



ENVIRONMENTAL STUDY REPORT

**Adelaide Street North Municipal Class Environmental
Assessment Study**

August 2023

Prepared For: The Corporation of the City of London

Executive Summary

The City of London Transportation Master Plan (TMP) identified the improvements to Adelaide Street North and Sunningdale Road East (west of Adelaide Street North) corridors including new active transportation facilities and increasing the number of travel lanes from two to four. The corridor widening will be subject to the Mobility Master Plan and Development Charges Study. Based on the City's 2019 Development Charges Background Study and 2021 Development Charges Background Study Update, the widening of Adelaide Street North is expected to commence in 2029 and the widening of Sunningdale Road East in 2025 (from Adelaide to Bluebell). Accordingly, the City of London undertook a "Schedule C" Municipal Class Environment Assessment (Class EA) in order to address capacity and operational improvements on Adelaide Street North and to gain the required environmental assessment approval as a necessary first step towards implementation. The Schedule 'C' Class EA for this project completes Phases 1 to 4 to identify the problem or opportunity, identify alternative solutions, examine alternative design concepts for implementing the preferred solution and the preparation of an Environmental Study Report (ESR). An Environmental Study Report was previously prepared for Sunningdale Road East in May 2013.

In order to determine the need and extent of the capacity and operational improvements required for the Adelaide Street North corridor, a transportation and traffic analysis study was undertaken to assess current and future traffic demands. Under the existing (2018) traffic conditions, the section of Adelaide Street North, between Phillbrook Drive / Grenfell Drive & The Home Depot Plaza Entrance, is over capacity for the southbound direction during the AM peak hour. During the PM peak hour, this section is over capacity in the northbound direction. Respectively, some sections along Adelaide Street North are approaching capacity in the southbound direction during the AM peak hour and northbound traffic during the PM peak hour. Based on the future (2029 and 2039) traffic analysis completed, results indicate that additional through lanes are required for the Adelaide Street North corridor in order to accommodate future traffic demands.

Based on the existing planning policies applicable to the corridor and the transportation and traffic assessment completed, the following Problem Statement was developed for this study:

Based on the recommendations of the City of London's Smart Moves Transportation Master Plan and confirmed through a corridor traffic analysis undertaken as part of the study, Adelaide Street North, from Fanshawe Park Road East to Sunningdale Road East, has been identified as requiring improvements to address future traffic operational deficiencies.

In addition to addressing future traffic operational deficiencies, there is also an opportunity to improve the roadway to meet the City's Complete Streets standards which includes incorporating transit, active transportation, and safety initiatives.

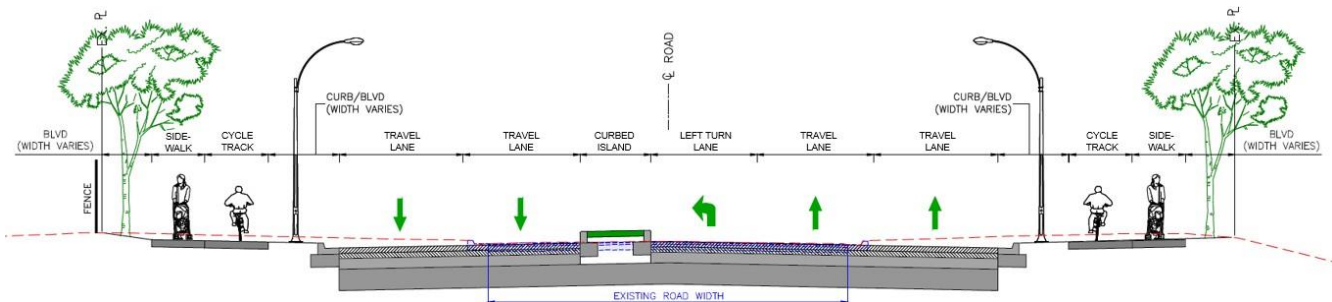
Adelaide Street North is characterized as an urban road with one lane of traffic in each direction, sidewalks on both sides, and a combination of on-road bicycle lanes and cycle tracks along portions of the corridor. The City's London Plan and Complete Streets Design Manual designates Adelaide Street North and Sunningdale Road East as Civic Boulevards, which are intended to accommodate "multi-modal travel, with a priority on pedestrian, cycling and transit movements".

Land use along Adelaide Street North includes a combination of low, medium and higher density residential uses, retail areas, a retirement residence and place of worship. North of Sunningdale Road East are primarily agricultural uses, though this area has been designated as Neighbourhoods and there are current plans for subdivision development. The City of London's Official Plan designates the land types adjacent to the Adelaide Street North study area as Neighbourhoods, Shopping Areas, Green Space and Main

Street. Several background reports were completed during the EA process including Archaeological, Cultural Heritage, Noise and Geotechnical assessments. A scoped Environmental Impact Study (EIS) was also completed to document existing natural heritage features within the study area in accordance with the City of London Official Plan (OP) and Environmental Management Guidelines.

A total of seven alternative planning solutions were considered for Adelaide Street North and carried through an evaluation process. Through the evaluation of the alternative solutions for Adelaide Street North, a combined approach was carried forward to address the problem statement. This included using Transportation Demand Management (TDM) measures, operational and intersection improvements, additional lanes, and accommodating other modes of travel.

Based on the preferred solution, three (3) alternative design concepts were considered for the Adelaide Street North corridor. Recommendations for Sunningdale Road East were mostly unchanged from the previous Sunningdale Road East Environmental Assessment Study. Each concept for the Adelaide Street North corridor featured two lanes of traffic in each direction, cycle tracks and sidewalks on each side, centre medians and dedicated turning lanes. The 3 concepts varied in terms of the extent of the widening either from centreline, to the west, or to the east. Based on the evaluation completed it was determined that widening Adelaide Street North from the centreline (west and east side) will have the least overall impacts within the technical, natural environment, cultural/socio-economic environment and costs parameters. The typical cross section developed for Adelaide Street North includes 2 through lanes, 2 curb lanes, a centre median, cycle tracks and sidewalks with varying boulevard width. The key features of the typical cross section developed for Adelaide Street North is shown below. Lane widths will be confirmed and finalized during the detailed design stage based on the City’s design standards and guidelines.



In addition to formal study notices, the project benefited from regular correspondence with interested parties and two (2) Public Information Centres (PICs). The first PIC was held on November 14, 2018 at the Stoney Creek Branch of the London Public Library. The first PIC was held to present and obtain feedback on the EA planning process being followed; study background, existing conditions, and key issues and constraints; and alternative and recommended solutions. Approximately 55 people attended. The second PIC was held on Wednesday, June 5th, 2019 from 5:00pm to 7:00pm at A.B. Lucas Secondary School. The purpose of the second PIC was to present and obtain feedback on the alternative design concepts and evaluation criteria, the preliminary preferred alternative design concept and potential impacts and mitigation measures. A total of 28 participants attended.

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Please note that accessible versions of the ESR appendices can be provided upon request by contacting the City's Project Team listed in Section 1.4 of this report.

1 Introduction

The purpose of this study was to determine the existing and future transportation needs for the Adelaide Street North corridor, specifically addressing existing and future traffic demand and capacity. Study justification was identified in the City of London’s Smart Moves Transportation Master Plan (TMP). In order to address the capacity and operational improvements on Adelaide Street North, the City of London undertook this study as per the planning process and requirements of a “Schedule C” Municipal Class Environmental Assessment (EA), approved under the Ontario Environmental Assessment Act.

1.1 Study Area

The study limits include the section of Adelaide Street North from Fanshawe Park Road East to 350m north of Sunningdale Road East, including Sunningdale Road East from Blackwater Road to the entrance of the Stoney Creek Community Centre (**Figure 1**). The Adelaide Street North corridor extends approximately 1.75km from north to south and is within a predominantly residential area. The study area north of Sunningdale Road East is currently agricultural uses but is planned to be developed with low & medium density residential communities, further increasing traffic volumes in the area. There is a significant natural environment area located adjacent to the Powell Drain, the major watercourse in the study area.

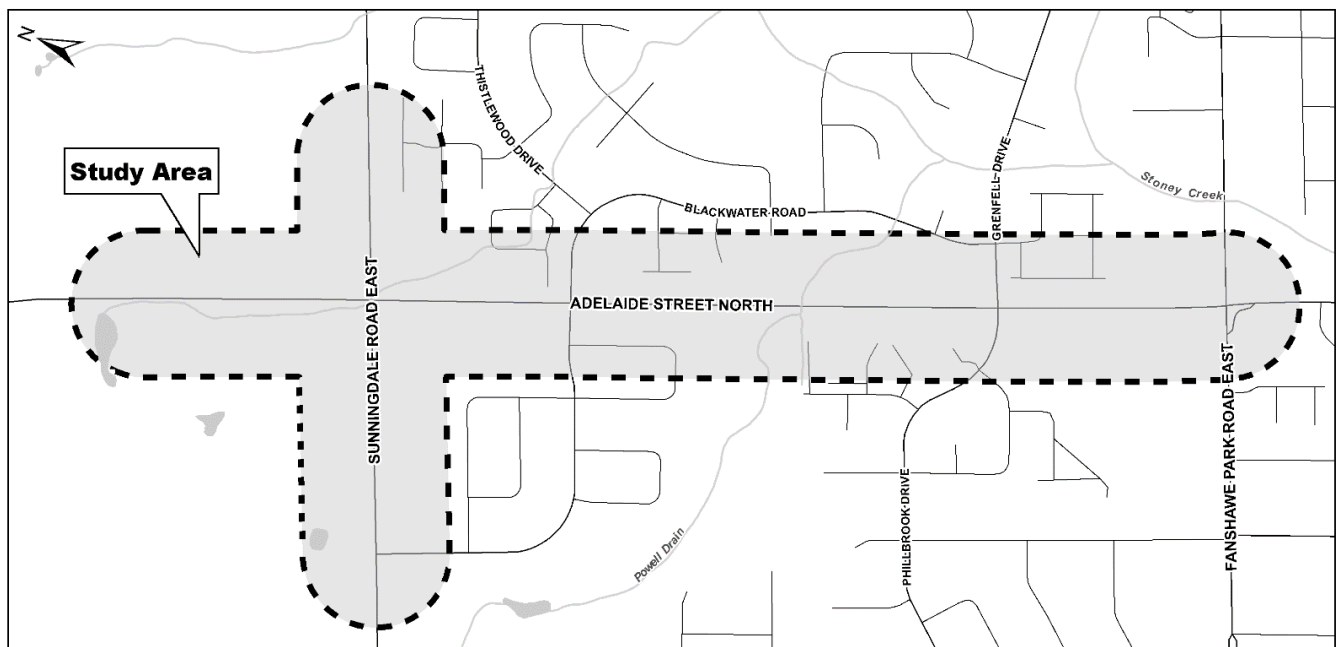


FIGURE 1: STUDY AREA

1.2 The Municipal Class EA Process

The Municipal Class EA (Municipal Engineers Association October 2000, as amended in 2007, 2011 and 2015) is the guiding process that the City of London is required to complete for public works projects as indicated under the Ontario Environmental Assessment Act (EAA) at the time when the EA was conducted. The Municipal Class EA applies to municipal infrastructure projects including roads, water and wastewater. Projects are classified according to the scope of work and are described by the Municipal Engineers Association in four different classification types that are determined by environmental significance:

Schedule A: Defined as a project that is limited in scale, generally includes emergency operational and maintenance activities, and have minimal environmental effects and therefore are preapproved and do not require formal consultation or documentation.

Schedule A+: Similar scope of work as a Schedule A project, but the public is to be advised of the project prior to the implementation of the project undertakings.

Schedule B: Defined as a project that includes minor expansions and improvements to existing facilities. The undertakings could result in some adverse environmental impacts and therefore the project is subject to a screening consisting of mandatory public and agency consultation and preparation and filing of a project record for public review.

Schedule C: Defined as a project that includes major expansions or new facilities that have the potential to have significant impact on the environment and are therefore subject to the full Municipal Class Environmental Assessment process; preparation of an Environmental Study Report is required for this type of study.

This Adelaide Street North Class EA was initiated as a Schedule 'C' project due to its potential for impacts to the environment as defined in the Ontario Environmental Assessment Act. Schedule 'C' projects require that all 5 phases of the Municipal Class EA planning process are completed. The first four phases will be completed as a part of this study; the fifth phase will be initiated following completion of the study. The 5 phases are illustrated in **Figure 2** and are summarized as follows:

- Phase 1** – Identify the Problem and Opportunity Statement
- Phase 2** – Identify and Evaluate Alternative Solutions
- Phase 3** – Identify Alternative Design Concepts for Preferred Solution
- Phase 4** – Prepare Design Plans & Environmental Study Report
- Phase 5** – Implement Recommended Solution

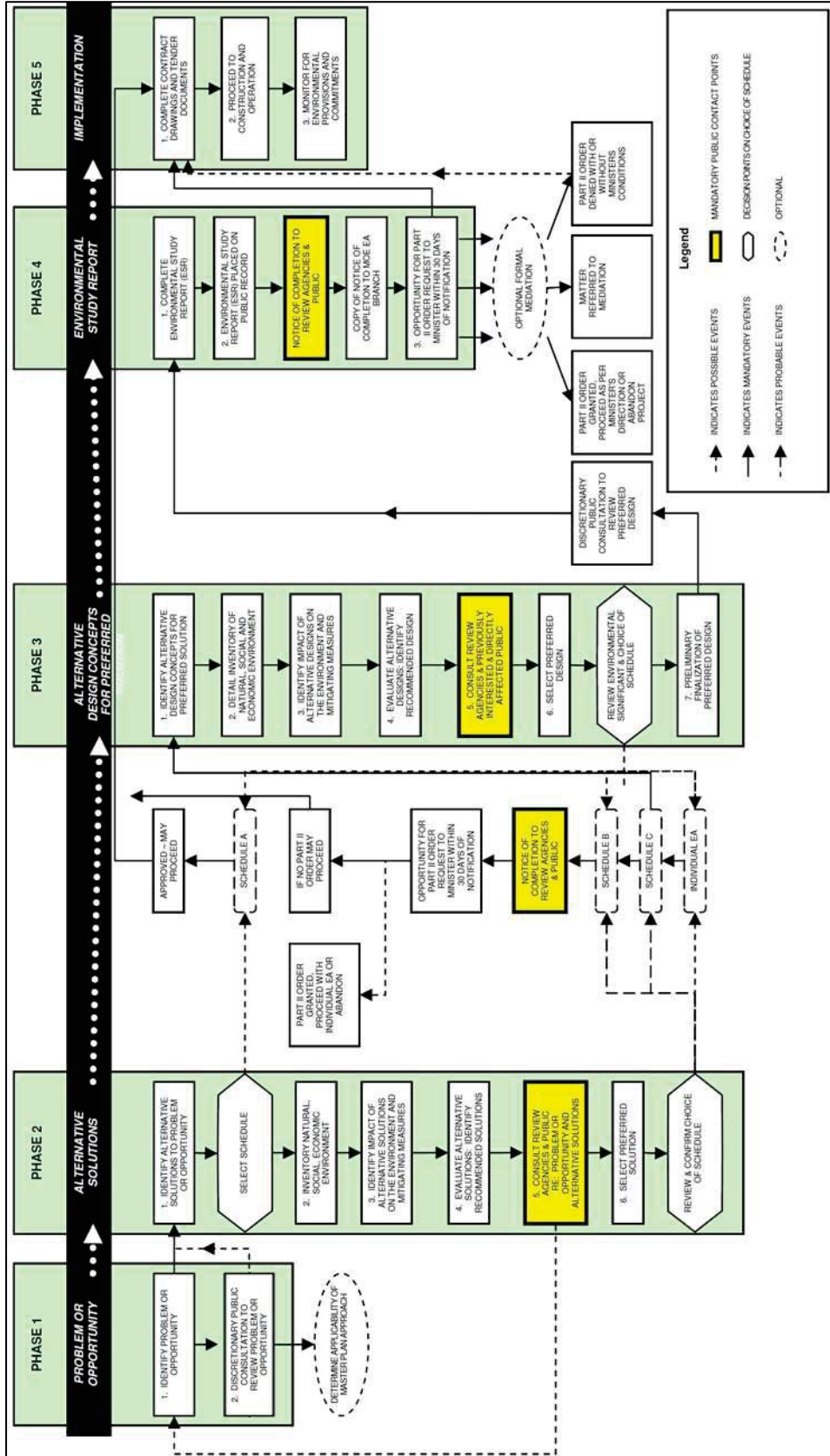


FIGURE 2: FIVE PHASES OF THE MUNICIPAL CLASS EA PROCESS

1.3 Environmental Study Report

This Environmental Study Report (ESR) has been prepared to document in full the Class EA process followed as per the requirements for a Schedule ‘C’ project. It describes the problem/opportunity being addressed, provides a full description of the study area’s existing conditions as related to project constraints and considerations, details the alternative solutions and the means by which they were evaluated, and presents the preferred design solution. Also discussed with regards to the preferred solution are: the potential environmental, social, cultural, and economic impacts of this solution; recommended impact mitigation measures and monitoring and other future work requirements and commitments.

This ESR is being made available for public review for a period of 30 calendar days beginning on **August 11, 2023** and ending on **September 11, 2023**. A Notice of Completion signaling the start of this review period has been advertised in *The Londoner* and City’s website and sent directly to local stakeholders, residents, technical agencies, Indigenous Communities, and other interested parties as noted on the project mailing list. Please visit the City’s website link to the project: <https://london.ca/projects/adelaide-street-north-environmental-assessment>. During the 30-day review period, copies of the report will be available for review and comment at the following locations:

City of London – City Hall
City Clerk’s Office, 3rd Floor
300 Dufferin Avenue
London, ON N6A 4L9
Hours of Operation:
Mon-Fri: 8:30am to 4:30pm

London Public Library, Stoney Creek Branch
920 Sunningdale Road East
London, ON N5X 0H5
Tue: 9:00am – 9:00pm
Wed: 9:00am – 9:00pm
Thu: 9:00am – 9:00pm
Fri: 9:00am – 6:00pm
Sat: 9:00am – 5:00pm

1.4 Section 16 Order Requests

The Municipal Class EA process includes an opportunity for members of the public, review agencies, and various stakeholders to request that a project’s status be elevated to a higher level of review, such as an Individual Environmental Assessment as per Section 16 of the Ontario *Environmental Assessment Act* (EAA). As part of the Class EA process, it is suggested that all stakeholders (public, agencies and authorities) work together to determine the preferred solutions to the problem or opportunity. If concerns regarding a project cannot be resolved in discussion with the proponent, members of the public, interest groups or technical review agencies may request the Ontario Minister of Environment, Conservation and Parks (MECP) require a proponent comply with the Section 16 order request of the *Environmental Assessment Act* before proceeding with the proposed undertaking. MECP then decides whether to deny the request, refer the matter to mediation or require the proponent to comply with the Section 16 Order Request. **Requests can be made only on the grounds that the requested order may prevent, mitigate or remedy adverse impacts on constitutionally protected Aboriginal and treaty rights.**

The procedures for dealing with concerns are outlined as follows:

1. For Schedule ‘C’ projects, a person or party with a concern should bring it to the attention of the City of London (the proponent) in Phase 4 of the planning process.

2. If a concern is not resolved through discussion with the proponent, the person or party raising the objection may request the City of London to voluntarily elevate the Schedule 'C' project to an Individual Environmental Assessment.

3. If the City of London declines, and the person or party with the concern wishes to pursue the matter, they may write the Minister of the Environment, Conservation and Parks, or delegate to request a Section 16 Order. These requests shall be copied by the requestor to the City of London and the Director of the Environmental Assessment and Permissions Branch at MECP at the same time they are submitted to the Minister, or delegate. For a Schedule 'C' project, a written request must be submitted to the Minister or delegate within the 30-day review period after the Notice of Completion has been issued.

The request shall be sent in writing or by e-mail to the following contacts at the Ministry of Environment, Conservation and Parks, with a copy to the City of London Project Manager:

**Minister of the Environment,
Conservation and Parks**

Ministry of the Environment,
Conservation and Parks
College Park 5th Floor
777 Bay Street
Toronto, ON
M7A 2J3
Minister.mecp@ontario.ca

**Director, Environmental
Assessment and Permissions
Branch**

Ministry of the Environment,
Conservation and Parks
135 St. Clair Avenue West, 1F
Toronto, ON
M4V 1P5
enviopermissions@ontario.ca

**Paul Yanchuk
Project Manager**

City of London
300 Dufferin Avenue,
P.O. Box 5035
London, ON
N6A 4L9
pyanchuk@london.ca

For further information regarding Section 16 Order Requests, please visit MECP's website at the following address: <https://www.ontario.ca/page/class-environmental-assessments-section-16-order>.

1.5 Project Team Organization

The City of London retained Parsons Inc. as the prime consultant to undertake this Class EA Study on their behalf. The "Project Team" consisted of members from the City of London, Parsons Inc. and specialized sub-consultants required to address specific requirements of the project.

1.6 Consultation with Public, Agency and Stakeholders

Public involvement is an integral component of the Class EA planning process. For Schedule "C" Class EA studies, three mandatory points of consultation are required. For this study, the key points of contact included:

- Advertising of notices at project milestones through direct mailing, newspaper publication, and posting on the City of London website;
- Engagement and liaison with Indigenous Communities;
- Technical agency consultation and review;
- Private stakeholder meetings; and
- Two Public Information Centres (PICs).

Technical agencies were identified at the onset of the study, where they were able to express concerns relevant to the study/study area. These technical agencies were provided updates as the study moved forward. Other major stakeholders, including property owners, were notified about the study and were requested to provide their input at key points during the study. Refer to **Section 6.0** and **Appendix A** for all public consultation materials and records.

2 Project Need and Justification

Prior to developing solutions to address the study requirements for Adelaide Street North, it is important to understand the needs of the corridor. In establishing the project need and defining the study problem statement, this section identifies the study area conditions within a planning policy and traffic operational context. **Section 2.5** describes the problem statement, which serves as the key justification for the work to be carried out in subsequent phases of the Class EA and for which the alternatives to be developed will aim to address.

2.1 Existing Planning Policies

2.1.1 2020 PROVINCIAL POLICY STATEMENT (PPS)

The Provincial Policy Statement (2020 PPS) is issued under Section 3 of the Planning Act and provides policy direction on matters of provincial interest related to land use planning and development. The policy statement includes a range of policies related to building strong healthy communities, wise use and management of resources and protecting public health and safety. One of the visions in the 2020 PPS promote a mix of housing, including affordable housing, employment, recreation, parks and open spaces, and transportation choices that increase the use of active transportation and transit before other modes of travel. A land use pattern, density and mix of uses should be promoted that minimize the length and number of vehicle trips and support current and future use of transit and active transportation. These policies are applicable for the improvements to Adelaide Street North and Sunningdale Road East.

2.1.2 CLEAN WATER ACT, 2006

As a requirement of the Municipal Class EA process, proponents are required to include reference to the Clean Water Act (2006) and must identify in the process whether a project is, or could potentially be occurring, within a vulnerable area. An objective of the Clean Water Act seeks to stop contaminants from getting into sources of drinking water and the construction work associated with road improvements could pose a risk. Additional information regarding source water protection and vulnerable areas within the study area is outlined in **Section 3.3.5**.

2.1.3 CITY OF LONDON CLIMATE EMERGENCY

On April 23, 2019, London City Council approved a declaration of a climate emergency and requested the Civic Administration to report back on tangible actions that the municipality can undertake. The City has recognized the importance of climate change mitigation, climate change adaptation, sustainable energy use, related environmental issues and the need for a more sustainable and resilient city in the development of its 2019-2023 Strategic Plan for the City of London. London's efforts in transportation and climate change mitigation and adaptation contribute to the following Areas of Focus: 1) Strengthen our community,

2) Build a sustainable city, 3) Grow our economy, create a safe London for women and girls, and 4) Leading in public service.

The City’s policy direction for Adelaide Street North through completion of a Climate Emergency Screening Tool (CSET) is that based on completeness of the corridor that has curbs, sidewalks and cycling lanes on both sides, widening should remain deferred and be evaluated as part of the upcoming Mobility Master Plan to ensure that any future improvements align with the City’s objectives related to land use, transit planning and promoting equity and sustainable transportation options. However, this Environmental Assessment Study should proceed to London City Council to inform improvements identified for the Sunningdale Road intersection to address localized safety and operational issues and improve active transportation in conjunction with other Sunningdale Road improvements.

2.1.4 2030 TRANSPORTATION MASTER PLAN – SMART MOVES

The City’s Transportation Master Plan (TMP), SmartMoves, was developed in 2013 and provides a series of policies and projects to support transportation improvements within the City. The plan lists 5 “Smart Moves” to consider as part of transportation related initiatives within the City:

1. Rethinking Growth to Support the Transportation Master Plan;
2. Taking Transit to the Next Level;
3. Actively Managing Transportation Demand;
4. Greater Investment in Cycling and Walking Infrastructure; and
5. More Strategic Program of Road Network Improvements.

The widening of Adelaide Street North and Sunningdale Road East (west of Adelaide Street North) to four lanes is identified within a 5 to 10-year horizon. However, it is noted that the City of London’s 2019 Development Charges Background Study identified the widening of Adelaide Street North to commence in 2029 and the widening of Sunningdale Road East in 2025 (from Adelaide Street North to Bluebell Road).

2.1.5 CITY OF LONDON OFFICIAL PLAN

The City’s new Official Plan (the “London Plan”) was adopted by City Council on June 23, 2016 and was approved by the Province on December 28, 2016. At the time of Provincial approval, The London Plan was appealed to the Ontario Land Tribunal (OLT). Through OLT decision May 25, 2022, the final phase of policy appeals have been resolved. The “London Plan” identifies land uses within the study area as a combination of Neighbourhoods, Shopping Areas, Green Space (including the Powell Drain) and Main Street, as outlined further in **Section 3.2**. Both Adelaide Street North and Sunningdale Road East are designated as “Civic Boulevards” and “Cycling and Walking Routes”. **Table 1** presents examples of policies which are to be considered during the EA study process:

TABLE 1: EXAMPLES OF APPLICABLE OFFICIAL PLAN POLICIES

No.	Policies
228	Neighbourhood streets and all infrastructure will be planned and designed to enhance safety by implementing the principles of Crime Prevention Through Environmental

	Design, encouraging greater levels of passive surveillance, and providing sidewalks of sufficient width to support planned levels of activity.
313	6. Design streets and rights-of-way to provide a variety of safe, convenient, attractive, viable, and accessible mobility choices for all Londoners. 10. Create opportunities for connecting London to the surrounding region through on- and off- street cycling pathways.
329	Civic infrastructure will be designed to promote all forms of mobility within neighbourhoods and throughout the city.
357	Cycling routes and pedestrian pathways will provide linkages between open space areas, neighbourhoods, centres, corridors, employment areas and the public transit services and will enhance the convenience, safety and enjoyment of walking and cycling.
358	All street reconstruction and/or street widenings will incorporate cycling or cycling related infrastructure where identified by the Cycling Master Plan.
371 (5)	Civic Boulevard: a. Priority on pedestrian, cycle and transit movements, b. Moves medium to high volumes of vehicular traffic, c. Very high-quality pedestrian realm, d. Very high standard of urban design. <i>Note: Currently under appeal.</i>

Source: City of London Official Plan

2.1.6 CITY OF LONDON CYCLING MASTER PLAN (LONDON ON BIKES)

The City of London’s 2016 Cycling Master Plan identifies Adelaide Street North as an existing Designated and Separated Facility and a future east-west pathway network is proposed midblock along the Powell Drain. The Designated Facility type is reflective of the existing on-road bicycle lanes, whereas the separated facility is reflective of the existing cycle tracks. The Cycling Master Plan does not identify a future facility along this segment due to the presence of existing facilities, however the Cycling Plan notes that “facility types will require future site-specific assessment and investigation through future EAs and / or detailed design assignments”. A midblock crossing is recommended at the pathway crossing of Adelaide Street North along the Powell Drain. The recommend crossing type includes a combined crossride treatment.

2.1.7 SUNNINGDALE ROAD EAST ENVIRONMENTAL ASSESSMENT

The Sunningdale Road East Improvements “Schedule C” Class Environmental Assessment Study was completed by AECOM in May 2013 for widening of the corridor in order to meet traffic needs. The study was completed between Wonderland Road North and Adelaide Street North. The recommended design concept included widening Sunningdale Road East to a four-lane cross section with on-road bicycle lanes. A roundabout was recommended as the traffic control for the intersection of Sunningdale Road East and Adelaide Street North with two entry lanes in each direction. The recommended design concept for widening of Sunningdale Road East based on the 2013 EA was considered in the development of recommendations for this Adelaide Street North EA.

2.2 Existing Traffic Conditions

In order to determine the need and extent of the capacity and operational improvements required for the Adelaide Street North corridor, a transportation and traffic analysis study was undertaken to assess current and future traffic demands. Understanding existing and future traffic capacity constraints was a key requirement in developing a problem statement for the study. The full Transportation and Traffic Analysis Report is provided in **Appendix B**.

The traffic analysis conducted for this study considers the capacity and level of service for individual intersections and mid-block sections along the study corridor. Intersections were analyzed using the procedures of the Highway Capacity Manual (HCM) methodologies for signalized and unsignalized intersections, as implemented in the Synchro / SimTraffic software developed by Trafficware. Existing traffic volumes for the study area intersections collected between 2015 and 2017 were provided by the City of London. Traffic volume data was also extracted from a Synchro file and the Sunningdale ESR, both provided by the City.

2.2.1 EXISTING ROAD NETWORK

Table 2 below provides additional information on the existing road network in and adjacent to the study area based on the City’s Official Plan, the number of existing lanes and active transportation facilities.

TABLE 2: EXISTING ROAD NETWORK SUMMARY

Road	London Plan Designation	Number of Through Lanes	Pedestrian Facilities	Cycling Facilities
Adelaide Street North	Civic Boulevard	2	Sidewalks on both sides ¹	Cycle Tracks and On-Road Bicycle Lanes ²
Fanshawe Park Road East	Urban Thoroughfare	4	Sidewalks on both sides	Cycle Tracks/ Mixed Traffic
Phillbrook Drive / Grenfell Drive	Neighbourhood Connector	2	Sidewalks on both sides	Mixed Traffic
Blackwater Road	Neighbourhood Connector	2	Sidewalks on both sides	Mixed Traffic
Sunningdale Road East	Civic Boulevard	2	Sidewalk on both sides east of Adelaide, sidewalk on south side only west of Adelaide.	Mixed Traffic

2.2.2 EXISTING (2018) LANE CAPACITY & INTERSECTION OPERATIONS ANALYSIS

Link volumes were estimated using the intersection entering and exiting volumes at the mid-block sections. Lane capacity analysis for the existing traffic conditions were undertaken using the estimated mid-block

¹ No existing pedestrian or cycling facilities north of Sunningdale Road East.

² Mixed traffic north of Sunningdale Road East.

link volumes and theoretical lane capacity of 850 vehicles per hour per lane. Under the existing (2018) traffic conditions, the section of Adelaide Street North, between Phillbrook Drive / Grenfell Drive & The Home Depot Plaza Entrance, is over capacity for the southbound direction during the AM peak hour. During the PM peak hour, this section is over capacity in the northbound direction. Respectively, some sections along Adelaide Street North are approaching capacity in the southbound direction during the AM peak hour and northbound traffic during the PM peak hour.

Using the existing (2018) traffic volumes established and signal timings received from the City, operational analysis for the signalized and unsignalized intersections were completed within the corridor using the Synchro/SimTraffic for the AM and PM peak hours. All analyses were completed using parameters outlined in the City of London Transportation Impact Assessment Guidelines, April 2012. Operations at the signalized intersection of Adelaide Street North and Fanshawe Park Road East is currently approaching capacity during both the AM and PM peak hours and there are several critical movements present during both peak hours. Some critical movements are also present at both unsignalized intersections of Blackwater Road with Sunningdale Road East and Adelaide Street North. The other study area intersections are currently operating well.

2.3 Future Traffic Conditions

Future (2029) and (2039) traffic volumes were established by applying a 1.0% per annum growth rate to the existing (2018) traffic volumes.

There are several proposed developments located along Sunningdale Road East as well as Adelaide Street North immediately north and south of Sunningdale Road East. The Applewood Subdivision Traffic Impact Study (TIS), September 2008, contains site traffic volumes from the majority of these developments. The traffic volumes associated with these developments have been utilized in establishing the future total traffic volumes for the Adelaide Street North corridor. Since the completion of the Applewood Subdivision TIS, some parts of the Stoney Creek Subdivision development and Powell Lands development have been built. The trips from the built portions are assumed to be captured by existing traffic data. As a result, a portion of the trips generated from these developments has been subtracted from the total Applewood TIS site traffic volumes. The resulting traffic volumes generated by these developments were added to the roadway network and included in the future traffic analysis.

The future total (2029) and (2039) traffic volumes were established by combining the background (2029) and (2039) traffic volumes with the site generated traffic of the proposed and future potential developments. The resulting future total (2029) and (2039) traffic volumes for the AM and PM peak hours are outlined in the Transportation and Traffic Analysis Report in **Appendix B**.

2.3.1 FUTURE PROPOSED ROADWAY IMPROVEMENTS

The Sunningdale ESR recommends that Sunningdale Road East be widened from 2 to 4 through lanes within a 10-year planning horizon. This is also consistent with recommendations noted in the City's 2030 Transportation Master Plan document and through discussions with the City, this widening is scheduled for 2025. The 2030 Transportation Master Plan also recommends that Fanshawe Park Road East be widened from Wonderland Road to Clarke Road from 4 to 6 through lanes within a 10 to 15 years planning horizon. However, the City of London's 2019 Development Charges Background Study indicates that this widening will not occur until beyond the ultimate 2039 horizon year of this study.

As a result, only the recommended roadway widening for Sunningdale Road East has been incorporated into all future analysis scenarios completed for this EA. To be consistent with the 2019 Development Charges Background Study, the existing lane configurations for the intersection of Adelaide Street North with Fanshawe Park Road East were maintained.

2.3.2 SIGNAL WARRANT ANALYSIS

Signal warrant analyses for the unsignalized and future proposed intersections within the study area were performed using OTM Book 12 – Traffic Signals guidelines under the future total (2029 & 2039) traffic conditions. Based on the signal warrant results presented in **Appendix B**, the unsignalized intersections of Adelaide Street North and Sunningdale Road East with Blackwater Road are warranted for signalization under future total (2029) traffic conditions.

The intersection of Adelaide Street North with the proposed east-west road as part of future development to the north of Sunningdale Road East does not meet the warrants. As a result, the warrant analysis for this intersection was repeated under future total (2039) traffic conditions. The results of the signal warrant analysis indicate that a signal is still not warranted at this location under future total (2039) traffic conditions.

2.3.3 FUTURE (2029) LANE CAPACITY & INTERSECTION OPERATIONS ANALYSIS – DO NOTHING

Corridor lane capacity analysis for the future (2029) do nothing traffic conditions was undertaken using the estimated mid-block link volumes and a theoretical lane capacity of 850 vehicles per hour per lane. The results of the future (2029) do-nothing corridor lane capacity analysis indicates there are several sections within the Adelaide Street North corridor which are forecast to operate approaching capacity or above capacity. The southbound direction is critical during the AM peak hour while both northbound and southbound directions are critical during the PM peak hour. These results indicate that additional through lanes are required for the Adelaide Street North corridor in order to accommodate future (2029) traffic demands.

Under the future (2029) do nothing analysis scenario, the signalized intersections of Adelaide Street North with Sunningdale Road East and Fanshawe Park Road East are forecast to have several critical movements and capacity constraints. The unsignalized intersection of Blackwater Road with Adelaide Street North, and Adelaide Street North with a future development connector road also have critical movements and capacity constraints. The other study area intersections are forecast to operate well.

2.3.4 FUTURE (2039) LANE CAPACITY & INTERSECTION OPERATIONS ANALYSIS -- DO NOTHING

Corridor lane capacity analysis for the future (2039) do-nothing traffic conditions was undertaken using the estimated mid-block link volumes and a lane capacity of 850 vehicles per hour per lane. The results of the future (2039) do-nothing corridor lane capacity analysis indicates there are several sections within the Adelaide Street North corridor which are forecast to operate approaching capacity or above capacity. The northbound and southbound directions are critical during both AM and PM peak hours. These results indicate that additional through lanes are required for the Adelaide Street North corridor in order to accommodate future (2039) traffic demands.

Intersection capacity analyses were completed for the signalized and unsignalized intersections using the future (2039) traffic volumes. Several of the study area intersections are forecasted to operate poorly. With no improvements to the corridor or intersections, there are critical movements and capacity constraints that cannot be improved further with adjusted signal timings.

2.3.5 FUTURE (2029 & 2039) TRAFFIC CONDITIONS – WITH IMPROVEMENTS

Based on the corridor and intersection adjustments outlined as part of the City's 2019 Development Charges Background Study, under future (2029) and (2039) traffic conditions both Adelaide Street North at Sunningdale Road East and Fanshawe Park Road East are forecast to operate above capacity, with the exception of Adelaide Street North at Sunningdale Road East during the AM peak period under (2029 and 2039) conditions which is forecast to operate satisfactorily.

Under the future (2029) and (2039) traffic conditions based on the 2019 Development Charges Background Study recommendations, a sensitivity analysis of northbound and eastbound dual left turn lanes at Adelaide Street North and Fanshawe Park Road East has improved the critical movements with shorter queues at the respective movements. However, the intersection is still forecast to operate above capacity during both peak periods for each horizon year.

Following design considerations of lane requirements for the recommended alternative and discussions with the City, some of the recommended lanes have not been carried forward in the preliminary design due to significant property constraints and both technical and economic factors. As a result, the recommended intersection and corridor lane configurations are discussed in **Section 7.7**.

2.4 Collision Analysis

A Safety Performance Assessment was completed as part of this study which included a review of intersection and mid-block collision data within the study area. A total of 311 collisions occurred within the study area based on 7 years of historical data. 58% (181 of 311) of the total collisions were rear-end, 18% (57 of 311) were turning movement, 11% (34 of 311) were angle, while sideswipe accounted for 7% (22 of 311), and the remainder were classified as 'other' or 'SMV'. A significant percentage of the collisions occurred at the signalized intersection of Adelaide Street North and Fanshawe Park Road East with 77% (238 of 311) of the total recorded collisions over 7 years.

A review of the current intersection lane configurations at Adelaide Street North and Fanshawe Park Road East revealed that the existing dedicated left turn lanes on all approaches are a negative offset from one another. Retrofitting the current left turn lanes from negative offset to zero or positive offset at each approach could potentially reduce the amount of turning movement collisions.

2.5 Problem Statement

As per Phase 1 of the Municipal Class Environmental Assessment process for a Schedule 'C' project, a "Problem Statement" was prepared for the Adelaide Street North Municipal Class EA to identify in detail the various problems and opportunities to be addressed throughout the study. In essence, the Problem Statement outlines the need and justification for the overall project and establishes the general parameters, or scope, of the study. Based on the existing planning policies applicable to the corridor and the transportation and traffic assessment completed, the following Problem Statement was developed for this study:

Problem Statement for Adelaide Street North:

Based on the recommendations of the City of London's Smart Moves Transportation Master Plan and confirmed through a corridor traffic analysis undertaken as part of the study, Adelaide Street North, from

Fanshawe Park Road East to Sunningdale Road East, has been identified as requiring improvements to address future traffic operational deficiencies.

In addition to addressing future traffic operational deficiencies, there is also an opportunity to improve the roadway to meet the City’s Complete Streets requirements which includes incorporating transit, active transportation, and safety initiatives.

3 Existing Conditions

As part of the EA planning process, the existing base conditions of the study area are established to determine any constraints, barriers or considerations prior to developing alternatives to address the problem statement. Understanding existing conditions also provides the project team knowledge of potential impacts so that avoidance and mitigation can be considered earlier in the planning process. In determining the existing conditions within the study area, a variety of factors were considered, representing the transportation, technical, socio-economic, cultural and natural environments.

3.1 Transportation Environment

3.1.1 ROAD NETWORK

Adelaide Street North is characterized as an urban road with one lane of traffic in each direction, sidewalks on both sides, and a combination of on-road bicycle lanes and cycle tracks along portions of the corridor. The London Plan designates Adelaide Street North and Sunningdale Road East as **Civic Boulevards**. The City’s Complete Streets Design Manual provides guidance for the design of Civic Boulevards, which are intended to accommodate “multi-modal travel, with a priority on pedestrian, cycling and transit movements”.

The *Complete Street Design Manual* was reviewed to determine recommended treatments for Boulevards, Intersections, Side Streets and Transit Stops. Key requirements which are applicable to the Civic Boulevard Designation and relevant to this segment of Adelaide Street North are summarized in **Table 3** below based on the categories presented in the manual, which include Pedestrians, Cyclists, Transit, Motorists & Freight, Green Infrastructure and Utilities.

TABLE 3: SUMMARY OF KEY POLICIES FOR CIVIC BOULEVARDS

Category	Applicable Policies
Pedestrians	<ul style="list-style-type: none"> • Crossovers or refuge islands where gaps between signalized intersections are in excess of 400m or when justified by pedestrian desire lines, connectivity considerations or pedestrian and vehicle volume. • High quality public realm including street furniture elements, shade trees and clearway widths exceeding 1.5m standard where appropriate. • Pedestrian clearway set at least 1.5m back from motor vehicle travel lanes.
Cyclists	<ul style="list-style-type: none"> • Physically separated and continuous facilities. • 1.0m buffer width preferred. • Unidirectional facilities on both sides of the street.

	<ul style="list-style-type: none"> • Left turn boxes desirable. • Markings at entrances and intersections.
Transit	<ul style="list-style-type: none"> • Queue jump lanes, signal priority and bus shelters should be considered at all locations. • Design of transit stops based on stop usage (e.g. use of shelters/benches or waste receptacles). • Integrate cycling facilities into transit stop. • Bus bays typically not preferred.
Motorists & Freight	<ul style="list-style-type: none"> • 3-5 lane typical cross section with use of planted median or two-way left turn lane where appropriate. When planted medians are used, separation may be needed to accommodate left turns. • On-street parking permitted. • Consider freight and emergency vehicle use when completing geometric design. • Driveway separation 75m or greater. • 60km/hr design speed.
Green Infrastructure	<ul style="list-style-type: none"> • Hard surfaces where significant volumes of pedestrian activity exist. • Street trees in appropriate configurations.
Utilities	<ul style="list-style-type: none"> • Preferred position for utility poles between the sidewalk and roadway. • Overhead utilities should be consolidated to use the same poles where possible. • Underground utilities in easily accessible locations and mitigating conflict with tree roots.

Source: City of London Complete Streets Design Manual (2018).

3.1.2 TRANSIT

The London Transit Commission (LTC) operates several routes within the vicinity of the study area. Route #19 runs along Sunningdale Road East and continues in a loop direction southbound on Adelaide Street North and eastbound onto Blackwater. Route #25 traverses Phillbrook and Grenfell Drive across Adelaide Street North. Several other routes (#16, 25 and 92) run on Fanshawe Park Road East and on Adelaide Street North, south of Fanshawe Park Road East. Within the City’s 2030 Transportation Master Plan, Adelaide Street North and Sunningdale Road East within the study area are designated as “Key Supporting Transit Routes” which “should be considered for enhanced service to support the BRT corridors and improve transit ridership across the City”.

3.1.3 PEDESTRIANS AND CYCLISTS

Adelaide Street North currently features 1.5 metre sidewalks and a green boulevard on both sides of the corridor between Sunningdale Road East and Fanshawe Park Road East. A combination of on-street bicycle lanes and cycle tracks are provided. From Sunningdale Road East, a bicycle lane continues southbound until approximately 90 metres north of Phillbrook Drive, where it transitions to a cycle track running parallel to the sidewalk and continues south of Fanshawe Park Road East. From Fanshawe Park Road East, a cycle track continues in the northbound direction parallel to the sidewalk until 300 metres north of Grenfell Drive, where it transitions to an on-road bicycle lane and continues to Sunningdale Road

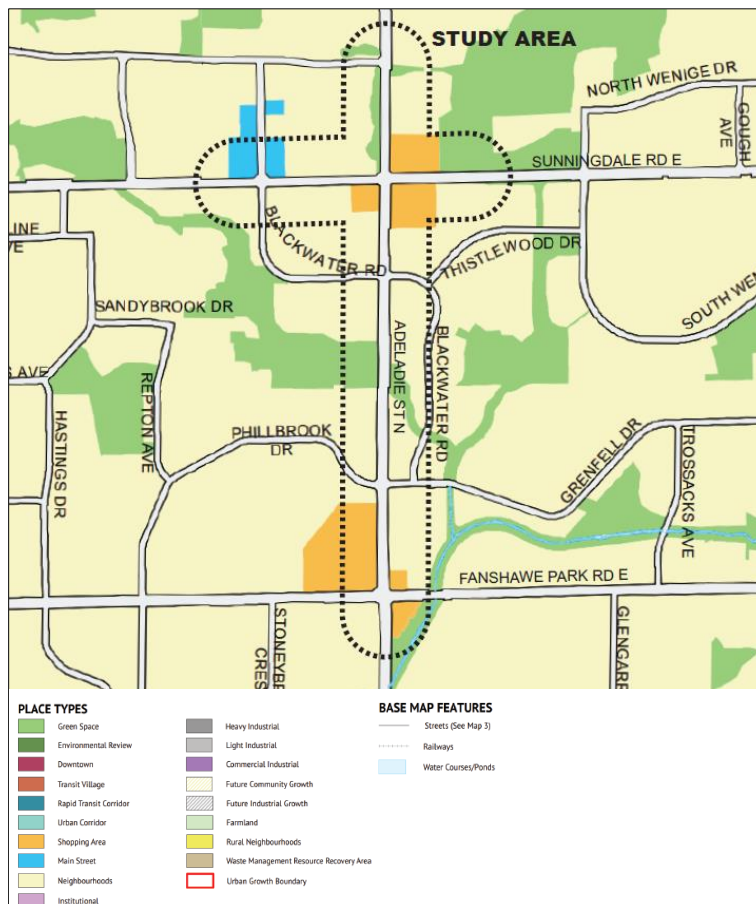
East. Sunningdale Road East includes sidewalks on both sides east of Adelaide and a sidewalk on the south side only west of Adelaide.

3.2 Socio-Economic Environment

3.2.1 EXISTING LAND USE AND PLANNED DEVELOPMENT

Land use along Adelaide Street North includes a combination of low, medium and higher density residential uses, retail areas, a retirement residence and place of worship. North of Sunningdale Road East are primarily agricultural uses, though this area has been designated as Neighbourhoods and there are current plans for subdivision development, as illustrated on the London Plan in **Figure 3** below. Additional development is planned at the south-east corner of the intersection of Adelaide Street North and Sunningdale Road East, and the Adelaide Street North Corridor has experienced recent infill development between Fanshawe Park Road East and Sunningdale Road East. As shown in Figure 3 below, the City of London’s Official Plan designates the land types adjacent to the Adelaide Street North study area as Neighbourhoods, Shopping Areas, Green Space (including Powell Drain) and Main Street.

FIGURE 3: EXISTING OFFICIAL PLAN LAND USE DESIGNATIONS



Source: The London Plan (2016)

3.3 Natural Environment

A scoped Environmental Impact Study (EIS) was completed to verify and document existing natural heritage features within the study area in accordance with the City of London Official Plan (OP) and the City of London Environmental Management Guidelines. A general overview of the study area's natural environment features is discussed below, with the detailed Environmental Impact Study provided in **Appendix C**.

3.3.1 TERRESTRIAL RESOURCES

Vegetation Communities

A total of 139 species were documented, representing 48 families, of which 52% of the species are native and 48% considered introduced. A floristic quality assessment was completed to assess the overall quality of habitat based on species composition and their assigned coefficient of conservatism (CC). Each species is assigned a CC value based on their tolerance to disturbance and fidelity to a specific habitat type. The mean CC value was determined to be 2.8 which is indicative of disturbed sites. CC values above four (4) are more closely associated with specific habitats. There were no Species of Conservation Concern (SoCC) or Species at Risk (SAR) confirmed within the study area. A complete list of species and summary of vegetation communities documented is provided in **Appendix C**.

Significant Wildlife Habitat

An assessment of significant wildlife habitat (SWH) was completed within the study area. SWH are discussed in Policies 1352 through 1355 of *The London Plan*.

Policy 1354 states "The significance of wildlife habitat will be assessed following the processes outlined in the Natural Heritage Reference Manual. Applicants shall evaluate the significance of wildlife habitat using criteria outlined in the Ministry of Natural Resources and Forestry's Significant Wildlife Habitat Technical Guide, the Natural Heritage Reference Manual, and associated Ecoregion 7E Criteria Schedule. The following will also be considered:

1. It is an area of habitat where particularly important wildlife species are concentrated or are particularly susceptible to impacts for a specific period of their life cycle. These areas include but are not limited to: seasonal concentration areas; rare vegetation communities; specialized habitat for wildlife; habitat for special concern species; habitat for species of conservation concern; and animal movement corridors.
2. The amount of the specific type of habitat that exists within the context of the ecological region and its representation within other components of the Natural Heritage System. In the City of London, examples of under-represented habitat types include marshes, tall grass prairie and savannah, bog, fen, bluff, shallow aquatic and open aquatic.
3. It is an area of habitat having a high diversity of species that are of value for research, conservation, education and passive recreation opportunities.

A SWH assessment was completed for the study area in accordance with the SWH Criteria Schedule for Ecoregion 7E (MNR 2015). The assessment of each of the SWH types and SoCC screening is provided in **Appendix C**. A summary of the confirmed and Candidate Significant Wildlife Habitat (cSWH) types found within the Study Area are summarized below and are detailed in **Appendix C**.

Confirmed SWH

- Snapping Turtle – this species was confirmed in the upstream floodplain of Powell Drain during field investigations in July 2019. Habitat for this species is considered to be Powell Drain and the associated wetlands.
- Monarch – this species was confirmed throughout the Study Area, although SWH is considered to be the meadow communities located north of Sunningdale Road East.
- Terrestrial Crayfish – confirmed habitat was identified by NRSI in 2016 in the marsh community located near the corner of Sunningdale Road East and Adelaide Street North. This habitat was not confirmed during the 2019 field investigations but is assumed present as conditions remain suitable.

Candidate Significant Wildlife Habitat (cSWH)

- Turtle Nesting Areas, Turtle Wintering Areas, Midland Painted Turtle and Northern Map Turtle – candidate habitat was identified for the portion of the provincially significant wetlands (PSW) south of Sunningdale Road East.
- Amphibian Breeding Habitat (Wetland, Amphibian Movement Corridors and Terrestrial Crayfish - candidate habitat was identified within the PSW units located north and south of Sunningdale Road East.

3.3.2 AQUATIC RESOURCES

Aquatic Habitat

The study area is located in the Stoney Creek watershed in the Upper Thames River basin. The primary drainage feature found within the study area is Powell Drain, which crosses under Adelaide Street North between Blackwater Road and Phillbrook/Grenfell Drive. Secondary surface water features consist of roadside ditches, small isolated wetlands, an offline storm water management pond (SWMP), and Worrall Drain.

Powell Drain

Powell Drain originates northwest of the study area, through which it permanently flows. Powell Drain is a municipal drain that has not yet been designated under the Municipal Drain Classification System. Based on the preferences of the fish community in the drain, the thermal regime of Powell Drain is considered to be cool.

As Powell Drain crosses Adelaide Street North, many differences in the creek were noted, including: morphology, temperature, riparian habitat and shade, cover, water quality, and fish community. As such, two separate reaches are discussed as upstream and downstream, with Adelaide Street North being the boundary. It should be noted that there is flow through the culvert under the road, and hence hydrologic connectivity, but debris buildup at the culvert inlet grate appeared to be posing a barrier to fish migration. A second barrier to fish passage was noted in the downstream reach in the form of a perched steel grade control structure approximately 40 m downstream of the culvert outlet, east of Adelaide Street North. Field investigations observed that the water flowing over the sheet pile wall fell approximately 1 m before hitting gabion baskets in the channel below. Future channel or culvert rehabilitation projects could improve fish habitat in this section of drain by replacing the gabion baskets with round stone to prevent potential entrapment of aquatic animals. Additional future improvement projects should consider removing the sheet

pile grade control wall and designing the channel to gradually raise the streambed such that fish may pass (i.e., via rocky ramp).

Upstream of Adelaide Street North

This section of Powell Drain originates to the west of the study area and flows east, towards Adelaide Street North. This section of the watercourse is associated with significant valleylands. The creek morphology in this section was generally flat and meandering through a grassy floodplain. The channel widened at the culvert inlet and the water spread out over a substrate of predominantly silt, over 0.5 m deep. The natural debris that had built up at the grate over the culvert inlet appeared to be promoting the settling of sediments, as typically observed in similar watercourses. There were several species of aquatic plants including Curly Pondweed (*Potamogeton crispus*), American Pondweed (*Potamogeton nodosus*), Widgeon Grass (*Ruppia maritima*), Water Celery (*Vallisneria americana*) and watercress, which suggests evidence of groundwater in this reach.

Downstream of Adelaide Street North

This section of Powell Drain begins at the culvert outlet at Adelaide Street North and flows to the south east for approximately 40 m. The creek in this section is characterized by a narrower and straighter channel comprised of a riffle-run morphology flowing through a deciduous forest. There were fewer instream plants in this reach, with watercress noted in several spots. This section of the drain was mostly shaded and therefore cooler than upstream. The relatively short reach ended abruptly at a sheet pile grade control wall built across the channel. The wall was perched over 1 metre, creating a barrier to fish migration.

Downstream of Sheet Pile Grade Control

This section of Powell Drain begins downstream of the sheet pile wall across the channel and flows south east to Blackwater Road. Approximately 20 m from the sheet pile grade control, a concrete culvert with headwall, wingwalls, spillway and concrete energy dissipation risers entered the channel from south. At the outlet of this culvert was the deepest pool in the study area and the coolest water temperature. This was also where the most diverse fish community was observed. Instream vegetation consisted of watercress, tape grass, and pondweed. This section of the drain meandered through a riparian buffer of deciduous forest.

Worral Drain

At the north end of the study area, Worral Drain runs parallel to Adelaide Street North west of the road, in a southward direction towards the Sunningdale Road East intersection. The watercourse then crosses under Adelaide Street North draining to the southeast corner of the intersection, where it empties into the west branch of the Northdale Tributary. According to NRSI (2016), the west branch of the Northdale Tributary has been realigned, and now flows from the southeast corner of the Adelaide Street North and Sunningdale Road intersection, east towards its main branch. Field investigations in the summer of 2019 confirmed the Class F (intermittent; Municipal Drain Classification System) drain designation, as the majority of the channels were dry. Shallow, stagnant water was observed at the culvert outlet at the southeast corner of the intersection.

Fish Community

Through the study area from upstream to downstream of Adelaide Street North, the Powell Drain was determined to provide suitable habitat to support a warm to cool water fishery. There were no aquatic SAR identified through background sources including Natural Heritage Information Centre (NHIC) and

Department of Fisheries and Oceans (DFO) SAR mapping, and none were identified in the field. Fish species information received from the MNRF (2018) concludes that the drain also supports Bluntnose Minnow (*Pimephales notatus*), Greenside Darter (*Etheostoma blennioides*), Johnny Darter (*Etheostoma nigrum*), Northern Redbelly Dace (*Chrosomus eos*), and Spottfin Shiner (*Cyprinella spiloptera*). All these species are bait or forage fish that are common in Ontario and generally tolerant of degraded or altered watercourses with warm to cool water.

The fish community in Powell Drain was sampled in the summer of 2019 in the three distinct reaches separated by physical barriers; the list of species collected is presented in **Appendix C**.

Upstream of Adelaide Street North there were three fish species collected in the Powell Drain, representing a common, tolerant baitfish community. Immediately downstream of the Adelaide Street North culvert, up to the sheet pile barrier, there was only one fish captured. Further downstream, however, in the reach with no noted migratory obstructions that flows into Stoney Creek, ten fish species were collected. These species were generally widespread and common in both Ontario and Canada and make up a fish community that is best described as a tolerant, baitfish community. This downstream Powell Drain fish community represented a diverse, cool water community.

No freshwater mussels or dead valves were observed in or along the banks of the Powell Drain. Stoney Creek is known to provide habitat for several species of mussel, however, given the fish migration barriers noted in Powell Drain in the study area, it is unlikely that mussels would be found in the system upstream of the sheet pile wall.

3.3.3 SPECIES AT RISK – HABITAT OF ENDANGERED AND THREATENED SPECIES

The background review identified 18 SAR that have the potential to occur within the Study Area. A SAR screening assessment was completed to determine the likelihood of occurrence within the Study Area, with the results provided in **Appendix C**. Based on the results of the screening and field investigations, only one SAR, Barn Swallow, was confirmed foraging in the Study Area. There were no confirmed nests observed during the field investigations; only foraging habitat was identified. Other species identified as having potential to occur include SAR bats (i.e., individual snag trees (although none were confirmed) and forested communities), Bobolink and Eastern Meadowlark (i.e., hay fields and cultural meadow north of Sunningdale Road East), and Common Nighthawk (naturalized communities north of Sunningdale Road East). Potential impacts to these species are considered limited as the Project is not expected to significantly encroach within the areas identified as potential habitat.

3.3.4 DESIGNATED AREAS AND FEATURES

Significant Woodlands

This section discusses the presence/absence of significant woodlands (i.e., those previously evaluated), woodlands (unevaluated) and unevaluated vegetation patches within the study area. Significant woodlands and woodlands are discussed in Policies 1337 through 1343 of The London Plan, while unevaluated patches are discussed in Policies 1383 through 1386. The desktop study and field investigations determined there are no significant woodlands, woodlands (unevaluated) or unevaluated vegetation patches within the Study Area. Policies 1337 and 1339-1343 of the London Plan are under appeal.

Provincially Significant Wetlands, Wetlands and Unevaluated Wetlands

This section discusses the presence/absence of provincially significant wetland (PSWs), wetlands and unevaluated wetlands within the study area. PSWs, wetlands and unevaluated wetlands are discussed in Policies 1330 through 1336 of The London Plan.

The desktop study identified a PSW within the Study Area, specifically the Arva Moraine Wetland Complex (UT 15), as confirmed during the field investigations. There were other wetlands also identified within the study area as part of the ELC characterization. These wetlands would be too small to evaluate under the Ontario Wetland Evaluation System but would be protected under the City of London wetland policies. Field investigations completed for the Project confirmed the desktop findings.

The Arva Moraine Wetland Complex "UT 1") encompasses approximately 63.6 ha, representing 70% swamp and 30% marsh. This PSW is bisected Adelaide Street North, with three polygon units within the Study Area. These include:

- Two polygon units associated with Powell Drain, located south of Sunningdale Road East between Blackwater Road and Phillbrook Drive. This portion of the PSW includes a marsh community on the west side of Adelaide Street North and a swamp community to the east.
- One polygon unit north of Sunningdale Road East towards the northern limit of the Study Area. This portion of the PSW is located on the west side of Adelaide Street North and is characterized as a marsh community.

Permitted activities and uses for infrastructure projects are discussed in Policies 1395 through 1402. With respect to infrastructure within or adjacent to the Natural Heritage System, Policy 1396_ states "*New or expanded infrastructure shall be permitted within the Natural Heritage System only where it is clearly demonstrated through an environmental assessment process under the Environmental Assessment Act, including an environmental impact study, that it is the preferred alternative for the location of the infrastructure.*" The EIS provided in **Appendix C** is intended to meet the requirements of the Policies in The London Plan. Note that policies 1334 and 1401 of the London Plan are under appeal. A discussion on impacts and mitigation measures within and adjacent to natural heritage features are outlined in Section 8.3.

Regulated Lands

The Upper Thames River Conservation Authority (UTRCA) administers the Ontario Regulation (O. Reg.) 157/06: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses under Section 28 of the Conservation Authorities Act. Under O. Reg. 157/06, a permit is required for development, site alteration, construction, or placement of fill within the Regulated Limit. A permit is also required for interference with a wetland or any alteration to an existing watercourse within the Regulation Limit. Consultation with UTRCA is recommended during detailed design to confirm all permitting requirements.

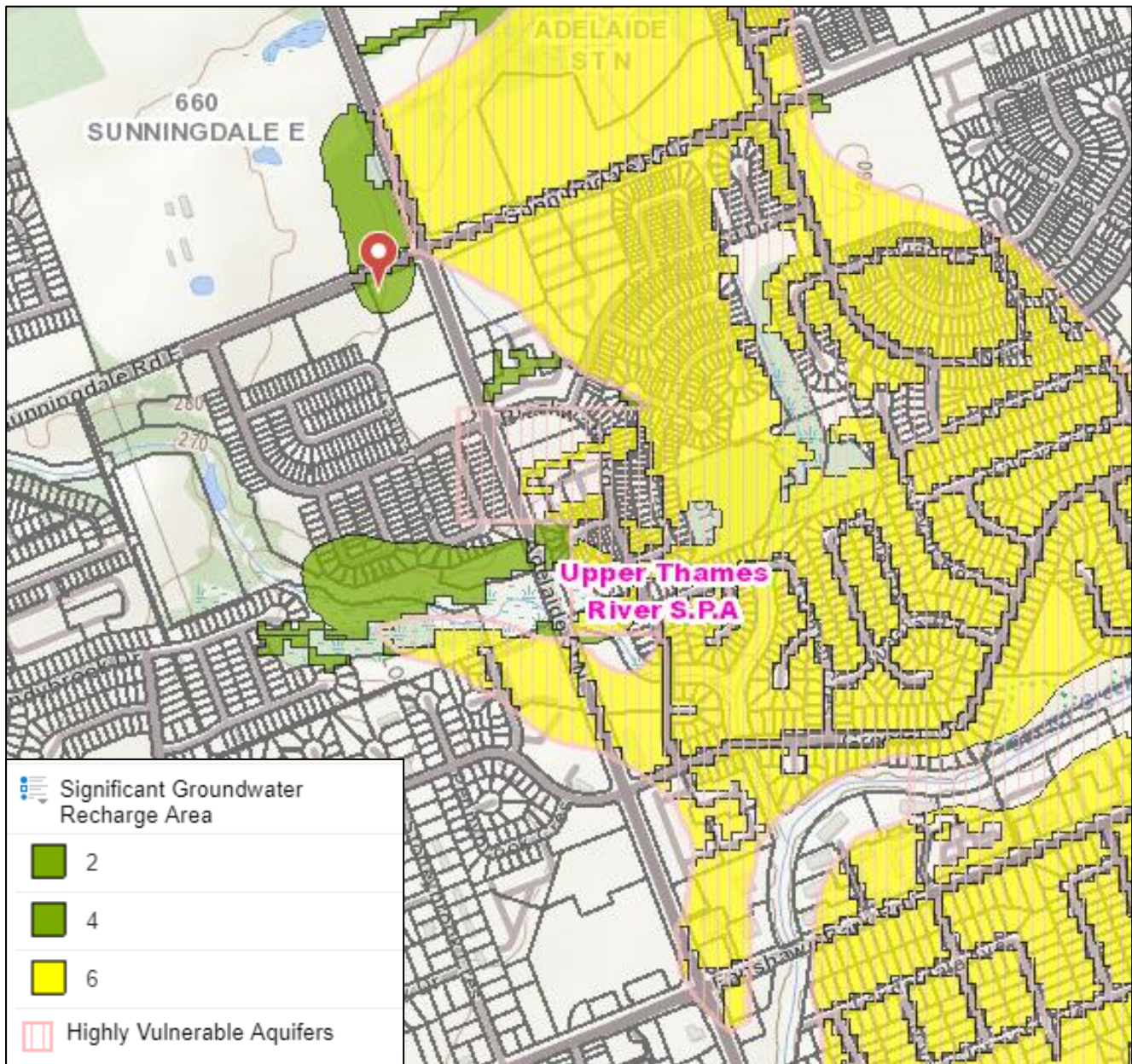
3.3.5 SOURCE WATER PROTECTION

Municipal Class EAs must give consideration to the Clean Water Act (2006), which seeks to stop contaminants from getting into sources of drinking water. Significant Groundwater Recharge Areas (SGRA) and Highly Vulnerable Aquifers (HVA) were identified throughout the Adelaide Street North study area. No Wellhead Protection Areas (WHPA) nor Intake Protection Zones (IPZ) were identified in the study area. These areas are shown in **Figure 4** below. The vulnerability scores provided for the SGRAs correspond to

medium (4) and high (6) vulnerability areas. These values indicate the relative level of each areas' susceptibility to activities that can affect drinking water sources.

Best Management Practices (BMPs) will be employed during construction work to prevent contaminants and other unwanted materials from entering surface and groundwater throughout the whole study area. This includes maintaining accessible spill kits on site near refueling locations and storage locations for fuel and other contaminants including pesticides, waster or sewage. Any groundwater takings required to support construction activities will be completed under the appropriate Provincial and Municipal permit(s), as required. A detailed erosion and sediment control (ESC) plan should be developed during detailed design to prevent erosion and sedimentation during construction. ESC will prevent sediment inputs into surface water features, but additional ESC considerations should be given in areas with near-surface groundwater. Based on the location of the Project Area and the works proposed as part of the EA, no long-term impacts to the hydrogeological regime are anticipated.

FIGURE 4: SIGNIFICANT GROUNDWATER RECHARGE AREA & HIGHLY VULNERABLE AQUIFER AREA



3.4 Existing Geotechnical Conditions

A preliminary geotechnical assessment of the study area was completed in November 2018. A summary of the existing geotechnical conditions within the study area is provided below, with complete details provided in the Preliminary Geotechnical Assessment Report in **Appendix D**. The geotechnical investigation completed was primarily a desktop review, and additional investigations would be required for any deep servicing and/or trenchless infrastructure installations. Subsurface Utility Engineering and additional investigations would be required to confirm construction methods during detailed design.

To supplement and update existing available subsurface data, a total of seven new boreholes were drilled within the study area along Adelaide Street North and Sunningdale Road East. It was noted the existing ground surface elevation varies from about 251.5 metres at Fanshawe Park Road East (south limit) to about 266 metres at the north limit of the site.

The study area is located in the physiographic region of southwestern Ontario known as the Stratford Till Plain. The Stratford Till Plain is a broad clay plain predominately of fine-grained (silt and clay) glacial till extending across the north end of London. The soil conditions encountered in the boreholes drilled along the subject portion of roadway generally consisted of the pavement structure overlying fill, silts and sands which were, in turn, underlain by silty clay, clayey silt and glacial till.

Groundwater levels were observed in the existing open boreholes during drilling and, on completion of drilling and sampling, and subsequently in the monitoring wells installed. Groundwater was encountered at depths of about 1.2 to 3.4 metres and measured groundwater depths ranged from about 1.3 to 4.9 metres. It should be noted that the existing boreholes were drilled over a period of several decades and during various seasons. Seasonal variations in groundwater levels should be anticipated. Development activities and subsequent to the dates of the previous explorations can also significantly impact groundwater levels.

The condition of the existing Adelaide Street North and Sunningdale Road East pavements is generally fair to good throughout the project area. However, localized areas of longitudinal, transverse and alligator cracking with patches were observed north of Sunningdale Road East within the southbound lane and within the intersection of Sunningdale Road East.

3.5 Cultural Heritage Environment

3.5.1 ARCHAEOLOGICAL RESOURCES

A Stage 1 Archaeological Assessment (AA) and limited Stage 2 assessment was completed for the study area. The study area was initially determined to have archaeological potential, however a property inspection revealed that the Study Area has been subject to deep and extensive disturbance from the previous construction of roads, sidewalks, driveways, ditches, buried utilities and landscaping. As such, archeological potential has been removed and no further archeological work is necessary.

Background researched revealed that a portion of a pre-contact Indigenous campsite, registered as the Adelaide-Fanshawe site (AgHh – 168) had been previously documented at the southern end of the Study Area near the intersection of Adelaide Street North and Fanshawe Park Road East. Following advice received from the Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI), the area where the site existed was subject to a Stage 2 test pit survey to determine whether the site existed within the current Study Area and/or to document disturbance. The Stage 2 survey found that the entire study area has been subject to previous disturbance down to natural subsoil. As such, all archaeological potential has been removed from the entire Study Area and no further archaeological work is necessary.

Based on the results of the Stage 1-2 Archaeological Assessment, it is concluded that due to complete and intensive previous disturbances there is no potential for archaeological resources within the limits of the Study Area, and as such, no further archaeological work is recommended. The complete Stage 1 and 2 Archaeological Assessment Report is provided in **Appendix E**.

3.5.2 CULTURAL HERITAGE RESOURCES

A Cultural Heritage Assessment Report (CHAR) was conducted for the study area. Based on the results of background research and field investigations, one designated protected heritage property was identified at 660 Sunningdale Road East. The boundaries of the protected heritage property are directly adjacent to the proposed works on Adelaide Street North, but efforts are underway to amend the designation to a smaller parcel around the property's two red tile barns. The complete Cultural Heritage Assessment Report is provided in **Appendix F**.

3.6 Drainage and Stormwater Management

A Drainage and Stormwater Management (SWM) Report was prepared to document the existing drainage patterns and floodplain condition, as well as to assess the hydraulic performance of culvert crossing in the study limit. The study area lies within the Stoney Creek Subwatershed regulated by the Upper Thames River Conservation Authority (UTRCA). The existing subwatershed boundaries, water crossings and the existing drainage patterns with delineated road drainage sub-areas for Adelaide Street North in the study area are shown in



Figure 5 below.

The existing drainage patterns of Adelaide Street North from Fanshawe Park Road East to Sunningdale Road East mainly cross high-density residential areas. The Stoney Creek Subwatershed is being crossed by Adelaide Street North within the study limit at approximately 700m north of Fanshawe Park Road East. As shown in



Figure 5, three hydrologic reference points (HRPs) have been identified for the overland drainage patterns and the existing outlets within the study limits.



FIGURE 5: EXISTING DRAINAGE PATTERNS

HRP1 represents major overland flow as well as minor system flows from the north boundary of the study limit to Sunningdale Road East, which is conveyed southerly towards the Creek. **HRP2** represents the road drainage to the water crossing at the Adelaide Street North where the culvert is located. **HRP3** is at the south study limit close to Fanshawe Park Road East.

As shown in



Figure 5, the Powell Drain discharges the north-west segment tributary areas of the Stoney Creek watershed along the creek and crosses Adelaide Street North through a culvert. The Powell Drain wetland is located upstream of the culvert and an orifice-weir structure is installed immediately upstream of the culvert inlet headwall. The orifice-weir structure is designed and installed to provide a low flow regime in the creek and enhance the ecology of the wetland.

Parsons conducted two site visits, separately on June 27th, 2018 and October 16th, 2018. In both site visits, it was observed that the orifice-weir structure immediately upstream of the culvert crossing at Adelaide Street North is clogged with vegetation and debris. This clogging will have an impact on the discharge coefficient of the structure and reduce the discharge performance, which will eventually increase the water level in the wetland, particularly at storm events.

Additional information regarding existing drainage and stormwater management features within the study corridor is provided in **Appendix G**.

3.7 Utilities and Services

Aerial telecommunication and hydro utilities are present along Adelaide Street North and Sunningdale Road East. Based on preliminary information reviewed during the completion of the EA, it is noted there is a significant Imperial Oil pipeline crossing of Adelaide Street North, midblock between the Powell Drain and Phillbrook Drive/Grenfell Drive intersection. Proposed work in proximity to the Imperial Oil pipeline

would require consultation with the affected utility and adherence to Imperial Oil's 3rd Party Requirements. As noted in Imperial Oil's Facility Safety Guide, any ground disturbance within 30 metres of the pipeline Right of Way requires permission from Imperial Oil's third-party request team at thirdpartyrequests@esso.ca.

Within the project area, there is an existing 600mm concrete (CPP) watermain on Adelaide Street North from Sunningdale Road East to Grenfell Drive, an existing 300mm ductile iron (DI) watermain on Adelaide Street North from Philbrook Drive to Fanshawe Park Road East and an existing 1200mm concrete (CPP) watermain on Sunningdale Road East from the east limit of the project to the west.

The 2014 Water Servicing Development Charge Background Study identified that a 1050mm diameter watermain is to be constructed on Adelaide Street North, north of Sunningdale, and a 900mm diameter watermain is to be constructed on Adelaide Street North from Sunningdale Road south to Huron Street. The timing for this work is beyond a 20-year timeframe. However, a change in alignment has been made based on the Arva Pumping Station to Huron Street Water Transmission Main Master Plan in 2021, which states a need for a future 1050mm watermain along Fanshawe Park Road and through the intersection of Fanshawe and Adelaide St N. Further details can be developed during the detailed design phase.

The presence of all subsurface utilities within the study area such as buried telecom, gas and municipal servicing will need to be confirmed during the detailed design phase through the completion of Subsurface Utility Engineering investigations.

3.8 Illumination

Illumination along Adelaide Street North is provided by a combination of steel light posts and lamp poles affixed to wooden hydro poles. The source of illumination varies along the corridor between the west and east sides. Lighting on the approaches to the intersection of Adelaide Street North and Fanshawe Park Road East are provided by steel light posts from the median with two masts. Adelaide Street North, north of Sunningdale Road East is currently a rural cross section with no illumination. Illumination along Sunningdale Road East within the study area is provide by a combination of lamp poles affixed to hydro poles along the south side of the roadway and segments of steel light posts along the north side. Future lighting requirements for both the Adelaide Street North and Sunningdale Road East corridors will need to be confirmed during the detailed design process and meet the City's street lighting design standards.

4 Alternative Solutions

Under Phase 2 of the Municipal Class EA process, all reasonable solutions, or planning alternatives, to address the study objectives and opportunities (i.e. problem statement) are identified and described, including the "Do Nothing" alternative, which is typically included to represent the status quo, in which no improvements are made and traffic conditions continue to proceed as forecasted. Following the completion of general inventories of the natural, social, cultural and economic environments, the alternatives are evaluated based on the potential impacts, resulting in a recommended solution. The recommended solution is then presented to the public, stakeholders and technical agencies to solicit input into the selection of the "preferred solution".

4.1 Development of Alternative Solutions

For this study, alternative solutions to address the issues identified in the study problem statement were developed for Adelaide Street North, taking into consideration factors such as the existing environment, recommendations from previous studies, and input from the public, stakeholders and technical agencies.

4.1.1 ALTERNATIVE SOLUTIONS

Table 4 identifies the alternative planning level solutions that were developed to address the identified issues for the Adelaide Street North corridor.

TABLE 4: ALTERNATIVE SOLUTIONS CONSIDERED FOR ADELAIDE STREET NORTH

Alternative Solutions		Description
1	Do Nothing	Maintain existing roadway network and provide no changes to Adelaide Street North (this alternative was selected as a baseline for comparison of alternative solutions).
2	Limit Development	Restrict development in the surrounding area to projects already underway in order to limit growth.
3	Incorporate Travel Demand Management (TDM) Measures	Introduce TDM measures to reduce or redistribute the travel demand (e.g. carpooling, workplace changes, pricing, etc.).
4	Improve Alternative Routes	Undertake improvements (capacity or operational) on adjacent roads where justified (e.g. Highbury Avenue, Richmond Street).
5	Operational / Intersection Improvements	Improve existing intersection operations and undertake roadway geometric improvements (roundabouts, traffic signals, through lanes, turn lanes, etc.).
6	Provide Additional Lanes	Widen Adelaide Street North with additional lanes to increase traffic capacity and accommodate future growth.
7	Accommodate other Modes	Improve existing facilities to encourage active transportation (walking, cycling, etc.) and improve Adelaide Street North/Sunningdale Road East to accommodate existing transit services.

4.2 Evaluation Criteria

To select the alternative solution(s) that best addresses the Problem Statement, a broad range of evaluation criteria were developed, representing the environment as defined in the Ontario Environmental Assessment Act. These criteria were categorized along five main groups: Transportation/Technical, Cultural, Socio-Economic, Natural, and Cost. **Table 5** below describes the criteria used in evaluating the alternative solutions in further detail.

TABLE 5: DESCRIPTION OF EVALUATION CRITERIA

Criteria	Description
Transportation/Technical	
Traffic Operations/Performance	Will the alternative be able to adequately accommodate the projected traffic volumes?
Active Transportation	Is the alternative able to provide facilities that support active transportation?
Transit Services	Is the alternative able to provide facilities that support transit use?
Stormwater	What effect will the alternative have on stormwater and drainage?
Cultural	
Archaeological Resources	Will the alternative impact existing archaeological resources?
Cultural and Built Heritage	Will the alternative impact existing cultural landscapes/built heritage resources?
Socio-Economic	
Planning Policies and Objectives	Does the alternative meet the objectives of provincial and local policies and plans, such as Ontario's Provincial Policy Statement (PPS), the City's Official Plan and the City's Transportation Master Plan?
Property	Will the alternative require the purchase/acquisition of property?
Construction Disruption	What effect will the construction of the alternative have on the existing usage of the road?
Noise	How will the alternative impact the noise levels along the corridor?
Commercial and Residential Access	Will the alternative impact the access for commercial/residential properties adjacent to Adelaide Street North?
Natural	
Aquatic Species/Watercourses	What impacts does the alternative have on the existing fish community, their habitats and watercourses?
Wildlife and Wildlife Habitat	What impacts does the alternative have on the existing wildlife and their habitats?
Species-at-Risk (SAR)	What impacts does the alternative have on SAR in the area?
Locally Designated Areas	What impacts does the alternative have on locally designated areas?
Vegetation	What impacts does the alternative have on surrounding vegetation?
Surface Water	How will the alternative impact the surface water along the corridor?
Ground Water	How will the alternative impact the ground water along the corridor?

Cost	
Capital Cost	What is the cost to construct the alternative?
Property Cost	What will be the cost to acquire the property needed for the alternative?
Utilities	What will be the cost to relocate utilities that will be impacted by the alternative?
Operation and Maintenance Cost	What will be the cost to maintain and operate the alternative?

4.3 Evaluation of Alternative Solutions

A comparative evaluation of the alternative solutions discussed in **Section 4.1.1** was carried out against the criteria described in **Section 4.2**. The results of the evaluation are presented in **Table 6**.

Table 6: Evaluation of the Alternative Solutions for Adelaide Street North

Alternative	Evaluation Factors					Prelim. Recommendation
	Transp./ Technical	Cultural	Socio-Economic	Natural	Cost	
1. Do Nothing	Does not address the transportation needs of the area.	No impacts to the cultural environment.	Inconsistent with the City's plans and policies. No other socio-economic impacts.	No impacts to the natural environment.	No additional costs.	Do not carry forward.
2. Limit Development Growth	Does not address the transportation needs of the area.	No impacts to the cultural environment.	Inconsistent with the City's plans and policies. No other socio-economic impacts.	No impacts to the natural environment.	No additional costs.	Do not carry forward.
3. Incorporate Travel Demand Management (TDM) Measures	Partially addresses the transportation needs of the area.	Potential impacts to the cultural environment.	Consistent with the City's plans and policies with potential for other socio-	Potential impacts to the natural environment.	Low to moderate capital and operation costs.	Carry forward in combination with other alternatives.

Alternative	Evaluation Factors					Prelim. Recommendation
	Transp./ Technical	Cultural	Socio-Economic	Natural	Cost	
			economic impacts.			
4. Improve Alternative Routes	Does not address the transportation needs of the area.	Potential impacts to the cultural environment.	Inconsistent with the City's plans and policies and potential for other socio-economic impacts.	Potential impacts to the natural environment.	Significant capital costs and potentially other costs.	Do not carry forward.
5. Operational / Intersection Improvements	Partially addresses the transportation needs of the area.	Potential impacts to the cultural environment.	Consistent with the City's plans and policies with potential for other socio-economic impacts.	Potential impacts to the natural environment.	Moderate to significant capital costs and potential utility and property costs.	Carry forward in combination with other alternatives.
6. Provide Additional Lanes	Partially addresses the transportation needs of the area.	Potential impacts to the cultural environment.	Consistent with the City's plans and policies with potential for other socio-economic impacts.	Potential impacts to the natural environment.	Significant capital costs, increase in operation costs and potential utility and property costs.	Carry forward in combination with other alternatives.
7. Accommodate Other Travel Modes	Partially addresses the transportation needs of the area.	Potential impacts to the cultural environment.	Consistent with the City's plans and policies with potential for other socio-economic impacts.	Potential impacts to the natural environment.	Moderate to significant capital costs and potential utility and property costs.	Carry forward in combination with other alternatives.

4.4 Selection of Alternative Solutions

Through the evaluation of the alternative solutions for Adelaide Street North, Alternatives 3, 5, 6 and 7 were recommended to be carried forward as a combined approach to address the problem statement. This includes using TDM measures, operational and intersection improvements, additional lanes, and accommodating other modes of travel.

5 Alternative Design Concepts for the Preferred Solution

5.1 Design Criteria and Cross Section Requirements

In developing alternative and recommended design concepts for the Adelaide Street North and Sunningdale Road East corridors, the following design criteria was developed to provide consistent design standards for incorporation into the design options. The design criteria was developed based on the City of London’s current policies, plans and design standards including the *Complete Streets Design Manual*; Transportation Association of Canada (TAC); City of London Design Specifications and requirements Manual and the Ontario Traffic Manual (OTM). It is noted the preferred right of way for Civic Boulevards is 36m as per the *City’s Complete Streets Design Manual*. An overview of the preliminary design criteria used during the EA process is provided in **Table 7** below. It should be noted Adelaide Street North is a rural-cross section north of Sunningdale with shoulders/ditches. Given the 10-year horizon for anticipated construction, the preliminary Design Criteria listed below will need to be confirmed and expanded on during the detailed design process.

TABLE 7: PRELIMINARY DESIGN CRITERIA SUMMARY

	Design Standards		Adelaide Street North and Sunningdale Road East Corridors Proposed Design	
Roadway Classification	Major Urban Arterial –Divided Civic Boulevard		Major Urban Arterial – Divided Civic Boulevard	
Design Speed	70 km/hr		70 km/hr	
Posted Speed	60 km/hr		60 km/hr	
Alignment	Minimum	Maximum	Minimum	Maximum
Radius	2200m	-	2200m	2200m
Grade	0.50%	6.00%	0.50%	4.25%
Intersection Corner Radius	13m	13m	13m	13m
Lane Widths				
Thru Lane	3.30m	3.50m	3.30m	3.3m¹
Curb Lane	3.50m	4.0m	3.50m	3.5m
Right Turn Lane	3.00m	-	3.00m	3.5m
Left Turn Lane	3.00m	-	3.00m	3.0m

Median Width	2.00m	4.50m	2.00m	4.50m
Sidewalk Widths	1.50m	2.00m	1.50m	2.00m
Multi-Use Path	3.00m	4.00m	3.00m	-
Cycle Track	1.50m	1.80m	1.5m	1.8
Boulevard Width	1.00m	Varies	1.00m	Varies

¹Note: Sunningdale Road East design incorporated from previous EA which included 3.5m through lanes.

Based on the outcome of the City’s Climate Emergency Screening Tool applied to major transportation projects, the reconstruction of strategic streets in growing areas that are missing components of pedestrian, cycling and transit amenities are recommended for construction to a four-lane Civic Boulevard Complete Street as a standard, cost-effective approach to enable sustainable mobility choices, support growth and accommodate municipal and emergency services.

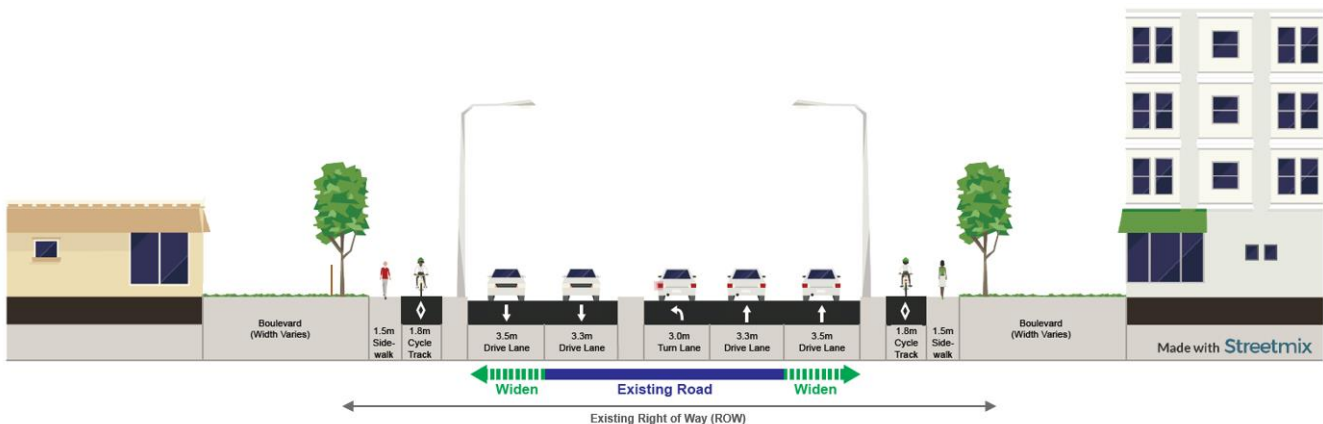
It is noted minor deviations from the intended design criteria may occur under some circumstances such as where there are no major revisions to existing conditions and the existing geometry has not contributed to safety concerns and/or would be cost prohibitive to modify.

5.2 Alternative Design Concepts

Based on the preferred solution to provide additional lanes, accommodate other travel modes, improve operations and intersections and incorporate TDM measures, three alternative design concepts shown in **Figures 6 to 8** were considered for the Adelaide Street North corridor. Recommendations for Sunningdale Road East were mostly unchanged from the previous Sunningdale Road East Environmental Assessment Study. Each concept for the Adelaide Street North corridor featured two lanes of traffic in each direction, cycle tracks and sidewalks on each side, centre medians and dedicated turning lanes. The three concepts varied in terms of the extent of the widening either from centreline, to the west, or to the east.

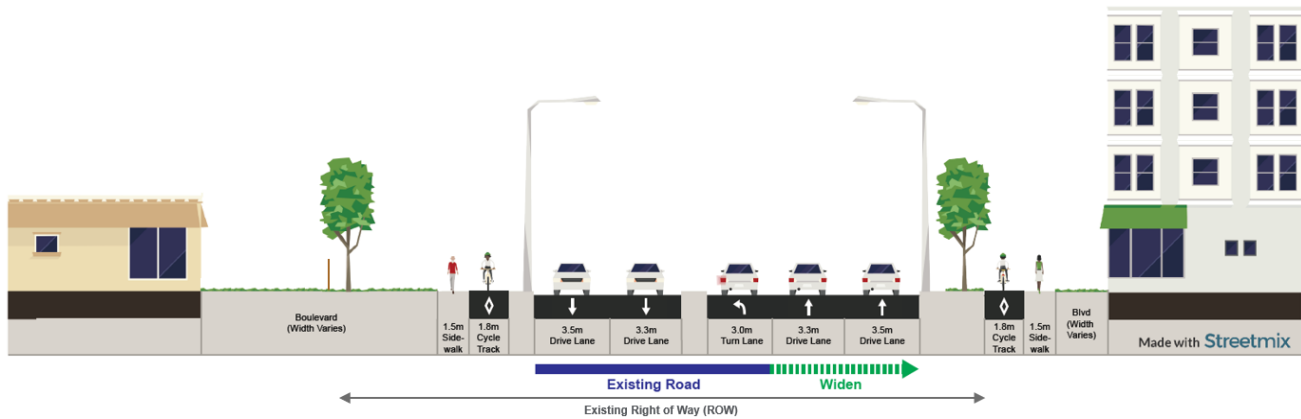
Option 1: Widen from the Centerline. This option generally widens Adelaide Street North from the centerline of the roadway (even widening on both the west and east side).

FIGURE 6: OPTION 1: WIDEN FROM CENTERLINE



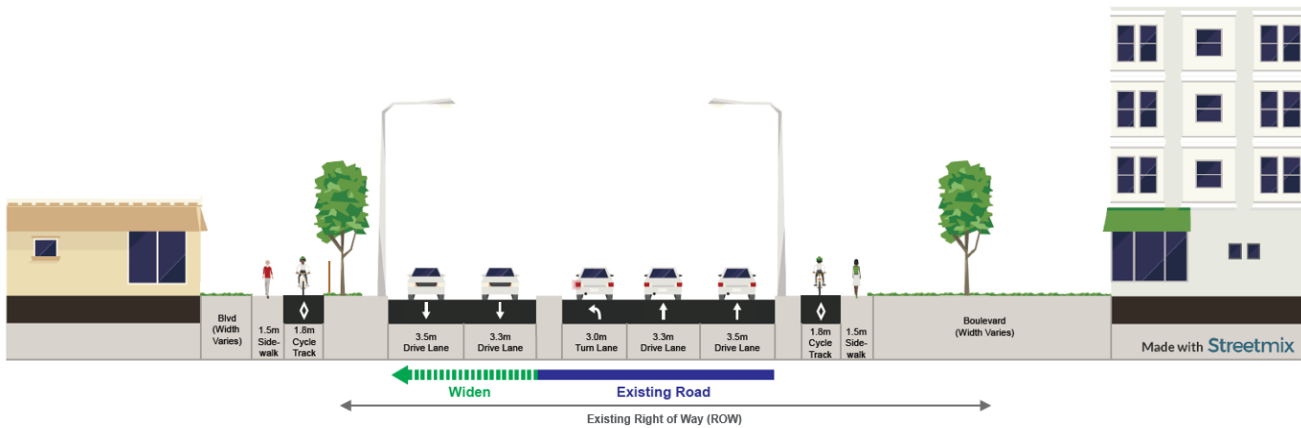
Option 2: Widen to the East. This option generally widens Adelaide Street North to the east side, while mostly maintaining the westside.

FIGURE 7: OPTION 2: WIDEN TO THE EAST



Option 3: Widen to the West. This option generally widens Adelaide Street North to the westside, while mostly maintaining the east side.

FIGURE 8: OPTION 3: WIDEN TO THE WEST





















5.3 Evaluation of Alternative Design Concepts



















In evaluating the options to improve the Adelaide Street North corridor and Sunningdale Road East intersection, consideration was given to the technical requirements of the City, as well as impacts on the area’s natural, cultural, social and economic environments. The Alternative Design Concepts were evaluated by determining each alternative’s impacts in the broad categories listed in **Table 5** which are consistent with the criteria used to evaluate the alternative solutions.



















An overview of the evaluation of Alternative Design Concepts is outlined in **Table 8** below. The performance of each alternative was compared to the evaluation criteria using a “positive”, “neutral” or “negative” impact.

TABLE 8: EVALUATION OF ALTERNATIVE DESIGN CONCEPTS



Evaluation Criteria	Alternative Design Concepts		
	1	2	3
	Widen from Centerline	Widen to the <u>East</u>	Widen to the <u>West</u>
Transportation / Technical			
Traffic Operations and Capacity			
	Will meet traffic capacity needs on Adelaide Street North.	Will meet traffic capacity needs on Adelaide Street North.	Will meet traffic capacity needs on Adelaide Street North.
Roadway Safety			
	Provides most boulevard space on both east and west sides.	Limits boulevard space on east side.	Limits boulevard space on west side.
Active Transportation			
	Accommodates improvements to active transportation facilities and improves connectivity.	Accommodates improvements to active transportation facilities and improves connectivity.	Accommodates improvements to active transportation facilities and improves connectivity.
Drainage and Stormwater Management			
	Increased run-off from road widening, however no impacts to existing Powell Drain Culvert Crossing.	Increased run-off from road widening and impacts to the existing Powell Drain Culvert Crossing.	Increased run-off from road widening, however no impacts to existing Powell Drain Culvert Crossing.
Natural Environment			
Terrestrial Wildlife and Habitat			
	Least impact to terrestrial environment, since widening from centerline would be in areas previously disturbed.	Impacts to terrestrial environment at east side of the Powell Drain.	Impacts to terrestrial environment at the west side of the Powell Drain.
			

Evaluation Criteria	Alternative Design Concepts		
	1	2	3
	Widen from Centerline	Widen to the <u>East</u>	Widen to the <u>West</u>
Street Trees	Some impacts to street trees.	Some impacts to street trees.	Some impacts to street trees.
Aquatic Wildlife and Habitat			
	Least impact to aquatic environment.	Impacts to the wetland at east side of the Powell Drain. Increased impact to Worrall Drain.	Increased Impact to wetland at the west side of the Powell Drain. Decreased impact to Worrall Drain.
Groundwater			
	Displacement of groundwater as a result of excavations.	Displacement of groundwater as a result of excavations.	Displacement of groundwater as a result of excavations.
Cultural / Socio-Economic Environment			
Planning Policies and Objectives			
	Supported by the Transportation Master Plan.	Supported by the Transportation Master Plan.	Supported by the Transportation Master Plan.
Property Impacts			
	Minimal property impacts.	Encroachment onto properties on the east.	Encroachment onto properties on the west.
Noise Impacts (Traffic Volume)			
	Will worsen with increase in traffic but increasing capacity will allow for less idling.	Will worsen with increase in traffic but increasing capacity will allow for less idling.	Will worsen with increase in traffic but increasing capacity will allow for less idling.
			

	Alternative Design Concepts		
Evaluation Criteria	1	2	3
	Widen from Centerline	Widen to the <u>East</u>	Widen to the <u>West</u>
Noise Impacts (Buffer)	Widening from centre will allow for the greatest buffer from residences on both sides. Road widening is expected to result in minimal changes to long term noise levels no higher than approximately 0.6 dBA.	Road will be in close proximity to residences on the east, resulting in significant noise impacts for those homes.	Road will be in close proximity to residences on the west, resulting in significant noise impacts for those homes.
Archaeology / Cultural Heritage	 No anticipated impacts to archaeological or cultural heritage resources.	 No anticipated impacts to archaeological or cultural heritage resources.	 No anticipated impacts to archaeological or cultural heritage resources.
Construction-Related Impacts	 Short-term construction related impacts are anticipated, though these will be mitigated with standard construction mitigation measures.	 Short-term construction related impacts are anticipated, though these will be mitigated with standard construction mitigation measures.	 Short-term construction related impacts are anticipated, though these will be mitigated with standard construction mitigation measures.
Costs			
Capital Costs	 Moderate capital costs.	 Moderate capital costs.	 Moderate capital costs.
Maintenance Costs	 Some increase in maintenance costs.	 Some increase in maintenance costs.	 Some increase in maintenance costs.
Utility Costs	 Moderate utility relocation costs.	 Moderate utility relocation costs.	 Moderate utility relocation costs.
Property Costs	 Moderate property relocation costs.	 Moderate property relocation costs.	 Moderate property relocation costs.

Evaluation Criteria	Alternative Design Concepts		
	1	2	3
	Widen from Centerline	Widen to the <u>East</u>	Widen to the <u>West</u>
	Least property costs as there will be little need for additional property.	Some property costs due to need for additional land on the east.	Some property costs due to need for additional land on the west.
Recommendation	Recommended. There will be the least impacts overall.	Not Recommended. There would be significant property and environmental impacts to the east.	Not Recommended. There would be significant property and environmental impacts to the west.

5.3.1 SELECTION OF PREFERRED DESIGN CONCEPT

Based on the evaluation completed it was determined that **Option 1**, widening Adelaide Street North from the centreline (west and east side) will have the least overall impacts within the technical, natural environment, cultural/socio-economic environment and costs parameters. Widening solely to the east or west sides with Options 2 and 3 would have significant property and environmental impacts.

The recommended alternative for the widening of Adelaide Street North will have 2 travel lanes in each direction with turning lanes at intersections, dedicated cycle tracks in each direction, sidewalks and medians. Limited areas of property will be required to accommodate the road widening at intersections and to create a uniform property line, discussed further in **Section 8.2.1**. The features of the preferred design concept are consistent with the requirements of the Complete Streets Design Manual for Civic Boulevards.

5.4 Evaluation of Adelaide Street North and Sunningdale Road East Intersection

An evaluation was completed to determine the potential of a roundabout at the intersection of Adelaide Street North and Sunningdale Road East as presented in the Sunningdale Road East Environmental Assessment Study (2013). **Table 9** provides an overview of the evaluation to determine the preferred intersection control at this location.

TABLE 9: EVALUATION OF ADELAIDE STREET NORTH AND SUNNINGDALE ROAD EAST INTERSECTION

Criteria	Roundabout	Signalized Intersection
Required Number of Entry Lanes	More than two entry and circulatory lanes would be required in order to operate efficiently, resulting in increased impacts to land use and property	Adequate amount of entry lanes can be accommodated with reduced impacts to land use and property.

Traffic Operations	Does not operate well without additional entry lanes.	Operates well with proposed number of entry lanes.
Land/Property Requirements and Costs	Requires significant property to meet geometric requirements and number of lanes.	Does not require significant property to meet geometric requirements.
Pedestrian & Cyclist Movements	Results in out of the way travel for pedestrians and cyclists and would require through-cyclists to dismount and walk across the intersection.	Minimizes travel distance for pedestrians and cyclists and offers increased flexibility to accommodate turning movements such as bike boxes.
Vehicle Speeds and Potential Conflict Points	Reduces vehicle entry speeds and number of potential conflict points.	Greater vehicle entry speeds and number of potential conflict points.
Vehicle Emissions (Idling)	Reduced fuel consumption since roundabout as allows for increased free flow movements of vehicles.	Idling during a stop cycle or waiting to turn increases fuel consumption.
Recommendation	Not recommended.	Recommended.

Based on the evaluation completed which considered the various trade-offs between a roundabout and a signalized intersection, including recommendations from the Transportation and Traffic Analysis report (Appendix B), a roundabout is not recommended at the intersection of Adelaide Street North and Sunningdale Road East. A roundabout at this location would require more than two entry and circulatory lanes, operate worse than a signalized intersection, require significant land area and create challenges for pedestrian and cyclist movements.

6 Consultation

Consultation efforts are key to ensuring the successful completion of the Class EA process. Significant insight to the study area can be gained through consulting and engaging residents and businesses, stakeholder groups, and technical agencies who all have a unique understanding of the study area. Engaging with stakeholders early in the process also helps by initiating discussions earlier rather than later, when decisions may be more difficult to change and accommodate various interests. The input received throughout the duration of the study assisted the project team in developing and refining the study recommendations. For Schedule “C” Class EA studies, three mandatory points of consultation are required. For this study, the key points of contact included:

- Advertising of notices at project milestones through direct mailing, newspaper publication, and posting on the City of London website
- Engagement and liaison with Indigenous Communities
- Technical agency consultation and review
- Private stakeholder meetings

- Two Public Information Centres (PICs)

All forms of correspondence described in **Section 6.0** are provided in **Appendix A**, however **Table 10** below summarizes the key points of contact.

Table 10: Key Points of Contact, Summary

Point of Contact/Date	Notification	Purpose
Notice of Study Commencement	<ul style="list-style-type: none"> • Published in <i>The Londoner</i> on August 24 and 31, 2018 • Sent via regular mail and email to technical agencies and stakeholders on August 15, 2018 • Posted on the City’s project website 	Issued at the beginning of the study to announce the study has been initiated, to provide background and preliminary information on the study, invite stakeholder comments and identify key project contacts.
Public Information Centre (PIC) 1 November 14, 2018	<ul style="list-style-type: none"> • Published in <i>The Londoner</i> on November 1 and 8, 2018 • Sent via regular mail and email to technical agencies and stakeholders prior to the PIC • Posted on the City’s project website 	The first Public Information Centre is the first point of contact that the project team can meet with the public. The first PIC is used to present the Municipal Class EA process, background and project information, and the proposed alternative solutions and the preliminary preferred alternative solution. The PIC is also meant for the project team to solicit comments from the public.
Public Information Centre (PIC) 2 June 5, 2019	<ul style="list-style-type: none"> • Published in <i>The Londoner</i> on May 23 and 30, 2019 • Sent via regular mail and email to technical agencies and stakeholders prior to the PIC • Posted on the City’s project website 	The second PIC is used to present the alternative design concepts, the evaluation of the concepts and the preliminary preferred design concept. The PIC also presents the anticipated impacts as a result of the project and their mitigation measures. The PIC is also meant for the project team to solicit comments from the public.
Notice of Study Completion	<ul style="list-style-type: none"> • To be published in <i>The Londoner</i> on August 11 and September 11, 2023 • Sent via regular mail and email to technical agencies 	Issued at the end of the study to announce the completion of the study, the recommended alternative design concept, the ESR is available for a 30-day public review period, and the provisions for a Section 16 Order.

	<p>and stakeholders prior to the PIC</p> <ul style="list-style-type: none"> • Posted on the City’s project website 	
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The following sections illustrate in more details the consultation process and public engagement in the study.

6.1 Notice of Study Commencement

At the beginning of the study, a Notice of Study Completion is issued to announce that a study has been initiated and to provide some preliminary details introducing the study. The Notice also includes information on the Class EA planning process, the study purpose, and key study contacts.

The Notice of Study Commencement was advertised in *The Londoner*, a local newspaper, on August 24 and 31, 2018 and posted on the City of London website. The Notice was also sent via regular mail and e-mail to local residents, businesses, property owners and technical agencies on August 15, 2018.

6.2 Public Information Centres

Public Information Centres (PICs) allow the project team to present and convey project details to the public and provide an opportunity for the public to meet the project team and discuss concerns relevant to the study/study area with key project staff. Two PICs were held for this Class EA. A Summary Report of each PIC was prepared and can be found in **Appendix A**.

Public Information Centre #1

The first PIC was held on November 14, 2018 at the Stoney Creek Branch of the London Public Library. A ‘Notice of Public Information Centre No. 1’ was advertised on the City of London website, and notices were sent directly to local area residents, property and business owners within the study area, technical agencies, and Indigenous Communities. In addition, the PIC was advertised in a local newspaper, *The Londoner*, on November 1 and 8, 2018.

The PIC was held as an ‘Open House’ format where City of London staff and consultant project team members were on site to answer questions as visitors viewed the presentation panels. This first PIC was held to present and obtain feedback on: the Municipal Class EA planning process being followed; study background, existing conditions, and key issues and constraints; and alternative and recommended solutions. Approximately 55 people attended the PIC based on the sign-in sheet provided. Comment sheets were available for visitors to submit written concerns or comments to the project team.

A summary of the key comments received at the first PIC and the project team’s consideration of those comments is provided in **Table 11**. For all comments, refer to the PIC No. 1 Summary Report in **Appendix A**.

TABLE 11: PUBLIC INFORMATION CENTRE NO.1 COMMENT SUMMARY

Comments Received	Project Team Response
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General agreement that there is a need to improve capacity on Adelaide Street North.	The need is recognized and the alternative selected includes widening to accommodate more capacity.
Split opinions on the best intersection control method (i.e. roundabout or traffic signal) at the Adelaide / Sunningdale intersection. Issues raised include traffic flow, access, and pedestrian and cyclist safety.	The intersection control method at the Adelaide / Sunningdale intersection was considered and evaluated as part of the EA study. Ultimately, traffic signals are recommended for the intersection due to operational and property constraints.
Traffic signals are needed at Adelaide / Blackwater intersection.	Through the traffic analysis, a signal warrant was conducted for this intersection, which determined that signals are warranted. This is included as part of the design recommendations.
Signal improvements are needed at Adelaide / Phillbrook as well as general concerns to pedestrian safety at the intersection and at the plaza entrance nearby.	Noted. Options to increase the visibility of the pedestrians and cyclists at the plaza entrance can be explored during the detailed design phase such as enhanced pavement treatments and signage.
Noise barriers are needed to mitigate noise impacts as a result of increase in traffic volume.	There are no significant increase in the long-term noise levels anticipated as a result of roadway widening. The approximate noise increase was determined to be 0.6 dBA, while Provincial noise criteria requires a change of 5 dBA or greater when considering permanent noise mitigation measures.
Concerns on whether widening will encroach on private property.	The alternative design concept, widening from the centerline, was selected as it would have the least property impacts compared to the other widening options.

Public Information Centre #2

The second PIC for was held on Wednesday, June 5th, 2019 from 5:00pm to 7:00pm at A.B. Lucas Secondary School. Notice of Public Information Centre #2 was advertised on the City of London website, and notices were sent directly to local area residents, property and business owners within the study area, agencies, and Indigenous Communities. The Notice also appeared in *The Londoner* on May 23, 2019 and May 30, 2019.

The purpose of the second PIC was to present and obtain feedback on the alternative design concepts and evaluation criteria, the preliminary preferred alternative design concept and potential impacts and mitigation measures. Comments received would assist the project team in refining the preferred design concept prior to completing the Environmental Study Report (ESR). A total of 28 participants attended the PIC based on records from the sign-in sheet. A total of 12 written comments (including comment sheets) and 5 e-mail comments were received.

A summary of the key comments received at the second PIC and the project team's consideration of those comments is provided in **Table 12**. A summary of all comments received are provided in the PIC #2 Summary Report in **Appendix A**.

TABLE 12: PUBLIC INFORMATION CENTRE NO.2 COMMENT SUMMARY

Comments Received	Project Team Response
Supportive of preferred design plan for Adelaide Street North.	Noted.
Traffic signals needed/supported at blackwater.	Traffic signals are proposed at the intersection of Adelaide Street North & Blackwater and Sunningdale Road East.
Existing speeding concerns on Adelaide Street North.	Noted. Measures to reduce speeding along the corridor can be considered upon completion of the road widening such as greater enforcement and signage.
Roundabout preferred at Adelaide Street North / Sunningdale Road East intersection.	A roundabout at the Adelaide Sunningdale Intersection is not preferred at this time due to the operational and property constraints.
Traffic concerns at Sobeys/Home Depot entrance / consider traffic signal.	Traffic signals are not recommended at this time, as the access does not meet the spacing requirements between the adjacent signalized intersections at both Fanshawe and Phillbrook. Dedicated right turn and left turn lanes into the Sobeys plaza will be provided. Under current conditions, this entrance is generally served by single lanes on Adelaide Street North and there are few gaps in traffic. Widening Adelaide to two through lanes in each direction will help break up this queue. The signals at Fanshawe and Phillbrook will also allow for gaps in traffic, providing turning opportunities for traffic to/from the entrance.
Install sound barriers to mitigate noise impacts.	There is no significant increase in the long-term noise levels anticipated as a result of roadway widening. The approximate noise increase was determined to be 0.6 dBA, while Provincial noise criteria requires a change of 5 dBA or greater when considering permanent noise mitigation measures.

6.3 Consultation with Technical Agencies and Stakeholders

Consultation with technical agencies and local stakeholders is key to identifying area-specific interests and constraints so that they can be considered early in the study and included in the development and evaluation of alternative solutions and design concepts. Mandates of technical agencies with a vested interest in the resources/infrastructure in the study area may be impacted by changes in the study area. Likewise, stakeholders, such as property owners or residents, may also be impacted. Thus, it is important to identify and consult with these groups.

At the onset of the study, the project team compiled a list of technical agencies that may have an interest in the study. These agencies were first contacted through the Notice of Study Commencement. Key agencies that were consulted with to review the project scope and identify issues included the Ministry of Environment, Conservation and Parks (MECP), Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI), the Ministry of Natural Resources and Forestry (MNR), and the Upper Thames River Conservation Authority (UTRCA).

Comments received from key technical agencies and utilities are summarized in **Table 13**. Minutes documenting specific meetings held during the study are included in **Appendix A**.

TABLE 13: COMMENTS RECEIVED FROM LOCAL STAKEHOLDERS, TECHNICAL AGENCIES AND INTEREST GROUPS

Agency	Date	Comment	Project Team Response
Ministry of Environment, Conservation and Parks (MECP)	August 15, 2018	Formal letter from MECP acknowledging the study and opportunity for comment. MECP provided further requirements on the need to consult with Indigenous and Metis communities. MECP should continue to be notified of project updates.	Indigenous communities were engaged in the study per MECP requirements. MECP was notified throughout the study.
Ministry of Natural Resources and Forestry (MNR)	October 31, 2019 May 16, 2019	Natural heritage information provided to project team. Noting the Ministry of Environment, Conservation and Parks (MECP) has assumed responsibility for the Endangered Species Act (ESA), including species at risk (SAR) in Ontario. All future correspondence related to ESA or SAR should be sent to SAROntario@ontario.ca to reach the MECP directly.	Noted. Noted.
Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI)	September 13, 2018	MHSTCI provided a formal letter detailing their interests, particularly for archaeological resources and built heritage and cultural heritage landscapes. The appropriate screening should be undertaken to determine if a formal assessment is needed. If a full assessment is required, it should be completed to determine the potential impacts of the project to archaeological/cultural heritage resources.	Existing cultural heritage resources were identified and will not be impacted, so no further heritage assessment will be completed. A Stage 1-2 archaeological assessment (AA) was completed and no further AA was recommended.
Upper Thames River Conservation	August 21, 2018	Information provided to the project team related to the development of the EIS report.	Noted.

Agency	Date	Comment	Project Team Response
Authority (UTRCA)			
EEPAC	November 14, 2018	Glad that phragmites will be addressed. Consideration should be given to including the wooded area north of the community centre in the 3-season inventory.	Should an option for the road extend to the wooded lot, the scope of the EIS will include it, however the alternatives are limited to the existing study area so the scope of the 3-season inventory will not be extended.
MECP	June 28, 2023	Response letter to draft ESR regarding excess materials and waste, Indigenous community consultation and Species at Risk.	Noted in ESR.
Utilities			
London Hydro	August 15, 2018	Provided a contact and would like to be kept updated on the project.	Added contact to project list.
Telus	August 17, 2018	Telus has no infrastructure in the study area.	Noted.
Hydro One	August 22, 2018	Hydro One Station Maintenance has no equipment in the study area. May want to contact Hydro One Strathroy Area Lines Office.	Noted.
Imperial Oil	August 23, 2018	Imperial Oil has a pipeline that crosses Adelaide Street North between Sunningdale and Fanshawe.	Noted.
Zayo	September 6, 2018	Zayo has no existing plant in the study area.	Noted.

6.4 Consultation with Indigenous Communities

Consultation with Indigenous Communities is a mandatory component of the Municipal Class EA process. At the beginning of the study, a comprehensive list developed by the project team included: Aamjiwnaang First Nation, Caldwell First Nation, Kettle and Stony Point First Nation, Chippewas of the Thames First Nation, Delaware Nation – Moravian of the Thames, Munsee-Delaware Nation, Oneida Nation of the Thames, Bkejwanong Territory, Walpole Island First Nation, Métis Nation of Ontario, Anishnabek Nation –

Union of Ontario Indians, Association of Iroquois and Allied Indians, Southern First Nations Secretariat, and the London District Chiefs Council.

All study notices were sent to the Indigenous Communities listed above electronically and a hard copy was sent to directly affected Indigenous Communities. Efforts were also made to follow up with all Indigenous communities via phone that had not provided any response to the notices in case they did not receive it.

A Consultation Log containing a summary of the Project Team’s liaison with Indigenous communities during the study is included in **Table 14**.

TABLE 14: SUMMARY OF CONSULTATION WITH INDIGENOUS COMMUNITIES

Indigenous Community	Point of Contact/ Date	Comment/Purpose	Team Response
All	Notice of Study Commencement August 10, 2018	Individual notices were sent to each Indigenous community to notify them of the project and to encourage their participation in the study.	N/A.
All	Notice of Public Information Centre (PIC) 1 October 31, 2018	Individual notices were sent to each Indigenous Community to notify them of the date and location of the first PIC.	N/A.
All	November 6, 2018	Followed up with Indigenous communities if they received the PIC Notice and if they had any comments.	N/A.
Chippewas of the Thames First Nation	November 6, 2018	Letter expressing their interest in the study.	The City can provide the studies as they are completed, particularly relating to archaeology and natural heritage.
Chippewas of the Thames First Nation	November 28, 2018	Meeting with the City of London and the Chippewas of the Thames First Nation.	N/A.
All	Public Information Centre (PIC) 2 May 16, 2019	Individual notices were sent to each Indigenous Community to notify them of the date and location of the second PIC.	N/A.
All	May 31, 2019	Followed up with Indigenous communities if they received the PIC Notice and if they had any comments.	N/A.

Indigenous Community	Point of Contact/ Date	Comment/Purpose	Team Response
All	Notice of Study Completion	Individual notices are to be sent to each Indigenous Community with comments addressed in the final ESR.	N/A

6.5 Notice of Study Completion

The Notice of Study Commencement is to be advertised in *The Londoner*, a local newspaper, on August 3, 2023 and August 10, 2023 and posted on the City of London website. The Notice will also be sent via regular mail and e-mail to local residents, businesses, property owners and technical agencies beginning July 28, 2023. This ESR is being made available for public review for a period of 30 calendar days beginning on **August 11, 2023** and ending on **September 11, 2023**.

7 Description of the Preferred Design

This section of the report identifies the key features of the preferred design developed for Adelaide Street North. A complete overview of the preferred design concept is provided in the preliminary plan and profile drawings in **Appendix H**. The preferred design concept will form the basis of future detailed design work which will be required prior to project implementation.

7.1 Typical Cross Sections

The typical cross sections for Adelaide Street North and Sunningdale Road East were developed to meet both technical requirements of the study and planning objectives established in the London Plan (Official Plan), 2030 Transportation Master Plan – SmartMoves, City of London Cycling Master Plan (London ON Bikes), Complete Streets Design Manual and the previous Sunningdale Road East EA.

The typical cross section developed for Adelaide Street North includes 2 x 3.3m through lanes, 2 x 3.5m curb lanes, a centre median, 1.8m cycle tracks, and 1.5m sidewalks with varying boulevard width. The key features of the typical cross section developed for Adelaide Street North are illustrated in **Figure 9**.

The typical cross section for Sunningdale Road East (west of Adelaide Street North) generally follows the recommendations of the previously completed EA study. Sidewalks are generally 1.5m metres with varying boulevard width, 1.5 metre bicycle lanes are provided along with centre medians and turning lanes. The typical cross-section for Sunningdale Road East is illustrated in **Figure 10** as shown in the Sunningdale Road East ESR.

FIGURE 9: ADELAIDE STREET NORTH TYPICAL CROSS SECTION

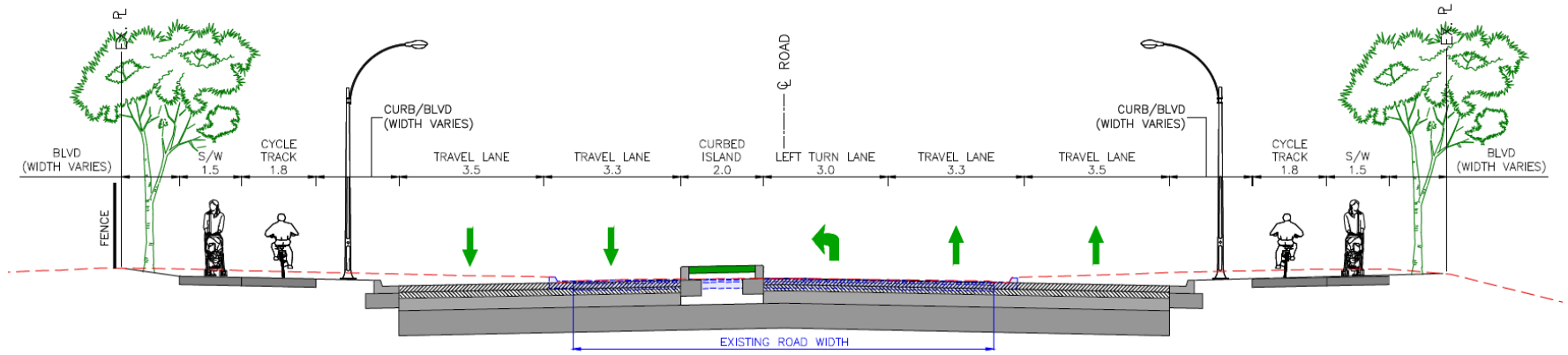
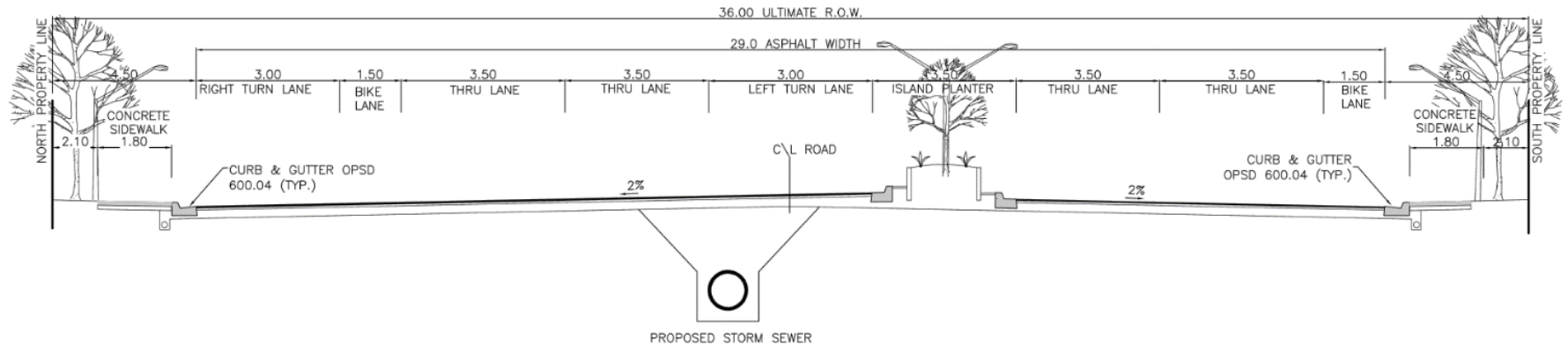


FIGURE 10: SUNNINGDALE ROAD EAST TYPICAL CROSS SECTION



Source: Sunningdale Road East EA

7.2 Horizontal Alignment

The proposed horizontal alignment for the Adelaide Street North and Sunningdale Road East corridors to widened primarily from the centerline of the roadways to minimize impacts to existing land uses and environmentally sensitive features such as the wetlands on both sides of the Powell Drain. The widening of Adelaide Street North is designed to match the existing alignment of intersections and shifts alignment slightly along the study corridor in between the cycle tracks and sidewalks which are generally positioned at a far offset from the edge of pavement. The preliminary horizontal alignment of the future road widenings are indicated on the preliminary plan and profile drawings in **Appendix H**.

7.3 Vertical Alignment

It is expected the vertical alignment of Adelaide Street North and Sunningdale Road East will generally follow the existing roadway profile. Additional refinements to the vertical profile will occur during the detailed design stage. Additional refinement to the grading limits will need to occur at environmentally sensitive areas such as the Powell Drain crossing to avoid impacts to the existing wetland and to match existing driveways and side streets. The preliminary vertical profile of the of Adelaide Street North is indicated on the preliminary plan and profile drawings in **Appendix H**.

7.4 Pavement and Subsurface Requirements

The following text provides a preliminary summary of the pavement recommendations for the widening of Adelaide Street North. Full details, including geotechnical recommendations for other work required within the study area such as excavation and groundwater control, are provided in **Appendix D - Preliminary Geotechnical Assessment Report**. The preliminary requirements listed below, including additional requirements, will need to be confirmed during subsequent phases of design through further geotechnical investigative work.

Widening of the existing Adelaide Street North roadway platform will be required during construction. Based on the condition of the asphalt in the area of the intersection with Sunningdale Road East, it is suggested these pavements also be fully reconstructed. In general, all surficial topsoil, organic, loose, soft and/or deleterious materials should be stripped from the areas requiring widening. Based on the current boreholes and geologic mapping, organic soils are anticipated in the area of the intersection. Subexcavations for pavement widening should extend from the existing edge of pavement and consist of a vertical cut to the proposed subgrade level.

Any fill required to bring the areas to subgrade level should consist of City of London Granular B or Granular C. Any fill materials required to achieve subgrade elevation should be carefully benched into the existing materials in accordance with Ontario Provincial Standard Drawing (OPSD) 209.010.

Using the traffic volumes and estimated proportions of heavy vehicles noted for the corridor, together with the anticipated subgrade conditions, the following preliminary pavement structures are provided in **Table 15** for the proposed widenings for both Marshall and SuperPave asphalts:

TABLE 15: PRELIMINARY GEOTECHNICAL PAVEMENT REQUIREMENTS

Roadway	Pavement Component Thickness (millimetres)			
	HL 3/SuperPave 12.5 FC1 Surface Asphalt	HL 8/SuperPave 19.0 Binder Asphalt	Granular A Base	City of London Granular B Subbase
Sunningdale Road East (west of Adelaide Street North)	50	130 (2 @ 65)	150	450
Sunningdale Road East (east of Adelaide Street North)	50	130 (2 @ 65)	150	600
Adelaide Street North (north of Sunningdale Road East)	50	130 (2 @ 65)	150	450
Adelaide Street North (south of Sunningdale Road East)	50	130 (2 @ 65)	150	600
Intersection at Sunningdale Road East	50	130 (2 @ 65)	150	600

The superpave 12.5 surface asphalt and top lift of Superpave 19.0 binder asphalt shall use Performance Graded Asphalt Cement (PGAC) 64-28. The lower lift of Superpave 19.0 binder asphalt may use PGAC 58-28. Based on the traffic data provided, Ontario Traffic Category C is applicable for Adelaide Street North and Sunningdale Road East pavements.

Any fill, organic or deleterious materials encountered at subgrade level should be removed prior to placement of subbase material. All subgrades should be heavily proofrolled under the direction of the geotechnical engineer and remedial work carried out as required.

The indicated preliminary pavement structures are based on properly prepared and graded subgrades with appropriate drainage of the pavement granular provided.

The Granular A base and Granular B subbase should be placed in maximum 300-millimetre thick loose lifts and uniformly compacted to at least 100 per cent of SPMDD. Short, perforated stub drains should be provided at subgrade level at all catch-basin locations.

The asphaltic materials should be produced, placed and compared in accordance with the current Ontario Provincial Standard Specifications (OPSS) and City of London requirements. Milled notches the depth of the surface course and 500 millimetres wide should be provided where new pavements abut existing pavements and care should be taken to properly tack coat all butt joints and milled surfaces.

Subsurface investigations will be undertaken during detailed design to confirm the location and elevation of existing infrastructure and to inform the construction method for any required utility/service crossings.

7.5 Powell Drain Culvert Crossing

The Powell Drain Culvert structure at Adelaide Street North consists of two segments. The first segment is an 1800 mm CSP pipe which starts at the culvert inlet, immediately downstream of the orifice-weir structure, with a length of 22.5 m. The second segment has the same length and is an arch 1830 mm x 1140 mm CSP. The two segments are connected to each other through a 3000 mm Maintenance Hole. The proposed road curb elevation at the culvert crossing is 252.2 m.

Based on the preliminary preferred design concept for the widening of Adelaide Street North, a short extension of the Powell Drain culvert crossing may be required to the east in order to accommodate the grading limits. However, the use of a headwall at the existing outlet to accommodate the grade changes may mitigate the need for an extension. The extension of the Powell drain culvert to the east will need to be further explored during detailed design and through consultation with the Upper Thames River Conservation Authority. Preliminary recommendations are provided in the Geotechnical Investigation Report for an extension of the culvert and installation of a headwall. Further subsurface information may be required to confirm the preferred construction method at the culvert crossing.

The existing orifice-weir structure located immediately upstream of the Powell Drain Culvert controls the flow in the Powell Drain. As previously noted, the site visits on June 27th, and October 16th, 2018 indicated that the structure is clogged with debris and vegetation. Clogging in the orifice-weir structure will reduce the discharge capacity of the Powell Drain Creek and will increase the water level elevation in the Powell Drain Wetland. This will increase the risk of road overtopping particularly at low-frequent storm events. Three options can be considered to improve the hydraulic performance of the orifice-weir structure as follows:

Option 1: Provide a regular maintenance and cleanout of the orifice-weir structure from vegetation and debris to reduce the risk of clogging and any potential flooding. It is recommended to consider this option as the cost effective, feasible solution to alleviate the flooding due to the low hydraulic performance of the orifice-weir structure. An Operation and Maintenance Manual for the routine maintenance of this structure which will improve the fish migration from downstream to the Powell Drain wetland should be provided in the detailed design stage.

Option 2: Relocate the orifice-weir structure from the existing location to a new location approximately 2 m upstream of the culvert entrance. This relocation will decrease the flooding and road overtopping risk in case of clogging occurrence. The gap between the relocated orifice-weir structure and the culvert entrance will provide adequate space for the flow to overtop the structure and convey through the culvert without any adverse impact on the adjacent properties. A geotechnical study will be required in the detailed design stage to assess the creek condition at upstream of the Powell Drain Culvert if the orifice-weir structure relocation is selected.

Option 3: The proposed wildlife culvert on the north side of the culvert crossing at Adelaide Street North can help mitigate the potential flooding at low-frequent storm events if needed. This wildlife culvert is proposed to enhance the animal passage across Adelaide Street North along the Powell Drain. The culvert's inlet is at higher elevation than the orifice-weir structure and can help mitigate the potential flooding at low-frequent storm events if needed.

The results from HEC-RAS analysis indicate that the existing culvert crossing at Adelaide Street North has enough capacity to convey the controlled flow for different storm events. The existing culvert can convey the controlled flow at less frequent storms including 50-yr 100-yr and Regulatory (250-yr) storm events without any road overtopping.

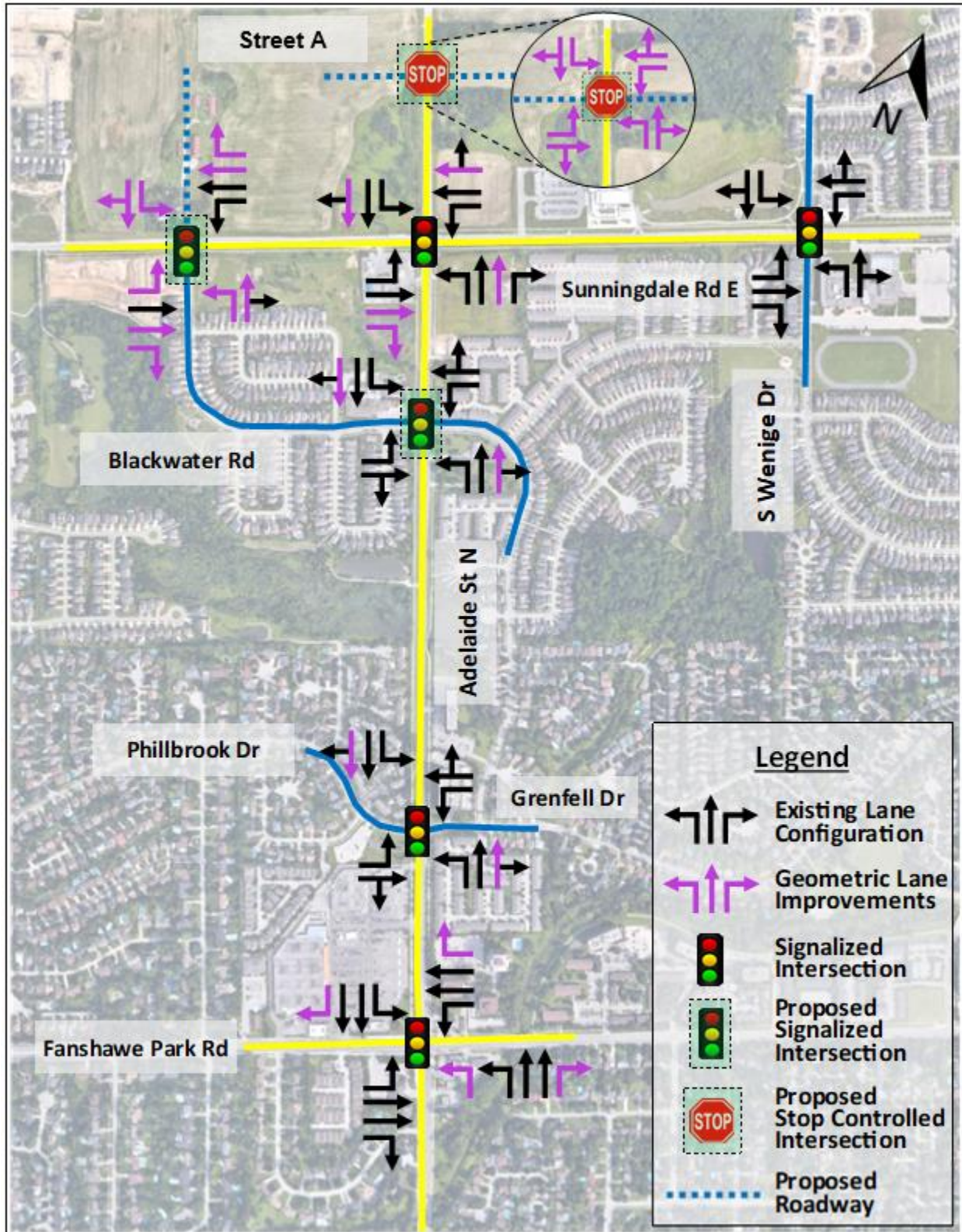
7.6 Midblock Pedestrian and Cycling Crossing at Powell Drain

Based on the City of London Cycling Master Plan, and to maintain connectivity of the local pathway network, it is recommended a signalized midblock crossing be provided across the Powell Drain to connect existing and future Multi Use Pathways (MUPs). A signalized crossing with separate bicycle and pedestrian signal heads and pavement markings will allow cyclists to continue through the intersection rather than dismount and walking as would be the case with a traditional pedestrian crossover (PXO). Based on a review of the site conditions, it is recommended the crossing be provided south of the Powell Drain Stormwater Management Pond service entrance to minimize conflict at this entry point. As part of this design, a 3.0m MUP would branch from the existing Powell Drain MUP on the west side towards the signal and a bi-directional cycle track would be provided for a short section on the east side of Adelaide Street North to connect the crossing to the Blackwater MUP link and future pathway on the east side of the Powell Drain. The stormwater management pond access road would be converted to right-in right-out only since a centre median would be installed. The midblock crossing location is indicated on the plan and profile drawings in **Appendix H** and will require further investigation during the detailed design process.

7.7 Intersections

Based on the results of the future total (2029 and 2039) traffic analysis completed as outlined in the Traffic and Transportation Analysis (Appendix B) and considering the 2019 Development Charges Background Study, preferred intersection and corridor lane configurations were established to accommodate the forecasted traffic growth within the study area. Following design considerations of lane requirements for the recommended alternative and discussions with the City, some of the recommended lanes have not been carried forward in the preliminary design due to significant property constraints and both technical and economic factors, including eastbound double left turn lanes at Adelaide Street North & Fanshawe Park Road East and a westbound exclusive right turn lane at Adelaide Street North & Sunningdale Road East. As a result, the recommended intersection and corridor lane configurations are presented in **Figure 11**. Additional information on the intersection layout, including turning lane geometry and pavement markings, are included in **Appendix H**. It is noted that due to changes in the Development Charges Act, the City updated the 2019 Development Charges Background Study by completing the 2021 Development Charges Background Study Update.

FIGURE 11: RECOMMENDED INTERSECTION LANE CONFIGURATIONS



7.8 Cyclist and Pedestrian Facilities

Proposed Design

The widening of Adelaide Street North will provide cycle tracks and sidewalks on both sides between Sunningdale Road East and Fanshawe Road Park East. Based on the recommendations of the Sunningdale Road East Environmental Assessment Study, on-road bicycle lanes will be provided on Sunningdale Road East, west of Adelaide Street North, however, a short section of cycle track will be provided for the east-bound direction. Sidewalks will be provided on both sides of Sunningdale Road East within the study area. The inclusion of cycle tracks along Adelaide Street North is consistent with the City's Complete Street policy to include "physically separated and continuous facilities" along Civic Boulevards. A minimum width of 1.8m will provide a reasonable level of comfort, and a minimum buffer of 1.0m from the roadway will be maintained. On Adelaide Street North, existing sidewalks will be widened to 2.0m between Phillbrook/Grenfell and Fanshawe Park Road East due to the surrounding presence of medium to higher density residential uses, retail areas and transit use which are conducive to higher pedestrian volumes.

Considerations for Detailed Design

During the detailed design phase, the following additional elements can be considered to enhance the pedestrian and cycling realm:

1. Inclusion of pavers between cycle tracks and sidewalks (1.0m) on Adelaide Street North to reduce the risk of conflict and provide a more aesthetically pleasing public realm;
2. Installation of planters, seating areas and waste bins to serve as a buffer between the cycle track and sidewalk on Adelaide Street North between Phillbrook/Grenfell and Fanshawe Park Road East;
3. Extension of centre medians into intersections to provide increased pedestrian refuge areas, particularly at the intersection of Fanshawe Park Road East and Phillbrook/Grenfell;
4. Use of green thermoplastic paint (crossrides), left turn bike boxes and wide landing pads at all signalized intersections along the corridor;
5. Green thermoplastic crossrides at unsignalized intersections/private driveways; and
6. Confirmation of treatments at bus stops as envisioned in the Complete Streets Design Manual to minimize the risk pedestrian/cyclist conflicts.

7.9 Drainage and Stormwater Management

Based on the drainage analysis completed, the existing storm sewer drainage system along the Adelaide Street North corridor has adequate capacity to convey the proposed runoff due to the proposed works in most of the study area. New Catch Basins and Manholes shall be installed at some locations and the existing ones will need to be removed. To ensure that there is no need to upsize the storm sewers at the locations with less capacity, further exploration needs to be considered in the detailed design stage.

The existing culvert crossing at Adelaide Street North has enough capacity to convey the controlled flow for different storm events. The existing culvert can convey the controlled flow at less frequent storms including 50-yr 100-yr and Regulatory (250-yr) storm events without any road overtopping. The proposed uncontrolled runoff from the storm sewer system at HRP's is larger than the existing condition. Different options are discussed below to mitigate the increased peak flows and provide quantity control prior

discharging to HRPs. Further exploration will be required in detailed design stage to finalize the dimensions and locations of the quantity control measures.

7.9.1 STORMWATER MANAGEMENT STRATEGY

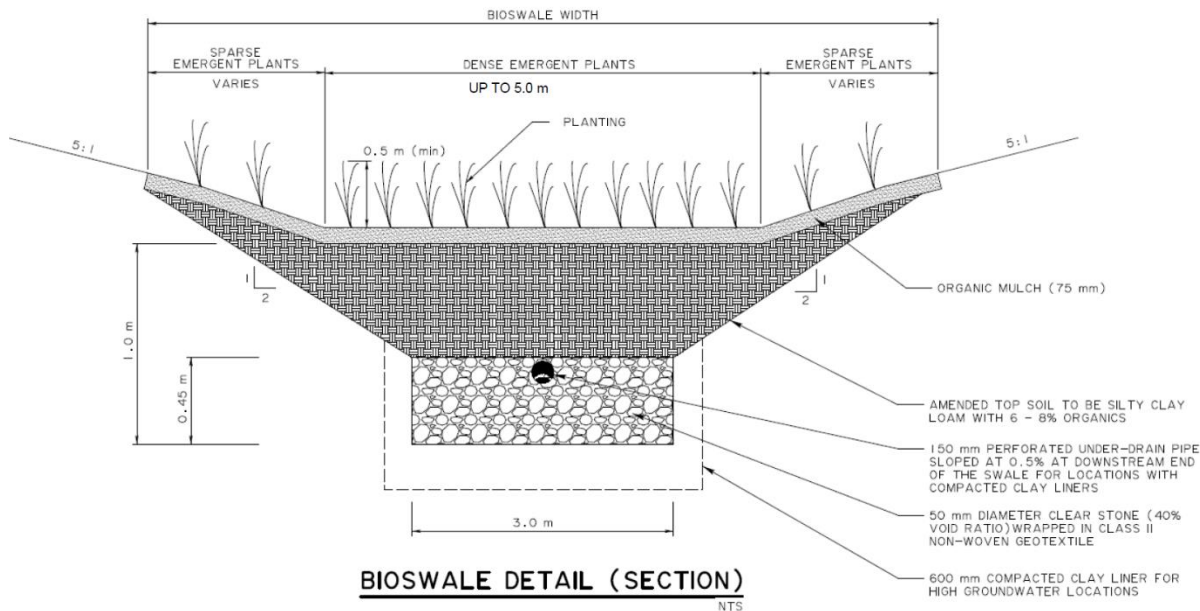
The Drainage and Stormwater Management Report prepared for this study recommends several measures to help manage stormwater Quality and Quantity which includes the consideration of Low Impact Development (LID) measures to be explored during the Detailed Design process.

Based on the findings of the Geotechnical Report, it is noted the project area has adequate geotechnical potential to build shallow Stormwater Management Facilities (SWMFs) for quantity control, except at Phillbrook Drive/Grenfell Drive and Adelaide Street North intersection.

The three Hydraulic Reference Points (HRPs) considered in the analysis show a subtle flow increase for the less frequent storm event (10-yr storm) with a maximum 19.7% compared to existing release rate for HRP #3. However, for infrequent events (e.g. 100-Year), less increase release rates can be observed for the proposed condition. The following discusses different options to match the pre-and post-development flow rates, which will be explored more in the detailed design stage

- **Storage pipes and orifice control** in the proposed storm sewer trunk system can attenuate the post-development flow rates to the pre-development values. This option is a popular and common practice in storm sewer systems. It can be constructed as part of a sewer trunk system. This option can be explored more in detailed design stage to determine the storage and orifice sizes.
- A **“Silva Cell” system** is an effective Low Impact Development (LID) measure that can be utilized at different locations upstream of HRP outlets to reduce the post-development flow rates. The “Silva Cell” is a modular suspended pavement system that uses soil volumes to support large tree growth and provide powerful on-site stormwater management through absorption, evapotranspiration, and interception. The advantage of the system is that it doesn’t require costly maintenance, however the system structure and construction are costly.
- **Bio-Swales and Bio-Retentions** (as shown in **Figure 12**) are other popular, cost-effective and industry accepted LID measures that could be used to provide water quantity/quality measures. The proposed road cross sections show the road drainage is contained curb to curb and the only space available to construct Bio-Swale is in the boulevards on the sides of the sidewalks. To convey the runoff to the Bio-Swale several lead pipes can be extended from the catch-basins to discharge the flow to the Bio-Swales or the drainage flow can directly discharge from the storm sewers to the Bio-Swales. This option looks to be a feasible quantity control measure for this study as shown in **Appendix H**. The storm sewer profile and road profile indicate that there is a tight elevation difference between the storm sewer outlet and the Bio-Retention/Bio-Swale inlet. At the detailed design stage, it should be confirmed if sufficient boulevard space, elevation difference, ideal soil condition and utility locations would allow installation of this type of LID systems to store, treat and release roadway drainage.

FIGURE 12: TYPICAL BIOSWALE CROSS-SECTION



- Perforated pipe system** is another option to be considered as water quantity/ quality measures to alleviate roadway drainage. The perforated pipe would run parallel to the storm sewer system, outside of the roadway limit, under the sidewalk and ultimately discharging to the existing municipal system. Soil type, high ground water levels, utility conflict, winter maintenance and salt particles could be the main prohibiting items in selecting this option. There is also the potential risk of clogging the perforations along the pipe that will cause backwater in the sewer system and may cause serious damage to the sewer network.

Quality control is also provided throughout the Project limits in the form of Oil Grit Separator (OGS). OGS units are proposed at four locations upstream of the outlets to HRP's throughout the Project limits. Modelling results show that the 80% TSS removal can be achieved by specific types of unit. It is noted pre-treatment to LID measures may be provided through catch basins and other pre-treatment sumps.

Additional information regarding the proposed drainage and stormwater management facilities within the Study Area is provided in **Appendix G** (Drainage and Stormwater Management Report).

7.10 Utilities and Services

It is anticipated that some of the existing hydro poles along Adelaide Street North and Sunningdale Road East corridors will need to be removed or relocated in order to facilitate widening of the road corridors. As previously noted, the presence of all subsurface utilities within the study area such as buried telecom, gas and municipal servicing will need to be confirmed during the detailed design phase through the completion of Subsurface Utility Engineering investigations. The need for any relocation of aerial and subsurface utilities should consider the City of London's Complete Streets Design Manual which recommends the preferred placement for utilities along Civic Boulevards and the City's Utilities Co-ordinating Committee Standard Utility Locations.

The recommended option for widening Adelaide Street North is to widen the road symmetrically on both sides of the existing roadway. Essentially, this will extend the edge of the pavement approximately 3.5m beyond existing making the new edge of pavement 0.07m lower than the existing. With the proposed vertical alignment essentially remaining the same as the existing alignment, this results in a negligible change in the depth of cover over the existing watermains after completion of the project. However, as with all construction projects within the zone of influence of large diameter watermains, consideration of the impact of the temporary loss of cover, lateral support during adjacent excavations and construction traffic will need to be included as part of the detailed design. This may include additional geotechnical investigations, construction phasing and/or enhanced temporary support details.

An examination of available record drawings for the existing watermain indicate that the recommended option for the widening of Adelaide Street should not have an impact on the existing water infrastructure. However, the location, depth of cover and condition of the existing watermains and appurtenances should be confirmed and assessed during detailed design.

The City has identified the need for a new watermain chamber to be located at the intersection of Adelaide Street North and Sunningdale Road for the existing 1200mm diameter main on Sunningdale.

The final configuration of the internal fittings in the valve should be completed during detailed design but given the size and importance of the watermains in this chamber, the City has a number of requirements and preferences to be included. These are:

- SCADA connectivity and automated controls, including heating and sump pump with alarms;
- A pressure transducer;
- Acoustic Fibre Optic (AFO) ports on either side of the valve for the Sunningdale main;
- A 400mm flange connection, include a gate valve that can be utilized for insertion of inspection equipment; and
- A 100mm flange connection that can be utilized for the installation of a temporary flow meter.

Additionally, the chamber should include any necessary air relief, drains and swab launch accesses required depending on the specific configuration determined during detailed design. A conceptual chamber design is shown on Figure DET-1 in **Appendix H**.

Given the minimum requirements outlined above and the size of the mains, the proposed size of this chamber would be approximately 4 metres by 6.5 metres. The chamber will need to be cast-in-place as the components will be too large to transport to the site. As such, it will likely be necessary for the existing 1200mm watermain to be shutdown for a significant amount of time for construction and the City will need to evaluate how construction will impact the larger system to determine the timing for this chamber. Alternatively, consideration can be given to separating the fittings into 2 or more smaller chambers that can be more easily constructed or by isolating the intersection by temporarily capping the existing mains so that they can remain active during the majority of construction.

Assuming that a single chamber is constructed, the size of the proposed chamber and the location of the existing underground services, specifically the storm sewers, indicates that the best location for the new chamber is to the west of the intersection. This would allow that any future maintenance work on the new chamber does not impact traffic flows on Adelaide Street North.

7.11 Illumination

It is anticipated that roadway illumination along the widened corridors will include light poles on both sides of the corridor. Poles, arms and luminaires would need be in accordance with City of London standards. Illumination design and light standard spacing and will be explored further during the detailed design phase of the project considering illumination requirements and optimization of the boulevard design treatments.

7.12 Ecological Crossing

A wildlife crossing is proposed at the Powell Drain and Arva Moraine PSW complex and is included on the Plan and Profile drawings in **Appendix H**. The proposed design includes an elliptical pipe that is 865mm by 1345mm which will be sized and installed to accommodate reptiles, amphibians and small mammals following Best Management Practices (MNRF, 2016b). A larger crossing structure at this location is constrained by underground utilities and unlikely feasible. The installation of a wildlife crossing at this location would help reduce the risk of wildlife mortality along this area of Adelaide Street North. The limited use of short wildlife fencing or similar techniques such as cuts into the slope can be considered to help lead reptiles, amphibians and small mammals into the crossing.

7.13 Landscape and Streetscaping

The preliminary plan and profile drawing prepared for the EA in **Appendix H** identifies opportunities to implement landscaped boulevards where wide medians will be installed. During the detailed design phase, the installation of boulevard trees should be identified at regular intervals along the corridor. Between Phillbrook/Grenfell and Fanshawe Park Road East, where higher volume of pedestrian activity is anticipated due to existing land uses, the installation of raised planter boxes could be considered to provide a buffer between the sidewalk and travel lane, along with the use of hard surfaces. Where landscaped medians cannot be accommodated, a hardscaped median could be provided with enhanced pavers to match treatments along the outer boulevard (e.g. splash strips) where possible. The preparation of a landscape plan for the corridor will be required during the detailed design phase which considers the requirements identified in the City's Complete Streets Design Manual for Civic Boulevards. Considerations for operation and maintenance of landscaping will also be required during the detailed design phase including development of an operational and maintenance procedure in order for the infrastructure to be properly maintained over the long-term. Other relevant design guidelines, area specific studies and planning documentation should be referenced during detailed design as applicable.

7.14 Construction Staging

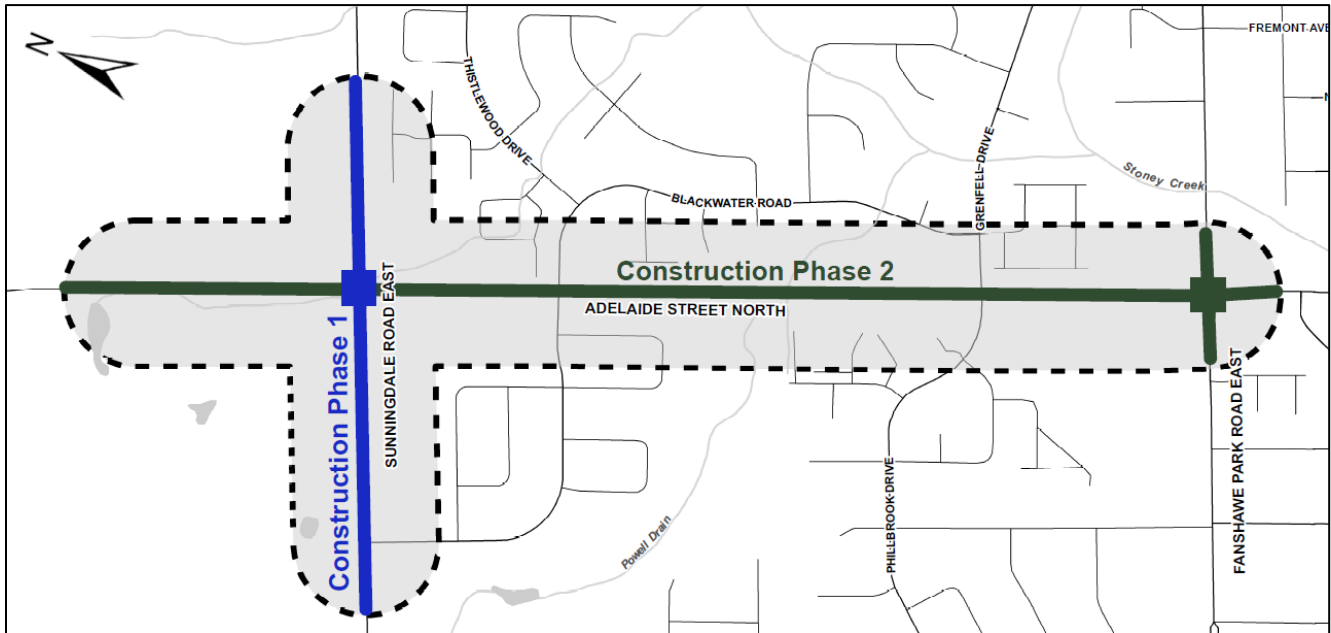
Based on the City's 2019 Development Charges Background Study and 2021 Development Charges Background Study Update, the widening of Sunningdale Road East will occur in 2025, followed by the widening of Adelaide Street North in 2029. Based on this two-phase approach, the following construction staging plan in **Table 16** can be considered as a baseline approach for implementing the preferred design concept and further refined during the detailed design stage:

TABLE 16: PRELIMINARY CONSTRUCTION STAGING PLAN

Phase 1: Widening of Sunningdale Road East (2025)	
Phase 1-1	<ul style="list-style-type: none"> • Complete all required utility relocations. • Removal of existing infrastructure as required. • Install temporary traffic signals as required at intersections along the corridor.
Phase 1-2	<ul style="list-style-type: none"> • Maintain traffic on the existing lanes. • Complete north side ultimate design.
Phase 1-3	<ul style="list-style-type: none"> • Shift traffic to the north side. • Complete south side ultimate design.
Phase 1-4	<ul style="list-style-type: none"> • Construct proposed centre median. • Completion of Adelaide Street North/Sunningdale intersection to match future (2029) configuration of Adelaide Street North widening. • Finalization of intersection controls, street lighting and installation of pavement markings. • Finalization of required landscaping and streetscaping elements along the widened Sunningdale Road East.
Phase 2: Widening of Adelaide Street North (2029)	
Phase 2-1	<ul style="list-style-type: none"> • Complete all required utility relocations. • Removal of existing infrastructure as required. • Install temporary traffic signals as required at intersections along the corridor.
Phase 2-2	<ul style="list-style-type: none"> • Maintain traffic on the existing lanes • Complete east side ultimate design including any required modifications to the Powell Drain crossing and portion of proposed wildlife crossing.
Phase 2-3	<ul style="list-style-type: none"> • Shift traffic to the east side. • Complete west side ultimate design and remaining portion of wildlife crossing.
Phase 2-4	<ul style="list-style-type: none"> • Construct proposed centre median. • Install proposed midblock pedestrian and cyclist crossing of Powell Drain. • Finalization of intersection controls, street lighting and installation of pavement markings. • Finalization of required landscaping and streetscaping elements along the widened Adelaide Street North.

The preliminary construction staging plan noted above will be refined during detailed design to take into account localized considerations associated with underground infrastructure, adjacent land use and their access and operations and future development plans. Advance notification to property owners will be required, along with a traffic management plan. The limits of both construction phases are shown in **Figure 13** below.

FIGURE 13: CONSTRUCTION STAGES



7.15 Preliminary Cost Estimates

Preliminary cost estimates were developed for the recommended design concept considering work on both Adelaide Street North and Sunningdale Road East. The estimate breaks down the project into various parameters such as roadways, sewer infrastructure and traffic signals. The preliminary capital cost of implementation is estimated to be approximately **\$14.2M** for Adelaide Street North and **\$6.8M** for Sunningdale Road East with a 20% contingency applied, however the final cost estimate will be further refined during detailed design. Preliminary cost estimates for Adelaide Street North and Sunningdale Road East as shown in **Table 17** and **Table 18** below. As it is expected that this work will be implemented in approximately 10 years, the costs below are being presented in current dollar values as well as being adjusted for inflation. An inflation factor of 30% was used based on a comparison of pricing within the past 10 years.

TABLE 17: PRELIMINARY CONSTRUCTION COST ESTIMATE FOR ADELAIDE STREET NORTH WIDENING

Adelaide Street North Cost Estimate Summary		
Item	Estimated Cost (Current Value)	Estimated Cost (Adjusted for Inflation)
Roadworks	\$4,757,500.00	\$5,951,000.00
Storm Sewers & Appurtenances	\$838,000.00	\$1,078,400.00

Adelaide Street North Cost Estimate Summary		
Sanitary Sewers & Appurtenances	\$0.00	\$0.00
Watermain & Appurtenances	\$23,000.00	\$28,000.00
Traffic Signals and Illumination	\$1,230,000.00	\$1,635,000.00
Miscellaneous	\$410,000.00	\$550,000.00
Utility Relocations (10%)	\$725,850.00	\$924,240.00
Property Acquisition	\$285,000.00	\$327,750.00
Subtotal	\$8,269,350.00	\$10,494,390.00
Contingency (20%)	\$1,653,870.00	\$2,098,878.00
Engineering & Consulting (15%)	\$1,240,402.50	\$1,574,158.50
Total	\$11,163,622.50	\$14,167,426.50
Lifecycle Costs		
Sanitary Sewers & Appurtenances	N/A	\$145,000.00
Storm Sewers & Appurtenances	N/A	\$940,000.00
Subtotal	N/A	\$1,085,000.00
Contingency (20%)	N/A	\$217,000.00
Engineering & Consulting (15%)	N/A	\$162,750.00
Total	N/A	\$1,464,750.00

TABLE 18: PRELIMINARY CONSTRUCTION COST ESTIMATE FOR SUNNINGDALE ROAD EAST WIDENING

Sunningdale Road East Cost Estimate Summary		
Item	Estimated Cost (Current Value)	Estimated Cost (Adjusted for Inflation)
Roadworks	\$1,489,400.00	\$1,860,100.00
Storm Sewers & Appurtenances	\$657,700.00	\$848,200.00
Sanitary Sewers & Appurtenances	\$92,200.00	\$116,125.00
Watermain & Appurtenances	\$655,000.00	\$822,000.00
Traffic Signals and Illumination	\$410,000.00	\$545,000.00
Miscellaneous	\$260,000.00	\$340,000.00
Utility Relocations (10%)	\$356,430.00	\$453,142.50
Subtotal	\$3,920,730.00	\$4,984,567.50

Contingency (20%)	\$784,146.00	\$996,913.50
Engineering & Consulting (15%)	\$588,109.50	\$747,685.13
Total	\$5,292,985.50	\$6,729,166.13
Lifecycle Costs		
Sanitary Sewers & Appurtenances	N/A	\$35,000.00
Subtotal	N/A	\$35,000.00
Contingency (20%)	N/A	\$57,000.00
Engineering & Consulting (15%)	N/A	\$5,250.00
Total	N/A	\$47,250.00

8 Impacts, Mitigation Measures and Monitoring

Implementation of the preferred design concept can have impacts on the existing environment. These impacts often occur either during construction or as a result of the design itself. This section documents the potential impacts resulting from the proposed works and their associated mitigation measures that serve to reduce or minimize the potential effects.

8.1 Transportation and Technical Environment

Construction of the preferred design could have potential impacts on the transportation environment, including potential disruption to vehicular traffic during construction activities. Coordination with the London Transit Commission will need to occur for potential transit disruptions resulting from construction. Traffic disruption shall be minimized as much as possible during construction and access for emergency vehicles will need to be maintained. At least one lane shall remain open at all times. A construction staging and traffic management plan will be developed during the detailed design phase of the project. There may also be a potential disruption to pedestrians and cyclists during construction activities. Pedestrian and cycling access shall be maintained during construction with an emphasis on providing safe and accessible routes.

The extent of groundwater to be distributed during construction shall be minimized. Additionally, as noted in **Section 3.3.5**, Best Management Practices (BMPs) will be employed during construction work to prevent contaminants and other unwanted materials from entering surface and groundwater throughout the whole study area. This includes maintaining accessible spill kits on site near refueling locations and storage locations for fuel and other contaminants including pesticides, waste or sewage. Any groundwater takings required to support construction activities will be completed under the appropriate Provincial and Municipal permit(s), as required. A detailed erosion and sediment control (ESC) plan should be to prevent erosion and sedimentation during construction. ESC will prevent sediment inputs into surface water features, but additional ESC considerations should be given in areas with near-surface groundwater. Transportation impacts resulting from construction at the Powell Drain will be minimized to where possible based on the construction methods selected during detailed design resulting from subsurface utility engineering and hydrogeological investigations.

8.2 Socio-Economic Environment

8.2.1 PROPERTY REQUIREMENTS AND ACCESS CHANGES

Based on the recommended design concept presented in **Appendix H**, widening of the Adelaide Street North corridor requires a limited amount of property acquisition along the frontages of three existing properties. An overview of the approximate area required at each property and the rationale is provided in **Table 19** below.

TABLE 19: PROPERTY REQUIREMENTS

Property Required	Approximate Area	Rationale
614 Fanshawe Park Road East	39.05 m ²	Sliver of existing property parcel required to accommodate the intersection widening and installation of 1.8m cycle track and 1.5m sidewalk.
1570 Adelaide Street North	9.24 m ²	Sliver of existing property parcel required to accommodate the intersection widening and installation of 1.8m cycle track and 1.5m sidewalk.
1786 Adelaide Street North	184.15 m ²	Bend-out of existing property parcel required to accommodate the roadway widening and installation of 1.8m cycle track and 1.5m sidewalk including snow storage, street lighting and utilities (hydro/gas/communications).

In addition to the property parcels required, there are commercial, institutional and development properties along the corridor where access will be changing to right-in, right-only movements due to the installation of centre medians. These properties are summarized in **Table 20** below:

TABLE 20: ACCESS CHANGES

Municipal Property Number	Access Restriction	Rationale
1825 Adelaide Street North	Right-In, Right-Out	Median extension at Sunningdale Road East and Adelaide Street North intersection.
614 Fanshawe Park Road East	Right-In, Right-Out	Median extension at Fanshawe Park Road East and Adelaide Street North intersection.
1536 Adelaide Street North	Right-In, Right-Out	Median extension at Fanshawe Park Road East and Adelaide Street North intersection.
1530 Adelaide Street North	Right-In, Right-Out	Median extension at Fanshawe Park Road East and Adelaide Street North intersection.
1537 Adelaide Street North	Right-In, Right-Out	Median extension at Fanshawe Park Road East and Adelaide Street North intersection.

Municipal Property Number	Access Restriction	Rationale
2230 Blackwater Road	Right-In, Right-Out	Installation of centre medians on Sunningdale Road East as part of road widening.
1830 Adelaide Street North (Future Development)	Right-In, Right-Out	Installation of centre medians on Adelaide Street North as part of road widening.

The final design for the placement of centre medians and impacts to properties will be confirmed during subsequent stages of design and further discussions with property owners, as required.

In addition to permanent modifications to driveways, potential access restrictions may occur at private driveways during construction activities. Every effort will be made to maintain driveway access during the construction period. Driveways may be closed for short periods of time to facilitate re-construction.

8.2.2 NOISE IMPACTS

A Noise Impact Assessment was completed for the recommended design concept to assess future “build” and “no-build” sound levels from road traffic noise sources in the area (i.e., noise levels with and without the proposed project taking place). The full assessment is provided in **Appendix I**. The analysis was completed by using predictions to assess potential impacts according to the applicable guidelines; to specify mitigation measures where required; and to assess the potential for construction noise and provide a Code of Practice to minimize potential impacts. Several noise sensitive areas (NSAs) were used in the analysis to represent worst-case potential noise impacts at all nearby noise sensitive land uses within the study area.

The analysis results show that changes in sound levels resulting from the proposed project are expected to be no higher than approximately 0.6 dBA. No investigation of noise mitigation was undertaken because there were no changes in sound levels greater than the criteria set out in the MECP/MTO Joint Protocol. However, the City of London may wish to undertake a structural and acoustical evaluation of the effectiveness of the existing wooden noise barriers within the study limits.

It is anticipated that Construction noise impacts are temporary in nature but will be noticeable at times at residential NSAs. To minimize the potential for construction noise impacts, it is recommended that provisions be written into the contract documentation for the contractor:

1. Where possible construction should be carried out during the daytime. If construction activities are required outside of these hours, the Contractor should try and minimize the amount of noise being generated.
2. There should be explicit indication that Contractors are expected to comply with all applicable requirements of the contract.
3. All equipment should be properly maintained to limit noise emissions. As such, all construction equipment should be operated with effective muffling devices that are in good working order.
4. The Contract documents should contain a provision that any initial noise complaint will trigger verification that the general noise control measures agreed to be in effect.

5. In the presence of persistent noise complaints, all construction equipment should be verified to comply with MECP NPC-115 guidelines.
6. In the presence of persistent complaints and subject to the results of a field investigation, alternative noise control measures may be required, where reasonably available. In selecting appropriate noise control and mitigation measures, consideration should be given to the technical, administrative and economic feasibility of the various alternatives.

8.2.3 AIR QUALITY

There is potential for short term reduction in air quality due to dust and/or emissions from construction equipment. Dust/debris control measures shall be undertaken to control roadway dust. Measures to be included in the construction plans should include, but not be limited to:

- Application of water or non-chloride-based compounds.
- Soil and other material storage piles to be stabilized/covered to prevent wind erosion.
- Fine particulate materials to be covered during transportation to and from the site.
- Contractor to use new or well-maintained heavy equipment and machinery, preferably fitted with fully functional emission control systems/ muffler/ exhaust system baffles and engine covers.

8.3 Natural Environment

A summary of the anticipated Natural Environment impacts is provided below. A detailed overview of the net effects and assessment is included outlined **Table 21** and further described in **Appendix C - Environmental Impact Study Report**.

8.3.1 VEGETATION

Construction Impacts and Mitigation

Vegetation clearing to allow for the new road alignment and access areas will take place prior to construction. Vegetation removal will primarily be along the existing grassed boulevards to accommodate road widening. There will be limited encroachment into natural areas with the exception of some edge removal. The tree assessment (**Appendix J**) identified a total of 63 individual trees that may require removal along the existing ROW with the remaining 88 trees identified for preservation (see Tree Preservation Drawing in **Appendix J**). The trees identified for removal include: 55 City-owned trees, six (6) privately-owned trees, and two (2) boundary trees. The trees identified for removal and preservation should be re-assessed at detailed design.

In the area north of Sunningdale Road East, encroachment along the edge of the wetland unit is required to accommodate a sidewalk. The detailed design phase should consider installing a boardwalk style sidewalk in this location to minimize impacts to the wetland. If moving the sidewalk is not possible the type and materials to be used for the sidewalk (e.g., boardwalk-style) should consider potential effects to the Provincially Significant Wetland (PSW) and select a design that to minimize long-term impacts. It is noted alternative locations for pedestrian connectivity north of Sunningdale Road East will be reviewed in conjunction with future development applications.

The most significant feature where removal may occur includes the Arva Moraine PSW complex. A pathway is proposed at the northeast edge of one of the wetland units, located on the west side of Adelaide

Street North, south of Sunningdale Road East. If possible, the location of the pathway should be relocated outside of the PSW and the design should consider potential effects to the PSW (e.g. maintain vegetated buffers, incorporate pervious materials) to minimize short term and long term impacts. Vegetation removal will also be required on both sides of Adelaide Street North within the PSW to accommodate the wildlife crossing, which will ultimately improve connectivity and linkages between habitat types. Following construction, any disturbed areas should be restored and planted with native seed mix. Detailed design should also consider potential short-term (e.g., temporary loss of vegetation, accidental spills/sedimentation) and long-term impacts (e.g., changes in moisture regime, species compositions and structure) associated with the proposed works within and adjacent to the PSW and incorporate appropriate mitigation.

The spread of *Phragmites* may occur as a result of construction and encroachment into areas dominated by this species. The Project should develop an Invasive Species Management Plan which details management options to help control the spread of *Phragmites* and other invasive species. Invasive species management should follow the strategic process in the London Invasive Plant Management Strategy (LIPMS; City of London 2017a) and Best Management Practices (BMPs) developed by MNRF, Ontario Invasive Plant Council (OIPC) and the Clean Equipment Protocol for Industry (Halloran et al., 2013). It is also recommended that prior to construction, areas with *Phragmites* should be treated to prevent the spread of seeds. As part of the detailed design phase, it is recommended that an inventory of invasive species be completed and the extent of those locations mapped. As discussed previously, City funded *Phragmites* management, control and monitoring in the study area began in 2018 with touch-ups, additional control work and monitoring underway again in 2019.

A tree preservation plan should also be prepared to ensure the health of retained vegetation and measures to protect retained vegetation (e.g., tree protection fencing) should be installed prior to construction.

Long Term Impacts and Mitigation

Necessary vegetation removals have been minimized in the preferred design by adjusting the road alignments. Overall, very little encroachment into natural areas will occur as a result of road widening, with approximately 63 trees identified for removal within the existing ROW. Where encroachment and tree removal may occur, compensation through vegetation plantings in designated restoration areas and along the new ROW can offset the loss of vegetation and overall impacts. The extent of encroachment and tree removal should be determined during detailed design.

The post-construction Restoration Plan should include native, non-invasive plant species suited to the site conditions; any plantings immediately adjacent to the road should also be reasonably tolerant of salt, as salt spray from winter maintenance is likely to occur. Pollinator species, including milkweed, should be considered, where appropriate.

8.3.2 TERRESTRIAL WILDLIFE

Construction Impacts and Mitigation

To avoid impacts to breeding birds and bats protected under the Migratory Birds Convention Act and/or Endangered Species Act, vegetation removal should occur between October 1 and March 31 in any given year. Although not confirmed, should trees with snags (e.g., cavities, hollows, cracks) be encountered (i.e., as conditions may change from the time of the field investigations), removal shall not occur during the active season (April 1 – September 30) unless a qualified biologist deems it unsuitable habitat for SAR bats. For birds, simple habitats (e.g., habitats that have low nesting potential such as anthropogenic or

developed areas, manicured lawns, short or sparse grass) may be inspected for nests by a qualified biologist during the breeding season and subjected to vegetation removal if no nests are found. Complex habitats such as woodlands, isolated trees, shrubs, and grasslands, should not be treated in this manner as breeding birds and their nests are more difficult to locate and increase the risk of contravention of the Migratory Birds Convention Act. If trees, shrubs or ground vegetation removal occurs between April 1st and September 30th, a qualified biologist is required to complete a search for nests / bat habitat potential (in the event that a snag tree needs to be removed) and once cleared, the contractor has 48 hours to remove. If removal does not occur within 48 hours, another search will be required.

Wildlife could enter the work area from surrounding habitats during construction. To ensure that no wildlife is harmed during the course of construction, wildlife protection measures should be included in the construction contract package, including actions to be taken by workers if wildlife is encountered in an active work area. It is the responsibility of the contractor to ensure that Species at Risk are not killed, harmed, or harassed, and that their habitat is not damaged or destroyed through the proposed activities to be carried out on the site. Typically, wildlife should be left alone and allowed to leave the area by themselves. Capture and relocation of some animals may be necessary if they are unwilling to move or are at risk of immediate harm, but this should only be done by individuals who are experienced in the safe handling of wildlife. Any wildlife that is injured by construction activities should be delivered into the keeping of an MNRF-approved wildlife rehabilitator. If the proposed activities cannot avoid impacting protected species and their habitats, then the City or contractor will need to apply for an authorization under the Endangered Species Act (ESA) during detailed design and prior to construction activities.

As beavers are known to occur along Powell Drain, the Humane Urban Wildlife Conflict Policy: Beaver Protocol (City of London, 2017b) will be followed.

As previously noted, a wildlife crossing is proposed at the Powell Drain and Arva Moraine PSW complex. The proposed design includes an elliptical pipe that is 865mm by 1345mm which will be sized and installed to accommodate reptiles, amphibians and small mammals following Best Management Practices (MNRF, 2016b). A larger crossing structure at this location is constrained by underground utilities and unlikely feasible.

Long Term Impacts and Mitigation

Wildlife habitat is primarily focused around the Arva Moraine PSW complex, south of Sunningdale Road East, and the naturalized areas north of Sunningdale Road East. Although encroachment into natural areas is expected to be minor, increased traffic along Adelaide Street North has the potential to result in increased road mortality, especially at Powell Drain where road mortality has been identified. Areas north of Sunningdale Road East may also result in increased mortalities.

Installation of a wildlife passage at Powell Drain will create a natural linkage/corridor that is currently fragmented by Adelaide Street North and has the potential to reduce road mortality. The wildlife passage will be sized and installed to accommodate reptiles, amphibians and small mammals following Best Management Practices (MNRF, 2016b). The MNRF BMP guidance document (MNRF, 2016b) will be consulted for designing and implementing the wildlife passage.

There are opportunities for enhancement throughout the Project. This includes management and restoration of areas dominated by Phragmites. As discussed previously, City funded Phragmites management, control and monitoring in the study area began in 2018 with touch-ups, additional control work and monitoring underway again in 2019. Enhancement of Powell Drain is also recommended following any disturbance caused by construction of the wildlife passage and culvert extension.

8.3.3 FISHERIES AND AQUATIC RESOURCES

Construction Impacts and Mitigation

Potential impacts to fish and aquatic habitat can be identified as: a direct loss of habitat; direct injury to fish as a result of construction; or indirect changes to fish habitat that may occur in the long term and/or over a larger area. The DFO has developed Pathways of Effects (PoE) diagrams to describe the cause-effect relationships connecting a project activity to a potential stressor, and the stressor to some ultimate effect on fish and fish habitat. These diagrams were used as a tool to identify appropriate mitigation measures and determine residual impacts or effects.

The proposed project includes the widening of Adelaide Street North from the centerline, the potential extension of the Powell Drain culvert and/or the installation of headwalls at the east end of the culvert and realigning of the intermittent Worrall Drain channel and other ephemeral surface drainage. These works will include various construction activities that have the potential to impact the surrounding aquatic environments and trigger the following PoEs:

- Excavation;
- Use of industrial equipment;
- Vegetation clearing;
- Placement of materials or structures in water;
- Water extraction;
- Grading; and
- Fish passage.

The following sections provide assessment of the potential environmental impacts associated with the above-noted construction activities and a description of the appropriate design modifications and mitigation measures required to avoid and/or minimize those impacts. Additional information is provided in **Appendix C**.

Excavation

Excavation impacts will be mitigated by Erosion and Sediment Controls (ESCs) implemented during construction, such as timing constraints on covering exposed banks, and silt fence/fibre filtration tubes surrounding areas of exposed soils to slow water velocities and allow settling of suspended sediments. In general, all work areas will be isolated from the open watercourse via cofferdams to avoid sediment loading and resuspension in the waterbody. All permanent changes to the slopes in the area as a result of excavation will be stabilized in the short term with interim products (such as Flexible Growth Medium) and long term with vegetation (grasses and native plantings, discussed below). All excess materials generated by excavation will be stockpiled, handled, and disposed of in a manner that prevents entry into the adjacent waterbody.

Use of Industrial Equipment

Any part of equipment entering the waterbody or operating on the banks shall be free of fluid leaks and externally cleaned and/or degreased. All equipment maintenance and refueling shall be conducted at least 30 m away from the watercourse. A Spill Response and Action Plan that describes actions to be taken in the event of an incident such as an accidental spill should be prepared with all staff aware of the procedures

to be followed. A spill kit containing adsorbent materials (appropriate for removing petroleum from water and ground surfaces, i.e., pads, socks, granular) will be kept on site at all times in the event of a spill. Any area of streambed that will be accessed by industrial equipment will be isolated from the open waterbody, and any fish confined within the sequestered area will be removed by a qualified biologist, under a License to Collect Fish for Scientific Purposes issued by the MNR. This fish salvage will be completed prior to dewatering in order to prevent suffocation and mechanical harm.

Vegetation Clearing

Vegetation clearing impacts to the watercourse slopes and banks will be mitigated by ESCs (e.g., silt fence, fibre filtration tubes, etc.) in place during construction. Riparian vegetation removal will be kept to a minimum, as required for construction and access only. Vegetation scheduled for removal will have proper clearing techniques implemented to protect and retain the surrounding vegetation, and root masses will be left in place for bank stabilization, where feasible. All exposed soils should be stabilized with a suitable seed and cover mix.

Placement of Material or Structures in Water

The new culvert extension would enclose a section of the Powell Drain which was previously open. In order to construct the extension, additional materials will be placed in the water during construction to isolate the work areas (cofferdams).

To avoid resuspension of sediment as result of streambed disturbance during the placement of material or structures in water, the entire in-water work area will be isolated from the open waterbody using cofferdams. Any fish confined within the isolated areas will be removed by a qualified biologist prior to dewatering, in order to prevent harm. Only clean materials, free of particulate matter will be used for cofferdams and all temporary containment areas will be stabilized against the impacts of high flow. The cofferdams should be sized to withstand storm flows to prevent any accidental contact with raw concrete. Temporary flow will be maintained from upstream to downstream at all times to prevent impacts to the drain system below the culverts. To avoid construction related impacts and disruption to fish species during their most vulnerable life cycles, an in-water work timing window restricting all construction activities directly or indirectly impacting Powell Drain will be confirmed with the MNR with consideration for the cool water system classification. Should a concrete box culvert extension be considered (as opposed to open-footing culvert) the extension must be countersunk a minimum of 10% into the ground and the native streambed materials replaced within the culvert bottom.

Water Extraction

To prevent the displacement or stranding of aquatic organisms, prior to water extraction, a qualified biologist shall relocate any fish that are trapped in the isolated area to suitable downstream habitat within Powell Drain. The fish shall be transferred to suitable habitat using appropriate capture, handling, and release techniques. Screens should be placed at the end of all pump intakes, in accordance with DFO's "Freshwater Intake End-of-Pipe Fish Screen Guideline" (March 1995), to prevent the potential entrainment of fish and other aquatic animals during water extraction. Any water removed from the work area during extraction shall be treated (i.e., via settlement pond, filter bag, flowing through vegetated land, etc.) to remove suspended sediments prior to re-entering the stream. Treated water should be released back into the system in a manner that prevents erosion and sediment inputs in the receiving waterbody.

Grading

Grading will be required following bank disturbance due to construction equipment access, and to achieve the new slopes behind and surrounding the new culvert extension and/or headwall. Grading operations disturb the ground and expose soils, increasing the likelihood of erosion and the potential release of sediments into nearby water features. The installation of ESC measures at key locations will be paramount in preventing the release of sediments into nearby water features. These measures will be monitored regularly to ensure effective ESC and mitigation of erosion and sediment runoff. These measures shall continue to be maintained until acceptable vegetative cover is established. The focus should be placed on providing erosion controls (i.e., covering exposed slopes) as opposed to sediment controls (i.e., trying to capture the sediment).

Fish Passage

During installation of the culvert extension, the entire width of the stream channel will be restricted with cofferdams upstream and downstream of the worksites. This restriction is temporary, and during construction only and will not interfere with any migration patterns or access to habitats, provided the in-water work window is adhered to. Appropriate sizing and placement (i.e., in-line with the existing drain channel, countersinking of a box culvert by a minimum of 10%) of the new culvert extension will ensure that fish and aquatic invertebrates are able to move freely through the drain.

Long Term Impacts and Mitigation

The potential long-term impacts to fish and fish habitats include: barriers to fish migration and impacts to water quality. The design of the culvert extension will be paramount in preventing the eventual creation of fish barriers. Proper installation of the culvert extension, including sufficient countersinking, generally reduces the potential for perching or barriers to develop over time. The aspects of water quality that may be affected long-term as a result of this project include sediment loading and the introduction of road runoff contaminants (i.e., salt, hydrocarbons, pesticides, waster, sewage, etc.). Exposed soils are easily erodible, and sediment generated can flow into the watercourse.

8.3.4 WETLANDS

Construction Impacts and Mitigation

Some encroachment into the Arva Moraine PSW complex is proposed for a pathway near Powell Drain and a sidewalk near the northern extent of the Project. The Project design should consider relocating the pedestrian pathways outside of the PSW, where feasible. If relocation is not possible, these pathways should be designed to minimize potential long-term effects to the wetland (e.g., boardwalk-style path).

Long Term Impacts and Mitigation

There may be long-term impacts if construction of the pathway and sidewalk within the PSW are not properly designed. Stormwater management as a result of increased impervious surfaces may also impact the wetland. Through proper planning and design, long-term impacts to wetlands can be mitigated.

8.3.5 DFO PROJECT REVIEW

A The DFO Projects Near Water website contains a list of criteria used to determine if a project requires submission for specific review. The self-assessment section of this website lists types of waterbodies and project activities which do not require DFO review, however, it is still required that the project avoid causing

serious harm to fish. The self-assessment criteria for each of the watercourse crossings in this project are presented below.

The potential extension of the Powell Drain culvert is not a project activity listed under the self-assessment section as exempt from DFO review. However, given the limited length of the extension (i.e., 5 m or less) and the possibility to reduce this length further or even eliminate the need for an extension by the installation of a headwall, and the potential opportunities to improve fish passage and habitat, it was determined that this project will not require DFO review.

The *Fisheries Act* requires that projects avoid causing serious harm to fish unless authorized by the Minister of Fisheries and Oceans Canada. This applies to work being conducted in or near waterbodies that support fish that are part of or that support a commercial, recreational or Aboriginal (CRA) fishery. To protect fish and fish habitat, their residences, and their critical habitat, efforts should be made to avoid, mitigate and/or offset harm.

The impact assessment outlined in **Appendix C** shows that through design modifications and the application of mitigation measures during construction, extending the Powell Drain culvert by 5 m or installing a headwall to remove the need for culvert extension will not result in serious harm to fish. DFO review is therefore not required for this project, and provided the work follows the mitigation measures described in this report, the project may proceed in compliance with the *Fisheries Act*.

8.3.6 EROSION AND SEDIMENT CONTROL

Appropriate ESCs will be necessary during construction around all drainage features and wetlands. These are anticipated to include a primary focus on erosion control (i.e., cover on exposed slopes, fibre filtration tubes along slope contours adjacent to Powell Drain, Worrall Drain, and Northdale Tributary west branch) and a secondary focus on sediment control (i.e., silt fence at the site perimeter to control the movement of water and sediment to adjacent lands). Complete isolation of any in-water work areas from the open or flowing watercourse will be necessary to avoid introducing sediment or other construction-related deleterious substances into the watercourse.

Seeding of exposed soil should be completed as soon as possible following the completion of grading activities. Temporary seeding of fast-growing cover crops should be done on areas where construction will be suspended for extended periods of time (e.g., prior to winter shutdown, or in areas where final grade cannot be achieved until other construction is completed); alternately, other methods of erosion control (such as placement of rolled erosion control blanket) may be used to stabilize the soil surface and minimize erosion. Erosion control products with plastic netting or mesh should be prohibited, as these can lead to the entanglement and subsequent mortality of wildlife.

Once the construction phase is complete, and exposed soils are graded to their final configuration and stabilized with perennial vegetation, there should be very low potential for surface erosion on the site. Over the long term, road drainage outlets or steeply-sloped ditches could become localized sources for sediment if scouring occurs, but this type of issue can be avoided by incorporating appropriate energy attenuation measures into the detailed design. Permanent erosion control measures such as turf reinforcement mats could be incorporated into the detailed design if scour areas are likely to occur.

8.3.7 STREET TREES

Tree inventory and assessment works were completed, outlining the potential impacts of the preferred design concept on trees within or close to the limits of the preferred design concept and to provide

recommendations for tree removal and preservation strategies. In total, 151 trees were identified, reviewed, and were addressed. No rare or endangered species were observed during the tree inventory. All trees observed are common and typical of the varied current land uses. Up to 63 trees have been recommended for removal due to direct and unavoidable conflict with the proposed layout and required grading and servicing. Other trees that may be in proximity to the proposed construction are candidates for preservation. Trees to be preserved may be impacted by the construction process, or by the construction itself. Strategies and methods to avoid these impacts are documented in **Appendix J – Tree Assessment Report**.

8.4 Cultural Heritage Environment

A Cultural Heritage Assessment Report was completed which identified one cultural heritage resource at 660 Sunningdale Avenue East, however the proposed widening will have negligible impact through encroachment on the property and will not adversely affect the property's built heritage resources. Thus, no conservation or mitigation measures are required. Based on the results of the Stage 1 and Stage 2 Archaeological Assessments completed for the study area, it is concluded that due to complete and extensive previous disturbances there is no potential for archaeological resources within the limits of the Study Area. Thus, no mitigation measures are required.

8.5 Climate Change

The project has the potential for impacts to climate change through GHG emissions associated with existing and future vehicular travel, anticipated impacts to existing trees and expansion of impervious materials. In accordance with the City's Climate Lens for Transportation Capital Projects, the project will implement measures to support modal split through the implementation of dedicated pedestrian and cycling facilities. Additionally, there are opportunities for street trees within the boulevard to help reduce the urban heat island effect which is caused in part by dark surfaces (i.e. asphalt). The project will also feature stormwater management facilities such as bio-swales and can consider the use of preferred materials during the detailed design stage that are more resilient to increased freeze/thaw cycles.

TABLE 21: NATURAL ENVIRONMENT NET EFFECTS ASSESSMENT

Item of Concern	Potential impacts	Recommended Actions and mitigation	Net Effects Following Mitigation	Management and Monitoring Recommendations
<i>Design Stage</i>				
PSW and Significant Valleyland	Realignment may encroach within a portion of the PSW on both sides of the road.	Maintain vegetated areas adjacent to wetlands/valleylands as described previously in this report	Low – vegetation will be maintained between the road and vegetation patch with very minimal chance of vegetation removal	Restoration Plan – enhance restoration areas through invasive species management and native plantings
	Removal of vegetation associated with: pedestrian pathway, sidewalk, wildlife passage, and potential culvert extension	Avoid encroachment, where possible. If relocation of pathway and sidewalk is not possible, design should consider the type/materials used to minimize long-term effects.	Low – unavoidable removal of small area of common cultural vegetation community to accommodate the new crossing	Restoration Plan – enhance the surrounding stream corridor with native plantings
Powell Drain	Loss or degradation of fish habitat due to culvert extension	Possibility to install a headwall and remove the need to extend the culvert, if culvert must be extended – the length will be minimized (i.e., 5 m) and will be sized to match the existing culvert and natural substrate	Low – potential to enclose a section of Powell Drain in culvert extension, however sizing/substrate will significantly reduce any impacts to fish habitat/passage.	Environmental Monitoring During Construction – ensure design criteria are met with regard to streambed material replacement and culvert extension/ headwall
Terrestrial Wildlife	Incidental take has been noted at Powell Drain/PSW	Improve wildlife linkage at the Powell Drain culvert. A wildlife passage is currently being proposed.	Positive –if a wildlife passage is installed, incidents of wildlife mortality may decrease.	Road mortality surveys should be completed to determine areas where wildlife are crossing. Post-construction Monitoring Plan - determine use of culvert for wildlife passage, and investigate incidence of road mortality along Adelaide Street North.
<i>Construction Stage</i>				
Terrestrial Vegetation	Removal of vegetation for construction, staging, access, etc.	Confirm the areas of removals and conduct a floral inventory in these areas to confirm the absence of rare	None – currently no known rare plants present in removal areas or snag trees for SAR bats (pending	n/a

Item of Concern	Potential impacts	Recommended Actions and mitigation	Net Effects Following Mitigation	Management and Monitoring Recommendations
		species and snag trees for SAR bats.	confirmation during detailed design)	
		Prepare a post-construction Restoration Plan to compensate for removed vegetation and enhance buffers using native species.	Low – temporary reduction in overall study area vegetation while new plantings establish and grow	Restoration Plan
	Damage to retained vegetation throughout the construction zone	Prepare a tree preservation plan to ensure the health of retained vegetation during and after construction. Install exclusion fencing around areas and trees to be retained	None – no impacts to retained vegetation so long as exclusion fencing remains properly maintained and contractors do not enter areas beyond fencing.	Tree Preservation Plan – provide methods to protect retained trees
Wildlife and Wildlife Habitat	Disturbance or destruction of active bird nests	Complete all necessary vegetation removals between September 1 – March 31, which is outside of the bird nesting season. If active nests are found at any time in the construction zone, stop work in the vicinity.	None – all impacts to active bird nests will be avoided through timing windows.	Environmental Monitoring During Construction – ensure no active bird nests within work areas
	Harm to wildlife in the construction work area	Instruct workers that any wildlife discovered on the site is not to be harmed or harassed, and should be left to vacate the site on its own unless there is a risk of immediate harm to the animal	None – harm or harassment of wildlife will be avoided	Environmental Monitoring During Construction – check for wildlife within work areas
		Any wildlife that is injured by construction activities should be transported immediately to an approved wildlife rehabilitator	Low – no harm to wildlife is anticipated. However, in the unlikely event that an animal is injured by construction activities it will be transported to a wildlife rehabilitator	Environmental Monitoring During Construction – check for wildlife within work areas

Item of Concern	Potential impacts	Recommended Actions and mitigation	Net Effects Following Mitigation	Management and Monitoring Recommendations
		Select wildlife friendly ESC measures. Prohibit the use of erosion control or other products with plastic mesh or netting, as these can cause entanglement of wildlife	None – no impacts to wildlife if appropriate ESC measures are used	Environmental Monitoring During Construction – ensure prohibited products are not used
	Habitat avoidance and temporary loss of habitat at Powell Drain	Install wildlife passage outside of active seasons. BMPs to minimize wildlife-vehicle collisions should be installed during construction.	Low – impacts to wildlife and their habitat can be minimized through appropriate timing windows.	Pre-construction monitoring to verify species that may be impacted, including any nesting or overwintering that may occur at Powell Drain. Environmental Monitoring During Construction – check for wildlife within work areas
Fish and Aquatic Habitat	Sedimentation of Powell Drain	Erosion and sediment controls installed and maintained until vegetative cover establishes	Low – properly installed and maintained ESC measures will reduce erosion and sediment inputs into Powell Drain and other watercourses	Environmental Monitoring During Construction – a qualified environmental monitor should regularly inspect ESC measures to ensure they are functioning correctly
		Limit construction equipment access on banks	Low – some equipment access will be required on the banks during construction, however isolation methods will be employed	Environmental Monitoring During Construction
		Isolate in-water work areas from the open watercourse	Low – minimal disturbance during isolation method installation	Environmental Monitoring During Construction – a qualified environmental monitor should be onsite during in-water isolation set up and removal
		Treat dewatering effluent prior to release back into the drain, and discharge it in a manner which does not erode the receiving watercourse	None – properly treated dewatering effluent will not cause sedimentation of the stream	Environmental Monitoring During Construction – a qualified environmental monitor should regularly monitor the discharge areas for turbidity and erosion

Item of Concern	Potential impacts	Recommended Actions and mitigation	Net Effects Following Mitigation	Management and Monitoring Recommendations
	Barriers to fish migration	Adhere to in-water timing window to prevent impacts to fish migration during sensitive lifecycles	None – no in-water work/isolation during prohibited timing window	Environmental Monitoring During Construction
		Extension will be designed to prevent future scour and possible creation of fish barriers (i.e., countersinking culvert a minimum of 10%)	None – potential extension will adhere to design standards and match existing	n/a
	Stranding, impingement, or other physical harm to fish	Fish stranded within any isolated in-water work areas shall be removed by a qualified Fisheries Biologist prior to dewatering or work.	Low – fish will be removed prior to in-water work in any isolated areas, preventing harm/mortality	Environmental Monitoring During Construction – fish salvage oversight
		Place fish screens on all pump intakes as per the DFO End-of-Pipe guidelines (DFO 1995)	None – fish harm or mortality due to pumps will be prevented	Environmental Monitoring During Construction – ensure protection/mitigation measures are operating effectively
		At no time shall industrial equipment access any portion of the waterbody that is not isolated and has had fish removed	None – fish harm or mortality due to industrial equipment will be prevented	Environmental Monitoring During Construction – ensure protection measures are being abided
	Loss of fish habitat	Culvert extension will be open-footing or countersunk to reproduce existing fish habitat characteristics	Low – no net loss of fish habitat, however a change in open channel to closed culvert, but with native substrate and no instream footprint	Environmental Monitoring During Construction – ensure protection/mitigation measures are operating effectively
	Change in cover, food, riparian structure, thermal regime	Riparian vegetation will be replaced, with seed and cover or landscaping with native plants	Low – slight reduction in riparian vegetation while new plantings establish and grow	Restoration Plan
		Loss of riparian shade at the Powell Drain extension will be replaced by the	None – overall shade of stream section will be increased by enclosing structure, this will aid in	n/a

Item of Concern	Potential impacts	Recommended Actions and mitigation	Net Effects Following Mitigation	Management and Monitoring Recommendations
		shading from the actual new structure	water temperature reduction	
Surface Water and Wetlands	Contamination of surface water by road runoff	Design appropriate containment and treatment of road runoff to ensure that contaminated water is not directed towards watercourses or wetlands	Low –measures will be incorporated in design to mitigate the impacts of road runoff	Environmental Monitoring During Construction
	Encroachment into wetland habitat	Assign and enhance suitable buffers around wetlands, as described above, to provide additional protection to these habitats.	Low – minor encroachment into wetlands is proposed through construction of pedestrian pathway along the edge of the PSW (west side of Adelaide Street North)	Restoration Plan – enhance buffer areas with native plantings
Species at Risk and Species of Conservation Concern	Encroachment of design into areas where SAR and SoCC occur.	Define and enhance buffers around natural heritage areas, as described above, to provide additional protection to the habitat of rare species. Installation of wildlife passage at Powell Drain will improve linkages and may reduce mortality.	Low – minor encroachment into wetland inhabited by turtles, however, enhancement opportunities will offset any impacts and improve overall habitat / connectivity.	Restoration Plan – enhance buffer areas with native plantings
	Removal of snag trees for SAR bats	Complete all necessary vegetation removals between October 1 – March 31, which is outside of the active period for bats (should snag trees be encountered) .	None – currently no known snag trees in removal areas (pending confirmation during detail design). If present, impacts can be mitigated through timing windows.	Environmental Monitoring During Construction – ensure no encroachment into tree communities
	Opportunity for improvement of wildlife habitat	Management and restoration of areas dominated by Phragmites consistent with existing City funded management, control and monitoring (ongoing since 2018).	Positive – creation of breeding and foraging habitat for Monarch.	Restoration Plan – enhance buffer areas with native plantings

Item of Concern	Potential impacts	Recommended Actions and mitigation	Net Effects Following Mitigation	Management and Monitoring Recommendations
Erosion and Sedimentation	Input of sediment to watercourses during construction	Install appropriate measures on the construction site to limit surface erosion and control the movement of water and suspended sediment	Low – properly installed and maintained ESC measures will reduce erosion and sediment inputs into Powell Drain and other watercourses	Environmental Monitoring During Construction – A qualified environmental monitor should regularly inspect ESC measures to ensure they are functioning correctly
	Long-term erosion issues due to site instability	Utilize permanent erosion controls such as turf reinforcement mats if there is the potential for scouring or other erosion concerns that cannot be addressed through other methods.	None – site stability should be assured if appropriate energy attenuation, erosion controls, and related measures are incorporated into detailed design and installed properly	Post-construction Monitoring Plan – review site to identify any areas of erosion concern that should be addressed

9 Additional Work, Permits and Monitoring

9.1 Detailed Design Commitments

In accordance with the Schedule “C” Class EA requirements for the study, impacts to the environment, as defined in the Ontario Environmental Assessment Act, were minimized, where possible, through the evaluation process that was undertaken in identifying the preferred design. In addition to incorporating all of the recommended mitigation and monitoring measures in **Section 8.0**, additional works that are required to be completed during the detailed design phase of the project, prior to construction, are summarized below.

Transportation/Technical Requirements

1. Confirm design requirements for future watermain chamber installation.
2. Confirm presence of all subsurface utilities within the study area such as buried telecom, gas and municipal servicing through the completion of Subsurface Utility Engineering (SUE) investigations. Geotechnical and SUE investigations are required to confirm the preferred construction method for crossing the Powell Drain and existing Imperial Oil pipeline with any subsurface utilities or municipal servicing.
3. Confirm future lighting requirements for both the Adelaide Street North and Sunningdale Road East corridors and consider the City’s street lighting design standards.
4. Confirmed the project’s Design Criteria at the onset of the detailed design process to incorporate any changes to prevailing guidelines and existing conditions over the next 10 years.

5. Incorporate any necessary refinements to the horizontal and vertical profile of the proposed design.
6. Confirm need for the mid-block pedestrian and cyclist crossing at the Powell Drain and review and refine the conceptual design.
7. Explore options for additional refinements to active transportation facilities as noted in **Section 7.8**, including options to increase the visibility of the pedestrians and cyclists at the commercial plaza entrance on the north-west side of the Adelaide / Fanshawe Park intersection such as such as enhanced pavement treatments and signage.
8. Develop a detailed landscape plan for the corridor which considers the requirements identified in the City's Complete Streets Design Manual for Civic Boulevards and other applicable planning documents/guidelines and incorporate the installation of boulevard trees at regular intervals along the corridor.
9. Complete a detailed construction staging and traffic management plan building on the preliminary staging approach documented in **Section 7.14**.
10. Refine preliminary cost estimates for the Adelaide and Sunningdale corridors.
11. Develop necessary reports and plans for the management of excess soils in accordance with O. Reg. 406/19 and the ministry's current guidance documents titled "Management of Excess Soil – A Guide for Best Management Practices" (2014) and "Rules for Soil Management and Excess Soil Quality Standards" (2022).

Drainage/Stormwater Management

1. Prepare detailed erosion and sediment control (ESC) plan.
2. Explore different options to match the pre-and post-development drainage flow rates and options for improving flow conditions at the Powell Drain as noted in **Section 7.5** and **7.9**. The incorporation of Low Impact Development (LID) measures will need to consider boulevard space, elevation difference, ideal soil condition and utility locations.
3. Confirm the need for an extension of the Powell Drain culvert to the east through refinement of the proposed grading limits and consultation with the Upper Thames River Conservation Authority.
4. Confirm there is no need to upsize the storm sewers at locations with less capacity.
5. Review and revise Hydrologic and Hydrographic model based on any changes to regulatory flood lines that may have occurred.
6. Undertake hydrogeological studies in areas of proposed LID measures to verify soil suitability.

Socio-Economic Requirements

1. Confirm anticipated property requirements and complete additional consultation / negotiation with affected property owners.
2. Confirm the design for the placement of centre medians and potential impacts to adjacent driveway access.

Natural Environment Requirements

1. Confirm all permitting requirements with Upper Thames River Conservation Authority (UTRCA).

2. Re-assess the trees identified for removal and preservation encompassing any updates which may occur to the design drawings. Incorporate all identified tree mitigation measures into the detailed design drawings.
3. Confirm wetland encroachments and consider installing a boardwalk style sidewalk at select locations to minimize impacts to PSW wetland areas including at the Powell Drain and north of Sunningdale Road East.
4. Complete an inventory of invasive species and map the extents of locations.
5. Incorporate appropriate energy attenuation measures into the detailed design at drainage outlets and steeply-sloped ditches to minimize potential for sediment. Permanent erosion control measures such as turf reinforcement mats could be incorporated into the detailed design if scour areas are likely to occur.
6. Conduct a pre-construction assessment of the adjacent natural heritage features to act as a baseline for construction and pre-construction monitoring.
7. Implement monitoring, management and restoration of areas dominated by priority invasive species.
8. Implement the Clean Equipment Protocol for Industry practices.
9. Prepare an Invasive Species Management Plan for the control of priority invasive species consistent with the LIPMS (City of London 2017a).
10. Time construction activities outside of sensitive timing windows (e.g., vegetation removal in the winter). Adhere to City of London protocols for any necessary tree removals including pre-marking.
11. Produce a restoration plan that includes restoration or enhancement of adjacent natural heritage features.
12. Conduct regular monitoring during construction including wildlife presence and silt fencing.
13. Consider removing noted barriers to fish migration to improve connectivity throughout the Powell drain system.
14. Ensure culvert extension sizing and countersinking in design to avoid Fisheries Act implications.
15. Prepare a contractor awareness package for wildlife and species at risk protection and protocols.
16. Develop and implement a post-construction monitoring plan to determine use of culvert for wildlife passage and investigate incidence of road mortality along Adelaide Street North.
17. Inspect seeded and planted material for deficiencies and replace as required under warranty.

9.2 Permits and Approvals

A preliminary list of permits and approvals that have been, and may be, required for this project are identified in **Table 22**. The contractor may need to acquire additional permits may be required from the City of London prior to construction.

TABLE 22: PERMITS & APPROVALS SUMMARY

Regulatory Agency	Legislation	Permit/Approval	Comments
Ministry of the Environment, Conservation and Parks	Ontario Environmental Assessment Act	Schedule 'C' Class EA (Municipal Engineer's Association Class EA)	Satisfactory completion of EA requirements is a prerequisite for obtaining most other approvals.
	Ontario Water Resources Act	Permit to Take Water / Registration in the Environmental Activity Sector Register	If construction dewatering is needed between 50,000 and 400,000 litres per day, registration in the water taking Environmental Activity Sector Register (EASR) is required. If amounts greater than 400,000 litres per day are anticipated, a Permit to Take Water will be required.
	Endangered Species Act	Endangered Species Act permit or authorization	If the proposed activities cannot avoid impacting protected species and their habitats, then the City or contractor will need to apply for an authorization under the Endangered Species Act (ESA) during detailed design and prior to construction activities.
	Environmental Protection Act	Environmental Compliance Approval	Required prior to construction to ensure that the proposed works comply with MECP guidelines for the design of sanitary sewage systems, storm sewer systems and/or water systems.
Ministry of Natural Resources and Forestry	Fish and Wildlife Conservation Act	License to Collect Fish for Scientific Purposes	Any area of streambed that will be accessed by industrial equipment will be isolated from the open waterbody, and any fish confined within the sequestered area will be rescued and relocated by a qualified biologist, under a License to Collect Fish for Scientific Purposes issued by the MNR. This fish salvage will be completed prior to dewatering in order to prevent suffocation and mechanical harm.

Regulatory Agency	Legislation	Permit/Approval	Comments
Upper Thames River Conservation Authority	Development, Interference with Wetlands and Alterations to Shorelines and Watercourses regulation	Permit under ON. Reg. 157/06	Applies to areas along the Powell Drain and other key watercourses in the study area. Under this regulation, any development, site alteration, construction, or placement of fill within the regulated area requires a permit from UTRCA, as does interference with a wetland or any alteration to an existing watercourse channel.

9.3 Monitoring During Construction

Monitoring must be undertaken during construction so that all the environmental commitments as detailed in this ESR and the contract document are fulfilled.

A qualified Certified Inspector of Sediment and Erosion Control (CISEC) should conduct regular inspections of the environmental protection measures (ESCs, containment measures, etc.) and identifying deficiencies. The inspector will ensure all environmental mitigation and design measures are properly installed / constructed and maintained, and appropriate contingency and response plans are in place and implemented if required.