

City of London

**Final Report: Arva Pump Station to  
Huron Street Water Transmission Main  
Municipal Class Environmental Assessment Master Plan  
Project File - Schedule B**

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## Revision History

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1	Jan. 28, 2021	BAT/PA	First Draft Submission
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# Quality Information

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# List of Acronyms

<b>BRT</b>	Bus Rapid Transit
<b>CHAR</b>	Cultural Heritage Assessment Report
<b>CSDM</b>	Complete Streets Design Manual
<b>COTTFN</b>	Chippewa of the Thames First Nation
<b>CSP</b>	Corrugated Steel Pipe
<b>CWA</b>	Clean Water Act
<b>DBH</b>	Diameter at Breast Height
<b>DCBS</b>	Development Charges Background Study
<b>EA</b>	Environmental Assessment
<b>EAA</b>	Environmental Assessment Act
<b>EBL</b>	East Bound Left Turn Lane
<b>EBT</b>	East Bound Through Lane
<b>EBTR</b>	East Bound Through Right Lane
<b>ECA</b>	Environmental Compliance Approval
<b>EIS</b>	Environmental Impact Study
<b>ELC</b>	Ecological Land Classification
<b>EM</b>	Electro Magnetic
<b>END</b>	Endangered
<b>ESA</b>	Endangered Species Act
<b>ESR</b>	Environmental Study Report
<b>GMIS</b>	Growth Management Implementation Strategy
<b>IPZ</b>	Intake Protection Zone
<b>HVA</b>	Highly Vulnerable Area
<b>KM</b>	Kilometre
<b>LOS</b>	Level of Service
<b>MOECC</b>	Ministry of the Environment and Climate Change
<b>MECP</b>	Ministry of the Environment, Conservation and Parks
<b>MHSTCI</b>	Ministry of Heritage, Sport, Tourism and Culture Industries (Formerly MTCS)
<b>MTCS</b>	Ontario Ministry of Tourism, Culture & Sport
<b>MUP</b>	Multi-use Pathway
<b>MCEA</b>	Municipal Class Environmental Assessment
<b>MEA</b>	Ontario Municipal Engineers Association
<b>MNRF</b>	Ontario Ministry of Natural Resources & Forestry
<b>NHRM</b>	Natural Heritage Reference Manual
<b>NBL</b>	North Bound Left Turn Lane
<b>NBT</b>	North Bound Through Lane
<b>OP</b>	Official Plan
<b>O'Reg.</b>	Ontario Regulation
<b>PIC</b>	Public Information Centre
<b>PPS</b>	Provincial Policy Statement
<b>PS</b>	Pump Station
<b>PSW</b>	Provincially Significant Wetland
<b>PTTW</b>	Permit to Take Water
<b>PVC</b>	Polyvinyl Chloride
<b>ROW</b>	Right-of-Way
<b>SAR</b>	Species at Risk
<b>SARA</b>	Species at Risk Act
<b>SBL</b>	South Bound Left Turn Lane
<b>SBT</b>	South Bound Through Lane
<b>SC</b>	Special Concern
<b>SGRA</b>	Significant Groundwater Recharge Area
<b>SPP</b>	Source Protection Plan
<b>SWAP</b>	Southwest Area Plan
<b>SWP</b>	Source Water Protection
<b>SWH</b>	Significant Wildlife Habitat
<b>SWM</b>	Stormwater Management
<b>SWMF</b>	Stormwater Management Facility
<b>TDM</b>	Transportation Demand Management
<b>THR</b>	Threatened
<b>TMP</b>	Transportation Master Plan
<b>UTRCA</b>	Upper Thames River Conservation Authority

<b>V/C</b>	Volume to Capacity Ratio
<b>WBL</b>	West Bound Left Turn Lane
<b>WBT</b>	West Bound Through Lane
<b>WBTR</b>	West Bound Through Right Lane
<b>WHPA</b>	Well Head Protection Area
<b>WTP</b>	Water Treatment Plant

# Executive Summary

## Introduction and Background

The City of London (the City), through its consultant, AECOM, has completed a Municipal Class Environmental Assessment (Class EA Master Plan) Schedule B to evaluate short- and long-term solutions to maintain and twin the existing high pressure potable water transmission main(s) from the Arva Pumping Station to Chamber 13 on Huron Street. The City is supplied with water from two lake-based sources, 85% comes from Lake Huron utilizing the Lake Huron Water Supply System (LHWSS) and 15% comes from Lake Erie utilizing the Elgin Area Water Supply System (EAWSS). The City utilizes several water storage facilities including the Arva Reservoir (owned and operated by the LHWSS) that supplies water to the north portion of the City. The Arva Pumping station to Huron Street transmission main is the 'main artery' for water supply and distributes potable water to the City's water storage facilities and distribution system. The LHWSS transmission main has been partially twinned from the South Huron Water Treatment Plant (WTP), located north of Grand Bend to the Arva Reservoir and Pumping Station. In 1984, the City twinned its transmission main southerly from the Arva Reservoir and Pumping Station to Fanshawe Park Road, which allows for the LHWSS and the City to provide transmission main redundancy and increased capacity in addition to improved maintenance and operations. South of Fanshawe Park Road, the single transmission main travels through several residential properties, which poses some challenges to inspect, maintain, and repair the transmission main and other infrastructure along the route. The transmission main age is approximately 60 years of its potential 100 year expected lifetime and is not expected to be replaced in the short term. As a result, continuous monitoring, inspections and repairs are expected and may increase over its remaining lifetime.

## Consultation

The involvement of the community – residents, approval agencies, stakeholders, Indigenous communities, and those who may be potentially affected by a project – is an integral part of the Class EA process. The purpose of the Class EA study consultation process is to provide an opportunity for stakeholder groups and the public to gain an understanding of the study process; contribute to the process for the development and selection of alternatives/design concepts; and provide feedback and advice at important stages in the Class EA process. Specifically, the objectives of the consultation efforts are to:

- generate awareness of the project and provide opportunities for involvement throughout the planning process; and
- facilitate constructive input from public and agency stakeholders at key points in the Class EA process, prior to decision-making.

A consultation program was incorporated into the study to meet the above objectives. The consultation program included:

- Posting project milestones on the City of London website;
- Conducting meetings with agencies and stakeholders at key phases during the project (**See Report Section 3**);
- Publishing notices in The Londoner and the City's project website (<https://london.ca/projects/arva-pumping-station-huron-street-water-transmission-main-master-plan>) for all project milestones (**See Report Section 3.1, Table 3.1**);
- Notifying stakeholders, affected residents, the general public and review agencies regarding project milestones;
- Conducting two virtual open houses, one for the property owners between Fanshawe Park Road and Huron Street and one for the general public to inform the public, review agencies and stakeholders and obtain input; and
- Issuing a Notice of Completion.

## Identification of the Problem/Opportunity

The Class EA Problem / Opportunity statement provides the basis for the need and justification for this project and is presented below:

*The City receives approximately 85% of its water supply from the LHWSS, making the water transmission main that transports this water a critical and important asset. The water transmission main from the Arva PS and Reservoir to Huron Street was constructed in 1966 and ranges in condition, having fair and good sections. Several portions of the pipe south of Windermere Road and north of the Thames River were proactively replaced in 2017 and the existing easement (50' / 15m wide) was not adequate to allow for replacement by traditional means. Portions of the transmission main run through the backyards of residents where easements are in place and access to repair the transmission main via these easements could be difficult, especially if there are obstacles such as decks, sheds, trees, etc. within the easement and in close proximity to the water transmission main. The MCEA process provides the City the opportunity to develop a short-term strategy and solution that assess the existing easements in place to ensure maintenance access can be properly completed, and the possibility of increasing easement widths to allow for easier access or maintaining the easements at their current width and enforcing the City's rights to access if maintenance and/or repairs are required. The process also provides an opportunity for a long-term solution to be developed by examining twinning of the transmission main in other locations to provide a redundancy of supply and service future growth. This long-term solution also provides the possibility of decommissioning and abandoning the existing water transmission main once it has reached its service life.*

## Short- and Long-Term Alternative Solutions

A list of alternative solutions to meet the project needs was established for both the short- and long-term alternatives. The list was subject to a review and screening process that considered the ability to maximize the use of existing infrastructure; impacts to residents, communities, and existing infrastructure; and the avoidance of excessive capital and operating costs.

Short-term requirements involve regular inspections and maintenance of the transmission mains, chambers, valves and associated appurtenances to ensure optimal operation of the transmission main, and to facilitate emergency repairs in the event of a transmission main failure. Three short term alternative solutions were developed for evaluation including:

- **Alternative 1: Do Nothing** – no maintenance improvements or changes would be undertaken to address current and future requirements. This represents what would likely occur if none of the other alternative solutions were implemented. All monitoring, maintenance and repair that the City currently undertakes on this transmission main would continue as per current conditions.
- **Alternative 2: Maintain Easements as is (minimum 15m or 50')** - This Alternative would maintain the current easements in place without increasing them, but would require removing or relocating obstructions that impede or prevent access to the transmission main to enhance ongoing maintenance and/or repair needs.
- **Alternative 3: Widen the Easement to greater than 15m or 50' where possible** – This alternative would have the existing easements widened to greater than 15m wherever possible, to allow for easier access to the transmission main to enhance ongoing maintenance and/or repair needs.

For the long-term, solutions to eventually replace the single transmission main and associated valve chambers, located on several privately owned properties, between Fanshawe Park Road and Huron Street is required, in addition to providing redundancy of supply and additional supply for future growth servicing purposes. The current location of this infrastructure makes it difficult to access, maintain, repair, and twin the existing infrastructure in the future. Several alternatives to twin the single transmission main were reviewed and analyzed including:

- 1- **Alternative 1:** Do nothing, where no twinning is considered from Fanshawe Park Road to Huron Street;



- 2- **Alternative 2:** Twin the transmission main along Adelaide Street with connections to the existing transmission main(s) via Medway Road, Sunningdale Road, or Fanshawe Park Road and ending at the new relocated Chamber 13 on Maitland Street at Regent Street (**See Figure ES1**); and
- 3- **Alternative 3:** Twin the transmission main along Richmond Street ending at the new relocated Chamber 13 on Maitland Street at Regent Street. Several options for connections to Richmond Street included:
  - a. **3A:** Twin the transmission main along Richmond Street with a connection via Medway Road or Fanshawe Park Road (**See Figure ES1**);
  - b. **3B:** Twin the transmission main along Richmond Street via Windermere Road and the existing easement between Windermere Road and Huron Street, or via Huron Street (**See Figure ES1**).

**Evaluation of Short - Term Alternative Solutions**

A qualitative evaluation was undertaken for the evaluation of short-term existing transmission main maintenance alternatives based on Socio-Economic, Cultural Environment, Natural Heritage, Technical and Cost criteria, including environmental components that address the broad definition of the environment as described in the Environmental Assessment Act, to assist in determining the best possible solution. A summary of the evaluation matrix is shown in **Table ES-1**. For a comprehensive evaluation in matrix form see the full evaluation of the short-term alternative solutions as shown in **Table 6-3** of the Report.

**Table ES-1: Short Term Alternatives Evaluation Matrix Summary**

Evaluation Category	Alternative 1	Alternative 2	Alternative 3	Rationale
Socio Economic				<ul style="list-style-type: none"> <li>• Alternative 3 requires significant property/easement agreements</li> <li>• Alternatives 1 restricts quick access to the transmission main in an emergency</li> </ul>
Cultural Environment				<ul style="list-style-type: none"> <li>• Alternative 1 and 2 have minimal impact due to less chance of encroachment into areas of significance</li> <li>• Alternative 3 would have more impact due to clearing obstructions <u>and</u> adding easement width.</li> </ul>
Natural Heritage				<ul style="list-style-type: none"> <li>• Alternative 1 would have lowest impact. Greater impact if emergency works are required</li> <li>• Alternatives 2 and 3 would have greater impact due to removal obstructions and/or for the increased easement width</li> </ul>
Technical				<ul style="list-style-type: none"> <li>• Alternative 1 does not facilitate easy access for repairs</li> <li>• Alternative 3 provides easier access allowing for lower Monitoring and Maintenance costs.</li> </ul>
Economic/Financial				<ul style="list-style-type: none"> <li>• Alternative 1 has high costs associated with access in an emergency due to obstacles</li> <li>• Alternative 3 has very high costs associated with significant property and easement agreements</li> </ul>

<b>Overall Alternative Rating</b>				<ul style="list-style-type: none"> <li>Alternative 2 does not require additional easements or property</li> <li>Alternative 2 has lowest costs associated with easement agreements and emergency repairs</li> </ul>
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**Legend:** 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	Preferred Alternative Solution

Based on the criteria and methodology applied as part of the evaluation process, the preferred Short-term maintenance alternative is **Alternative 2 - Maintain Easements as is (minimum 15m or 50')**. (See Figures 8.1 - 8.3 in Section 8 of the Report). This short-term alternative ensures access to the existing transmission main(s) for ongoing monitoring, maintenance and/or repair purposes using the easements in place without requiring the purchase of additional easements or property.

### Evaluation of Long - Term Alternative Solutions

A qualitative evaluation was undertaken for the evaluation of long-term twinning alternatives to add system capacity and/or redundancy based on the above referenced criteria, including environmental components that address the broad definition of the environment as described in the Environmental Assessment Act, to assist in determining the best possible solution. A summary of the evaluation matrix is shown in **Table ES-2**. For a comprehensive evaluation in matrix form see the full evaluation of the long-term alternative solutions as shown in **Table 7-3** of the Report.

**Table ES-2: Long Term Twinning Alternatives Evaluation Matrix Summary**

Evaluation Criteria Category	Alternative 1	Alternative 2	Alternative 3A	Alternative 3B	Rationale
<b>Socio Economic</b>					<ul style="list-style-type: none"> <li>Alternative 1 high impacts in an emergency due to 15m or less easement widths</li> <li>Alternative 3A and 3B may require easements or property acquisition.</li> <li>Alternative 2 no apparent property easements or acquisitions required.</li> <li>Alternatives 2 and 3 have similar construction impacts.</li> </ul>
<b>Cultural Environment</b>					<ul style="list-style-type: none"> <li>Alternative 2 and 3B have higher potential for Archaeological impacts.</li> <li>Alternative 3B has the highest potential for cultural heritage impacts.</li> </ul>
<b>Natural Heritage</b>					<ul style="list-style-type: none"> <li>Alternative 1 has high impacts for repairs in significant terrestrial areas.</li> <li>Alternative 2 has the most water crossings, and a greater potential to Impact SAR</li> <li>Alternative 3A has less water crossings and a lower potential to impact SAR</li> </ul>

Evaluation Criteria Category	Alternative 1	Alternative 2	Alternative 3A	Alternative 3B	Rationale
					<ul style="list-style-type: none"> <li>Alternative 3B has fewer but more significant water crossings than 3A, a higher potential to impact SAR and a greater impact to climate change due to reduced carbon sequestration capacity resulting from vegetation removal</li> </ul>
Technical					<ul style="list-style-type: none"> <li>Alternatives are technically (hydraulics/water quality) equal except Alternative 1 which would require increased monitoring and maintenance.</li> <li>Alternative 3A and 3B have a greater design complexity</li> </ul>
Economic / Financial					<ul style="list-style-type: none"> <li>All Alternatives have similar costs associated with them.</li> <li>Alternative 1 has high emergency repair costs.</li> </ul>
Overall Alternative Rating					<ul style="list-style-type: none"> <li>Alternative 1 has significant emergency repair impacts</li> <li>Alternative 2 the least impacts and the clearest route for twinning</li> </ul>

Legend: 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	Preferred Alternative Solution

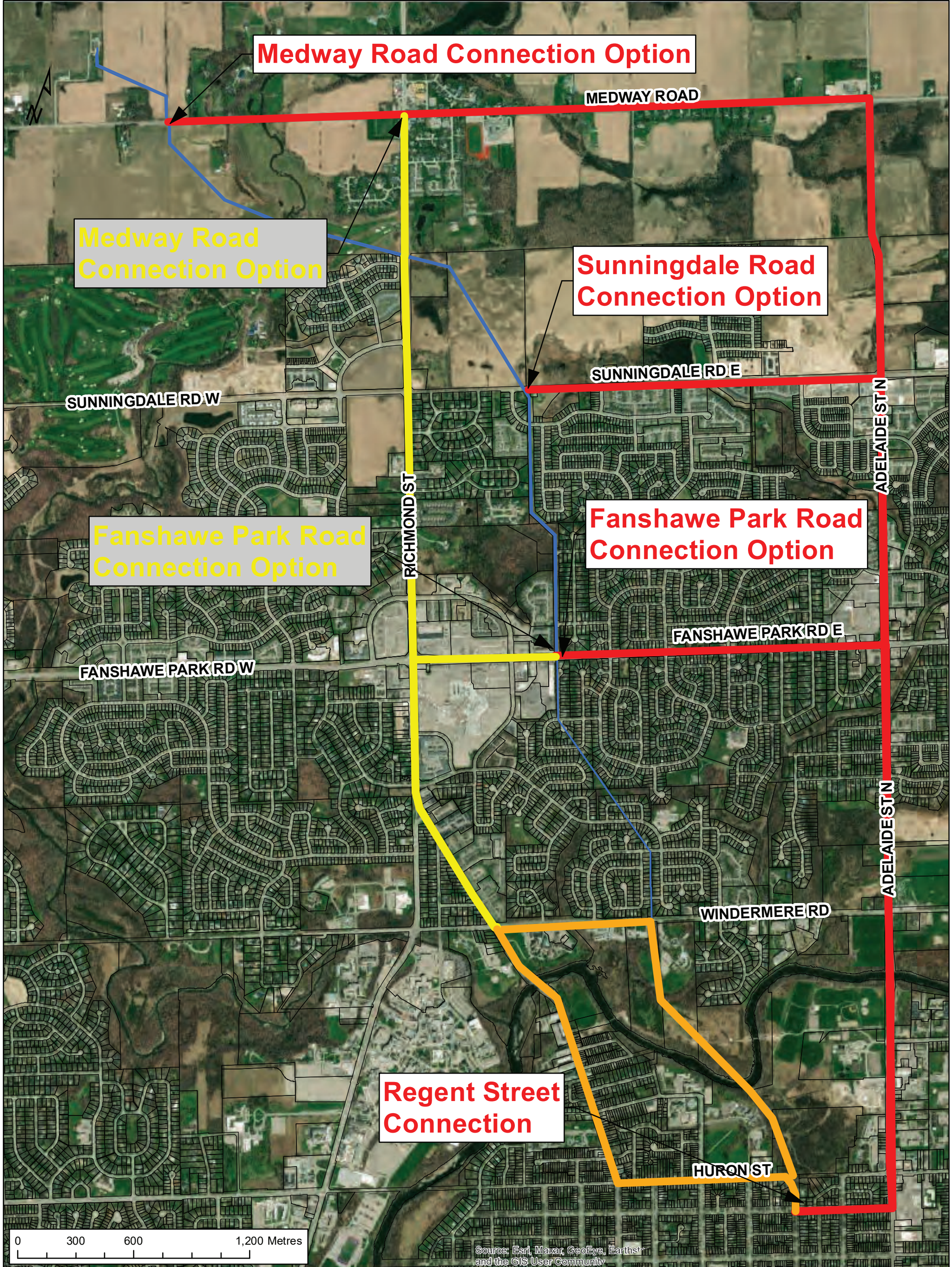
Based on the criteria and methodology applied as part of the evaluation process, the preferred long-term twinning alternative is **Alternative 2: Twin the Transmission Main Along Adelaide Street** to add system capacity and redundancy with a connection to the existing transmission mains at Fanshawe Park Road and on Regent Street. (See Figure ES-2). The preferred long-term alternative also provides an opportunity for eventual decommissioning of the existing water transmission main between Fanshawe Park Road and Huron Street in the future. See Section 8 of the Report for complete Short- and Long-Term Project descriptions.

### Preliminary Short- & Long-Term Cost Estimates

The estimated costs for upgrades, inspections, maintenance, and repairs over a 20-year period for the preferred short-term alternative is approximately \$10,400,000. The estimated costs for placing the transmission main along Adelaide Street with connections on Fanshawe Park Road and Regent Street for the preferred long-term alternative is approximately \$20,000,000 for a new single main, and \$32,000,000 for twinned mains.

### Recommended Mitigation Measures / Monitoring

It is recommended to complete the mitigation and monitoring tasks outlined in Section 9 of the Report during detailed design for the preferred Short and Long-Term alternatives,



**Medway Road Connection Option**

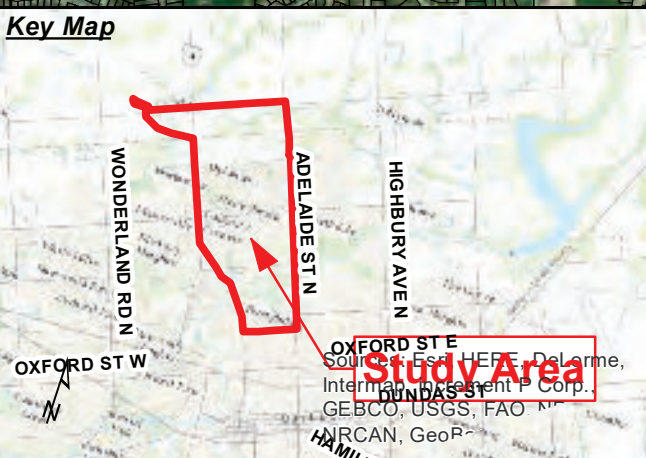
**Medway Road Connection Option**

**Sunningdale Road Connection Option**

**Fanshawe Park Road Connection Option**

**Fanshawe Park Road Connection Option**

**Regent Street Connection**



**City of London  
Arva Pump Station to Huron Street  
Water Transmission Main  
Municipal Class Environmental Assessment  
Master Plan**

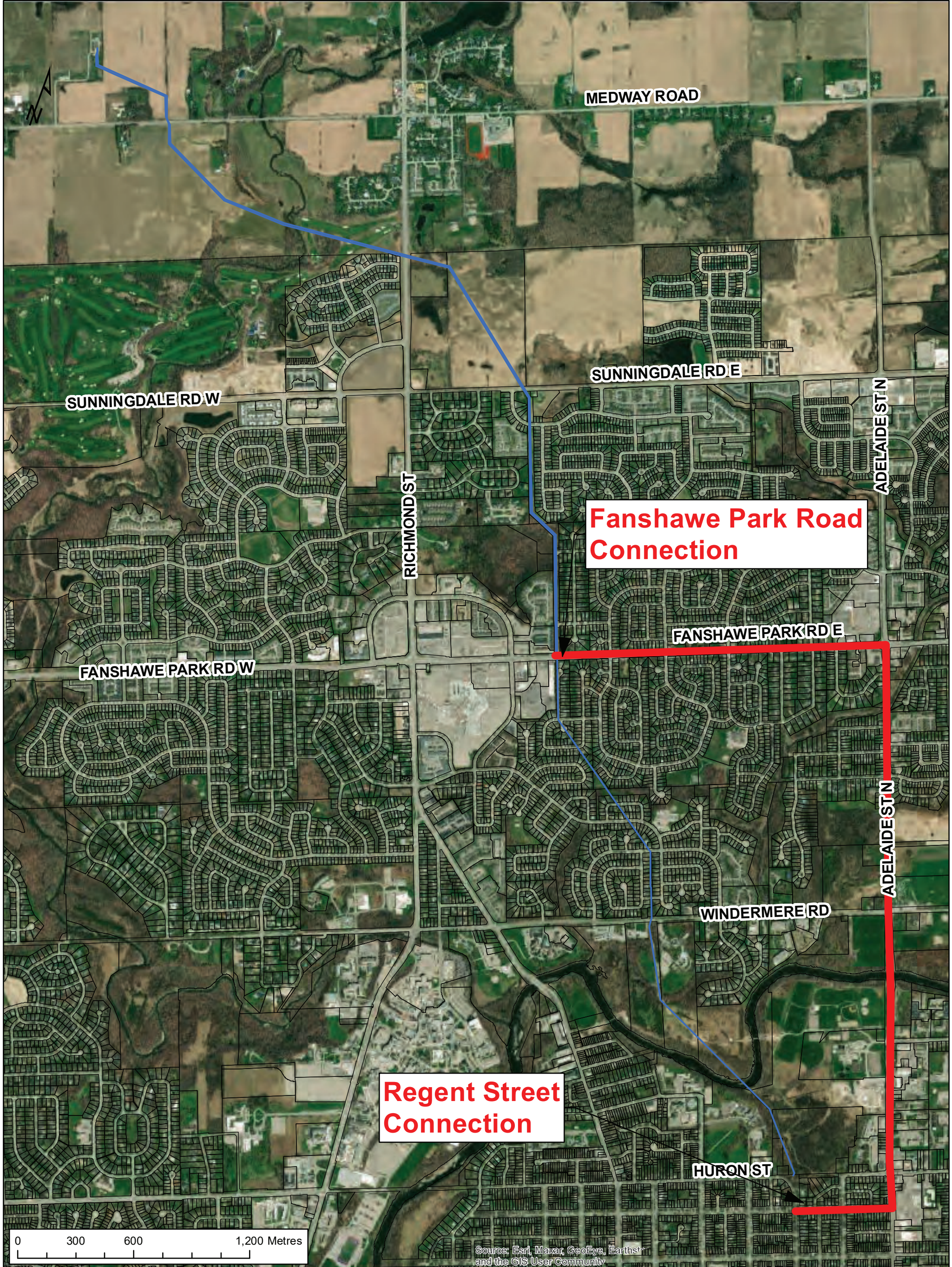
**Figure ES-1:  
Long-Term Alternative Solutions**

Date: April 2021	PN: 60619503	Datum: NAD83 UTM17 Source: City of London
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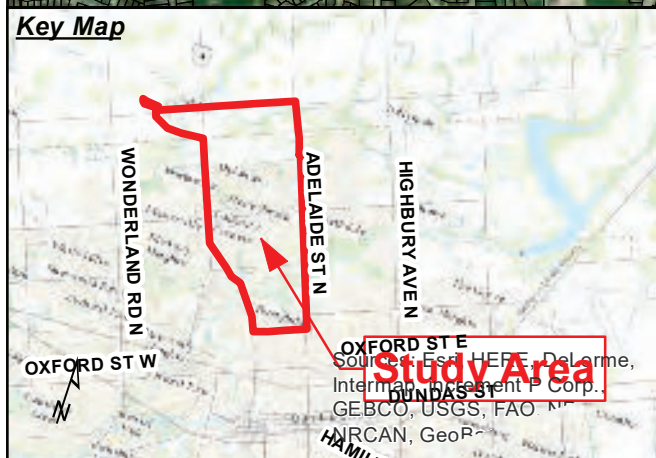
- Legend**
- Existing Transmission Main
  - Alternative 2: Adelaide Street Twinning Routes
  - Alternative 3A: Richmond Street North Twinning Routes
  - Alternative 3B: Richmond Street South Twinning Routes

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Source: Esri, Maxar, GeoEye, Earthstar and the GIS User Community



**City of London  
Arva Pump Station to Huron Street  
Water Transmission Main  
Municipal Class Environmental Assessment  
Master Plan**

**Figure ES-2:  
Long-Term Design Concept**

Date: April 2021	PN: 60619503	Datum: NAD83 UTM17 Source: City of London
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- Legend**
- Existing Transmission Main
  - Recommended Alternative 2: Adelaide Street Twinning Routes
  - - - Potential Future Connections

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It is also recommended to perform the following maintenance activities to ensure the existing infrastructure continues to operate adequately for the remainder of its service life, or when a new transmission main(s) is constructed and the existing infrastructure is taken out of service:

- Annual inspection and maintenance of all valve chambers
- Soil sampling and testing every 15 years near the transmission mains, including coring into ground, sample collection and laboratory testing;
- Complete test pits every 15 years to inspect the surface of the transmission main, including excavating to and inspecting the surface of the concrete pipe for signs of pitting, cracking or damage;
- Utilize Free-Swimming Electro Magnetic (EM) tool or Pipe Diver tool technology every 15 years to inspect the inside of the transmission main for damage while the line is in service; and
- Proactively repair joints as required based on the above inspection methods and results.

It is recommended to maintain discussions and open lines of communications with the various approval agencies such as the UTRCA, MNRF, DFO, Ministry of Heritage, Sports, Tourism and Culture Industries, and the Ministry of Environment, Conservation and Parks throughout all phases of design and construction.

### **Recommended Construction Phasing for the Preferred Long-Term Alternative**

It is recommended to construct the new transmission main(s) in several phases to reduce the financial burden to the City, and to reduce traffic congestion and long road closures in major developed areas. The following phasing strategy is suggested and can be modified in the future during preliminary/detailed design:

**Phase 1** – Within 0-5 years: The new relocated Chamber 13 be installed on Maitland Street at Regent Street. Capped stubs 1050 mm in dia. are recommended to be installed as part of the Chamber 13 relocation project, and a corridor for future piping be Summer 2020

allowed for on Regent Street for the future twin 1050 mm dia. main(s).

**Phase 2** – Within 5-15 years: It is recommended that portions of the transmission main be installed when 20 to 30% of the life expectancy of the existing PCCP is remaining, or when an opportunity or a requirement to upgrade portions of roadways along the route is required. Fanshawe Park Road is in relatively good condition and does not require reconstruction for 10 to 15 years.

**Phase 3** – Within 15-25 years: All major road and watercourse crossings are on the north to south portion of the transmission main(s) on Adelaide Street. It is preferred that all works on Adelaide Street be completed in one phase to reduce multiple closures of the roadway in the future. Adelaide Street is also relatively new, and reconstruction of the roadway is not required for 15-25 years.

### **Summary**

The Project File Report outlines the process required to ensure that the proposed short- and long-term 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/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. The proposed mitigation measures will further be developed at detailed design and will form commitments that will be adhered to by the City. 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 City can start the detailed design and permitting-approvals phase and proceed to construction as outlined in the Project File Report.

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- C.1 Short Term Conceptual Design
- C.2 Long Term Alternative Conceptual Design

# 1. Introduction

## 1.1 Introduction

The City of London (the City), through their consultant AECOM Canada Ltd. has completed a Municipal Class Environmental Assessment (MCEA) Master Plan study to develop short and long-term maintenance and improvement/expansion plans for the Arva to Huron Water Transmission Main, located between the Arva Pumping Station and Huron Street. The Arva Pumping Station to Huron Street Transmission Watermain MCEA (hereafter the “Project”) is classified as a Schedule ‘B’ project in the Municipal Engineers Association (MEA) MCEA process (October 2000, as amended in 2015), where project activities are subject to Phases 1 and 2 of the Environmental Assessment (EA) planning process of the MCEA. The Study included:

- A Problem and Opportunity Statement;
- The identification of and evaluation of short- and long-term alternative solutions;
- An assessment of the effects on the environment including natural, social, economic and engineering aspects associated with the preferred alternatives;
- The identification of any measures required to mitigate any potential adverse effects; and
- Public, approval agency, impacted property owner, and Indigenous community consultation.

## 1.2 Background

The City’s water system provides safe drinking water to residents, businesses and industries within the City limits. The City is supplied with water from two lake-based sources, 85% comes from Lake Huron utilizing the Lake Huron Water Supply System (LHWSS) and 15% comes from Lake Erie utilizing the Elgin Area Water Supply System (EAWSS). **Refer to Figure 1-1 City of London Water Supply.** The City utilizes several water storage facilities including the Arva Reservoir (owned and operated by the LHWSS), that supplies water to the north portion of the City. The Arva Pump station to Huron Street transmission main is the ‘main artery’ for water supply and distributes potable water to the City’s water storage facilities and distribution system. **Refer to Figure 1-2 – City of London Water System.**

The LHWSS transmission main has been partially twinned from the South Huron Water Treatment Plant (WTP), located north of Grand Bend to the Arva Reservoir and Pumping Station. In 1984, the City twinned its transmission main southerly from the Arva Reservoir and Pumping Station to Fanshawe Park Road, which allows for the LHWSS and the City to provide transmission main redundancy and increased capacity in addition to improved maintenance and operations.



Figure 1-1: City of London Water Supply

FROM LAKE HURON  
PRIMARY WATER SUPPLY SYSTEM

TO ARVA VILLAGE

TO BALLYMOTE

ARVA PS  
AND RESERVOIR

UPLANDS PS

HYDE PARK  
HIGH LEVEL ZONE

HYDE PARK PS

UPLANDS  
HIGH LEVEL ZONE

WICKERSON PS

WESTMOUNT PS

POND MILLS PS

TO DELAWARE

WICKERSON  
HIGH LEVEL ZONE

SPRINGBANK PS,  
RESERVOIRS AND  
RE-CHLORINATION  
FACILITIES

PCJ

SOUTHEAST RESERVOIR  
AND PUMPING STATION

PDC

SOUTH LONDON  
HIGH LEVEL ZONE

FROM ELGIN-MIDDLESEX



ELGIN-MIDDLESEX PS  
AND RESERVOIR



London CANADA AECOM

The section of water transmission main between Fanshawe Park Road East and Windermere Road was originally built in green field areas in 1966. Over time land development occurred with agreements and legal easements put in place for access to and maintenance of the water transmission main, which is now surrounded by on both sides by residential development with parts of the water transmission main in the rear and side yards of private properties.

Recently, based on the results of active and continuous monitoring, the section of water transmission main between Windermere Road and Huron Street had some pipe sections proactively repaired and replaced. Due to the narrow easements in place, it was difficult to access the pipe to complete this work. This led to a review of the entire water transmission main easement, which found several areas difficult to access, meaning it will be difficult to repair or replace pipe sections if needed in the future.

## 1.3 Study Purpose and Objectives

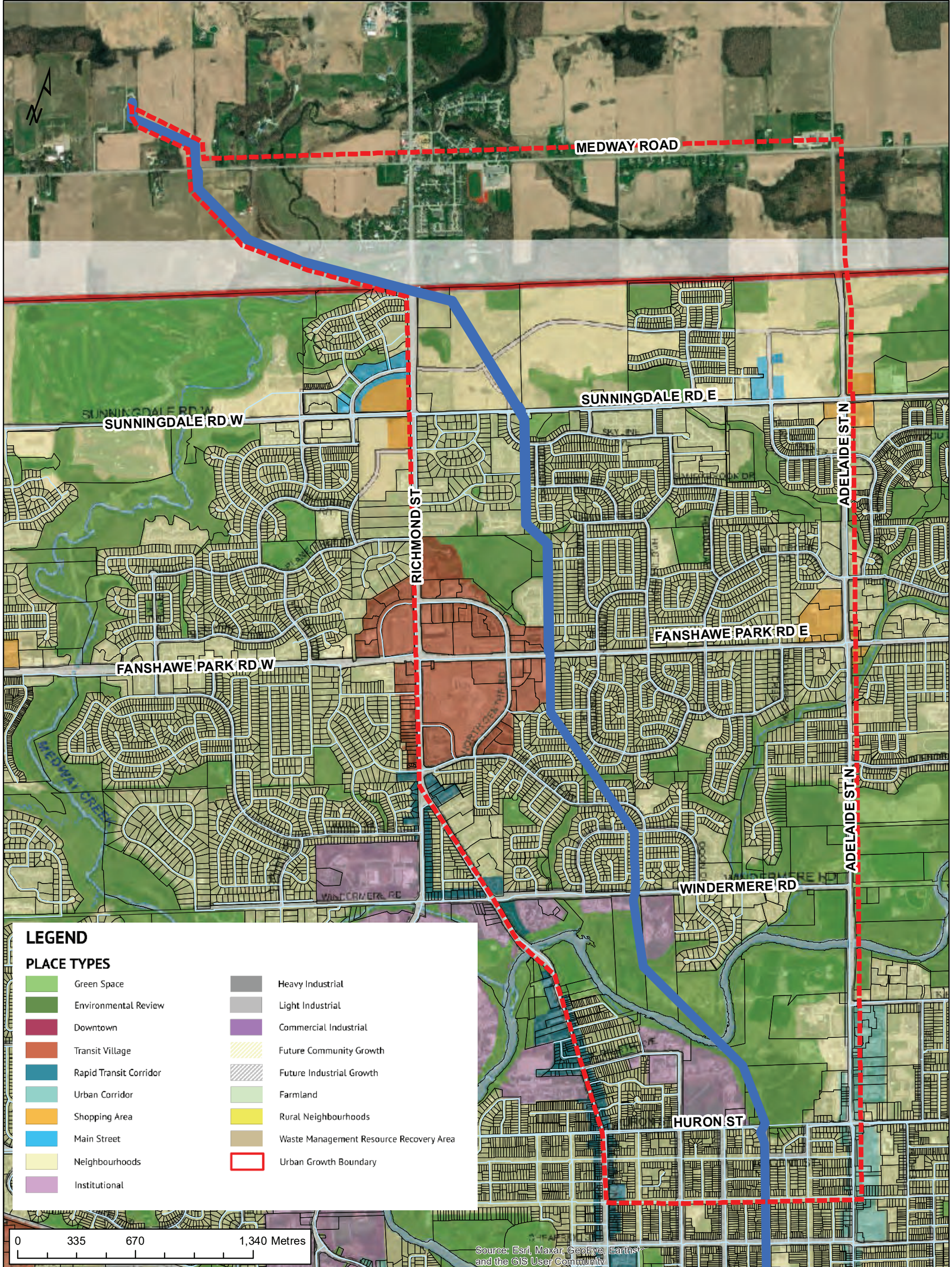
The purpose of this MCEA study is to provide a comprehensive and environmentally sound planning process, which is open to public participation, to select preferred short and long-term maintenance and improvement/expansion plans for the Arva Huron Transmission Watermain. The objectives of this study include:

- Provide an opportunity to identify short-term easement maintenance requirements;
- Provide an opportunity to identify long-term water transmission main twinning routes;
- Protect the environment, as defined in the Environmental Assessment Act (EAA), through the wise management of resources;
- Consult with affected and interested agencies, Indigenous communities, key stakeholders, and the public;
- Identify a range of alternative solutions that incorporate any concerns raised during the planning process;
- Identify the measures needed to mitigate any impacts associated with the recommended solutions; and
- Prepare Project File that documents all consultation input and complies with the requirements of the MCEA process for Schedule 'B' undertakings.

## 1.4 Study Area and Surrounding Land Use

The study area is centrally located within the Northern portion of the City of London. The study area includes the approximately 8km of water transmission main running from the Arva Reservoir and Pump Station to Huron Street, bounded by the potential alternative routes primarily along Richmond Street and Adelaide Street North. North of Sunningdale Road, a portion of the study area is located outside the City of London and is under the jurisdiction of Middlesex County. **Refer to Figure 1-3: Study Area and Surrounding Land Use.**

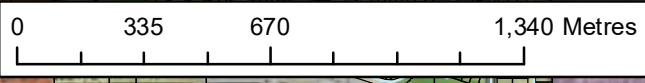
The land use in the study area is characterized primarily by agricultural fields, residential development, commercial development and green space. **Refer to Figure 1-3.**



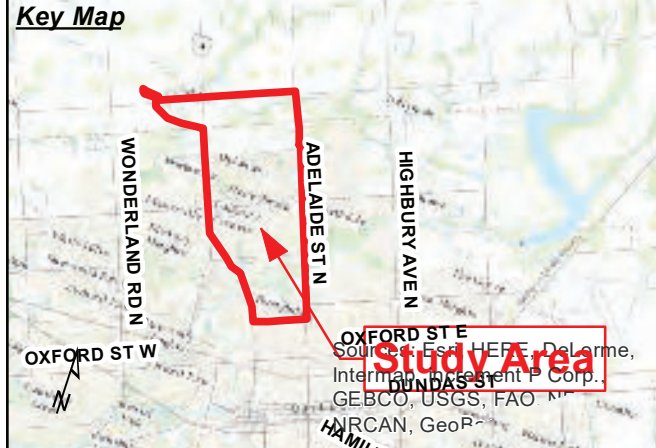
**LEGEND**

**PLACE TYPES**

- |  |                        |  |   |
|--|------------------------|--|---|
|  | Green Space            |  | Heavy Industrial                        |
|  | Environmental Review   |  | Light Industrial                        |
|  | Downtown               |  | Commercial Industrial                   |
|  | Transit Village        |  | Future Community Growth                 |
|  | Rapid Transit Corridor |  | Future Industrial Growth                |
|  | Urban Corridor         |  | Farmland                                |
|  | Shopping Area          |  | Rural Neighbourhoods                    |
|  | Main Street            |  | Waste Management Resource Recovery Area |
|  | Neighbourhoods         |  | Urban Growth Boundary                   |
|  | Institutional          |  |   |



Source: Esri, Maxar, GeoEye, Earthstar and the GIS User Community



**City of London  
Arva Pump Station to Huron Street  
Water Transmission Main  
Municipal Class Environmental Assessment  
Master Plan**

**Figure 1-3:  
Study Area and Land Use**

Date: April 2021	PN: 60619503	Datum: NAD83 UTM17 Source: City of London
------------------------	-----------------	--

- Base Map Legend**
- Study Area
  - Existing Watermains
  - Existing Transmission Main



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## 1.5 Project Team Organization

AECOM Canada Ltd. was retained by the City of London to assist in completing the MCEA study. In order to address all aspects of the environment, the full range of technical issues, and the requirements of the MCEA process, this study was carried out by a Project Team consisting of staff from the City and AECOM. Key members of the project team included the following individuals listed in **Table 1-1**:

**Table 1-1: Study Team**

Proponent:	Consultant
<b>City of London</b>	<b>AECOM Canada Ltd.</b>
<b>Stephen Romano, P.Eng. - Project Manager</b> Tel: 519-661-2489 x5537 Email: <a href="mailto:sromano@london.ca">sromano@london.ca</a>	<b>John Haasen, PMP, CET - Project Director/Manager</b> Tel: 519-963-5889 Email: <a href="mailto:john.haasen@aecom.com">john.haasen@aecom.com</a>
– Aaron Rozentals, P.Eng., Division Manager Water Engineering – Jake Helm, Water Engineering Technologist	– Karl Grueneis, Environmental Assessment Planning Lead – Paul Adams CPT, Environmental Planner – Bander Abou Taka, P.Eng., Project Engineer – Chris Martire, M.Eng., P.Eng. Asset Management Engineer – Eppo Eerkes, P.Eng., Hydraulic Modeling Engineer – Taesang Ahn, PhD., Geotechnical Engineer – Adria Grant, Senior Archaeologist – Adam McClelland, Ecologist

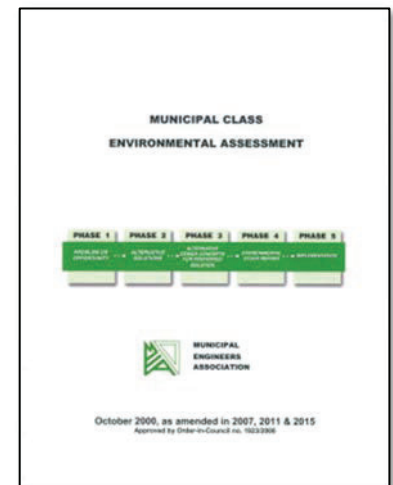
## 2. Planning Process

### 2.1 Municipal Class Environmental Assessment Process

All municipalities in Ontario, including the City of London, 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 Arva to Huron Water Transmission main 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 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.

#### Project Schedule

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).

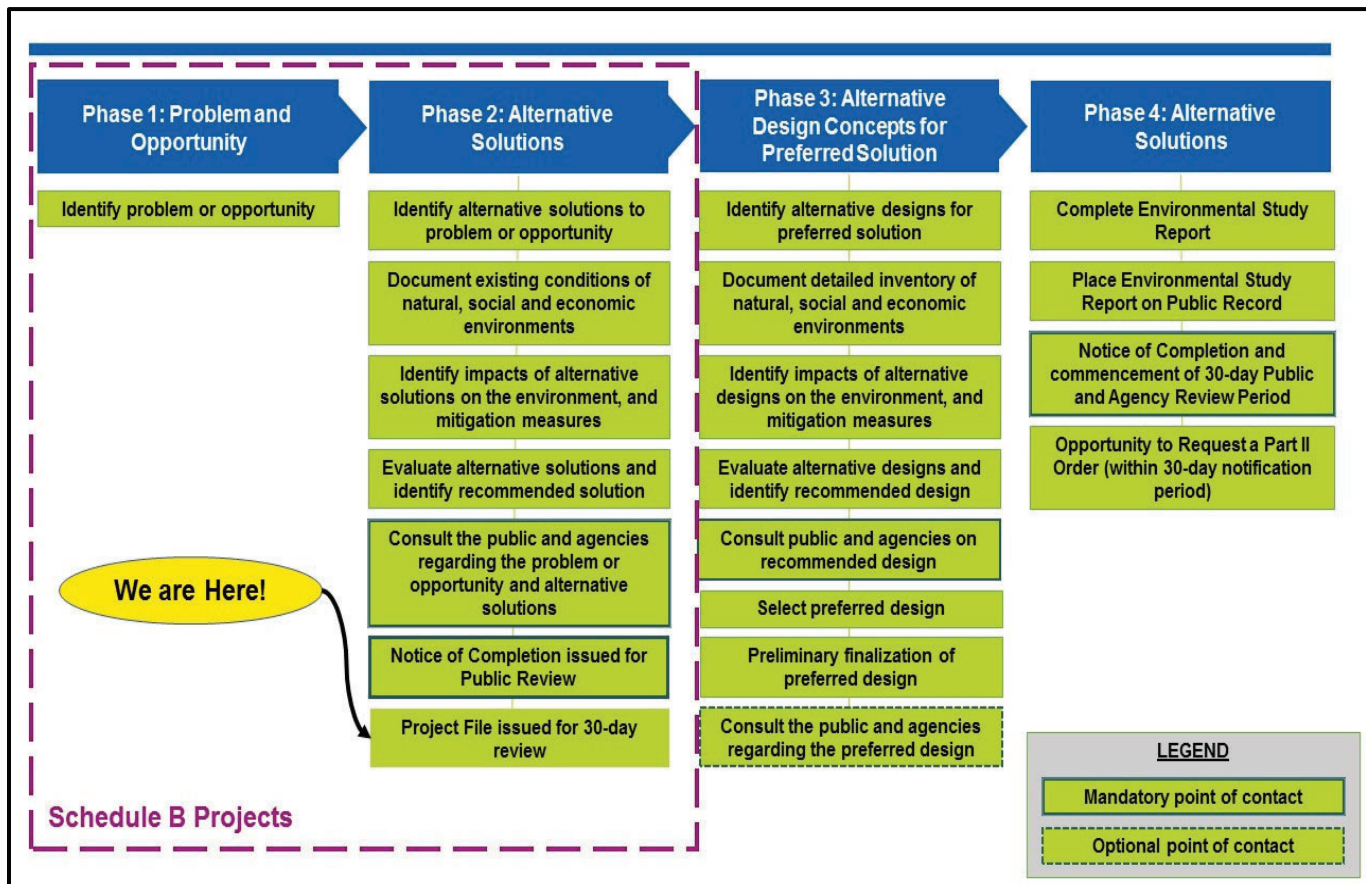
**Schedule B:** These projects have the potential for some adverse environmental effects. The proponent is required to undertake a screening process (Phases 1 and 2), involving mandatory contact with directly affected public, Indigenous Communities and with relevant review agencies to ensure they are 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.

At this point 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. Requests on other grounds will not be considered. Requests should include the requester contact information and full name for the ministry.

**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 document, 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 Schedule B projects, the Project File Report has been prepared using the Master Plan approach (Approach #2). The Master Plan Project File will be made available for a minimum 30-day review period. **Figure 2-1** illustrates the process followed for the Arva Pump Station to Huron Street Water Transmission Main MCEA Master Plan.

Figure 2-1: MCEA Planning Process



### 2.1.1 MCEA Documentation and Filing

This Project File Report incorporates the documentation developed for this Schedule 'B' MCEA Master Plan study for the placement of this report for public review.

This Master Plan Project File Report is available for public review and comment for a period of 45 Calendar days Starting on July 12, 2021 and ending on August 27, 2021. A public notice (Notice of Completion) was published to announce the commencement of the review period. To facilitate public review of this document, copies are available at the following locations:

Location	Location
<b>City of London City Hall</b> 300 Dufferin Avenue, London City Clerk 3 <sup>rd</sup> Floor	<b>London Public Library</b> Masonville Branch – 30 North Centre Road Should the Library be closed due to Covid-19 and public health recommendations, the Project File Report will also be available on the City of London Website.

**City of London Website**

<https://london.ca/projects/arva-pumping-station-huron-street-water-transmission-main-master-plan>

If, after reviewing this report, you have any questions or concerns, please follow this procedure:

1. Contact Mr. John Haasen or the City of London at the address below to discuss your questions or concerns:

**John Haasen PMP, CET**

Project Manager  
 AECOM  
 250 York Street Suite 410  
 London, ON N6A 6K2  
 Phone: 519-963-5889  
 Email: [john.haasen@aecom.com](mailto:john.haasen@aecom.com)

**Stephen Romano, P.Eng.**

Project Manager  
 City of London  
 300 Dufferin Avenue  
 London, ON N6A 4LL9  
 Phone: 519-661-CITY (2489) x. 5537  
 Email: [sromano@london.ca](mailto:sromano@london.ca)

If your concerns remain, the City of London will attempt to resolve the issue(s) as best it can.

## 2.1.2 Bill 197 - COVID-19 Economic Recovery Act

During the completion of this EA study the Ontario government also introduced another legislative change that will affect the MCEA process. On July 21, 2020 the COVID-19 Economic Recovery Act (Bill 197) was passed that amended the Environmental Assessment Act. Bill 197 resulted in two key changes that included an amendment to the Part II Order Request process and the granting of authority to the MECP to create new regulations that will ultimately replace Class EAs with an expedited Environmental Assessment (EA) process. As such, the Notice of Completion to be issued for this undertaking reflects this most recent change in legislation. In accordance with Bill 197 the Part II Order process is now available only for concerns related to Aboriginal or Treaty Rights. Concerns will no longer be filed with the Ministry but will now be addressed to the proponent. For non-aboriginal concerns the Part II Order process is now replaced with an additional 30-day window for the MECP to decide what action should be taken in response to a concern raised by the general public (i.e. disregard, elevate project (PIIOR granted) or approve with conditions).

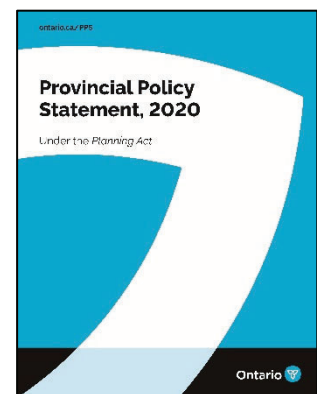
## 2.2 Planning Studies and Policy Context

### 2.2.1 Provincial Policy Statement

The 2020 Provincial Policy Statement<sup>1</sup> (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;



<sup>1</sup> Provincial Policy Statement. Ontario Ministry of Municipal Affairs and Housing, 2020.

**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.

## 2.2.2 Climate Change

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).

Further information on climate change is included in **Section 9.4**

**Relevance to Study:** Improvements to water infrastructure increases overall water system reliability and response in emergencies. Improvements to water infrastructure in relation to climate change have been considered and incorporated into the planning alternatives for this study. Further to this, on April 23, 2019 the City of London declared a climate emergency for the purposes of naming, framing, and deepening its commitment to protecting its economy, ecosystems and its communities from climate change. Further climate change mitigation information is included in **Section 9.4**.

## 2.2.3 Source Water Protection

Section A.2.10.6 of the MCEA document directs proponents, including the City of London 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: and
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 have been considered in this study. This study will continue to bring potable water to City residents immediately adjacent to the proposed works and the City as a whole. Small sections of the locations considered for evaluation are within SGRAs and HVAs where the vulnerability score is low. 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 is low.

- Policy 3.03 – New Prescribed Instruments Related to Moderate and Low Threats.

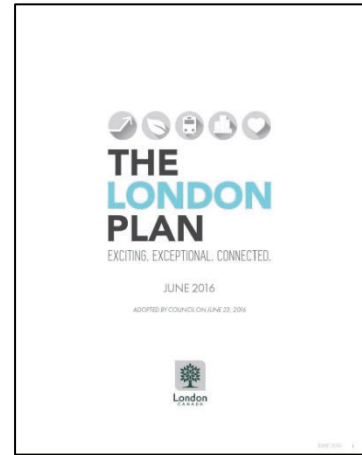
For activities that are identified as moderate or low drinking water threats, no additional measures beyond existing approval requirements are necessary.

See **Section 9.3** for Construction Mitigation Measures.

## 2.2.4 The London Plan

The London Plan (2016) is the new policy direction document for the City and replaces the former Official Plan (OP). It contains policies approved by Council to provide direction for the allocation of land use, provision of services and facilities, and policies to control the use of land, having regard for social, economic, and environmental matters. The Plan identifies the following:

- The London Plan supports the requirements of the MECP to provide safe drinking water.
- The City will ensure water servicing is available to service long term growth and upgrade the water system to address intensification
- The City is committed to meeting and exceeding service requirements for water supply for fire protection
- Water supply will be provided to avoid shortages



**Relevance to Study:** This MCEA has been conducted with regard to the water servicing policies of the London Plan and all necessary design standards for the City and the Province.

## 2.2.5 Strategic Plan

The City of London Strategic Plan (2015-2019) sets out tangible actions and auditable projects/programs that will be coupled with the multi-year budget to bring about a higher quality of life in the City. The strategies for Building a Sustainable City set out the City's mandate to manage and improve servicing infrastructure through water and wastewater business plans and to build new infrastructure as London expands.

**Relevance to Study:** Expanding the capacity of the current water supply system aligns with the Strategic Plan to improve water servicing infrastructure within the City.

## 2.2.6 Upper Thames River Conservation Authority Policies

Portions of the study area are within the Upper Thames River Conservation Authority (UTRCA) regulated area. Regulated areas are established where development could be subject to flooding, erosion or dynamic beaches, or where interference with wetlands and alterations to shorelines and watercourses might have an adverse effect on those environmental features. Any proposed development, interference or alteration within a Regulated Area would require a permit from the UTRCA under the *Development, Interference with Wetlands and Alterations to Shorelines and Watercourses*, Ontario Regulation (O.Reg.) 157/06.

**Relevance to the Study:** If construction is required within regulated areas, permitting will be required prior to project construction.

## 3. Consultation

The involvement of the community – residents, approval agencies, stakeholders, Indigenous communities, and those who may be potentially affected by a project – is an integral part of the MCEA process. The purpose of a consultation process is to provide an opportunity for stakeholder groups and the public to gain an understanding of the study process; contribute to the process for the development and selection of alternatives/design concepts; and provide feedback and advice at important stages in the MCEA process. Specifically, the objectives of the consultation efforts are to:

- Generate awareness of the project and provide opportunities for involvement throughout the planning process; and,

- Facilitate constructive input from public and agency stakeholders at key points in the MCEA process, prior to decision-making.

A summary of the consultation activities undertaken for this study is provided in this section.

### 3.1 Public Consultation

Public notices were issued throughout the course of the study to notify approval agencies, local stakeholders, Indigenous communities and the public of the status of the project, provide notification of the Public Information Centres (PICs), and to invite feedback on the project.

At the beginning of the study, a Notice of Study Commencement and Property Owner Townhall (Property owners along the Fanshawe Park Road to Huron Street portion of the project) was mailed to the public and review agencies. The notice presented an overview of the project and details of how to participate in the study. Notices for PICs and Study Completion were also distributed as part of this study. The list of public notices that were issued as part of the study are provided in **Table 3-1** Public Consultation Notices.

All notices were listed on the City's website

<https://london.ca/projects/arva-pumping-station-huron-street-water-transmission-main-master-plan>

**Table 3-1: Public Consultation Notices**

Notice	Newspaper Publication Dates
Notice of Commencement Appendix A.1	The Londoner June 11 <sup>th</sup> , 2020/ June 18 <sup>th</sup> 2020
Notice of Commencement/Property Owner Townhall Appendix A.1	The Londoner June 11 <sup>th</sup> , 2020/June 18 <sup>th</sup> 2020
Notice of PIC #1 Appendix A.2	The Londoner November 12 <sup>th</sup> , 2020/November 19 <sup>th</sup> , 2020
Notice of Completion* Appendix A.3	The Londoner July 15 <sup>th</sup> , 2021/July 22 <sup>nd</sup> 2021

\* Prior to issuing the Notice of Completion, the project file was issued to the Civic Works Committee and Council for approval (July 6<sup>th</sup> 2021).

### 3.1.1 Virtual Property Owner Town Hall

An online virtual tele-Property Owner townhall using the Zoom platform was held on June 25<sup>th</sup>, 2020 from 7:00-8:00 pm. The purpose of the townhall was to:

- Introduce the project to property owners who have sections of the water transmission main and/or its related easement on their property;
- Highlight the importance of the water transmission main;
- Describe the existing easement on their property including the City's ability to access the water transmission main for maintenance and repairs;
- Describe the Problem and Opportunity Statement;
- Present the alternative short- and long-term solutions being considered; and
- Gather feedback

Representatives from the project team, including City staff and the AECOM consulting team, were available to discuss the project with participants. Thirteen (13) people registered and attended the townhall.

Based on comments and questions raised at the townhall, the following points summarize the key issues from the resident's perspective:

**Table 3-2: Townhall Residents Concerns and Issues**

Key Issues / Concerns Raised	AECOM / City Response
What would be considered an obstacle for access to the water transmission main within the easement?	Any object within the easement that would impede access to the water transmission main or valve chambers for maintenance or repair. Examples would include permanent structures such as decks, sheds, playsets, large trees and concrete pads.
Who would be responsible for removing obstacles within the easement/?	The property owner would be responsible to remove obstacles from the easement as per their easement agreement.
What is the possibility of a water transmission main break?	The City proactively monitors all of its transmission mains to ensure the safety of the water supply and City residents. The chance of a water transmission main break is very low.
What is the current state of the transmission main?	The current state of the transmission main, based on the Pure Technologies Ltd. assessment ranges from Good (40-60 years of useful life) to Very Good (60+ years of useful life) from Windemere Road North to the Arva Pump Station and Adequate (20-40 years of useful life) from Windemere Road South to the Thames River.

See **Appendix A.2** for the Townhall notices and materials.

### 3.1.2 Virtual Public Information Centre #1

A virtual Public Information Centre (PIC) was held using the Zoom platform on November 25<sup>th</sup> from 6:00pm to 8:00pm. The PIC was structured as an online PowerPoint presentation with a question and answer period at the end. The purpose of the PIC was to share study findings and gather comments on the following:

Problem and Opportunity Statement;  
 Existing conditions;  
 Short- and Long-term alternatives to address the Problem and Opportunity Statement;  
 The evaluation of the short- and long-term alternatives; and  
 Next Steps.

Representatives from the project team, including City staff and the AECOM consulting team, were available to discuss the project with participants. Twenty-two (22) people registered and attended the virtual PIC presentation.

Based on comments and questions raised at the PIC, the following points summarize the key issues from the public's perspective:

**Table 3-3: Publics Concerns and Issues**

What would be considered an obstacle for access to the water transmission main within the easement?	Any object within the easement that would impede access to the water transmission main or valve chambers for maintenance or repair. Examples would include permanent structures such as decks, sheds, playsets, large trees and concrete pads.
Who would be responsible for removing obstacles within the easement/?	The property owner would be responsible to remove obstacles from the easement as per their easement agreement.
Who would be responsible for installing gates or repairing fences should the City need access.	The City would install gates and restore any damage to property that is not considered an easement obstacle to the same or better condition.
When the long-term solution is constructed will the existing transmission main on private property be abandoned?	The installation of the long term solution would provide the opportunity to decommission and abandon the existing watermain once it has reached its reached its useful service life.

See **Appendix A.3** for PIC notices and materials.

### 3.1.2.1 Virtual Open House

To augment the information presented at the PIC, a Virtual Open House (VOH) webpage was created (See **Figure 3-1**). The VOH was opened on November 25<sup>th</sup>, 2020 and closed on December 14<sup>th</sup>, 2020. The VOH was structured as a virtual room that could be explored to examine display boards, maps, comment sheets and a recording of the November 25<sup>th</sup> PIC could also be watched. The webpage address ([www.londonwatermain.ca](http://www.londonwatermain.ca)) for the VOH was provided in the Notice of PIC and on the City of London website.



See **Appendix A.3** for PIC notices and materials.



### 3.1.3 Notice of Completion

A public Notice of Completion was published in the Londoner on July 17<sup>th</sup> to notify the public and stakeholders about the 30-day public review period. To facilitate public review of this document, copies are available at London City Hall and the London Public Library – Masonville Branch during regular business hours and on the City's website. See **Section 2.1.1** for more information and location addresses.

See **Appendix A.3** for the Notice of Completion.

## 3.2 Agency Consultation

**Table 3-4: Agency Comments**

Agency	Comment	Response
Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI)	MHSTCI provided an outline of the MCEA requirements as they relate to archaeology resources, built heritage and cultural heritage landscapes.	This study has undertaken the necessary studies to fulfill the EA requirements of MHSTCI. A CHER will need to be completed for the recommended route during detailed design. See <b>Section 5.3</b>
Ministry of Natural Resources (MNR)	MNR provided details relating to natural areas, Species at Risk and Significant Wildlife Habitat.	This information was used as background for the natural heritage studies. See <b>Section 5.2</b>
Agency	Comment	Response
Ministry of Environment Conservation and Parks (MECP)	MECP provided information on the following: <ul style="list-style-type: none"> <li>○ Requirements for duty to consult with Indigenous communities; and</li> <li>○ Requirements for work within Source Water Protection areas.</li> <li>○ Requirements for addressing climate change.</li> </ul>	This study has undertaken the necessary requirements to fulfill the Duty to Consult. See <b>Section 3.3</b> for details of Indigenous consultation.  SWP is addressed in <b>Section 2.2.3</b> of this study, and climate change is addressed in <b>Sections 2.2.2 and 9.4.</b>
Upper Thames River Conservation Authority (UTRCA)	UTRCA provided information on Natural Heritage Background data.	This information was used as background for the natural heritage studies. See <b>Section 5.2</b>

### 3.3 Indigenous Consultation

The City of London is committed to proactively identifying and addressing potential impacts of constructing a new transmission main on the interests and rights of interested Indigenous communities within proximity to the City. Consultation with Indigenous communities is important for the project in order to identify and address specific cultural and heritage interests, as well as potential impacts to established or asserted Indigenous or treaty rights or Land Claims that Indigenous communities may have within the area. Consultation activities were conducted in accordance with the guidelines provided in the MCEA (MEA 2000) and the Code of Practice – Consultation in Ontario’s Environmental Assessment Process (MECP 2014).

The duty to consult with Indigenous communities is triggered when a proponent contemplates decisions or actions that may adversely impact asserted or established Indigenous or Treaty rights. Although ultimate legal responsibility to meet the duty to consult requirements lies with the Crown, the City undertakes a procedural aspect of the Crown’s duty. As part of this procedural responsibility, the City will notify the Director of the Environmental Approvals Branch if the project has the potential to adversely affect an Indigenous or Treaty right. This procedural aspect would be solely to provide information regarding the proposal and to gather information about the potential impacts of the asserted project on potential or established Aboriginal or Treaty rights.

The City initiated consultation with Indigenous communities that have previously engaged in London infrastructure planning / development projects and are anticipated to have interest in the project, and other recognized Indigenous communities and organizations. A list of communities and groups that were included in correspondence for this project is provided below. All Indigenous correspondence is included in **Appendix A.4**.

Community	Community
Aamjiwnaang	Munsee-Delaware Nation
Bkejwanong Territory (Walpole Island) First Nation	Oneida Nation of the Thames
Caldwell First Nation	Chippewas of the Thames First Nation
Chippewas of Kettle and Stony Point	Delaware Nation (Moravian of the Thames)

Correspondence was received from the following Indigenous community:

**Chippewas of the Thames First Nation** (September 23<sup>rd</sup>, 2020) advised the project is within the London Township Treaty (1786) to which they are a signatory and within the Big Bear Creek Additions to Reserve (ATR) land selection area. Based on a review of project information they determined that the project is of minimal concern. A request to have the opportunity to participate in any Archaeological studies was made (See **Section 9.1** for commitments to engage Chippewas of the Thames First Nation during any Stage 2 – 4 Archaeological Assessments).

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## 4. Project Needs and Justification

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### 4.1 Project Needs and Justification

Phase 1 of the five-phase MCEA planning process requires the proponent of an undertaking (i.e., the City) to first document factors leading to the conclusion that an improvement is needed and develop a clear statement of the identified problems or opportunities to be investigated. As such, the Problem and Opportunity Statement is the principal 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.

In developing the Problem/Opportunity Statement for this study, the following was considered.

- The City of London’s water system provides safe drinking water to residents, businesses and industry within the City limits and the hamlet of Arva in Middlesex Center
- The City is supplied with water from two lake-based sources, the Lake Huron Water Supply System and the Elgin Area Water Supply System (Lake Erie).
- The Arva Pump Station the Huron Street water transmission main is the main artery for potable water supply to the City of London making it essential.
- The City must consider the potential of a disruption of water supply during emergency situations and plan for redundancy in supply.
- The water transmission main is nearing the end of its service life cycle and gaining safe, quick and easy access for repairs and maintenance is an issue.
- The London Plan identifies policies that require the City to ‘provide and maintain water storage facilities, pump stations and the City’s watermain distribution system with sufficient capacity to provide for existing and planned development to an acceptable standard and at the lowest cost possible’.
- The PPS promotes the expansion of any service in a coordinated, efficient and cost-effective manner to accommodate projected needs, and requires that planning for infrastructure and public services ‘be integrated with the planning for growth so that these are available to meet current and projected needs’.

### 4.2 Problem and Opportunity Statement

The Problem and Opportunity Statement is the principal starting point of a MCEA and becomes the central theme and integrating element of the project. It also assists in setting the scope of the project. Based on the needs and justifications outlined above, the Problem and Opportunity Statement is as follows:

*The City receives approximately 85% of its water supply from the LHWSS, making the water transmission main that transports this water a critical and important asset. The water transmission main from the Arva PS and Reservoir to Huron Street was constructed in 1966 and ranges in condition, having fair and good sections. Several portions of the pipe south of Windermere Road and north of the Thames River were proactively replaced in 2017 and the existing easement (50’ / 15m wide) was not adequate to allow for replacement by traditional means. Portions of the transmission main run through the backyards of residents where easements are in place and access to repair the transmission main via these easements could be difficult, especially if there are obstacles such as decks, sheds, trees, etc. within the easement and in close proximity to the water transmission main.*

*The MCEA process provides the City the opportunity to develop a short-term strategy and solution that assess the existing easements in place to ensure maintenance access can be properly completed, and the possibility of*

*increasing easement widths to allow for easier access or maintaining the easements at their current width and enforcing the City's rights to access if maintenance and/or repairs are required. The process also provides an opportunity for a long-term solution to be developed by examining twinning of the watermain in other locations to provide a redundancy of supply and service future growth. This long-term solution also provides the possibility of decommissioning and abandoning the existing water transmission main once it has reached its service life.*

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## 5. Existing Conditions

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The following section documents current water transmission main conditions and the socio-economic, natural, and cultural environments and existing infrastructure within the study area.

### 5.1 Technical Environment

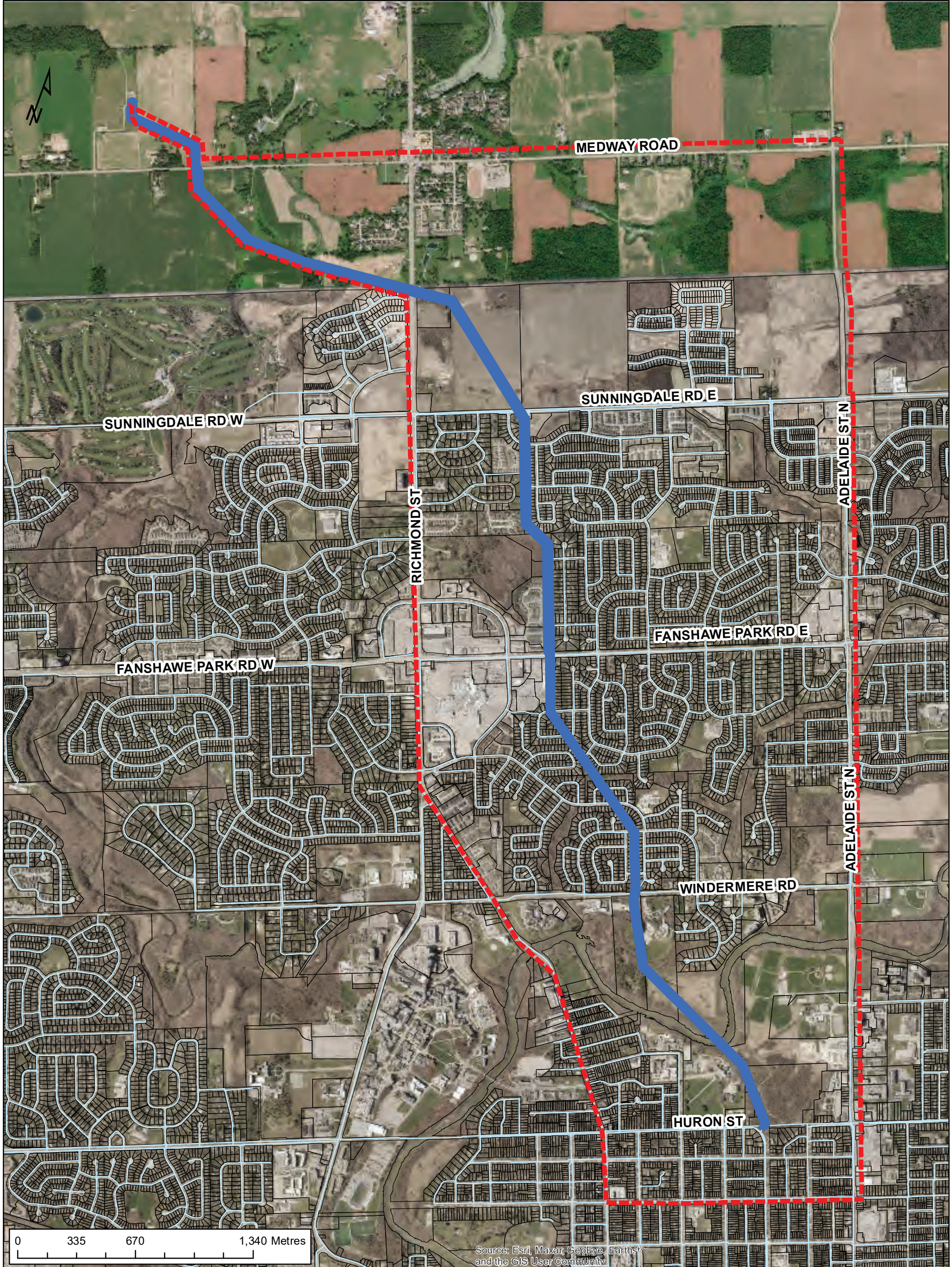
#### 5.1.1 Transmission Main Condition Assessment

The transmission mains consist of twinned 1,050 mm dia. Prestressed Concrete Cylinder Pipe (PCCP) from the Arva Pumping Station to Fanshawe Park Road, and a single 1,050 mm dia. transmission main between Fanshawe Park Road and Huron Street. **Refer to Figure 5.1.** The section of transmission main between Fanshawe Park Road and Windermere Road was originally built in green field areas in 1966. Over time, land development occurred with agreements and legal easements put in place for access and maintenance to the transmission main which is now surrounded on both sides by residential development (parts of the transmission main are in rear and/or side yards). The transmission main between Windermere Road and Huron Street had some pipe sections proactively repaired and replaced recently based on the results of active and continuous pipe monitoring implemented by the City along the entire transmission main. It was difficult to access the pipe for the replaced pipe sections because of the narrow easement. This led to a review of the entire transmission main easement which found several areas difficult to access along the easement. This means it will be difficult to repair or replace pipe sections in the future if needed. The system also consists of several buried chambers, some in green field areas and a few on or near residential and privately owned lands. The chambers function as valve chambers to control flow direction and provide safety equipment such as air release valves or drain valves to increase the life of the mains and allow for emergency shutdowns and drainage of the pipeline when required.

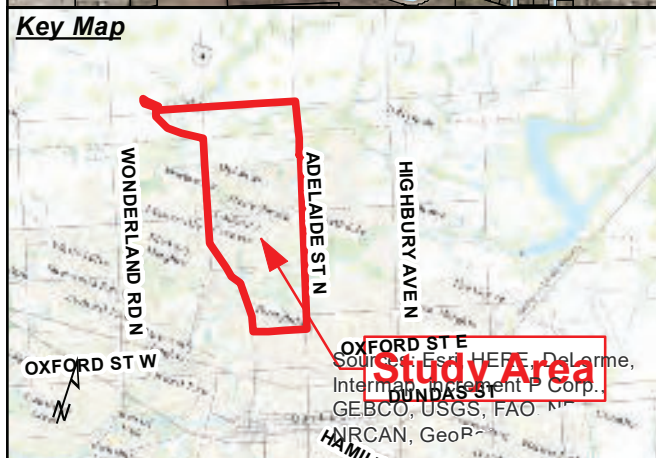
The City utilizes several inspection tools to assess the condition of the pipeline as discussed in the Interim Asset Management Report in (**Appendix B.1**). More proactive Inspections commenced in 2007 using three types of monitoring technology including Smart Ball and Pipe Diver equipment for leak detection and pipe condition, and Acoustic Fibre Optic (AFO) Monitoring for wire breaks in the structure of the concrete piping. Based on these inspections, the following was concluded:

- No Leaks were detected along the inspected pipeline;
- Three anomalous segments (identified signals that do not resemble broken wire wraps either caused by undocumented features or changes in pipe properties) were detected;
- Nine distressed pipes were observed;
- Some joints with missing mortar; and
- Some joints with corroding steel.

Pure Technologies Ltd., a company that specializes in providing equipment and condition assessment services of transmission mains were hired by the City to conduct these assessments. Pure conducted a gap analysis and risk assessment for the development of a likelihood of Failure model to aid in estimating the remaining useful life of the transmission main. The Likelihood of Failure of pipes from the Arva Pumping Station to Windermere Road ranged between Very Good (Remaining useful life is greater than 60 years) to Good (Remaining useful life is between 40 to 60 years) and the segment located to the south of Windermere Road to Huron Street was ranked as Adequate (Remaining useful life is between 20 and 40 years). The latter included the segments with the highest quantity wire



Source: Esri, Maxar, GeoEye, Earthstar  
and the GIS User Community



**City of London**  
**Arva Pump Station to Huron Street**  
**Water Transmission Main**  
**Municipal Class Environmental Assessment**  
**Master Plan**

**Base Map Legend**

- - - Study Area
- Existing Watermains
- Existing Transmission Main

**Figure 5-1: Transmission Mains from Arva Pumping Station to Chamber 13 on Huron Street**

Date: January 2021	PN: 60619503	Datum: NAD83 UTM17 Source: City of London
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**AECOM**

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breaks along the water transmission main from Arva Pumping Station to Huron Street. According to the likelihood of failure model, no immediate interventions are required.

Based on risk-management, the two most critical sections of the water transmission main are the segments located between Fanshawe Park Road East and Windermere Road and Windermere Road to Huron Street.

Geotechnical assessment and soil analysis were also conducted at several locations along the transmission main as part of this study to assess soil corrosivity and its effect on the concrete piping. There is a wide variation in soils that could contribute to degradation based on the soil investigation. Generally, the soils do not seem to be aggressively corrosive along all the sections; however, some localized degradation of the concrete and prestressing wires is expected. The results have shown higher concentrations of sulphates between Windermere Road and Huron Street. This may indicate that the concrete along those specific locations is subjected to concrete degradation.

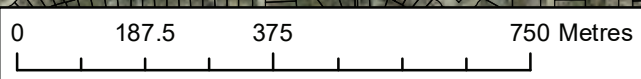
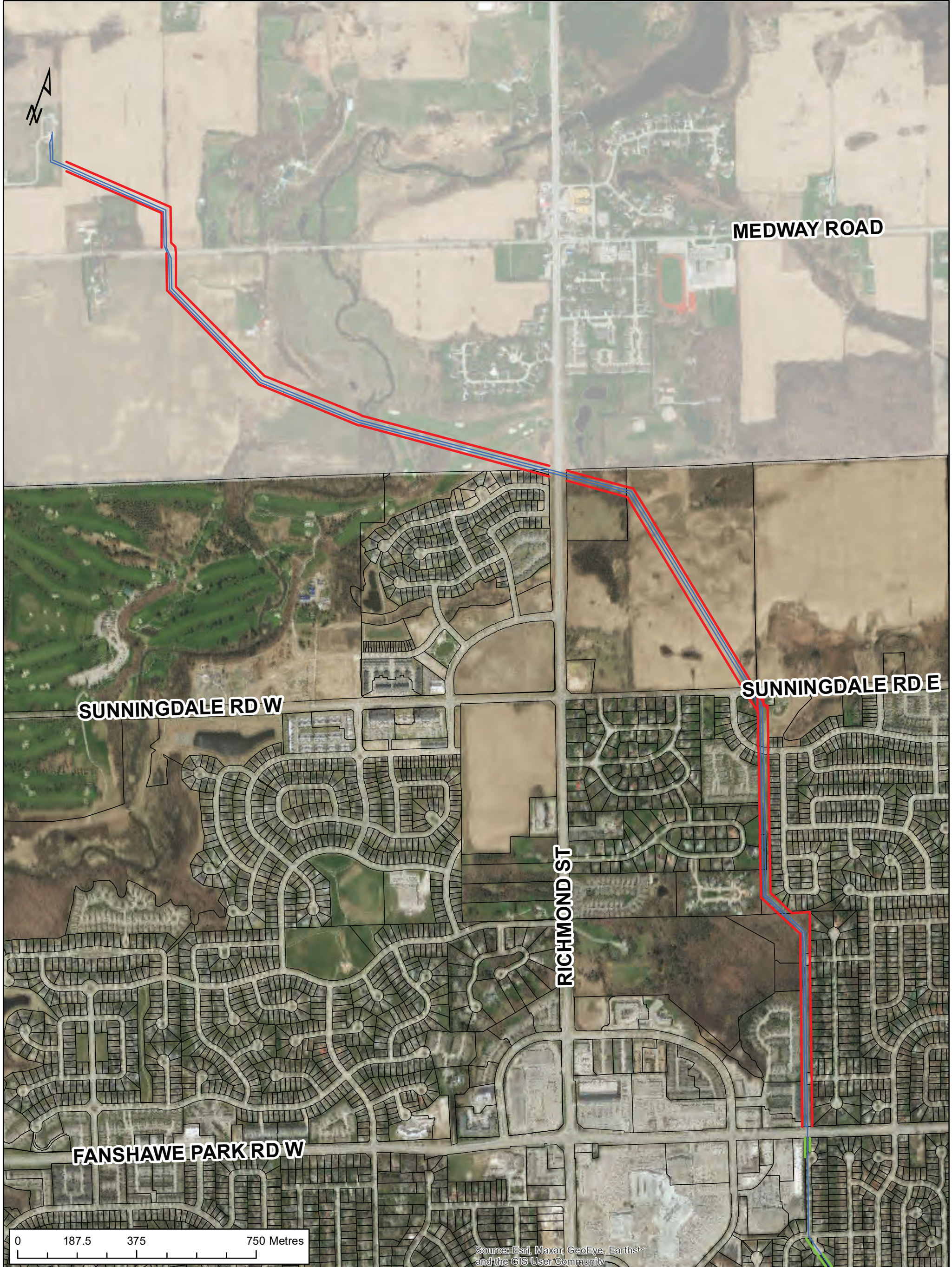
A transient modelling was performed by AECOM on the existing pipeline from Arva Pumping Station to Springbank Reservoir (approximately 18 km) as part of this study. The transient modelling simulated a power failure at the Arva Pumping Station during high pumping scenarios (considered to be the worst case). The analysis showed the impact of this simulation for the minimum and maximum surge pressures along the pipe. For more details, refer to **Appendix B.1**. Based on the elevation of the pipe and the maximum Transient Hydraulic Grade Line (HGL) head, the overall maximum HGL is the greatest between Windermere Road and Huron Street. From the historical data received, the observed breaks in the prestressing wires are mostly recorded along this section where the highest maximum transient HGL is recorded.

### 5.1.2 Existing Easements along Water Transmission Main

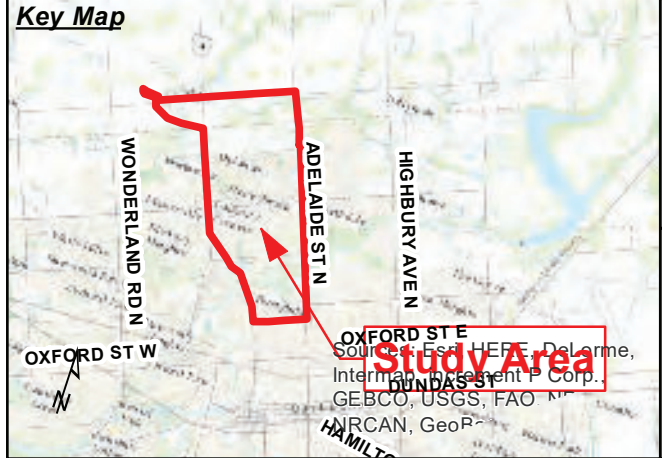
The water transmission main was originally constructed in 1966. Over time land development occurred and legal agreements and/or legal easements were put in place for access and maintenance to the transmission main. From the Arva Pump Station and Reservoir to Sunningdale Road, where the transmission main has already been twinned there is a 30m (100') easement in place. This section of the transmission main runs through primarily undeveloped land and agricultural fields. The City owns a 30m swath of property for the transmission main from Sunningdale Road to just south of Fanshawe Park Road. The section of transmission main between Fanshawe Park Road East and Windermere Road is now surrounded on both sides by residential development. Most of the transmission main through this section is located in residential backyards or side yards and the easement allows the City access for maintenance and/or repairs. The easement along this portion of the water transmission main is mostly 15m (50') wide with a small section just north of Windermere Road being reduced to 8m (25') wide. The section of watermain from Windermere Road to Huron Street is also 15m (50') wide, and located primarily in open space, naturalized areas, some institutional property and crosses the Thames River. Refer to **Figure 5-2 and 5-3 Existing Transmission Main Easements**.

## 5.2 Natural Environment Features

The City of London enjoys an abundance of Green Space Places including Natural Heritage Features and Areas, Natural and Human-made Hazard Lands, Natural Resources and Public Parkland. These areas are governed by the policies of the London Plan as a means of protecting and enhancing the natural environment within the City. An existing conditions background report was completed to provide a summary of the existing natural heritage features in the vicinity of the existing water transmission main easement, and along potential route alternatives. A high-level background review of available data sources and aerial imagery was completed to guide any field investigations.



Source: Esri, Maxar, GeoEye, Earthstar and the GIS User Community



**City of London  
Arva Pump Station to Huron Street  
Water Transmission Main  
Municipal Class Environmental Assessment  
Master Plan**

**Figure 5-2: Existing Transmission Main Easements - Arva PS to Fanshawe Park Road**

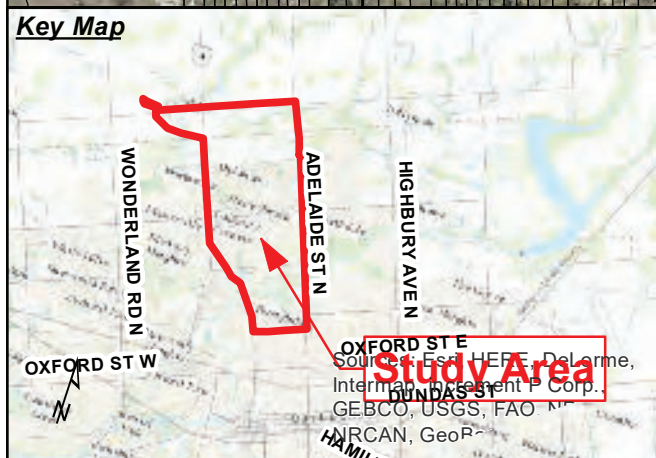
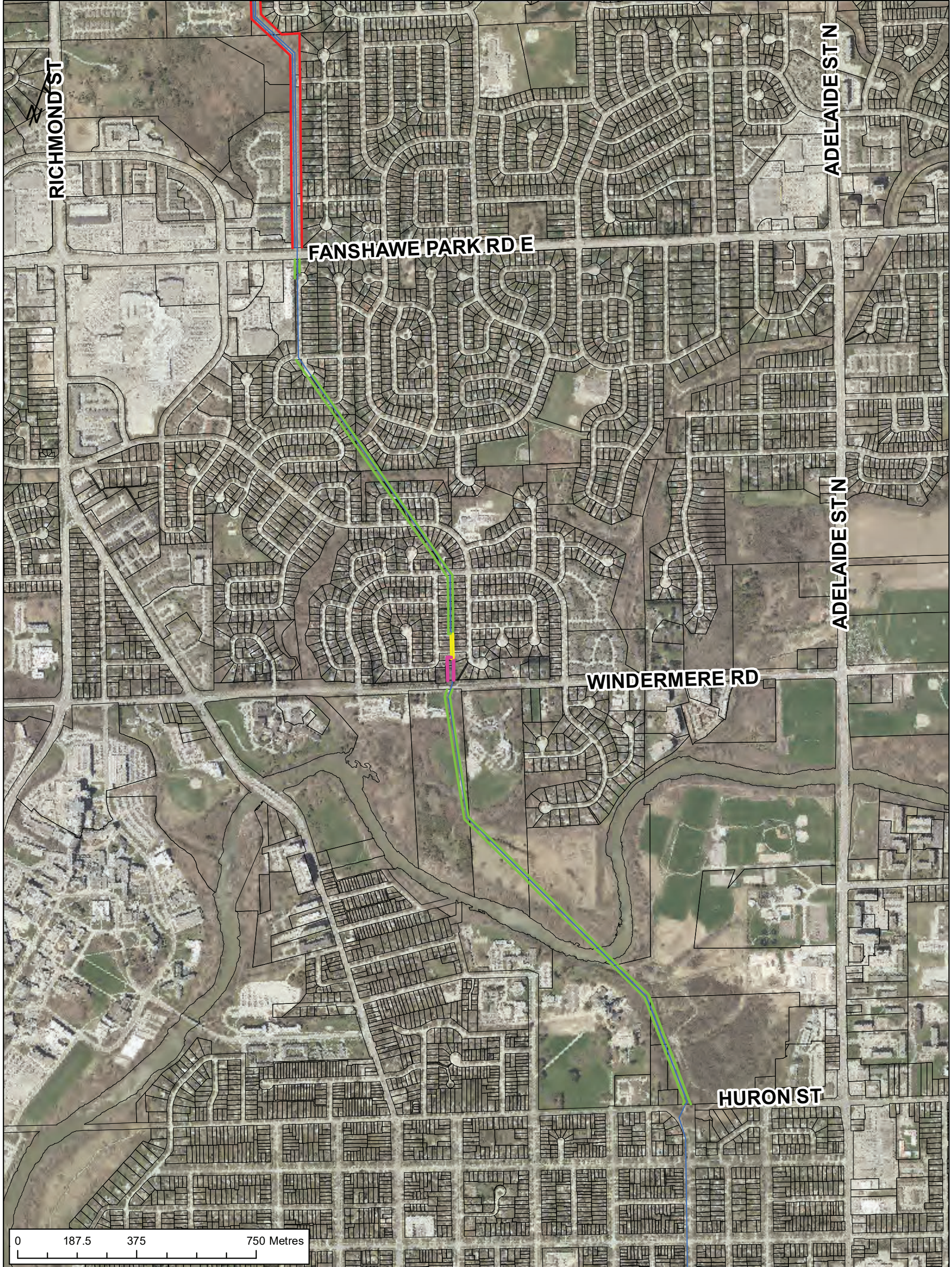
Date: January 2021	PN: 60619503	Datum: NAD83 UTM17 Source: City of London
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Legend		Easement Width	
	Existing Transmission Main		30m (100') Easement
			15m (50') Easement
			8m (25') Easement



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**City of London**  
**Arva Pump Station to Huron Street**  
**Water Transmission Main**  
**Municipal Class Environmental Assessment**  
**Master Plan**

Legend	Easement Width
<span style="color: blue;">—</span> Existing Transmission Main	<span style="color: red;">—</span> 30m (100') Easement
	<span style="color: pink;">—</span> 20m (62') Easement
	<span style="color: green;">—</span> 15m (50') Easement
	<span style="color: yellow;">—</span> 8m (25') Easement

**Figure 5-3: Existing Transmission Main Easements - Fanshawe Park Road Huron Street**

Date: April 2021	PN: 60619503	Datum: NAD83 UTM17 Source: City of London
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The following section provides information on existing conditions within the Study Area. Background data were reviewed to obtain existing information on natural features and species occurrences within the Study Area and the surrounding landscape.

Field investigations of natural features within the Study Area included: aquatic habitat assessments, vegetation community delineation using Ecological Land Classification (ELC) protocols (Lee *et al.* 1998), a botanical inventory, breeding bird surveys, anuran call surveys, SAR habitat assessments and SWH assessments

**See Appendix B.4 for Natural Heritage Background Reports and Figures**

## 5.2.1 Aquatic Environment

Aquatic systems and species which have the potential to be found within the Study Area were identified through a review of secondary data sources. Aquatic habitat assessments were also conducted at watercourse crossings throughout the Study Area. The evaluated watercourse crossings included potential new crossings along five possible route alternatives as well as existing crossings, as future pipeline integrity work to assess and repair weakened areas of the existing transmission main is possible.

The following section provides a summary of background information collected for watercourses which have the potential to be affected by the Project. Additional details on watercourses and waterbodies within the Study Area are provided in Appendix B.4.

The Project crosses or has the potential to interact with 13 watercourses. These watercourses and corresponding crossing identifiers (refer to **Appendix B.4 Natural Heritage Existing Conditions Report Figures 2-01 and 2-12**) include:

- Medway Creek (Crossings 2 and 7);
- Colbert Award Drain (Crossings 8 and 9);
- Two unnamed Municipal Drains (Crossings 1 and 20);
- Worrall Drain (Crossings 10 and 13);
- Powell Drain (Crossings 11, 12, and 14);
- Gibbons Creek (Crossings 3 and 4);
- Stoney Creek (Crossing 16);
- Two unnamed Tributaries of Stoney Creek (Crossings 17 and 18);
- Masonville Creek (Crossing 21);
- Thames River - North Branch (Crossings 5, 19, and 22);
- One unnamed Tributary of Thames River - North Branch (Crossing 6).

Records of fish presence were identified within the listed watercourses, excluding Worrall Drain, Masonville Creek, the two unnamed Municipal Drains and the unnamed Tributary of the Thames River – North Branch. Aquatic Species at Risk (SAR) that have the potential to occur at each of the potential crossing locations are listed in **Table 5-1** below.

The Project also has the potential to interact with two aquatic features identified within the Study Area associated with the existing water transmission main. Corridor Feature 1, located approximately 75 m north of the existing alignment and 50 m west of Medway Creek, was identified as a permanent, unnamed lake with a surface area of approximately 330 m<sup>2</sup>. Corridor Feature 2, located approximately 70 m north of the alignment and 620 m east of Medway Creek on the east side of Richmond Street, was identified as a permanent, unnamed lake with a surface area of approximately 1050 m<sup>2</sup> (LIO 2019). Aerial photo interpretation suggests that Corridor Feature 2 may form a portion of a stormwater management (SWM) facility located adjacent to Weldon Park.

The background review did not identify any mapped connections to adjacent watercourses for either Corridor Features 1 or 2; however, both features are in close proximity to adjacent habitat features and potential connectivity may occur during periods of high-water conditions. Due to limited permission to enter (PTE), these features were not assessed during field investigations. No fish community information or critical habitat was identified during the background review for either feature (DFO 2020).

**Table 5-1: Aquatic Species at Risk by Watercourse Crossing**

Common Name	Scientific Name	SARA (Schedule 1)	ESA	Watercourse Crossing	Comments
<b>Black Redhorse</b>	<i>Moxostoma duquesnei</i>	Threatened	Threatened	1, 2, 5, 7, 8, 9, 16, 17, 18, 19, 20, 22	
<b>Northern Sunfish</b>	<i>Lepomis peltastes</i>	Special Concern	Special Concern	1, 2 <sup>1</sup> , 7, 8, 9, 16, 17, 18	<sup>1</sup> Record indicating presence approximately 50 m u/s of Crossing 2
<b>Silver Shiner</b>	<i>Notropis photogenis</i>	Threatened	Threatened	1, 2, 5, 7, 8, 9, 16, 17, 18, 19, 20, 22	
<b>Wavy-rayed Lampmussel</b>	<i>Lampsilis fasciola</i>	Special Concern	Threatened	2, 5, 20, 22	

## 5.2.2 Terrestrial Ecosystems

The following section documents the existing terrestrial conditions within the Study Area identified through review of secondary data sources and supporting field investigations.

### 5.2.2.1 Vegetation Communities

Various background sources were reviewed to determine known existing conditions within the Study Area including previously completed studies such as Environmental Impact Studies, Environmental Assessments, Natural Heritage Studies as well as online databases including faunal atlases and provincial online mapping (e.g., Natural Heritage Information Centre Make-a-map). In addition to a review of background resources, field investigations including Ecological Land Classification (ELC) (Lee *et al.*, 1998) were completed where access allowed to characterize vegetation communities within the Study Area.

Roadside surveys were completed where property access was not available. Several communities were delineated through aerial photo interpretation. The Study consists of a myriad of vegetations communities from naturalized communities including forests and wetlands, to those associated with anthropogenic activities including agriculture, golf courses and parkland.

Vegetation communities identified within the Study Area are provided in **Table 5-2**.

**Table 5-2: Vegetation Communities**

ELC Code	ELC Community Name
<b>OAG</b>	Open Agriculture
<b>CGL1</b>	Golf Course
<b>CGL2</b>	Parkland
<b>CUM1-1</b>	Dry-Moist Old Field Meadow
<b>CUW1</b>	Mineral Cultural Woodland
<b>CUT1</b>	Mineral Cultural Thicket

ELC Code	ELC Community Name
CUP3	Coniferous Plantation
FOD	Deciduous Forest
FOD5-1	Fresh-Moist Sugar Maple Deciduous Forest
FOD6-5	Fresh-Moist Sugar Maple-Hardwood Deciduous Forest
FOD7	Fresh-Moist Lowland Deciduous Forest
FOD7-2	Fresh-Moist Ash Lowland Deciduous Forest
FOD7-3	Fresh-Moist Willow Lowland Deciduous Forest
FOD7-4	Fresh-Moist Black Walnut Lowland Deciduous Forest
FOD8-1	Fresh-Moist Poplar Deciduous Forest
SWD	Mineral Deciduous Swamp
SWD3-4	Manitoba Maple Mineral Deciduous Swamp
SWD4	Mineral Deciduous Swamp
SWT	Thicket Swamp
SWT2	Mineral Thicket Swamp
SWT2-2	Willow Mineral Thicket Swamp
SWT2-9	Gray Dogwood Mineral Thicket Swamp
SWT3-11	Spicebush Organic Thicket Swamp
MAM	Meadow Marsh
MAM2	Mineral Meadow Marsh
MAM2-2	Reed Canary Grass Mineral Meadow Marsh
MAM2-10	Forb Mineral Meadow Marsh
MAS	Shallow Marsh
MAS/MAM	Shallow Marsh / Meadow Marsh Mosaic
MAS2	Mineral Shallow Marsh
MAS2-1	Cattail Mineral Shallow Marsh
MAS2-9	Forb Mineral Shallow Marsh
OAO	Open Aquatic
SAF1	Floating-leaved Shallow Aquatic
SAF1-3	Duckweed Floating-leaved Shallow Aquatic

Further details on each vegetation community are described in the Natural Heritage Existing Conditions Report (**Appendix B.4 Natural Heritage Existing Conditions Report; Figures 3-01 to 3-14**).

### 5.2.2.2 Breeding Birds

Area search surveys and point counts were conducted during the breeding season (May 25<sup>th</sup> to July 10<sup>th</sup>) to document breeding birds within the Study Area. A total of 48 bird species were recorded. One Special Concern species, Eastern Wood-Pewee (*Contopus virens*) was recorded within Huron Street Woods Park and the Gibbons Wetland Environmentally Significant Area (ESA). This species is designated as Special Concern provincially; habitat for Eastern Wood-Pewee is considered Significant Wildlife Habitat (SWH). Nests of Cliff Swallow (*Petrochelidon pyrrhonota*) were recorded on the underside of the bridge structure on Medway Road spanning Medway Creek west of Richmond Street. Cliff Swallows are not designated at risk within Ontario but are afforded protection under the Migratory Bird Convention Act (1994). Nests of Barn Swallow (*Hirundo rustica*) were recorded on the underside of the bridge structure on Richmond Street spanning the Thames River (North Branch). Barn Swallows are listed as Threatened provincially and are therefore afforded protection under the Endangered Species Act (2007).

### 5.2.2.3 Reptiles and Amphibians

Anuran (i.e., frogs and toads) call surveys were conducted to determine the potential presence of *Amphibian Breeding Habitat* as defined in the *Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E* (MNR 2015).

Six anuran species were heard over the course of the survey period: Spring Peeper (*Pseudacris crucifer*), Gray Treefrog (*Hyla versicolor*), American Toad (*Anaxyrus americanus*), Northern Leopard Frog (*Lithobates pipiens*), Green Frog (*Lithobates clamitans*) and American Bullfrog (*Lithobates catesbeianus*). The survey station locations are provided on **Figures 2-01 to 2-12 of Appendix B.4**. Significant amphibian breeding habitat was confirmed in three locations:

- A deciduous swamp within the Richmond Street Significant Woodland;
- The wetland north of Sunningdale Road and west of Canvas Way; and
- a pond north of Medway Road and adjacent to Medway Creek.

## 5.2.3 Wetlands

The Arva Moraine Wetland Complex Provincially Significant Wetland (PSW) is a large wetland complex in north London that is distributed across a wide area bordered by Richmond Street, Medway Road, Highbury Avenue and Fanshawe Park Road.

Several wetlands were identified within the Study Area, containing multiple communities:

- A large wetland unit is located west of the intersection of Sunningdale Road and Canvas Way (AECOM, unpublished data);
- A wetland unit is located east of Richmond Street and north of Sunningdale Road (AECOM 2016);
- A large wetland unit is located near the intersection of Medway Road and Adelaide Street North;
- A large wetland unit is located adjacent to Adelaide Street North south of Blackwater Road;
- A wetland unit is located within the Gibbons Wetland ESA;
- A wetland unit is located within North Branch Park (this is not part of the Arva Moraine wetland complex); and
- A wetland unit is located within Huron Street Woods Park (this is not part of the Arva Moraine wetland complex).

Section 3.2.3 of the Natural Heritage Existing Conditions report (**Appendix B.4**) provides further details on wetlands within the Study Area.

## 5.2.4 Species at Risk

A Species at Risk (SAR) habitat screening was conducted to determine the potential occurrence of terrestrial SAR within the Study Area. For the purpose of this screening, SAR are defined as species that are listed as either Threatened (THR) or Endangered (END) under the ESA. Individuals of these species, as well as their habitat, are protected in Ontario. Species listed as Special Concern (SC) under the ESA receive protection under the Natural Heritage Reference Manual (NHRM) and their habitat is considered Significant Wildlife Habitat (SWH). Species listed under the federal SARA are only protected on federal land or as part of projects that are otherwise being permitted by a federal agency (including aquatic SAR).

A list of 23 SAR was compiled through background review. A habitat assessment and SAR screening was then completed to identify candidate habitat for each SAR with respect to vegetation communities within the Study Area.

Candidate habitat for 14 SAR was identified within the Study Area. Habitat for six SAR was confirmed within the Study Area and include the following:

Butternut (*Juglans Cinera*);  
Barn Swallow;  
Kentucky Coffee-tree (*Gymnocladus dioicus*);  
Eastern Flowering Dogwood (*Conrus florida*);  
Red Mulberry (*Morus ruba*); and  
Spiny Softshell (*Apalone spinifera*).

Candidate and confirmed SAR habitat are further described in the Natural Heritage Existing Conditions Report (**Appendix B.4**).

### 5.2.5 Significant Wildlife Habitat (SWH)

A Significant Wildlife Habitat screening exercise was conducted using the Ecoregion 7E criteria schedules (MNRF 2015) to determine the presence of candidate SWH in the Study Area. Species that are listed as SC under the ESA, that have a provincial S-Rank of S1 to S3, or species that are listed as END or THR by COSEWIC but not the ESA are referred to as Species of Conservation Concern (SOCC). Habitat for these species is considered SWH and is afforded protection under the PPS and through the policies of the London Plan (2016).

Thirteen candidate SWH types were identified within the Study Area. Four SWH types were confirmed within the Study and include the following:

- Amphibian Breeding Habitat (Woodland);
- Amphibian Breeding Habitat (Wetland);
- Terrestrial Crayfish; and
- Special Concern and Rare Wildlife Species

These SWH types are further described in the Natural Heritage Existing Conditions Report (**Appendix B.4**).

## 5.3 Cultural Heritage Environment

Cultural heritage resources include archaeological resources, built heritage resources and cultural heritage landscapes.

### 5.3.1 Archaeological Resources (Pending the entry of the Stage 1 AA into the Provincial Register)

A Stage 1 Archaeological Assessment (Project Information Form Number P438-0204-2020) was undertaken on January 26, 2021 by AECOM, in support of this MCEA. A Stage 1 AA consists of a review of geographic, land use and historical information for the property and the relevant surrounding area, a property visit to inspect its current condition and contacting MHSTCI to find out whether, or not, there are any now archaeological sites on or near the property. Its purpose is to identify areas of archaeological potential and further archaeological assessment (e.g. Stage 2,3,4) as necessary. The Stage 1 AA is included in **Appendix B.2**.

The Stage 1 archaeological assessment was conducted as part of a Municipal Class EA study during the design stage of the project and was triggered by the requirements of the Environmental Assessment Act in accordance with subsection 11(1) (Ontario Government 1990a). This project is subject to the requirements of the Ontario Heritage Act

(Government of Ontario 1990b) and the Standards and Guidelines for Consultant Archaeologists (Government of Ontario 2011).

AECOM's Stage 1 archaeological assessment for the Arva-Huron WTM Municipal Class EA has determined that the potential for the recovery of both pre- and post-contact Indigenous and 19th century Euro-Canadian archaeological resources within parts of the study area is moderate to high. As a result of extensive urban development, some portions of the study area have been previously disturbed and archaeological potential has been removed; however, areas of manicured lawn and woodlot within the study area limits are included as areas where archaeological integrity may remain intact. Areas of moderate to high and low archaeological potential, as well as areas that have been subject to previous assessment are illustrated in **Appendix B.2 Figures 7-2 to 7-5**. Based on these findings, a Stage 2 archaeological assessment is recommended following the below stated requirements.

The Stage 2 archaeological assessment must be conducted by a licensed archaeologist and must follow the requirements set out in the Standards and Guidelines for Consultant Archaeologists (Ontario Government 2011). Areas identified as having low archaeological potential (e.g. building footprints, roadways, urban development) are to be photo-documented only. The Stage 2 field survey for areas of moderate to high archaeological potential must include:

The standard test pit survey method at 5 m intervals is to be conducted in all areas that will be impacted by the project where ploughing is not possible (e.g., woodlots, overgrown areas, manicured lawns);

Pedestrian survey at 5 m intervals where ploughing is possible (i.e. agricultural fields). Assessment will only occur when agricultural fields have been recently ploughed, weathered, and exhibit at least 80% surface visibility; and,

Poorly drained areas, areas of steep slope, and areas of confirmed previous disturbance (i.e. areas with identifiable land alterations below topsoil level) are to be mapped and photo-documented only.

It is pertinent to note that the Arva-Huron WTM study area evaluated in this report includes additional land that may not be impacted by the project. A large area was assessed as part of this Stage 1 archaeological assessment in order to accommodate possible infrastructure alternatives outside of the existing WTM corridor. Once the area of project impacts has been determined, only the land that will be impacted by this project will require Stage 2 archaeological assessment.

Given that there are 133 registered archaeological sites within 1 km of the study area, a comprehensive list of recommendations is not provided here. However, details for each site can be found in Appendix A of the Stage 2 Archaeological Assessment Report. Once a preferred route alternative is chosen, all archaeological sites located within the study area boundaries that require further work must be subject to further archaeological assessment prior to ground disturbing activities. Of particular note is archaeological site AgHh-265 which will be required to be subject to Stage 4 archaeological assessment and must follow the requirements set out in the Standards and Guidelines for Consultant Archaeologists (Ontario Government 2011).

Any further required assessment (e.g. Stage 2,3,4) will be undertaken as early as possible during the detailed design.

See **Appendix B.2 Figures 7-2 to 7-5** for mapping of the Stage 1 Archaeological Assessment results.

## 5.3.2 Built Heritage Resources and Cultural Heritage Landscapes

### Cultural Heritage Report Existing Conditions and Preliminary Impact Assessment

A Cultural Heritage Report: Existing Conditions and Preliminary Impact Assessment report was completed for the water transmission main undertaken to:

Provide a brief contextual overview of the study area and its development using primary and secondary source material.

- Identify the baseline cultural heritage conditions within the study area.
- 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.

Based on the results of the background research and field review, a total of 14 above-ground cultural heritage resources were identified within and/or adjacent to the study area. These cultural heritage resources are comprised of four residences, four farmscapes, four institutions, one institution/place of worship, one place of worship, and one Canadian Heritage River (**Table 5-3**).

**Table 5-3: Summary of cultural heritage resources within and/or adjacent to the study area**

Feature ID	Location/Address	Resource Type	Heritage Recognition
CHR 1	14038 Medway Road	Farmscape	Potential Cultural Heritage Resource
CHR 2	14037 Medway Road	Farmscape	Potential Cultural Heritage Resource
CHR 3	14104 (14106) Medway Road	Farmscape	Potential Cultural Heritage Resource
CHR 4	14143 Medway Road	Farmscape	Potential Cultural Heritage Resource
CHR 5	21468 Richmond Street	Residence	Potential Cultural Heritage Resource
CHR 6	1836 Richmond Street	Residence	Heritage Listed Property
CHR 7	551 Windermere Road	Institutional	Heritage Listed Property
CHR 8	1040 Waterloo Street- St. Peter's Seminary	Institutional/Place of Worship	Designated Heritage Property
CHR 9	1070 Waterloo Street- London Diocesan Centre	Institutional	Heritage Listed Property
CHR 10	370/1071 Colbourne Street- Aquinas House	Institutional	Heritage Listed Property
CHR 11	432 Huron Street	Residence	Potential Cultural Heritage Resource
CHR 12	520 Huron Street	Residence	Heritage Listed Property
CHR 13	534 Huron Street	Place of Worship	Heritage Listed Property
CHR 14	Thames River	Watercourse	Canadian Heritage River

Generally, as a means of mitigation, infrastructure improvements should be designed to avoid impacts to properties that have been identified as cultural heritage resources in this report. Based on the results of the preliminary impact assessment, the following recommendations have been developed:



1. Consult **Table 3** of the Cultural Heritage Report (**Appendix B.3**) for the results of the preliminary impact assessment. If necessary, if there is a detailed design for a new water transmission main within a potential 30m (100') easement between Fanshawe Park Rd. and Huron Street, this report should be reviewed with a confirmation of impacts and mitigation measures of the undertaking on cultural heritage resources identified within and/or adjacent to the study area. Any changes in impacts and mitigation measures, as presented in **Table 3** of the Cultural Heritage Report, will be identified.
2. Where temporary landscape disturbance may occur due to water transmission main maintenance and/or redundancy, restore landscape features associated with CHR 1, CHR 2, CHR 3, CHR 4, CHR 5, CHR 9, CHR 11, and CHR 14 to pre-construction conditions through post-construction landscape treatments to ensure there are no negative impacts to the properties. If the disturbance is substantial, a Qualified Person should be retained to conduct a pre-repair conditions assessment and restore the landscape to pre-repair conditions.
3. Repair work, construction activities and staging related to the water transmission main should be suitably planned and undertaken to avoid negative impacts to identified cultural heritage resources (i.e. remain within existing and proposed easements). Suitable mitigation measures include establishing no-go zones adjacent to the identified cultural heritage resources and issuing instructions to construction crews to prevent impacts to existing structures.
4. Should detailed design for the proposed undertaking be extended beyond the potential limits of the 30m (100') easements as outlined on **Figures 3-7** in the Cultural Heritage Report (**Appendix B.3**), this report should be updated to confirm impacts of the proposed work on previously identified known and potential cultural heritage resources.

### Cultural Heritage Memorandum

Further to the CHR, a Cultural Heritage Memorandum was completed as a desktop study to identify cultural heritage resources within and/or adjacent to the proposed route alternatives for the MCEA Master Plan. See **Appendix B.3** for the full list of cultural heritage resources within and/or adjacent to the alternatives.

Based on the current routes of the proposed alternatives and the desktop study, the following presents the alternatives in order from preferred to least preferred based on the total amount of cultural heritage resources identified within and/or adjacent to the alternative routes:

1. Alternative 2 - 15 cultural heritage resources (preferred)
2. Alternative 3A - 19 cultural heritage resources
3. Alternative 3B - 70 cultural heritage resources (least preferred)

The following recommendations have been developed based on the results of this Cultural Heritage Memorandum:

1. The preferred alternative, including construction activities and staging should be suitably planned and undertaken to avoid negative impacts to the identified cultural heritage resources (i.e. remain within existing and proposed easements). Suitable mitigation measures include establishing no-go zones adjacent to the identified cultural heritage resources and issuing instructions to construction crews to prevent impacts to existing structures.
2. Should Alternative 2, Alternative 3A or Alternative 3B be selected as the Preferred Alternative there is potential for negative impacts to the cultural heritage resources identified in **Tables 1 and 2** of the Cultural Heritage Memorandum (**Appendix B.3**). A Cultural Heritage Report: Existing Conditions and Preliminary Impact Assessment is required for the Preferred Alternative as part of later project stages by the City of London.

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## 6. Short Term Alternative Solutions

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In order for the City of London to properly manage the existing transmission main(s) and continue to deliver water supply to its current and future customers the City requires access for ongoing monitoring, maintenance and/or repair purposes and the ability to expand service as needed. While proactively repairing sections of the existing transmission main south of Windermere Road the City found access difficult because of the narrow easement. Due to the relatively long life remaining for the existing transmission main, the project was separated into short term and long-term alternatives so the City could get the most value out of the existing asset and optimize expansion or replacement for the future. Therefore, a review of the existing transmission main condition and the existing easements and the City's ability to access the transmission main for maintenance/repair purposes over the next 10-15 years forms the basis for the short-term alternative solutions. To service future growth and/or replace the existing transmission main once it reaches its service life the City would implement the long-term alternative solutions.

This section describes the short-term alternative solutions, their evaluation, and the selection of the preferred alternative solution.

### 6.1 Identification of Short-Term Alternative Solutions

In order to address the project Problem/Opportunity statement to best maintain the existing water transmission mains in place to maximize their useful life, three short term alternative solutions were developed for evaluation purposes. For the Arva Pump station to Huron Street Water Transmission Main MCEA, short term alternative solutions for the existing transmission mains included:

**Alternative 1: Do Nothing** – The Do Nothing alternative means no maintenance improvements or changes would be undertaken to address current and future requirements. This represents what would likely occur if none of the other alternative solutions were implemented. All monitoring, maintenance and repairs that the City currently undertakes on the existing transmission mains would continue as per current conditions.

**Alternative 2: Maintain Easements as is (minimum 15m or 50')** - This Alternative would maintain the current easements in place without increasing them in width any further. Any obstructions or structures within the easement that would impede or prevent access to the transmission main for ongoing monitoring, maintenance and/or repair purposes would be required to be moved or removed (e.g. decks, sheds, trees, playsets).

**Alternative 3: Widen the Easement to greater than 15m or 50' where possible** – This alternative would have the existing easements widened to greater than 15m wherever possible, to allow for easier access to the transmission main for ongoing monitoring, maintenance and/or repair purposes. The exact width of the widening would be subject to the proximity of existing structures and clear space availability.

The above identified alternative solutions were screened against the problem and opportunity statement identified in Section 4 of this Report.

### 6.2 Short Term Alternatives Evaluation Criteria

A qualitative evaluation was undertaken for the evaluation of short-term existing transmission main. **Table 6-1** below summarizes the criteria, including environmental components 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 6-1: Evaluation Criteria – Short Term Easement Alternatives**

Category	Criteria	Indicator
Socio-Economic	Property requirements	Impacts to private property and ability for owners to use their land Ability to provide equitable dispersal of easement width to all property owners
Cultural Environment	Archaeological resources Built Heritage Resources Cultural Heritage Landscapes	Impacts on archaeological resources and areas of archaeological potential Impact on (know and/or potential) built heritage resources and/or cultural heritage landscapes
Natural Heritage	Aquatic environment Terrestrial environment Species at Risk Source water protection	Impacts to aquatic and terrestrial species and habitat Effects of the project on source water resources (I.e. Wetlands)
Technical	Asset management Performance	Ongoing monitoring and maintenance (M&M) Increased soil and visual testing Proactive joint/pipe section repairs Hydraulic transient performance Risk of failure Consequence of failure
Cost	Ongoing monitoring and maintenance costs Emergency repair costs Property/Easement agreement costs	Cost to access transmission main for repairs Costs to access transmission main during emergency Cost to negotiate new easement width with property owners

### 6.3 Evaluation of Short-Term Alternative Solutions

A detailed assessment of each alternative solution was completed based on the previously described evaluation components 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.

A summary of the evaluation matrix is shown in **Table 6-2**, for a comprehensive evaluation in a matrix format see the full evaluation of alternative solutions as shown in **Table 6-3**.

**Table 6-2: Short Term Alternatives Evaluation Matrix Summary**

Evaluation Criteria Category	Alternative 1	Alternative 2	Alternative 3	Rationale
Socio Economic				<ul style="list-style-type: none"> <li>Alternative 3 requires significant property/easement agreements</li> <li>Alternatives 1 restricts quick access to the transmission main in an emergency</li> </ul>
Cultural Environment				<ul style="list-style-type: none"> <li>Alternative 1 and 2 have minimal impact due to less chance of encroachment into areas of significance</li> </ul>

Evaluation Criteria Category	Alternative 1	Alternative 2	Alternative 3	Rationale
				<ul style="list-style-type: none"> <li>Alternative 3 would have more impact due to clearing obstructions <u>and</u> adding easement width.</li> </ul>
Natural Heritage				<ul style="list-style-type: none"> <li>Alternative 1 would have lowest impact. Greater impact if emergency works are required</li> <li>Alternatives 2 and 3 would have greater impact due to removal obstructions and/or for the increased easement width</li> </ul>
Technical				<ul style="list-style-type: none"> <li>Alternative 1 does not facilitate easy access for repairs</li> <li>Alternative 3 provides easier access allowing for lower Monitoring and Maintenance costs.</li> </ul>
Economic/Financial				<ul style="list-style-type: none"> <li>Alternative 1 has high costs associated with access in an emergency due to obstacles</li> <li>Alternative 3 has very high costs associated with significant property and easement agreements</li> </ul>
Overall Alternative Rating				<ul style="list-style-type: none"> <li>Alternative 2 does not require additional easements or property</li> <li>Alternative 2 has lowest costs associated with easement agreements and emergency repairs</li> </ul>

Legend: 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	Preferred Alternative Solution

## 6.4 Preferred Short Term Easement Alternative

Based on the criteria and methodology applied as part of the evaluation process, the preferred alternative is **Alternative 2 - Maintain Easements as is (minimum 15m or 50')** - Ensuring access is maintained for maintenance and repairs (no structures or obstructions are within the easement) without widening the easement except to the minimum 15m or 50'.

The preferred short-term alternative provides an opportunity for the City to ensure access to the existing transmission mains for ongoing monitoring, maintenance and/or repair purposes using the easements in place without requiring the purchase of additional easements or property except to the minimum 15m or 50'. See **Section 8** for the Short-Term Alternative project description and details.

Table 6.3 Evaluation of Short-Term Alternatives

Factor	Criteria	Alternative 1: Do Nothing	Alternative 2: Maintain Easement as is – 15m to 30m Wide	Alternative 3: Widen the Existing Easement to Greater than 15m up to 30m (if/where possible)
Socio-Economic	<p><b>Property Impacts</b></p> <p>Potential impact to private property, and the ability for owners to use their land</p>	<p>Low impact for lands north of Sunningdale Rd and NW of Richmond St given 30m Easement width and rights can be exercised for monitoring/maintenance/repair</p> <p>No impact on Fanshawe Park Rd to Sunningdale Rd portion given 30m is owned by City</p> <p>High impacts on Windermere Rd to Fanshawe Park Rd portion given 15m or less easement width and rights more difficult to exercise property by property for monitoring/maintenance/repair purposes. Significant impacts in an emergency</p> <p>Medium impacts on Huron St to Windermere Rd portion given 15m easement but rights can be exercised for monitoring/maintenance/repair</p>	<p>Low impact for lands north of Sunningdale Rd and NW of Richmond St given 30m Easement width and few obstructions to remove for monitoring/maintenance/repair</p> <p>No impact on Fanshawe Park Rd to Sunningdale Rd portion given 30m property is owned by City and few obstructions to remove for monitoring/maintenance/repair</p> <p>High impacts on Windermere Rd to Fanshawe Park Rd portion given 15m or less easement width and extensive obstructions to remove for monitoring/maintenance/repair. Medium impacts in an emergency once obstructions are removed</p> <p>Medium impacts on Huron St to Windermere Rd portion given 15m easement and a moderate amount of obstructions to remove for monitoring/maintenance/repair. Low impacts in an emergency once obstructions are removed</p>	<p>No need/ impact for lands north of Sunningdale Rd and NW of Richmond St given 30m Easement width and rights can be exercised for monitoring/maintenance/repair</p> <p>No need or impact on Fanshawe Park Rd to Sunningdale Rd portion given 30m property is owned by City</p> <p>Significant impacts on Windermere Rd to Fanshawe Park Rd portion given 15m or less easement width and need for additional property along most of this portion for monitoring/maintenance/repair purposes to reduce emergency impacts to medium</p> <p>Medium impacts on Huron St to Windermere Rd portion given 15m easement but more potential to widen the easement with less impacts to the number of properties and this area in general for monitoring/maintenance/repair purposes to reduce emergency impacts to low.</p>
				
	<p><b>Ability to provide Equitable dispersal of easement width to all property owners (maintaining a consistent easement width along the whole transmission main)</b></p>	<p>No, not across the Windermere Rd to Fanshawe Park Rd and Huron St to Windermere Rd portions. Maintains high emergency risk</p>	<p>No, not across the Windermere Rd to Fanshawe Park Rd and Huron St to Windermere Rd portions, but clearing obstructions to maximize the 15m easement portions would be an improvement and reduce emergency risks.</p>	<p>Yes, for all portions to the extent possible to reduce emergency risks to the minimum.</p>
				
	<p>Socio-Economic Evaluation Summary</p>			

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







Legend	<p>Low Impact</p> 	<p>Low to Moderate Impact</p> 	<p>Moderate Impact</p> 	<p>Moderate to High Impact</p> 	<p>High Impact</p> 	<p>Most Preferred</p> 
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Table 6.3 Evaluation of Short-Term Alternatives

Factor	Criteria	Alternative 1: Do Nothing	Alternative 2: Maintain Easement as is – 15m to 30m Wide	Alternative 3: Widen the Existing Easement to Greater than 15m up to 30m (if/where possible)
Cultural Environment	<p><b>Archaeological Resources</b></p> <p>Potential impacts to Archaeological Resources</p>	<p>Moderate to high potential NW of Richmond St</p> <p>Previously assessed for lands north of Sunningdale Rd</p> <p>Low to moderate potential for Fanshawe Park Rd to Sunningdale Rd and Windermere Rd to Fanshawe Park Rd portions</p> <p>Moderate to high potential in Huron St to Windermere Rd portion</p> <p>Minimal impact if left undisturbed as is for monitoring/maintenance purposes. Impacts would have to be assessed for repairs in the general areas noted above</p>	<p>Moderate to high potential NW of Richmond St</p> <p>Previously assessed for lands north of Sunningdale Rd</p> <p>Low to moderate potential for Fanshawe Park Rd to Sunningdale Rd and Windermere Rd to Fanshawe Park Rd portions</p> <p>Moderate to high potential in Huron St to Windermere Rd portion</p> <p>Low to moderate impact if clearing obstructions for monitoring/maintenance purposes. Moderate to high impact for repairs. Each would have to be assessed in the general areas noted above</p>	<p>Moderate to high potential NW of Richmond St</p> <p>Previously assessed for lands north of Sunningdale Rd</p> <p>Low to moderate potential for Fanshawe Park Rd to Sunningdale Rd and Windermere Rd to Fanshawe Park Rd portions</p> <p>Moderate to high potential in Huron St to Windermere Rd portion</p> <p>Moderate to high impact if clearing obstructions <u>and</u> adding easement width for monitoring/maintenance purposes. High impact for repairs. Each would have to be assessed in the general areas noted above</p>
	Cultural Heritage Resources	<p><b>Cultural Heritage Resources</b></p> <p>Potential impacts on built heritage resources and cultural landscape</p>	<p>Low potential NW of Richmond St; for lands north of Sunningdale Rd; for Fanshawe Park Rd to Sunningdale Rd and for the Windermere Rd to Fanshawe Park Rd portions.</p> <p>Moderate to high potential in Huron St to Windermere Rd portion</p> <p>Minimal impact if left undisturbed as is for monitoring/maintenance purposes. Moderate impacts would have to be assessed for repairs in close proximity to cultural heritage resources, and in the Huron St to Windermere Rd portion.</p>	<p>Low potential NW of Richmond St; for lands north of Sunningdale Rd; for Fanshawe Park Rd to Sunningdale Rd and for the Windermere Rd to Fanshawe Park Rd portions.</p> <p>Moderate to high potential in Huron St to Windermere Rd portion</p> <p>Low impact if clearing obstructions for monitoring/maintenance purposes. Moderate impacts for repairs in close proximity to cultural heritage resources, and in the Huron St to Windermere Rd portion.</p>
Social and Cultural Evaluation Summary				

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










Legend	<p>Low Impact</p> 	<p>Low to Moderate Impact</p> 	<p>Moderate Impact</p> 	<p>Moderate to High Impact</p> 	<p>High Impact</p> 	<p>Most Preferred</p> 
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Table 6.3 Evaluation of Short-Term Alternatives

Factor	Criteria	Alternative 1: Do Nothing	Alternative 2: Maintain Easement as is – 15m to 30m Wide	Alternative 3: Widen the Existing Easement to Greater than 15m up to 30m (if/where possible)
Natural Environment	Terrestrial – ecological impacts Impacts/Enhancements to terrestrial species and habitat	<p>Low to moderate impacts for the wooded communities NW of Richmond St</p> <p>Low to moderate impacts to forest and woodland communities and portions of the Arva Moraine Wetland Complex/PSW communities NE of Richmond St</p> <p>Low impacts forest and thicket communities and portions of the Arva Moraine Wetland Complex in the mid-part of the Fanshawe Park Rd and Sunningdale Rd Portion.</p> <p>Moderate to High impacts due to Significant Woodland and swamp in the Huron St to Windermere Rd portion.</p> <p>Minimal impact if left undisturbed as is for monitoring/maintenance purposes. Moderate to High impacts would have to be assessed for repairs in the significant areas noted above.</p>	<p>Moderate impacts to the treed communities NW of Richmond St</p> <p>Moderate impacts to forest and woodland communities and portions of the Arva Moraine Wetland Complex/PSW communities NE of Richmond St</p> <p>Moderate impacts forest and thicket communities and portions of the Arva Moraine Wetland Complex in the mid part of the Fanshawe Park Rd to Sunningdale Rd Portion.</p> <p>High impacts due to Significant Woodland and swamp in the Huron St to Windermere Rd portion.</p> <p>Moderate to High impacts if clearing obstructions for monitoring/maintenance purposes. Moderate to High impacts would also have to be assessed for repairs in the significant areas noted above.</p>	<p>Moderate to High impacts to the treed communities NW of Richmond St</p> <p>Moderate to High impacts to forest and woodland communities and portions of the Arva Moraine Wetland Complex/PSW communities NE of Richmond St</p> <p>Moderate impacts forest and thicket communities and portions of the Arva Moraine Wetland Complex in the mid part of the Fanshawe Park Rd to Sunningdale Rd Portion.</p> <p>High impacts due to Significant Woodland and swamp in the Huron St to Windermere Rd portion.</p> <p>High impact if clearing obstructions <u>and</u> adding easement width for monitoring/ maintenance purposes. High impacts would have to be assessed for repairs in the significant areas noted above.</p>
				

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










Legend	<p>Low Impact</p> 	<p>Low to Moderate Impact</p> 	<p>Moderate Impact</p> 	<p>Moderate to High Impact</p> 	<p>High Impact</p> 	<p>Most Preferred</p> 
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Table 6.3 Evaluation of Short-Term Alternatives

Factor	Criteria	Alternative 1: Do Nothing	Alternative 2: Maintain Easement as is – 15m to 30m Wide	Alternative 3: Widen the Existing Easement to Greater than 15m up to 30m (if/where possible)
	<p><b>Aquatic – ecological impacts</b> Impacts/Enhancements to aquatic species and habitat</p>	<p>Low to moderate impacts at 2 water crossings (one Medway Creek), NW of Richmond St</p> <p>Low impacts in the Windermere Rd to Fanshawe Park Rd portion</p> <p>Moderate impacts due to the Thames river crossing and swamp areas in the Huron St to Windermere Rd portion</p> <p>Minimal impact if left undisturbed as is for monitoring/maintenance purposes. Moderate impacts would have to be assessed for repairs in the significant areas noted above</p>	<p>Moderate - High impacts at 2 water crossings (one Medway Creek), NW of Richmond St</p> <p>Low impacts in the Windermere Rd to Fanshawe Park Rd portion</p> <p>High impacts due to the Thames river crossing and swamp areas in the Huron St to Windermere Rd portion</p> <p>Moderate to High impacts if clearing obstructions for monitoring/maintenance purposes. Moderate to High impacts would have to be assessed for repairs in the significant areas noted above</p>	<p>Moderate - High impacts at 2 water crossings (one Medway Creek), NW of Richmond St</p> <p>Low to Moderate impacts for the 2 minor water crossings in the Windermere Rd to Fanshawe Park Rd portion</p> <p>High impacts due to the Thames river crossing and swamp areas in the Huron St to Windermere Rd portion</p> <p>High impact if clearing obstructions <u>and</u> adding easement width for monitoring/ maintenance purposes. High impacts would have to be assessed for repairs in the significant areas noted above</p>
				
	<p><b>Impacts to Species at Risk and Significant Wildlife Habitat</b></p>	<p>Low to moderate impacts to wooded areas NE of Richmond St identified as Candidate SWH/SAR habitat for resident bat species. Low impacts to Monarch butterfly habitat @ Richmond St, north of Sunningdale Rd</p> <p>Low to Moderate impacts to Eastern Wood Peewee in the Gibbons ESA swamp area in the mid part of the Fanshawe Park Rd to Sunningdale Rd portion.</p> <p>Low impacts in the Windermere Rd to Fanshawe Park Rd portion</p> <p>Low – Moderate impacts to the Eastern Wood Peewee habitat/ Significant Woodland in the Huron St to Windermere Rd portion.</p> <p>Low – Moderate impacts to 10 candidate SWH throughout the route including, but not limited to</p>	<p>Moderate impacts to wooded areas NE of Richmond St identified as Candidate SWH/SAR habitat for resident bat species. Low impacts to Monarch butterfly habitat @ Richmond St, north of Sunningdale Rd</p> <p>Moderate impacts to Eastern Wood Peewee in the Gibbons ESA swamp area in the mid part of the Fanshawe Park Rd to Sunningdale Rd portion.</p> <p>Low impacts in the Windermere Rd to Fanshawe Park Rd portion.</p> <p>Moderate - High impacts to the Eastern Wood Peewee/Significant Woodland in the Huron St to Windermere Rd portion.</p> <p>Moderate - High impacts to 10 candidate SWH throughout the route including, but not limited to Bat Maternity Colonies, Turtle Nesting and Rare</p>	<p>Moderate to high impacts to wooded areas NE of Richmond St identified as Candidate SWH/SAR habitat for resident bat species. Low impacts to Monarch butterfly habitat @ Richmond St, north of Sunningdale Rd</p> <p>Moderate - High impacts to Eastern Wood Peewee in the Gibbons ESA swamp area in the mid part of the Fanshawe Park Rd to Sunningdale Rd portion.</p> <p>Low impacts in the Windermere Rd to Fanshawe Park Rd portion.</p> <p>Moderate - High impacts to the Eastern Wood Peewee/Significant Woodland in the Huron St to Windermere Rd portion.</p> <p>Moderate - High impacts to 10 candidate SWH throughout the route including, including but limited to Bat Maternity Colonies, Turtle Nesting and Rare</p>

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










Legend	 <p>Low Impact</p>	 <p>Low to Moderate Impact</p>	 <p>Moderate Impact</p>	 <p>Moderate to High Impact</p>	 <p>High Impact</p>	 <p>Most Preferred</p>
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Table 6.3 Evaluation of Short-Term Alternatives

Factor	Criteria	Alternative 1: Do Nothing	Alternative 2: Maintain Easement as is – 15m to 30m Wide	Alternative 3: Widen the Existing Easement to Greater than 15m up to 30m (if/where possible)
		<p>Bat Maternity Colonies, Turtle Nesting and Rare Vegetation Communities or Habitat for Rare Species or SOCC.</p> <p>Moderate impact to candidate SAR and SAR Habitat for 10 species including, but not limited to Butternut, Kentucky Coffee tree and bat species.</p> <p>Minimal impact if left undisturbed as is for monitoring/maintenance purposes. Moderate to high impacts would have to be assessed for repairs in the significant areas noted above</p>	<p>Vegetation Communities or Habitat for Rare Species or SOCC.</p> <p>Moderate to High impact to candidate SAR and SAR Habitat for 10 species including but not limited to Butternut, Kentucky Coffee Tree and SAR Bat species.</p> <p>High impacts if clearing obstructions for monitoring/maintenance purposes. High impacts would have to be assessed for repairs in the significant areas noted above</p>	<p>Vegetation Communities or Habitat for Rare Species or SOCC.</p> <p>Moderate to High impact to candidate SAR and SAR Habitat for 10 species including but not limited to Butternut, Kentucky Coffee Tree and SAR Bat species.</p> <p>High impacts if clearing obstructions for monitoring/maintenance purposes. High impacts would have to be assessed for repairs in the significant areas noted above</p>
				
	<p><b>Water Resources</b></p> <p><b>Effects of the project on source water resources (Wetlands/Source Water Protection).</b></p>	<p>Low to moderate impacts for 2 water crossings (one Medway Creek) NW of Richmond St</p> <p>Moderate to high impacts for the PSW @ Richmond St for lands north of Sunningdale Rd</p> <p>Low to moderate impacts for Gibbons ESA and 2 minor water crossings for the Fanshawe Park Rd to Sunningdale Rd portion</p> <p>Low impacts for 2 minor water crossings Windermere Rd to Fanshawe Park Rd portion</p> <p>Moderate to High impacts for the Thames River and 1 minor water crossing, and the swamp areas North &amp; South of the river in the Huron St to Windermere Rd portion</p> <p>Minimal impact if left undisturbed as is for monitoring/maintenance purposes. Moderate to High impacts would have to be assessed for repairs in the significant areas noted above</p>	<p>Moderate impacts for 2 water crossings (one Medway Creek) NW of Richmond St</p> <p>High impacts for the PSW @ Richmond St for lands north of Sunningdale Rd</p> <p>Moderate impacts for Gibbons ESA and 2 minor water crossings for the Fanshawe Park Rd to Sunningdale Rd portion</p> <p>Moderate impacts for 2 minor water crossings Windermere Rd to Fanshawe Park Rd portion</p> <p>High impacts for the Thames River and 1 minor water crossing, and the swamp areas North &amp; South of the river in the Huron St. to Windermere Rd portion</p> <p>Moderate to High impacts if clearing obstructions for monitoring/maintenance purposes. Moderate to High impacts would have to be assessed for repairs in the significant areas noted above</p>	<p>Moderate impacts for 2 water crossings (one Medway Creek) NW of Richmond St</p> <p>High impacts for the PSW @ Richmond St for lands north of Sunningdale Rd</p> <p>Moderate impacts for Gibbons ESA and 2 minor water crossings for the Fanshawe Park Rd to Sunningdale Rd portion</p> <p>Moderate impacts for 2 minor water crossings Windermere Rd to Fanshawe Park Rd portion</p> <p>High impacts for the Thames River and 1 minor water crossing, and the swamp areas North &amp; South of the river in the Huron St to Windermere Rd portion</p> <p>Moderate to High impacts if clearing obstructions for monitoring/maintenance purposes. Moderate to High impacts would have to be assessed for repairs in the significant areas noted above</p>

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







Legend	<p>Low Impact</p> 	<p>Low to Moderate Impact</p> 	<p>Moderate Impact</p> 	<p>Moderate to High Impact</p> 	<p>High Impact</p> 	<p>Most Preferred</p> 
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Table 6.3 Evaluation of Short-Term Alternatives

Factor	Criteria	Alternative 1: Do Nothing	Alternative 2: Maintain Easement as is – 15m to 30m Wide	Alternative 3: Widen the Existing Easement to Greater than 15m up to 30m (if/where possible)
Natural Environment Summary				
Technical Considerations	<b>Asset Management</b> Ongoing monitoring and maintenance (M&M), to minimize impacts Increased soil and visual testing (SVT), to facilitate proactive repairs Proactive joint/pipe section repairs to minimize impacts	Increased M&M and SVT due to transmission main age and remaining service life. Facilitates access but with limitations due to obstructions and/or easement width, primarily between Fanshawe Park Rd and Huron St  Increased proactive repairs due to transmission main age and remaining service life. Facilitates access but with some significant limitations due to obstructions and/or easement width, primarily between Fanshawe Park Rd and Huron St	Increased M&M and SVT due to transmission main age and remaining service life. Better facilitates access with obstructions removed but some limitations remain due to easement width, primarily between Fanshawe Park Rd and Huron St  Increased proactive repairs due to transmission main age and remaining service life. Better facilitates access with obstructions removed but some significant limitations remain due to obstructions and/or easement width, primarily between Fanshawe Park Rd and Huron St	Increased M&M and SVT due to transmission main age and remaining service life. Better facilitates access with obstructions removed <u>and</u> easement width increased where possible (min. 15m+ width), primarily between Fanshawe Park Rd and Huron St  Increased proactive repairs due to transmission main age and remaining service life. Better facilitates access with obstructions removed <u>and</u> easement width increased where possible (min. 15m+ width), primarily between Fanshawe Park Rd and Huron St
	<b>Performance</b> Hydraulic/Transient performance Risk of Failure Consequence of Failure	Maintains hydraulic/transient performance but impacts slightly due to access limitations  Risk of failure Low for all sections, except Windermere Rd to Huron St, Moderate  Consequence of failure Low for all sections, except Fanshawe Park Rd to Huron St, High	Maintains hydraulic/transient performance better with obstructions removed  Risk of failure Low for all sections, except Windermere Rd to Huron St, Moderate. Improved with obstructions removed  Consequence of failure Low for all sections, except Fanshawe Park Rd to Huron St, High. Improved with obstructions removed	Maintains hydraulic/transient performance best with obstructions removed <u>and</u> easement width increased where possible (min. 15m+ width), primarily between Fanshawe Park Rd and Huron St  Risk of failure Low for all sections, except Windermere Rd to Huron St, Moderate. Improved with obstructions removed <u>and</u> easement width increased where possible (min. 15m+ width), primarily between Fanshawe Park Rd and Huron St  Consequence of failure Low for all sections, except Fanshawe Park Rd to Huron St, High. Improved with obstructions removed <u>and</u> easement width

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

Legend						
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






Table 6.3 Evaluation of Short-Term Alternatives

Factor	Criteria	Alternative 1: Do Nothing	Alternative 2: Maintain Easement as is – 15m to 30m Wide	Alternative 3: Widen the Existing Easement to Greater than 15m up to 30m (if/where possible)
				increased where possible (min. 15m+ width), primarily between Fanshawe Park Rd and Huron St
<b>Technical Considerations Evaluation Summary</b>				
<b>Economic and Financial Considerations</b>	<b>Ongoing Monitoring &amp; Maintenance (M&amp;M) Costs</b>	Increased M&M costs due to transmission main age and remaining service life. Increased access and easement maintenance costs, particularly in the Fanshawe Park Rd to Huron St portions	Increased M&M costs due to transmission main age and remaining service life. Decreased access and easement maintenance costs, particularly in the Fanshawe Park Rd to Huron St portions due to obstruction removal	Increased M&M costs due to transmission main age and remaining service life. Decreased access and easement maintenance costs, particularly in the Fanshawe Park Rd to Huron St portions due to obstruction removal <u>and</u> added easement widths
	<b>Emergency Repair (ER) Costs</b>	Highest ER costs due to access /easement limitations, particularly in the Fanshawe Park Rd to Huron St portions	High ER costs due to access /easement limitations, particularly in the Fanshawe Park Rd to Huron St portions	Moderate ER costs due to improved access /easement widths, particularly in the Fanshawe Park Rd to Huron St portions
	<b>Property/Easement Agreement (P/E) Costs</b>	No P/E costs	No P/E costs	Significant P/E costs anticipated, particularly in the Fanshawe Park Rd to Huron St portions unless obtained through redevelopment applications







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

<b>Legend</b>	<b>Low Impact</b> 	<b>Low to Moderate Impact</b> 	<b>Moderate Impact</b> 	<b>Moderate to High Impact</b> 	<b>High Impact</b> 	<b>Most Preferred</b> 
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Table 6.3 Evaluation of Short-Term Alternatives

Factor	Criteria	Alternative 1: Do Nothing	Alternative 2: Maintain Easement as is – 15m to 30m Wide	Alternative 3: Widen the Existing Easement to Greater than 15m up to 30m (if/where possible)
				
Economic and Financial Evaluation Summary				
Overall Summary / Recommendation				

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

Legend						
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## 7. Long Term Alternative Solutions

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To service future growth and/or replace existing transmission main sections once the existing transmission main reaches the end of its service life, and opportunities to implement with future road works present themselves, the City can implement a long-term solution of twinning the existing single transmission main sections on adjacent roadways and potentially decommission the existing transmission. This would provide an environment where monitoring, maintenance and repair of the transmission main could be undertaken more readily using traditional construction methods. This section describes the long-term alternative solutions, their evaluation, and selection of the preferred alternative solution.

### 7.1 Identification of Long-Term Alternative Solutions

In order to address the project problem/opportunity statement from an added system capacity and/or redundancy perspective, four long term alternative solutions were developed for evaluation purposes. For the Arva Pump station to Huron Street Water Transmission Main MCEA, long term alternative solutions to provide additional system capacity and/or redundancy included:

**Alternative 1: Do Nothing** – The Do Nothing alternative means no improvements or changes would be undertaken to address current and future requirements and represents what would likely occur if none of the other alternative solutions were implemented. All monitoring, maintenance and repair that the City currently undertakes on this transmission main would continue.

**Alternative 2: Twin the Transmission Main Along Adelaide Street** with a connection to the existing transmission main(s) at either: Medway Road or Sunningdale Road or Fanshawe Park Road and on Regent Street. (See Figure 7.1)

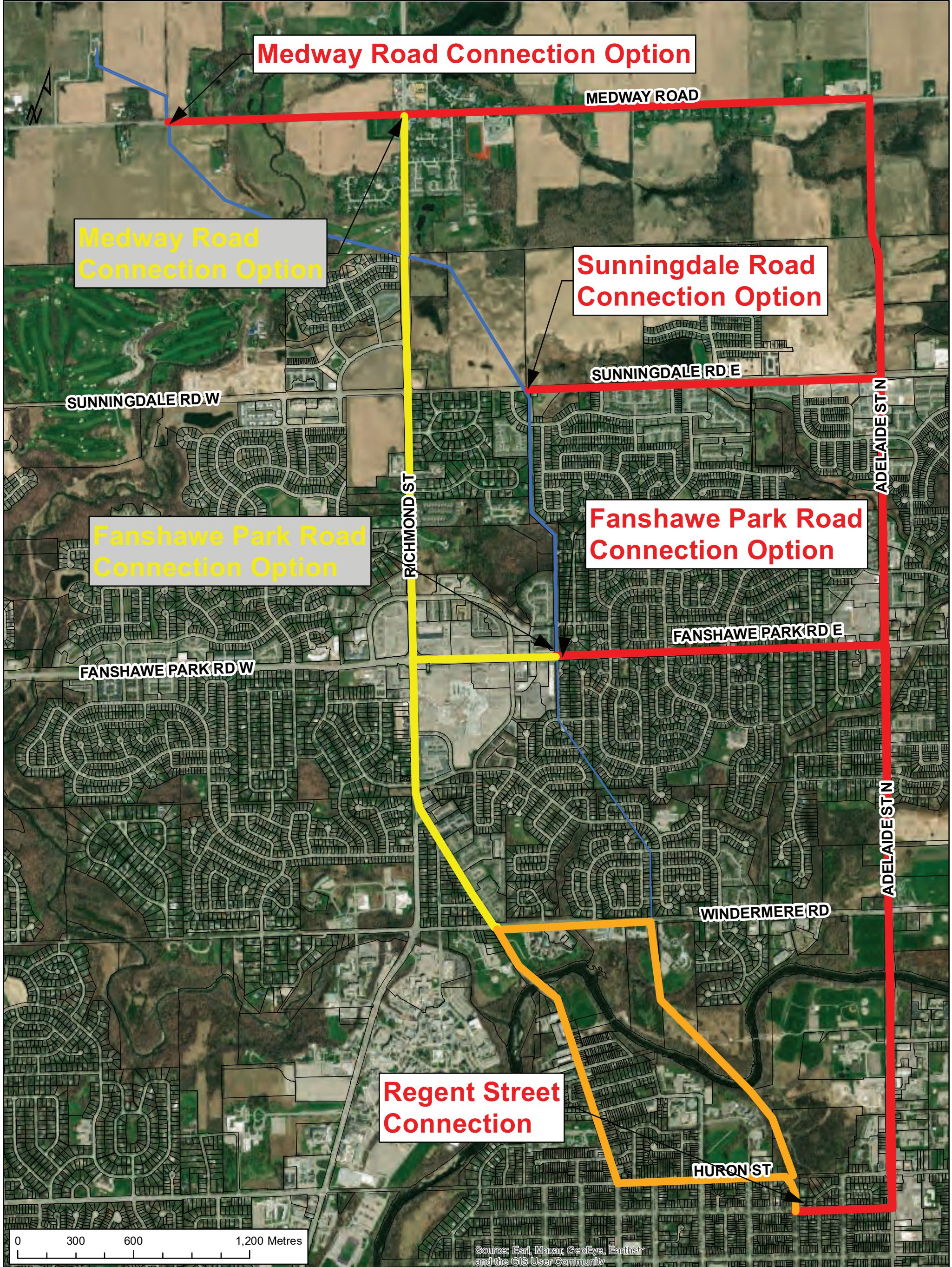
**Alternative 3: Twin the Main Along Richmond Street.** This alternative was separated into two different alternatives. **Alternative 3A** evaluates the Richmond Street North section with connections to the existing transmission mains at either Medway Road and on Richmond Street or Fanshawe Park Road. **Alternative 3B** evaluates the Richmond Street South section with connections to the existing transmission main on Windermere Road and via the existing easement, or via Huron Street. While evaluated separately, these two alternatives are not independent of each other and need to be considered together when choosing the preferred alternative. (See Figure 7.1)

**Alternative 4:** Twin the existing transmission main using internal local roads between Fanshawe Park Road and Windermere Road. This alternative looked at using local streets as the transmission main twinning route. This alternative was **screened out of further evaluation** and deemed not feasible very early in the study due to the significant social impacts, difficult construction requirements and the number of bends that would be required for transmission main implementation that could cause hydraulic issues.

Alternative solutions 1, 2 and 3 identified above were therefor screened against the problem and opportunity statement identified in Section 4 of this Report.

### 7.2 Long Term Alternatives Evaluation Criteria

A qualitative evaluation was undertaken for the evaluation of long-term twinning alternatives to add system capacity and/or redundancy. **Table 7-1** below summarizes the criteria, including environmental components that address the



**Medway Road Connection Option**

MEDWAY ROAD

**Medway Road Connection Option**

**Sunningdale Road Connection Option**

SUNNINGDALE RD E

SUNNINGDALE RD W

**Fanshawe Park Road Connection Option**

**Fanshawe Park Road Connection Option**

RICHMOND ST

ADELAIDE ST N

FANSHAWE PARK RD E

FANSHAWE PARK RD W

ADELAIDE ST N

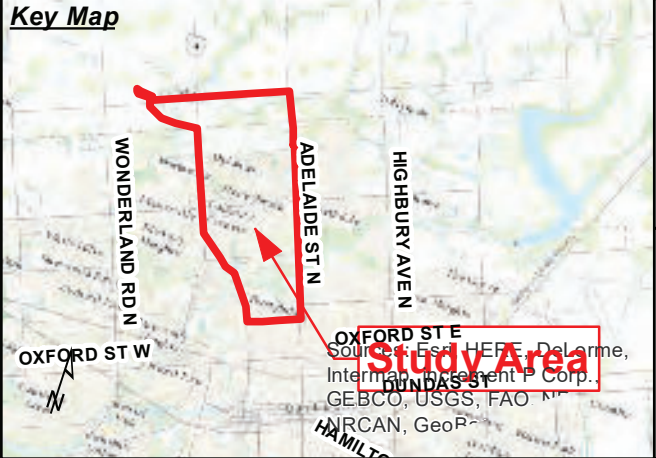
WINDERMERE RD

**Regent Street Connection**

HURON ST



Source: Esri, Maxar, GeoEye, Earthstar and the GIS User Community



**City of London  
Arva Pump Station to Huron Street  
Water Transmission Main  
Municipal Class Environmental Assessment  
Master Plan**

**Figure 7.1:  
Long-Term Alternative Solutions**

Date: April 2021	PN: 60619503	Datum: NAD83 UTM17 Source: City of London
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- Legend**
- Existing Transmission Main
  - Alternative 2: Adelaide Street Twinning Routes
  - Alternative 3A: Richmond Street North Twinning Routes
  - Alternative 3B: Richmond Street South Twinning Routes



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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 7-1: Evaluation Criteria – Long Term Twinning Alternatives**

Category	Criteria	Indicator
Socio-Economic	property requirements Construction Impacts Disruption of service	Permanent/Temporary Impact to private/public lands Potential impacts to existing/future land use Potential property requirements Potential nuisance impacts Travel delays due to construction Disruption to businesses Potential to adversely affect the reliability of service during construction
Cultural Environment	Archaeological resources Built Heritage Resources Cultural Heritage Landscapes	Impacts on archaeological resources and areas of archaeological potential Impact on (know and/or potential) built heritage resources and/or cultural heritage landscapes
Natural Heritage	terrestrial environment aquatic environment Species at Risk Source water protection and Climate change	Impacts/enhancements to aquatic and terrestrial species and habitat Effects of the project on source water resources (I.e. Wetlands) Resilience to extreme weather events Reducing the effect on climate change
Technical	Water Quality Hydraulics Transient Protection Design and Constructability Operations and Maintenance	Ability to maintain/reduce potable water turnover Storage Balancing Ability to mitigate high/low pressures Ability to mitigate high/low velocity and head loss Transient protection Air valve needs Construction complexity Energy consumption
Cost	Capital Costs Operation and Maintenance Costs Property Costs	Cost to construct Costs to operate and maintain the system Cost to purchase required property

### 7.3 Evaluation of Long-Term Alternative Solutions

A detailed assessment of each alternative solution was completed based on the previously described evaluation components 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.

A summary of the evaluation matrix is shown in **Table 7-2**, for a comprehensive evaluation in a matrix format see the full evaluation of alternative solutions as shown in **Table 7-3**.

**Table 7-2: Long Term Twinning Alternatives Evaluation Matrix Summary**

Evaluation Criteria Category	Alternative 1	Alternative 2	Alternative 3A	Alternative 3B	Rationale
<b>Socio Economic</b>					<ul style="list-style-type: none"> <li>Alternative 1 high impacts in an emergency due to 15m or less easement widths</li> <li>Alternative 3A and 3B may require easements or property acquisition.</li> <li>Alternative 2 no apparent property easements or acquisitions required.</li> <li>Alternatives 2 and 3 have similar construction impacts.</li> </ul>
<b>Cultural Environment</b>					<ul style="list-style-type: none"> <li>Alternative 2 and 3B have higher potential for Archaeological impacts.</li> <li>Alternative 3B has the highest potential for cultural heritage impacts.</li> </ul>
<b>Natural Heritage</b>					<ul style="list-style-type: none"> <li>Alternative 1 has high impacts for repairs in significant terrestrial areas.</li> <li>Alternative 2 has the most water crossings, and a greater potential to Impact SAR</li> <li>Alternative 3A has less water crossings and a lower potential to impact SAR</li> <li>Alternative 3B has fewer but more significant water crossings than 3A, a higher potential to impact SAR and a greater impact to climate change due to reduced carbon sequestration capacity resulting from vegetation removal</li> </ul>
<b>Technical</b>					<ul style="list-style-type: none"> <li>Alternatives are technically (hydraulics/water quality) equal except Alternative 1 which would require increased monitoring and maintenance.</li> <li>Alternative 3A and 3B have a greater design complexity</li> </ul>
<b>Economic / Financial</b>					<ul style="list-style-type: none"> <li>All Alternatives have similar costs associated with them.</li> <li>Alternative 1 has high emergency repair costs.</li> </ul>
<b>Overall Alternative Rating</b>					<ul style="list-style-type: none"> <li>Alternative 1 has significant emergency repair impacts</li> <li>Alternative 2 the least impacts and the clearest route for twinning</li> <li>Although Alternative 3A had the same score as Alternative 2, it only represented the northern portions of the route comparisons. When the southern portion alternative was considered under Alternative 3B it they scored less favourably than Alternative 2.</li> </ul>

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	Preferred Alternative Solution



Table 7-3 Evaluation of Long-Term Twinning Alternatives

Factor	Criteria	Design Alternative			
		Alternative 1: Do Nothing	Alternative 2: Twin the Transmission Main Along Adelaide Street with a connection to the existing main at either: Medway Road; or Sunningdale Road; or Fanshawe Park Road; or Regent Street.	Alternative 3A: Twin the Transmission Main Along Richmond Street directly to Huron Street, with a connection to the existing main at either: Medway Road and on Richmond Street; or Fanshawe Park Road.	Alternative 3B: Twin the Transmission Main Along Richmond Street via the existing easement between Windemere Road and Huron Street with a connection at  Windemere Road; or Huron Street
Socio-Economic	Property Impacts  Permanent/Temporary impacts on private/public lands Potential Impacts to existing/future land use.  Potential Property Requirements	<p>Low impact for lands north of Sunningdale Rd and NW of Richmond St given 30m Easement width and rights can be exercised for monitoring/maintenance/repair</p> <p>No impact on Fanshawe Park Rd to Sunningdale Rd portion given 30m property is owned by City</p> <p>High impacts on Windemere Rd to Fanshawe Park Rd portion given 15m or less easement width <u>and</u> rights more difficult to exercise property by property for monitoring/maintenance/repair purposes. Significant impacts in an emergency and needs for property</p> <p>Moderate impacts on Huron St to Windemere Rd portion given 15m easement but rights can be exercised for monitoring/maintenance/repair. Some impacts and needs for property</p>	<p>Low to Moderate impacts for the Medway Rd/Adelaide St; Sunningdale Rd/ Adelaide St and Fanshawe Park Rd /Adelaide St/Regent St portions given some property/easements may be required in specific locations.</p> <p>Sunningdale connection, no property requirements or easements. Enough space for a second transmission main.</p> <p>Medway section east of the Richmond intersection, there are some conflicts with existing utilities that may require a construction easement. Additional easements and land may be required to install a second transmission main.</p> <p>Fanshawe Park Road, no property requirements or easements. Easements and property may be required for a second transmission main.</p> <p>Adelaide Street from Fanshawe to Regent there is no required easements or property.</p> <p>Regent street, no property requirements or easements, mains would be placed under</p>	<p>Moderate impacts for the Medway Rd/Richmond St and Fanshawe Park Rd /Richmond St portions given some property/easements may be required in specific locations</p> <p>Medway Rd, no easements or property required. Enough space for a second transmission main.</p> <p>Huron Street, no property requirements or easements. Easements or property may be required for a second transmission main.</p> <p>Richmond St, no property requirements or easements. Easements or property may be required for a second transmission main.</p>	<p>Moderate impacts for the Windemere Rd/Existing Transmission main portions to Huron St, and the Richmond St/Huron St portions given greater property/easements may be required in specific locations</p> <p>Windemere Rd, no easements or property acquisition. Enough space for a second transmission main.</p> <p>Richmond St, no property requirements or easements. Easements or property may be required for a second transmission main.</p>

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 
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Table 7-3 Evaluation of Long-Term Twinning Alternatives

			residents driveways; however, still within the City's ROW.		
					
	Construction Impacts  Potential nuisance impacts (e.g., air, dust, noise and vibration) from construction and operations. Travel delays due to detours or lane closures Disruption to area businesses (noise/dust/access during construction)	Low impact for lands north of Sunningdale Rd and NW of Richmond St given 30m Easement width and residences and/or business are further away to facilitate monitoring/ maintenance/ repair  Low to moderate impact on Fanshawe Park Rd to Sunningdale Rd portion even though 30m property is owned by City. Residences are adjacent to the corridor on either side  High impacts on the Windermere Rd to Fanshawe Park Rd portion given 15m or less easement width right though private properties <u>and</u> rights are more difficult to exercise property by property for monitoring/maintenance/repair purposes. Significant impacts in an emergency  Moderate impacts on the Huron St to Windermere Rd portion given 15m easement but rights can be exercised for monitoring/maintenance/repair. Some impacts to adjacent properties north and south of the Thames river	Low to Moderate impacts for the Medway Rd/Adelaide St portions, primarily in the Arva area  Moderate impacts in the Sunningdale Rd/ Adelaide St portions given the traffic and proximity of residential homes and businesses along these roadway portions  Moderate to High impacts for the Fanshawe Park Rd /Adelaide St/Regent St portions given the heavy traffic and proximity of residential homes and businesses along most of these roadway portions  Twinning Impacts are highest for the Fanshawe Park Rd /Adelaide St/Regent St portions	Moderate impacts for the Medway Rd/Richmond St portions, primarily in the Arva and Masonville north areas given the traffic and proximity of residential homes and businesses along these roadway portions  Moderate to High impacts for the Fanshawe Park Rd /Richmond St portions given the heavy traffic and proximity of residential homes and businesses along most of these roadway portions  Twinning Impacts are highest for the Fanshawe Park Rd /Richmond St portions	Moderate impacts for the Windermere Rd/Existing Transmission main portions to Huron St given the reduced traffic and proximity of residential homes along the roadway and existing transmission main portions, but easement width and access a concern  Moderate to High impacts for the Richmond St/Huron St portions given the heavy traffic and proximity of residential homes and along most of these roadway portions  Twinning Impacts are highest for the Richmond St/Huron St portions
	Disruption of Service Potential to adversely affect the reliability of services during construction				
	Low impacts for monitoring/maintenance purposes overall for the existing transmission main portions. High impact for repair purposes overall for the existing transmission main portions,	Low to Moderate impacts to the existing transmission mains and/or water servicing in general for each of the Medway Rd/Sunningdale Rd/Fanshawe Park Rd/Adelaide St/Regent St portions	Low to Moderate impacts to the existing transmission mains and/or water servicing in general for each of the Medway Rd/Fanshawe Park Rd/Richmond St portions	Moderate impacts to the existing transmission mains and/or water servicing in general for each of the Windermere Rd/Existing Transmission main portions to Huron St and Richmond St/Huron St portions	

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







Legend						
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Table 7-3 Evaluation of Long-Term Twinning Alternatives

		particularly for the Fanshawe Park Rd to Huron St portion			
Socio-Economic Evaluation Summary		Overall – Moderate to High	Overall – Moderate	Overall – Moderate to High	Overall – Moderate to High
Cultural Environment	Archaeological Resources  Potential impacts to Archaeological Resources	Moderate to high potential NW of Richmond St	Low to Moderate potential Medway Rd/Adelaide St portion	Low to Moderate potential Medway Rd/ Richmond St portion	Low to High potential in the Windermere Rd/Existing Transmission main portions to Huron St
		Previously assessed for lands north of Sunningdale Rd	Low to Moderate potential Sunningdale Rd/Adelaide St portion	Low potential Fanshawe Park Rd /Richmond St portions	Moderate to High potential in the Richmond St/Huron St portions
		Low to moderate potential for Fanshawe Park Rd to Sunningdale Rd and Windermere Rd to Fanshawe Park Rd portions	Moderate potential Fanshawe Park Rd /Adelaide St/Regent St portions Twinning Impacts would be greatest in the Adelaide St/Regent St portions	Twinning Impacts would be greatest in the Medway Rd/Richmond St portions	Twinning Impacts would be greatest in the Richmond St/Huron St portion
		Moderate to High potential in Huron St to Windermere Rd portion			
		Minimal impact if left undisturbed as is for monitoring/maintenance purposes. Impacts would have to be assessed for repairs in the general areas noted above			
Cultural Environment	Cultural Heritage Resources  Potential impacts on built heritage resources and cultural landscape	Low potential NW of Richmond St; for lands north of Sunningdale Rd; for Fanshawe Park Rd to Sunningdale Rd and for the Windermere Rd to Fanshawe Park Rd portions.	Moderate potential for Medway Rd/Adelaide St portions	Moderate potential Medway Rd/ Richmond St portions	Moderate to High potential in the Windermere Rd/Existing Transmission main portions to Huron St
		Moderate to High potential in Huron St to Windermere Rd portion	Low to Moderate potential Sunningdale Rd/Adelaide St portions	Low potential Fanshawe Park Rd /Richmond St portions	High potential in the Richmond St/Huron St portions
		Minimal impact if left undisturbed as is for monitoring/maintenance purposes. Moderate impacts would have to be	Low to Moderate potential Fanshawe Park Rd /Adelaide St/Regent St portions Twinning Impacts would be greatest in the Medway RdAdelaide St portions	Twinning Impacts would be greatest in the Medway Rd/Richmond St portions	Twinning Impacts would be greatest in the Richmond St/Huron St portions

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

Legend						
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Table 7-3 Evaluation of Long-Term Twinning Alternatives

		assessed for repairs in close proximity to cultural heritage resources, and in the Huron St to Windermere Rd portion.			
Social and Cultural Evaluation Summary					
Natural Environment	Terrestrial – ecological impacts	<p>Low to moderate impacts to forest, agricultural and woodland communities and portions of the Arva Moraine Wetland Complex (PSW) communities NW of Richmond St</p> <p>Moderate to high impacts to amphibian habitat in the Arva Moraine PSW at Richmond St, north of Sunningdale Rd</p> <p>Low to Moderate impacts to forest and thicket communities and portions of the Arva Moraine Wetland Complex in the mid-part of the Fanshawe Park Rd and Sunningdale Rd Portion.</p>	<p>Low to moderate impacts for some meadow and wooded areas, as well as Arva Moraine Wetland Complex (PSW) for the Medway Rd/Adelaide St portions</p> <p>Moderate impacts for a number of meadow and wooded areas, as well as Arva Moraine Wetland Complex (PSW) and Killaly Meadows ESA for the Sunningdale Rd/Adelaide St portions</p> <p>Low to moderate impacts for some meadow and wooded areas as well as Killaly Meadows ESA for the Fanshawe Park Rd /Adelaide St/Regent St portions</p>	<p>Moderate impacts for a number of meadow, wooded and Arva Moraine PSW areas for the Medway Rd/Richmond St portions</p> <p>Low impacts in the Fanshawe Park Rd /Richmond St portions</p> <p>Twinning Impacts would be greatest in the Medway Rd/Richmond St portions</p>	<p>Moderate to High impacts due to significant woodland and swamp in the Windermere Rd/Existing Transmission main portions to Huron St</p> <p>High impacts due to Significant Woodland and swamp in the Huron St to Windermere Rd portion.</p> <p>Low to moderate impacts for some wooded areas in the Richmond St/Huron St portions</p> <p>Twinning impacts would be greatest in the Windermere Rd/Existing Transmission main portions to Huron St</p>
	Impacts/Enhancements to terrestrial species and habitat	<p>Low impacts to trees and landscape features in yards. for the Windermere Rd to Fanshawe Park Rd portion. Limited natural heritage features due to urban setting.</p> <p>Moderate to High impacts due to Significant Woodland and swamp in the Huron St to Windermere Rd portion.</p> <p>Minimal impact if left undisturbed as is for monitoring/maintenance purposes.</p> <p>Minimal impact if left undisturbed as is for monitoring/maintenance purposes. Moderate to High impacts would have to</p>	<p>Twinning Impacts greater if the Medway or Sunningdale options are pursued in addition to Fanshawe/Adelaide</p>		

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

Legend						
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Table 7-3 Evaluation of Long-Term Twinning Alternatives

		be assessed for repairs in the significant areas noted above			
	Aquatic – ecological impacts  Impacts/Enhancements to aquatic species and habitat	<p>Low to moderate impacts at 2 water crossings (one Medway Creek), NW of Richmond St</p> <p>Low impacts in the Windermere Rd to Fanshawe Park Rd portion</p> <p>Moderate impacts due to the Thames river crossing.</p> <p>Minimal impact if left undisturbed as is for monitoring/maintenance purposes. Moderate impacts would have to be assessed for repairs in the significant areas noted above</p>	<p>Moderate to High impact potential for 4 water crossings (1 Medway Creek; 2 associated with Arva Moraine PSW) for the Medway Rd/Adelaide St portions</p> <p>Moderate to High impact potential for 4 water crossings (3 associated with Arva Moraine PSW) for the Sunningdale Rd/Adelaide St portions</p> <p>Moderate to High impact potential for 4 water crossings (1 Stoney Creek; 1 Thames River), for the Fanshawe Park Rd /Adelaide St/Regent St portions</p> <p>Twinning Impacts are comparable for all portions but greater if the Medway or Sunningdale options are pursued in addition to Fanshawe/Adelaide</p>	<p>Moderate to High impact potential for 3 water crossings (1 Medway Creek; 2 Arva Moraine PSW for the Medway Rd/ Richmond St portions</p> <p>Low potential Fanshawe Park Rd /Richmond St portions</p> <p>Twinning Impacts would be greatest in the Medway Rd/Richmond St portions</p>	<p>Moderate to High impacts for the Thames River and 2 other water crossings, and the swamp areas in the Windermere Rd/Existing Transmission main portions to Huron St</p> <p>Moderate potential in the Richmond St/Huron St portions for the Thames River crossing.</p> <p>Twinning impacts would be greatest in the Windermere Rd/Existing Transmission main portions to Huron St</p>

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

Table 7-3 Evaluation of Long-Term Twinning Alternatives

	<p>Impacts to Wildlife (Species at Risk)</p> <p>Potential impact to Species at risk and habitat</p>	<p>Low to moderate impacts in wooded areas NE of Richmond St</p> <p>Moderate to high impacts in the Arva Moraine PSW @ Richmond St, and just north of Sunningdale Rd</p> <p>Low impacts to monarch butterfly habitat @ Richmond St, north of Sunningdale Rd</p> <p>Low to moderate impacts to the Arva Moraine Wetland Complex/ Gibbons Wetland ESA in the mid part of the Fanshawe Park Rd to Sunningdale Rd portion</p> <p>Low to Moderate impacts to the Eastern Wood Peewee in the Gibbons ESA swamp area in the mid part of the Fanshawe Park Rd to Sunningdale Rd portion</p> <p>Low impacts in the Windermere Rd to Fanshawe Park Rd portion</p> <p>Low to moderate impacts to the Eastern Wood Peewee habitat/Significant Woodland in the Huron St to Windermere Rd portion</p> <p>Minimal impact if left undisturbed as is for monitoring/maintenance purposes. Moderate to high impacts would have to be assessed for repairs in the significant areas noted above</p>	<p>Low to Moderate impacts for species at risk habitat in some wooded areas and the Arva Moraine PSW for the Medway Rd/Adelaide St portions</p> <p>Low to Moderate impacts for species at risk habitat in some wooded areas and the Arva Moraine PSW for the Sunningdale Rd/Adelaide St portions</p> <p>Moderate to High impact potential for amphibian and terrestrial crayfish habitat at 4 water crossings (3 associated with Arva Moraine PSW) for the Sunningdale Rd/Adelaide St portions</p> <p>Moderate impacts for species at risk habitat in some wooded areas, Kilally Meadows ESA and barn swallows for the Fanshawe Park Rd /Adelaide St/Regent St portions</p> <p>10 candidate SWH one confirmed SWH, as well as 6 candidate SAR species and 2 confirmed SAR species identified as potentially occurring or occurring along this route.</p> <p>Twinning Impacts similar if the Medway or Sunningdale options are pursued in addition to Fanshawe/Adelaide</p>	<p>Moderate impacts for a number of meadow, Arva Moraine PSW and wooded areas with barn swallows for the Medway Rd/ Richmond St portions</p> <p>Moderate to High impact potential for amphibian and terrestrial crayfish habitat at 3 water crossings (1 Medway Creek; 2 Arva Moraine PSW) for the Medway Rd/ Richmond St portions</p> <p>Low impacts in the Fanshawe Park Rd /Richmond St portions</p> <p>8 candidate SWH and 3 confirmed SWH, as well as 10 candidate SAR species and 2 confirmed SAR species identified as potentially occurring or occurring along this route.</p> <p>Twinning Impacts would be greatest in the Medway Rd/Richmond St portions</p>	<p>Moderate to High impacts to the Eastern Wood Peewee habitat in the wooded and swamp areas in the Windermere Rd/Existing Transmission main portions to Huron St</p> <p>Moderate impacts for species at risk habitat in some wooded areas and barn swallow habitat/Kentucky coffee trees in the Richmond St/Huron St portions</p> <p>Moderate potential in the Richmond St/Huron St portions for Spiny Softshell Turtle habitat</p> <p>11 candidate SWH and 3 confirmed SWH, as well as 10 candidate SAR species and 2 confirmed SAR species potentially occurring or occurring along this route.</p> <p>Twinning impacts would be greatest in the Windermere Rd/Existing Transmission main portions to Huron St</p>
					

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



















Legend	<p>Low Impact</p> 	<p>Low to Moderate Impact</p> 	<p>Moderate Impact</p> 	<p>Moderate to High Impact</p> 	<p>High Impact</p> 	<p>Most Preferred</p> 
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Table 7-3 Evaluation of Long-Term Twinning Alternatives

<p>Water Resources</p> <p>Effects of the project on source water resources (Wetlands/Source Water Protection).</p> <p>Effects of the project surface water and ground water due to construction</p> <p>Number of water crossings</p>	<p>Low to moderate impacts for 2 water crossings (one Medway Creek) NW of Richmond St</p>	<p>Moderate to High impact potential for 4 water crossings (1 Medway Creek; 2 Arva Moraine PSW), for the Medway Rd/Adelaide St portions</p>	<p>Moderate to High impact potential for 3 water crossings (1 Medway Creek; 2 Arva Moraine PSW), Medway Rd/Richmond St portions</p>	<p>Moderate to High impacts for the Thames River and 2 other water crossings, and the swamp areas in the Windermere Rd/Existing Transmission main portions to Huron St</p>
	<p>Moderate to high impacts for the PSW @ Richmond St for lands north of Sunningdale Rd</p>	<p>Moderate to High impact potential for 4 water crossings (3 Arva Moraine PSW), for the Sunningdale Rd/Adelaide St portions</p>	<p>Low potential Fanshawe Park Rd /Richmond St portions</p>	<p>Moderate potential in the Richmond St/Huron St portions for the Thames River crossing</p>
	<p>Low to moderate impacts for Gibbons ESA and 2 minor water crossings for the Fanshawe Park Rd to Sunningdale Rd portion</p>	<p>Moderate to High impact potential for 4 water crossings (1 Stoney Creek; 1 Thames River), for the Fanshawe Park Rd /Adelaide St/Regent St portions</p>	<p>Twinning Impacts would be greatest in the Medway Rd/Richmond St portions</p>	<p>Twinning impacts would be greatest in the Windermere Rd/ Existing Transmission main portions to Huron St</p>
	<p>Low impacts for 2 minor water crossings Windermere Rd to Fanshawe Park Rd portion</p>	<p>Twinning Impacts are comparable for all portions but greater if the Medway or Sunningdale options are pursued in addition to Fanshawe/Adelaide</p>		
	<p>Moderate to High impacts for the Thames River and 1 minor water crossing, and the swamp areas N &amp; S of the river in the Huron St to Windermere Rd portion</p>			
	<p>Minimal impact if left undisturbed as is for monitoring/maintenance purposes. Moderate to High impacts would have to be assessed for repairs in the significant areas noted above</p>			
				
<p>Climate Change</p> <p>Resilience to extreme weather events (mitigation)</p> <p>Reducing the projects effect on climate change (adaptation)</p>	<p>Transmission main will be equally impacted by climate change trends such as extreme precipitation and heat</p>	<p>Transmission main will be equally impacted by climate change trends such as extreme precipitation and heat</p>	<p>Transmission main will be equally impacted by climate change trends such as extreme precipitation and heat</p>	<p>Transmission main will be equally impacted by climate change trends such as extreme precipitation and heat</p>
	<p>No carbon sequestration capacity reduction due little or no vegetation removal</p>	<p>No carbon sequestration capacity reduction due little or no vegetation removal as route is mostly within the existing ROW.</p>	<p>No carbon sequestration capacity reduction due little or no vegetation removal as route is mostly within the existing ROW.</p>	<p>Some carbon sequestration capacity reduction due vegetation removal as route passes through naturalized areas.</p>
				
<p><b>Natural Environment Summary</b></p>				

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







Legend	<p>Low Impact</p> 	<p>Low to Moderate Impact</p> 	<p>Moderate Impact</p> 	<p>Moderate to High Impact</p> 	<p>High Impact</p> 	<p>Most Preferred</p> 
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Table 7-3 Evaluation of Long-Term Twinning Alternatives

Technical Considerations	Water Quality Ability to maintain/reduce potable water turnover Storage Balancing	Low impact water turnover overall, moderate impact for Storage balancing overall for the existing transmission main portions	Moderate impact for water turnover for the Medway Rd/Adelaide St and Sunningdale Rd/Adelaide St portions Low impact for storage balancing for the Medway Rd/Adelaide St portion, Low to moderate impact for the Sunningdale Rd/Adelaide St portions Low to Moderate impact for water turnover and storage balancing for the Fanshawe Park Rd /Adelaide St/Regent St portions Twinning Impacts are comparable for all portions	Moderate impact for water turnover for the Medway Rd/ Richmond St and Fanshawe Park Rd /Richmond St portions Low to Moderate impact for storage balancing for the Medway Rd/ Richmond St and Fanshawe Park Rd /Richmond St portions Twinning Impacts are the same for each portion	Low to Moderate impact for water turnover for the Windermere Rd/Existing Transmission main portions to Huron St Moderate impact water turnover for the Richmond St/Huron St portions Low to Moderate impact for storage balancing for the Windermere Rd/Existing Transmission main portions to Huron St and the Richmond St/Huron St portions Twinning Impacts are comparable for all portions
Technical Considerations	Hydraulics Ability to mitigate high/low pressures Ability to mitigate high/low velocities and headloss	Low to Moderate impact for water pressure and velocities/head loss overall for the existing transmission main portions	Low impact for water pressure and velocities/head loss for the Medway Rd/Adelaide St portion Low to Moderate impacts for water pressure and velocities/head loss for the Sunningdale Rd/Adelaide St and Fanshawe Park Rd /Adelaide St/Regent St portions Twinning Impacts are least for the Medway Rd/Adelaide St portions	Low to Moderate impacts for water pressure and velocities/head loss for the Medway Rd/ Richmond St and Fanshawe Park Rd /Richmond St portions Twinning Impacts are comparable for each portion	Low to Moderate impacts for water pressure and velocities/head loss for the Windermere Rd/Existing Transmission main portions to Huron St and the Richmond St/Huron St portions Twinning Impacts are comparable for each portion

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 
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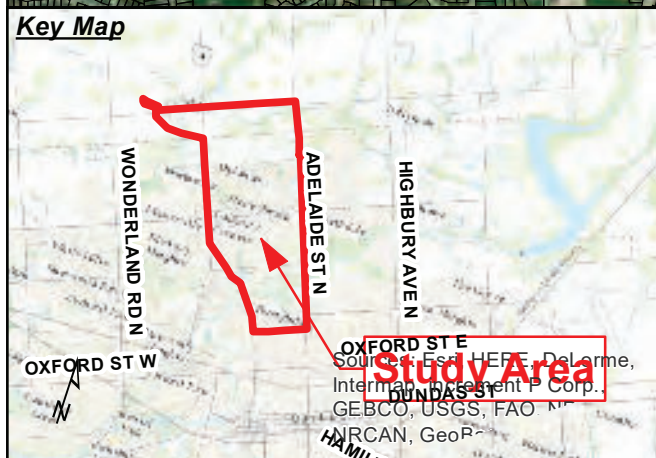
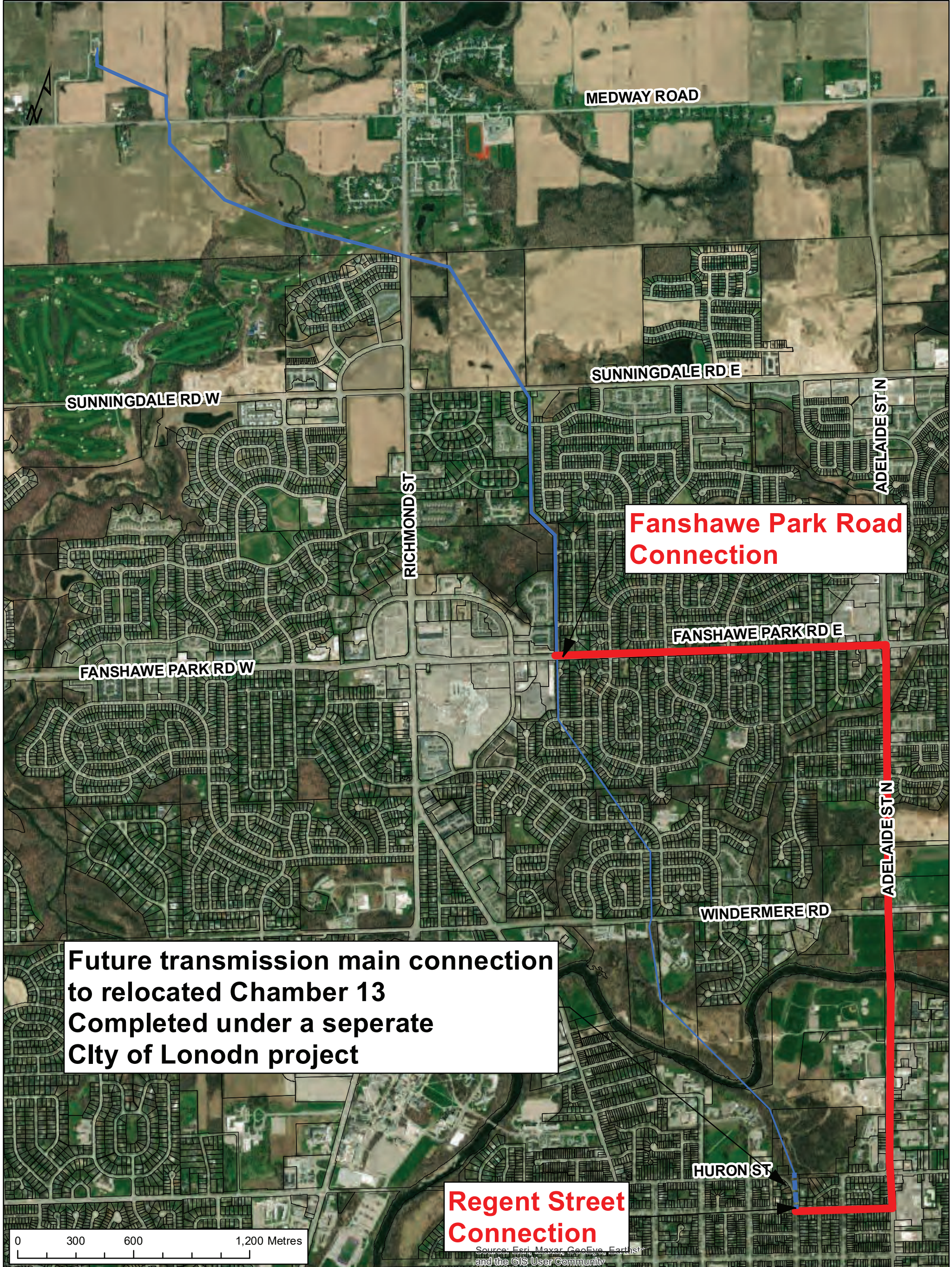
## 7.4 Preferred Long Term Twinning Alternative

Based on the criteria and methodology applied as part of the evaluation process, the preferred long-term twinning alternative is:

**Alternative 2: Twin the Transmission Main Along Adelaide Street** to add system capacity and redundancy with a connection to the existing transmission mains at Fanshawe Park Road and on Regent Street. (See Figure 7-2).

Although **Alternative 3A: Twin the Transmission Main Along Richmond Street directly to Windermere Rd** had the same overall score as **Alternative 2**, it only represented the north portions of the route comparisons. When the southern portion alternatives were considered under **Alternative 3B**, they scored less favourably vs. Alternative 2, hence it was chosen as the preferred alternative overall.

The preferred long-term alternative provides an opportunity for the City to add system capacity and redundancy and allow for eventual decommissioning of the existing water transmission main between Fanshawe Park Road and Huron Street in the future. See **Section 8** for the Long-Term Alternative project description and details.



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- Existing Transmission Main
- Alternative 2: Adelaide Street Twinning Routes
- Alternative 3A: Richmond Street North Twinning Routes
- Alternative 3B: Richmond Street South Twinning Routes

**Figure 7.2:**  
**Preferred Long-Term**  
**Alternative Solution**

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## 8. Recommended Alternatives Project Descriptions

This section of the report describes the proposed works involved with the preferred short- and long-term alternatives recommended as outlined below:

**Short Term Alternative 2 - Maintain Easements as is (minimum 15m or 50')** - Ensuring access is maintained for maintenance and repairs (no structures or obstructions are within the easement) without widening the easement except to the minimum 15m or 50', or where opportunities present themselves to safely widen the easement wherever possible with property owner and city consent.

**Long Term Alternative 2: Twin the Transmission Main Along Adelaide Street** to add system capacity and redundancy with a connection to the existing transmission mains at Fanshawe Park Road and on Regent Street. Although this is the recommended alternative for the purposes of this environmental assessment, connection points along Sunningdale Road or Medway Road may be reconsidered as part of future water system master planning to be completed by the City to better serve the City as a whole.

### 8.1 Short Term Works Description

Regular inspection and maintenance of the City's water transmission main chambers, valves and associated appurtenances and the transmission mains themselves are essential components of good transmission main management. The strategic closure of one or more transmission main valves in the event of a water transmission main failure is necessary to ensure an efficient response to stop the flow of water is where valve condition and operation becomes critical. Regular clearing of access routes to and the interior clearing of accumulated debris associated with easements and each chamber can improve response times during a failure. Routine inspection and maintenance of transmission mains and chambers are proactive measures to ensure peak performance and the level of service of the transmission main and its associated components.

Based on the condition of the existing transmission main, the asset management strategy for the water transmission mains included in **Appendix B.1** outlines the short-term monitoring actions that should be undertaken in the next 20 years. It is recommended that the City continue to/or implement the regular inspection and maintenance programs listed in **Table 8-1** Short Tern Asset Management Strategy, for the recommended short- term alternative.

**Table 8-1: Short Tern Asset Management Strategy**

Action	Frequency	Comment
Inspection and Maintenance of Valves and Chambers	Annual	Inspection and maintenance of valves and valve chambers is required to avoid impacts to the loss of physical integrity of the chamber and valves. This includes ensuring proper valve operation, replacing damaged valves, chamber cleaning where required, missing air vents, minor rehabilitation of chambers, etc. 100% of the valves and chambers should be inspected/maintained annually.

Action	Frequency	Comment
<b>Soil Sampling and Testing of ground near transmission mains, including coring into ground, sample collection, and laboratory testing.</b>	Every 15 Years	Reduced resistivity of soil is one of the contributing factors to increased deterioration of PCCP. Due to de-icing, chloride levels may elevate and would further decrease the resistivity levels. Therefore, understanding the soil characteristics on a frequent basis would provide additional insights for interventions.
<b>Test Pits to inspect the surface of the transmission main by excavating to the transmission main and inspecting the surface of the concrete pipe for signs of pitting, cracking or damage.</b>	Every 15 Years	Test pits would offer direct information about the condition of the pipe, depending on the type of examination. The evaluation of joints located within corrosive soils should be monitored at a certain frequency to understand the level of intervention required.
<b>Free-Swimming use long form for Electro Magnetic (EM) or (e.g. Pipe Diver) tools to inspect the inside of the transmission main for damage while the line is in service</b>	Every 15 Years	The City currently monitors the pipeline using Acoustic Fiber Optics (AFO) technology that provides an estimated location for wire breaks in the concrete piping. It is recommended to deploy a Free-Swimming EM (e.g. or Pipe Diver) tool to inspect, detect and quantify potential wire breaks inside the pipeline and provide a baseline of the state of the pipeline periodically.
<b>Repair of Joints</b>	Based on Assessment	Joints are mostly assessed based on the above internal or external examinations. The deterioration of joints is difficult to assess with EM technologies due to their configuration and joints in PCCP pipes do not include prestressing wires. The impact of soil envelope may also, increase the degradation level of joints.

The easement agreements for the existing water transmission mains entitle the City to the following rights on each property:

At any time and from time to time, to lay, install, construct, reconstruct, operate, maintain, open, inspect, repair and keep in good condition, remove, replace, relocate and supplement not more than one transmission main, including all accessories, equipment and appurtenances necessary or incidental thereto, any of which shall be located underground at a depth of not less than four feet below grade level, and valve chambers, vent pipes and marker posts on the surface and/or underground, the valve chambers to be located on that part of the said easement lying south of Fanshawe Park Road, and which said chambers shall not extend above the surface of the ground more than two feet nor have a surface area in excess of twenty-five square feet.

To keep the said lands, clear of brush, trees and other obstructions of any nature whatsoever as may be necessary to exercise and for the enjoyment of the said rights and easements.

To enter upon the said lands and pass and repass from time to time and at all times with the servants, agents, contractors, workmen of and other persons duly authorized by The Corporation of the City of London with all plant, machinery, material, vehicles and equipment as may be necessary for the purposes necessary or incidental to the exercise and for the enjoyment of the said rights and easements.

To erect such gates as the said Corporation may from time to time consider necessary.

**The owner of the property has the following right:**

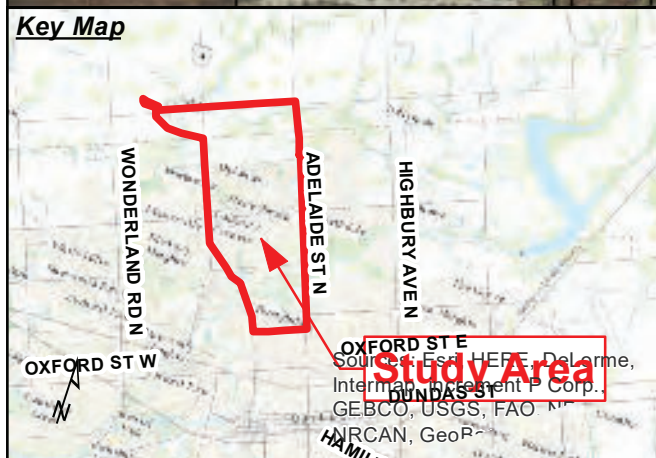
The owner of the said lands otherwise to have the right fully to use and enjoy the said lands except as may be necessary for the said rights and easements provided no person shall excavate, drill, install or erect thereon, any pit, well, foundation, pavement, building or other structure or installation without the consent in writing of the said Corporation.

Depending on the site conditions, access will be necessary to maintain valve chambers, and for monitoring and/or rapid repairs on piping, chambers, and other infrastructure along the transmission mains to prevent and/or in the event of a failure. This requirement will necessitate coordination with property owners to allow City crews and/or their representatives immediate access when required. It is recommended that the City issue notifications to property owners where the existing easements are in place to allow them time to make changes to their property to accommodate the City's needs and requirements per the easement rights. Three levels of notifications are recommended:

- 1- **Level 1 - Low risk:** For property owners with a low risk designation, a notice should be sent advising property owners that City owned infrastructure is located on their property, that is not critical at this stage but may require the City to inspect or access, if required. The notice should also recommend changes to properties as per the easement agreement requirements to facilitate access to City owned infrastructure, within reason. Low level risk means that a potential failure of the main on the property would likely cause minimal damage. These sites also provide rapid access to City crews for repairs or inspections. Refer to **Figures 8-1 to 8-4** for locations of Level 1 properties within the existing easement. An example of Level 1 properties include a property with no valve chambers, non-fenced areas with little to no obstacles within the City's easement, infrastructure on City owned land, or property that the City's crews can access immediately with minimal obstacle removal to monitor, maintain and/or excavate and repair damaged transmission mains. The City is not obligated to repair or compensate owners for any damages caused by removing any obstacles within the City's easement.
- 2- **Level 2 - Medium risk:** For property owners with a medium risk designation, a notice should be sent advising property owners that City owned infrastructure is located on their properties, that are important for the City to have access to for monitoring, inspections and/or repairs. The notice should advise property owners to relocate or remove obstacles to facilitate access to City owned infrastructure as per the easement agreement requirements. The letter would include a warning that damage to property may occur if City infrastructure malfunctions and requires immediate repair, and if repairs and emergency work are required, the City has the right to remove obstacles to repair infrastructure. The City is not obligated to repair or compensate owners for obstacle removals in violation of the easement agreement requirements. Refer to **Figures 8-1 to 8-4** for locations of Medium risk or Level 2 properties. An example of a Level 2 property is one that has an air valve chamber on it with access required for City crews to inspect or repair.
- 3- **Level 3 - High risk:** For property owners with a high-risk designation, a notice should be sent advising property owners that City owned infrastructure is located on their properties, that are critical for the City to have access to for routine monitoring, inspections and/or repairs. The notice should be sent to require homeowners to make immediate changes to their properties to facilitate access to high risk infrastructure, such as major drain chambers or air valve chambers as per the easement agreement requirements. The letter should include a warning with a deadline to comply with the required changes. If repairs and emergency work is required, the City has the right to remove obstacles to repair or replace infrastructure. The City is not obligated to repair or compensate owners for any damages caused by obstacle removals in violation of the easement agreement requirements. Refer to **Figures 8-1 to 8-4** for locations of Level 3 properties. An example of a Level 3 property includes properties with critical valve chambers that require regular maintenance and inspections to ensure the valves are operating adequately.

Following any repairs, the City will reinstate areas to previous condition or better, minus any manmade or natural obstacles within the City's easement in violation of the easement agreement requirements. Any obstacle outside the easements where the City required its removal to facilitate access or repairs, would be repaired, replaced or compensated for to the owner. **See Appendix C.1** for the Short-Term Conceptual Design Memo **Figures 8-5 to 8-9** in **Appendix C.1** provide mapping to support the tables in the memo.

Should development occur on any properties with an existing easement, the City can/will use the development application process to increase the easement width as necessary.



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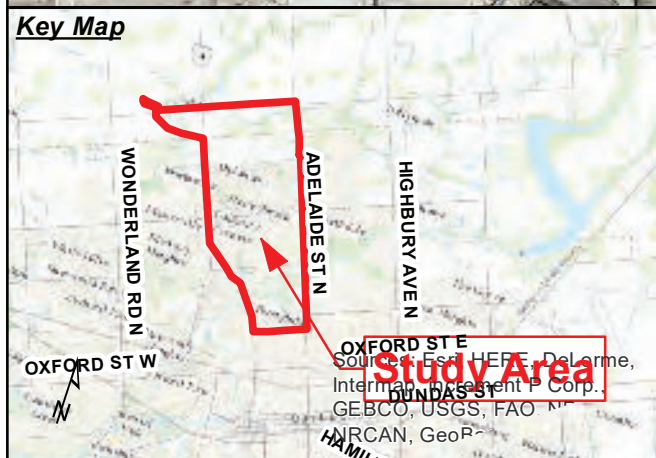
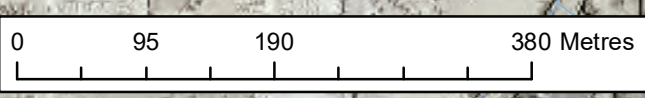
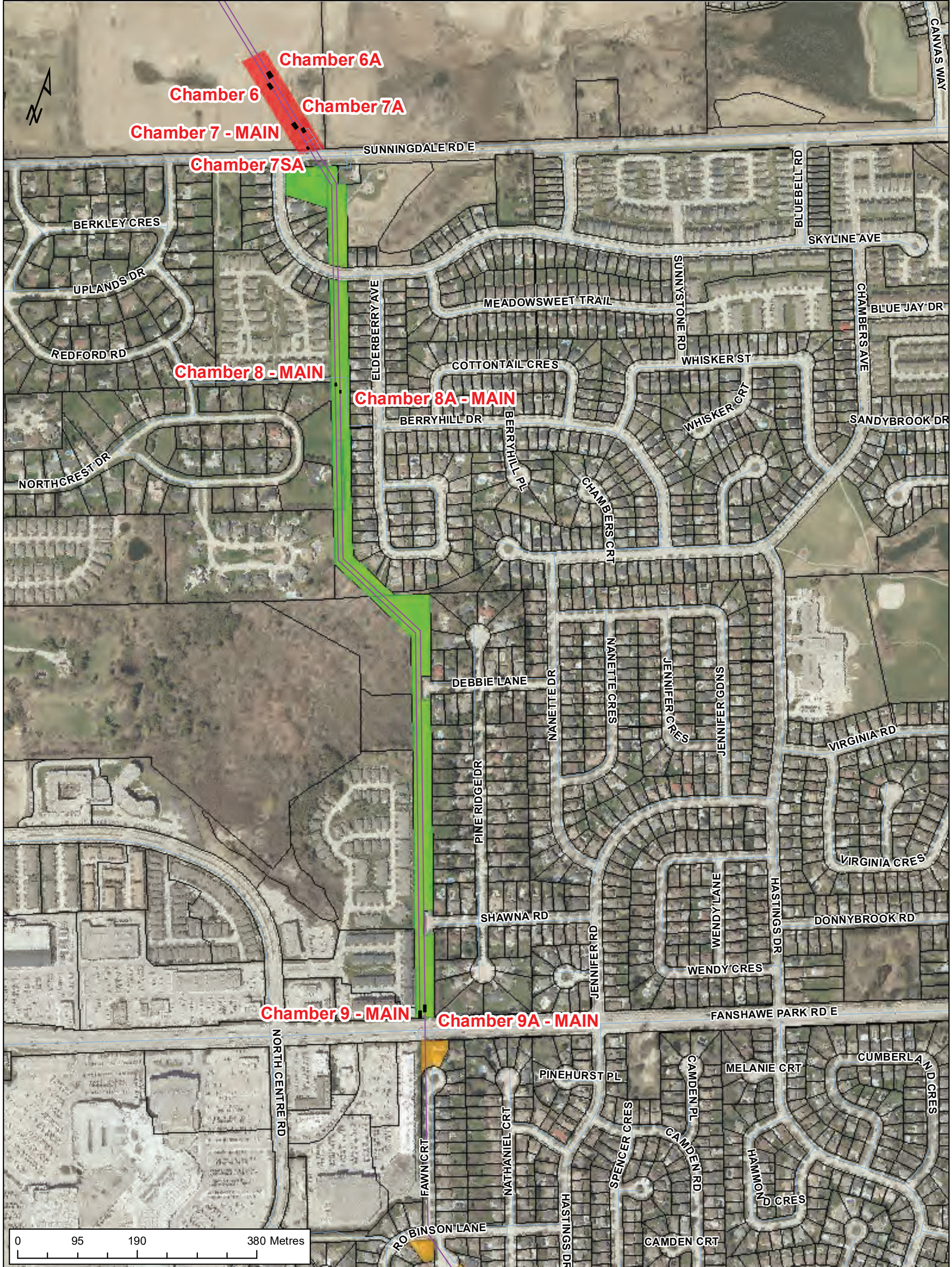
- Existing Transmission Main
- Existing Valve Chambers
- High Risk Area
- Medium Risk Area
- Existing Watermains
- Low Risk Area

**Figure 8.1:**  
**Short Term Design Concepts**  
**Arva PS to Sunningdale Road**

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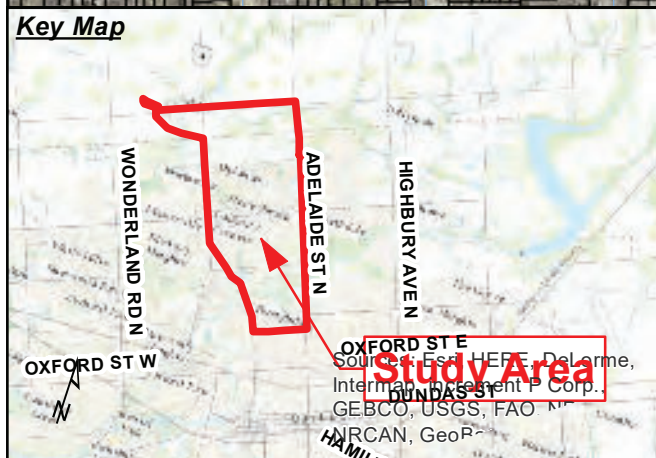
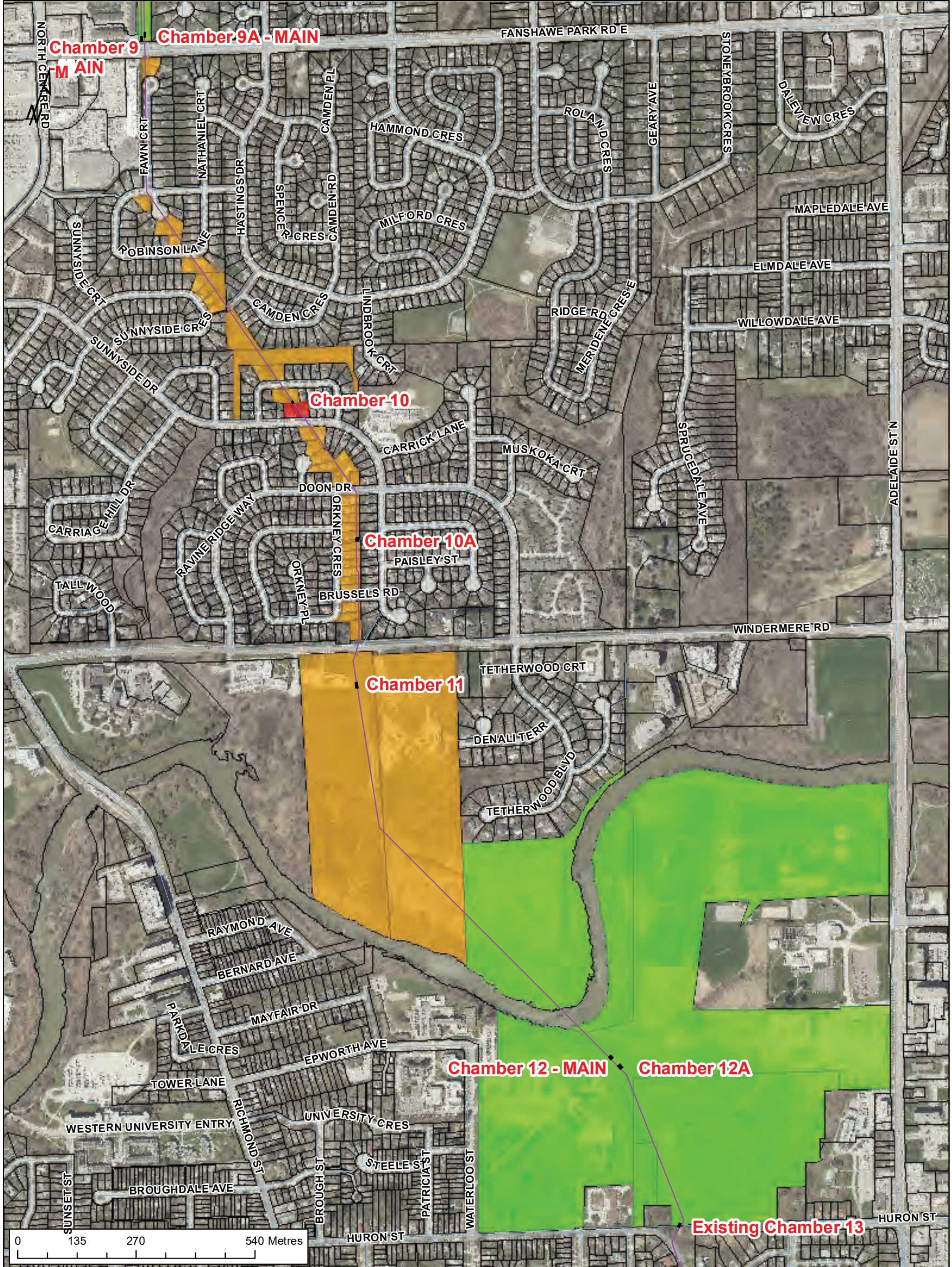


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**Water Transmission Main**  
**Municipal Class Environmental Assessment**  
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**Figure 8.2: Short Term Design Concepts Sunningdale Road to Fanshawe Park Road**  
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Legend	
	Existing Valve Chambers
	High Risk Area
	Medium Risk Area
	Low Risk Area
	Existing Transmission Main
	Existing Watermains

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Arva Pump Station to Huron Street  
Water Transmission Main  
Municipal Class Environmental Assessment  
Master Plan**

**Legend**

- Existing Transmission Main
- Existing Watermains
- Existing Valve Chambers
- High Risk Area
- Medium Risk Area
- Low Risk Area

**Figure 8.3: Short Term Design Concepts Fanshawe Park Road to Huron Street**

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## 8.1.1 Short Term Cost Estimate

Based on the above recommendations and the details provided in **Appendix C.1, Table 8-2** provides an estimate to complete all maintenance, monitoring and upgrade works from the year 2021 to 2040 (20-year period). The estimated costs do not include removals or relocations of privately owned obstacles within the City's easement, but include the costs for removing mature trees, clearing bushes, and installing gates and removable fence sections on private properties where appropriate. For ongoing maintenance and inspection work, a 2% yearly inflation rate was used along with the 2020 costs for maintenance, inspections and replacements presented in the Asset Management Strategy include in **Appendix B.1**.

**Table 8-2: Capital & O&M costs for 20 years from 2021 to 2040**

Item	Year 2021 Costs	Year 2022 to 2040 Costs
<b>Clearing of bushes and trees (including stumps and roots) <sup>1</sup></b>	\$ 200,000	\$ 580,000
<b>Removable bollards or barricade for Chambers 9 and 9A</b>	\$ 2,500	\$ 0,000
<b>Inspection and Maintenance of Valves and Chambers</b>	\$ 62,500	\$ 1,460,000
<b>New Chamber 10 <sup>2</sup></b>	\$0.00	\$170,000
<b>Replacing Valves <sup>3</sup></b>	\$ 40,000	\$ 940,000
<b>Soil Sampling and Testing <sup>4</sup></b>	\$ 0.00	\$ 20,000
<b>Test Pits <sup>5</sup></b>	\$ 127,500	\$ 170,000
<b>Free-Swimming EM <sup>6</sup></b>	\$ 0.00	\$ 2,120,000
<b>Joints Repairs <sup>7</sup></b>	\$ 100,000	\$2,330,000
<b>Subtotal</b>	\$ 532,500	\$ 7,590,000
<b>Contingency (25%)</b>	\$ 133,125	\$ 1,900,000
<b>TOTAL (Rounded)</b>	<b>\$ 700,000</b>	<b>\$ 9,700,000</b>

- 1- Assumed Value.
- 2- Abandon existing chamber 10, remove access, concrete encase piping, and install new chamber 10 on Shetland or Sunnyside St in year 2025.
- 3- Assume replacing 1 valve per year. Valves range in size from 150mm air release and butterfly valves to 600mm main drain gate valves. Costs range from \$10,000 to \$100,000 for full replacement of the valves including valve costs, removal of old valve(s), installation of new valve(s), testing, and commissioning. An average cost of \$40,000 was used in the calculations to replace each valve; however, costs will be based on actual valve condition, location, access, valve type, and replacement value at the time of replacement. Costs do not include costs to replace or modify the chamber itself.
- 4- No sampling is required in year 2021 as samples were taken in 2020. Assume 10 soil samples are tested in year 15. Cost of each sample is based on the year 2020 cost of \$1,200 per soil sample as stated in the Asset Management Report included in **Appendix B.1**.
- 5- Assume 5 test pits are to be completed in years 2021 and 2036, using the year 2020 cost of \$25,000 per test pit as stated in the Asset Management Report included in **Appendix B.1**.
- 6- Assume testing both twin mains for the full length from Arva PS to Chamber 13 – (12.3Km at \$60/km + \$100,000 fee) in years 2023 and 2038 as stated in the Asset Management Report in **Appendix B.1** for the year 2020 costs.
- 7- Assume repairing 2 joints per year, at \$40,000 to \$50,000 per joint repair. Costs include the cost to excavate to the damaged joint, drain the pipeline, access inside the main, remove corroded materials, welding by a specialty welder, grouting, testing, and reinstating area and surface to previous condition (green field to paved roads).

**Total costs for upgrades, inspections, maintenance, and repairs over a 20-year period is approximately \$10,400,000.**

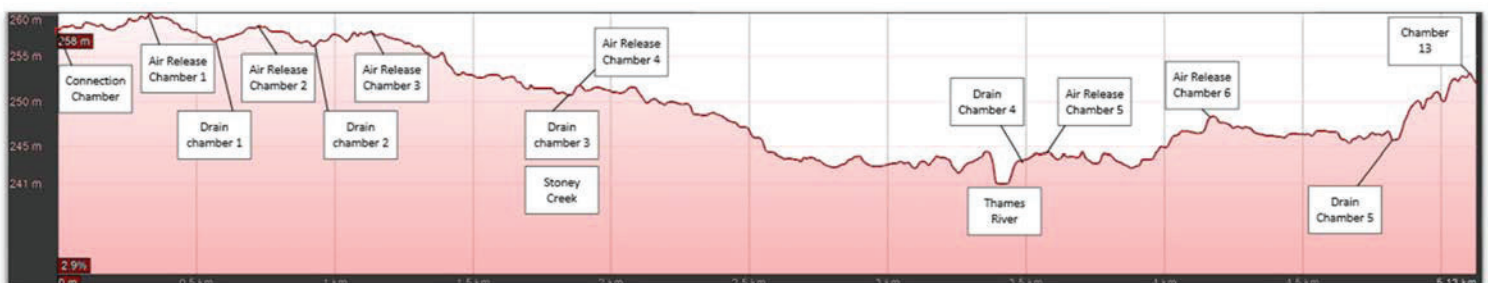
## 8.2 Long Term Works Description

Alternative 2, twinning along Adelaide Street of a single transmission main or two at the same time 1050mm dia. , connecting to the existing transmission mains via Fanshawe Park Road and Regent Street, was identified as the preferred Long Term alternative to service future growth and/or provide water system redundancy. Future modeling and master planning for the City as a whole to better serve Northeast London may modify or add connection points to one of the other options on Medway Road or Sunningdale Road. (See Figure 8-5).

For the Adelaide Street preferred option, single or twinned transmission main construction would be within existing roadway right-of-way's (ROW) on roadway portions for the most part, with some sections in boulevard areas wherever possible along the preferred route. Existing utilities on Fanshawe Park Road, Adelaide Street and Regent Street including water, sanitary and storm were evaluated to identify a transmission main route that limits disruption to existing utilities, reduces bends and abrupt change sin direction, and limits the need to purchase or obtain additional land or easements outside of City owned property. Other shallow utilities such as gas and communication lines were only evaluated where available and may affect the final location and/or construction methods. This should be confirmed as part of preliminary/detailed design for the project.

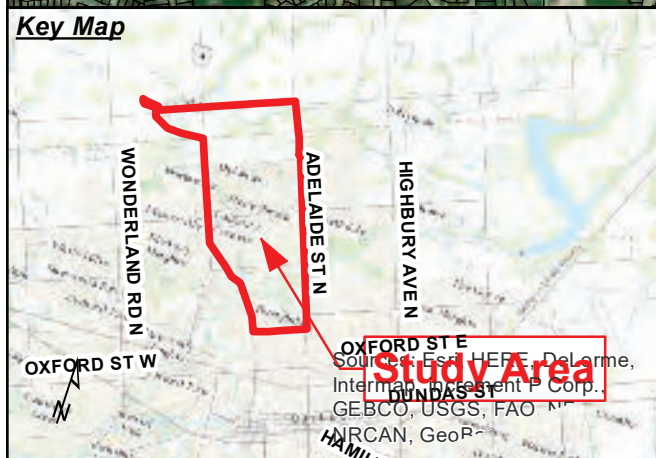
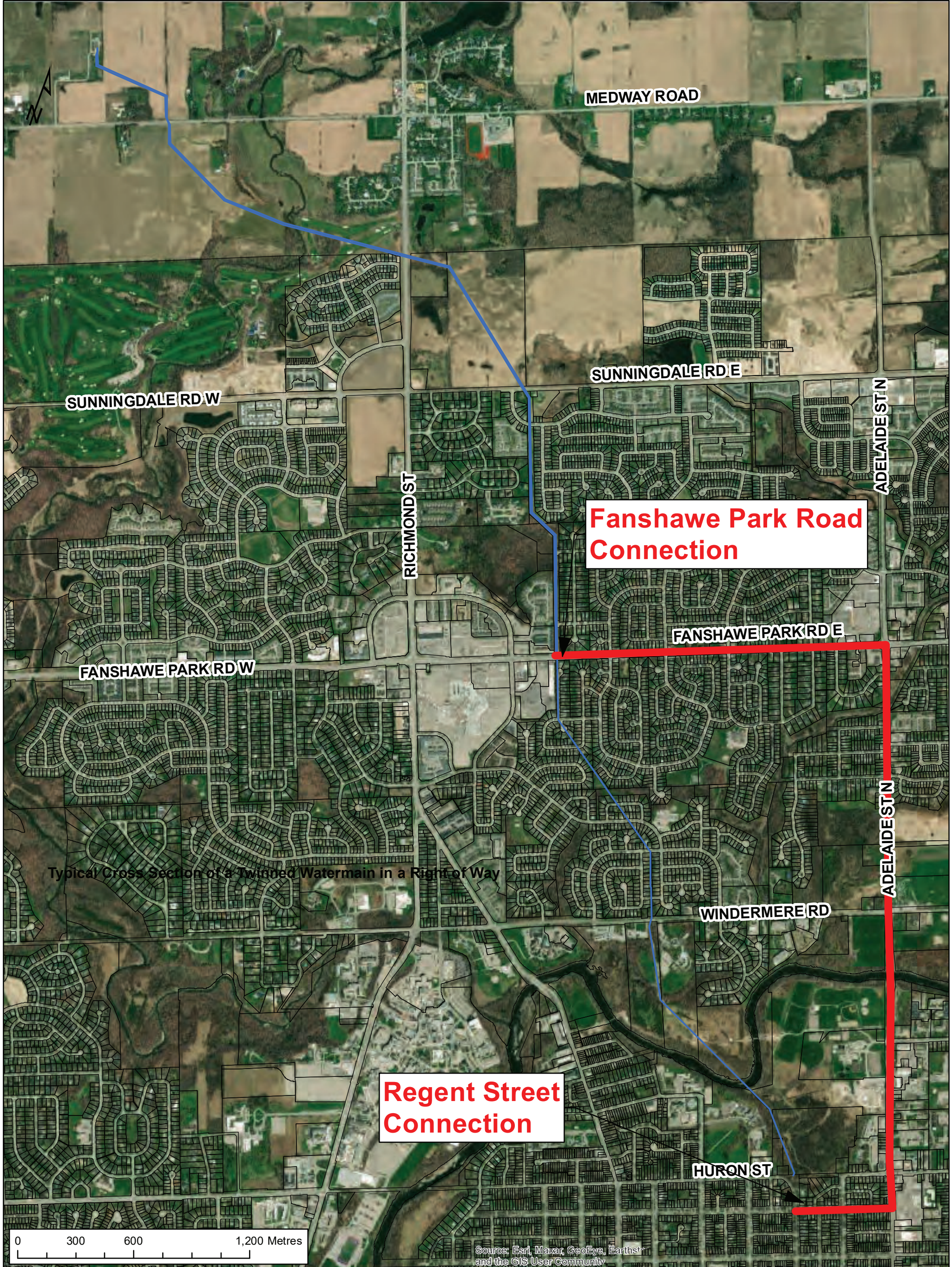
**Figure 8-4** illustrates the profile for the proposed transmission mains from the Fanshawe Park Road connection to the new Chamber 13 on Regent Street at Maitland Street. There are several high and low points along the route including two water crossings and several road crossings that may require air and drain valve chambers to accommodate elevation changes associated with deeper installation methods.

**Figure 8-4: Transmission Main Proposed Profile and Chamber Locations**



Since the proposed transmission main and future twinning will be within existing roadway right of ways and developed areas of the City, the work should be initiated when several factors occur including:

- 1- Changing condition of the existing transmission main. This will expedite or delay the start of the upgrades. If the single main between Fanshawe Park Road and Windermere Road starts to show increasing signs of deterioration, such as increased wire break reports, and more unscheduled repair work before the anticipated lifespan of the PCCP is reached, then it may be necessary to accelerate the twinning schedule, or start installing portions of the transmission main before the theoretical end of life of the PCCP is reached.
- 2- Road work and repairs: The reconstruction of roadways in the City is a major undertaking and usually accompanies other infrastructure upgrades and modifications such as rerouting or replacing underground utilities, new concrete curbs, new storm catch basins, and storm and sanitary sewer and manholes upgrades. When certain road portions along the proposed transmission main route are scheduled to be replaced along with major underground utilities work, it is recommended to evaluate the opportunity to install portions of this new transmission main(s) then, or at least rearrange the utilities to take into consideration the location of the proposed main(s) in that portion of the roadway, to allow for future installation of the main(s)
- 3- Requirements for urban development. In certain areas along the transmission main, undeveloped lands may be developed in the future, and servicing these new developments will require utility and road works to be



**City of London  
Arva Pump Station to Huron Street  
Water Transmission Main  
Municipal Class Environmental Assessment  
Master Plan**

**Legend**

- Existing Transmission Main
- Recommended Alternative 2: Adelaide Street Twinning Routes
- - - Potential Future Connections

**Figure 8.5:  
Long-Term Design Concept**

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completed. The City will have an opportunity to install portions of the transmission main(s) near these developments when service connections are added. The City may also have an opportunity to acquire new easements for the transmission main(s) and reduce portions under roadways through development application plan dedication.

- 4- Capital Costs. The cost to twin the transmission main for Alternative 2 is high and constructing the work in several phases over many years may be necessary to reduce the financial burden to the City, and to reduce traffic congestion and long road closures along major roadway corridors. The following phasing strategy is suggested and can be modified in the future during preliminary/detailed design:

Phase 1 – Within 0-5 years: The new relocated Chamber 13 will be installed on Maitland Street at Regent Street. Capped stubs 1050 mm dia. are recommended to be installed at this time as part of the Chamber 13 relocation project, and a corridor for future piping 1050 mm dia. be identified and confirmed on Regent Street for the future twin mains.

Phase 2 – Within 5-15 years: It is recommended that portions of the transmission main be installed when 20 to 30% of the life expectancy of the existing PCCP is remaining, or when an opportunity or a requirement to upgrade portions of the roadways along the route is required. The Fanshawe Park Road portion of the work is considered critical as it requires major interconnections to the existing transmission main(s). Having this connection ready, and most of the transmission main on Fanshawe Park Road to Adelaide Street in place would facilitate rapid installation of the transmission main when required on Adelaide Street. Fanshawe Park Road is in relatively good condition and does not require reconstruction for 10 to 15 years.

Phase 3 – Within 15-25 years: All major roadway and watercourse crossings are on the north to south portion of the transmission main(s) on Adelaide Street. It is preferred that all works on Adelaide Street be completed in one phase to reduce multiple closures of the roadway in the future. Adelaide Street is also relatively new, and reconstruction of the roadway is not required for 15-25 years. At this time all remaining mains on Regent Street would be installed to complete the connection from the Arva Pumping Station to Chamber 13.

Appendix C.2 provides further details of the Long-Term alternative which should be referred to.

## 8.2.1 Long Term Cost Estimate

Table 8-3 presents a summary of estimated costs for placing the transmission main(s) along Adelaide Street with connections on Fanshawe Park Road and Regent Street. Costs include the costs for new single or twinned portions (in the same trench), of a 1,050mm main(s) installed via the open cut method, and some sections by trenchless methods at the Thames River and Stoney Creek crossings. At this stage of the review, it is assumed that the remaining transmission main construction work will be completed using open cut construction methods. However, this should be verified during preliminary/detailed design. The costs also include the supply and installation of air and drain chambers, interconnecting chambers to connect to the existing transmission main(s), pavement and surface restoration, engineering, and an estimating contingency of 25%. These costs do not include taxes, or the costs to purchase additional lands or easements if required. All costs are in 2020 dollars.

**Table 8-3: Summary of Estimated Long-Term Alternative Costs**

Alternative	Single Line	Twinned Lines
Alternative 2 – Option C: Connection on Fanshawe Park Road	\$ 20,000,000	\$ 32,000,000

(See Appendix C.2 for the cost breakdown).

The City may want to consider connecting to the existing main(s) at other locations in the future based on changes in demands in the northeast portion of the City or if other factors render the connection on Fanshawe Park Road less

desirable. The costs to connect via Medway Road is estimated at \$34 and \$53 Million for single and twinned mains respectively. The costs to connect via Sunningdale Road is estimated at \$25 and \$40 Million for single and twin mains respectively.

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## 9. Recommended Mitigation Measures / Monitoring

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Implementation of the recommended Short-term and Long-Term alternatives has the potential to create positive and negative effects. The avoidance of negative effects has been a key consideration throughout Phases 1 and 2 of the EA process and have been discussed with agencies, stakeholders, and the public.

Effects can be generally divided into two (2) main categories: construction-related effects (which are temporary in nature), and effects related to ongoing operation and maintenance of the short-term and/or long-term works (effects that are permanent). Negative effects caused by the short-term and/or long-term works are avoided to the extent possible; however, in cases where negative effects cannot be fully avoided, mitigation measures will be required during construction, and/or for ongoing operation and maintenance of each. It is recommended that the City of London adopt a formal by-law to protect all infrastructure within the easement from any future development near the easement. All future construction shall be outside the easement where possible, and to a minimum, a 3 meter offset from the outside of the pipeline(s) on either side shall be implemented to allow for sufficient room for the City's construction equipment to access the infrastructure within the easement.

### 9.1 Design and/or Construction Activities

The purpose of this section is to detail the recommended mitigation measures and necessary monitoring activities recommended as the project moves into detailed design and construction.

#### Natural Environment

##### *Preferred Short-Term Alternative:*

Where proposed activities associated with the preferred short-term alternative (see **Table 8-1**) are required within or immediately adjacent to natural heritage features, a qualified Ecologist should be retained to complete a pre-clearance survey to identify potential impacts to significant/sensitive species or habitat.

Where feasible, vegetation removal required for maintenance/repair activities should occur outside of sensitive timing windows including the breeding bird nesting and bat roosting season (**April 1<sup>st</sup> to August 31<sup>st</sup> ; March 21<sup>st</sup> to August 31<sup>st</sup>**); where vegetation removal is required within this window, a qualified ecologist should be retained to complete a pre-clearance survey and provide advisory services on additional mitigation measures.

Where tree removal is required to perform maintenance/repair activities, a Certified Arborist should be retained and consulted with prior to removals.

For works within or adjacent to natural heritage features, Tree Protection Fencing should be installed prior to maintenance/repair activities to further protect natural heritage features and trees from potential damage as a result of vehicle and machine use.

Where maintenance/repair activities are required adjacent to water features, sediment and erosion fencing should be installed prior to works to avoid sedimentation by vehicular/machinery use.

Permits and/or approvals for the short-term activities are not anticipated at this time; should proposed activities occur within or adjacent natural heritage features, a qualified biologist should be consulted to determine any applicable permitting/approval requirements.

*Preferred Long-Term Alternative:*

Design and construction mitigation measures should be outlined within an Environment Impact Study (EIS) for the preferred long-term alternative as part of later design activities; The tasks required to complete this study should be scoped through consultation with the UTRCA and City of London's Long-term Planning and Sustainability department.

Design mitigation measures should include avoidance of natural heritage features to the extent possible. The EIS should summarize impacts to significant and/or sensitive features and wildlife and further identify any permitting requirements under relevant provincial and federal legislation (see Section 9.2 below); Construction mitigation measures should be outlined within the EIS and may include restricting activities within sensitive timing windows for local and sensitive fauna; recommendations for any applicable wildlife exclusionary measures as well as appropriate sediment and erosion control measures; A Tree Inventory and Arborist Report should be completed to outlined removals and tree protection measures.

A Construction Mitigation and Monitoring Plan (CMMP) should be developed prior to the initiation of construction and should include a detailed Species at Risk (SAR) and Wildlife Handling Protocol, an Invasive Plant Management Plan (if found applicable through EIS recommendations) as well as the Clean Equipment Protocol for Industry (Halloran *et al.*, 2013). The CMMP should also outline the level of effort for environmental construction monitoring based on the level of potential impacts to adjacent natural heritage features; A detailed Restoration Plan utilizing native plantings and native seed mixes following City specifications should be developed and implemented.

Potential permits/approvals for the preferred long-term alternative are outlined in **Section 9.2**.

### **Socio Economic**

A traffic management plan is to be developed to minimize disruption during construction; and Access to existing properties, businesses, institutions and commercial areas are to be maintained during and after construction.

### **Archaeology**

The completion of a Stage 2 Archaeological Assessment is to be undertaken during detailed design for the preferred long-term twinning alternative route;

The completion of a Stage 3 Archaeological Assessment is to be undertaken during detailed design if required by the Stage 2 Archaeological Assessment;

Chippewas of the Thames First Nation and Oneida Nation of the Thames will be invited on any future Stage 2, 3 or 4 Archaeological Assessment activities undertaken during detailed design; and

No impacts to existing archaeological resources are to occur.

### **Built Heritage Resources and Cultural Heritage Landscapes**

*Preferred Short-Term Alternative:*

Where temporary landscape disturbance may occur due to water transmission main maintenance and/or redundancy, restore landscape features associated with CHR 1, CHR 2, CHR 3, CHR 4, CHR 5, CHR 9, CHR 11, and CHR 14 (**See Appendix B.3**) to pre-construction conditions through post-construction landscape treatments to ensure there are no negative impacts to the properties. If the disturbance is substantial, a Qualified Person should be retained to conduct a pre-repair conditions assessment and restore the landscape to pre-repair conditions

#### Preferred Long-Term Alternative:

Complete a Cultural Heritage Report: Existing Conditions and Preliminary Impact Assessment for the Preferred Long-term Alternative. Complete any subsequent work as a result of the Cultural Heritage Report (CHERs and/or HIAs if required) as early as possible during detailed design and prior to any final design being endorsed.

Should project activities require demolition or removal (in its entirety or partial) of any identified (known or potential) built heritage resource/cultural heritage landscape, a heritage impact assessment shall be undertaken by a qualified person in consultation with a City of London heritage planner. All technical cultural heritage studies should be undertaken as early as possible during detailed design and prior to any final design being endorsed.

All technical cultural heritage studies should be submitted to the City of London Heritage planner and MHSTCI for review and comment.

## 9.2 Permits and Approvals

### 9.2.1 Upper Thames River Conservation Authority (UTRCA)

In accordance with O.Reg 157/06, a Development Interference with Wetlands and Alteration to Watercourses and Shoreline Regulation permit (Section 28) will be required from UTRCA prior to construction within the regulated area. The completion of an EIS for the long-term alternative in support of a Section 29 permit is likely required during design and should be scoped with the UTRCA and the City of London.

### 9.2.2 Ministry of Environment, Conservation and Parks (MECP)

In addition to Species at Risk (SAR) identified through field investigations (i.e., Barn Swallow), several SAR (i.e., fish, mussels, turtles, etc.), were also identified through background review within the Thames River. Should impacts to SAR or SAR habitat be identified through detailed design, an authorization and/or permit may be required if impacts cannot be mitigated. MECP should be consulted to determine any potential permitting/authorization requirements during detailed design. All required permitting/authorizations should be obtained prior to the initiation of construction.

### 9.2.3 Ministry of Natural Resources & Forestry (MNRF)

Should in-water works be required, the Ministry of Natural Resources and Forestry (MNRF) should be consulted to confirm in-water window timing restrictions. During detailed design, implications with respect to the Public Lands Act should also be assessed.

### 9.2.4 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.

## 9.2.5 Species at Risk Act (SARA)

Several federally ranked species with candidate and confirmed habitats, listed on Schedule 1 of the *Species at Risk Act* (SARA) were identified as potentially occurring within the Study Area. These species are afforded protection under Section 32(1) and Section 33 of the SARA, which prohibits the killing, harming, harassment, capture or taking of these individuals as well as the damage or destruction of the residence of these individuals respectively. Should impacts to SARA be identified through a review of the detailed design, the DFO and Environment Canada should be consulted to determine permitting/approval requirements.

## 9.2.6 Ministry of Heritage, Sport, Tourism, and Culture Industries

The review and entry of the stage 1 archeological Assessment into the Ontario Public Register of Archaeological Reports and any further required archeological assessment (e.g. Stage 2,3,4) is required. Archeological concerns have not been addressed until reports have been entered into the Ontario Public Register of Archaeological Reports and;

1. the archeological assessment of the project area is complete;
2. all archeological sites identified by the assessment are either of no further cultural heritage value or interest (as per Section 48(3) of the Ontario Heritage Act) or that mitigation of impacts has been accomplished through an avoidance and protection strategy; and
3. MHSTCI's letter indicating that archeological assessment reports (e.g. Stage 1-4) has been entered into the Ontario Public Register of Archaeological Reports.

## 9.2.7 Canadian Navigable Waters Act

The Long-term design concept will require the transmission main to cross the North Branch of the Thames River, which should be considered navigable. The Canadian Navigable Waters Act (the act) should be reviewed during detailed design to identify any permitting, construction or mitigation requirements stipulated by the act.

## 9.3 Construction Mitigation

Based on the Long-term twinning route design concept, it is recognized that transmission main(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 9-1** provides assessments of the potential impacts associated with the project and the recommended mitigative measures required to reduce these effects.



**Table 9-1: 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. Once finalized the Erosion and Sediment Control Plan must be submitted to MECP for Review. A dust suppressant (non-chloride) can be applied to areas of exposed soils to reduce or eliminate dust generation during construction. Water adjacent vegetation when dust accumulation occurs.
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
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 <i>et al.</i> 2013)
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
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.
Invasive Species	Consideration should be given to the London Invasive Plant Management Strategy (City of London 2017) and the Clean Equipment Protocol for Industry (Halloran <i>et al.</i> 2013) during construction activities. A Management Plan for common reed, common buckthorn, glossy buckthorn and other invasive species should be developed for the construction phase of the Project
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 MNR.
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.

Potential Impact	Mitigation /Compensation or Enhancement Measure
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 <i>Phragmites</i> should be considered for the post-construction phase of the Project.
Species at Risk	To be determined through the completion of an EIS for the long-term alternative and consultation with relevant authorities (i.e., MECP, DFO and Environment Canada) where applicable.
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. Milkweed should be incorporated into native seed mixes to provide a net benefit to Monarch. Identify and control invasive plant species (common reed, buckthorn spp. etc.) where encountered.
Damage to Adjacent Natural Features	Root pruning of adjacent trees during grading and excavation; Installation of tree protection or feature protection fencing.
Change in Water Balance or Alteration of Fish Habitat	Dense vegetation can be planted in roadside ditches or flow regulating structures installed at discharge points of roadside conveyance to dissipate flow energy before runoff enters nearby watercourses. Limiting vegetation clearing or other disturbance near water. Should near-water works be required, a Request for Review submission to DFO is recommended to identify additional mitigation measures.
Archaeological Resources	If archaeological resources are impacted by EA project work, notify MHSTCI at archaeology@ontario.ca. All activities impacting archaeological resources must cease immediately, and a licensed archaeologist is required to carry out an archaeological assessment in accordance with the Ontario Heritage Act and the Standards and Guidelines for Consultant Archaeologists.  If human remains are encountered, all activities must cease immediately and the local police as well as the Registrar, Burials of the Ministry of Government and Consumer Services (416-326-8800) must be contacted. In situations where human remains are associated with archaeological resources, MHSTCI should also be notified to ensure that the site is not subject to unlicensed alterations which would be a contravention of the Ontario Heritage Act.
Built Heritage Resources and Cultural Heritage Landscapes	Where possible design to avoid property impacts. Complete a Cultural Heritage Report: Existing Conditions and Preliminary Impact Assessment for the Preferred Long-term Alternative. Complete any subsequent work as a result of the Cultural Heritage Report (CHERs and/or HIAs if required) as early as possible during detailed design and prior to any final design being endorsed.  Should Project activities require demolition or removal (in its entirety or partial) of any identified (known or potential) built heritage resource/cultural heritage landscape, a heritage impact assessment shall be undertaken by a qualified person in consultation with a City of London heritage planner. All technical cultural heritage studies should be undertaken as early as possible during detailed design and prior to any final design being endorsed.

## 9.4 Climate Change

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. As mentioned in **Section 2.2.2** the City of London declared a climate change emergency on April 23<sup>rd</sup>, 2019.

### 9.4.1 Potential Construction Effects

The planning and design of City infrastructure should take into consideration key factors and climate change trends, such as building to withstand extreme precipitation and extreme heat. These climate events will impact the physical infrastructure in place.

During construction, the proposed twinned transmission main should be as climate ready as possible. Potential effects to consider include the greenhouse gas (GHG) emissions associated with the construction period including the physical machinery and equipment, travel distance and time for construction workers to get to and from the site, and the sourcing of building materials.

Loss of trees (reduced carbon storage) related to construction in built up areas should be addressed by tree replacement (minimum 3:1 ratio or the City Standard).

Should the construction of the twinned water main result in an increased impervious surface, LIDs and appropriate stormwater capacity should be considered to mitigate additional runoff due to climate change and the likelihood of extreme precipitation.

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## 10. Summary

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The Project File Report outlines the process required to ensure that the proposed short- and long-term 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/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 9**. The proposed mitigation measures will further be developed at detailed design and will form commitments that will be adhered to by the City. 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 City can start the detailed design and permitting-approvals phase and proceed to construction as outlined in the Project File Report.

