, proceed to construction and operation, and monitor construction for adherence to environmental provisions and commitments. Also, where special conditions dictate, monitor the operation of the completed facilities.

The MCEA process ensures that all projects are carried out with effectiveness, efficiency and fairness. This process serves as a mechanism for understanding economic, social and environmental concerns while implementing improvements to municipal infrastructure.

1.5.2 Project Planning Schedules

The Class EA defines four types of projects and the processes required for each (referred to as Schedule A, A+, B, or C). The selection of the appropriate schedule is dependent on the anticipated level of environmental impact, and for some projects, the anticipated construction costs. Projects are categorized according to their environmental significance and their effects on the surrounding environment. Planning methodologies are described within the Class EA and are different according to Class type, such as the following:

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 pre-approved and may proceed to implementation without following the full Class EA planning process.

Schedule A+: The purpose of Schedule A+ is to ensure some type of public notification for certain projects that are pre-approved under the Class EA. It is appropriate to inform the public of municipal infrastructure project(s) being constructed or implemented in their

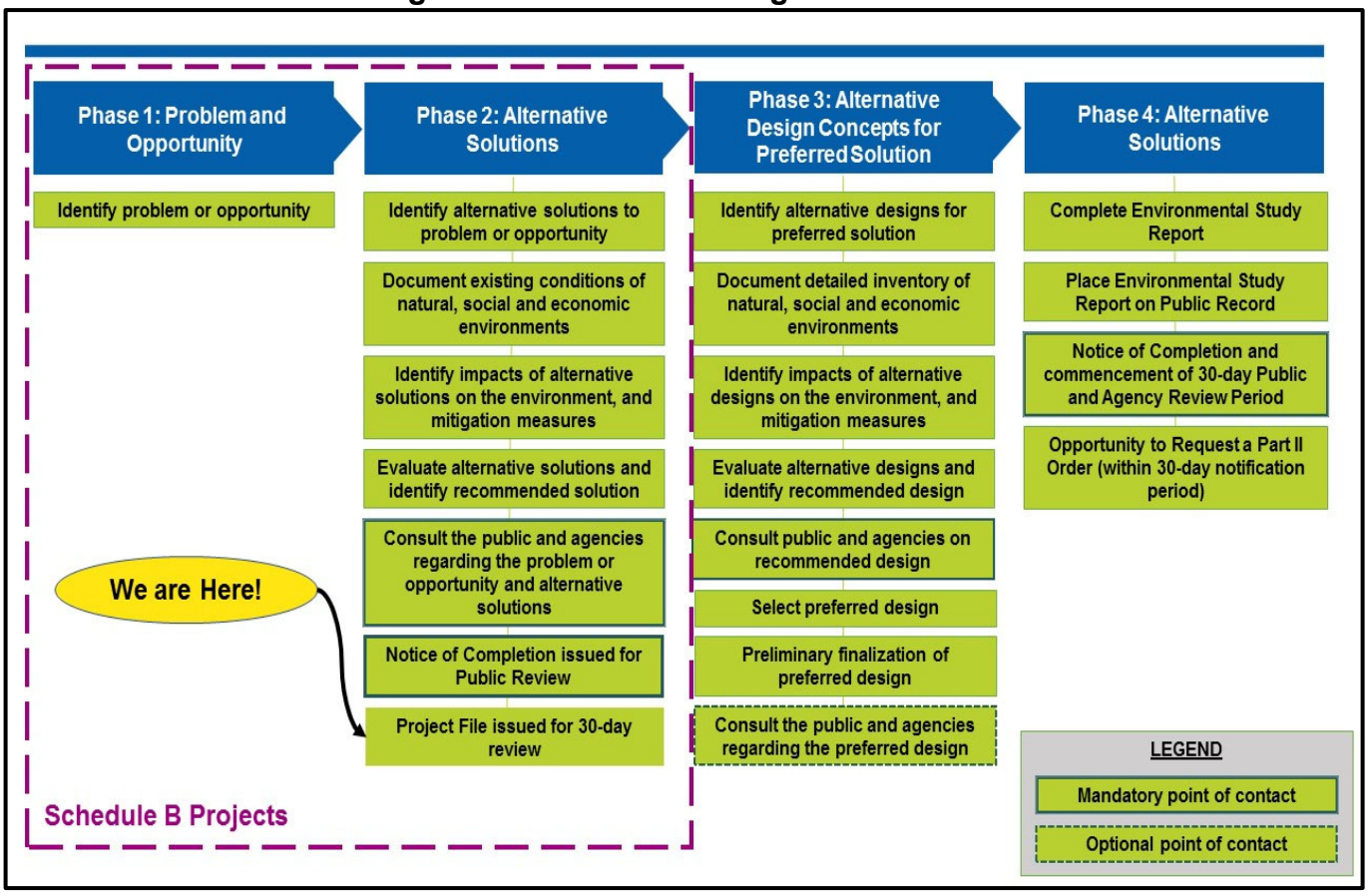
area; however, there would be no ability for the public to request a Part II Order (discussed below).

Schedule B: These projects have the potential for some adverse environmental effects. The proponent is required to undertake a screening process (Phases 1 and 2), involving mandatory contact with directly affected public, Indigenous Communities and with relevant review agencies to ensure 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. At the end of Phase 2, a Project File Report documenting the planning process followed through Phases 1 and 2 shall be finalized and made available for public and agency review.

Schedule C: Such projects have the potential for significant adverse environmental effects and must proceed under the full planning and documentation (Phases 1 to 4) procedures specified in the Class EA document. Schedule C projects require that an Environmental Screening Report (ESR) be prepared and filed for review by the public and review agencies.

Based on a review of the MEA MCEA manual, this project triggers a Schedule 'B' planning process and as such, Phases 1 and 2 of the Municipal MCEA planning process must be completed. Due to this study recommending multiple potential Schedule B projects, this Master Plan Project File Report has been prepared using the Master Plan Approach #2. The Master Plan Project File will be made available for a minimum 30-day review period. **Figure 1-2** illustrates the process followed for the LAWSS MCEA Master Plan Update.

Figure 1-2: MCEA Planning Process



1.5.3 Municipal Class EA Master Planning Process

The MEA MCEA manual recognizes that, in many cases, it is beneficial to utilize the master planning process for projects which have common elements, looking at the overall infrastructure system rather than dealing exhaustively with project specific issues. The LAWSS Joint Management Board has utilized this approach in preparation of this master plan study as the project:

- Has a broad scope and includes an analysis of several municipal infrastructure systems rather than a site-specific problem; and
- Recommends a set of works which are distributed geographically throughout the study area, some of which may be implemented over a period of time.

By planning in this way, the need and justification for individual projects and the associated broader context are better defined.

The MEA MCEA manual outlines four (4) approaches to the master planning process. At a minimum, Master Plans address Phases 1 and 2 of the Municipal Class EA

process. Master Plan Approach #2 involves the preparation of a master plan document (i.e., Master Plan Project File Report) at the conclusion of Phases 1 and 2 of the MCEA process where the level of investigation, consultation and documentation are sufficient to fulfill the requirements for Schedule B projects. For this study, the identified potential Schedule B project includes:

- Siting a New Booster Pumping Station at the Town of Plympton Wyoming works yard (intersection of Oil Heritage Road and London Line) (Refer to **Figure 8.4**).

The final public notice for the master plan serves as the Notice of Completion for the Schedule B projects identified above.

1.6 Public Review of Master Plan Project File and Next Steps

This report comprises the review and documentation for the Master Plan Schedule B requirements for this study. Placement of the report for public review completes Phase 2 of the Project. To facilitate public review of the documentation, copies are available at the following locations during regular business hours:

Online LAWSS Website:

https://www.lawss.org/master-plan

Interested persons may provide written comments to our project team by June 7 2022. All comments and concerns should be sent directly to the Project Managers:

Clinton Harper, CET
General Manager
Lambton Area Water Supply System
1215 Fort Street
Sarnia, Ontario N7V 1M1
clinton.harper@lawss.org

John Haasen, CET, PMP
Consultant Project Manager
AECOM Canada Ltd.
410-250 York Street, Citi Plaza
London, Ontario N6A 6K2
John.Haasen@aecom.com

In addition, a request may be made to the Ministry of the Environment, Conservation and Parks for an order requiring a higher level of study (i.e. requiring an individual/ comprehensive EA approval before being able to proceed), or that conditions be imposed (e.g. require further studies), only on the grounds that the requested order may prevent, mitigate or remedy adverse impacts on constitutionally protected Aboriginal and treaty rights. This is called a Part II Order process. For all other concerns, an additional 30-day window has been considered for the Ministry to decide if the Minister should take any action. During the additional 30 days the Minister will review the requested concerns and project documents in detail, decide if the project will be elevated (Part II Order Request granted) or if It will be approved with conditions.

Requests should specify what kind of order is being requested (request for conditions or a request for an individual/comprehensive environmental assessment), how an order may prevent, mitigate or remedy potential adverse impacts on Aboriginal and treaty rights, and any information in support of the statements in the request. This will ensure that the ministry is able to efficiently begin reviewing the request.

After reviewing the Part II Order request and project documents in detail, the Minister may make one of the following decisions:

- Deny the request;
- Deny the request with conditions;
- Refer the matter to mediation; or
- Issue a Part II Order whereby the proponent will be required to prepare a Terms of Reference and an Individual EA for the undertaking.

The request should be sent in writing or by email to:
Minister of the Environment, Conservation and Parks
Ministry of Environment, Conservation and Parks
777 Bay Street, 5th Floor
Toronto ON M7A 2J3
minister.mecp@ontario.ca

and

Director, Environmental Assessment Branch
Ministry of Environment, Conservation and Parks
135 St. Clair Ave. W, 1st Floor

Toronto ON, M4V 1P5
EABDirector@ontario.ca

Requests should also be copied to the LAWSS by mail or by e-mail. Please visit the ministry's website for more information on requests for orders under section 16 of the Environmental Assessment Act at: https://www.ontario.ca/page/class-environmental-assessments-part-ii-order

All personal information included in your request – such as name, address, telephone number and property location – is collected, under the authority of section 30 of the Environmental Assessment Act and maintained for the purpose of creating a record that is available to the general public. As this information is collected for the purpose of a public record, the protection of personal information provided in the Freedom of Information and Protection of Privacy Act (FIPPA) does not apply (s.37). Personal information you submit will become part of a public record that is available to the general public unless you request that your personal information remain confidential.

2 Existing Conditions

2.1 Lambton Area Water Supply System

The LAWSS supplies potable water to approximately 100,000 people to its six partner municipalities (City of Sarnia, Township of St. Clair, Village of Point Edward, Town of Plympton-Wyoming, Township of Warwick and Municipality of Lambton Shores) and one customer area (Alvinston). For emergency supply purposes, LAWSS is connected to the Chatham-Kent, Petrolia, and the Lambton Shores systems.

The LAWSS consists of three (3) water supply zone systems:

- Zone 1: Point Edward, Sarnia, St. Clair and Chatham-Kent;
- Zone 2: Lambton Shores (Forest) and Plympton-Wyoming; and
- Zone 3: Watford/Warwick, Plympton-Wyoming, Petrolia and Alvinston.

The system is fed by the LAWSS Water Treatment Plant (WTP) which is located in the City of Sarnia and has a maximum rated treatment capacity of 181,844 m3/day. The LAWSS distribution system has 3 pumping stations (including the WTP high lift pump station), 2 surface or in-ground reservoirs,1 elevated tank (ET), 3 standpipes (SP) and roughly over 250 km of watermains (with distribution mains sizes ranging from 150 mm to 1050 mm diameter), among other water infrastructure assets. Additionally, three standpipes are managed directly by member municipalities. An overview of the LAWSS is presented in **Figure 2-1**. The water infrastructure for each supply system is presented in **Table 2-1**.

The LAWSS storage and pumping station facilities are shown in **Table 2-2** and **Table 2-3**, based on a review of as-built drawings and storage facility profile drawings.

Table 2-1: Water Supply Systems

Water Supply Zone		Pump Station(s) and Facilities	Storage Facility
Zone 1	Point Edward, Sarnia, St. Clair, Chatham Kent	WTP HLPS, West Lambton PS	WTP Reservoir, West Lambton Reservoir, Indian Road ET, Port Lambton SP, Bridgen Water Tower*

Water Supply Zone		Pump Station(s) and Facilities	Storage Facility
Zone 2	Lambton Shores (Forest), Plympton/Wyoming	East Lambton PS (Forest)	East Lambton Reservoir, Forest SP
Zone 3	Watford/Warwick, Plympton/Wyoming, Petrolia, Alvinston	East Lambton PS (Watford)	East Lambton Reservoir, Watford SP, Wyoming SP*, Alvinston SP*

*Water storage facility managed directly by member municipality

Table 2-2: LAWSS Storage Facility Characteristics

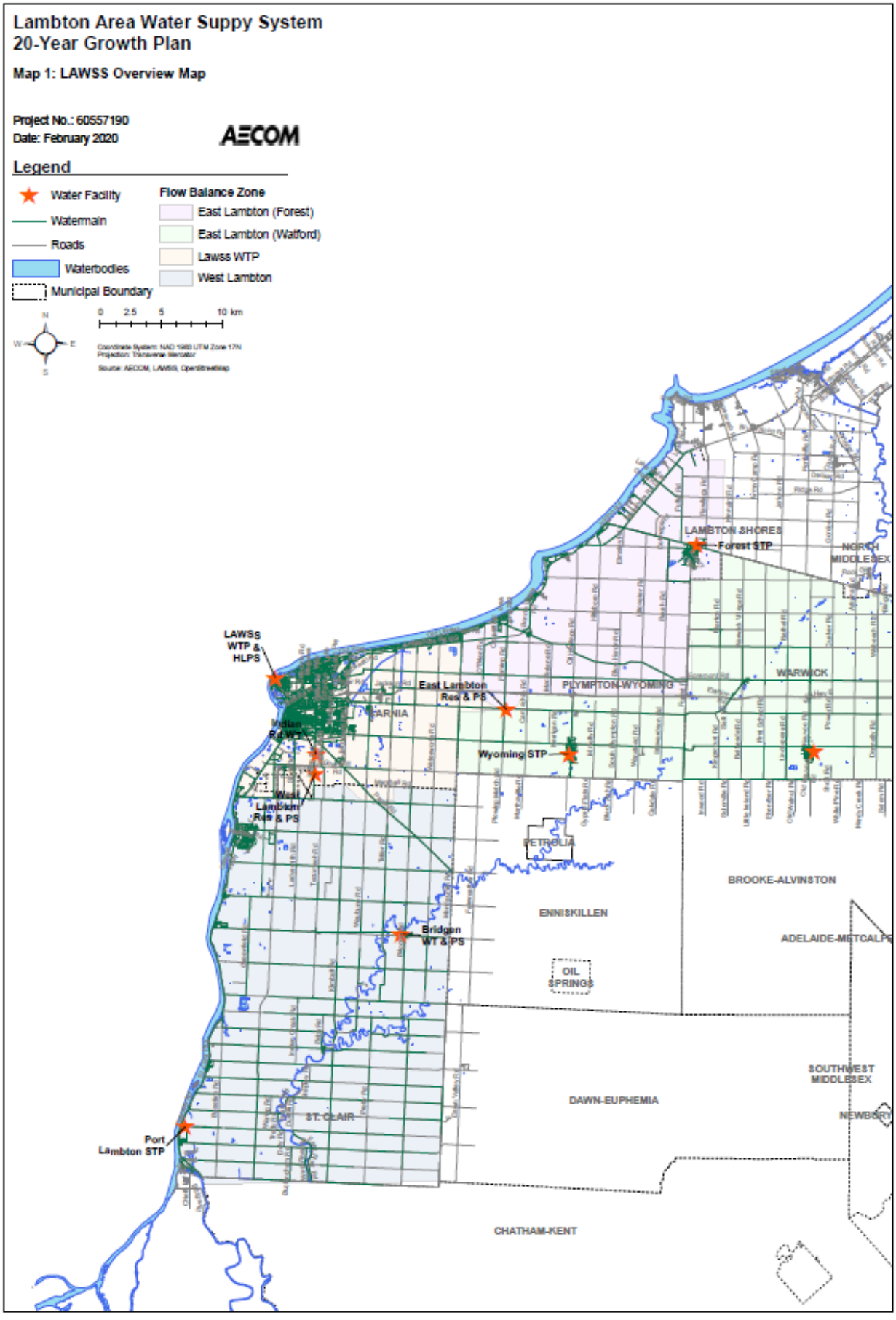
Storage Facility	Capacity (m^3)	Grade Elevation (m)	Bottom Elevation (m)	High Water Level Elevation (m)	Diameter (m)
West Lambton Reservoir	90,000	192.45	193.00	211.98	55.2 (north/south cell)
East Lambton Reservoir	9,000	206.00	198.50	204.60*	31.0** (cell 1/cell 2)
Indian Road ET	2,300	189.28	219.46	232.71*	15.24
Forest SP	4,500	221.00	221.00	253.00	13.25
Watford SP	3,840	243.60	243.60	279.60	11.50
Port Lambton SP	2,700	177.09	177.43	222.84	8.71
WTP Reservoir	75,000	186.84	176.88	184.40	--

*Overflow level elevation
**Equivalent diameter based on average area of 756 m2 for reservoir cell 1 or cell 2

Table 2-3: LAWSS Pumping Station Facilities Characteristics

Pump Station	Pump Label	Pump Type	Design Capacity (L/s)	TDH (m)	Firm Capacity (L/s)	Manufacturer Pump Curve Available?
WTP HLPS	HLP1	Constant Speed	1,277	68.6	4,146 (358.2 MLD)	Yes
	HLP2		630.8	70.1		
	HLP3		323.0	73.8		
	HLP4		1,277	68.6		
	HLP6	VFD	638.4	71.6		
	HLP8	Constant Speed	1,277	68.6		
West Lambton	WLPS PP01	Constant Speed	475.0	32.0	2,180 (188.4 MLD)	Yes
	WLPS PP02	VFD	475.0	32.0		
	WLPS PP03		615.0	32/47		
	WLPS PP04		615.0	47.0		
	WLPS PP05	Constant Speed	615.0	47.0		
East Lambton (Forest)	FP_PMP-1	Constant Speed	81.9	81.2	163.8 (14.2 MLD)	Yes
	FP_PMP-2		81.9	81.2		
	FP_PMP-3		81.9	99.4		
East Lambton (Watford)	WP_PMP-1	Constant Speed	54.3	77.1	99.3 (8.6 MLD)	Yes
	WP_PMP-2		54.3	77.1		
	WP_PMP-3		45.0	95.7		

Figure 2-1: Overview of LAWSS Water Distribution System



2.1.1 Water Supply System Issues

The current water supply system has fill constraint and low-pressure issues at three locations, including the East Lambton Pump Station, the Watford Standpipe, and the West Lambton Pump Station (Refer to **Figure 2.2**) A fill constraint refers to difficulty in getting the right amount of water to the reservoir which is needed for water supply and system pressure. These are the issues that this Master Plan Update intended to address.

2.2 Natural Environment

2.2.1 Aquatic

Field investigations were completed for aquatic features within the limits of the Study Area for each Issue outlined in **Section 2.1.1**. Aquatic habitat assessments and visual surveys for the presence of fish were completed and detailed in **Appendix B.4**.

2.2.2 Terrestrial

Terrestrial ecosystems are those associated with surface lands including, but not limited to, forests, meadows, thickets and wetlands. Terrestrial ecosystems provide habitat for a variety of plant and wildlife species, some of which are rare or sensitive. These ecosystems and species identified within the focused Study Areas for each issue during the background review and field investigations are described in detail in **Appendix B.4**.

Vegetation communities within the Study Area were assessed and classified into Ecological Land Classification (ELC) units as per the MNRF guidelines (Lee *et al.*., 1998) using a combination of aerial photography interpretation and field investigations. This system provides a standard for comparing similar communities across Ontario. This protocol classifies vegetation communities through the completion of a multilayer (canopy, sub-canopy, ground cover) vegetation inventory.

2.2.3 Species at Risk

A SAR habitat assessment was undertaken for the 26 SAR records identified during the background review process to determine if suitable SAR habitat for these species is potentially present within the focused Study Areas for each issue. This assessment was based on the initial characterization of vegetation communities using aerial photo interpretation and was further refined using the aquatic existing conditions and ELC communities observed during field investigations. Candidate SAR habitat for 21 SAR

Legend

LAWSSPressure Zones

- ZONE 1
- ZONE 2
- ZONE 3
- Interconnect Points
- Existing LAWSSS Watermains
- LAWSS WTP
- Wyoming Standpipe
- Forest Standpipe
- Watford Standpipe
- Indian Road Tower
- Port Lambton Standpipe
- West Lambton Pumping Station
- East Lambton Reservoir and Pumping Station

Ravenswood (Lambton Shores) Interconnection

Issue #1 (Pressure Zone 1): East Lambton Pump Station Fill Constraint / Low Pressures

Issue #2 (Pressure Zone 3): Watford Standpipe Fill Constraint / Low Pressures

Issue #3 (Pressure Zone 1): West Lambton Pump Station Fill Constraint / Low Pressures

Petrollia Emergency Connection

Alvinston Connection

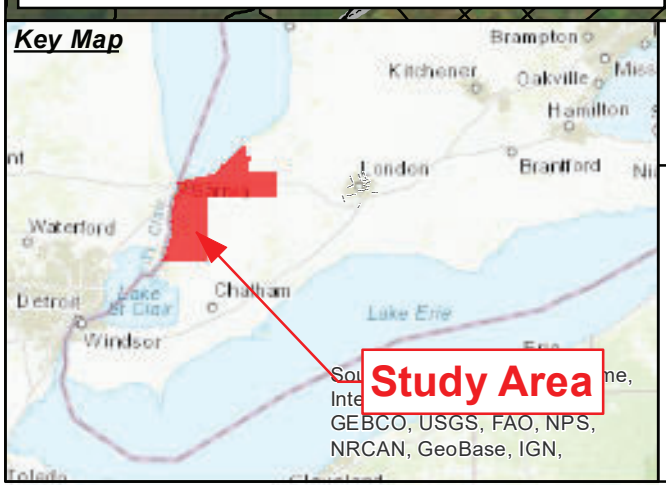
Wallaceburg Interconnection

Lakeshore Rd, Rawlings Rd, Thomson Line, King St, Northville Rd, Arkona Rd, Townsend Line, Nauvoo Rd, Egremont Rd, Highway 402, Forest Rd, London Line, Oil Heritage Rd, Broadway St, Confederation Line, Kerwood Rd, Highway 402, Modeland Rd, Front St, Indian Rd, Vidal St, Plank Rd, Churchill Line, Lasalle Line, Lyndoch St, Hill St, Petrolia Line, Highway 40, Kimball Rd, Mandaumin Rd, Marthaville Rd, Courtright Line, Inwood Rd, Calvert Dr, Dundonald Rd, Bentpath Line, St Clair Pky, Holt Line, Broadway St, Oil Heritage Rd, Shetland Rd, Cairo Rd, Concession Dr, Hagerty Rd, Irish School Rd, Oakdale Rd, Florence Rd, Jane Rd, Peter Rd, Clachan Rd, McCreary Line, Dufferin Ave, Murray St, Croton Line, Baseline, Centre Sideroad, Kent Bridge Rd, Longwoods Rd, Little John Rd, Highway 401

0 4,100 8,200 16,400 Metres

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Key Map



Lambton Area Water Supply System Water Master Plan Update

Legend

Junction Pressures

- 0-40 psi
- 40 - 50 psi
- 50 - 80 psi
- 80 - 100 psi
- >100 psi

Figure 2.2: System Issue Locations

Date:	PN:	Datum: NAD83 UTM17
June 2021	60624749	Source: LIO, LAWSS

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was identified within the various Study Areas (**Table 1**). No SAR were identified during field investigations; however, species specific surveys were not conducted. Therefore, candidate habitat for the 21 SAR remains as such.

Table 2-4: Identified Candidate Species at Risk

Bridge	Candidate SAR	
Issue 1	▪ Little Brown Myotis (END) ▪ Northern Myotis (END) ▪ Tri-colored Bat (END)	
Issue 2	▪ Little Brown Myotis (END) ▪ Northern Myotis (END) ▪ Tri-colored Bat (END)	
Issue 3	▪ American columbo (END) ▪ barn owl (END) ▪ barn swallow (THR)\ ▪ Blanding's turtle (THR) ▪ Butler's gartersnake (END) ▪ bobolink (THR) ▪ butternut (END) ▪ cerulean warbler (THR) ▪ chimney swift (THR) ▪ common five-lined skink (END) ▪ dense blazing star (THR)	▪ eastern foxsnake (END) ▪ eastern meadowlark (THR) ▪ Little Brown Myotis (END) ▪ nine spotted lady beetle (END) ▪ northern bobwhite (END) ▪ Northern Myotis (END) ▪ prothonotary warbler (END) ▪ spoon-leaved moss (END) ▪ Tri-colored Bat (END) ▪ willowleaf aster (END)

2.2.4 Significant Wildlife Habitat

A Significant Wildlife Habitat (SWH) screening exercise was conducted using the Ecoregion 7E criteria schedules (MNRF 2015) to determine the presence of candidate SWH in the focused Study Area for each issue.

The presence of candidate habitat for each SWH category was determined by comparing the ELC communities to criteria listed in the Ecoregion 7E Criteria Schedules (MNRF 2015) and incidental observations from the site visits. Candidate SWH for each Study Area is identified in **Table 2-5**. Confirmed SWH for Deer Winter Congregation Areas was identified through the presence of a White-Tailed Deer Wintering Area (Stratum 2) within the Issue 3 Study Area.

Table 2-5: Identified Candidate SWH

Bridge	Candidate SWH habitat
Issue 1	▪ **Marsh Breeding Bird Habitat** ▪ **Reptile Hibernaculum** ▪ **Special Concern and Rare Wildlife Species** ▪ Pawpaw and snapping turtle ▪ **Waterfowl Stopover and Staging Areas (Terrestrial)**
Issue 2	▪ **Amphibian Breeding Habitat (Woodland)** ▪ **Bat Maternity Colonies** ▪ **Marsh Breeding Bird Habitat** ▪ **Old Growth Forest** ▪ **Other Rare Vegetation Communities** ▪ **Raptor Wintering Area** ▪ **Reptile Hibernaculum** ▪ **Seeps and Springs** ▪ **Special Concern and Rare Wildlife Species** ▪ Brindled madtom, greater redhorse, northern sunfish, redtop panicgrass, winged loosestrife and snapping turtle ▪ **Terrestrial Crayfish** ▪ **Waterfowl Stopover and Staging Areas (Terrestrial)**
Issue 3	▪ **Amphibian Breeding Habitat (Wetlands)** ▪ **Amphibian Breeding Habitat (Woodland)** ▪ **Bat Maternity Colonies** ▪ **Colonially -Nesting Bird Breeding Habitat (Tree/Shrubs)** ▪ **Marsh Breeding Bird Habitat** ▪ **Old Growth Forest** ▪ **Other Rare Vegetation Communities** ▪ **Raptor Wintering Area** ▪ **Reptile Hibernaculum** ▪ **Special Concern and Rare Wildlife Species** ▪ Common nighthawk, eastern wood-pewee, red-headed woodpecker, wood thrush, blackstripe topminnow, silver lamprey, spotted sucker, monarch, big shellbark hickory, climbing prairie rose, creeping draba, redtop panicgrass, Duke's skipper, narrowleaf sedge, pumpkin ash, sharp-fruited rush, Shumard oak, swamp cottonwood, taperleaf bugleweed and snapping turtle ▪ **Seeps and Springs** ▪ **Terrestrial Crayfish** ▪ **Turtle Wintering Areas** ▪ **Waterfowl Nesting Area** ▪ **Waterfowl Stopover and Staging Areas (Terrestrial)** ▪ **Waterfowl Stopover and Staging Areas (Aquatic)** ▪ **Woodland Raptor Nesting Habitat** ▪ **Woodland Area-Sensitive Bird Breeding Habitat**

2.3 Socio-Economic Environment

2.3.1 Existing Land Use

Lands within the Study Area are varied and include residential neighbourhoods, industrial areas, institutional uses, commercial properties, agricultural land, and green space including natural heritage systems.

2.3.2 Future Land Use

Future growth is guided by the Lambton County Official Plan and area municipality Official Plans. While growth can be expected in the Study Area, the existing land uses will mostly remain the same.

2.4 Archaeological Assessment and Built and Cultural Heritage Features

2.4.1 Stage 1 Archaeological Assessment

AECOM's Stage 1 background study of the LAWSS Master Water Plan update focused study area for each issue has determined that the potential for the recovery of First Nation and Euro-Canadian archaeological resources is high. Areas where archaeological potential has been removed include areas that have been subject to extensive land alterations that have significantly compromised the recovery of archaeological materials such as constructed roadways. Stage 2 archaeological assessment is recommended for all areas identified as retaining archaeological potential. See **Appendix B.3**.

2.4.2 Cultural Heritage

A Cultural Heritage Report Existing Conditions and Preliminary Impact Assessment was completed for the recommended projects to:

- Identify the baseline cultural heritage conditions within the focused Study Area for each issue;
- Present a built heritage resources and cultural heritage landscapes inventory of known (previously identified) properties.
- Identify potential built heritage resources and cultural heritage landscapes (properties not listed or designated but which may have cultural heritage value or interest).

- Identify preliminary project-specific impacts on the known or potential built heritage resources and cultural heritage landscapes.
- Propose appropriate mitigation measures and recommendations for minimizing and avoiding negative impacts on previously identified and potential Cultural Heritage Resources (CHRs).

Based on the results of the background research and field review, a total of 23 potential cultural CHRs were identified within the Study Area. A summary of these resources is provided in Table 2.x. below, and a detailed inventory of these CHRs is presented in Appendix B.3 Cultural Heritage.

Table 2-6: Summary of Built Heritage Resources

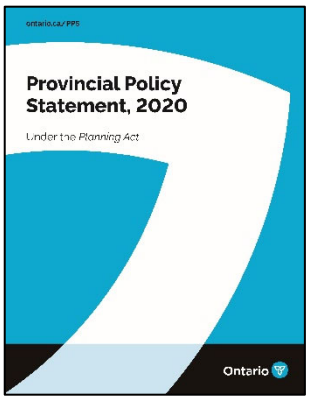
Built Heritage Resource/Cultural Heritage Landscape Ref. #	Type of Property/Name	Location/Address	Heritage Recognition
CHR 1	Residential	576 London Street, Wyoming	▪ Potential CHR
CHR 2	Residential	557 Front Street, Wyoming	▪ Potential CHR
CHR 3	Streetscape	Broadway Street between the CNR railway tracks and to Ontario Street, Wyoming	▪ Potential CHR
CHR 4	Residential	5687 Oil Heritage Road, Reese Corners	▪ Potential CHR
CHR 5	Former Institutional/Commercial, est. 1881	4562 London Line, Reece's Corners	▪ Potential CHR
CHR 6	Farmscape	4665 London Line	▪ Potential CHR
CHR 7	Residential	5027 London Line	▪ Potential CHR
CHR 8	Farmscape, est. 1923	5111 London Line	▪ Potential CHR
CHR 9	Farmscape	5108 London Line	▪ Potential CHR
CHR 10	Residential	5222 London Line	▪ Potential CHR

CHR 11	Residential	5458 London Line, at Uttoexeter Road, Kertch	▪ Potential CHR
CHR 12	Residential	5491 London Line	▪ Potential CHR
CHR 13	Residential	5504 London Line	▪ Potential CHR
CHR 14	Residential	5709 London Line	▪ Potential CHR
CHR 15	Residential	5431 Stewardson Road	▪ Potential CHR
CHR 16	Residential	5784 London Line	▪ Potential CHR
CHR 17	Residential	5826 London Line	▪ Potential CHR
CHR 18	Residential	5878 London Line	▪ Potential CHR
CHR 19	Farmscape	5283 London Line	▪ Potential CHR
CHR 20	Farmscape	5910 London Line	▪ Potential CHR
CHR 21	Residential	6410 London Line	▪ Potential CHR
CHR 22	Residential	6454 London Line	▪ Potential CHR
CHR 23	Residential	6505 London Line	▪ Potential CHR

The above CHRs were considered in the evaluation of potential impacts related to recommended projects.

3 Provincial, Regional and Municipal Planning Context

3.1 Provincial Policy Statement



The 2020 Provincial Policy Statement[3] (PPS) provides policy direction on matters of provincial interest related to land use planning and development. As a key part of Ontario's policy-led planning system, the PPS sets the policy foundation for regulating the development and use of land. It provides for appropriate development while protecting resources of provincial interest, public health and safety, and the quality of the natural environment.

Key policies relevant to this project include the following:

- 1.6: Infrastructure and Public Service Facilities;
- 1.8: Energy Conservation, Air Quality and Climate Change;
- 2.1: Wise Use and Management of Resources, Natural Heritage
- 2.2: Wise Use and Management of Resources, Water
- 2.6: Wise Use and Management of Resources, Cultural Heritage and Archaeology;

Relevance to Study: Investment in water servicing infrastructure within the study area for a project of this nature, will have regard for the range of planning objectives of the PPS. In addition, project design will consider and address impacts involving natural heritage, cultural heritage, water resources and climate change.

3.2 County of Lambton Official Plan

The County of Lambton Official Plan outlines the general policies for future land use and planning goals at the County Level that guides future development and Official Plans of local Municipalities. This Master Plan has regard for and complies with the following relevant policies:

3 *Provincial Policy Statement. Ontario Ministry of Municipal Affairs and Housing, 2020.*

Section 2.5 Drinking Water Source Protection

Section 2.7 Climate Change

Section 3.1 Anticipated Growth

Section 7.10 Water and Sanitary and Storm Sewers

Section 8.1 – 8.9 Natural Heritage

Relevance to the Study: This MCEA has been conducted with regard to the policies of the Lambton County Official Plan.

3.3 Thames-Sydenham and Region Source Protection Plan

Section A.2.10.6 of the MCEA document directs proponents, including the LAWSS to consider Source Water Protection (SWP) in the context of the *Clean Water Act* (CWA). Projects proposed within a SWP `vulnerable area are required to consider policies in the applicable Source Protection Plan (SPP), including their impact with respect to the project. A watershed based SPP contains policies to reduce existing and future threats to drinking water in order to safeguard human health through addressing activities that have the potential to impact municipal drinking water systems. The Thames - Sydenham & Region Drinking Water Source Protection Plan is the relevant SPP for this project and contains policies that address current and potential threats to municipal drinking water supply.

There are four types of vulnerable areas covered by the SPP:

1. Intake protection zones (IPZs) – An IPZ is the area around a surface body of water where water is drawn in and conveyed for municipal drinking water.

2. Highly vulnerable aquifers (HVAs) – Aquifers are underground layers of water that supply wells. HVAs are susceptible to contamination due to their proximity to the ground surface or where the types of materials in the ground around it are highly permeable.

3. Significant groundwater recharge areas (SGRAs) - SGRAs are characterized as having porous soils (e.g. sand or gravel), which allow for water to easily seep into the ground and flow to an aquifer.

4. Wellhead protection areas (WHPAs) – WHPAs are areas of land around a municipal well where land use activities have the greatest potential to affect the quality of water flowing into the well.

Relevance to Study: The relevance of the policies of the SPP has been considered in this study. There are no IPZ or WHPAs within or adjacent to the proposed issue areas within the study area, however, the study area for proposed linear infrastructure on London Line, passes through a designated vulnerable area where the vulnerability score is low to moderate. Although it is designated as a vulnerable area, there are no significant, moderate or low drinking water quality threats associated with this project. Potential contamination for fuel storage and fuelling vehicles during construction was considered and the threat is low .

3.4 Water Supply Projections

The water servicing strategy for the LAWSS was completed based on the growth rates approved by member municipalities as well as the existing servicing agreements with other water customers. The following presents the approved growth rate from 2016 to 2031.

- City of Sarnia: 11.2%
- St. Clair Township: 24.7%
- Town of Plympton-Wyoming: 25.0%
- Township of Warwick: 21.7%
- Village of Point Edward: 10.0%
- Municipality of Lambton Shores: 17.0%
- Maximum Supply for Brooke-Alvinston: 460 m3/day (5.3L/s)
- Maximum Supply for Nova Chemicals: 32,746 m3/day (379L/s)

Based on the above noted growth rates, the water supply projections for each LAWSS member and customers were estimated up to the 2041 planning horizon. **Table 3-1** to **Table 3-3** presents the water supply projections that were utilized for water servicing strategy evaluation purposes.

Table 3-1: LAWSS Water Supply Projections (Average Daily Demand, m^3/day)

Year	*Sarnia*	*Point Edward*	*St. Clair*	*Plympton/ Wyoming*	*Lambton Shores*	*Watford-Warwick*	*Alvinston*	*Petrolia*	*Chatham-Kent*	*Nova Chemicals*	*LAWSS*
2019	29,250	1,142	14,399	2,500	913	1,102	251	112	18	21,600	**49,686**
2026	31,355	1,225	16,122	2,812	1,084	1,440	460	208	35	32,746	**87,487**
2031	32,858	1,285	17,353	3,034	1,206	1,681	460	277	47	32,746	**90,947**
2036	34,362	1,345	18,583	3,257	1,328	1,922	460	346	59	32,746	**94,408**
2041	35,865	1,404	19,814	3,480	1,450	2,163	460	415	71	32,746	**97,869**

Table 3-2: LAWSS Water Supply Projections (Maximum Daily Demand*, m^3/day)

Year	*Sarnia*	*Point Edward*	*St. Clair*	*Plympton/ Wyoming*	*Lambton Shores*	*Watford-Warwick*	*Alvinston*	*Petrolia*	*Chatham-Kent*	*Nova Chemicals*	*LAWSS*
2019	58,500	2,284	28,798	5,000	1,826	2,204	251	223	36	21,600	**120,722**
2026	62,710	2,451	32,244	5,623	2,168	2,880	460	416	70	32,746	**141,767**
2031	65,717	2,570	34,705	6,069	2,412	3,362	460	554	94	32,746	**148,688**
2036	68,724	2,689	37,166	6,514	2,656	3,844	460	692	118	32,746	**155,610**
2041	71,731	2,808	39,628	6,960	2,901	4,327	460	829	143	32,746	**162,532**

* based on Maximum Daily Demand Multiplier of 2.0 times Average Daily Demand

Table 3-3: LAWSS Water Supply Projections (Peak Hour Demand*, m^3/day)

Year	*Sarnia*	*Point Edward*	*St. Clair*	*Plympton/ Wyoming*	*Lambton Shores*	*Watford-Warwick*	*Alvinston*	*Petrolia*	*Chatham-Kent*	*Nova Chemicals*	*LAWSS*
2019	76,050	2,969	37,437	6,500	2,374	2,866	251	290	47	21,600	**150,383**
2026	81,522	3,186	41,917	7,310	2,818	3,743	460	541	91	32,746	**174,335**
2031	85,432	3,341	45,117	7,889	3,136	4,371	460	720	122	32,746	**183,333**
2036	89,341	3,496	48,316	8,468	3,453	4,997	460	899	154	32,746	**192,331**
2041	93,250	3,651	51,516	9,047	3,771	5,625	460	1,078	185	32,746	**201,329**

* based on Peak Hour Demand Multiplier of 2.6 times Average Daily Demand

4 Phase 1: Problem and Opportunity Statement

The Problem and Opportunity Statement is the principle starting point in the undertaking of a MCEA and becomes the central theme and integrating element of the Project. It also assists in setting the scope of the Project. The MCEA Problem and Opportunity Statement is as follows:

Problem:

- Near- and long-term growth is expected in specific areas of the LAWSS distribution system service area. As such, there is a need for improving water servicing in a sustainable manner that can be logically phased. Additional infrastructure and improvements to the existing system must be in place in a timely and orderly manner to service approved growth.
- A detailed cost phasing and implementation plan is required to allow the LAWSS Joint Management Board to develop a capital works program and budget.

Opportunity:

- To develop a water utility infrastructure master plan or “road map” that will support future capital works planning including funding opportunities and meet the needs of existing and future water customers.
- There is also the potential to reconfigure the West Lambton Pumping Station/Reservoir and avoid expensive rehabilitation.

5 Phase 2: Alternative Solutions

In order to address the project Problem and Opportunity statement and to best meet the requirements of future growth within the LAWSS area, three alternative solutions were developed for evaluation purposes.

5.1 Identification of Phase 2 Solutions

1. **Do Nothing** – Assumes no improvements will be made beyond those already planned or approved. Regular maintenance activities will continue.

2. **Limit Growth** – Assumes no improvements will be made beyond those already planned or approved and includes measures to limit future development in the study area.

3. **Expand / Upgrade Existing System Components to Address Pressure and Fill Constraints –** Includes improving the system with new or upgraded transmission mains, watermains, storage facilities, booster pumping stations and other required projects to meet future demands and address existing issues.

4. **Continue to Implement Water Conservation and Efficiency Programs –** Primarily implemented by LAWSS member municipalities and includes public education, directing water conservation through the Building Code and repairs to leaking watermains.

The above identified alternative solutions were screened against the problem and opportunity statement Do Nothing, Limit Growth and Continue to Implement Water Conservation and Efficiency Programs were screened out because it was determined that these solutions will not address the project needs or address the problem and opportunity statement in **Section 4** or address the water supply system issues identified in **Section 2.1.1**.

Do Nothing – This was not carried forward for further assessment as, although this solution avoids impacts to natural environment, archaeological and cultural resources and costs less compared to other solutions, it does not address future growth or the existing fill constraint issues and does not address the problem and opportunity statement identified for this project.

Limit Growth – This option was not carried forward as it does not comply with current Lambton County growth policies and does not address the problem and opportunity statement.

Continue to Implement Water Conservation and Efficiency Programs – This was not carried forward for further assessment as, although this solution avoids impacts to natural environment, archaeological and cultural resources and costs less compared to other solutions, it does not address future growth or the existing fill constraint issues and does not address the problem and opportunity statement identified for this project.

The remaining solution, System Upgrades / Expansion, was carried forward for further examination. To meet the needs of the existing system and for future growth, system upgrade solutions are examined and evaluated in the next sections. While water conservation and efficiency programs can not address the problem and opportunity statement on their own, they will continue to be implemented, recognizing their benefits.

6 Assessment of Water Infrastructure

The assessment of the LAWSS water infrastructure was completed based on the water supply projections and the following assessment criteria. The results of the assessment are summarized in the following sections.

- Water Treatment Capacity:
    - Rated capacity of a water treatment plant = Maximum Day Demand (MDD)
    - Capacity expansion is required when projected MDD exceeds 90% of the rated capacity
- Water Storage Capacity:
    - Storage capacity requirements is the sum of Equalization Storage, Fire Storage and Emergency Storage; where:
        - Equalization Storage – 25% of MDD
        - Fire Storage – Based on Mistry of Environment, Conservation and Parks guidelines with a maximum limit of 378L/s for 6 hrs.
        - Emergency Storage – 25% of Equalization Storage plus 25% of Fire Storage
- Pumping Capacity:
    - Available pumping capacity is rated on the firm capacity[4]
    - Required water supply based on maximum day demand (MDD) while storage capacity is sufficient to meet the requirement by gravity feed
    - Required water supply based on peak hour demand (PHrD) while storage capacity is provided via pumping

[4] *Firm capacity = total installed pumping capacity with a single largest pump out of service*

  - Pump capacity expansion is required when the required supply exceeds the available pumping capacity.

- Water Network Capacity:
  - Ability to maintain a system pressure of 40 to 100psi under normal operating conditions
  - Ability to maintain minimum pressure of 20psi under maximum day demand plus fire event

6.1 Treatment Capacity Assessment

The projected water supply under maximum daily demand conditions was compared with the available treatment capacity. **Table 6-1** summarizes the treatment capacity assessment results.

Table 6-1: Treatment Capacity Assessment Results

Year	*LAWSS*	*Existing Treatment Capacity (m3/d)*	*90% of Existing Treatment Capacity (m3/d)*	*Treatment Capacity Surplus / Deficit (-) (m3/d)*
2019	120,973	181,800	163,620	**42,647**
2026	142,227	181,800	163,620	**21,393**
2031	149,148	181,800	163,620	**14,472**
2036	156,070	181,800	163,620	**7,550**
2041	162,992	181,800	163,620	**628**

Based on the treatment plant capacity assessment results, the available capacity of 163,620 m^3/d at the LAWSS Water Treatment Plant was sufficient to accommodate the increase in water demand to Year 2041. As a result, water treatment plant capacity expansion is not required within the planning horizon.

Although the available capacity is sufficient to meet the projected water demand in the system, it is recommended that LAWSS further reviews the overall Water Treatment Plant optimization to further enhance the treatment process efficiency. In addition, the review should also include the alternate methodology for handling the dewatering of the sludge generated from the treatment process.

6.2 Storage Capacity Assessment

A storage capacity assessment was completed for each water supply zone based on the assessment criteria as articulated in Section 6.0. **Tables 6-2** to **6-4** summarize the storage capacity assessment results.

Table 6-2: Storage Capacity Assessment Results for Zone 1

Planning Horizon	Equalization Storage (m3)	Fire Storage (m3)	Emergency Storage (m3)	Total Required Storage (m3)	Available Storage (m3)*	Storage Capacity Surplus / Deficit (-) (m3)
2019	27,860	8,200	9,015	45,075	170,800	**125,725**
2026	32,659	8,200	10,215	51,074	170,800	**119,726**
2031	34,096	8,200	10,574	52,871	170,800	**117,930**
2036	35,534	8,200	10,933	54,667	170,800	**116,133**
2041	36,971	8,200	11,293	56,464	170,800	**114,336**

* Zone 1 storage facility includes:
- West Lambton Reservoir: 90,000 m^3
- Indian Road Elevated Tank: 2,300 m^3
- Port Lambton Standpipe: 2,700 m^3
- Bridgen Elevated Tank: 800 m^3
- Water Treatment Plant Onsite Storage: 75,000 m^3

Table 6-3: Storage Capacity Assessment Results for Zone 2

Planning Horizon	Equalization Storage (m3)	Fire Storage (m3)	Emergency Storage (m3)	Total Required Storage (m3)	Available Storage (m3)*	Storage Capacity Surplus / Deficit (-) (m3)
2019	1,369	1,720	772	3,861	13,500	**9,639**
2026	1,568	1,720	822	4,110	13,500	**9,390**
2031	1,711	1,720	858	4,288	13,500	**9,212**
2036	1,853	1,720	893	4,466	13,500	**9,034**
2041	1,995	1,720	929	4,644	13,500	**8,856**

* Zone 2 storage facility includes:
- East Lambton Reservoir: 9,000 m^3
- Forest Standpipe: 4,500 m^3

Table 6-4: Storage Capacity Assessment Results for Zone 3

Planning Horizon	Equalization Storage (m3)	Fire Storage (m3)	Emergency Storage (m3)	Total Required Storage (m3)	Available Storage (m3)*	Storage Capacity Surplus / Deficit (-) (m3)
2019	1,014	1,720	683	3,417	5,340	**1,923**
2026	1,329	1,720	762	3,812	5,340	**1,528**
2031	1,480	1,720	800	4,000	5,340	**1,340**
2036	1,631	1,720	838	4,188	5,340	**1,152**
2041	1,781	1,720	875	4,377	5,340	**963**

* Zone 3 storage facility includes:
- Watford Standpipe: 3,840 m^3
- Wyoming Standpipe: 1,590 m^3

According to the storage capacity assessment results, storage capacity from the existing storage facilities was sufficient to meet the water supply projections. As a result, storage capacity expansion would not be required within the planning horizon. In evaluating the storage capacity, the capacity for the inground reservoirs was applied for Zone 1 and Zone 2, which the storage capacity for these zones was provided through pumping. The pumping capacity assessment for these zones would be evaluated based on peak hour demand.

6.3 Pumping Capacity Assessment

A pumping capacity assessment was completed for each water supply zone based on the assessment criteria as articulated in **Section 6.0. Table 6-5 to Table 6-7** summarize the pumping capacity assessment results.

Table 6-5: Pumping Capacity Assessment Results for Zone 1

Planning Horizon	Pumping Requirements (m3/d)*	Avaliable Pumping Capacity (m3/d)**	Pumping Capacity Surplus / Deficit (-) (m3/d)
2019	147,663	546,566	398,903
2026	171,113	546,566	375,453
2031	179,752	546,566	366,814
2036	188,391	546,566	358,176
2041	197,030	546,566	349,536

* Based on Peak Hour Demand
** Based on firm capacity at WTP and West Lambton Pumping Station

Table 6-6: Pumping Capacity Assessment Results for Zone 2

Planning Horizon	Pumping Requirements (m3/d)*	Avaliable Pumping Capacity (m3/d)**	Pumping Capacity Surplus / Deficit (-) (m3/d)
2019	4,128	11,750	7,622
2026	4,792	11,750	6,958
2031	5,266	11,750	6,485
2036	5,740	11,750	6,011
2041	6,214	11,750	5,537

* Based on Peak Hour Demand
** Based on firm capacity at East Lambton Pumping Station (Forest)

Table 6-7: Pumping Capacity Assessment Results for Zone 3

Planning Horizon	Pumping Requirements (m3/d)*	Avaliable Pumping Capacity (m3/d)**	Pumping Capacity Surplus / Deficit (-) (m3/d)
2019	5,249	7,793	2,544
2026	6,482	7,793	1,311
2031	7,213	7,793	580
2036	7,944	7,793	-151
2041	8,676	7,793	-883

* Based on Peak Hour Demand
** Based on firm capacity at East Lambton Pumping Station (Watford)

According to the pumping capacity assessment results, firm capacity from the existing pumping facilities was sufficient to meet the water supply projections except East Lambton supply to Watford. Increase in pumping capacity at East Lambton Pumping for Zone 3 (Watford / Plympton-Wyoming System) would be required. The recommended upgrades for East Lambton Pumping Station was further investigated and presented in Section **Error! Reference source not found.** - **Error! Reference source not found.**.

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6.4 Water Network Capacity Assessment

The water system conveyance capacity was evaluated based on the calibrated hydraulic model. The hydraulic model was updated based on the latest infrastructure information (2019) and the accuracy of the hydraulic model was confirmed through the model calibration process. The hydraulic model includes the local distribution mains, LAWSS transmission mains, pumping facilities and storage facilities.

To evaluate existing and future conditions, the modelling demands were updated based on the water supply projections presented in **Tables 3-1** and **3-2**. The modelling analysis was undertaken based on extended period simulation, while the water consumption patterns were based on the flow balance calculation results completed as part of the model calibration process. The system hydraulics during the peak hour demand period were included in the extended period simulation for both average day demand and maximum day demand scenarios for each planning horizon. Detailed model calibration results and hydraulic analysis results are presented in **Appendix B.1.**

The completion of the hydraulic modelling analysis lead to the following key findings:

- Issue 1: ELPS Fill Constraint / Low Pressures at upstream of ELPS reservoir area
    - A bottleneck appears when filling the ELPS Reservoir in the form of low service pressures (below 275 kPa or 40 psi) upstream of the ELPS Reservoir.
- Issue 2: Watford Standpipe Fill Constraint / Low Pressures in Watford/Warwick area
    - The estimated future demands in East Lambton (Watford) exceeded the ELPS Watford PS system capacity.
    - The existing network in the ELPS Watford PS system cannot satisfy 2041 projected flows at acceptable pressures and has inadequate filling of the Watford Standpipe.
- Issue 3: WLPS Fill Constraint / Low Pressures in St. Clair area
    - Minimum pressures cannot be maintained within St. Clair area with the WLPS turned off while filling under the current WLPS fill operating method.
    - Under the current WLPS run operating method (flow discharged both north to Sarnia and south to St. Clair), the WLPS discharge pressure is

limited to 57 psi (so as to not overfill the Indian Road Tower) with WLPS turned on. This operation could cause low pressures at some areas in St. Clair under the high demand condition.

The next section provides the details for system constraint mitigation options.

7 Identification of Alternatives for System Upgrades and Improvements

The system upgrades and improvements were separated into three different areas, one for each of the water supply systems fill constraint and low-pressure issues identified in the hydraulic modeling (**Appendix B.1**). This section describes the alternative solutions for each issue.

7.1 Issue 1 (Pressure Zone 1) – East Lambton Pump Station (ELPS) Fill Constraint and Low Pressures

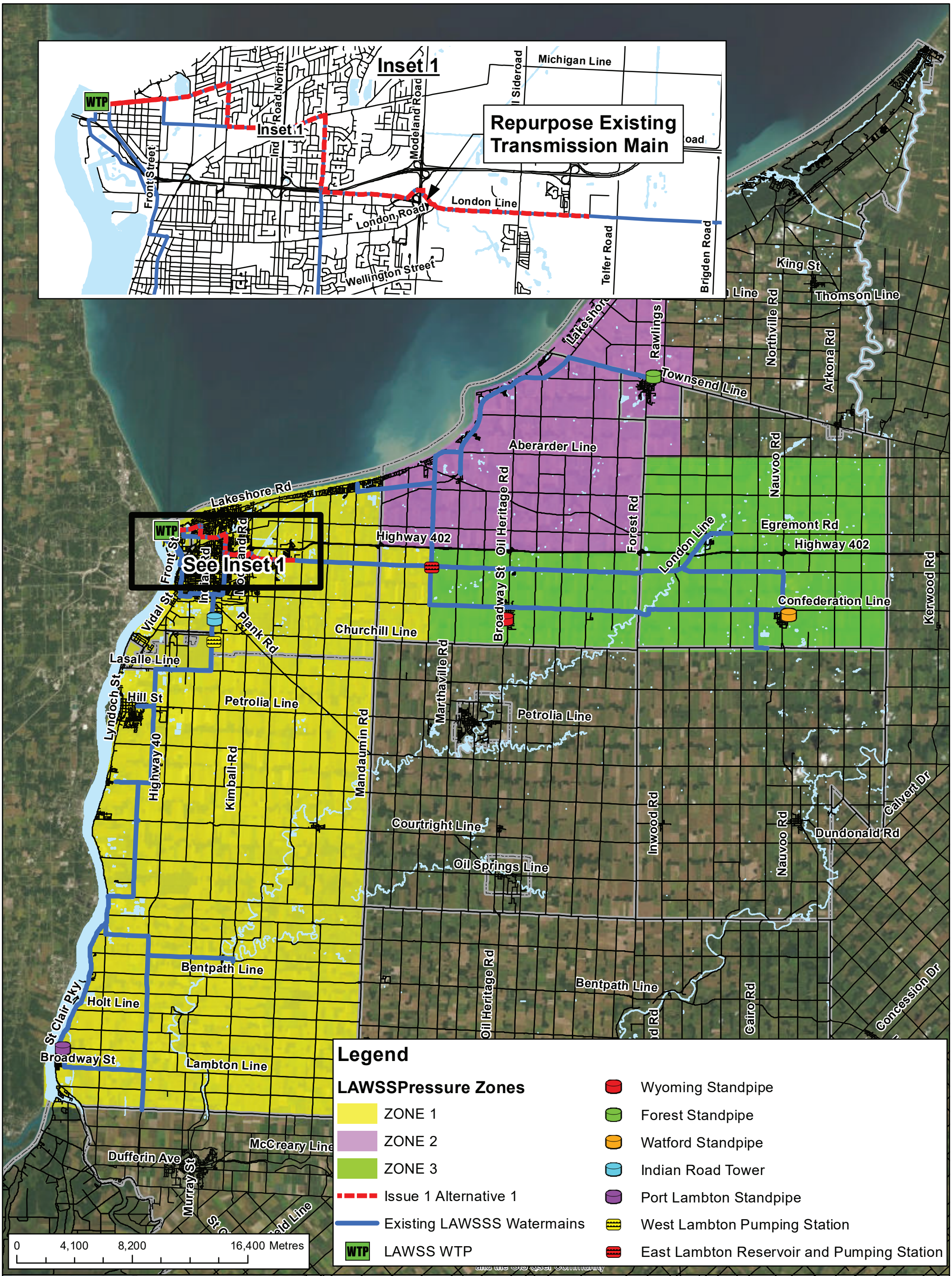
For Issue 1, four alternative solutions were identified to address the low pressures and fill constraints:

1. Repurposing an existing water transmission main from the Water Treatment Plant (WTP) in Sarnia to London Line just west of Telfer Road (Refer to **Figure 7.1**);

2. New Booster Pumping Station between the WTP and the East Lambton Booster Station (Refer to **Figure 7.2**);

3. New 600mm feedermain from the WTP to the East Lambton Booster Station and Reservoir (Refer to **Figure 7.3**); and

4. New local watermain from the East Lambton Booster Station to Mandaumin Road. (Refer to **Figure 7.4**).



Lambton Area Water Supply System Water Master Plan Update

Figure 7.1: Issue 1 Alternative 1 - Re-purpose an existing transmission main

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May 2021	60624749	Source: LIO, LAWSS

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Inset 1

Locate New Booster Station in this area

Source: Esri, Maxar, G… DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Locate New Booster Station in this area (See Inset 1)

Study Area

Legend

LAWSSPressure Zones

- ZONE 1
- ZONE 2
- ZONE 3
- Existing LAWSSS Watermains
- Issue 1 Alternative 2
- LAWSS WTP
- Wyoming Standpipe
- Forest Standpipe
- Watford Standpipe
- Indian Road Tower
- Port Lambton Standpipe
- West Lambton Pumping Station
- East Lambton Reservoir and Pumping Station

0 4,100 8,200 16,400 Metres

Key Map

Lambton Area Water Supply System Water Master Plan Update

Figure 7.2: Issue 1 Alternative 2 - New Booster Pumping Station between the WTP and ELBS

Date:	PN:	Datum: NAD83 UTM17
May 2021	60624749	Source: LIO, LAWSS

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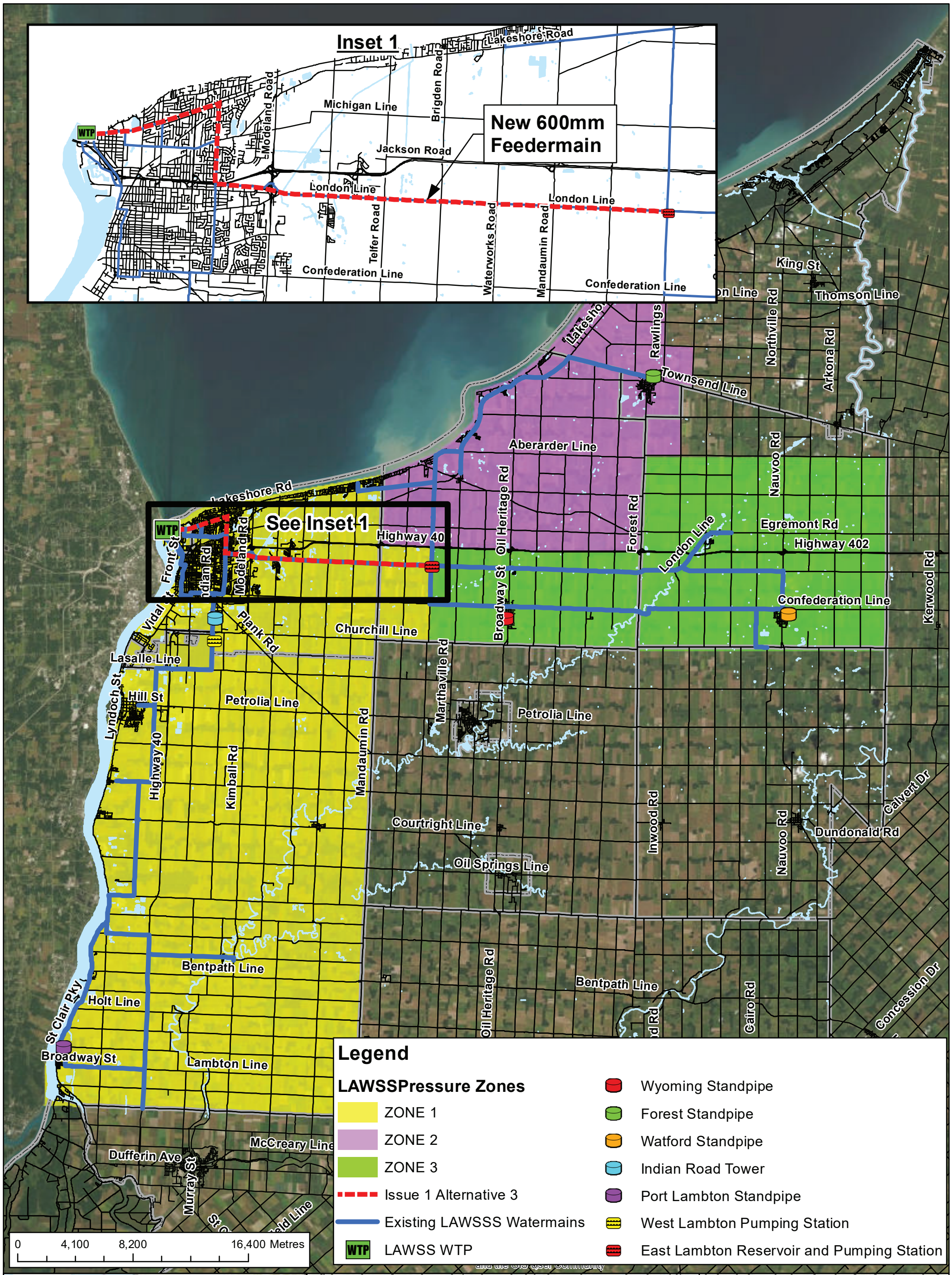

Lambton Area Water Supply System Water Master Plan Update

Figure 7.3: Issue 1 Alternative 3 - New 600mm Feedermain from WTP to the ELBS

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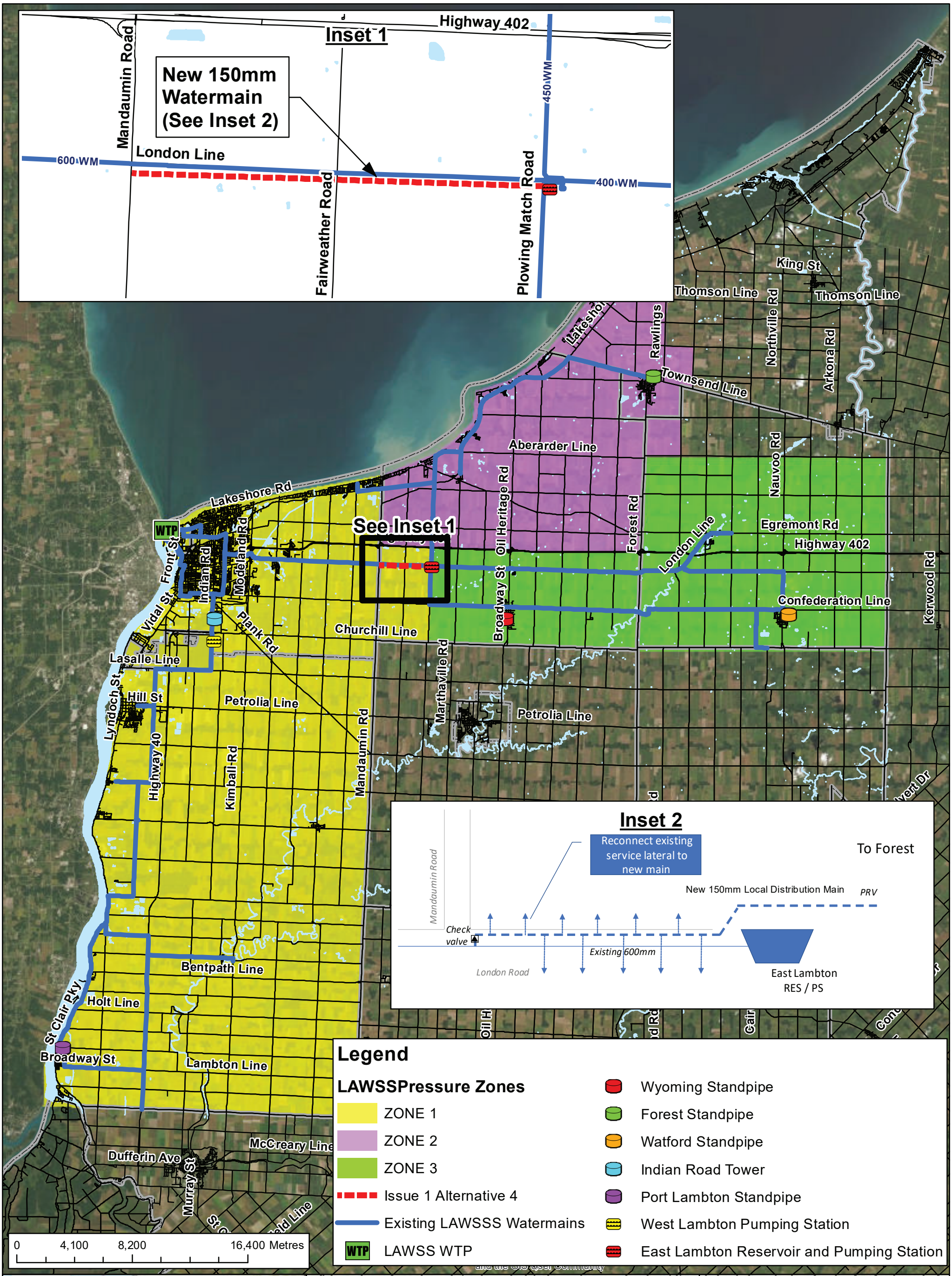
Inset 1

Inset 2

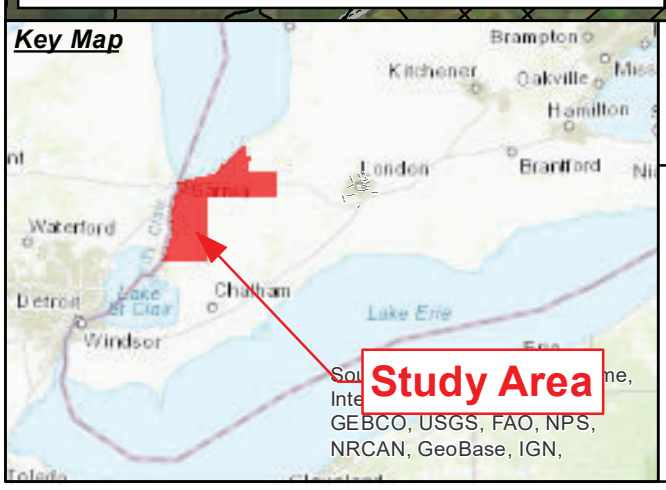


Legend

LAWSSPressure Zones

- ZONE 1
- ZONE 2
- ZONE 3
- Issue 1 Alternative 4
- Existing LAWSSS Watermains
- WTP LAWSS WTP
- Wyoming Standpipe
- Forest Standpipe
- Watford Standpipe
- Indian Road Tower
- Port Lambton Standpipe
- West Lambton Pumping Station
- East Lambton Reservoir and Pumping Station

Key Map



Lambton Area Water Supply System Water Master Plan Update

Figure 7.4: Issue 1 Alternative 4 -New Local Watermain from East Lambton

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7.2 Issue 2 (Pressure Zone 3) – Watford Standpipe Fill Constraint and Low Pressures

For Issue 2, three alternative solutions were identified to address the low pressures and fill constraints:

1. New transmission main along London Line from the East Lambton Pumping Station to the Watford Standpipe (Refer to **Figure 7.5**);

2. New Pressure Zone in East Lambton (Watford) (Refer to **Figure 7.6**); and

3. New Pressure Zone in East Lambton (Watford) with a new booster station and transmission main along London Line. This would include siting a new booster pumping station in the Town of Plympton Wyoming (Refer to **Figure 7.7).**

7.3 Issue 3 (Pressure Zone 1) – West Lambton Pump Station Fill Constraint and Low Pressures

For Issue 3, the 2011 LAWSS Grid Reinforcement and Transmission Main Twinning Municipal Class Environmental Assessment assessed the fill constraint issue and recommended twinning the transmission main. The recommendation of this EA has been confirmed in an addendum[5]. To increase supply for St. Clair Township's planned growth and provide continuous supply while filling the reservoir, some pump modifications within the existing pump station will also take place which is a Schedule A+ project. These modifications will have St. Clair Township operated as a separate pressure zone (i.e. Zone 1B).

[5] *In 2011 The LAWSS completed a Grid Reinforcement and Transmission Main Environmental Assessment which recommended twinning the existing transmission main from Courtright Line to the West Lambton Pumping Station and Reservoir and connecting into the Sarnia system. An EA Addendum has been completed to confirm this routing.*

Inset 1

New 450mm Feedermain

London Line

Oil Heritage Road

Forest Road

Nauvoo Road

Confederation Line

Churchill Line

See Inset 1

WTP

Lakeshore Rd

Aberarder Line

Townsend Line

Thomson Line

Rawlings R

Northville Rd

Arkona Rd

Highway 402

Modeland Rd

Indian Rd

Front St

Vidal St

Plank Rd

Lasalle Line

Hill St

Lyndoch St

Petrolia Line

Highway 40

Kimball Rd

Mandaumin Rd

Marthaville Rd

Courtright Line

Oil Springs Line

Inwood Rd

Dundonald Rd

Calvert Dr

Bentpath Line

Holt Line

St Clair Pky

Broadway St

Lambton Line

Dufferin Ave

Murray St

McCreary Line

Cairo Rd

Concession Dr

Kerwood Rd

Broadway St

Egremont Rd

0 4,100 8,200 16,400 Metres

Legend

LAWSSPressure Zones

- ZONE 1
- ZONE 2
- ZONE 3
- Issue 2 Alternative 1
- Existing LAWSSS Watermains
- LAWSS WTP
- Wyoming Standpipe
- Forest Standpipe
- Watford Standpipe
- Indian Road Tower
- Port Lambton Standpipe
- West Lambton Pumping Station
- East Lambton Reservoir and Pumping Station

Key Map

Study Area

Source: Esri, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN,

Lambton Area Water Supply System Water Master Plan Update

Figure 7.5: Issue 2 Alternative 1 - New 450mm Feeder Main Along London Line

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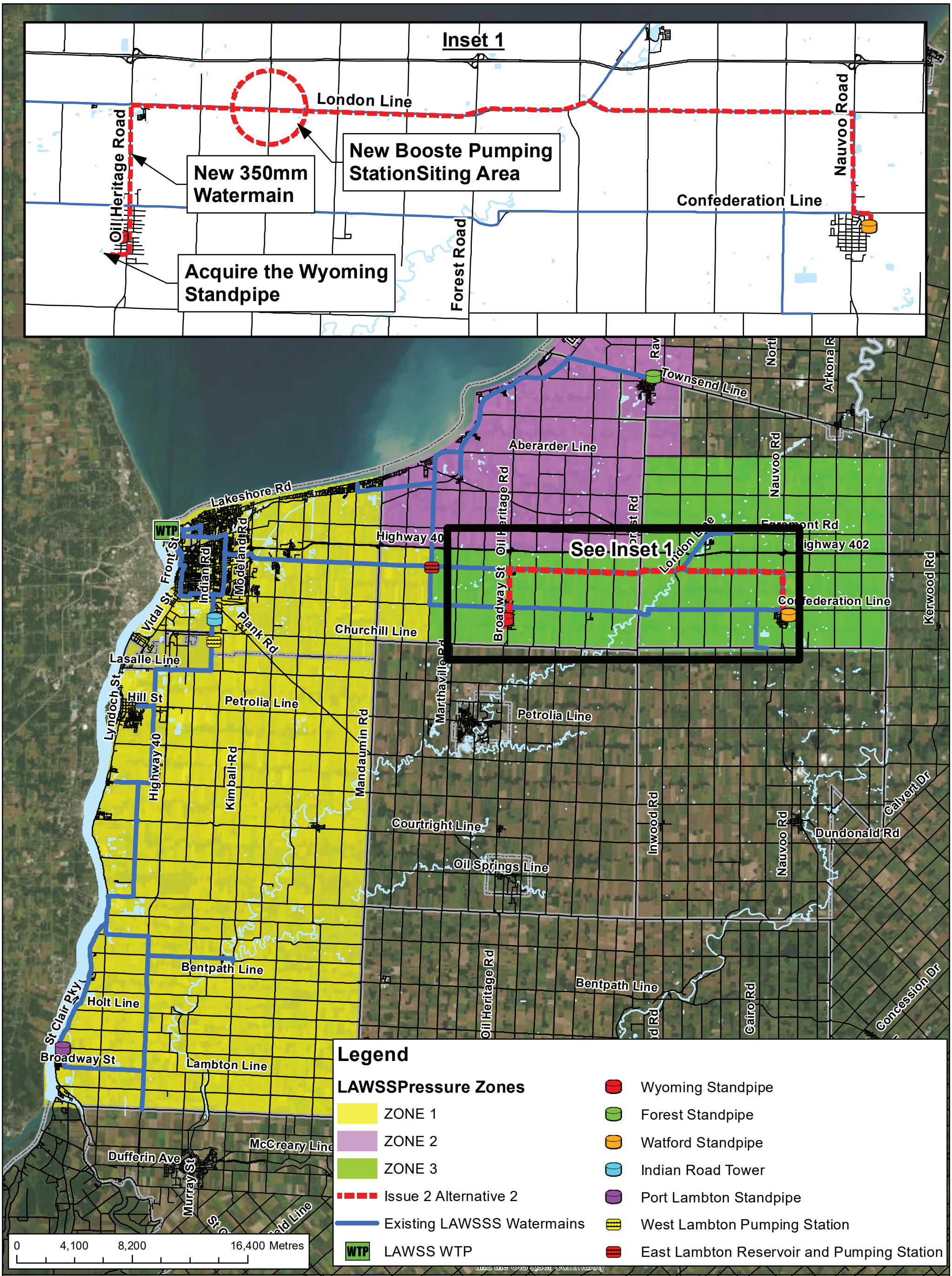

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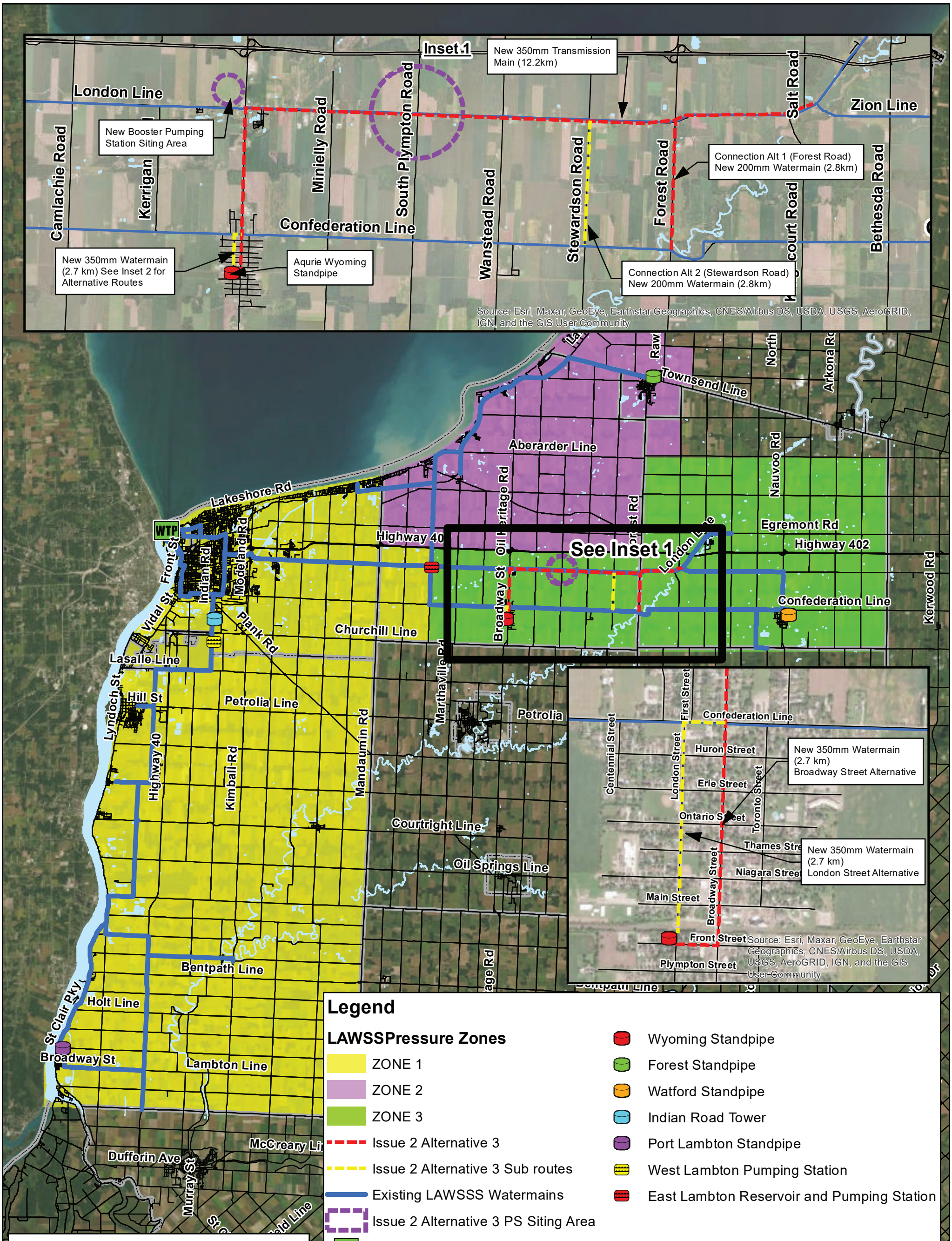

Lambton Area Water Supply System Water Master Plan Update

Figure 7.7: Issue 2 Alternative 3 - New Pressure Zone in East Lambton (Watford)

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8 Evaluation of Alternatives

A detailed assessment of each alternative solution was completed based on the below evaluation categories and criteria. The evaluation approach used to consider the suitability and feasibility of alternative solutions for the study was a qualitative assessment. In this evaluation approach, trade-offs consider the advantages and disadvantages of each alternative to address the problem and opportunity statement with the least environmental effects and the most technical benefits which forms the rationale for the identification of a preferred alternative.

8.1 Evaluation Criteria

Table 8-1 below summarizes the criteria, including environmental categories that address the broad definition of the environment as described in the Environmental Assessment Act, used for evaluation purposes to assist in determining the best possible solution.

Table 8-1: Evaluation Criteria

Category	Criteria
Land Use	• Conformance with approved local, county, and provincial plans and policies. • Potential effects on existing and approved / planned land uses.
Technical	• Potential constructability with the system – requirement for system upgrades. • Potential constructability and minimum utility conflicts. • Ability to meet long-term water servicing requirements including flow, pressure and fire flow for the servicing area.
Natural Environment	• Potential effects on terrestrial species and habitat. • Potential effects on aquatic habitat. • Potential effects on Species at Risk (SAR) and SAR habitat. • Potential effects on surface water and groundwater. • Potential to encounter soil and water contamination. • Potential for the project to impact climate change and for climate change to impact the project.

Socio-Economic	• Potential effects (Noise, vibration, dust, access to property) related to disruption to residences, agricultural, businesses, and travelling public during construction and operation. • Degree of property acquisition / easement requirements.
Cultural Environment	• Potential effects on archaeological resources. • Potential effects to built heritage resources and cultural heritage landscapes.
Cost	• Cost of construction (including property acquisition). • Cost of operations / maintenance.

Each evaluation category was evaluated based on the following scoring system. Low impact is considered a preferred solution compared to moderate or high impact.

Legend	Low Impact	Low to Moderate Impact	Moderate Impact	Moderate to High Impact	High Impact	Preferred Solution

8.2 Evaluation of Issue 1 Alternatives

A summary of the evaluation matrix for the Issue 1 alternatives is shown in **Table 8.2** below, for a comprehensive evaluation in matrix form see the full evaluation of Issue 1 Alternative Solutions as shown in Table **8.3**

Table 8-2: Evaluation of Issue 1 Alternatives Summary

Evaluation Criteria Category	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Land Use				
Technical				

Evaluation Criteria Category	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Natural Heritage				
Socio Economic				
Cultural Environment				
Cost				
Overall Alternative Rating				

Table 8-3: Evaluation Matrix of Issue 1 Alternatives

8.2.1 Preferred Issue 1 Alternative

Based on the criteria and methodology applied as part of the evaluation process, the preferred alternative is **Alternative 4 – New Local Watermain from East Lambton Pumping Station.** This alternative involves constructing a new 150mm watermain parallel to the existing transmission main from the East Lambton Pumping Station to Mandaumin Road. (Refer to **Figure 8.1)**

8.3 Evaluation of Issue 2 Alternatives

A summary of the evaluation matrix for the Issue 2 alternatives is shown in **Table 8-4** below, for a comprehensive evaluation in matrix form see the full evaluation of Issue 1 Alternative Solutions as shown in **Table 8-5.**

Table 8-3 Issue 1: East Lambton Pump Station Fill Constraint / Low Pressures

Alternative Solutions

Factor	Criteria	Alternative 1: Re-purposing Existing Transmission Main	Alternative 2: New Booster Pumping Station between the Water Treatment Plant and the East Lambton Booster Station	Alternative 3: New 600mm Feedermain from Water Treatment Plant to the East Lambton Pump Station and Reservoir	Alternative 4: New Local Watermain from East Lambton
Description of Alternative		**Repurpose the existing transmission main from the LAWSS WTP to Water Works Road**	**Locate new Booster Pumping Station (BPS) in area of London Line and Bridgen Road.**	**New 600 mm Feedermain from Water Treatment Plant to the East Lambton Pump station and Reservoir**	**New 300 mm Watermain on London Line from Mandaumin Road to East Lambton Reservoir and Pumping Station.**
Land Use	1. Conformance with approved local, county and provincial plans and policies	• Conforms with approved local, county and provincial plans and policies.	• Conforms with approved local, county and provincial plans and policies. • BPS is permitted use in agricultural area.	• Conforms with approved local, county and provincial plans and policies.	• Conforms with approved local, county and provincial plans and policies.
	2. Potential effects on existing and approved / planned land uses	• No impacts – all works are within existing right-of-way.	• Potential for impacts relating to siting BPS. • Displacement of existing land use for new BPS.	• Potential significant impacts to adjacent land uses (built up area and agricultural area) related to Feedermain construction (primarily within existing right-of-way).	• Potential minor impacts to adjacent land uses (agricultural area) related to new local watermain construction (primarily within existing right-of-way).
Land Use Evaluation Summary		●	◔	◔	◔
Technical	1. Potential compatibility with system - requirement for system upgrades	• Not compatible with system.	• Compatible with system.	• Compatible with system.	• Compatible with system.
	2. Potential constructability and minimum utility conflicts	• Good constructability and minimum utility conflicts.	• Good constructability and minimum utility conflicts.	• More difficult constructability and higher potential for utility conflicts (significant portion of Feedermain replacement in built up urban area).	• Good constructability and minimum utility conflicts.
	3. Ability to meet long-term water servicing requirements including flow, pressure and fire flow for the servicing area	• Meets meet long-term water servicing requirements.	• Meets meet long-term water servicing requirements.	• Meets meet long-term water servicing requirements.	• Meets meet long-term water servicing requirements.
Technical Evaluation Summary		◑	●	◑	●
Natural Environment	1. Potential effects on terrestrial species and habitat	• No impacts to terrestrial species and habitat.	• No impacts to terrestrial species and habitat.	• No impacts to terrestrial species and habitat.	• No impacts to terrestrial species and habitat.
	2. Potential effects on aquatic species and habitat	• 2 Water crossings that potentially impact aquatic species and habitat.	• No water crossing or impacts to aquatic species and habitat.	• 7 Water crossings that potentially impact aquatic species and habitat.	• 4 Water crossings that potentially impact aquatic species and habitat.
	3. Potential effects on Species at Risk (SAR) and SAR habitat	• Easterly part of theTransmission Main is located adjacent to the Canatara Park Wetland. Moderate potential for SAR impacts.	• No impacts to SAR.	• New feedermain would pass through several areas of potential SAR habitat. Highest potential SAR impacts	• New local watermain would pass through a couple of potential SAR habitat areas. Minor potential SAR impacts.
	4. Potential effects on surface water and groundwater	• Low to Moderate Potential impacts to surface water related to water crossings • Construction of repurposed transmission main may require temporary dewatering.	• No impacts to surface water. • Construction of BPS may require temporary dewatering.	• Highetst Potential impacts to surface water related to water crossings (long Feedermain length) • Construction of Feedermain may require temporary dewatering.	• Minor impacts to surface water and groundwater (relatively short watermain length).

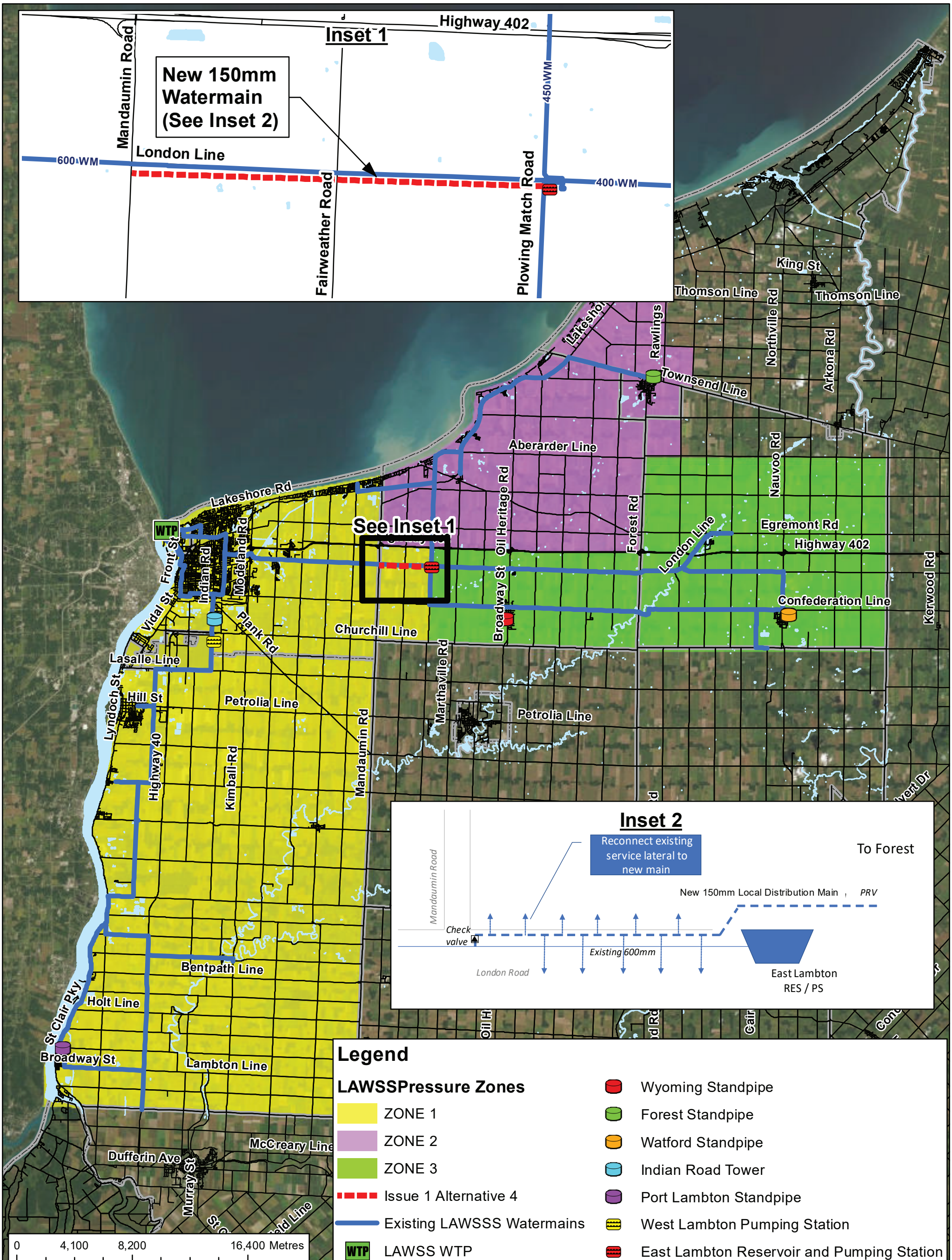
Low Impact is considered preferred compared to moderate or high impact.

Legend	Low Impact	Low to Moderate Impact	Moderate Impact	Moderate to High Impact	High Impact	Most Preferred Overall
	●	◔	◑	◔	○	▭

Factor	Criteria	Alternative 1: Re-purposing Existing Transmission Main	Alternative 2: New Booster Pumping Station between the Water Treatment Plant and the East Lambton Booster Station	Alternative 3: New 600mm Feedermain from Water Treatment Plant to the East Lambton Pump Station and Reservoir	Alternative 4: New Local Watermain from East Lambton
	5. Potential to encounter soil and water contamination	• No potential to encounter soil and water contamination.	• No potential to encounter soil and water contamination.	• Potential to encounter soil and water contamination (significant portion of Feedermain in built up urban area).	• No potential to encounter soil and water contamination.
	6. Potential for project to impact climate change and for climate change to impact the project	• Low to moderate impacts to climate change during construction period.	• BPS involves increased energy and is susceptible to extreme weather events (e.g. loss of power) • Minor impacts to climate change during construction period.	• Moderate impacts to climate change due to potentially long construction period along the long feedermain length.	• Minor impacts to climate change due to shorter construction period on a relatively short watermain.
Natural Environment Evaluation Summary					
Socio-Economic	1. Potential effects (noise, vibration, dust, access to property) related to disruption to residences, agricultural, businesses and travelling public during construction and operation	• Moderate temporary disruptions anticipated.	• Minor temporary disruptions anticipated. • Potential for displacement of actively farmed land for new BPS (~50 m x 50 m)	• Major temporary disruptions anticipated based on construciton in built up urban area.	• Low to moderate temporary disruptions anticipated.
	2. Degree of property acquisition / easement requirements	• No property aquisition/easement requirements.	• Potential farm property aquisiton required for BPS. • No easements required.	• No property acquisition required. • Potential for easements if Feedermain can not be constructed within existing right-of-way.	• No property aquisition/easement requirements (London Line has signficant right-of-way width to accomocate new watermain).
Socio-Economic Evaluation Summary					
Cultural Environment	1. Potential effects on archaeological resources	• No impacts to archaeological resources.	• Potential for impacts to archaeological resources.	• Potential for impacts to archaeological resources.	• Low potential for impacts to archaeological resources (London Line has signficant right-of-way width to accomocate new watermain.
	2. Potential effects to built heritage resources and cultural heritage landscapes	• No impacts to built heritage resources and cultural heritage landscapes.	• No impacts to built heritage resources and cultural heritage landscapes.	• Potential for indirect impacts (e.g. vibration) to built heritage resources and cultural heritage landscapes.	• Potential for indirect impacts (e.g. vibration) to built heritage resources and cultural heritage landscapes.
Cultural Environment Evaluation Summary					
Cost	1. Cost of construction (including property acquisition)	• Moderate costs to re-purpose existing Transmission Main.	• Higher costs related to BPS, including property acquisition.	• Highest costs based on length of Feedermain.	• Moderate costs related to new local watermain.
	2. Cost of operations / maintenance	• Moderate operation/maintenance costs.	• Higher costs related to BPS operation and maintenance.	• Higher operation/maintenance costs based on length of Feedermain	• Low operation/maintenance costs.
Cost Evaluation Summary					
Overall Evaluation Summary					

Low Impact is considered preferred compared to moderate or high impact.

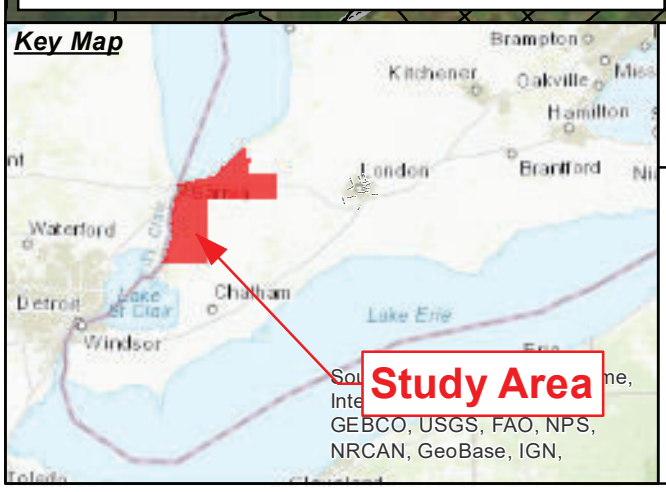
Legend	Low Impact	Low to Moderate Impact	Moderate Impact	Moderate to High Impact	High Impact	Most Preferred Overall



Legend

LAWSSPressure Zones

- ZONE 1
- ZONE 2
- ZONE 3
- Issue 1 Alternative 4
- Existing LAWSSS Watermains
- LAWSS WTP
- Wyoming Standpipe
- Forest Standpipe
- Watford Standpipe
- Indian Road Tower
- Port Lambton Standpipe
- West Lambton Pumping Station
- East Lambton Reservoir and Pumping Station



Lambton Area Water Supply System Water Master Plan Update

Figure 8.1: Issue 1 Preferred Alternative -New Local Watermain from East Lambton

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Table 8-4: Evaluation of Issue 2 Alternatives Summary

Evaluation Criteria Category	Alternative 1	Alternative 2	Alternative 3
Land Use			
Technical			
Natural Heritage			
Socio Economic			
Cultural Environment			
Cost			
Overall Alternative Rating			

8.3.1 Preferred Issue 2 Alternative

Based on the criteria and methodology applied as part of the evaluation process, the preferred alternative is **Alternative 3 – New Pressure Zone in East Lambton (Watford).** This alternative involves LAWSS acquiring the Wyoming Standpipe from the Town of Plympton Wyoming and constructing a new 350mm watermain from the Wyoming Standpipe to London Line (includes CPR crossing). This also includes constructing a new 350 transmission main on London Line from Oil Heritage Road to Zion Line with a connection to Confederation Line and constructing a new booster pumping station in the area of London Line and South Plympton Road. (Refer to **Figure 8.2**). In addition, the existing pumps at the East Lambton Pumping Station for Zone 3 need to be replaced with larger capacity and equipped with variable frequency driven (VFD) capability to meet the 2036 and 2041 projected water supply. Replacement of pumps will not require building expansion.

Table 8-5: Issue 2: Watford Standpipe Fill Constraint / Low Pressure

Alternative Solutions

Factor	Criteria	Alternative 1: New Transmission Main Along London Line	Alternative 2: New Pressure Zone in East Lambton (Watford)	Alternative 3: New Pressure Zone in East Lambton (Watford)

Description of Alternative		• New 450 mm Feedermain (28.5 km) on London Line from East Lambton Reservoir to Watford Standpipe.	• Acquire Wyoming Standpipe.
			• New 350 mm watermain Wyoming Standpipe to London Line.
			• New 150 mm local distribution main (3.8 km) on London Line from Oil Heritage Road to Watford Standpipe.
			• New Booster Pumping Station in the area of London Line and South Plympton Road
				• Acquire Wyoming Standpipe.
				• New 350 mm watermain (2.7 km) from Wyoming Standpipe to London Line. 2 possible alternative watermain routes (**refer to Evaluation 3A**) are:
				  • Route 1: New 350 mm watermain (2.7km) via Broadway Street
				  • Route 2: New 350 mm watermain (2.7 km) via London Street
				• New 150 mm local distribution main (3.8 km) on London Line from Oil Heritage Road to Zion Line. 2 possible watermain connections from London Line (**refer to Evaluation 3B**) are:
				  • Connection 1: New 200 mm watermain (2.8 km) via Forest Road
				  • Connection 2: New 200 mm watermain (2.8 km) via Stewardson Road
				• New Booster Pumping Station in the area of London Line and South Plympton Road. Refer to **Evaluation 3C** for evaluation of siting options in this area.

Land Use	1. Conformance with approved local, county and provincial plans and policies	• Conforms with approved local, county and provincial plans and policies.	• Conforms with approved local, county and provincial plans and policies.	• Conforms with approved local, county and provincial plans and policies. • Watermain on Forest Road (Connection 1) may require significant works in regulated floodplain. •
	2. Potential effects on existing and approved / planned land uses	• No impacts to existing and approved / planned land uses.	• Impacts to existing and approved / planned land uses – BPS displaces active agricultural lands. • BPS is permitted use in agricultural area.	• Impacts to existing and approved / planned land uses – BPS displaces active agricultural lands. • BPS is permitted use in agricultural area.
Land Use Evaluation Summary				
Technical	1. Potential compatibility with system - requirement for system upgrades	• Compatible with system.	• Compatible with system.	• Compatible with system.
	2. Potential constructability and minimum utility conflicts	• Moderate constructability and utility conflicts.	• Moderate constructability and utility conflicts.	• Moderate constructability and utility conflicts.
	3. Ability to meet long-term water servicing requirements including	• Meets long-term water servicing requirements.	• Meets long-term water servicing requirements.	• Meets long-term water servicing requirements.

Low Impact is considered preferred compared to moderate or high impact.

	Low Impact	Low to Moderate Impact	Moderate Impact	Moderate to High Impact	High Impact	Most Preferred Overall
Legend						

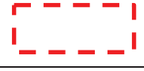
Factor	Criteria	Alternative 1: New Transmission Main Along London Line	Alternative 2: New Pressure Zone in East Lambton (Watford)	Alternative 3: New Pressure Zone in East Lambton (Watford)
	flow, pressure and fire flow for the servicing area			
Technical Evaluation Summary				
Natural Environment	1. Potential effects on terrestrial species and habitat	• No impacts to terrestrial species and habitat.	• No impacts to terrestrial species and habitat.	• No impacts to terrestrial species and habitat.
	2. Potential effects on aquatic species and habitat	• 16 water crossings that potentially impact aquatic species and habitat.	• 16 water crossings that potentially impact aquatic species and habitat.	• 10 water crossings that potentially impact aquatic species and habitat. Watermain on Forest Road (Connection 1) has greater potential to impact aquatic species and habitat related to a larger water crossing.
	3. Potential effects on Species at Risk (SAR) and SAR habitat	• Moderate impact to potential SAR	• Moderate impact to potential SAR	• Low to moderate impact to potential SAR
	4. Potential effects on surface water and groundwater	• Moderate Potential impacts to surface water related to water crossings • Construction of transmission main may require temporary dewatering.	• Moderate Potential impacts to surface water related to water crossings • Construction of BPS may require temporary dewatering. • Construction of transmission main may require temporary dewatering.	• Low to Moderate Potential impacts to surface water related to water crossings • Construction of BPS may require temporary dewatering. • Construction of transmission main may require temporary dewatering.
	5. Potential to encounter soil and water contamination	• No potential to encounter soil and water contamination.	• Moderate potential to encounter soil and water contamination (portion of watermain in built up urban area -Wyoming and Watford).	• Low to moderate potential to encounter soil and water contamination (portion of watermain in built up urban area - Wyoming).
	6. Potential for project to impact climate change and for climate change to impact the project	• Low to moderate impacts to climate change during construction period.	• Low to moderate impacts to climate change during construction period. • BPS involves increased energy and is susceptible to extreme weather events (e.g. loss of power).	• Low to moderate impacts to climate change during construction period. • BPS involves increased energy and is susceptible to extreme weather events (e.g. loss of power).
Natural Environment Evaluation Summary				
Socio-Economic	1. Potential effects (noise, vibration, dust, access to property) related to disruption to residences, agricultural, businesses and travelling public during construction and operation	• Temporary disruptions anticipated.	• Temporary disruptions anticipated. • Displacement of land for new BPS (~50 m x 50 m).	• Temporary disruptions anticipated, shorter construction route. • Displacement of land for new BPS (~50 m x 50 m).
	2. Degree of property acquisition / easement requirements	• No property acquisition required. • Potential for easements if new transmission main can not be constructed within existing right-of-way (London Line has signficant right-of-way width to accomocate new transmission main).	• Property aquisiton required for BPS. • Potential for easements if new distribution main and watermain can not be constructed within existing right-of-way (London Line has signficant right-of-way width to accomocate new transmission main).	• Property aquisiton required for BPS. • Potential for easements if new transmission main, distribution main and watermain can not be constructed within existing right-of-way (London Line has signficant right-of-way width to accomocate new transmission main).
Socio-Economic Evaluation Summary				
Cultural Environment	1. Potential effects on archaeological resources	• Potential for impacts to archaeological resources if works are outside of disturbed right-of-way.	• Potential for impacts to archaeological resources for work outside of disturbed right-of-way (e.g. siting of new BPS)	• Potential for impacts to archaeological resources for work outside of disturbed right-of-way (e.g. siting of new BPS)

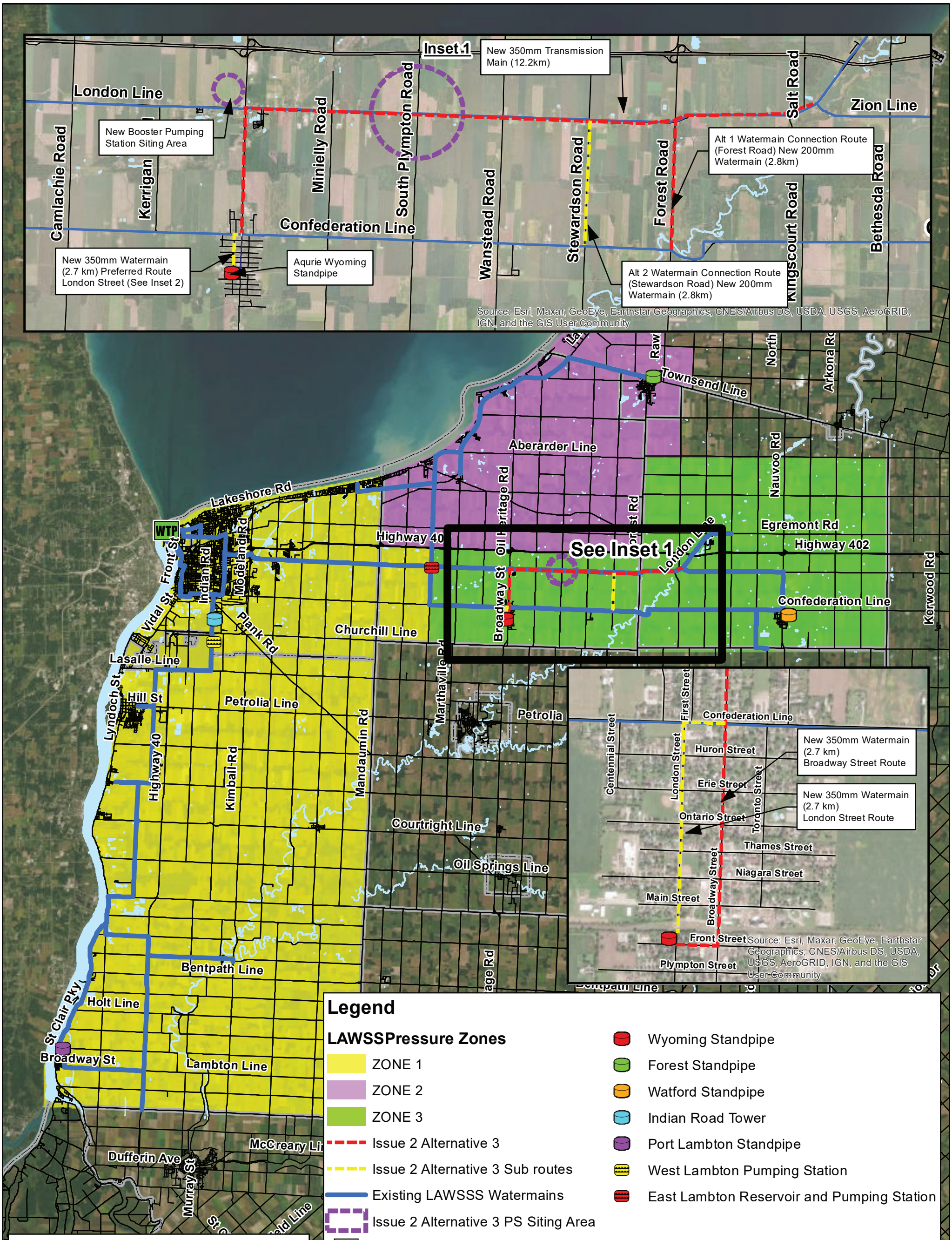
Low Impact is considered preferred compared to moderate or high impact.

	Low Impact	Low to Moderate Impact	Moderate Impact	Moderate to High Impact	High Impact	Most Preferred Overall
Legend						

Factor	Criteria	Alternative 1: New Transmission Main Along London Line	Alternative 2: New Pressure Zone in East Lambton (Watford)	Alternative 3: New Pressure Zone in East Lambton (Watford)
	2. Potential effects to built heritage resources and cultural heritage landscapes	• Low potential for indirect impacts (e.g. vibration) to built heritage resources and cultural heritage landscapes.	• Low potential for indirect impacts (e.g. vibration) to built heritage resources and cultural heritage landscapes.	• Low potential for indirect impacts (e.g. vibration) to built heritage resources and cultural heritage landscapes.
Cultural Environment Evaluation Summary				
Cost	1. Cost of construction (including property acquisition)	• Highest construction costs. • No property acquisition required.	• High construction costs as a new BPS is required • Property acquisition required.	• Moderate to high costs as a new BPS is required • Property acquisition required.
	2. Cost of operations / maintenance	• Low operation/maintenance costs.	• Higher costs related to BPS operation and maintenance.	• Higher costs related to BPS operation and maintenance
Cost Evaluation Summary				
Overall Evaluation Summary		/35	/35	/35

Low Impact is considered preferred compared to moderate or high impact.

	Low Impact	Low to Moderate Impact	Moderate Impact	Moderate to High Impact	High Impact	Most Preferred Overall
Legend						



Lambton Area Water Supply System Water Master Plan Update

Figure 8.2: Issue 2 Preferred Alternative - New Pressure Zone in East Lambton (Watford)

Date: June 2021	PN: 60624749	Datum: NAD83 UTM17 Source: LIO, LAWSS

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Further evaluations were required to determine the routing of the 350mm watermain, the connection to Confederation Line and the location of the new booster pumping station.

8.3.1.1 Evaluation of 350mm watermain (Wyoming Routing)

There were two alternatives evaluated for the routing of the 350mm watermain from the Wyoming Standpipe to London Line:

1. From Wyoming Standpipe along Front Street to Broadway Street

2. From Wyoming Standpipe along London Street to Confederation Line to Broadway Street

A summary of the evaluation matrix for the Issue 2 350mm watermain routing alternatives is shown in **Table 8.6** below. For a comprehensive evaluation in matrix form see the full evaluation of Issue 2 350mm watermain (Wyoming) routing Alternative Solutions as shown in **Table 8.7**

Table 8-6: Evaluation of Issue 2 Alternatives Summary

Evaluation Criteria Category	Alternative 1	Alternative 2
Land Use		
Technical		
Natural Heritage		
Socio Economic		
Cultural Environment		
Cost		
Overall Alternative Rating		

8.3.1.2 Preferred 350mm Watermain Wyoming Routing

Based on the criteria and methodology applied as part of the evaluation process, the preferred alternative is **Alternative 2 – London Street Routing.** This alternative involves routing the 350mm watermain north along London Street to Front Street (includes CPR crossing). It will follow Front Street easterly until Broadway Street where it will go north until connecting at Confederation Line. (Refer to **Figure 8.3**)

Table 8-7: Issue 2: Watford Standpipe Fill Constraint / Low Pressure

Alternative Solution 3 - New Pressure Zone in East Lambton (Watford)

Sub Alternative: Alternative Wyoming Watermain Routes

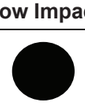
Factor	Criteria	Watermain Route 1: Broadway Street	Watermain Route 2: London Street
Description		• New 350mm Watermain (2.7 km) via Broadway Street.	• New 350mm Watermain (2.7 km) via London Street.
Land Use	1. Conformance with approved local, county and provincial plans and policies	• Conforms with approved local, county and provincial plans and policies.	• Conforms with approved local, county and provincial plans and policies.
	2. Potential effects on existing and approved / planned land uses	• Potential impacts to adjacent land uses (built up area in Wyoming) related to watermain construction (anticipated to be within existing right-of-way).	• Potential impacts to adjacent land uses (built up area in Wyoming) related to watermain construction (anticipated to be within existing right-of-way).
Land Use Evaluation Summary			
Technical	1. Potential compatibility with system - requirement for system upgrades	• Compatible with system.	• Compatible with system.
	2. Potential constructability and minimum utility conflicts	• No Rail Station conflict. • Wider ROW along Broadway Street. • Low to moderate impact to hydro poles on east side of Broadway Street.	• Construction conflict with VIA railway station building on the north side tracks • Narrower ROW. • Low Impact to hydro poles on west side of London Street.
	3. Ability to meet long-term water servicing requirements including flow, pressure and fire flow for the servicing area	• Meets long-term water servicing requirements.	• Meets long-term water servicing requirements.
Technical Evaluation Summary			
Natural Environment	1. Potential effects on terrestrial species and habitat	• Minimal impacts to terrestrial species and habitat	• Minimal impacts to terrestrial species and habitat
	2. Potential effects on aquatic species and habitat	• No water crossings to impact aquatic species or habitat	• No water crossings to impact aquatic species or habitat
	3. Potential effects on Species at Risk (SAR) and SAR habitat	• No potential impacts to SAR and SAR habitat.	• No potential impacts to SAR and SAR habitat.
	4. Potential effects on surface water and groundwater	• Minor impacts to surface water. • Construction of Feedermain may require temporary dewatering.	• Minor impacts to surface water. • Construction of Feedermain may require temporary dewatering.
	5. Potential to encounter soil and water contamination	• Potential to encounter soil and water contamination (significant portion of waterrmain in built up urban area).	• Potential to encounter soil and water contamination (significant portion of watermain in built up urban area).
	6. Potential for project to impact climate change and for climate change to impact the project	• Low to moderate impacts to climate change during construction period.	• Low to moderate impacts to climate change during construction period.

Low Impact is considered preferred compared to moderate or high impact.

	Low Impact	Low to Moderate Impact	Moderate Impact	Moderate to High Impact	High Impact	Most Preferred Overall
Legend						

Factor	Criteria	Watermain Route 1: Broadway Street	Watermain Route 2: London Street
Natural Environment Evaluation Summary			
Socio-Economic	1. Potential effects (noise, vibration, dust, access to property) related to disruption to residences, agricultural, businesses and travelling public during construction and operation	• Temporary disruptions anticipated based on construction in built up area. • Temporary severe distruptions to businesses during construction period.	• Temporary disruptions anticipated based on construction in built up area. • Less impact to local busineses
	2. Degree of property acquisition / easement requirements	• No property aqusiiton required. • Low to moderate potential for for easements if watermain can not be constructed within existing right-of-way due to wider ROW.	• No property aqusiiton required. • Low to Moderate potential for for easements if watermain can not be constructed within existing right-of-way due to narrow residential ROW.
Socio-Economic Evaluation Summary			
Cultural Environment	1. Potential effects on archaeological resources	• Low potential for impacts to archaeological resources.	• Low potential for impacts to archaeological resources.
	2. Potential effects to built heritage resources and cultural heritage landscapes	• Higher potential for indirect impacts (e.g. vibration) to built heritage resources and cultural heritage landscapes.	• Potential for indirect impacts (e.g. vibration) to built heritage resources and cultural heritage landscapes.
Cultural Environment Evaluation Summary			
Cost	1. Cost of construction (including property acquisition)	• Similar construction costs to Route 2.	• Similar construction costs to Route 2.
	2. Cost of operations / maintenance	• Similar operations and maintenance costs to Route 2.	• Similar operations and maintenance costs to Route 1.
Cost Evaluation Summary			
Overall Evaluation Summary			

Low Impact is considered preferred compared to moderate or high impact.

	Low Impact	Low to Moderate Impact	Moderate Impact	Moderate to High Impact	High Impact	Most Preferred Overall
Legend						

Inset 1

New 350mm Transmission Main (12.2km)

London Line

New Booster Pumping Station Siting Area

Camlachie Road

Kerrigan

Minielly Road

South Plympton Road

Wanstead Road

Stewardson Road

Forest Road

Salt Road

Zion Line

Bethesda Road

court Road

Confederation Line

New 350mm Watermain (2.7 km) Preferred Route London Street (See Inset 2)

Aqurie Wyoming Standpipe

Preferred Watermain Connection Route (Stewardson Road) New 200mm Watermain (2.8km)

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Townsend Line

Aberarder Line

North

Arkona Rd

Nauvoo Rd

Lakeshore Rd

WTP

Highway 40

Egremont Rd

Highway 402

See Inset 1

Oil Heritage Rd

Broadway St

London Line

Confederation Line

Kerwood Rd

Front St

Indian Rd

Modeland Rd

Vidal St

Plank Rd

Churchill Line

Lasalle Line

Lyndoch St

Hill St

Petrolia Line

Marthaville Rd

Petrolia

Mandaumin Rd

Highway 40

Kimball Rd

Courtright Line

Oil Springs Line

Bentpath Line

Holt Line

St Clair Pky

Broadway St

Lambton Line

McCreary Line

Dufferin Ave

Murray St

Inset 2

First Street

Confederation Line

Centennial Street

London Street

Huron Street

Erie Street

Toronto Street

Ontario Street

Thames Street

Broadway Street

Niagara Street

Main Street

Front Street

Plympton Street

New 350mm Watermain (2.7 km) London Street Preferred Route

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

LAWSSPressure Zones

- ZONE 1
- ZONE 2
- ZONE 3
- Issue 2 Alternative 3
- Issue 2 Alternative 3 Sub routes
- Existing LAWSSS Watermains
- Issue 2 Alternative 3 PS Siting Area
- LAWSS WTP
- Wyoming Standpipe
- Forest Standpipe
- Watford Standpipe
- Indian Road Tower
- Port Lambton Standpipe
- West Lambton Pumping Station
- East Lambton Reservoir and Pumping Station

0 4,100 8,200 16,400 Metres

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Key Map

Brampton, Kitchener, Oakville, Hamilton, London, Brantford, Waterford, Chatham, Detroit, Windsor, Lake St Clair, Lake Erie

Study Area

Source: Esri, DeLorme, GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN,

Lambton Area Water Supply System Water Master Plan Update

Figure 8.3: Issue 2 Preferred Alternative Watermain Routes

Date: June 2021	PN: 60624749	Datum: NAD83 UTM17 Source: LIO, LAWSS

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8.3.1.3 Evaluation of routing the 200mm connection from London Line to Confederation Line

There were two alternatives evaluated for the routing of the 200mm watermain from London Line to Confederation Line:

3. Stewardson Road; and
4. Forest Road.

A summary of the evaluation matrix for the Issue 2 200mm watermain routing alternatives is shown in **Table 8-8** below. For a comprehensive evaluation in matrix form see the full evaluation of Issue 2 200mm watermain routing Alternative Solutions as shown in **Table 8.9**

Table 8-8: Evaluation of Issue 2 200mm Watermain Routing Alternatives Summary

Evaluation Criteria Category	Alternative 1	Alternative 2
Land Use		
Technical		
Natural Heritage		
Socio Economic		
Cultural Environment		
Cost		
Overall Alternative Rating		

Table 8-9: Issue 2: Watford Standpipe Fill Constraint / Low Pressure

Alternative Solution 3 - New Pressure Zone in East Lambton (Watford)

Sub Alternative: Alternative Watermain Connections

Factor	Criteria	Watermain Connection 1: Forest Road	Watermain Connection 2: Stewardson Road
Description		• New 200 mm Watermain (2.8 km) via Forest Road from London Line to Confederation Line.	• New 200 mm Watermain (2.8 km) via Stewardson Road from London Line to Confederation Line.
Land Use	1. Conformance with approved local, county and provincial plans and policies	• Conforms with approved local, county and provincial plans and policies. • May require significant works in regulated floodplain.	• Conforms with approved local, county and provincial plans and policies.
	2. Potential effects on existing and approved / planned land uses	• No impacts to existing or future land uses.	• No impacts to existing or future land uses.
Land Use Evaluation Summary			
Technical	1. Potential compatibility with system - requirement for system upgrades	• Compatible with system.	• Compatible with system.
	2. Potential constructability and minimum utility conflicts	• Difficult constructability based on significant works in regulated floodplain and potential for utility conflicts.	• Good constructability and minimum utility conflicts.
	3. Ability to meet long-term water servicing requirements including flow, pressure and fire flow for the servicing area	• Meets long-term water servicing requirements.	• Meets long-term water servicing requirements
Technical Evaluation Summary			
Natural Environment	1. Potential effects on terrestrial species and habitat	• Moderate to high impact on Terrestrial species and habitat	• Low impact to terrestrial species and habitat
	2. Potential effects on aquatic species and habitat	• May require significant works in regulated floodplain. • 2 Minor water crossings, and 1 significant water crossing	• Minimal work within regulated floodplain. • 3 minor water crossings
	3. Potential effects on Species at Risk (SAR) and SAR habitat	• Moderate to High Impact as route passes through multiple areas with SAR and SAR habitat.	• No Impact to SAR and SAR habitat.
	4. Potential effects on surface water and groundwater	• Minor impacts to surface water. • Construction of waterermain may require temporary dewatering.	• Minor impacts to surface water. • Construction of waterrmain may require temporary dewatering.
	5. Potential to encounter soil and water contamination	• Low potential to encounter soil and water contamination.	• Low potential to encounter soil and water contamination.
	6. Potential for project to impact climate change and for climate change to impact the project	• Low to moderate impacts to climate change during construction period.	• Low to moderate impacts to climate change during construction period.

Low Impact is considered preferred compared to moderate or high impact.

	Low Impact	Low to Moderate Impact	Moderate Impact	Moderate to High Impact	High Impact	Most Preferred Overall
Legend						

Factor	Criteria	Watermain Connection 1: Forest Road	Watermain Connection 2: Stewardson Road
Natural Environment Evaluation Summary			
Socio-Economic	1. Potential effects (noise, vibration, dust, access to property) related to disruption to residences, agricultural, businesses and travelling public during construction and operation	• Temporary disruptions anticipated based on construction in built up urban area.	• Temporary disruptions anticipated based on construction in built up urban area.
	2. Degree of property acquisition / easement requirements	• No property acquisition required. • Potential for easements if watermain can not be constructed within existing right-of-way.	• No property acquisition required. • Potential for easements if watermain can not be constructed within existing right-of-way.
Socio-Economic Evaluation Summary			
Cultural Environment	1. Potential effects on archaeological resources	• Low potential for impacts to archaeological resources.	• Low potential for impacts to archaeological resources.
	2. Potential effects to built heritage resources and cultural heritage landscapes	• Low potential for indirect impacts (e.g. vibration) to built heritage resources and cultural heritage landscapes.	• Low potential for indirect impacts (e.g. vibration) to built heritage resources and cultural heritage landscapes.
Cultural Environment Evaluation Summary			
Cost	1. Cost of construction (including property acquisition)	• Higher construction cost due to significant water crossing	• Lower construction cost due to simpler water crossings.
	2. Cost of operations / maintenance	• Similar operations and maintenance costs	• Similar operations and maintenance costs
Cost Evaluation Summary			
Overall Evaluation Summary			

Low Impact is considered preferred compared to moderate or high impact.

	Low Impact	Low to Moderate Impact	Moderate Impact	Moderate to High Impact	High Impact	Most Preferred Overall
Legend						

8.3.1.4 Preferred 200mm Watermain Routing Alternative

Based on the criteria and methodology applied as part of the evaluation process, the preferred alternative is **Alternative 2 – Stewardson Road Routing.** This alternative involves routing the 200mm watermain along Stewardson Road from London Line to Confederation Line. (Refer to **Figure 8.3**)

8.3.1.5 Evaluation of Booster Pumping Station Siting Areas

There were four alternatives evaluated for the siting of the new booster pumping station (Refer to **Figure 8.4**):

1. Northwest corner of London Line and South Plympton Road;
2. Northeast corner of London Line and South Plympton Road;
3. Southeast corner of London Line and South Plympton Road; and
4. Town of Plympton Wyoming Works Yard at London Line and Oil Heritage Road

A summary of the evaluation matrix for the Issue 2 booster pumping station siting is shown in **Table 8.10** below. For a comprehensive evaluation in matrix form see the full evaluation of Issue 2 booster pumping station siting areas alternative solutions as shown in **Table 8.11.**

Table 8-10: Evaluation of Issue 2 Booster Pumping station Locations Summary

Evaluation Criteria Category	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Land Use				
Technical				
Natural Heritage				
Socio Economic				
Cultural Environment				

Evaluation Criteria Category	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Cost				
Overall Alternative Rating				

8.3.1.6 Preferred Booster Pumping Station Siting Area

Based on the criteria and methodology applied as part of the evaluation process, the preferred alternative is **Alternative 4 – Town of Plympton Wyoming Works Yard.** This alternative would place the booster pumping station within the works yard property limits. The exact location within the works yard will be determined during detailed design. The availability of Booster Pumping station land depends on the Towns ability to expand the existing Public Works Yard facility and lands. (Refer to **Figure 8.5**)

8.3.1.7 Existing East Lambton Pumping Station Upgrades

Regarding the existing East Lambton Pumping Station pump capacity upgrades, it was anticipated that the upgrades will be within the existing pumping station building and as such the Schedule B Class Environment Assessment process is not triggered.

8.4 Issue 3 – Pump Station Modifications

Supply is limited under existing conditions at the West Lambton Pump Station and the pump must be stopped when the West Lambton Reservoir is being filled. To increase the water supply for St. Clair Township's planned growth, modifications to the pumps at the station will be required to dedicate existing pumps for St. Clair Township and provide continuous supply while filling the reservoir. These works are all within the existing station and are classified as a Schedule A+ project, or pre-approved.

8.5 Recommended Capital Works

The phasing for the recommended future infrastructure upgrades described in the previous sections to address the system issues was evaluated for the current and each future interim scenario (2026, 2031 and 2036 planning years). Based on the hydraulic modelling analysis, the phasing for implementing the future infrastructures and the estimated capital costs were identified and are summarized in **Table 8-12**.

Table 8-11 Issue 2: Watford Standpipe Fill Constraint / Low Pressure

Alternative Solution 3 - New Pressure Zone in East Lambton (Watford)

Sub Alternative : Booster Station Siting Options

Factor	Criteria	BPS Siting Option 1	BPS Siting Option 2	BPS Siting Option 3	BPS Siting Option 4
Siting Details		• Location: northwest quadrant of land adjacent to intersection of London Line and South Plympton Road. • Site Size: 50 m x 50 m.	• Location: northeast quadrant of land adjacent to intersection of London Line and South Plympton Road. • Site Size: 50 m x 50 m.	• Location: southeast quadrant of land adjacent to intersection of London Line and South Plympton Road. • Site Size: 50 m x 50 m.	• Location: Plympton Wyoming Works Yard at London Line and Oil Heritage Road. • Site Size: 50 m x 50 m.
Land Use	1. Conformance with approved local, county and provincial plans and policies	• Conforms with approved local, county and provincial plans and policies. • BPS is permitted use in agricultural area.	• Conforms with approved local, county and provincial plans and policies. • BPS is permitted use in agricultural area.	• Conforms with approved local, county and provincial plans and policies. • BPS is permitted use in agricultural area.	• Conforms with approved local, county and provincial plans and policies. • Site is within a Conservation Authority Regulated Area • BPS is permitted use in a public works yard.
	2. Potential effects on existing and approved / planned land uses	• Displacement of existing land use for new BPS.	• Displacement of existing land use for new BPS.	• Displacement of existing land use for new BPS.	• Displacement of works yard storage areas.
Land Use Evaluation Summary					
Technical	1. Potential compatibility with system - requirement for system upgrades	• Compatible with system.	• Compatible with system.	• Compatible with system.	• Compatible with system.
	2. Potential constructability and minimum utility conflicts	• Good constructability and minimal utility conflicts.	• Good constructability and minimal utility conflicts.	• Good constructability and minimal utility conflicts.	• Good constructability and minimal utility conflicts.
	3. Ability to meet long-term water servicing requirements including flow, pressure and fire flow for the servicing area	• Meets long-term water servicing requirements.	• Meets long-term water servicing requirements.	• Meets long-term water servicing requirements.	• Meets long-term water servicing requirements.
Technical Evaluation Summary					
Natural Environment	1. Potential effects on terrestrial species and habitat	• Low impact to terrestrial species and habitat	• Low impact to terrestrial species and habitat	• Low impact to terrestrial species and habitat	• Low impact to terrestrial species and habitat
	2. Potential effects on aquatic species and habitat	• Low impact to aquatic species and habitat	Low impact to aquatic species and habitat	• Low impact to aquatic species and habitat	• Low impact to aquatic species and habitat
	3. Potential effects on Species at Risk (SAR) and SAR habitat	• No impacts to SAR and SAR habitat	No impacts to SAR and SAR habitat	• No impacts to SAR and SAR habitat	• No impacts to SAR and SAR habitat
	4. Potential effects on surface water and groundwater	• Potential impact the Dewar Forbes Drain • Minimal impact to surface water	Minimal impacts to surface water	• Potential impact the Dewar Forbes Drain • Minimal Impact to surface water	• Minimal Impact to surface water

Low Impact is considered preferred compared to moderate or high impact.

	Low Impact	Low to Moderate Impact	Moderate Impact	Moderate to High Impact	High Impact	Most Preferred Overall
Legend						

Factor	Criteria	BPS Siting Option 1	BPS Siting Option 2	BPS Siting Option 3	BPS Siting Option 4
		• Construction of booster station may require temporary dewatering.	Construction of booster station may require temporary dewatering.	• Construction of booster station may require temporary dewatering.	• Construction of booster station may require temporary dewatering.
	5. Potential to encounter soil and water contamination	• Low potential to encounter soil and water contamination.	Low potential to encounter soil and water contamination.	• Low potential to encounter soil and water contamination.	• Low to moderate potential to encounter soil and water contamination.
	6. Potential for project to impact climate change and for climate change to impact the project	• Low impacts to climate change during construction period. • BPS involves increased energy and is susceptible to extreme weather events (e.g. loss of power).	• Low impacts to climate change during construction period. BPS involves increased energy and is susceptible to extreme weather events (e.g. loss of power).	• Low impacts to climate change during construction period. • BPS involves increased energy and is susceptible to extreme weather events (e.g. loss of power).	• Low to moderate impacts to climate change during construction period. • BPS involves increased energy and is susceptible to extreme weather events (e.g. loss of power).
Natural Environment Evaluation Summary					
Socio-Economic	1. Potential effects (noise, vibration, dust, access to property) related to disruption to residences, agricultural, businesses and travelling public during construction and operation	• Temporary disriptions during construction.	• Temporary disriptions during construction.	• Temporary disriptions during construction.	• Temporary traffic disriptions during construction. • Temporary impacts to local businesses during construction (Tim Hortons/Korner Kitchen/Petro Canada)
	2. Degree of property acquisition / easement requirements	• Property acquisition required – assumes willing host.	• Property acquisition required – assumes willing host.	• Property acquisition required – assumes willing host.	• Property is owned by a LAWSS member municipality.
Socio-Economic Evaluation Summary					
Cultural Environment	1. Potential effects on archaeological resources	• Low to Moderate Potential for impacts to archaeological resources.	• Low to Moderate Potential for impacts to archaeological resources.	• Low to Moderate Potential for impacts to archaeological resources.	• Low potential for Archaeological resouces due to the area already being disturbed.
	2. Potential effects to built heritage resources and cultural heritage landscapes	• No impacts to built heritage resources and cultural heritage landscapes.	• No impacts to built heritage resources and cultural heritage landscapes.	No impacts to built heritage resources and cultural heritage landscapes.	No impacts to built heritage resources and cultural heritage landscapes.
Cultural Environment Evaluation Summary					
Cost	1. Cost of construction (including property acquisition)	• Similar costs for all BPS siting options with property acquisitions.	• Similar costs for all BPS siting options with property acquisitions.	• Similar costs for all BPS siting options with property acquisitions.	• Lower cost for siting BPS due to reduced property costs.
	2. Cost of operations / maintenance	• Similar operation / maintenance costs for all BPS siting options.	• Similar operation / maintenance costs for all BPS siting options.	• Similar operation / maintenance costs for all BPS siting options.	• Similar operation / maintenance costs for all BPS siting options.
Cost Evaluation Summary					
Overall Evaluation Summary					

Low Impact is considered preferred compared to moderate or high impact.

Legend	Low Impact	Low to Moderate Impact	Moderate Impact	Moderate to High Impact	High Impact	Most Preferred Overall

Option 1
~50mx50m

Option 2
~50mx50m

South Plympton Road

London L

Option 4
at Oil Heritage Line

Option 3
~50mx50m

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Option 4
~50mx50m
(Exact location to be
confirmed by the Town of Plympton Wyoming)

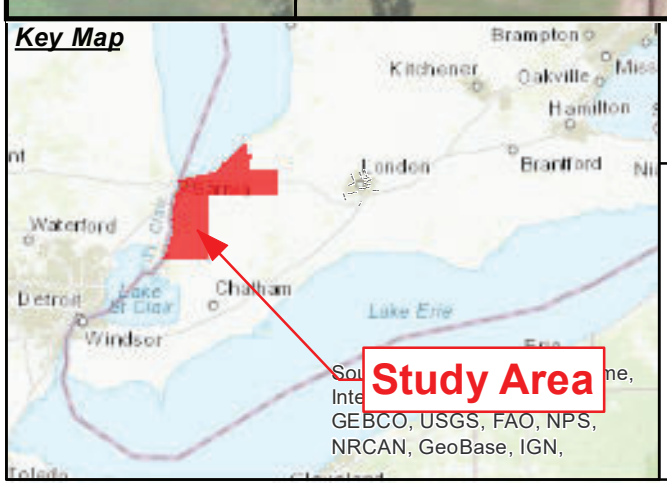
Oil Heritage Road

London Line

Town of Plympton Wyoming
Works Yard

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Key Map



Lambton Area Water Supply System
Water Master Plan Update

Figure 8.4: Issue 2
Preferred Alternative
Booster Pumping Station Siting

Date: May 2021	PN: 60624749	Datum: NAD83 UTM17 Source: LIO, LAWSS

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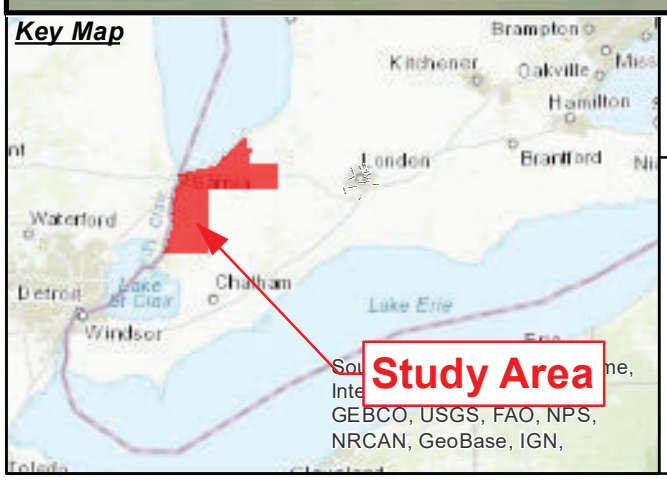
Option 4
~50mx50m
(Exact location to be
confirmed by the Town of Plympton Wyoming)

Oil Heritage Road

Town of Plympton Wyoming
Works Yard

London Line

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Lambton Area Water Supply System
Water Master Plan Update

Figure8.5: Issue 2
Preferred Alternative
Booster Pumping Station Site

Date: May 2021	PN: 60624749	Datum: NAD83 UTM17 Source: LIO, LAWSS

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Table 8-12: Recommended Capital Works Summary

SYSTEM ISSUE	PROJECT ID	PROJECT DESCRIPTION	IN SERVICE BY	CAPITAL COSTS
ISSUE 1: ELPS FILL CONSTRAINTS / LOW PRESSURES	1	New 150mm local distribution watermain from East Lambton PS (Forest) to Mandaumin Road	2026	$ 5,188,000
ISSUE 2: WATFORD STANDPIPE FILL CONSTRAINTS / LOW PRESSURES	2A	New 350mm transmission main on London Line	2026	
	2B	New Booster Pumping Station New 350mm watermain on Oil Heritage Road New water chambers Acquisition of Wyoming Standpipe	2031	$38,946,000
	2C	New 200mm watermain on Stewardson Road	2036	
ISSUE 3: WLPS FILL CONSTRAINTS / LOW PRESSURES IN ST. CLAIR	3	West Lambton Pumping Station Modifications	Immediate	$ 604,000
Water Treatment Plant Optimization Study				$250,000

Costs estimation details are presented in Appendix D

9 Project Descriptions

9.1 List of Schedule A+ Pre-approved Projects

Schedule A+ projects are considered pre-approved and apply to the following recommended projects:

1. Construction of a new 150mm watermain parallel to the existing transmission main from the East Lambton Pumping Station to Mandaumin Road.
2. Install new check valve on the transmission main on Confederation line east of Wyoming.
3. Install new check valve on the transmission main on London Line west of Oil Heritage Road
4. Acquire the Wyoming Standpipe
5. West Lambton Pumping Station and Reservoir pump modifications

6. Construct a new 350mm watermain from the Wyoming Standpipe to London Line. Routing will follow London Street to Front Street, Front Street to Broadway Street, Broadway Street to London Line. All works will be constructed within existing road allowances.

7. Construct a new 350mm transmission main on London Line from Oil Heritage Road to Zion Line. All works will be constructed within existing road allowances.

8. Construct a new 200mm watermain connection on Stewardson Road from London Line to Confederation Line. All works will be constructed within existing road allowances.

9.2 Schedule B Projects

Schedule B projects require the completion of Phase 1 and Phase 2 of the EA process before construction can begin. This Water Master Plan Update, satisfies Phases 1 and 2 of the EA process for the following project:

1. Construct a new Booster Pumping Station at the Town of Plympton Wyoming Works Yard. This requires land acquisition from the Town of Plympton Wyoming. The availability of Booster Pumping Station lands will depend on the Towns

ability to expand the existing Public Works Yard facility and lands. Refer to **Appendix E** Schedule B technical memorandum.

9.3 Climate Change Considerations

Climate change is now being integrated into infrastructure planning and design as a way of building more resilient and robust systems. Incorporating sustainability and resiliency early on in the decision-making process provides a level of flexibility to allow for changes in future weather and climate uncertainty into the project design. Climate change trends across Ontario show that temperatures are increasing across all seasons, precipitation patterns are changing, and extreme weather events are becoming more intense and frequent. Planning to account for these changes in historical averages, as well as shorter-term more extreme events, is challenging but essential.

The Ministry's guide "Consideration of Climate Change in Environmental Assessments in Ontario" was finalized in October 2017 and, therefore, the MECP requires that all MCEAs consider this within the scope of the project. Two approaches for the consideration and addressing climate change in project planning includes:
Reducing a project's effect on climate change (climate change mitigation).

- Increasing the project's and local ecosystem's resilience to climate change (climate change adaptation).

Climate change impacts were considered when evaluating all alternatives from a construction, energy use, and extreme weather events perspective.

9.4 Permits and Approvals

9.4.1 St. Clair Region Conservation Authority (SCRCA)

In accordance with O.Reg 171/06, a Development Interference with Wetlands and Alteration to Watercourses and Shoreline Regulation permit (Section 28) will be required from SCRCA prior to construction within regulated areas. This specifically applies to:

- The new 350mm watermain on London Line from Broadway Street to Zion Line;
- The new 200mm watermain on Stewardson Road;
- The new 350mm watermain on Broadway Street;
- The new 150m watermain on London Line from the ELPS to Mandaumin Road; and

- The new Pumping Station at London Line and Oil Heritage Road.

9.4.2 Ministry of Environment, Conservation and Parks (MECP)

Permitting under the Endangered Species Act (ESA) may be required if it is determined that there will be impacts to the natural areas located adjacent to the proposed routes. Further assessment will be required at detailed design to determine if permitting under the ESA will be necessary. This specifically applies to:

- The new 350mm watermain on London Line from Broadway Street to Zion Line;
- The new 200mm watermain on Stewardson Road;
- The new 350mm watermain on Broadway Street;
- The new 150m watermain on London Line from the ELPS to Mandaumin Road; and
- The new Pumping Station at London Line and Oil Heritage Road.

If the proposed activities cannot avoid impacting protected species and their habitats, then an application for authorization under the Endangered Species Act (ESA) will be required. If it is believed that the proposed activities are going to have an impact then SAROntario.ca should be contacted to undergo a formal review under the ESA.

9.4.3 Ministry of Natural Resources (MNRF)

A Licence to Collect Fish for Scientific Purposes (LCFSP) permit will be required from MNRF to relocate fish from features providing fish habitat where an open-cut crossing method is proposed.

9.4.4 Fisheries and Oceans Canada (DFO)

If, during detail design, activities are anticipated to occur below the high-water mark (i.e., the 1:2-year return event), a qualified fisheries biologist should screen the project to determine if a Request for Review (RfR) should be submitted to the Department of Fisheries and Oceans (DFO) to initiate regulatory review under the *Fisheries* Act. During regulatory review, DFO may decide to issue a Letter of Advice or require an Authorization under the *Fisheries Act*. During regulatory review, DFO may also require additional mitigation measures, or in the case of an Authorization, require offsetting for the potential impacts to fish and fish habitat.

9.4.5 Ministry of Heritage, Sport, Tourism and Culture Industries

In addition to review and entry into the Ontario Public Register of Archaeological Reports of the Stage 1 Archaeological Assessment, further archaeological work is required (Stage 2 at a minimum).

9.4.6 Lambton County and Local Municipality Road Occupancy Permits

Lambton County and effected local Municipalities will be consulted during preliminary detailed design to confirm the need for Road Occupancy Permits to be issued for construction.

9.4.7 MECP Amendment to Drinking Water Licence

An amendment to the LAWSS Drinking Water Works permit will be required for all proposed works. This will be undertaken during detailed design.

9.4.8 Hydro One Networks Incorporated (HONI)

HONI will be consulted during preliminary detailed design to confirm the need for permitting requirements where the proposed work crosses an existing HONI asset. All work will be within existing road allowances.

9.4.9 CPR

CPR will be consulted during preliminary detailed design to confirm scope and requirements for trenchless crossing of the tracks on London Street at the Wyoming Standpipe.

10 Potential Impacts, Recommended Mitigation Measures and Commitments

10.1 Potential Impacts and Mitigation Measures

Based on the project descriptions in Section 8, it is recognized that watermain(s) construction will result in some impact on the existing environment. In order to address the effects, the following approach was taken:

- **Avoidance:** The first priority is to prevent the occurrence of negative effects (i.e., adverse environmental effects) associated with the implementation of an alternative;
- **Mitigation:** Where adverse environmental effects cannot be avoided, it will be necessary to develop the appropriate mitigation measures to eliminate or reduce to some degree, the negative effects associated with implementing the alternative; and
- **Enhancement/Compensation:** In situations where appropriate mitigation measures are not available, or significant net adverse effects will remain following the application of mitigation, enhancement or compensation measures may be required to counterbalance the negative effect through replacement in kind, or the provision of a substitute or reimbursement.

The following mitigation measures are recommended to ensure that any disturbances are managed by the best available methods. These measures will be further confirmed and developed during detailed design. **Table 10-1** provides assessments of the potential impacts associated with the project and the recommended mitigative measures required to reduce these effects.

Table 10-1: Mitigation/Compensation and Enhancement Measures

Potential Impact	Mitigation /Compensation or Enhancement Measure
Sediment, Erosion and Dust	• Develop an Erosion and Sediment Control Plan during detailed design that would include the installation of sediment and erosion control measures such as silt fencing and hay-bale check dams prior to construction activities. • A dust suppressant can be applied to areas of exposed soils to reduce or eliminate dust generation during construction. • Water adjacent vegetation when dust accumulation occurs.

Potential Impact	Mitigation /Compensation or Enhancement Measure
Working near Water	• Works near water should follow DFO guidelines for projects near water (DFO 2019b), which could involve the submission of a Request for Review
Private water Supply Wells / Local Water Taking Activities	• During detailed design investigate the presence of private water supply wells and / or any water taking activities within the study area how the proposed works may affect them.
Construction Equipment / Machinery Practices	• Risk of impacts from construction machinery can be reduced or limited with machinery inspections and maintenance and by establishing areas away from natural heritage features that are dedicated to re-fueling and storing machinery. • Refueling should not occur within 30 m of a wetland, watercourse or drainage feature. • Regular maintenance, cleaning and inspection of machinery. • Adherence to the Clean Equipment Protocol for Industry (Halloran *et al.* 2013)
Noise and Vibration	• Construction operations to occur during day shift. • Adhere to municipal noise by-laws, where possible. • Use of low noise equipment during construction, where possible. • Implement a vibration, noise and dust monitoring and response program along with limits.
Excess materials and waste	• Construction activities involving the management of excess soil should be completed in accordance with O.Reg 406/19 and the MECP guidance document “Management of Excess Soil – A Guide for Best Management Practices (2014) • All construction waste must be disposed of in accordance with MECP requirements
Impacts to surface water quality and quantity	• A water quality monitoring program may be required to ensure that in water construction activities do not affect the water quality of any drains and creeks downstream of the project site.
Construction Timing	• Any vegetation clearing or significant species habitat clearing (i.e. removal of debris) should occur outside of the breeding bird period (i.e. April 1 to August 31).
Disturbance to Aquatic Communities	• To minimize disturbance to aquatic communities during critical periods, any proposed in-or near water works will need to be restricted to a designated period of any given year, to allow for all possible species to complete their reproduction without construction disturbance. • A specific in- or near water work timing window should be determined through consultation with the MNRF.

Potential Impact	Mitigation /Compensation or Enhancement Measure
Disturbance to Wildlife	• Restrict construction activities to daytime hours (sunrise to sunset). • Restrict vegetation removal to periods before and after the bird nesting period of April 1st to August 31st.
Ecological Restoration Loss of Native Vegetation	• Areas disturbed should be revegetated once construction is complete through the planting of native trees, shrubs, forbs, grasses, and sedges. • Vegetation removal and implementation of a planting plan can result in a net benefit to the ecosystem if invasive species are removed and the planting plan contains native species appropriate to local conditions • A Planting Plan for post-construction restoration and a Management Plan for invasive *Phragmites* should be considered for the post-construction phase of the Project.
Loss of Significant Wildlife Habitat	• Tree plantings and native seed mix will be used to revegetate disturbed areas within the habitat to the extent possible. • Identify and control invasive plant species (common reed, buckthorn spp. etc.) where encountered.
Damage to Adjacent Natural Features	• Root pruning of adjacent trees during excavation. • Installation of tree protection or feature protection fencing.
Archaeology	• Subject to completion of visual inspection (preliminary design activity) complete Stage 2 archaeological assessment for undisturbed areas to be impacted by construction. • If any archaeological and/or historical resources are discovered: o Require contractor to halt work in the area of the discovery, until permitted to resume by the MHSTCI. o Require contract administration to notify the MHSTCI (Archaeological Unit) of the discovery. • If human remains are identified all work will halt until the proper authorities have been notified.
Cultural Heritage	• Where possible design to avoid property impacts. • Review potential impacts to all Cultural Heritage Resources during detailed design.
Impacts to Residents	• Homeowners adjacent to the sending and receiving pits for directional drilling under the CPR at London Street will need to be consulted in advance of construction (during detailed design) to explain the approach to construction and how access to property will be maintained.

10.2 MCEA Commitments

The above future permitting-approvals and mitigation measures form EA commitments that will be subject to the design and construction phases.

10.3 Lapse of Time

According to the MCEA planning and design process, “if the period of time from the filing of the Notice of Completion in the public record or the MECP’s denial of a Part II Order request(s), to the proposed commencement of construction for the project exceeds ten (10) years, the proponent shall review the planning and design process and the current environmental setting to ensure that the project and the mitigation measures are still valid given the current planning period. The review shall be recorded in an addendum to the Project File which shall be placed on the public record.” This specifically applies to the construction of the new Booster Pumping Station at the Town of Plympton Wyoming Works Yard (MCEA Schedule B project).

11 Consultation

11.1 Notifications

11.1.1 Notice of Commencement and Public Information Centre #1

The Notice of Commencement and Public Information Centre (PIC) #1 was first issued on December 3, 2020 introducing the MCEA study and included the project webpage (https://www.lawss.org/master-plan) on the LAWSS website that included the PIC 1 presentation materials, including fillable comment card and contact information for the LAWSS and consultant project managers. The following describes the methods by which the notice was distributed:

- Advertised in the Sarnia Journal and Sarnia Observer on December 3, 2020 and December 10, 2020.
- Published on the LAWSS member Municipality Facebook pages; and
- Issued to the study's contact list, which included those on the 2010 Grid Reinforcement EA contact list.

No Comments were received from the members of the public after the Notice of Commencement and PIC#1

11.1.2 Notice of Public Information Centre #2

The Notice of Public Information Centre (PIC) #2 was first issued on April 3, 2021 included the project webpage (https://www.lawss.org/master-plan) on the LAWSS website that included the PIC 2 narrated presentation and supplementary materials, including fillable comment card and contact information for the LAWSS and consultant project managers. The following describes the methods by which the notice was distributed:

- Advertised in the Sarnia Journal and Sarnia Observer on April 3rd, 2021 and April 10th, 2020.
- Published on the LAWSS member Municipality Facebook pages; and
- Issued to the study's contact list, which included those on the 2010 Grid Reinforcement EA contact list.

No Comments were received from the members of the public after the Notice of Commencement and PIC#1

11.1.3 Notice of Completion

A public Notice of Completion was issued on May 9th, 2022 to notify the public and stakeholders about the 30-day public review period. The following describes the methods by which the notice was distributed:

- Advertised in the Sarnia Journal and Sarnia Observer on May 7th and May 14th, 2022
- Published on the LAWSS member Municipality Facebook pages; and
- Issued to the study's contact list, which included those on the 2010 Grid Reinforcement EA contact list.

11.1.4 PIC #1

The Objective of the first PIC was to:

- Introduce the Lambton Area Water Supply System (LAWSS) Water Master Plan Update Municipal Class Environmental Assessment (MCEA) study, including Sarnia-St Clair Township Grid Reinforcement and Transmission Main Twinning EA Addendum;
- Provide an overview of the MCEA planning process and Study Area;
- Describe the rationale for the Master Plan Update;
- Provide an overview of existing conditions and challenges affecting the existing LAWSS system including problems and opportunities;
- Identify possible solutions or strategies that will be formally presented at PIC 2; and
- Gather feedback on the above items and inform of next steps.

This was an online PIC used a project specific webpage to share project information/ The webpage was created on the LAWSS website and included a link to the PIC display boards and a fillable comment card: https://www.lawss.org/master-plan.

The PIC was posted online on December 14th, 2020 and will stay on the site for the duration of the study. The presentation included 25 display boards providing information on the background data collected and the alternative solutions being considered. The presentation slides and Notice of PIC requested comments to be received by January 8th, 2021

Refer to **Appendix A.2** for the **PIC #1 Briefing**.

11.1.5 PIC #2

The Objective of the second PIC was to:

- Provide a summary of PIC 1
- Describe the alternative solutions / strategies considered to address the system issues
- Describe the evaluation criteria for the alternative solutions
- Present the preferred alternative solution/strategy
- Gather feedback on the above items and inform next steps

This was an online PIC that used a narrated video and supplementary materials to convey the project details. The video and materials were posted online on April 8th 2021 and will stay on for the duration of the study. The narrated video requested that comments be received by April 30th 2021.

11.2 Agency and Stakeholder Consultation

- St Clair Region Conservation Authority – Acknowledged the project and recognized that Regulatory Limits and Natural Heritage features were documented in the PIC.
- Ministry of Heritage, Sport, Culture and Tourism Industries – Acknowledged the project and provided advice on incorporating cultural heritage into the Master Plan process.
- Lambton Shores Engineering – Asked to be placed on the contact list and kept informed.
- County of Lambton – Asked to be kept informed of the study progress. There is a potential to discuss long-term capital planning related to roads to take advantage of synergies available between LAWSS and the County.
- Ministry of Transportation – Has interest in this study, specifically in regard to any potential impacts it may have to Highway 40 and Highway 402 provincial transportation infrastructure, noting that all three zones within the study include or abut provincial highway corridors. Under the Public Transportation and Highway Improvement Act, any alteration to existing plant, or any new proposed works within or adjacent to a provincial highway must be reviewed and approved by MTO, and most often requires MTO permits. A meeting was held with MTO on xx to discuss any needs and or concerns.
- A meeting was held with the Public Works representative from the Municipality of Plympton/Wyoming on November 5th, 2020 to review and confirm booster pumping station siting options as well as watermain alternative alignments for the East Lambton Pump Station Fill Constrain/Low Pressures issue.

- A meeting with Hydro One was held on May 3, 2021 to discuss the interaction of the transmission mains with existing Hydro One infrastructure. After the meeting Hydro One had no immediate concerns with the recommended projects.
- A meeting was held with Lambton County to review proposed watermain installations within the London Line ROW.

11.3 Indigenous Community Consultation

AECOM First Nations liaison officer has reached out by phone to the three effected Indigenous Communities (Kettle and Stony Point First Nation, Aamjiwnaang First Nation, Bkejwanong (Walpole Island) First Nation) starting in the summer (2020) to introduce the study and confirm preferred methods of engagement. This included offering face to face or Tele-townhall meetings with affected community leadership. AECOM also completed several follow up emails and phone calls to confirm whether each community would like to have a meeting. To date, no meetings have been held.

Chippewas of the Thames First Nation (COTTFN) is also included on the contact list and has had all notices circulated to them. COTTFN has reviewed the project and have minimal concerns. They have requested to be kept informed of the project as it moves forward.

All Indigenous communities listed above will receive the Notice of Completion which provides an opportunity to review the Master Plan Project File report and to provide comments or request further information that may also include a meeting.

12 Conclusions and Next Steps

The Master Plan Project File Report outlines the process required to ensure that the proposed recommended solutions to the problem and opportunity statement meet the requirements of the *EAA*. The MCEA planning process has not identified any significant environmental concerns that cannot be addressed by incorporating established mitigation measures during construction.

The proposed projects resolve the problem and opportunity statement identified in this report. A preliminary evaluation of potential impacts has been included in the evaluation, which indicates minor and predictable impacts that can be addressed by recommended mitigation measures as presented in **Section 10**. The proposed mitigation measures will further be developed at detailed design and will form commitments that will be adhered to by the LAWSS. Appropriate public notification and opportunity for comment was provided and no comments were received that could not adequately be addressed. Subject to receiving MCEA clearance following the 30-day review period, the LAWSS can start the detailed design and permitting-approvals phase for selected projects and proceed to construction as outlined in this report.