

APPENDIX C

PARSONS

Environmental Impact Study

Adelaide Street North Municipal Class Environmental Assessment

City of London, Ontario

Prepared for:

The City of London

300 Dufferin Avenue, London, ON N6A 4L9

July 2020 (FINAL DRAFT)

Environmental Impact Study

**Adelaide Street North
Municipal Class Environmental Assessment**

Prepared for: City of London

Prepared by: Parsons

Acronyms

ANSI	Area of Natural and Scientific Interest
BCR	Bird Conservation Region
BMP	Best Management Practice
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
cSWH	Candidate Significant Wildlife Habitat
DFO	Department of Fisheries and Oceans
EEPAC	Environmental and Ecological Planning Advisory Committee
EIS	Environmental Impact Study
ELC	Ecological Land Classification
ESA	Environmentally Significant Areas
ESA, 2007	Endangered Species Act
HVA	Highly Vulnerable Aquifer
LIO	Land Information Ontario
LPAT	Local Planning Appeal Tribunal
MNRF	Ministry of Natural Resources and Forestry
NHA MaM	Natural Heritage Areas Make a Map
NHIC	Natural Heritage Information Center
NHRM	Natural Heritage Reference Manual
OBBA	Ontario Breeding Bird Atlas
OP	Official Plan
ORRA	Ontario Reptile and Amphibian Atlas
PPS	Provincial Policy Statement
PSW	Provincially Significant Wetland
SAR	Species at Risk
SARA	Species at Risk Act
SARO	Species at Risk in Ontario
SGRA	Significant Groundwater Recharge Area
SoCC	Species of Conservation Concern
SWH	Significant Wildlife Habitat
SWHTG	Significant Wildlife Habitat Technical Guide
URTCA	Upper Thames River Conservation Authority
UTM	Universal Transverse Mercator
VES	Visual encounter survey

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Introduction

1. Introduction

1.1 PROJECT OVERVIEW

Parsons Corporation (“Parsons”) was retained by the City of London (“City”) to complete a Municipal Class Environmental Assessment (MCEA) for the widening of Adelaide Street North from Fanshawe Park Road East to Sunningdale Road East (**Figure 1, Appendix A**). In support of the MCEA, a scoped Environmental Impact Study (EIS) is required 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.

1.2 STUDY OBJECTIVES

The Project includes assessing the right of way (ROW) along Adelaide Street North from Fanshawe Park Road East to Sunningdale Road East (“Subject Lands”) and within 120 m (“Study Area”) (**Figure 1, Appendix A**).

The objectives of this report are to:

- Characterize and evaluate the significance of existing natural heritage features within the study area;
- Identify potential constraints and opportunities of the Project; and
- Assess potential impacts and mitigations to be considered as part of the evaluation and selection of Project alternatives.

The scope of work for this EIS include:

- Delineation of vegetation communities following the Ecological Land Classification (ELC) protocol and three-season inventory of plant species present in these vegetation communities;
- Targeted wildlife studies, specifically breeding bird and amphibian call surveys, as well as incidental wildlife observations;
- Evaluation of significance of identified natural heritage features and functions, including assessment of significant wildlife habitat (SWH);
- Fisheries and aquatic habitat assessment of waterbodies within the study area;
- Visual mussel surveys in tributaries of Stoney Creek;
- Species at risk (SAR) screening of terrestrial and aquatic resources; and
- Assessment of potential impacts and recommend mitigation measures.

Planning Context

2. Planning Context

2.1 PLANNING POLICIES

2.1.1 PROVINCIAL POLICY STATEMENT

The Provincial Policy Statement (PPS) sets the policy direction for regulating development and land use planning in the province. Provincial plans and land use decisions made by municipalities build on the foundation of the PPS and all relevant policies must be considered. This report deals specifically with the policies contained in Part V, Section 2.1 (Natural Heritage) of the PPS which is directed at protection and management of natural heritage systems and natural heritage features. A natural heritage system is defined by the Province of Ontario as:

“A system made up of natural heritage features and areas, and linkages intended to provide connectivity (at the regional or site level) and support natural processes which are necessary to maintain biological and geological diversity, natural functions, viable populations of indigenous species and ecosystems. These systems can include natural heritage features and areas, federal and provincial parks and conservation reserves, other natural heritage features, lands that have been restored or have the potential to be restored to a natural state, areas that support hydrologic functions and working landscapes that enable ecological functions to continue. The Province has a recommended approach for identifying natural heritage systems, but municipal approaches that achieve or exceed the same objectives may also be used” (Provincial Policy Statement 2014).

Natural heritage features include:

- significant wetlands;
- significant coastal wetlands;
- other coastal wetlands in Ecoregions 5E, 6E and 7E;
- fish habitat;
- significant woodlands;
- significant valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River);
- habitat of endangered and threatened species;
- significant wildlife habitat; and
- significant areas of natural and scientific interest (ANSIs).

Development and site alteration is not permitted in:

- significant wetlands in Ecoregions 5E, 6E and 7E and significant coastal wetlands.
- significant wetlands in the Canadian Shield north of Ecoregions 5E, 6E and 7E, significant woodlands and significant valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River), significant wildlife habitat, significant ANSIs, and coastal wetlands in Ecoregions 5E, 6E and 7E that are not subject to policy 2.1.4(b), unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.
- fish habitat or habitat of endangered and threatened species except in accordance with provincial and federal requirements.

Development and site alteration are not be permitted on adjacent¹ lands to the protected natural heritage features and areas unless the ecological function of the adjacent lands has been evaluated, and it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.

2.1.2 THE LONDON PLAN AND 1989 OFFICIAL PLAN

The London Plan was adopted by City Council on June 23, 2016 and was approved by the Minister on December 28, 2016 (City of London 2016). The London Plan establishes a policy framework to guide the city’s growth and development. The objectives and policies of The London Plan direct Council’s decisions for the physical development of the Municipality, while having regard for relevant social, economic, and environmental matters. All decisions of the Municipality must be consistent with the policies of The London Plan.

Several environmental Policies of The London Plan are under appeal before the Local Planning Appeal Tribunal (LPAT) (formerly Ontario Municipal Board). As a result, applications related to those appealed policies will be evaluated on a case-by-case basis by the City.

The London Plan policy 1298 states that, “*The City’s Natural Heritage System is a system of natural heritage features and areas and linkages intended to provide connectivity at the regional or site level and support natural processes which are necessary to maintain biological and geological diversity, natural functions, viable populations of native species, and ecosystems. In London, this includes natural heritage features and areas, provincial parks, other natural heritage features, lands that have been restored or have the potential to be restored to a natural state, areas that support hydrologic functions and working landscapes that enable ecological functions to continue. The City’s Natural Heritage System is shown on Map 5 – Natural Heritage.*”

Most, but not all of the natural heritage features that comprise the natural heritage system are identified as Green Space or Environmental Review Place Types (shown on Map 1 of The London Plan).

Natural heritage features and areas within the Green Space Place Type include:

- Fish Habitat
- Habitat of Endangered Species and Threatened Species
- Provincially Significant Wetlands (PSW) and Wetlands
- Significant Woodlands and Woodlands
- Significant Valleylands
- Significant Wildlife Habitat (SWH)
- Areas of Natural and Scientific Interest (ANSI)
- Water Resource Systems
- Environmentally Significant Areas (ESA)
- Upland Corridors
- Potential Naturalization Areas
- Adjacent Lands

Natural heritage features and areas within the Environmental Review Place Type include:

- Unevaluated Wetlands
- Unevaluated Vegetation Patches
- Other Vegetation Patches Larger than 0.5 Hectares
- Valleylands
- Potential Environmentally Significant Areas

¹ Adjacent lands are those that are contiguous to a specific natural heritage feature or area where it is likely that development or site alteration would have a negative impact on the feature or area.

Map 1 and Map 5 of The London Plan and Schedule B-1 and B-2 of the 1989 Official Plan (OP) have been reproduced to show the Subject Lands and are provided in **Appendix B**.

Environmental Impact Study Policies

The requirements for completing an EIS are included in policies 1431 through 1437. An EIS is required where *“development or site alteration is proposed within or adjacent to components of the Natural Heritage System”* (Policy 1432). Further, *“ development or site alteration on lands adjacent to features of the Natural Heritage System shall not be permitted unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions”* (Policy 1433).

The City of London has indicated that in general, should a preferred infrastructure routing option go beyond the existing road allowance and then into a Natural Heritage Feature as identified on Map 5 of the London Plan or identified through the process, then an Environmental Impact Study (EIS) would be required which identifies potential impacts, mitigation and compensation for those areas beyond the road allowance, consistent with the Provincial Policy Statement (OMMAH, 2014), London Plan (London, 2016) and the London Environmental Management Guidelines (London, 2007).

Permitted Uses and Activities – Infrastructure Policies

The key Policies related to permitted uses and activities related to infrastructure are summarized below:

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.”*

Policy 1397 states *“The environmental impact study undertaken as part of the Environmental Assessment shall be completed to further assess potential impacts, identify mitigation measures, and determine appropriate compensatory mitigation, if required. Any alternative where the impacts of the proposed works as identified in the environmental impact study would result in the loss of the ecological features or functions of the component of the Natural Heritage System affected by the proposed works, such that the natural heritage feature would no longer be determined to be significant, shall not be permitted.”*

Policy 1400 states *“For infrastructure projects within the Natural Heritage System, the City shall require specific mitigation and compensatory mitigation measures that are identified in the accepted environmental impact study to address impacts to natural features and functions caused by the construction or maintenance of the infrastructure.”*

Study Approach

3. Study Approach

The scope of field investigations and other activities for this study was confirmed during a scoping meeting between Parsons’ ecological services team and City staff on August 21, 2019. Upper Thames Region Conservation Authority (UTRCA) was unable to attend the meeting but provided comments by email. A copy of the meeting minutes and Issues Summary Checklist Report and email from UTRCA is provided in **Appendix C**.

The Project included a background review and field investigations to verify presence/absence of natural heritage features within the study area. The following sections include a summary of information sources reviewed and field studies completed. The resumes for staff who have contributed to this report is provided in **Appendix I**.

3.1 BACKGROUND REVIEW

The following information sources were reviewed for information related to natural heritage features within the Subject Lands.

3.1.1 MINISTRY OF NATURAL RESOURCES AND FORESTRY

- **MNRF Aylmer District** – Information on natural heritage features within the Study Area was requested from the MNRF Aylmer District by way of email, dated July 23, 2018. The response from MNRF, received October 21, 2018, is provided in **Appendix C**.
- **Land Information Ontario (LIO) Mapping** – LIO data is maintained by the MNRF and provides key provincial geospatial data about Ontario. Shapefiles obtained from the LIO open datasets were obtained and used to show the natural features within the Subject Lands. A map showing the LIO environmental datasets within the Study Area is provided on **Figure 1, Appendix A**.
- **Natural Heritage Areas Make a Map (NHA MaM)** – The NHA MaM is a web application that provides information on provincial parks, conservation reserves, and natural features (i.e., ANSIs, wetlands, woodlands, natural heritage systems related to provincial policy plan areas (e.g., Niagara Escarpment, Oak Ridges Moraine and Greenbelt Plans). The NHA MaM also provides Natural Heritage Information Center (NHIC) data, which includes information on plant communities, wildlife concentration areas, natural areas, SoCC (i.e., rare species) and SAR. The NHIC data is organized into 1 km² map squares. The map squares that overlap the Project include 17MH7865, 17MH7866, 17MH7964, 17MH7965, and 17MH7966. A list of species from the background review is provided in **Appendix D**.

3.1.2 CITY OF LONDON

- **The London Plan** – A review of the Policies, including Map 1 (Place Types), Map 5 (Natural Heritage) and Map 6 (Hazards and Natural Resources). Map 1 and Map 6 of The London Plan are shown in **Appendix B**.
- **1989 OP** – A review of the Policies and Schedule B-1 (Natural Heritage Features) and Schedule B-2 (Natural Resources and Natural Hazards). Schedule B-1 and B-2 of the 1989 OP are shown in **Appendix B**.

3.1.3 PUBLICLY AVAILABLE DATABASES

- **Ontario Breeding Bird Atlas (OBBA)** – The OBBA (Bird Studies Canada et al., 2006) was reviewed to determine which species have the potential to occur within the Subject Lands. The OBBA provides a list of bird species that have been observed within a 10 x 10 km² area during surveys completed between 1981 and 1985 and 2001 and 2005. Species that were documented between 2001 and 2005 were considered as part of this background review. The map square that overlaps the Project is 17MH76. A list of species from the background review is provided in **Appendix D**.
- **Ontario Reptile and Amphibian Atlas (ORAA)** – The ORAA (Ontario Nature, 2015) and interactive range maps were reviewed. The ORAA provides known ranges of reptiles and amphibian species in Ontario based on historic and current species occurrences. The information is displayed in 10 x 10 km² map squares. The map square that overlaps the Project is 17MH76. A list of species from the background review is provided in **Appendix D**.
- **Fisheries and Oceans Canada (DFO) Aquatic Species at Risk (SAR) mapping**; A review of the aquatic DFO mapping to determine if SAR are within the Subject Lands.

3.1.4 CONSERVATION PLANS

The conservation plans identified in **Table 1** were reviewed for the designations and conservation status of priority species and to determine if any of those species are present based on the background review and field investigations.

Conservation priority species are considered a species of conservation concern and thus, would be assessed as part of the significant wildlife habitat assessment.

Table 1 – Conservation Plans Reviewed to Determine the Conservation Status of Species in the Subject Lands

DOCUMENT	DESCRIPTION
Bird Conservation Strategy for Bird Conservation Region (BCR) 13 in Ontario Region: Lower Great Lakes/St. Lawrence Plain (Environment Canada 2014)	Provides a list of priority species and conservation objectives, including species of regional concern. The designations for the bird species in this report were considered to identify SoCC as part of the SWH assessment. Species that have a conservation objective of Recovery are associated with SAR, while those assigned an objective of Increase (e.g., population decline) were considered to be a SoCC.
Canadian Shorebird Conservation Plan (Donaldson et al. 2000)	Provides population sizes and abundance status estimates and conservation priorities for 47 species of shorebirds breeding and occurring in Canada; of these species, there are 29 that regularly occur in Ontario (Ross et al., 2003). Conservation priorities for these species are assessed based on population trends throughout Canada and do not necessarily reflect province-wide trends. Nonetheless, the conservation priorities in the Canadian Shorebird Conservation Plan were considered for the species identified during the background review and field investigations to determine which are considered a SoCC. Species that have a conservation objective of High Concern (known or thought to be declining and some other known or potential threat) and Moderate Concern (populations are either: stable with moderate threats and distributions; increasing but with known or potential threats and moderate to restricted distributions; or of moderate size) are considered a species of conservation concern and considered in this EIS.
Wings Over Water: Canada's Waterbird Conservation Plan (Milko et al. 2003)	Addresses seabirds that are found in marine and coastal areas, inland colonial waterbirds or wetland related bird species. This publication provides population statistics, conservation status and conservation priorities for waterbirds. Species that have a conservation objective of Highly Imperiled (significant declines and either low populations or some other high risk factor), High Concern (populations are known or thought to be declining and have a known or potential threat), and Moderate Concern (populations are either: declining with moderate threats or distributions; stable with known or potential threats and moderate to restricted distributions; or relatively small with restricted distributions) are considered a species of conservation concern and considered in this EIS. The conservation priorities in the Canada's Waterbird Conservation Plan were also considered for the species identified during the background review and field investigations to determine which are considered a SoCC.

3.2 SPECIES AT RISK SCREENING – ENDANGERED AND THREATENED SPECIES

This report considers species at risk (SAR) as those classified as Extirpated, Endangered or Threatened and protected under the Endangered Species Act, 2007 (ESA, 2007) and/or Species at Risk Act (SARA). This includes:

- Provincially protected species on the Species at Risk in Ontario (SARO) List under Ontario Regulation 230/08.
- Federally listed migratory birds and fish on Schedule 1 of SARA; these species are protected anywhere they occur, including non-federal lands. All other federally listed species are generally² (except through an Order) only protected under SARA if they occur on federal lands.

In this report, rare species that are not considered a SAR are identified as a species of conservation concern (SoCC) and discussed under significant wildlife habitat (SWH) under habitat for SoCC (see definition in **Section 3.3**). This approach is consistent with the definitions and protocols under the SWHTG (MNR, 2000).

SAR Screening Approach

A list of SAR with potential to occur in the Subject Lands were compiled from background sources and the habitat requirements for these species were identified using authoritative references, namely the MNR's Significant Wildlife Habitat Technical Guide (SWHTG) (2000) and assessment reports from the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The potential that these species or their habitat could occur in the Subject Lands and present a constraint to the proposed work was assessed following field investigations. SAR which were confirmed to be

² SARA can make a ministerial order to protect species and their critical habitat on non-federal lands that are not already subject to the provisions of the Act.

present in the Subject Lands or were determined to have a high probability of occurring in the Subject Lands are discussed in detail in **Section 4.8**

3.3 SIGNIFICANT WILDLIFE HABITAT ASSESSMENT

The MNRF provides specific guidance on identifying and assessing wildlife habitat in the Significant Wildlife Habitat (SWH) Criteria Schedules for Ecoregion 7E (MNRF, 2015). Other guidance documents used as part of the SWH assessment included the SWHTG (MNRF, 2000) and Natural Heritage Reference Manual (NHRM; MNRF, 2010).

The MNRF recognizes five (5) main categories of wildlife habitat, each with several wildlife habitat types. The general definitions of these habitat types are provided below:

- **Seasonal Concentration Areas of Animals** – defined as “areas where animals occur in relatively high densities for the species at specific periods in their life cycles and/or in particular seasons” and areas that are “localized and relatively small in relation to the area of habitat used at other times of the year” (MNRF, 2010).
- **Rare Vegetation Communities** – defined as “areas that contain a provincially rare vegetation community and areas that contain a vegetation community that is rare within the planning area” (MNRF, 2010).
- **Specialized Habitat for Wildlife** – defined as “areas that support wildlife species that have highly specific habitat requirements, areas with high species and community diversity, and areas that provide habitat that greatly enhances species’ survival” (MNRF, 2010).
- **Habitat for SoCC** – defined as “habitats of species that are designated at the national level as endangered or threatened by COSEWIC, which are not protected in regulation under Ontario’s ESA, 2007; habitats of species listed as special concern under the ESA, 2007 on the SARO List (formerly referred to as “Vulnerable” in the SWHTG); and habitats of species that are rare or substantially declining, or have a high percentage of their global population in Ontario” (MNRF, 2010). More specifically, species of conservation concern (SoCC) include:
 - **globally rare species** – These species are assessed by NatureServe and assigned a global conservation status rank (G-rank) of G1 to G3.
 - **nationally rare species** – These species are assessed by COSEWIC as Extirpated, Endangered, Threatened, or Special Concern but not listed in SARA; species not protected under SARA including those designated as Special Concern on Schedule 1 (e.g., Monarch) or any of the listed species in Schedule 2 and Schedule 3; species on non-federal land listed on Schedule 1 of SARA, other than migratory birds and fish.
 - **provincially rare species** – These species are designated and assessed under two categories: species listed as Special Concern on the SARO List, and species that are assigned a provincial sub-national conservation status rank of S1 to S3. There are species that can be found in both categories.
 - **regionally rare species** – These species are not assigned a formal designation, however, have been recognized as declining within a planning jurisdiction by government and/or non-government authorities.
 - **conservation priority species** – These include priority species that are recognized in government and/or non-government conservation plans and assigned a conservation objective.
- **Animal Movement Corridors** – defined as “elongated, naturally vegetated parts of the landscape used by animals to move from one habitat to another” (MNRF, 2000).

An assessment of candidate significant wildlife habitat (cSWH) was completed for the Subject Lands following the protocols established by MNRF. The SWH assessment was based on findings from the background review and field investigations and is discussed further in **Section 4.6**. As discussed in **Section 3.2**, SAR are excluded from the SWH process and are discussed independently under SAR in **Section 4.8**.

3.4 FIELD INVESTIGATIONS

Field investigations were completed to verify information obtained during the desktop study, such as presence/absence or potential for SAR, SWH and cSWH (including SoCC). Other natural heritage features were verified, such as provincially

significant wetlands (PSW), as identified in The London Plan and/or 1989 OP. Field notes and a complete list of species documented during the field investigations are provided in **Appendix E**.

Table 2 provides the dates of field investigations completed by Parsons in 2019 and describes the activities that were completed on each site visit.

Table 2 – Schedule of 2019 Field Investigations

SURVEY TYPE	DATE OF SURVEY	WEATHER CONDITIONS	FIELD INVESTIGATORS
Anuran Call Survey	April 8, 2019	Overcast, 6°C	Kyle Vanin Craig Pezik
	May 27, 2019	Overcast, 14 °C	
	June 11, 2019	Clear, 17°C	
ELC, Botanical Inventory, Snake VES	October 16, 2018	Clear, 14 °C	Kyle Vanin Craig Pezik
	May 27, 2019	Clear, 16 °C	
	June 25, 2019	Sunny, 19°C	
	July 10, 2019	Sunny, 22°C	
Breeding Bird Survey	June 25, 2019	Sunny, 19°C	
	July 10, 2019	Sunny, 22°C	
Fish Habitat	July 11, 2019	Sunny, 30°C	Courtney Beneteau Mitch Dender

3.4.1 VEGETATION AND VEGETATION COMMUNITIES

The following sections include the methodology followed for completing the botanical inventory, invasive species mapping and ecological land classification (ELC) (i.e. vegetation community characterization).

Botanical Inventory

A three-season botanical inventory was completed within the Subject Lands to capture plant species with different phenology (e.g. spring ephemerals, midsummer wildflowers, fall wildflowers). The dates of the field visits are provided in **Table 2** in **Section 3.4**, above. The conservation status of plant species recorded in the Subject Lands was assessed to determine the presence of SoCC and SAR. A floristic quality assessment was also completed to determine the level of disturbance and overall quality of the vegetation / vegetation communities within the Subject Lands.

Invasive Species

Invasive species, specifically European Common Reed (*Phragmites australis australis*) were recorded as part of the botanical inventories and ELC, and their relative abundance identified (i.e., rare, occasional, abundant, and dominant) for each vegetation community. Areas with abundant *Phragmites* were mapped (**Figure 5, Appendix A**). It should be noted that City funded *Phragmites* management, control and monitoring in the Subject Lands and Study Area began in 2018 with touch-ups, additional control work and monitoring underway again in 2019.

Tree Inventory

Ron Koudys Landscape Architects (RKLA) was retained to complete an inventory of trees within the City ROW and for private property immediately adjacent to the ROW. The tree inventory was completed on September 28, 2018 and October 22, 2019 and the following data was collected: location (i.e., coordinates), species, size (i.e., diameter at breast height), crown radius, crown condition, structural conditions and general comments on the health of the trees. The tree inventory was used to inform design and establish a preservation strategy and removal plan.

Ecological Land Classification

Vegetation communities were generally characterized following the first approximation of the ELC System for Southern Ontario (Lee et al. 1998). The second approximation of ELC (Lee 2008) was also used when there was no code available for a specific community type in the first approximation. ELC was characterized for all naturalized lands within the Study Area.

Prior to undertaking field surveys, vegetation communities were mapped through aerial photograph interpretation, with polygons delineated using ArcGIS at a scale of 1:5,000 and using NAD83 Universal Transverse Mercator (UTM) 17 coordinate system. Although the ELC protocol indicates a minimum size of 0.5 ha for mapping polygons, all communities regardless of size were identified to ensure a complete understanding of the environmental characteristics of the Subject Lands were captured.

The field inventories included verifying and refining the boundaries mapped during the desktop exercise. Additional data was collected on disturbances and wildlife species presence within each of the polygons that could be field-verified. The vegetation communities were also assessed to determine if cSWH is present (this includes rare vegetation community types). Dates of the field inventories are provided in **Table 2, Section 3.4**.

3.4.2 WILDLIFE

Anuran Call Survey

Anuran call surveys were generally completed following the Great Lakes Marsh Monitoring Program *Marsh Monitoring Program Participant's Handbook for Surveying Amphibians* (Bird Studies Canada 2009). This included three surveys in the spring and early summer between April and June and separated by 15 days. Weather conditions suitable for calling amphibians include low wind; minimal precipitation; and temperatures of 5°C, 10°C, and 17°C for each of the three respective survey dates.

Although the protocol recommends that survey stations be at least 500 m apart, for the purpose of this Project, this spacing distance was reduced to ensure that all wetlands within the Subject Lands were surveyed to determine breeding activity. A total of six (6) survey stations were established throughout the Subject Lands. Each station was surveyed for three (3) minutes, beginning one half-hour after sunset and continuing as long as weather conditions permitted (i.e., as dictated by weather conditions such as wind and air temperature). All species heard calling were recorded, including the call abundance codes. This information is used to determine level of breeding activity and whether SWH is present.

Snake Visual Encounter Survey (VES)

Visual encounter surveys (VES) for snakes was completed within the Subject Lands following the *Survey Protocol for Ontario's Species at Risk Snakes* (MNR 2016a). Surveyors slowly walked areas of suitable habitat searching for congregations or individual snakes, including those basking and foraging. Cover objects were also searched by beneath logs, rocks, or artificial debris. Surveys were completed when air temperature was between 15°C and 25°C. Information was used to determine cSWH for reptile hibernaculum and presence/absence of SAR.

Breeding Bird Survey

Breeding bird surveys were conducted using the *Ontario Breeding Bird Atlas (OBBA) Guide for Participant* (Bird Studies Canada 2001) protocol. Two surveys (a combination of point counts along transects) were completed at least 15 days apart between May 27 and July 10. Birds were identified by sight and call and the breeding evidence for each species was recorded. Breeding birds were also recorded incidentally during field visits outside of the protocol period.

Point count locations were pre-determined prior to conducting the site visits and were at least 100 m apart in accordance with the protocol to avoid duplicating calls. A total of 11 stations were established within the Subject Lands. Where habitat for species at risk (SAR) birds were identified, all areas were assessed to verify presence, including locations within 100 m of a point count. Each point count location was surveyed for 5 minutes and all species heard or observed

were documented. Audio recordings from each location were also collected and archived for quality assurance and control purposes.

Incidental and General Wildlife Habitat Observations

All field investigations included documenting incidental observations of wildlife and wildlife habitat features. This information was collected for use as part of the SWH assessment. Wildlife habitat features that were documented included, but not limited to, rock piles, stick nests or other nests of wildlife, burrows, evidence of wildlife such as scat, tracks, predated nests, among others.

3.4.3 FISH AND FISH HABITAT

Aquatic habitat potential was investigated at all watercourse/road crossings and along swales and tributary channels within the study area in the summer of 2019 to determine the presence of aquatic vegetation and to confirm flow permanence and thermal regime. Aquatic habitats and riparian features were visually assessed to identify riparian and aquatic plant species, characterize the near-shore substrate, and map potential habitat features. Where possible, water quality measurements were taken.

Fish community sampling was conducted to assess spawning habitats and refuge areas. Fisheries collections were conducted using a Smith-Root backpack electroshocker (Model LR-24) moving in a downstream-to-upstream sweep and ensuring adequate sampling of all habitat types present at the site. All fish collected were identified, counted and live-released at the site of capture.

Existing Conditions

4. Existing Conditions

The components of the natural heritage system are generally shown on Map 5 of The London Plan and include: ANSIs, PSWs and wetlands, significant woodlands and woodlands, SWH, significant valleylands and valleylands, ESAs, and upland corridors. Other features considered as part of the natural heritage system, include: unevaluated vegetation patches, unevaluated wetlands, habitat of endangered and threatened species (i.e., SAR), fish habitat, water resource systems, potential ESAs, and potential naturalization areas.

Of the natural heritage features that comprise the natural heritage system, only PSWs, significant valleylands, water resource systems and fish habitat are within the Subject Lands and/or Study Area, as shown on Map 5 of The London Plan. Other natural heritage features, such as upland corridors, SWH and SAR require an evaluation to determine presence/absence and significance. The following sections only discuss the natural heritage features confirmed or that have the potential to occur in the Subject Lands and/or Study Area. All other features are not discussed further or carried forward to the EIS.

4.1 PHYSIOGRAPHY AND SOIL

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 cross 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. As shown on **Figure 3, Appendix A**, the majority of the Subject Lands and Study Area are characterized as Spillways, with a small portion of the northern extent of the Study Area identified as Till Moraines.

The dominant physiographic features Subject Lands are the Powell Drain, the Worrall Drain, the Northdale Tributary west branch, and the Arva Moraine Wetland Complex Provincially Significant Wetland , which all drain towards Stoney Creek located southeast of the Subject Lands (**Figure 3, Appendix A**). Like many tributaries in this region, these systems have been extensively altered to accommodate existing or previous agricultural activities.

4.2 DESIGNATED AREAS AND FEATURES

This EIS considers designated areas and features to include the following: ANSIs, ESAs, significant valleylands, and water resource systems. Of these designated areas, only significant valleylands, and water resource systems are found within the Subject Lands and/or Study Area and are discussed in the sections below.

4.2.1 SIGNIFICANT VALLEYLANDS

Significant valleylands and valleylands are shown on Map 5 of The London Plan and Map 1 of The London Plan as Green Space Place Types and discussed in Policies 1344 through 1350. A review of Map 1 and Map 5 shows that significant valleylands are present within the Subject Lands and Study Area and are associated with the Powell Drain, as shown on **Figure 1** in **Appendix A**. There are no other valleylands identified within the Subject Lands or Study Area.

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.”*

This EIS is intended to meet the requirements of the Policies in The London Plan.

4.2.2 WATER RESOURCE SYSTEMS

Water resources systems include hazards and natural resources shown on Map 6 of The London Plan, specifically significant groundwater recharge areas (SGRA), highly vulnerable aquifers (HVA) and wellhead protection areas.

Based on the background review, there are SGRAs and HVAs within the Subject Lands and Study Area; there are no wellhead protection areas. A map showing the water resource systems within the Subject Lands is provided in **Figure 1** in **Appendix A**.

Water resource systems are discussed in Policies 1361 through 1366 of The London Plan. Policy 1364 states that *“Development and site alteration will be restricted and mitigative measures or alternative development approaches may be required in or near sensitive surface water features and sensitive groundwater features in order to protect, improve and/or restore these features and their related hydrologic functions consistent with the Provincial Policy Statement. In accordance with the Source Protection Plans, uses or activities that may be a significant drinking water threat may be prohibited, restricted or otherwise regulated by the policies of the Source Protection Plan. Areas of significant drinking water threat are identified in the Source Protection Plans.”*

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.”*

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 to determine if the Project is within the Regulation Limit and any permitting requirements.

4.3 VEGETATION AND VEGETATION COMMUNITIES

4.3.1 BOTANICAL INVENTORY

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 SoCC or SAR confirmed within the Subject Lands. A complete list of species is provided in **Appendix E**.

4.3.2 TREE INVENTORY

A total of 151 trees were recorded, none of which are considered a SoCC or SAR. Of the trees identified, 61 are City-owned, 85 are privately owned, and five (5) are considered boundary trees (i.e., straddling the line between private property and City property). Details of the tree inventory, including species, size, location and preservation recommendations are provided in the tree inventory report (see **Appendix I**).

4.3.3 ECOLOGICAL LAND CLASSIFICATION

A summary of vegetation communities documented within the Study Area is provided in **Table 3**, below and shown on **Figure 4, Appendix A**. A map showing the areas dominated by invasive species is provided in **Figure 5, Appendix A**. As discussed previously, City funded Phragmites management, control and monitoring in the Subject Lands and Study Area began in 2018 with touch-ups, additional control work and monitoring underway again in 2019.

Table 3 – Vegetation Communities

ELC CODE	COMMUNITY TYPE	DESCRIPTION/COMMENTS
MEADOW COMMUNITIES		
CUM1-1	Mineral Cultural Meadow	Mineral cultural meadows (CUM1) can be found throughout the Subject Lands. This vegetation community is characterized by having little to woody vegetation cover and an abundance of exotic herbaceous species. They typically reflect early successional conditions following human disturbance. In the Subject Lands, cultural meadows occur where agricultural fields have been left fallow and where forests have been recently cleared. Dominant plant species include cool season grasses such as Smooth Brome (<i>Bromus inermis</i>) and abundant late-flowering forbs such as asters (<i>Symphotrichum</i> spp.) and goldenrods (<i>Solidago</i> spp.).
WETLAND COMMUNITIES		
MAM2-2	Reed-canary Grass Mineral Meadow Marsh	Mineral meadow marshes dominated by Reed-canary Grass (MAM2-2) can be found in the north end of the Subject Lands. These communities are dominated primarily by Reed-canary Grass (<i>Phalaris arundinacea</i>), but some contain traces of species of sedges (<i>Carex</i> spp.). These communities also contain small patches of Common Reed (<i>Phragmites australis</i>) which is a highly invasive species that with time will over grow and dominate the existing community. This community is associated with the PSW.
MASM1-12	Common Reed Mineral Meadow Marsh	Common Reed mineral meadow marshes are completely dominated by Common Reed (<i>Phragmites australis</i>). This species is highly invasive and quickly outcompetes other species resulting in a dominant monoculture. The majority of these wetland communities are associated with the PSW
OAO	Open Aquatic	Open Aquatic communities are communities that lack vegetation and are primarily dominated by plankton. These community provide little to no cover for wildlife but act as important stop over areas for waterfowl. This community was verified in the field from adjacent lands where PTEs were obtained and delineated through air photo interpretation.
SAF1-3	Duckweed Floating Leaved Shallow Aquatic Type	Duckweed floating-leaved shallow aquatic habitats are open water habitats that are characterized by primarily being dominated by duckweed species (<i>Lemna</i> spp.) as well as pondweed species (<i>Potamogeton</i> spp.) of vegetation. These habitats provide cover as well as a food source for wildlife within the Subject Lands. This community was verified in the field from adjacent lands where PTEs were obtained and delineated through air photo interpretation.

ELC CODE	COMMUNITY TYPE	DESCRIPTION/COMMENTS
		Associated with PSW
SWD	Deciduous Swamp	Fresh – Moist lowland deciduous forests (FOD7) are lowland forest communities characterized by having dry partially well drained soils and typically occur in areas where deposition of rich soils occurs due to flooding. Fresh – moist lowland deciduous forests are often dominated by water tolerant tree species such as White Willow (<i>Salix alba</i>) and American Elm (<i>Ulmus americana</i>) with herbaceous understory mainly comprised of Sensitive Fern (<i>Onoclea sensibilis</i>) and Spotted Jewelweed (<i>Impatiens capensis</i>). These communities were verified in the field from adjacent lands where PTEs were obtained and delineated through air photo interpretation Associated with PSW
SWD4	Mineral Deciduous Swamp	Deciduous swamps (SWD4) are forested wetlands characterized by having relatively moist soil and are sometimes flooded but typically dry with little to no surface water throughout most of the year. One community in the Subject Lands is mainly dominated by deciduous tree species mainly comprised of Eastern Cottonwood (<i>Populus deltoides</i>) with traces of Manitoba Maple (<i>Acer negundo</i>) and Common Buckthorn (<i>Rhamnus cathartica</i>). This community was verified in the field from adjacent lands where PTEs were obtained and delineated through air photo interpretation. Associated with PSW
SWT2-2	Willow Mineral Thicket Swamp	Mineral cultural thickets (CUT1) reflect a legacy of human disturbance but represent a later stage of succession beyond a meadow type community. Willow thickets in the Subject Lands are mainly dominated by deciduous shrub species such as Heart-leaved Willow (<i>Salix eriocephala</i>) and Meadow Willow (<i>Salix petiolaris</i>).
FOD3-1	Dry-Fresh Poplar Deciduous Forest Type	Dry-Fresh poplar deciduous forest types (FOD3-1) are upland forest communities characterized by having dry well drained soils and are typically representative of an early successional stage with high shrub and herb cover. Dry-fresh poplar deciduous forests found within the subject lands are dominated by Eastern Cottonwood (<i>Populus deltoides</i>) with herbaceous understory mainly comprised of late-flowering forbs such as asters (<i>Symphotrichum</i> spp.) and goldenrods (<i>Solidago</i> spp.) These communities were verified in the field from adjacent lands where PTEs were obtained and delineated through air photo interpretation.
CULTURAL COMMUNITIES		
CUH	White Spruce Coniferous Plantation	White Spruce coniferous hedge rows are cultural vegetation communities that are often a result of anthropogenic-based disturbances. Substrate types are often variable but typically lack in nutrients. White Spruce coniferous plantations are primarily dominated by White Spruce (<i>Picea glauca</i>) and contain little to no herbaceous undergrowth. PTE's were not obtained therefore these communities were verified in the field from adjacent lands where PTEs were obtained and delineated through air photo interpretation.
CUP3-3	Scot's pine Plantation	Scot's Pine plantations are cultural vegetation communities that are often a result of anthropogenic-based disturbances. Substrate types are often variable but typically lack in nutrients. Scot's Pine plantations are primarily dominated by Scot's Pine (<i>Pinus sylvestris</i>) and contain little to no herbaceous undergrowth. PTE's were not obtained therefore these communities were verified in the field from adjacent lands where PTEs were obtained and delineated through air photo interpretation.
CUP3-9	Norway Spruce Coniferous Plantation	Norway Spruce plantations are cultural vegetation communities that are often a result of anthropogenic-based disturbances. Substrate types are often variable but typically lack in nutrients. Norway Spruce coniferous plantations are primarily dominated by Norway Spruce (<i>Picea abies</i>) and contain little to no herbaceous undergrowth. PTE's were not obtained therefore these communities were verified in the field from adjacent lands where PTEs were obtained and delineated through air photo interpretation.

4.4 SIGNIFICANT WOODLANDS, WOODLANDS AND UNEVALUATED VEGETATION PATCHES

This section discusses the presence/absence of significant woodlands (i.e., those previously evaluated), woodlands (unevaluated) and unevaluated vegetation patches within the Subject Lands and 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. As such, these features will not be discussed further.

4.5 PROVINCIALLY SIGNIFICANT WETLANDS, WETLANDS AND UNEVALUATED WETLANDS

This section discusses the presence/absence of provincially significant wetland (PSWs), wetlands and unevaluated wetlands within the Subject Lands and 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) (Figure 1, Appendix A), 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 15) 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 Road 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.*”

This EIS is intended to meet the requirements of the Policies in The London Plan.

4.6 SIGNIFICANT WILDLIFE HABITAT

This section includes an assessment of significant wildlife habitat (SWH) within the Subject Lands and 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 Subject Lands in accordance with the SWH Criteria Schedule for Ecoregion 7E (MNR 2015), as discussed in **Section 3.3**. The assessment of each of the SWH types and SoCC screening is provided in **Appendix F**. A summary of the confirmed and cSWH types found within the Study Area are summarized below and shown on **Figure 6** in **Appendix A**.

- 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 out 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.
- cSWH
 - Turtle Nesting Areas, Turtle Wintering Areas, Midland Painted Turtle and Northern Map Turtle – candidate habitat was identified for the portion of the 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.

4.7 FISHERIES AND AQUATIC HABITAT

4.7.1 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 (**Figure 1, Appendix A**). 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 Subject Lands, 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 (see **Section 4.7.2**), 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 (discussed in **Section 4.7.2**). As such, this report will discuss the drain in terms of these two separate reaches, upstream and downstream, with Adelaide Street 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; and so, the downstream reach will be further separated and discussed as two distinct sections.

Upstream of Adelaide Street

This section of Powell Drain originates to the west of the study area and flows east, towards Adelaide Street. This section of the watercourse is associated with significant valleylands (discussed in **Section 4.2.1**). 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 impounded 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

This section of Powell Drain begins at the culvert outlet at Adelaide Street 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 m, 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.

Aquatic habitat features and water quality parameters measured in each of the three reaches of Powell Drain are summarized in **Table 4** and **Table 5**, respectively.

Table 4 – Aquatic Habitat Features in Powell Drain

FEATURE	UPSTREAM	DOWNSTREAM (ADELAIDE)	DOWNSTREAM (SHEET PILE FALLS)
Flow Regime	Permanent	Permanent	Permanent
Temperature Regime	Cool water	Cool water	Cool water
Stream Morphology	100% Flat	70% Run, 30% riffle	90% Flat, 5% run, 5% pool
Mean Wetted Width (m)	2.5	4.1, 3.2	1.1, 0.5, 2.0
Mean Wetted Depth (m)	0.15	0.32, 0.60	0.25, 0.30, 0.70
Current Velocity (m/s)	nil	0.20	0.15
Substrate	Silt	Cobble, sand, silt, detritus	Cobble, silt, detritus, muck
In-stream Cover	80% Instream vascular macrophytes, 20% instream woody debris	50% Cobble, 40% instream and overhanging vascular macrophytes, 10% instream woody debris	40% Instream and overhanging vascular macrophytes, 20% instream and overhanging woody debris, 20% cobble, 10% undercut banks
Riparian Vegetation	<i>Phragmites</i> , grasses	Deciduous forest	Deciduous forest
Shore (% stream shaded)	5%	80%	75%
Migration Barriers	Permanent – debris at culvert inlet	Permanent – sheet pile grade control in channel (perched ~1 m)	None noted from sheet pile grade control to Blackwater Road
Adjacent Land Use	Floodplain/wetland, residential	Forest, residential	Forest, residential

Table 5 – Water Quality Conditions in Powell Drain

PARAMETER	UPSTREAM	DOWNSTREAM (ADELAIDE)	DOWNSTREAM (SHEET PILE FALLS)
Conductivity (µS/cm)	426	700	762
pH	7.59	7.91	8.18
Water Temperature (°C)	28.7	23.8	20.6
Air Temperature (°C)	30.0	30.0	30.0
Dissolved Oxygen (mg/L)	4.3	5.3	4.3

Worral Drain

At the north end of the Subject Lands, Worral Drain runs parallel to Adelaide Street west of the road, in a southward direction towards the Sunningdale Road East intersection. The watercourse then crosses under Adelaide Street 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 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.

4.7.2 FISH COMMUNITY INVENTORY

Through the study area from upstream to downstream of Adelaide Street, 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 NHIC and 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 as noted in **Section 4.7.1**; the list of species collected is presented in **Appendix G**.

Upstream of Adelaide Street there were three fish species collected in the Powell Drain, representing a common, tolerant baitfish community. Immediately downstream of the Adelaide Street 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 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.

4.8 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 H**. 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.

4.9 SUMMARY OF NATURAL HERITAGE SYSTEM COMPONENTS

A summary of the natural heritage system components within the Subject Lands and Study Area is provided in **Table 6**.

Table 6 – Summary of Natural Heritage System Components within the Subject Lands

NATURAL HERITAGE SYSTEM COMPONENT	SUBJECT LANDS (YES/NO)	STUDY AREA (ADJACENT LANDS) (YES/NO)
Environmental Review lands	No	No
Significant Valleylands and Valleylands	Yes (Significant Valleylands)	Yes (Significant Valleylands)
Water Resource Systems (Significant groundwater recharge areas (SGRA), highly vulnerable aquifers (HVA), and wellhead protection areas)	Yes (SGRA and HVA)	Yes (SGRA and HVA)

NATURAL HERITAGE SYSTEM COMPONENT	SUBJECT LANDS (YES/NO)	STUDY AREA (ADJACENT LANDS) (YES/NO)
Upland Corridors	No	No
Significant Woodlands and Woodlands	No	No
Wetlands and Unevaluated Wetlands	No	No
Provincially Significant Wetlands and connecting lands in a Wetland complex	No	Yes
Significant Wildlife Habitat	No	Yes
Fish Habitat	Yes (Powell Drain)	Yes (Powell Drain)
SAR - Habitat of Endangered Species and Threatened Species	No	Yes
Areas of Natural and Scientific Interest	No	No
Environmentally Significant Areas	No	No

Ecological Constraints and Opportunities

5. Ecological Constraints and Opportunities

5.1 POTENTIAL CONSTRAINTS

The Arva Moraine PSW complex is the largest naturalized area in the Study Area. There are two wetland units, one located north of Sunningdale Road East, which is isolated from the rest of the PSW, and a larger unit south of Sunningdale Road East. This wetland unit in particular provides habitat for SoCC and other wildlife habitats, particularly amphibians and reptiles. This wetland is also associated with a significant valleyland and Powell Drain, which provides direct fish habitat. The wooded riparian corridor east of Adelaide Street provides bird habitat for a variety of species in addition to buffering the watercourse from adjacent development-related disturbances.

Detailed design should consider minimizing encroachment into sensitive features, particularly the Arva Moraine PSW and watercourses.

5.2 OPPORTUNITIES

Wildlife Habitat and Linkages

Adelaide Street North bisects the Arva Moraine PSW and significant valleyland which is a barrier to safe wildlife movement between habitat types. A wildlife culvert is proposed in this area which will improve wildlife linkages and may reduce road mortality. Opportunities for enhancement of the PSW is also recommended following any disturbance caused by construction of the wildlife passage and potential culvert extension. Other opportunities for enhancement include management and restoration of areas dominated by Phragmites. As noted previously, City funded Phragmites management, control and monitoring in the Subject Lands and Study Area began in 2018 with touch-ups, additional control work and monitoring underway again in 2019. Native plantings, with a focus on pollinator species and promoting Monarch habitat is also recommended in open meadow communities.

Fish Habitat

In the study area, the existing condition of fish habitat in Powell Drain is fragmented by two barriers restricting fish movement. At the culvert inlet, west of Adelaide Street, natural debris had built-up at the metal grate. Removing the debris would not only restore fish passage but would likely improve drainage and the natural flow of sediments in the system. The second barrier is located approximately 40 m downstream of the culvert outlet, east of Adelaide Street, where a corrugated steel sheet pile wall extended across the width of channel. 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).

Alternative Solutions and Design Concepts

6. Alternative Solutions and Design Concepts

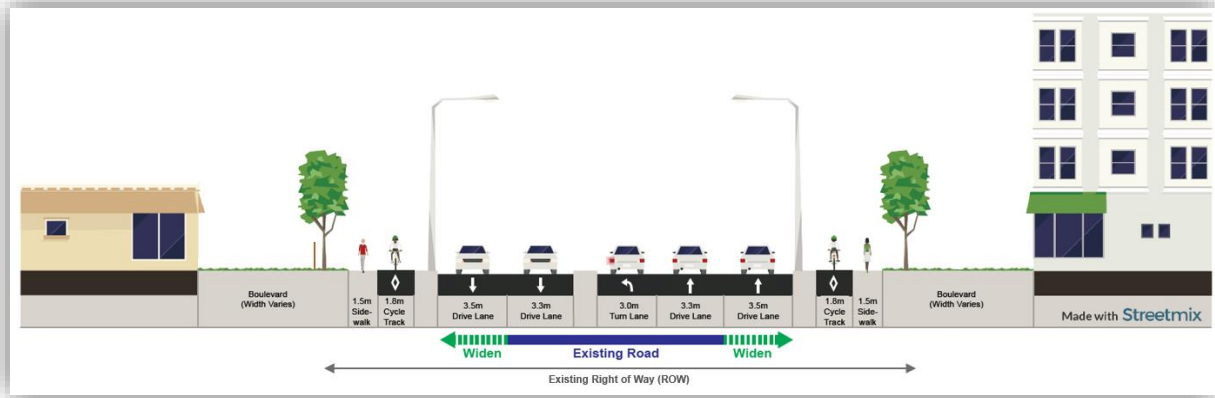
6.1 EVALUATION OF PROJECT ALTERNATIVES

The study objectives for the Project are to evaluate and select a preferred alternative design concept for the widening of Adelaide Street North, as well as intersection improvements along the corridor and review of a roundabout at Sunningdale Road East. Three alternative design concepts were identified, with each concept featuring two lanes of traffic in each direction, cycle tracks and sidewalks on each side, centre medians and dedicated turning lanes. The three concepts, identified below, varied in terms of the extent of the widening either from centreline, to the west, or to the east. Environmental impacts differed among the alternatives and are summarized below. Impacts to street trees and groundwater, as a result of excavation, were similar for all options and are therefore not presented here.

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).

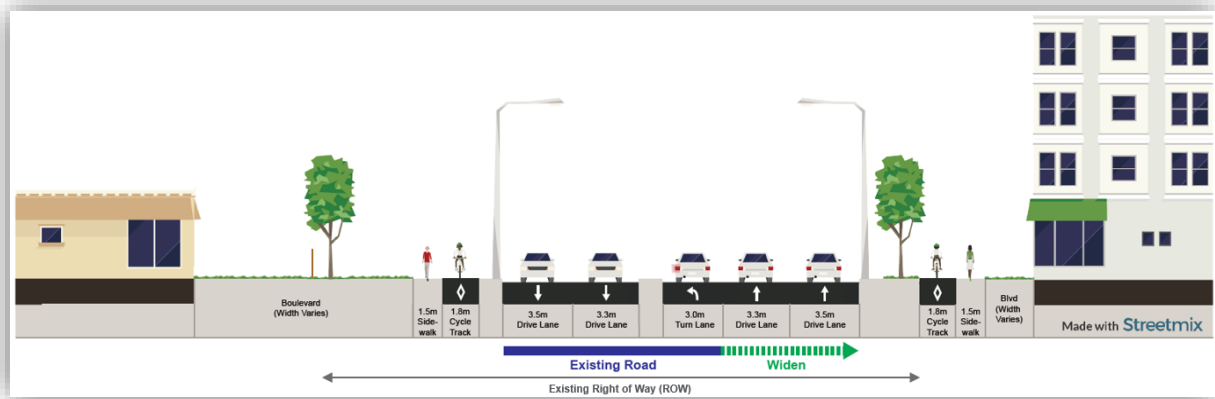
- Least impact to terrestrial environment, since widening from centerline would be in areas previously disturbed.
- Least impact to aquatic environment, requires a slight extension to the Powell Drain culvert to the east.



Option 2: Widen to the East

This option generally widens Adelaide Street to the eastside, while mostly maintaining the westside.

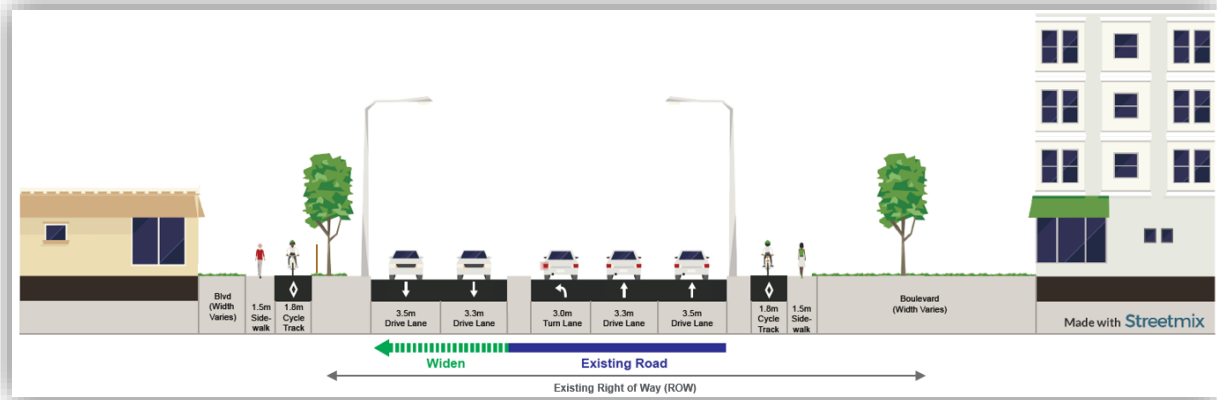
- Impacts to terrestrial environment at east side of the Powell Drain.
- Impacts to the watercourse and riparian habitat east side of the Powell Drain.



Option 3: Widen to the West

This option generally widens Adelaide Street to the westside, while mostly maintaining the east side.

- Impacts to terrestrial environment at west side of the Powell Drain.
- Increased impacts to the wetland and fish habitat east side of the Powell Drain.



6.2 PREFERRED ALTERNATIVE DESIGN CONCEPT

The evaluation of the alternative design concepts determined that Option 1 is the preferred solution. Option 1 includes widening Adelaide Street North from the centreline (west and east side) and 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. Based on the preliminary preferred design concept, 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.

Potential Impacts and Mitigation Measures

7. Potential Impacts and Mitigation Measures

7.1 CONSTRUCTION IMPACTS AND MITIGATION

7.1.1 TERRESTRIAL VEGETATION

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 (see **Appendix I**) identified a total of 40 individual trees that may require removal along the existing ROW with the remaining 111 trees identified for preservation (see Tree Preservation Drawing in **Appendix I**). The trees identified for removal include: 33 City-owned trees, five (5) 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. Design 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 PSW and select a design that to minimize long-term impacts.

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 extend of those locations mapped. As discussed previously, City funded *Phragmites* management, control and monitoring in the Subject Lands and 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.

7.1.2 WILDLIFE AND TERRESTRIAL HABITAT

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 in subsequent years), 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. 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.

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

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 (MNR, 2016b). A larger crossing structure at this location is constrained by underground utilities and unlikely feasible.

7.1.3 FISH AND AQUATIC HABITAT

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 (discussed in Section 7.2). 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.

Excavation

Excavation adjacent to the drainage features will be required to widen the road. Excavation of the banks and streambed surrounding the culvert will be required to install a headwall or extend the culvert to the east. Excavation exposes soils and increases the likelihood of erosion and release of sediments into the nearby watercourse. Release of sediment into Powell Drain could have significant detrimental impacts to water quality and fish habitats. Sediments that enter a watercourse can increase stream turbidity, abrade fish gill membranes (leading to physical stress), cover spawning areas and incubating juvenile fish, decrease food production, and smother eggs in nests. Excavation also changes the shape of the land, which affects slopes and drainage. This activity will most likely also require the use of industrial equipment, water extraction, and wastewater management, all of which are discussed in separate sections below.

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

Industrial equipment accessing the watercourse and watercourse banks may release deleterious materials such as debris, oil, fuel, and grease into the Powell Drain system. Industrial equipment will be required for excavation during of the existing Adelaide Street culvert. Heavy equipment entering a watercourse may possibly harm or kill aquatic species within its path.

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 MNRF. This fish salvage will be completed prior to dewatering in order to prevent suffocation and mechanical harm.

Vegetation Clearing

Vegetation clearing will be required for road widening, construction access, and to construct the culvert extension and/or headwall. Impacts of terrestrial vegetation clearing and general mitigation measures are also discussed above in Section 7.1.1. Vegetation clearing exposes soils and increases the likelihood of erosion and release of sediments into the nearby waterbody. As previously discussed, the release of sediment into a watercourse can have significant detrimental impacts to fish and fish habitats. Removing riparian vegetation can also decrease watercourse shading, thereby affecting the water temperature, and can limit the natural shedding of organic materials into the watercourse which may provide food, cover, and nutrients to the aquatic ecosystems.

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). The concrete material potentially used to construct the culvert and/or headwall is toxic to aquatic organisms while in raw state, until cured. The placement of materials in water can disturb and re-suspend the sediments, negatively affecting the aquatic organisms in the area. The new culvert extension has potential to change the channel morphology, shoreline morphometry, substrate and aquatic macrophyte compositions, and water flows.

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 MNRF 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

Water contained in the temporarily isolated work areas will be extracted prior to construction or equipment accessing the areas. The treatment and discharge of effluent water will be required during water extraction. This activity may accidentally entrain fish in pumps and also has the potential to displace or strand fish. The discharge of wastewater may erode banks and increase sediment concentrations in the watercourse. Unwatering effluent discharged directly downstream without filtration will negatively impact water quality within the immediate area and downstream.

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. As previously noted, release of sediment from adjacent graded areas can degrade fish habitat and have significant detrimental impacts to water quality.

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.

7.1.4 WETLANDS

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).

7.1.5 EROSION AND SEDIMENTATION

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, Worral 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.

7.2 LONG-TERM IMPACTS AND MITIGATION

7.2.1 TERRESTRIAL VEGETATION

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 40 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.

7.2.2 WILDLIFE AND TERRESTRIAL HABITAT

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 incidental take, 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 should help 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 Subject Lands and 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.

7.2.3 FISH AND AQUATIC HABITAT

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, waste sewage etc.). Exposed soils are easily erodible, and sediment generated can flow into the watercourse.

7.2.4 WETLANDS

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.

7.2.5 EROSION AND SEDIMENTATION

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.

Net Effects Assessment

8. Net Effects Assessment

The following table (**Table 7**) addresses the predicted net effects throughout the project – i.e., during the design, construction, and operation stages of both the Adelaide Street widening.

Table 7 – Summary of Potential Impacts and Mitigation Measures

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

ITEM OF CONCERN	POTENTIAL IMPACTS	RECOMMENDED ACTIONS AND MITIGATION	NET EFFECTS FOLLOWING MITIGATION	MANAGEMENT AND MONITORING RECOMMENDATIONS
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.
CONSTRUCTION STAGE				
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 species and snag trees for SAR bats.	None – currently no known rare plants present in removal areas or snag trees for SAR bats (pending confirmation during detail design)	n/a
		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
		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

ITEM OF CONCERN	POTENTIAL IMPACTS	RECOMMENDED ACTIONS AND MITIGATION	NET EFFECTS FOLLOWING MITIGATION	MANAGEMENT AND MONITORING RECOMMENDATIONS
	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
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

ITEM OF CONCERN	POTENTIAL IMPACTS	RECOMMENDED ACTIONS AND MITIGATION	NET EFFECTS FOLLOWING MITIGATION	MANAGEMENT AND MONITORING RECOMMENDATIONS
	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 shading from the actual new structure	None – overall shade of stream section will be increased by enclosing structure, this will aid in water temperature reduction	n/a
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 <i>Phragmites</i> 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
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

DFO Project Review

9. DFO Project Review

9.1 SELF-ASSESSMENT

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.

9.1.1 POWELL DRAIN CULVERT EXTENSION/HEADWALL

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.

9.2 SERIOUS HARM TO FISH

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 presented in Section 7 and the Net Effects Assessment presented in Section 8 show 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*.

Study Recommendations

10. Study Recommendations

Recommendations to be carried forward into detailed design and construction include the following:

- Minimize tree and vegetation removal, particularly within the PSW, where possible.
- Consider boardwalk type pathways within the wetland units on the west side of Adelaide Street North, both north and south of Sunningdale Road East.
- City funded *Phragmites* management, control and monitoring in the Subject Lands and Study Area began in 2018 with touch-ups, additional control work and monitoring underway again in 2019. Prior to construction, areas with *Phragmites* that have not yet been addressed (by 2018-2019 management projects) should be treated to prevent the spread of seeds and rhizomes;
- Implement monitoring, management and restoration of areas dominated by priority invasive species;

- Implement the Clean Equipment Protocol for Industry practices;
- Prepare an Invasive Species Management Plan for the control of priority invasive species consistent with the LIPMS (City of London 2017a).
- Time construction activities outside of sensitive timing windows (e.g., vegetation removal in the winter);
- Produce a restoration plan that includes restoration or enhancement of adjacent natural heritage features;
- Monitoring during construction: silt fence, wildlife presence, etc.;
- Consider removing noted barriers to fish migration to improve connectivity throughout the Powell drain system;
- Ensure culvert extension sizing and countersinking in design to avoid *Fisheries Act* implications; and
- Prepare a contractor awareness package for wildlife and species at risk protection and protocols.

Post-construction monitoring activities may include:

- 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;
- Inspect seeded and planted material for deficiencies and replace as required under warranty; and
- Vegetation monitoring to assess the success of plantings and *Phragmites* management.

References

11. References

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Appendix A

Project Maps

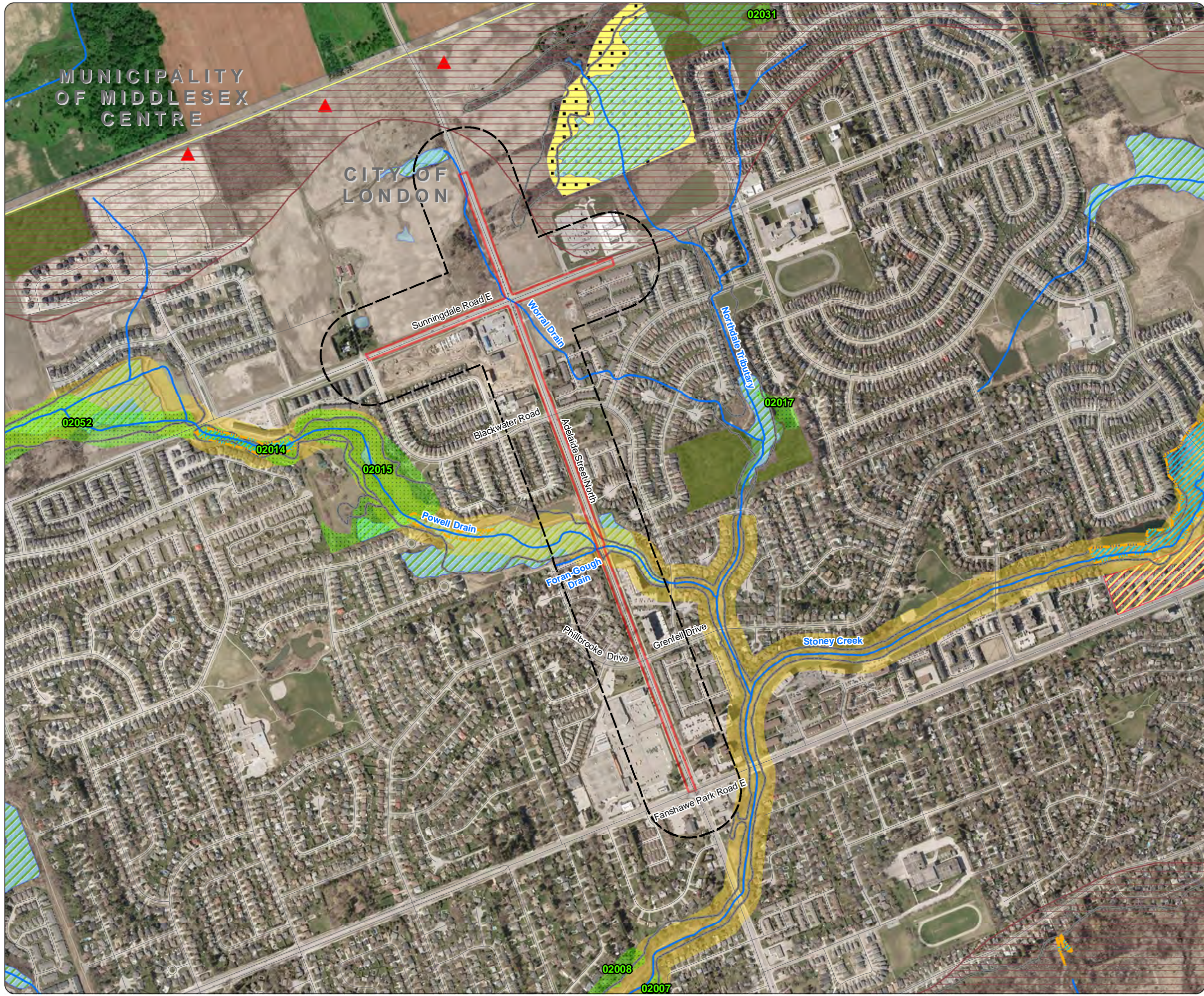
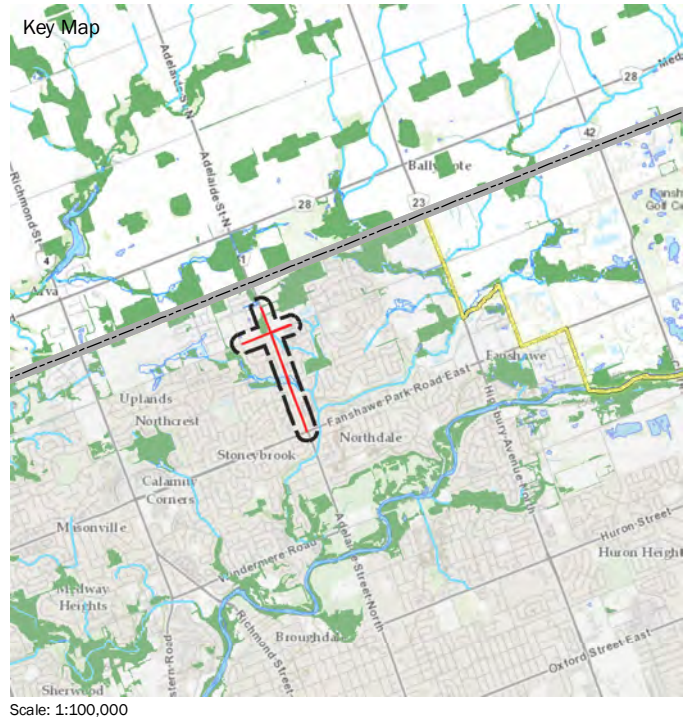


Figure 1
Adelaide Street North Widening EIS
Study Area Overview - Natural Heritage



LEGEND

- Road
- Watercourse
- ▭ Study Area
- ▭ Subject Lands
- ▭ 'Big Picture' Meta-Corridors (City of London)
- ▭ Municipal Boundary
- ▭ Urban Growth Boundary
- ▭ Waterbody

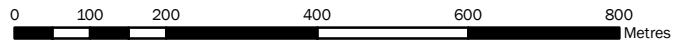
Schedule B1- Natural Heritage Features (1989 Official Plan)

- ▨ Groundwater Recharge
- ▨ Maximum Hazard
- ▨ Unevaluated Wetland

Map 5 - Natural Heritage (The London Plan)

- ▲ Potential Naturalization Area
- ▨ Unevaluated Vegetation Patch
- ▨ Unevaluated Wetland
- ▨ PSW - Arva Moraine Wetland Complex (UT-15)
- ▨ Potential ESA
- ▨ Significant Woodland
- ▨ Significant Valleyland

Scale: 1:10,000



Parsons Job No:	Date: 7/10/2020	Draft By: M.E.	
<p>Data Sources: Parsons; City of London Geospatial Data from Official Plan, Ontario Ministry of Natural Resources and Forestry; Ontario Ministry of Transportation; Fisheries and Oceans Canada; ESRI imagery</p>			



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OF MIDDLESEX
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CITY OF
LONDON

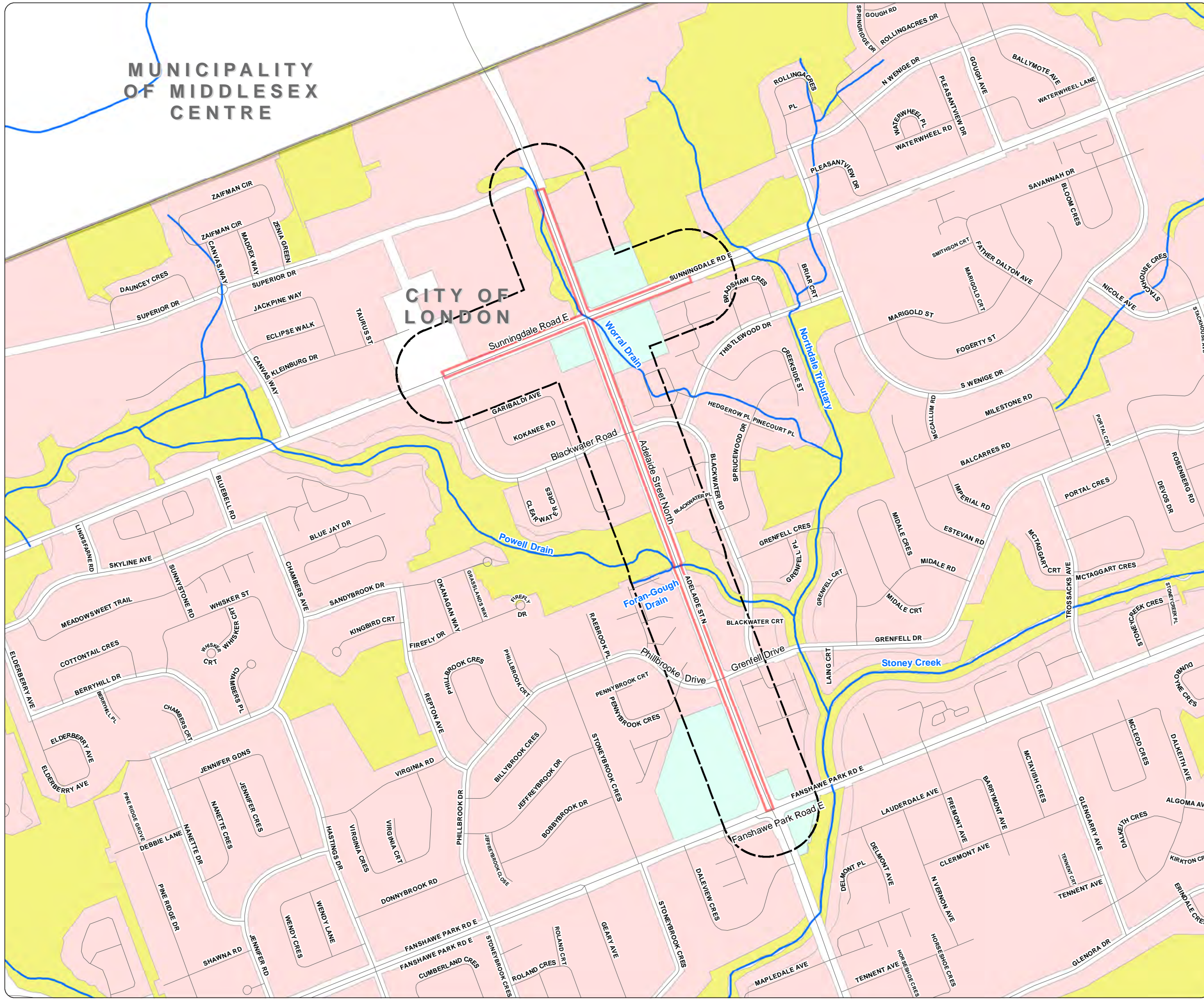
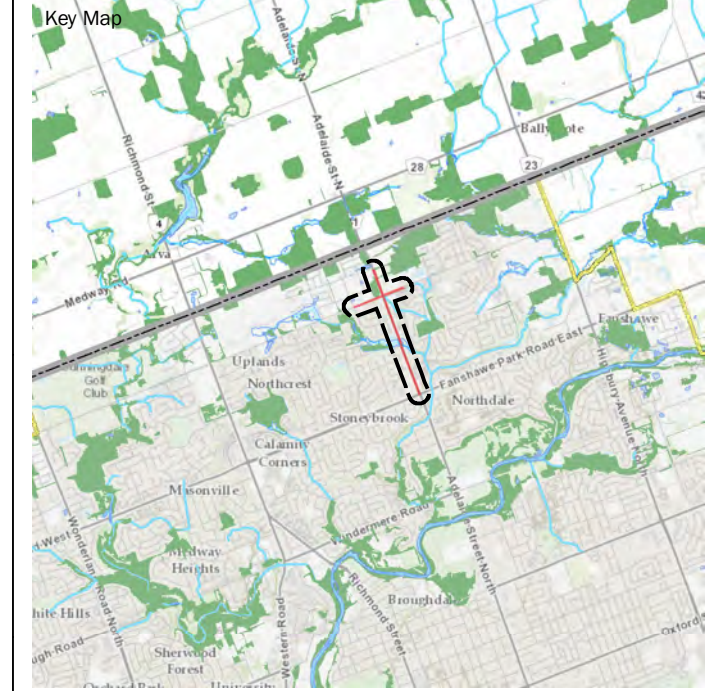


Figure 2
Adelaide Street North Widening EIS
Place Types



Scale: 1:100,000

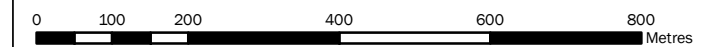
LEGEND

- Road
- Watercourse
- Municipal Boundary
- Study Area
- Subject Lands

Map 1 - Place Types (The London Plan)

- Neighbourhood
- Green Space
- Shopping Area
- Urban Growth Boundary

Scale: 1:10,000



Parsons Job No:	Date: 9/25/2019	Draft By: M.E.
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Data Sources: Parsons; City of London Geospatial
Data from Official Plan, Ontario Ministry of Natural Resources and
Forestry; Ontario Ministry of Transportation; Fisheries and Oceans
Canada; Bing Imagery



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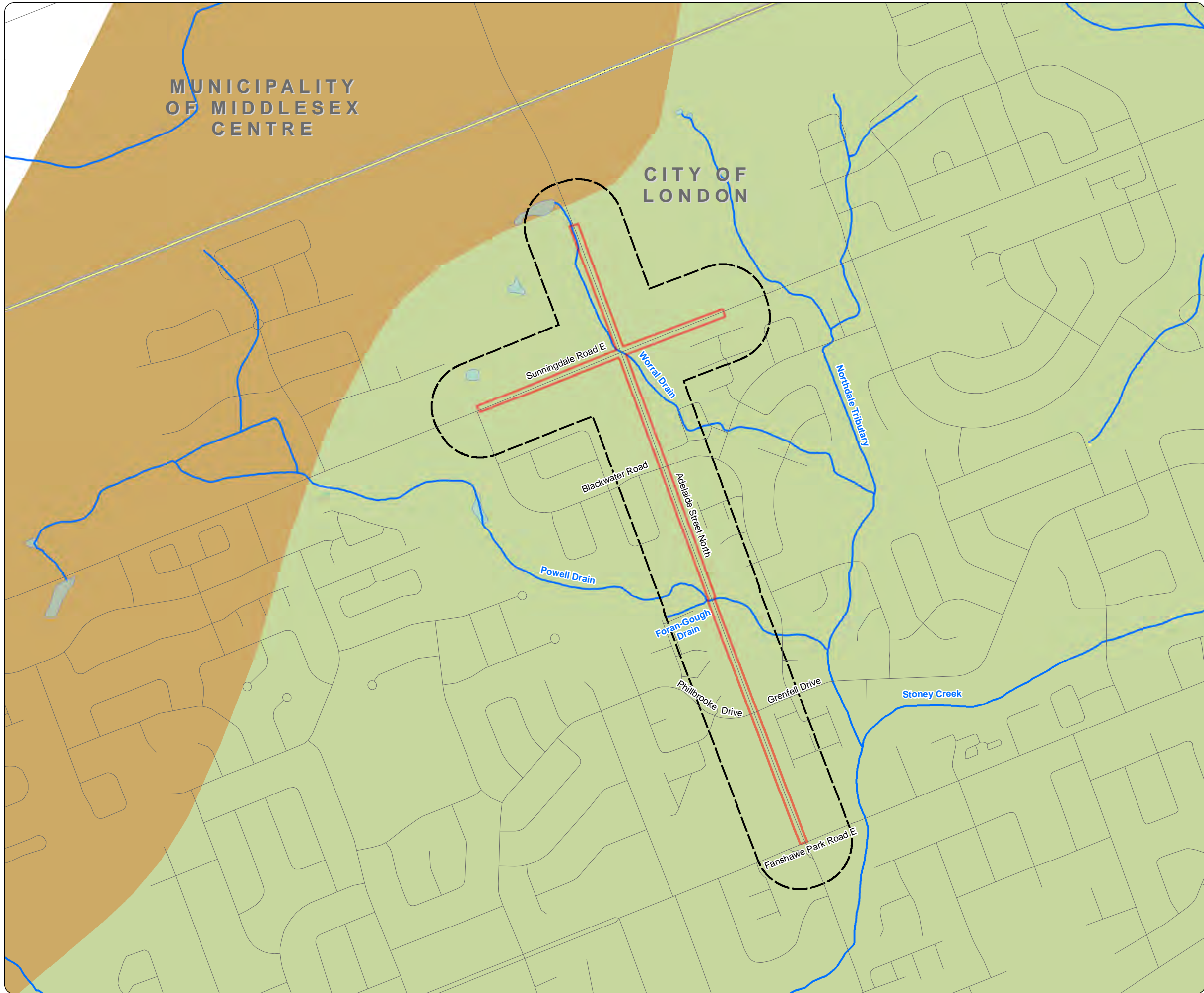
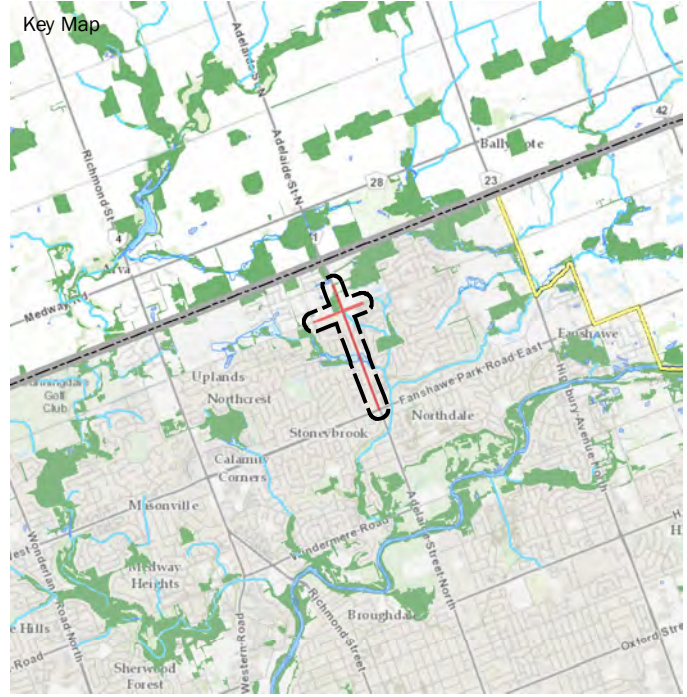


Figure 3
Adelaide Street North Widening EIS
Physiography



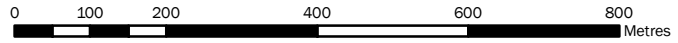
LEGEND

- Road
- Watercourse
- Municipal Boundary
- Urban Growth Boundary
- Waterbody
- Study Area
- Subject Lands

Physiography

- Till Moraines
- Spillways

Scale: 1:10,000



Parsons Job No:	Date: 9/25/2019	Draft By: M.E.
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Data Sources: Parsons; City of London Geospatial
Data from Official Plan, Ontario Ministry of Natural Resources and Forestry; Ontario Ministry of Transportation; Fisheries and Oceans Canada; Bing Imagery



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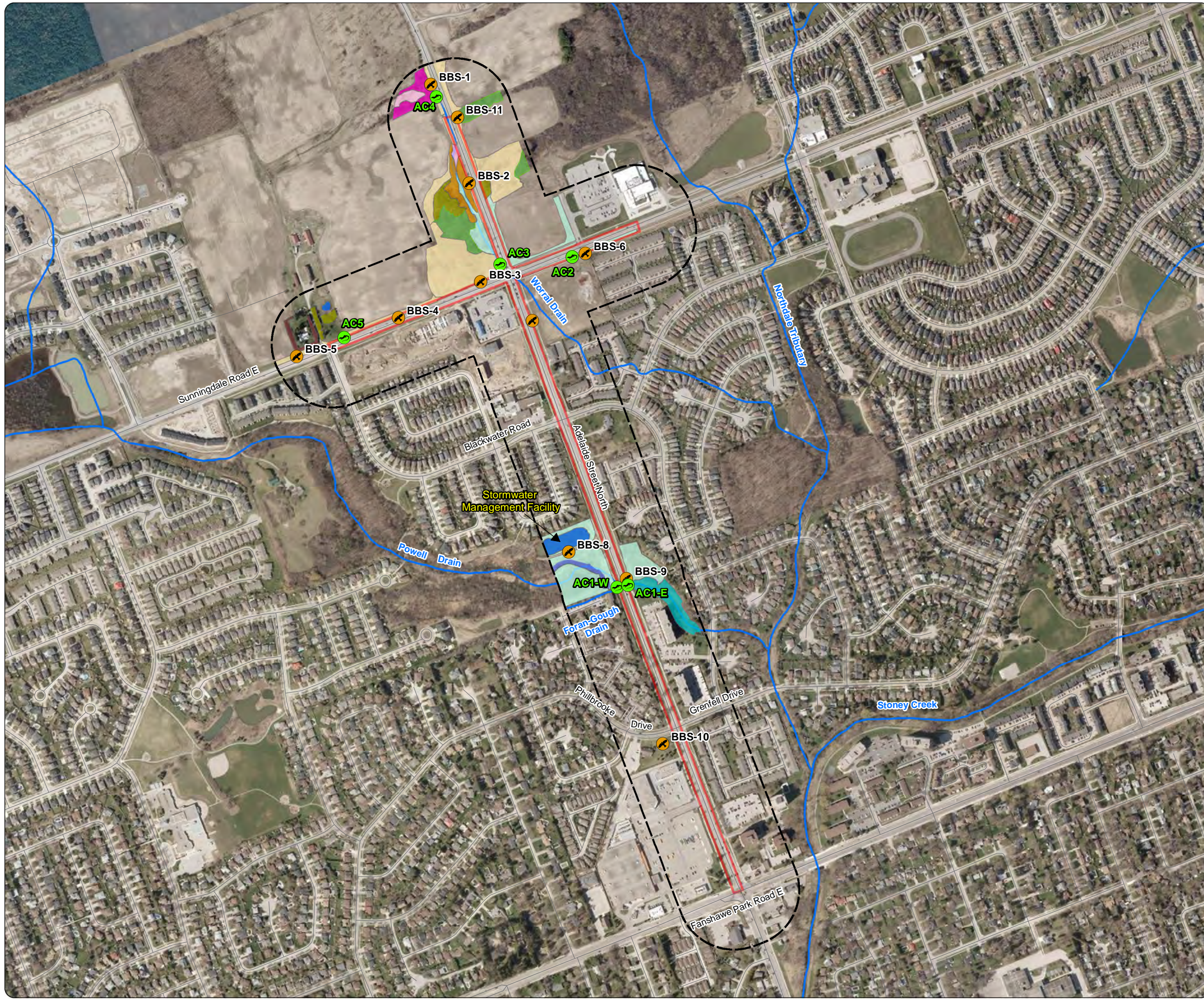
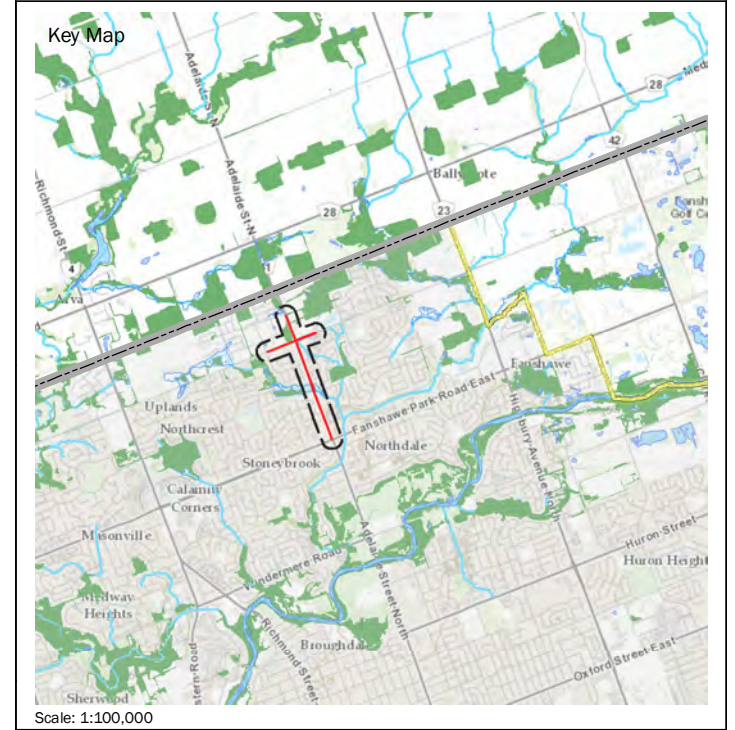


Figure 4
Adelaide Street North Widening EIS
ELC and Survey Locations

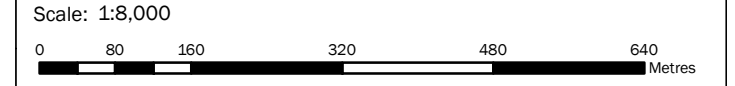


LEGEND

- Amphibian Survey Stations
- Breeding Bird Point Location
- Watercourse
- Study Area
- Subject Lands
- Road

Ecological Land Classification (ELC)

- CUH - White Spruce Hedgerow
- CUM1-1 - Dry-Moist Old Field Meadow Type
- CUP3-3 - Scotch (Scot's) Pine Coniferous Plantation Type
- FOD3-1 - Dry-Fresh Poplar Deciduous Forest Type
- MAM2-2 - Reed-canary Grass Mineral Meadow Marsh Type
- MASM1-12 - Common Reed Mineral Shallow Marsh Type
- OAO - Open Aquatic Ecosite
- SAF1-3 - Duckweed Floating-leaved Shallow Aquatic Type
- SWD - Deciduous Swamp Ecosite
- SWD4 - Mineral Deciduous Swamp Ecosite
- SWT2-2 - Willow Mineral Thicket Swamp Type



Parsons Job No:	Date: 10/29/2019	Draft By: M.E.	
<small>Data Sources: Parsons; City of London Geospatial Data from Official Plan, Ontario Ministry of Natural Resources and Forestry; Ontario Ministry of Transportation; Fisheries and Oceans Canada; ESRI imagery</small>			

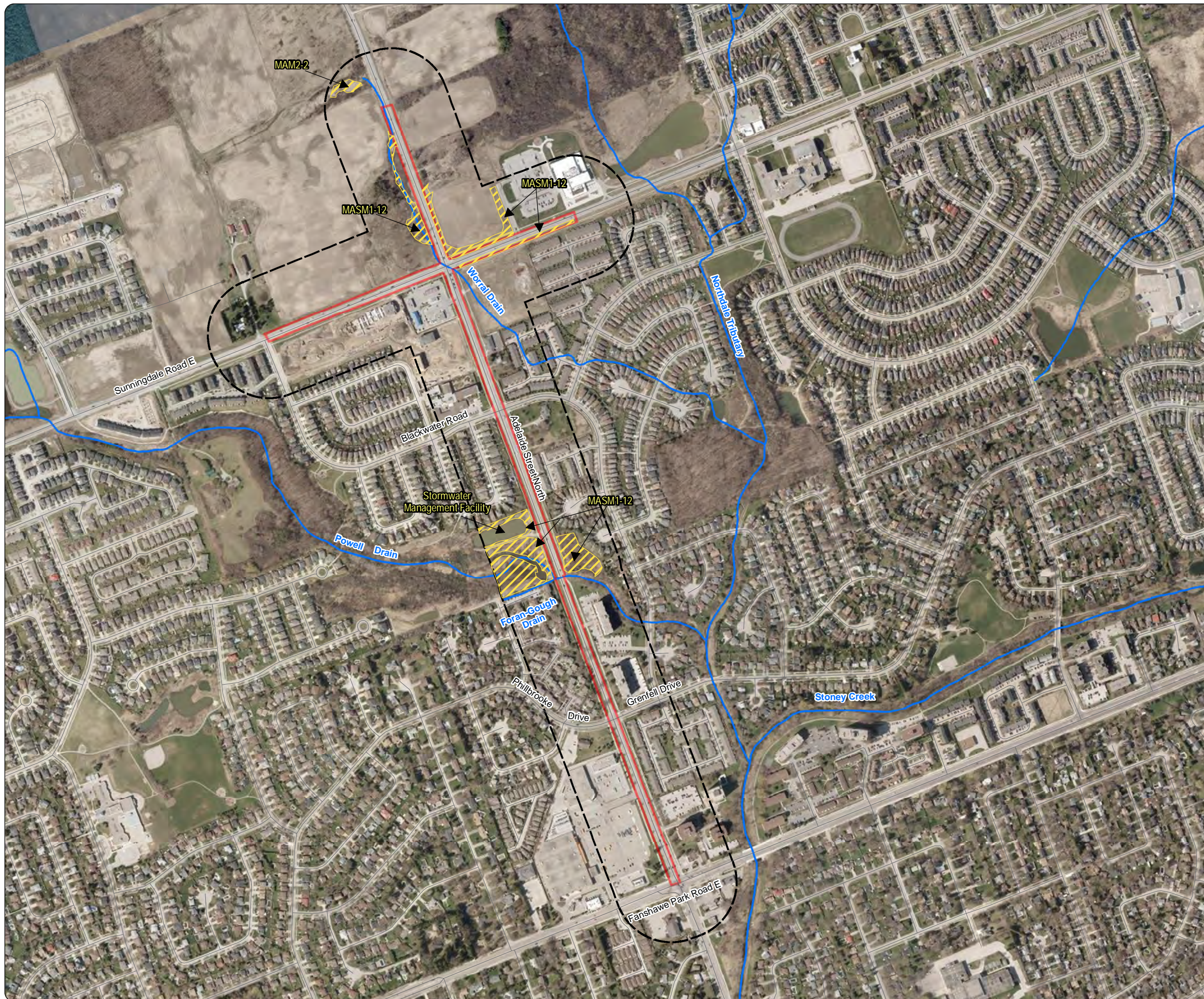
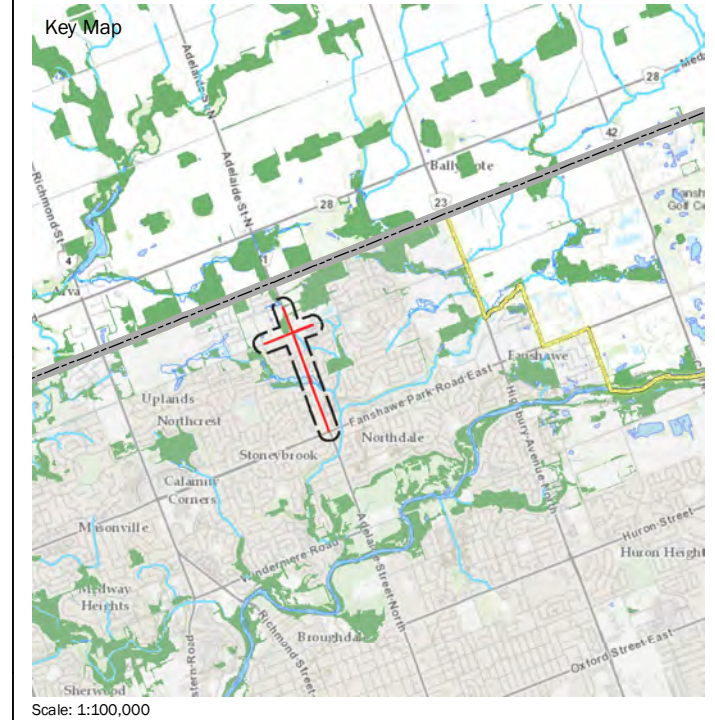


Figure 5
Adelaide Street North Widening EIS
Invasive Species - Phragmites



LEGEND

- Road
- Watercourse
- ▭ Subject Lands
- ▭ Study Area
- ▨ Invasive Species (Phragmites)

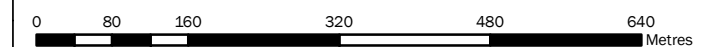
Phragmites Management

City funded Phragmites management, control and monitoring in the Subject Lands and Study Area began in 2018 with touch-ups, additional control work and monitoring underway again in 2019.

ELC Name

- MAM2-2 Reed-canary Grass Mineral Meadow Marsh Type
- MASM1-12 Common Reed Mineral Shallow Marsh Type

Scale: 1:8,000



Parsons Job No:	Date: 10/29/2019	Draft By: M.E.	
<p>Data Sources: Parsons; City of London Geospatial Data from Official Plan, Ontario Ministry of Natural Resources and Forestry; Ontario Ministry of Transportation; Fisheries and Oceans Canada; ESRI imagery</p>			

Data Sources: Parsons; City of London Geospatial
Data from Official Plan, Ontario Ministry of Natural Resources and Forestry; Ontario Ministry of Transportation; Fisheries and Oceans Canada; ESRI imagery



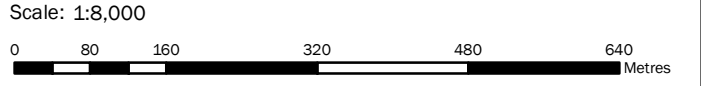
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Figure 6
 Adelaide Street North Widening EIS
 Significant Wildlife Habitat



- LEGEND**
- Road
 - Watercourse
 - ▭ Study Area
 - ▭ Subject Lands
- Confirmed Significant Wildlife Habitat (SWH)**
- ▨ Monarch Habitat
 - ▨ Snapping Turtle Habitat
 - ▨ Terrestrial Crayfish Habitat (NRSI, 2016)
- Candidate Significant Wildlife Habitat (cSWH)**
- ▨ Amphibian Breeding Habitat (Wetland)
 - ▨ Amphibian Movement Corridor
 - ▨ Terrestrial Crayfish
 - ▨ Turtle Nesting Habitat
 - ▨ Turtle Wintering Areas
 - ▨ Midland Painted Turtle Habitat
 - ▨ Northern Map Turtle Habitat



Parsons Job No:	Date: 10/29/2019	Draft By: M.E.	
<small>Data Sources: Parsons; City of London Geospatial Data from Official Plan, Ontario Ministry of Natural Resources and Forestry; Ontario Ministry of Transportation; Fisheries and Oceans Canada; ESRI imagery</small>			

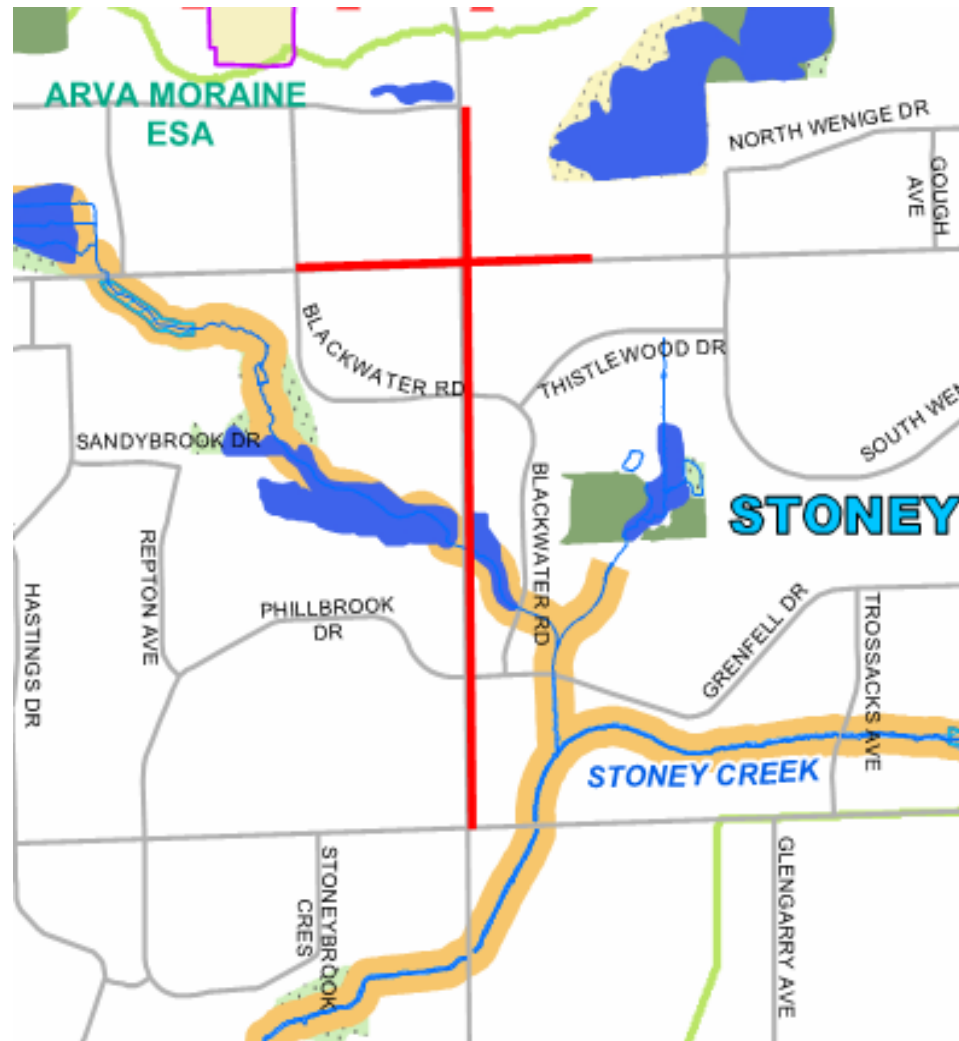
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Appendix B

Official Plan Maps

MAP 5 – NATURAL HERITAGE

MAP SUBJECT TO LPAT APPEAL PL170100



LEGEND

NATURAL HERITAGE SYSTEM

- Provincially Significant Wetlands
- Wetlands
- Unevaluated Wetlands
- Significant Woodlands
- Woodlands
- Significant Valleylands
- Valleylands
- Areas of Natural and Scientific Interest
- Environmentally Significant Areas (ESA)
- Potential ESAs
- Upland Corridors
- Potential Naturalization Areas
- Unevaluated Vegetation Patches

BASE MAP FEATURES

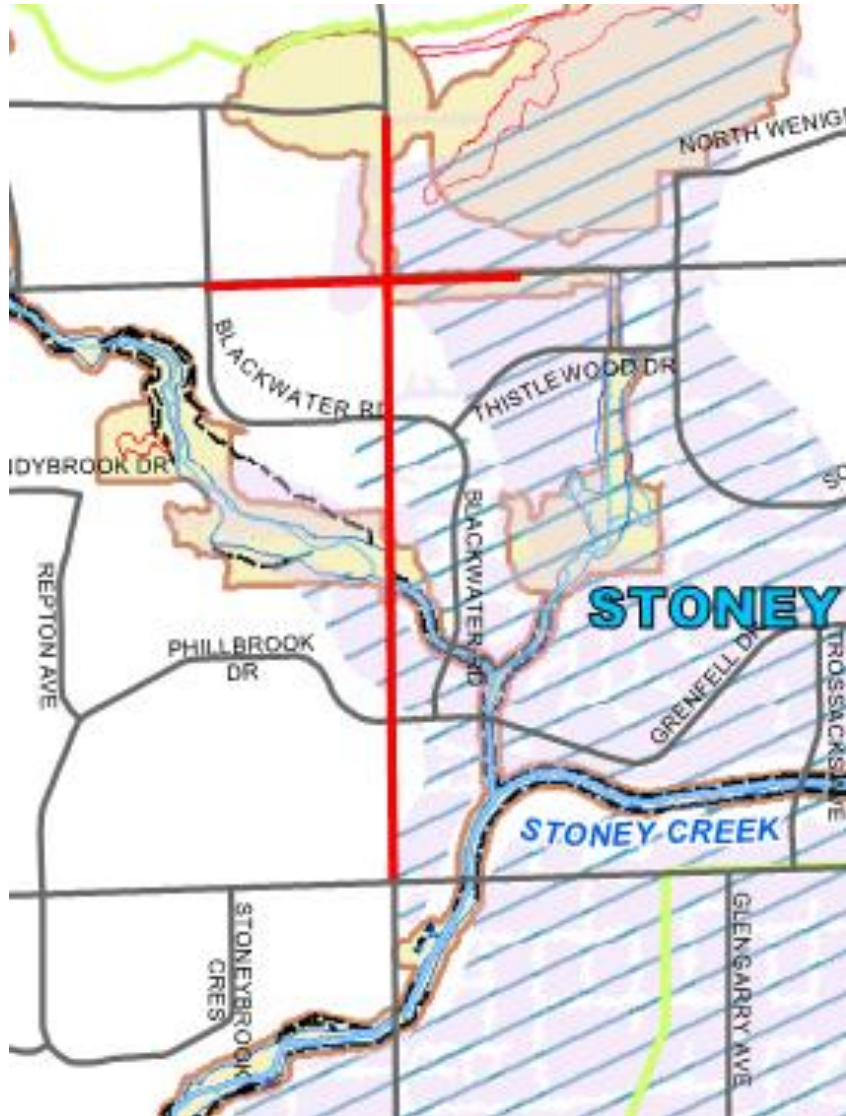
- Streets (See Map 3)
- Railways
- Urban Growth Boundary
- Water Courses/Ponds
- Water Bodies
- Conservation Authority Boundary
- Subwatershed Boundary
- Subwatershed Name

Subject Lands
(Approximate Boundary)

Reproduced from The London Plan (2018)

MAP 6 – HAZARDS AND NATURAL RESOURCES

MAP SUBJECT TO LPAT APPEAL PL170100



LEGEND

HAZARDS

- Regulatory Flood Line
NOTE 1: Flood Lines shown are 1:50 map scale approximations. The precise delineation of flood risks mapping is available from the Conservation Authority having jurisdiction.
NOTE 2: Road Fringe mapping for certain areas of the City is available from the Upper Thames Conservation Authority.
- Special Policy Areas
- Potential Special Policy Areas
- Riverine Erosion Hazard Limit for Confined Systems
NOTE: Slope Slopes Outside the Riverine Erosion Hazard Limit on the map are approximates. Precise delineation is available from the Conservation Authority having jurisdiction.
- Riverine Erosion Hazard Limit for Unconfined Systems
- Maximum Hazard Line
- Conservation Authority Regulation Limit
- Abandoned Oil/Gas Wells

NATURAL RESOURCES

- Aggregate Resource Areas
- Extractive Industrial Areas
- Wellhead Protection Areas
- Emergency Municipal Water Wells
- Significant Groundwater Recharge Areas
- Highly Vulnerable Aquifers

BASE MAP FEATURES

- Streets (See Map 3)
- Railways
- Urban Growth Boundary
- Water Courses/Ponds
- Water Bodies
- Conservation Authority Boundary
- Subwatershed Boundary
- STONEY CREEK**: Subwatershed Name

Subject Lands (Approximate Boundary)

Reproduced from The London Plan (2018)

1989 Official Plan – Schedule B-1

SCHEDULE B-1 TO THE CITY OF LONDON OFFICIAL PLAN - NATURAL HERITAGE FEATURES MAP NO. 2

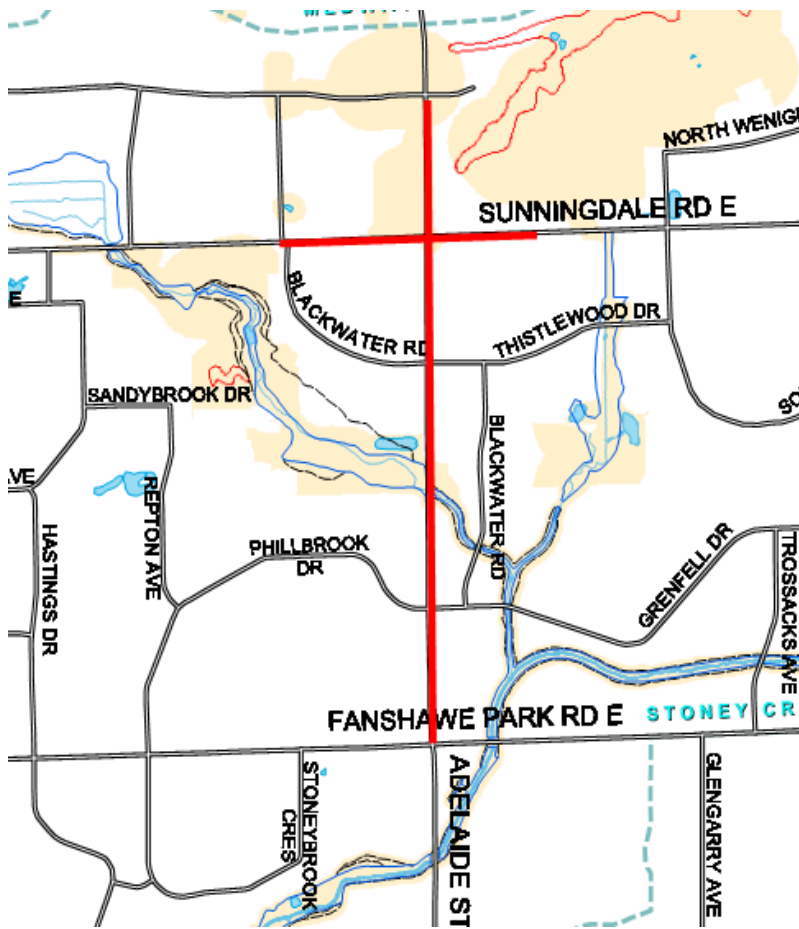


- ESAs
- Woodlands
- Unevaluated Corridors
- Potential ESAs
- Unevaluated Vegetation Patches
- Provincially Significant Wetlands
- Significant Woodlands
- Significant Corridors
- Locally Significant Wetlands
- Unevaluated Wetlands
- Ground Water Rechg
- Subwatershed Boundary
- Potential Naturalization Area
- Max Hazard Line
- Big Picture Meta-Cores and Meta-Corridors
- Potential Upland Corridor
- Conservation Authority Bndry

⊕ Subject Lands
(Approximate Boundary)

Reproduced from the 1989 Official Plan

1989 Official Plan – Schedule B-2



SCHEDULE B-2 TO THE CITY OF LONDON OFFICIAL PLAN - NATURAL RESOURCES AND NATURAL HAZARDS MAP NO. 2

Natural Resources		Natural Hazards	
Extractive Industrial	Emergency Municipal Water Wells	Regulatory Floodline	Riverine Erosion Hazard Limit for Unconfined Systems
Aggregate Resource Areas		Riverine Erosion Hazard Limit for Confined Systems	Steep Slopes Outside of the Riverine Erosion Hazard Limit
Base Map Features		Conservation Authority Boundary	Special Policy Areas
Water Courses/Ponds	Subwatershed Boundary	Potential Special Policy Areas	

Subject Lands
(Approximate Boundary)

Reproduced from the 1989 Official Plan

Appendix C

Agency Consultation

ATTACHMENT B
Environmental Impact Study
ISSUES SUMMARY CHECKLIST REPORT

Application Title: Municipal Class Environmental Assessment for Adelaide Street North Widening between Fanshawe Park Road and Sunningdale Road

Date Submitted: August 21, 2018

Proponent: City of London

Qualifications

Primary Consultant: Parsons

Key Contact Person: Henry Huotari - Project Manager / Tisha Doucette – PM, Ecology

Other Consultants/field personnel:

Hydrogeology / Hydrology: _____

Geotechnical: Golder Associates

Biological - Flora: Parsons

Biological - Fauna: Parsons

Other: Golder – Cultural / Archaeological Assessment

Ron Koudys Landscape Architects Inc. - Tree Inventory

Novus Environmental – Noise Assessment

Context for Background Information

Subwatershed: Stoney Creek (Powell Drain)

Tributary Fact Sheet Number: _____

Planning/Policy Area: Stoney Creek

Technical Advisory Review Team:

Ecologist Planner

Planner for the File

EEPAC - invited

Conservation Authority: Upper Thames River CA – invited and sent in comments

Ministry of Natural Resources

Ministry of the Environment

Ministry of Municipal Affairs and Housing

Ministry of Agriculture and Food

Handwritten signature and date: [Signature] Aug 23/2018

Other Review Groups (e.g. Community Associations, Field Naturalists)

1.0 DESCRIPTION OF THE ENVIRONMENT (Features)

Purpose: To have a clear understanding of the current status of the land, and the proposed "development" or land use change.

1.1 Mapping (Location and Context)

(current aerial photographs, preferably ortho-images, 1:2000 Ontario Base Map, NTS 1:50,000 maps)

- Land Use - Excerpts of the Official Plan for the City of London Ontario Schedules A, B, showing a 5-10km radius of subject site
- Terrain setting @ 1:10,000 – 1:15,000 scale showing landscape features, subwatershed divides
- Existing Environmental Resources @ 1:2,000 -1:5,000 showing Vegetation, Hydrology, contours, linkages
- Environmental Plan or Strategy from Subwatershed reports (tributary fact sheet), Community (Area) Plans, or other

1.2 Description of Site, Adjacent lands, Linkage with Natural Heritage System

List all supporting studies and reports available to provide background summary (e.g. sub-watershed, hydrological, geo-technical, natural heritage etc.); check the first box if it is relevant to the subject area and surrounding landscape, and check the second box if it is determined that sufficient information is available.

- Stoney Creek 2017 Watershed Report Card (UTRCA, 2017)
- Sunningdale Road Improvements, Wonderland Road North to Adelaide Street North, Environmental Study Report (AECOM, 2013)
- Fanshawe Park Road East Corridor, Adelaide Street to Highbury Avenue, Environmental Study Report (Delcan, 2009)
- Status Review of Stoney Creek Subwatershed Study (IBI Group, 2007)
- Stoney Creek Community Plan North of Sunningdale Road (GSP Planning Consultants, 1999)
- Stoney Creek Subwatershed Study (Paragon Consulting Engineers Ltd, 1996)
- Stoney Creek Stormwater Management Facility #2 Environmental Impact Study (NRSI, 2016)
- 660 Sunningdale Road – Wetland Evaluation Boundary Review (BioLogic Incorporated, 2013)

1.2.1 Terrain Setting

- | | | |
|-------------------------------------|-------------------------------------|--------------------------------------|
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Soils (surface & subsurface) |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Glacial geomorphology- landform type |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Sub-watershed |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Topographic features |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Ground water discharge |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Shallow ground water/baseflow |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Ground water recharge/aquifer |
| <input type="checkbox"/> | <input type="checkbox"/> | Aggregate resources |

1.2.2 Hydrology

- | | | |
|-------------------------------------|-------------------------------------|---|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Hydrological catchment boundary |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Surface drainage pattern |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Watercourses (Permanent, Intermittent) |
| <input type="checkbox"/> | <input type="checkbox"/> | Stream order (Headwater, 1st, 2nd, 3 rd or higher) |

- Agricultural drains
- Downstream receiving watercourse

1.2.3 Natural Hazards

- 100 year Erosion Line
- Floodline mapping
- UTRCA Regulated Area (Ontario Regulation 157/06)

1.2.4 Vegetation

- Vegetation Patch numbers: 02032, 02014, 02015, 02017, 02008
- System (Terrestrial, Wetland, Aquatic)
- Cover (Open, Shrub, Treed)
- Community Type(s)
- ELC Community Class (Bluff, Forest, Swamp, Tallgrass Prairie, Savannah & Woodland, Fen, Bog, Marsh, Open Water, Shallow Water)
- ELC Community Series
- Rare Vegetation Communities

1.2.5 Flora

- Flora (inventory dates, source)
 - Rare flora (National, Provincial, Regional)
- + Mapping Inv. Species*

1.2.6 Fauna

- Fauna
- Breeding Birds
- Migratory Birds
- Amphibians (*marsh monitoring protocol*)
- Reptiles (*visual encounter*)
- Mammals (*incidental*)
- Butterflies (*incidental*)
- Odonata (*incidental*)
- Other
- Bird Species of Conservation Priority
- Rare Fauna

1.2.7 Significant Wildlife Habitat

(Ecoregion 7E Criterion)

- Species-At-Risk critical habitat mapping
- Winter habitat for deer, wild turkey
- Waterfowl Habitat (wetlands, poorly drained landscape – bottomlands, beaver ponds, seasonally flooded areas, staging areas, feeding areas)
- Colonial Birds Habitat
- Hibernacula
- Habitat for Raptors
- Forests with springs or seeps
- Ephemeral ponds

- | | | |
|-------------------------------------|--------------------------|---|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Wildlife trees (snags, cavities, x-large trees > 65 cm dbh) |
| <input type="checkbox"/> | <input type="checkbox"/> | Forest Interior Birds |
| <input type="checkbox"/> | <input type="checkbox"/> | Area-sensitive birds |

1.2.8 Aquatic Habitat

(SWS Aquatic Resources Management Reports)

- | | | |
|-------------------------------------|--------------------------|------------------------------------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Fish communities |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Fish spawning areas |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Fish migration routes |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Thermal refuge for fish |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Thermal Regime |
| <input type="checkbox"/> | <input type="checkbox"/> | Benthic inventory |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Substrate |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Riparian habitat (extent and type) |

1.2.9 Linkages and Corridors

(The diversity of natural features in an area, and the natural connections between them should be maintained, and improved where possible. Provincial Policy Statement 2.3.3).

- | | | |
|-------------------------------------|-------------------------------------|---|
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Valleylands |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Significant Watercourses |
| <input type="checkbox"/> | <input type="checkbox"/> | Upland Corridors / migration routes |
| <input type="checkbox"/> | <input type="checkbox"/> | Big Picture Cores and Corridors |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Linkages between aquatic and terrestrial areas (riparian habitat, runoff) |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Groundwater connections |
| <input type="checkbox"/> | <input type="checkbox"/> | Patch clusters (mosaic of patches in the landscape) |

1.3 Social Values

1.3.1 Human Use Values

- | | | |
|-------------------------------------|--------------------------|---|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Recreational linkages for hiking, walking |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Nature appreciation, aesthetics |
| <input type="checkbox"/> | <input type="checkbox"/> | Education, research |
| <input type="checkbox"/> | <input type="checkbox"/> | Cultural / traditional heritage |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Social (parks and open space) |
| <input type="checkbox"/> | <input type="checkbox"/> | Resource Products (e.g. timber, fish, furbearers, peat) |
| <input type="checkbox"/> | <input type="checkbox"/> | Aggregate Resources |

1.3.2 Land Use - Cultural

- | | | |
|-------------------------------------|--------------------------|---------------------------------------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Archaeological (pre-1500) |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Historical (post 1500-present) |
| <input type="checkbox"/> | <input type="checkbox"/> | Adjacent historical and archeological |
| <input type="checkbox"/> | <input type="checkbox"/> | Future |

1.3.3 Land Use - Active

- | | | |
|--------------------------|--------------------------|--------------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | Current |
| <input type="checkbox"/> | <input type="checkbox"/> | Historical (past 50-100 years) |

- Adjacent lands
- Future

1.3.4 Other _____

2.0 EVALUATION OF SIGNIFICANCE

Components of the Natural Heritage System

The policies in Section 15.4 apply to recognized and potential components of the natural heritage system as delineated on Schedule "B", or features that may be considered for inclusion on Schedule "B". They also address the protection of environmental quality and ecological function with respect to water quality, fish habitat, groundwater recharge, headwaters and aquifers.

2.1 Environmentally Significant Areas

- Identified Environmentally Significant Areas (Recognized in Official Plan (Schedule "B" and/or Section 15.4.1.1))
- Potential Environmentally Significant Areas – Expansion of (Recognized in Section 15.4.1.2 and Schedule "B")
- Potential Environmentally Significant Areas (Recognized in Section 15.4.1.5 and Schedule "B")

2.2 Wetlands

- Provincially Significant Wetlands (*Arva Moraine Wetland Complex*)
- Locally Significant Wetlands
- Unevaluated Wetlands

2.3 Areas of Natural and Scientific Interest

- Provincial Life Science ANSI
- Regional Life Science ANSI
- Earth Science ANSI

2.4 Habitat of Species-At-Risk (SAR)

- Endangered
- Threatened (*records of Eastern False Rue-anemone, Barn Swallow*)
- Special Concern (*records of Snapping Turtle, Wood Thrush*)

2.5 Woodlands

- Significant Woodlands
- Unevaluated Vegetation Patches

2.6 Corridors and Linkages

- River, Stream and Ravine Corridors
- Upland Corridors

- Naturalization and Anti-fragmentation Areas

3.0 IDENTIFICATION AND DESCRIPTION OF FUNCTIONS

Ecological Functions: the natural processes, products or services that species and non-living environments provide or perform within or between ecosystems and landscapes. Check those functions that will be required to assess for the study (key and supporting functions).

3.1 Biological Functions

- habitat (provision of food, shelter for species)
- limiting habitat
- species life histories (reproduction and dispersal)
- habitat guilds
- indicator species
- keystone species
- introduced species
- predation / parasitism
- population dynamics
- vegetation structure, density and diversity
- food chain support
- productivity
- diversity
- carbon cycle
- energy cycling
- succession and disturbance processes (natural and man-made)
- relationships between species and communities

3.2 Hydrological and Wetland Functions

- ground water recharge and discharge (hydrogeology)
- water storage and release (fluvial geomorphology)
- maintaining water cycles (water balance)
- water quality improvement
- flood damage reduction
- shoreline stabilization / erosion control
- sediment trapping
- nutrient retention and removal / biochemical cycling
- aquatic habitat (fish, macroinvertebrates)

3.3 Landscape Features and Functions

- size
- connections, corridors and linkages
- proximity to other areas / natural heritage features (e.g. woodlands, wetlands, valleylands, water, etc.)
- fragmentation

3.4 Functions, Benefits and Values of Importance to Humans

- contributing to healthy and productive landscapes
- improving air quality by supplying oxygen and absorbing carbon dioxide

- converting and storing atmospheric carbon
- providing natural resources for economic benefit
- providing green space for human activities
- aesthetic and quality-of-life benefit
- environmental targets and/or environmental management strategies

DATE:	2:00 PM, August 21, 2018		
LOCATION:	8 th Floor Boardroom, City Hall, City of London		
IN ATTENDANCE:	City of London		
	Andrew Giesen (AG)	Linda McDougall (LM)	
	Matt Davenport (MD)		
	Parsons Inc.		
	Tisha Doucette (TD)	Julie Scott (JS)	

	DESCRIPTION	ACTION
SUMMARY OF NOTES	<p><i>UTRCA was not able to attend, they will be invited to the next progress meeting. EEPAC was invited and not able to attend.</i></p> <ul style="list-style-type: none"> An overview of the project and study area was provided. Prior to the meeting, LM provided additional background reports for the study area (SWM Facility #2, EIS completed by NRSI October 2016, and Comfort Lands, BioLogic 2012). LM provided the vegetation patch numbers for the study area. It was agreed that a combined SLSR and EIS report will be prepared. LM requested invasive species ID and documentation. It was suggested that an Invasive Species Management plan could form part of the net benefit strategy. Phragmites is confirmed on site. A multi-use path planned for north of sunningdale, on west side of Adelaide; AG to look for a drawing to send us. It was noted that the study team will be looking at the potential for a wildlife crossing. LM was very supportive of this. The crossing could also form part of net benefit for the site. LM noted that she would send their standard text for road widening project EIS. LM noted that the idea of buffers isn't usually included in widening projects, they more discuss "limiting encroachment" onto features. Parsons is to review the City's Environmental Management Guidelines for a checklist of items that are to be included in an EIS (resumes for example). 	<p>City</p> <p>City</p> <p>Parsons</p>

	<ul style="list-style-type: none">• Since field work will not commence until fall 2018. The timeline for submission of the EIS and ESR would more likely be finalized in September 2019.• Overtopping of culvert was a noted concern at the project start-up. UTRCA correspondence mentioned the potential of beavers. Therefore, the team added flood damage reduction to the checklist of issues to consider.• City GIS data should be available which includes some tree inventory data, patch #s, basic ELC, etc.• London Plan Map 5 language should be used to describe features.• Phragmites treatment is encouraged ahead of construction to limit spread of seeds, etc. Clean equipment protocol to be used, and other provincial BMPs.• Post-construction monitoring program to be incorporated into the EA/EIS.	
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These Meeting Notes are the writer's interpretation only, and if there are any errors and/or omissions, please notify the undersigned immediately.

MINUTES PREPARED BY: Julie Scott and Tisha Doucette.

Distribution: to all present

Esraelian, Martine

From: Mark Snowsell <SNOWSELLM@thamesriver.on.ca>
Sent: Tuesday, August 21, 2018 7:46 AM
To: Brent Verscheure; Christine Creighton; Doucette, Tisha
Subject: Re: FW: Adelaide Street North EA - EIS Scoping Meeting

Follow Up Flag: Follow up
Flag Status: Flagged

Good morning, Tisha.

We will not be able to attend today.

Other commitments have been made but we look forward to meeting with you and the Parsons team at some point soon.

Just a few things to note as continue your work:

1. There has been a watercourse alteration at the corner of Adelaide Street North and Sunningdale Road. DFO was involved at the time and it led to the creation of a new watercourse channel running eastbound, parallel to and just south of Sunningdale Road and eventually connecting with a Stoney Creek tributary to the southeast. That channel remains in place today. Can provide you with more detail if necessary.
2. The City has been working with Mr. Peter Sergautis on subdivision plans NW of the intersection of Adelaide Street and Sunningdale Road. Some planning decisions have been made here and I suspect Linda McDougall can assist you in gathering information on some of the planning decisions.
3. Also, immediately NW of this same intersection, a stormwater management facility has been designed for the City. Footprint and design details can be obtained through the City's SWM unit - would suggest touching base with Paul Titus there. EIS work (including mapping of wetland features) done by NRSI in this area.
4. Much work has been done over the years on the Powell Drain which crosses Adelaide Street south of Sunningdale. Drainage issues continue here as obstructions to flow can be attributed to various possible causes, including beaver activity. The City's SWM unit has struggled with the SWM facility just north of Powell Drain (can't tell you the name or number of this facility - ask Paul Titus for more info here as well). It has frequently overtopped. Understanding drainage/SWM in this area will prove beneficial to your work.
5. Finally, our water resource engineers hope to make the Stoney Creek subwatershed a focus of updated flood plain modelling/mapping. Field surveys will be done to facilitate the modelling work and I don't think there is clear timeline for completing this project - may follow after much of your work has been done. I can connect you with the appropriate staff here to discuss further.

Hope the meeting goes well this afternoon.



Mark Snowsell
Land Use Regulations Officer
1424 Clarke Road, London, Ontario N5V 5B9
ph. 519-451-2800 ext 245
e-mail snowsellm@thamesriver.on.ca

>>> Doucette, Tisha 8/13/2018 2:00 PM >>>

Sorry about this last minute calendar invite. There was a miscommunication between Linda and myself.

We hope someone is able to attend, if not – we will reschedule.

Tisha

-----Original Appointment-----

From: Doucette, Tisha

Sent: Monday, August 13, 2018 2:00 PM

To: Doucette, Tisha; Giesen, Andrew; Davenport, Matthew; Scott, Julie; McDougall, Linda; Huotari, Henry

Subject: Adelaide Street North EA - EIS Scoping Meeting

When: Tuesday, August 21, 2018 2:00 PM-4:00 PM (UTC-05:00) Eastern Time (US & Canada).

Where: City Hall 8th Floor Boardroom

Hello all:

This meeting is to review the Issues Summary Checklist and confirm the natural heritage work plan that will support the preparation of an Environmental Impact Study that will be completed as part of the Adelaide Street North widening EA.

Attached, please find a completed Issues Summary Checklist for discussion and a study area map.

We will bring copies of Map 5 zoomed in on our study area to the meeting.

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From: ESA-Aylmer (MNRF)
To: [Van Hemessen, William](#)
Cc: [Beneteau, Courtney](#); [Doucette, Tisha](#)
Subject: RE: Information Request - Class EA for Adelaide Street North Widening, City of London
Date: Wednesday, October 31, 2018 3:40:35 PM
Attachments: [image001.png](#)
[Adelaide St N Environmental Study Area.pdf](#)
[2013AnnualMailoutAttachment_IdentifyingWetlands&PotentialWetlandsFromELC....pdf](#)

Hello William,

I sincerely apologize for the delay in response. The Ministry of Natural Resources and Forestry (MNRF) understands that Parsons has been retained to initiate a municipal class EA for the proposed widening of Adelaide Street North between Fanshawe Park Road and Sunningdale Road, including the construction of a roundabout at the intersection of Adelaide Street and Sunningdale Road.

MNRF provides the following natural heritage information in response to your request.

-
Species at Risk (SAR)

The Species at Risk in Ontario (SARO) List ([https://www.ontario.ca/laws/regulation/080230\[ontario.ca\]](https://www.ontario.ca/laws/regulation/080230[ontario.ca])) is Ontario Regulation 230/08 issued under the *Endangered Species Act, 2007* (ESA). The ESA came into force on June 30, 2008, and provides both species protection (under section 9) and habitat protection (under section 10) to species listed as endangered or threatened on the SARO List.

An initial SAR (endangered and threatened species) screening has been completed for the above-noted property.

There are no known occurrences of SAR on the property; however, there are known occurrences of SAR in the general project area, including:

- American Badger (endangered), with species and regulated habitat protection
- Spiny Softshell (endangered), with species and general habitat protection
- SAR bats (endangered), with species and general habitat protection
- Barn Swallow (threatened), with species and general habitat protection
- Bobolink (threatened), with species and general habitat protection
- Eastern Hog-nosed Snake (threatened), with species and general habitat protection. Please note, the property may fall within general habitat for this species.
- Eastern Meadowlark (threatened), with species and general habitat protection

Please note that this is an initial screening for SAR and the absence of an element occurrence does not indicate the absence of species. The province has not been surveyed comprehensively for the presence or absence of SAR and MNRF data relies on observers to report sightings of SAR. Field assessments by a qualified professional may be necessary if there is a high likelihood for SAR species and/or habitat to occur within the project footprint and potentially be impacted.

Based on the information provided for this project, MNRF considers there to be high likelihood for the above-noted species and/or habitat to occur within the proposed project footprint. Please refer to our attached SAR Screening Process Technical Bulletin. MNRF strongly recommends that no on-site activity (i.e. site alteration, vegetation/debris removal, etc.) occurs until Stage 2 is complete, in order for proponents to demonstrate due diligence and remain in compliance with the ESA. Failure to comply with this recommendation could result in a contravention of the ESA and possible compliance / enforcement action.

It is important to note the following:

- The Committee on the Status of Species at Risk in Ontario (COSSARO) meets regularly to evaluate new species for listing and/or re-evaluate species already on the SARO List.
- As a result, species designations may change and changes may occur in both species and habitat protection which could affect the level of protection they receive under the ESA 2007 and whether proposed projects may have adverse effects on SAR.
- Habitat protection provisions for a species may change if a species-specific habitat regulation comes into effect.

If an activity or project will result in adverse effects to endangered or threatened species and/or their habitat, additional action would need to be taken in order to remain in compliance with the ESA. Additional action could be applying for an authorization under section 17(2)(c) of the ESA, or completing an online registry for an ESA regulation and following the rules in regulation if the project is eligible ([http://www.ontario.ca/environment-and-energy/natural-resources-approvals\[ontario.ca\]](http://www.ontario.ca/environment-and-energy/natural-resources-approvals[ontario.ca])). Questions about the registry process should be directed to MNRF's Registry and Approval Services Centre at 1-855-613-4256 or at mnr.rasc@ontario.ca. Please be advised that applying for an authorization does not guarantee approval and the process can take several months.

Significant Wildlife Habitat (SWH)

Significant wildlife habitat (SWH) may be present on or adjacent to the above-noted subject lands (within 120 m). Please consult the Significant Wildlife Habitat Technical Guide (SWHTG, OMNR 2000), the Natural Heritage Reference Manual (NHRM) and the Ecoregion Criteria Schedules for criteria on identifying and determining significance of wildlife habitat. SWH is identified by planning authorities using the criteria and processes recommended in the SWHTG and Ecoregion Criteria Schedules.

Link to the SWHTG: [https://www.ontario.ca/environment-and-energy/guide-significant-wildlife-habitat\[ontario.ca\]](https://www.ontario.ca/environment-and-energy/guide-significant-wildlife-habitat[ontario.ca])

Link to Ecoregion 7E criteria schedule: [http://publicdocs.mnr.gov.on.ca/View.asp?Document_ID=21843&Attachment_ID=45645\[publicdocs.mnr.gov.on.ca\]](http://publicdocs.mnr.gov.on.ca/View.asp?Document_ID=21843&Attachment_ID=45645[publicdocs.mnr.gov.on.ca])

MNRF completed a screening for S1-S3, SH and special concern species and the following have known occurrences in the general project area:

- Eastern Wood-peewee (special concern)
- Monarch (special concern)
- Black Tern (special concern)
- Snapping Turtle (special concern)
- Wood Thrush (special concern)

The habitat of provincially rare (S1-S3, SH) and Special Concern species is considered SWH under the category of 'Special Concern and Rare Wildlife Species' in the SWHTG Ecoregion Criteria Schedules. Therefore, consideration should be given to these species and whether their habitat occurs on or within 120 m of the subject lands.

Wetlands

The project footprint as shown in the attached appears to be within the Arva Moraine Wetland Complex Provincially Significant Wetland.

Up to date information on wetlands can be obtained directly from [Lands Information Ontario\[ontario.ca\]](http://Lands Information Ontario[ontario.ca]) (separate layers for provincially significant wetlands and identified wetlands) or the Natural Heritage Information Centre's [Natural Heritage Make a Map\[ontario.ca\]](http://Natural Heritage Make a Map[ontario.ca]). Wetlands that are designated as provincially significant have been evaluated in accordance with the Ontario Wetland Evaluation System (OWES). Many wetlands in Ontario have not yet been evaluated, and a wetland evaluation in accordance with OWES is required to determine significance. Please note that wetland evaluations files are 'open' files, and are updated from time to time as new information becomes available. Lack of wetland data does not mean absence of wetlands that could be provincially or regionally protected.

It is possible for unevaluated wetlands to occur on or adjacent to the site, e.g. they could be located within or in proximity to woodlands.

Please see the attached reference sheet for a list of Ecological Land Classification (ELC) communities that could possibly be considered wetlands in Aylmer District. Site-specific investigation within the study area may find existing wetlands within such ELC communities that have not yet been evaluated or designated. Consideration and delineation of wetland areas should be determined using criteria and methodology as outlined in the Ontario Wetland Evaluation System (OWES) and submitted to MNRF for review.

Areas of Natural and Scientific Interest

Up to date information on Areas of Natural and Scientific Interest (ANSI) can be obtained directly from [Lands Information Ontario\[ontario.ca\]](http://Lands Information Ontario[ontario.ca]) or the Natural Heritage Information Centre's [Natural Heritage Make a Map\[ontario.ca\]](http://Natural Heritage Make a Map[ontario.ca]). Please note that ANSI files are updated from time to time as new information becomes available and additional areas are assessed.

Fisheries

Fish community data can be obtained through many sources, including [Lands Information Ontario\[ontario.ca\]](#), local fisheries or watershed management plans, and local MNRF district offices.

The following fish species are known to occur in the creek in the southern portion of the study area:

- Blacknose Dace, Bluntnose Minnow, Brook Stickleback, Central Stoneroller, Common Shiner, Creek Chub, Fathead Minnow, Greenside Darter, Johnny Darter, Northern Redbelly Dace, Pumpkinseed, Spottfin Shiner, White Sucker

Natural Heritage Systems

Policy 2.1.2 of the PPS states that the diversity and connectivity of natural features in an area, and the long-term ecological function and biodiversity of natural heritage systems (NHS), should be maintained, restored or, where possible, improved, recognizing linkages between and among natural heritage features and areas, surface water features and ground water features.

Applicable natural heritage studies (e.g. in an EIS) should identify and recognize natural heritage systems and the linkages between and among natural heritage features and areas associated with the proposed development and site alteration. Based on the local NHS/linkages identified, or those specifically identified in an Official Plan, an EIS should outline potential impacts to the NHS and consider ways of maintaining, restoring, and/or improving linkages between and among natural heritage features and areas.

Conservation Authorities and Official Plans may provide additional natural heritage information for this study.

Please be advised that it is your responsibility to be aware of and comply with all relevant federal or provincial legislation, municipal by-laws or other agency approvals.

If you have any questions or require additional information, please feel free to contact me.

Regards,

Jason Webb

Management Biologist
Ministry of Natural Resources and Forestry
Aylmer District
(519) 773-4744

From: Van Hemessen, William [mailto:William.VanHemessen@parsons.com]

Sent: July-23-18 4:34 PM

To: ESA-Aylmer (MNRF) <ESA.Aylmer@ontario.ca>

Cc: Beneteau, Courtney <Courtney.Beneteau@parsons.com>; Doucette, Tisha <Tisha.Doucette@parsons.com>

Subject: Information Request - Class EA for Adelaide Street North Widening, City of London

Hello,

Parsons has been retained by the City of London to initiate a municipal class EA for the proposed widening of Adelaide Street North between Fanshawe Park Road and Sunningdale Road, including the construction of a roundabout at the intersection of Adelaide Street and Sunningdale Road. A map of our study area for this project is attached. There are two watercourses in the study area: Powell Drain and Warren Drain, which are tributaries to Stoney Creek in the Thames River watershed.

We are currently in the process of collecting background information pertaining to the study area and we would like to request any relevant information you might have. This could include:

- Species at risk occurrences or concerns in the area (particularly any records not included in NHIC's public mapping application; note that three of our staff, including myself have received data sensitivity training)
- Locations of significant wildlife habitat, natural areas or features of concern, if known
- Watercourse classifications
- Fisheries records (fish and mussels)
- Fisheries management objectives, if any
- In-water work timing windows for construction

Additionally, I have attached an application for a scientific collection permit so that we can conduct fish sampling in the two watercourses in the study area.

Thank you for your time. Please do not hesitate to contact me if there is any other information you require.

All the best

Will Van Hemessen

Will Van Hemessen, BES
Environmental Scientist
1069 Wellington Rd S, Suite 214 - London, ON N6E 2H6
william.vanhemessen@parsons.com - P: +1 519.286.5509

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"Inspiring a Healthy Environment"

December 23, 2019

City of London
300 Dufferin Avenue
London ON, N6A 4L9

Attention: Matt Davenport, EIT (via email: mdavenport@london.ca)

Dear Mr. Davenport:

**Re: Environmental Impact Study
Adelaide Street North Municipal Class Environmental Assessment
City of London**

The Upper Thames River Conservation Authority (UTRCA) has completed a review of the (FINAL DRAFT) Environmental Impact Study (EIS), prepared by Parsons Inc. dated November 2019 and offer the following comments:

1. **6.0 Alternative Solutions and Design Concepts** – UTRCA is supportive of the preferred alternative design concept "Option 1". The preferred widening from centerline (west and east side) will have the least overall impacts to the natural environment.
2. **7.0 Construction Impacts and Mitigation** – UTRCA supports Parsons' recommendations to relocate any proposed pathways and/or sidewalks to an area outside of the PSW boundaries. Further, any proposed works within the areas adjacent to sensitive PSW's (north and south of Sunningdale) should consider any potential short term and/or long term impacts to these features and incorporate any mitigation during detailed design.
3. **3.3.5 Source Water Protection** – Following a review of this section, UTRCA recommends stronger language to require that spill kits be available on-site as a BMP. Additionally, further defining "other contaminants" to include "pesticides, waste or sewage" is suggested.

Please note that UTRCA is interested in receiving further information regarding this project as it moves into Phase 4 (Design and Environmental Study Report). Thank you for the opportunity to comment on aspects of the study pertinent to our mandate.

Yours truly,
UPPER THAMES RIVER CONSERVATION AUTHORITY



Brent Verscheure
Land Use Regulation Officer

c.c. Andrew Giesen – City of London

EEPAC Comments - June 19, 2020			PARSONS RESPONSES - July 30, 2020
Item No.	Item Description	Action	Description
1	1a. Field investigations and existing conditions were inadequately explained and described. RECOMMENDATION: Provide clarifications to the following and if need be improve surveying. For example are roadside bird surveys sufficient to capture an accurate estimate of species presence/absence in the areas that will be affected by the project?	N/A	The surveys are appropriate for the scope of work and were completed where access was provided. Birds/anurans can be heard more than 100 m from the ROW.
2	1b. Table 2 – Indicates that the earliest breeding bird survey was done May 27, 2019 – a date this late in May seems late in the season to capture early signs of breeding, which are the easiest to detect during 5 min breeding bird surveys – many breeding species would be incubating by then, and evidence of breeding activity would be more difficult to detect.	N/A	The breeding bird surveys were completed during the appropriate timing window which is mid-May to mid-July in accordance with the Bird Studies Canada guidelines.
3	1c. Table 2 – Was only one fish survey done? If yes, would it capture all fish given the hot (30°C) day it was done in July?	N/A	Given the presence of existing recent background fisheries data/information, one confirmatory survey was sufficient to confirm fish community and identify potential spawning and refuge areas that would need to be protected. Most of the species captured match MNRF data received.
4	1d. Section 3.4.2 Pg. 9 – Should be at “least 15 days” rather than 15 days for separation of anuran call surveys – the sampling between April 8 and May 27 is much more than 15 days	N/A	The surveys were completed within the appropriate window and can be separated more than 15 days apart.
5	1e. Pg. 9 Says snake surveys were done between 15 and 25 °C, but the Oct. 16 sampling was done at 14°C, which is below the recommended temperature for snake surveys.	N/A	The October surveys are for hibernacula only
6	1f. Pg. 9 Says 2 breeding bird surveys were done; Table 2 shows three were done and Appendix shows two were done. As best we can tell there does not seem to have been a May 27 sampling. How many surveys were actually done, and when? Is this sufficient to capture estimates of breeding bird species richness?	Report Update	Correct, the May 27th survey was only amphibians and not breeding bird. Table 2 will be revised accordingly. Two surveys are standard for completing breeding bird surveys.
7	1g. Map in Figure 4 Shows all bird and amphibian surveys were done right along the road. Is this adequate to capture the wildlife in the study area given traffic along the road? In particular, we are concerned about accurately surveying wildlife in the study area, given the noted encroachment into wetlands that will be required for this development.	N/A	The survey locations are adequate as birds/anurans can be heard at least 100 m away. The surveys are limited to the ROW where access is granted and is sufficient for the scope of the project.
8	1h. Section 3.4.3 pg. 10 notes that “where possible, water quality measurements were taken”. Table 5 indicates three samples were made. Why were only three sample sites selected? How were they selected? Are these averages of multiple samples at each site or single samples from each site? Were the measurements all made on July 11? A single point sample from a single day is not sufficient to describe the water chemistry of this drain. Was conductivity or specific conductivity measured? Conductivity varies with temperature, so usually specific conductivity is reported, which is corrected to 25°C. This is important given the temperature variations between samples upstream and downstream of Adelaide. Given there is no change in air temperature, what is causing the large change in water temperature? How does this affect road widening plans given this region is known to overlay a sensitive aquifer? What is driving the change in conductivity (if it is conductivity rather than specific conductivity being reported, correcting for temperature will actually make the difference between upstream and downstream even greater)? Is it groundwater or is it as a result of the road? What is the effect of road salt on the aquatic features in this area, and how will that change with road widening? Unless information is missing from the EA, the water chemistry work done is insufficient to adequately describe baseline conditions.	N/A	Water quality measurements were taken to support fisheries sampling (only during sampling) and to help inform the habitat assessment and the sensitivity of the drain. The conductivity was measured to assist with electrofishing and to ensure safe operation and not cause the death of fish. High conductivity readings are likely related to runoff impacts from the existing road. Changes to runoff patterns and quality should be considered further during Detailed Design.
9	1i. Section 4.1 pg. 10 Typo – under physiography and soils - Stratford Till Plan should be Stratford Till Plain and a broad clay plan should be a broad clay plain.	Report Update	Parsons will fix typo.
10	1j. Pg. 17 – Suggestion that downstream of the Powell drain provides cool and warm water fisheries, yet site is characterized as cool water fishery. This seems inconsistent/contradictory. What is the evidence for both cool and warm?	N/A	Powell Drain is a coolwater watercourse and has the ability to support coolwater-preferred species but it also has the ability to support warmwater-preferred species as they are generally tolerant of many types of habitat and different thermal regimes.
11	2a. Description of PSW locations is confusing RECOMMENDATION: Provide accurate and consistent descriptions of the wetlands and their locations. Be clear on exactly how much of the wetlands will be impacted (i.e. what is the minimum and maximum area that will be affected?).	N/A	The area to be affected is expected to be minor and would be further confirmed at detailed design, along with surveying the limits of the wetland boundary to determine precise encroachment, if necessary.
12	2b. Section 5.1 – the description of PSW is confusing. Map in Figure 1 indicates the Arva Moraine Wetland Complex is outside of the study area. But the description in the EA sounds like the Arva Moraine complex also includes the wetland south of Sunningdale along the Powell drain and then the small patch north of Sunningdale at the northern end of the study area. Is this all part of the Arva Moraine wetland complex? If yes, the map in Figure 1 should clearly show this. The present label is confusing. More confusing is the description in Section 4.5, page 13, which states “The desktop study identified a PSW within the study area, specifically the Arva Moraine Wetland Complex (UT15) (Figure 1, Appendix A). There are no other wetlands (unevaluated or other) documented within the Subject Lands or Study Area. Field investigations completed for the Project confirmed the desktop findings.” However, Map 1 clearly shows wetlands in other locations. Moreover, a description of polygon units on pg. 14 seems to indicate other wetlands.	Update Report	The Figure 1 legend for the Provincially Significant Wetland symbol will be updated by adding "Arva Moraine Wetland Complex" in brackets. The label only appears to show one segment of the PSW but it represents all of the PSWs shown on the map. Section 4.5 page 3 will be updated to clarify that other wetland vegetation communities were documented but are too small to be evaluated. The typical size to evaluate is 2 ha.
13	3a. The Safe Crossing Culvert: RECOMMENDATION: There needs to be more research on how additional lanes of traffic and active transport walkways will increase risks to wildlife. If the do nothing approach was considered, this would force this evaluation. We recommend a do nothing alternative be added to the EIS. If the project goes ahead as presently planned, considerably more research into safe crossing designs needs to be made. This should be done prior to the detailed design, so the true environmental costs of this project can be determined and mitigated for. Our recommendation is in line with the cities “Vision Zero” which supports looking at ways in which urban areas can decrease road fatalities to zero. The only way to reduce road fatalities is through road design and decreasing speed limits. Widening roads just supports the status quo.	N/A	The evaluation of Alternatives, including the “Do Nothing” scenario, will be documented in the overall Environmental Study Report (ESR) for the project.

14	3b. Pg. 18 - Adelaide North bisects the Arva Moraine PSW and significant valleyland which impedes safe wildlife passage. Widening the road and adding bike lanes will increase risks to animals that live and use this corridor. To protect wildlife, a culvert is proposed at the site of the Powell Drain. The plans for this are vague and we question the effectiveness of such a culvert. What animals are expected to use this culvert? Has monitoring of road kill been done to find out what species are being killed due to road mortality? Road kill surveys throughout the study area should be conducted to determine 1) species killed and number of mortalities and 2) to determine, based on mortality data, the best locations for such a corridor, or corridors. The proposed culvert dimensions are limited to 86cmX134.5cm – is this sufficiently large to protect the animals at risk? The suggested size would not accommodate wildlife larger than squirrels. It appears flooding is a problem in the culvert now – will this pose an additional threat to wildlife? Or render the culvert inoperable and useless to wildlife throughout much of the year, e.g. in spring when many species migrate and increase their movements to breed? Will fencing be used with the culvert that would guide wildlife to increase the likelihood of its use? Research suggests that fencing is critical for such crossings to be effective (Plante et al., 2019; Rytwinski et al., 2016).	N/A	The preliminary concept for the wildlife passage is considered acceptable given the current site conditions and type of wildlife that would be expected to use the crossing. Additional refinements to the size, including fencing on approaches and consideration for mitigating flood risk can be refined during the detailed design phase.
15	4a. The Powell Drain: RECOMMENDATION: The hydrology needs to be considered in much more detail before this project goes ahead. Based on the letter from the UTRCA, the hydrology is complex and sensitive, yet very little information is provided in the EA about how the Powell Drain works and what potential effects of alterations to the drain will be. We recommend more detailed study of the hydrology and groundwater is done before the project is approved. We also recommend design of a monitoring plan prior to detailed plans. See 13.5.3 Identifying Monitoring Needs in the Natural Heritage Reference manual.	N/A	This would be completed at the detailed design phase.
16	4b. Pg. 18 – The EA suggests that removing debris will improve drainage; letter from UTRCA indicates beavers may be partly responsible for this debris. What will be done to ensure drain remains clear in the future? How will this be done given city regulations for protecting beavers? What is the feasibility of monitoring or modifying drains to improve drainage and allow the natural migration of fish (evidence of which is reported in the EIS) to continue?	N/A	This would be assessed and considered further at the detailed design phase, including considerations for regular or increased maintenance of the drain.
17	4c. Pg. 21 – There is description of sidewalks and boardwalks in PSW. It is suggested that using boardwalks could reduce disturbance to the wetlands. If the project moves forward, the PSW will be disturbed – this needs to be stated clearly. It should be stated – these will impact the wetlands. Also, the extent of disturbance is unclear and should be clarified.	N/A	Impacts to the PSW will be assessed further at the detailed design phase. Without detailed design, it's not possible to fully assess the extent or magnitude of effects. The report discusses removal and encroachment of the wetland and recommends relocating pathways outside of the PSW to minimize longer-term effects.
18	4d. Table 7 – PSW and significant valleyland – there should be a statement of how far this project will encroach into the PSW and significant valleylands.	N/A	As above, this would need to be determined at detailed design.
19	4e. Table 7 – Powell Drain Environmental Monitoring – the plan should be developed prior to detailed design. See 13.5.3 Identifying Monitoring Needs in the Natural Heritage Reference manual.	N/A	Monitoring would need to consider further stages of design, and therefore, be developed/implemented at detailed design.
20	5. Invasive Species: RECOMMENDATION: Pg. 21 and elsewhere – It is noted that there is Phragmites in this area. It is highly advised to remove the Phragmites prior to construction to avoid its spread. Ideally, removal would be coordinated with larger scale removal projects, to reduce spread and increase the efficacy of labour intensive invasive species removal projects (which would ultimately save money).	N/A	The report recommends removal prior to construction. Details on the logistics of removal would be subject to future operational considerations by the City of London.
21	6a. Mitigations (Table 7): RECOMMENDATION: All monitoring should include pre-construction, during construction and post-construction monitoring.	N/A	There are requirements for monitoring at pre-construction, during and post-construction stages depending on the feature to be monitored.
22	6b. Pg. 27, 29, 30 – Management and monitoring for Powell Drain and erosions and sediment inputs only include monitoring during and sometimes post construction – potential impact is to water quality and fish habitat – yet monitoring of these is not indicated and monitoring of construction is limited to building time – this is insufficient.	N/A	ESC monitoring will be undertaken during construction and until all disturbed areas have stabilized with sufficient cover. Water quality monitoring will also be undertaken during in-water work (Turbidity monitoring) to ensure the site is well contained. In addition, if required, fish salvage will be undertaken if site isolation measures are required to work in dry conditions.
23	6c. Pg. 29 – Recommend waiting until later in Nov for tree removals to ensure protection of bats, as many bat species, including endangered Myotis lucifugus, will not hibernate until Nov, especially in mild years (https://www.ontario.ca/page/little-brown-myotis).	N/A	MECP permits removal of trees between October 1 - March 31. Removal in winter is preferred, although it is permitted to remove as of October 1. Removal in winter is always preferred.
24	7a. General Comments: We raise four points for the consultant and the city to consider, not just with regard to this EIS, but with road widening and city development in general. Piecemeal Approach: First, we strongly urge the city to package EAs and EISs for EEPAC, so that the cumulative environmental impacts of multiple projects in a sub-catchment or catchment area can be considered. A piecemeal approach is occurring more and more frequently, where small projects are considered in isolation; this prevents a holistic consideration of the broader effects and mitigations of multiple overlapping projects. A good example is observed in this EIS The letter from the UTRCA suggests issues with the culvert, discusses watercourse alterations, new subdivisions NW of Adelaide, and new stormwater facilities that are all relevant to this project, yet we found no mentions of these in this EIS. There is presently a city project underway to deal with the lack of capacity in the culvert that crosses Sunningdale to the west of Adelaide. There should be coordination with this project and the Adelaide road widening. It is noted that the stormwater management features at the northwest corner of Adelaide and Sunningdale have already harmed the wetland adjacent to it. How can we accurately evaluate the present project without an understanding of these other issues and projects co-occurring in the same geographic area? RECOMMENDATION: EAs and EISs in areas where multiple projects are being done be considered together or at least some broader context be provided in each EA or EIS. Ideally, the same consultant should be retained to do the work.	N/A	Noted.

25	<p>7b. Lack of "Do Nothing Alternative": Second, the "do nothing alternative" should be considered as it provides the baseline from which to measure ecological impacts of other alternatives. Increasingly this seems to be left out of this EIS but is critical for a careful and thoughtful evaluation of other alternatives. It is also critical for meeting London Plan Policy 1396 (in force) which 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." In addition, Policy 1395 (in force) says "Infrastructure should not be located in the Natural Heritage System. When 1396 is viewed in the context of 1395 it is clear that when the expanded infrastructure has environmental costs, the "do nothing alternative" and a "green alternative" must be considered.</p> <p>RECOMMENDATION: The "do nothing" and "green" alternatives should be considered.</p>	N/A	As noted in response to item #13, the evaluation of Alternatives, including the "Do Nothing" scenario, will be documented in the overall Environmental Study Report (ESR) for the project.
26	<p>7c. Monitoring Plans Be Properly Developed: Third, monitoring planning is almost always done poorly in EAs. There is an excellent section describing adequate monitoring in the Natural Heritage Reference Manual (NHRM) under section 13.5 Impact Assessment process, yet monitoring described in EAs rarely meets these requirements.</p> <p>RECOMMENDATION: All monitoring plans, including for this project, should include the following:</p> <p>1) "Development of a monitoring program should begin with a clear set of goals and objectives against which to measure the monitoring results, and should specify a repository for the information. Also important is a contingency plan in the event that the results indicate that there are negative impacts on the features being monitored." NHRM, Pg. 128</p> <p>2) "Monitoring requires that baseline data be collected before development occurs using methods that can be replicated later. For example, methods for monitoring vegetation or wildlife should be based on published and widely accepted monitoring methods, which are most likely to be statistically robust. In some cases, long-term monitoring programs may be required, particularly for impacts on surface- or groundwater quality or quantity. Remedial steps are undertaken where the results of monitoring indicate that actual impacts are greater than predicted impacts." NHRM, Pg. 129</p>	N/A	Monitoring details would be developed further in the detailed design and implementation phase.
27	<p>7c. Climate Change and London: Although we realize EAs do not have to consider climate change, we think they should, particularly given that the city has declared a climate emergency. We have concerns regarding road widening as a means to solve traffic congestion. This seems to be becoming the common response to increased traffic from London's new developments. For example, the Adelaide North widening is presumably to help get people from lands developing north of Fanshawe to the downtown core, but we question how well this will work given the bottlenecks of traffic at Huron and Adelaide, and most notably at Adelaide and Oxford. In conjunction with road widening plans, there also needs to be the development of an improved rapid transit system and access to well thought out active transportation. Although bike lanes are part of this plan – bike lanes end on Adelaide at Kipp's Lane, and there is no safe cycling route from there. Road widening is also in direct conflict with consideration of the environment and climate change. Increasing the number of cars on the road will increase greenhouse gas emissions and pollution. As well, road widening uses land that provides green space in areas where green space is becoming increasingly limited.</p> <p>RECOMMENDATION: Road widening projects should consider public transport alternatives to reduce greenhouse gases and protect London's greenspaces. We would encourage the city to develop a framework for calculating the environmental costs of each road widening project.</p>	N/A	Noted.

Appendix D

Background Review

Definitions, Acronyms and Symbols

Global G-rank

- G1:** Critically Imperiled (at very high risk of extinction)
- G2:** Imperiled (at high risk of extinction)
- G3:** Vulnerable (at moderate risk of extinction)
- G4:** Apparently Secure (Uncommon but not rare)
- G5:** Secure (common, widespread and abundant)
- G#G#:** Range Rank (range of uncertainty about the status of a taxon or ecosystem type)
- GU:** Unrankable (currently unrankable due to lack of information)
- GNR:** Unranked (global rank not yet assessed)
- GNA:** Not Applicable (species is not a suitable target for conservation activities)
- T:** Denotes that the rank applies to a subspecies or variety
- B:** Breeding
- N:** Non-breeding

Provincial S-rank

- S1:** Critically Imperiled (i.e. fewer than 5 occurrences in the nation and/or province)
- S2:** Imperiled (i.e. fewer than 20 occurrences in the nation and/or province)
- S3:** Vulnerable (i.e. 20-80 occurrences in the nation and/or province)
- S4:** Apparently Secure (uncommon, but not rare in the nation and/or province)
- S5:** Secure (common, widespread and abundant in the nation and/or province)

- SNA:** Not Applicable (species is not a suitable target for conservation activities)
- SHB:** Breeding is not confirmed in Ontario

S#S#: Range Rank (range of uncertainty about the status of the species or community)

- S#?:** Rank is Uncertain
- S?:** Not Ranked Yet
- B:** Breeding migrants/vagrants
- N:** Non-breeding migrants/vagrants

Species of Conservation Concern (SoCC)

Species at Risk (SAR)

- COSEWIC:** Committee on the Status of Endangered Wildlife in Canada
- ESA:** Endangered Species Act
- SARA:** Species at Risk Act
- SARO:** Species at Risk in Ontario

SARA or ESA designagtion

- END** - Endangered
- THR** - Threatened
- SC** - Special Concern
- NAR** - Not at Risk

Provincial Conservation Priorities

- Recovery¹** - Species at Risk
- Increase¹** - Population in decline
- Maintain Current¹** - Appears to be stable or increasing

National Conservation Priorities

- High Concern^{2,3}** - Species population is known or thought to be declining
- Moderate Concern^{2,3}** - Species population is either a) declining with moderate threats or disturbance; b) stable with known potential threats and moderate to restricted distributions; or c) relatively small with relatively restricted distributions
- Not Currently At Risk^{2,3}** - All other species for which information was available

Footnotes

¹ Bird Conservation Strategy for Bird Conservation Region (BCR) 13 in Ontario Region: Lower Great Lakes/St. Lawrence Plain (Environment Canada 2014)

² Wings over Water: Canada's Waterbird Conservation Plan (Miko et al., 2003)

³ Canadian Shorebird Conservation Plan (Donaldson et al., 2000)

⁴ Oldham, Michael J. 2017. List of the Vascular Plants of Ontario's Carolinian Zone (Ecoregion 7E). Carolinian Canada and Ontario Ministry of Natural Resources and Forestry. Peterborough, ON. 132 pp.

Species		SAR Status		Conservation Rank and Rarity Status						ORAA	OBBA	NHIC		
Common Name	Scientific Name	National (SARA)	Provincial (SARO Lst, ESA)	National (COSEWIC)	Global (G-rank)	Provincial (S-rank)	Provincial Conservation Priorities ¹	National Conservation Priorities ^{2,3}	Regional Rank ⁴	17MH76	17MH76	17MH7865, 17MH7866, 17MH7964, 17MH7965, 17MH7966	MNRF (Aymer District)	Confirmed During Field Investigations
Raccoon	<i>Procyon lotor</i>				G5	S5								Y
Striped Skunk	<i>Mephitis mephitis</i>				G5	S5								Y
Tricolored Bat	<i>Perimyotis subflavus</i>	END, Schedule 1	END	END	G2G3	S3?							X	N
White-footed Mouse	<i>Peromyscus leucopus</i>				G5	S5								Y
White-tailed Deer	<i>Odocoileus virginianus</i>				G5	S5								Y
BIRDS														
American Bittern	<i>Botaurus lentiginosus</i>				G5	S4B	Assess/Maintain ¹				X			N
American Crow	<i>Corvus brachyrhynchos</i>				G5	S5B					X			Y
American Goldfinch	<i>Carduelis tristis</i>				G5	S5B					X			Y
American Kestrel	<i>Falco sparverius</i>				G5	S4	Maintain Current ¹				X			N
American Redstart	<i>Setophaga ruticilla</i>				G5	S5B					X			N
American Robin	<i>Turdus migratorius</i>				G5	S5B					X			Y
American Woodcock	<i>Scolopax minor</i>				G5	S4B	Increase ¹	High Concern ³			X			Y
Bald Eagle	<i>Haliaeetus leucocephalus</i>		SC		G5	S2N, S4B	Recovery Objective ¹							Y
Baltimore Oriole	<i>Icterus galbula</i>				G5	S4B	Maintain Current ¹				X			N
Barn Swallow	<i>Hirundo rustica</i>	THR, Schedule 1	THR	THR	G5	S4B	Recovery Objective ¹				X		X	Y
Belted Kingfisher	<i>Ceryle alcyon</i>				G5	S4B	Increase ¹				X			N
Black Tern	<i>Chlidonias niger</i>		SC		G4G5	S3B	Recovery Objective ¹	Moderate Concern ²			X		X	N
Black-and-white Warbler	<i>Mniotilta varia</i>				G5	S5B								Y
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>				G5	S5B	Increase ¹				X			N
Blackburnian Warbler	<i>Setophaga fusca</i>				G5	S5B					X			N
Black-capped Chickadee	<i>Poecile atricapilla</i>				G5	S5					X			Y
Blue Jay	<i>Cyanocitta cristata</i>				G5	S5					X			Y
Blue-gray Gnatcatcher	<i>Poliophtila caerulea</i>				G5	S4B					X			N
Blue-winged Warbler	<i>Vermivora pinus</i>				G5	S4B	Maintain Current ¹				X			N
Bobolink	<i>Dolichonyx oryzivorus</i>	THR, Schedule 1	THR	THR	G5	S4B	Recovery Objective ¹				X		X	N
Brown Creeper	<i>Certhia americana</i>				G5	S5B					X			N
Brown Thrasher	<i>Toxostoma rufum</i>				G5	S4B	Increase ¹				X			N
Brown-headed Cowbird	<i>Molothrus ater</i>				G5	S4B					X			Y
Canada Goose	<i>Branta canadensis</i>				G5	S5	Decrease ¹				X			Y
Canada Warbler	<i>Cardellina canadensis</i>	THR, Schedule 1	SC	THR	G5	S4B	Recovery Objective ¹				X			N
Carolina Wren	<i>Thryothorus ludovicianus</i>				G5	S4					X			N
Cedar Waxwing	<i>Bombycilla cedrorum</i>				G5	S5B					X			N
Chestnut-sided Warbler	<i>Setophaga pensylvanica</i>				G5	S5B					X			N
Chimney Swift	<i>Chaetura pelagica</i>	THR, Schedule 1	THR	THR	G4G5	S4B, S4N	Recovery Objective ¹				X			N
Chipping Sparrow	<i>Spizella passerina</i>				G5	S5B					X			Y
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>				G5	S4B					X			Y
Common Grackle	<i>Quiscalus quiscula</i>				G5	S5B					X			Y
Common Nighthawk	<i>Chordeiles minor</i>	THR, Schedule 1	SC	SC	G5	S4B	Recovery Objective ¹				X			N
Common Yellowthroat	<i>Geothlypis trichas</i>				G5	S5B					X			Y

Species		SAR Status		Conservation Rank and Rarity Status						ORAA	OBBA	NHIC		
Common Name	Scientific Name	National (SARA)	Provincial (SARO Lst, ESA)	National (COSEWIC)	Global (G-rank)	Provincial (S-rank)	Provincial Conservation Priorities ¹	National Conservation Priorities ^{2,3}	Regional Rank ⁴	17MH76	17MH76	17MH7865, 17MH7866, 17MH7964, 17MH7965, 17MH7966	MNRF (Aylmer District)	Confirmed During Field Investigations
Cooper's Hawk	<i>Accipiter cooperii</i>				G5	S4					X			N
Downy Woodpecker	<i>Picoides pubescens</i>				G5	S5					X			Y
Eastern Bluebird	<i>Sialia sialis</i>				G5	S5B					X			N
Eastern Kingbird	<i>Tyrannus tyrannus</i>				G5	S4B	Increase ¹				X			N
Eastern Meadowlark	<i>Stumella magna</i>	THR, Schedule 1	THR	THR	G5	S4B	Recovery Objective ¹				X		X	N
Eastern Phoebe	<i>Sayornis phoebe</i>				G5	S5B					X			N
Eastern Screech-Owl	<i>Megascops asio</i>				G5	S4					X			N
Eastern Towhee	<i>Pipilo erythrophthalmus</i>				G5	S4B	Increase ¹				X			N
Eastern Wood-Pewee	<i>Contopus virens</i>	SC, Schedule 1	SC	SC	G5	S4B	Increase ¹				X		X	N
European Starling	<i>Stumus vulgaris</i>				G5	SNA					X			Y
Field Sparrow	<i>Spizella pusilla</i>				G5	S4B	Increase ¹				X			N
Gray Catbird	<i>Dumetella carolinensis</i>				G5	S4B					X			N
Great Blue Heron	<i>Ardea herodias</i>				G5	S4	Maintain Current ¹				X			N
Great Crested Flycatcher	<i>Myiarchus crinitus</i>				G5	S4B					X			N
Great Horned Owl	<i>Bubo virginianus</i>				G5	S4					X			N
Green Heron	<i>Butorides virescens</i>				G5	S4B	Increase ¹				X			N
Hairy Woodpecker	<i>Picoides villosus</i>				G5	S5					X			Y
Horned Lark	<i>Eremophila alpestris</i>				G5	S5B					X			N
House Finch	<i>Carpodacus mexicanus</i>				G5	SNA					X			Y
House Sparrow	<i>Passer domesticus</i>				G5	SNA					X			Y
House Wren	<i>Troglodytes aedon</i>				G5	S5B					X			Y
Indigo Bunting	<i>Passerina cyanea</i>				G5	S4B					X			N
Killdeer	<i>Charadrius vociferus</i>				G5	S5B, S5N	Increase ¹	Moderate Concern ³			X			Y
Least Flycatcher	<i>Empidonax minimus</i>				G5	S4B					X			N
Long-eared Owl	<i>Asio otus</i>				G5	S4					X			N
Mallard	<i>Anas platyrhynchos</i>				G5	S5	Maintain Current ¹				X			Y
Marsh Wren	<i>Cistothorus palustris</i>				G5	S4B					X			N
Mourning Dove	<i>Zenaida macroura</i>				G5	S5					X			Y
Northern Bobwhite	<i>Colinus virginianus</i>	END, Schedule 1	END	END	G4G5	S1	Recovery Objective ¹				X			N
Northern Cardinal	<i>Cardinalis cardinalis</i>				G5	S5					X			Y
Northern Flicker	<i>Colaptes auratus</i>				G5	S4B	Increase ¹				X			Y
Northern Harrier	<i>Circus cyaneus</i>	NAR	NAR		G5	S4B	Maintain Current ¹				X			N
Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>				G5	S4B	Increase ¹				X			N
Northern Waterthrush	<i>Parlesia noveboracensis</i>				G5	S5B								Y
Orchard Oriole	<i>Icterus spurius</i>				G5	S4B					X			N
Osprey	<i>Pandion haliaetus</i>				G5	S5B								Y
Purple Martin	<i>Progne subis</i>				G5	S4B	Increase ¹				X			N
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>				G5	S4					X			N

Species		SAR Status		Conservation Rank and Rarity Status						ORAA	OBBA	NHIC		
Common Name	Scientific Name	National (SARA)	Provincial (SARO Lst, ESA)	National (COSEWIC)	Global (G-rank)	Provincial (S-rank)	Provincial Conservation Priorities ¹	National Conservation Priorities ^{2,3}	Regional Rank ⁴	17MH76	17MH76	17MH7865, 17MH7866, 17MH7964, 17MH7965, 17MH7966	MNRF (Aylmer District)	Confirmed During Field Investigations
Red-breasted Nuthatch	<i>Sitta canadensis</i>				G5	S5					X			N
Red-eyed Vireo	<i>Vireo olivaceus</i>				G5	S5B					X			N
Red-tailed Hawk	<i>Buteo jamaicensis</i>	NAR	NAR		G5	S5					X			Y
Red-winged Blackbird	<i>Agelaius phoeniceus</i>				G5	S4					X			Y
Ring-necked Pheasant	<i>Phasianus colchicus</i>				G5	SNA					X			N
Rock Pigeon	<i>Columba livia</i>				G5	SNA					X			Y
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>				G5	S4B	Maintain Current ¹				X			N
Ruby-throated Hummingbird	<i>Archilochus colubris</i>				G5	S5B					X			N
Ruffed Grouse	<i>Bonasa umbellus</i>				G5	S4					X			N
Savannah Sparrow	<i>Passerculus sandwichensis</i>				G5	S4B	Increase ¹				X			N
Scarlet Tanager	<i>Piranga olivacea</i>				G5	S4B					X			N
Sedge Wren	<i>Cistothorus platensis</i>				G5	S4B					X			N
Sharp-shinned Hawk	<i>Accipiter striatus</i>				G5	S5					X			N
Song Sparrow	<i>Melospiza melodia</i>				G5	S5B					X			Y
Sora	<i>Porzana carolina</i>				G5	S4B	Assess/Maintain ¹	Moderate Concern ²			X			N
Spotted Sandpiper	<i>Actitis macularia</i>				G5	S5	Increase ¹	Moderate Concern ³			X			N
Swainson's Thrush	<i>Catharus ustulatus</i>				G5	S4B					X			Y
Swamp Sparrow	<i>Melospiza georgiana</i>				G5	S5B					X			N
Tree Swallow	<i>Tachycineta bicolor</i>				G5	S4B					X			Y
Turkey Vulture	<i>Cathartes aura</i>				G5	S5B					X			Y
Veery	<i>Catharus fuscescens</i>				G5	S4B					X			N
Vesper Sparrow	<i>Poocetes gramineus</i>				G5	S4B	Increase ¹				X			N
Virginia Rail	<i>Rallus limicola</i>				G5	S5B	Maintain Current ¹	Moderate Concern ²			X			N
Warbling Vireo	<i>Vireo gilvus</i>				G5	S5B					X			N
White-breasted Nuthatch	<i>Sitta carolinensis</i>				G5	S5					X			N
White-throated Sparrow	<i>Zonotrichia albicollis</i>				G5	S5B					X			N
Wild Turkey	<i>Meleagris gallopava</i>				G5	S5					X			N
Willow Flycatcher	<i>Empidonax traillii</i>				G5	S5B	Maintain Current ¹				X			N
Winter Wren	<i>Troglodytes hiemalis</i>				G5	S5B					X			N
Wood Duck	<i>Aix sponsa</i>				G5	S5	Increase ¹				X			N
Wood Thrush	<i>Hylocichla mustelina</i>	THR, Schedule 1	SC	THR	G4	S4B	Maintain Current ¹				X		X	N
Yellow Warbler	<i>Dendroica petechia</i>				G5	S5B					X			Y
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>				G5	S5B					X			N
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>				G5	S4B					X			N
INSECTS														
Monarch	<i>Danaus plexippus</i>	SC, Schedule 1	SC	END	G4	S2N, S4B			R				X	Y
PLANTS														
False-rue Anemone	<i>Enemion biternatum</i>	THR, Schedule 1	THR	THR	G5	S2						X		N

Appendix E

Species Lists
Field Notes

Definitions, Acronyms and Symbols

Global G-rank

- G1:** Critically Imperiled (at very high risk of extinction)
- G2:** Imperiled (at high risk of extinction)
- G3:** Vulnerable (at moderate risk of extinction)
- G4:** Apparently Secure (Uncommon but not rare)
- G5:** Secure (common, widespread and abundant)
- G#G#:** Range Rank (range of uncertainty about the status of a taxon or ecosystem type)
- GU:** Unrankable (currently unrankable due to lack of information)
- GNR:** Unranked (global rank not yet assessed)
- GNA:** Not Applicable (species is not a suitable target for conservation activities)
- T:** Denotes that the rank applies to a subspecies or variety
- B:** Breeding
- N:** Non-breeding

Provincial S-rank

- S1:** Critically Imperiled (i.e. fewer than 5 occurrences in the nation and/or province)
- S2:** Imperiled (i.e. fewer than 20 occurrences in the nation and/or province)
- S3:** Vulnerable (i.e. 20-80 occurrences in the nation and/or province)
- S4:** Apparently Secure (uncommon, but not rare in the nation and/or province)
- S5:** Secure (common, widespread and abundant in the nation and/or province)
- SNA:** Not Applicable (species is not a suitable target for conservation activities)
- SHB:** Breeding is not confirmed in Ontario
- S#S#:** Range Rank (range of uncertainty about the status of the species or community)
- S#?:** Rank is Uncertain
- S?:** Not Ranked Yet
- B:** Breeding migrants/vagrants
- N:** Non-breeding migrants/vagrants

Provincial Conservation Priorities

- Recovery¹** - Species at Risk
- Increase¹** - Population in decline
- Maintain Current¹** - Appears to be stable or increasing

National Conservation Priorities

- High Concern^{2,3}** - Species population is known or thought to be declining
- Moderate Concern^{2,3}** - Species population is either a) declining with moderate threats or disturbance; b) stable with known potential threats and moderate to restricted distributions; or c) relatively small with relatively restricted distributions
- Not Currently At Risk^{2,3}** - All other species for which information was available

Footnotes

¹ Oldham, Michael J. 2017. List of the Vascular Plants of Ontario's Carolinian Zone (Ecoregion 7E). Carolinian Canada and Ontario Ministry of Natural Resources and Forestry. Peterborough, ON. 132 pp.

Species of Conservation Concern (SoCC)

Species at Risk (SAR)

COSEWIC: Committee on the Status of Endangered Wildlife in Canada

ESA: Endangered Species Act

SARA: Species at Risk Act

SARO: Species at Risk in Ontario

SARA or ESA designagtion

- END** - Endangered
- THR** - Threatened
- SC** - Special Concern
- NAR** - Not at Risk

Regional Rank

- I:** Introduced
- C:** Common
- U:** Uncommon
- R:** Rare

Table E-1: Vegetation Documented within the Study Area

Species		At-Risk Status		Conservation Rank and Rarity Status				Floristic Quality Assessment		
Scientific Name	Common Name	National (SARA)	Provincial (SARO List, ESA)	National (COSEWIC)	Global (G-rank)	Provincial (S-rank)	Regional Rank ¹	Native/Introduced Status	Coefficient Conservatism (CC)	Coefficient of Wetness (CW)
Adoxaceae - Moschatel Family										
<i>Sambucus racemosa</i>	Red Elderberry				G5	S5	X	N	5	3
Allismataceae - Water-plantain Family										
<i>Alisma subcordatum</i>	Southern Water-plantain				G5	S4?	X	N	1	-5
Anacardiaceae - Cashew Family										
<i>Rhus typhina</i>	Staghorn Sumac				G5	S5	C	N	1	3
Apiaceae - Carrot Family										
<i>Daucus carota</i>	Wild Carrot				GNR	SNA/SE5	IC	I		5
<i>Heracleum maximum</i>	Cow-parsnip				G5	S5	X	N	3	-3
Apocynaceae - Milkweed Family										
<i>Apocynum androsaemifolium</i>	Spreading Dogbane				G5	S5	C	N	3	5
<i>Asclepias incarnata</i>	Swamp Milkweed				G5	S5	C	N	6	-5
<i>Asclepias syriaca</i>	Common Milkweed				G5	S5	C	N	0	5
Araceae - Arum Family										
<i>Symplocarpus foetidus</i>	Skunk Cabbage				G5	S5	C	N	7	-5
Asteraceae - Aster Family										
<i>Achillea filipendulina</i>	Fern-leaved Yarrow				GNR	SNA/SE5		I		
<i>Achillea millefolium</i>	Common Yarrow				G5	SNA/SE5		I		
<i>Ambrosia artemisiifolia</i>	Annual Ragweed				G5	S5	C	N	0	3
<i>Arctium minus</i>	Common Burdock				GNR	SNA/SE5	IC	I		
<i>Centaurea stoebe</i>	Spotted Knapweed				GNR	SNA/SE5	IX	I		
<i>Cichorium intybus</i>	Chicory				GNR	SNA/SE5	IC	I		5
<i>Cirsium arvense</i>	Canada Thistle				GNR	SNA/SE5	IC	I		3
<i>Cirsium vulgare</i>	Bull Thistle				G5	SNA/SE5	IX	I		3
<i>Erigeron annuus</i>	Annual Fleabane				G5	S5	C	N	0	3
<i>Erigeron philadelphicus</i>	Philadelphia Fleabane					S5	C	N	1	-3
<i>Eupatorium perfoliatum</i>	Common Boneset				G5	S5	C	N	2	-3
<i>Euthamia graminifolia</i>	Grass-leaved Goldenrod				G5	S5	C	N	2	0
<i>Eutrochium maculatum var. maculatum</i>	Spotted Joe Pye Weed				G5T5	S5	C	N	3	-5

Species		At-Risk Status		Conservation Rank and Rarity Status				Floristic Quality Assessment		
Scientific Name	Common Name	National (SARA)	Provincial (SARO List, ESA)	National (COSEWIC)	Global (G-rank)	Provincial (S-rank)	Regional Rank ¹	Native/Introduced Status	Coefficient Conservatism (CC)	Coefficient of Wetness (CW)
<i>Leucanthemum vulgare</i>	Oxeye Daisy				GNR	SNA/SE5	IC	I		5
<i>Solidago altissima</i> var. <i>altissima</i>	Eastern Tall Goldenrod				GNR	S5	U	N	1	3
<i>Solidago canadensis</i> var. <i>canadensis</i>	Canada Goldenrod				G5T5	S5	X	N	1	3
<i>Solidago</i> spp										
<i>Sonchus arvensis</i> ssp. <i>arvensis</i>	Glandular Field Sow-thistle				GNRTNR	SNA/SE5	IX	I		3
<i>Sonchus asper</i>	Prickly Sow-thistle				GNR	SNA/SE5	IX	I		
<i>Symphotrichum lanceolatum</i> var. <i>lanceolatum</i>	White Panicked Aster				G5T5	S5	C	N	3	-3
<i>Symphotrichum novae-angliae</i>	New England Aster				G5	S5	C	N	2	-3
<i>Symphotrichum puniceum</i>	Swamp Aster				G5	S5	X	N	6	-5
<i>Symphotrichum</i> Sp.										
<i>Taraxacum officinale</i>	Common Dandelion				G5	SNA/SE5	IC	I		5
<i>Tragopogon dubius</i>	Yellow Goat's-beard				GNR	SNA/SE5	IX	I		5
<i>Tussilago farfara</i>	Coltsfoot				GNR	SNA/SE5	IC	I		3
Balsaminaceae - Balsam Family										
<i>Impatiens capensis</i>	Spotted Jewelweed				G5	S5	C	N	4	-3
<i>Impatiens balsamina</i>	Garden Jewelweed				G5	S5		N		
Betulaceae - Birch Family										
<i>Corylus</i> spp										
Brassicaceae - Mustard Family										
<i>Alliaria petiolata</i>	Garlic Mustard				GNR	SNA/SE5	IC	I		
<i>Hesperis matronalis</i>	Dame's Rocket				G4G5	SNA/SE5	IX	I		3
<i>Lepidium virginicum</i>	Poor-man's Peppergrass				G5	S5	R	N	0	3
Caprifoliaceae - Honeysuckle Family										
<i>Lonicera tatarica</i>	Tartarian Honeysuckle				GNR	SNA/SE5	IX	I		
<i>Lonicera x bella</i>	(<i>Lonicera morrowii</i> X <i>Lonicera tatarica</i>)				GNA	SNA/SE4		I		
<i>Viburnum lentago</i>	Nannyberry				G5	S5	C	N	4	0
<i>Viburnum opulus</i> ssp. <i>opulus</i>	Cranberry Viburnum				GNR	SNA/SE3?	IR	I		
Caryophyllaceae - Pink Family										
<i>Cerastium fontanum</i>	Common Mouse-ear Chickweed				GNR	SNA/SE5	IC	I		3

Species		At-Risk Status		Conservation Rank and Rarity Status				Floristic Quality Assessment		
Scientific Name	Common Name	National (SARA)	Provincial (SARO List, ESA)	National (COSEWIC)	Global (G-rank)	Provincial (S-rank)	Regional Rank ¹	Native/Introduced Status	Coefficient Conservatism (CC)	Coefficient of Wetness (CW)
<i>Silene vulgaris</i>	Bladder Campion				GNR	SNA/SE5	IX	I		5
Convolvulaceae - Bindweed Family										
<i>Calystegia sepium ssp. americana</i>	American False Bindweed				G5T5	S5	X	N	2	0
Cucurbitaceae - Cucumber Family										
<i>Echinocystis lobata</i>	Wild Mock-cucumber				G5	S5	X	N	3	-3
Comaceae - Dogwood Family										
<i>Cornus racemosa</i>	Grey Dogwood				G5	S5	X	N	2	0
<i>Cornus sericea</i>	Red-osier Dogwood				G5	S5	C	N	2	-3
Clusiaceae - St. Johnswort Family										
<i>Hypericum perforatum</i>	Common St. John's-wort				GNR	SNA/SE5	IC	I		
Cyperaceae - Sedge Family										
<i>Carex granularis</i>	Limestone Meadow Sedge				G5	S5	C	N	3	-3
<i>Carex lacustris</i>	Lake Sedge				G5	S5	C	N	5	-5
<i>Carex stipata</i>	Awl-fruited Sedge				G5	S5	C	N	3	-5
<i>Carex vulpinoidea</i>	Fox Sedge				G5	S5	C	N	3	-5
<i>Eleocharis erythropoda</i>	Red-stemmed Spikerush				G5	S5	C	N	4	-5
<i>Schoenoplectus tabernaemontani</i>	Soft-stemmed Bulrush				G5	S5	C	N	5	-5
<i>Scirpus atrovirens</i>	Dark-green Bulrush				G5?	S5	C	N	3	-5
<i>Scirpus pendulus</i>	Rufous Bulrush				G5	S5	C	N	3	-5
Dipsacaceae - Teasel Family										
<i>Dipsacus fullonum</i>	Fuller's Teasel				GNR	SNA/SE5	IC	I		3
Equisetaceae - Horsetail Family										
<i>Equisetum arvense</i>	Field Horsetail				G5	S5	C	N	0	0
Elaeagnaceae - Oleaster Family										
<i>Elaeagnus angustifolia</i>	Russian Olive				GNR	SNA/SE3	IR	I		
Fabaceae - Bean Family										
<i>Lotus corniculatus</i>	Bird's-foot Trefoil				GNR	SNA/SE5	IX	I		3
<i>Medicago lupulina</i>	Black Medick				GNR	SNA/SE5	IC	I		3
<i>Melilotus albus</i>	White Sweet-clover				G5	SNA/SE5	IC	I		
<i>Melilotus officinalis</i>	Yellow Sweet-clover				GNR	SNA/SE5	IC	I		3

Species		At-Risk Status		Conservation Rank and Rarity Status				Floristic Quality Assessment		
Scientific Name	Common Name	National (SARA)	Provincial (SARO List, ESA)	National (COSEWIC)	Global (G-rank)	Provincial (S-rank)	Regional Rank ¹	Native/Introduced Status	Coefficient Conservatism (CC)	Coefficient of Wetness (CW)
<i>Robinia pseudoacacia</i>	Black Locust				GNR	SNA/SE5	IC	I		3
<i>Securigera varia</i>	Common Crown-vetch				GNR	SNA/SE5	IX	I		5
<i>Trifolium pratense</i>	Red Clover				GNR	SNA/SE5	IX	I		2
<i>Trifolium repens</i>	White Clover				GNR	SNA/SE5	IX	I		2
<i>Vicia cracca</i>	Tufted Vetch				GNR	SNA/SE5	IX	I		5
Fagaceae - Oak and Beech Family										
<i>Quercus macrocarpa</i>	Bur Oak				G5	S5	C	N	5	3
Juglandaceae - Walnut Family										
<i>Carya cordiformis</i>	Bitternut Hickory				G5	S5	X	N	6	0
<i>Juglans nigra</i>	Black Walnut				G5	S4?	X	N	5	3
Juncaceae - Rush Family										
<i>Juncus dudleyi</i>	Dudley's Rush				G5	S5	C	N	1	-3
<i>Juncus tenuis</i>	Path Rush				G5	S5	X	N	0	0
Lamiaceae - Mint Family										
<i>Glechoma hederacea</i>	Ground Ivy				GNR	SNA/SE5	IX	I		
<i>Leonurus cardiaca</i>	Common Motherwort				GNR	SNA/SE5	IC	I		
<i>Monarda fistulosa var. fistulosa</i>	Wild Bergamot				G5T5?	SU	C	N	6	3
<i>Nepeta cataria</i>	Catnip				GNR	SNA/SE5	IC	I		3
<i>Prunella vulgaris ssp. vulgaris</i>	Common Self-heal				G5T3	SNA/SE3		I		0
Lemnaceae - Duckweed Family										
<i>Lemna minor</i>	Lesser Duckweed				G5	S5	X	N	5	-5
Lythraceae - Loosestrife Family										
<i>Lythrum salicaria</i>	Purple Loosestrife				G5	SNA/SE5	IC	I		-5
Oleaceae - Olive Family										
<i>Fraxinus americana</i>	White Ash				G5	S4	C	N	4	3
Onagraceae - Willowherb Family										
<i>Oenothera biennis</i>	Common Evening Primrose				G5	S5	X	N	0	3
Orchidaceae - Orchid Family										
<i>Epipactis helleborine</i>	Eastern Helleborine				GNR	SNA/SE5	IX	I		
<i>Oxalis stricta</i>	Upright Yellow Wood-sorrel				G5	S5	X	N	0	3

Species		At-Risk Status		Conservation Rank and Rarity Status				Floristic Quality Assessment		
Scientific Name	Common Name	National (SARA)	Provincial (SARO List, ESA)	National (COSEWIC)	Global (G-rank)	Provincial (S-rank)	Regional Rank ¹	Native/Introduced Status	Coefficient Conservatism (CC)	Coefficient of Wetness (CW)
Pinaceae - Pine Family										
<i>Pinus strobus</i>	Eastern White Pine				G5	S5	X	N	4	3
Plantaginaceae - Plantain Family										
<i>Plantago lanceolata</i>	English Plantain				G5	SNA/SE5	IC	I		
<i>Plantago major</i>	Common Plantain				G5	SNA/SE5	IC	I		-1
<i>Plantago rugelii</i>	Rugel's Plantain				G5	S5	C	N	1	0
Poaceae - Grass Family										
<i>Bromus inermis</i>	Smooth Brome				G4G5	SNA/SE5	IC	I		5
<i>Dactylis glomerata</i>	Orchard Grass				GNR	SNA/SE5	IC	I		3
<i>Elymus repens</i>	Creeping Wildrye				GNR	SNA/SE5	IC	I		3
<i>Festuca rubra</i>	Red Fescue				G5	S5	IX	N		3
<i>Hordeum jubatum ssp. jubatum</i>	Foxtail Barley				G5T5	S5?	IX	N	0	0
<i>Lolium perenne</i>	Perennial Ryegrass				GNR	SNA/SE4	IX	I		3
<i>Phalaris arundinacea</i>	Reed Canary Grass				G5	S5	X	N	0	-3
<i>Phleum pratense</i>	Common Timothy				GNR	SNA/SE5	IC	I		
<i>Phragmites australis ssp. australis</i>	European Common Reed				G5T5	SNA/SE5	IC	I		-3
<i>Poa annua</i>	Annual Bluegrass				GNR	SNA/SE5	IC	I		
<i>Poa compressa</i>	Canada Bluegrass				GNR	SNA/SE5	IX	I		3
<i>Poa palustris</i>	Marsh Bluegrass				G5	S4	X	N	5	-3
<i>Poa spp</i>										
Polygonaceae - Knotweed Family										
<i>Persicaria maculosa</i>	Spotted Lady's-thumb				G5	SNA/SE5	IX	I		-5
<i>Rumex crispus</i>	Curled Dock				GNR	SNA/SE5	IC	I		-1
Pontamogetonaceae - Pondweed Family										
<i>Potamogeton crispus</i>	Curly-leaved Pondweed				GNR	SNA/SE5	IX	I		-5
Primulaceae - Primrose Family										
<i>Lysimachia arvensis</i>	Scarlet Pimpernel				GNR	SNA/SE4	IR	I		
Ranunculaceae - Buttercup Family										
<i>Ranunculus acris</i>	Tall Buttercup				G5	SNA/SE5	IC	I		
<i>Anemonastrum canadense</i>	Canada Anemone				G5	S5	C	N	3	-3

Species		At-Risk Status		Conservation Rank and Rarity Status				Floristic Quality Assessment		
Scientific Name	Common Name	National (SARA)	Provincial (SARO List, ESA)	National (COSEWIC)	Global (G-rank)	Provincial (S-rank)	Regional Rank ¹	Native/Introduced Status	Coefficient Conservatism (CC)	Coefficient of Wetness (CW)
<i>Ranunculus recurvatus</i>	Hooked Buttercup				G5	S5	X	N	4	-3
Rhamnaceae - Buckthorn Family										
<i>Frangula alnus</i>	Glossy Buckthorn				GNR	SNA/SE5	IU	I		
<i>Rhamnus cathartica</i>	Common Buckthorn				GNR	SNA/SE5	IC	I		
Rosaceae - Rose Family										
<i>Agrimonia striata</i>	Woodland Agrimony				G5	S4		N	3	3
<i>Fragaria vesca ssp. vesca</i>	Woodland Strawberry				G5T4T5	SNA/SE	X	I		
<i>Fragaria virginiana ssp. virginiana</i>	Wild Strawberry				G5T5	SU	C	N	2	3
<i>Potentilla norvegica</i>	Norwegian Cinquefoil				G5	S5	X	N	0	0
<i>Potentilla recta</i>	Sulphur Cinquefoil				GNR	SNA/SE5	IX	I		
<i>Prunus virginiana</i>	Choke Cherry				G5	S5	C	N	2	3
<i>Rubus idaeus ssp. idaeus</i>	Common Red Raspberry				G5T5	SNA/SE1		I		3
Rubiaceae - Bedstraw Family										
<i>Galium odoratum</i>	Sweet Bedstraw				GNR	SNA/SE1	IR	I		
Salicaceae - Willow Family										
<i>Populus deltoides ssp. deltoides</i>	Eastern Cottonwood				G5T5	S5	X	N	4	0
<i>Populus grandidentata</i>	Large-toothed Aspen				G5	S5	X	N	5	5
<i>Salix alba</i>	White Willow				G5	SNA/SE4	IX	I		-3
<i>Salix eriocephala</i>	Heart-leaved Willow				G5	S5	X	N	4	-3
<i>Salix petiolaris</i>	Meadow Willow				G5	S5	X	N	3	-3
Sapindaceae - Soapberry Family										
<i>Acer negundo</i>	Manitoba Maple				G5	S5	C	N	0	0
<i>Acer platanoides</i>	Norway Maple				GNR	SNA/SE5	IU	I		5
<i>Acer rubrum</i>	Red Maple				G5	S5	C	N	4	0
<i>Acer saccharinum</i>	Silver Maple				G5	S5	C	N	5	-3
<i>Acer saccharum</i>	Sugar Maple				G5	S5	C	N	4	3
<i>Acer x freemanii</i>	(<i>Acer rubrum</i> X <i>Acer saccharinum</i>)				GNA	SNA/SE5		I		
Scrophulariaceae - Figwort Family										
<i>Penstemon digitalis</i>	Foxglove Beardtongue				G5	S4	X	N	6	0

Species		At-Risk Status		Conservation Rank and Rarity Status				Floristic Quality Assessment		
Scientific Name	Common Name	National (SARA)	Provincial (SARO List, ESA)	National (COSEWIC)	Global (G-rank)	Provincial (S-rank)	Regional Rank ¹	Native/Introduced Status	Coefficient of Conservatism (CC)	Coefficient of Wetness (CW)
<i>Verbascum thapsus</i>	Common Mullein				GNR	SNA/SE5	IC	I		5
Solanaceae - Nightshade Family										
<i>Solanum dulcamara</i>	Climbing Nightshade				GNR	SNA/SE5	IC	I		0
Tiliaceae - Mallow Family										
<i>Tilia americana</i>	American Basswood				G5	S5	C	N	4	3
Typhaceae - Cattail Family										
<i>Typha angustifolia</i>	Narrow-leaved Cattail				G5	SNA/SE5	IX	I	3	-5
Ulmaceae - Elm Family										
<i>Ulmus americana</i>	American Elm				G5	S5	C	N	3	-3
Urticaceae - Nettle Family										
<i>Boehmeria cylindrica</i>	False Nettle				G5	S5	X	N	4	-5
Vitaceae - Grape Family										
<i>Parthenocissus quinquefolia</i>	Virginia Creeper				G5	S4?	X	N	6	3
<i>Vitis riparia</i>	Riverbank Grape				G5	S5	C	N	0	0

FLORISTIC QUALITY ASSESSMENT	
Families: n=48	Coefficient of Conservatism
Total Species: n=139	Mean CC: 2.8
Native Species: n=72 (52%)	
Introduced Species: n=68 (48%)	

Table E-2: Wildlife Documented within the Study Area

Species		SAR Status		Conservation Rank and Rarity Status					Confirmed During Field Investigations
Common Name	Scientific Name	National (SARA)	Provincial (SARO List, ESA)	National (COSEWIC)	Global (G-rank)	Provincial (S-rank)	Provincial Conservation Priorities ¹	National Conservation Priorities ^{2,3}	
AMPHIBIANS									
American Toad	<i>Bufo americanus</i>				G5	S5			Y
Green Frog	<i>Rana clamitans</i>				G5	S5			Y
Northern Leopard Frog	<i>Rana pipiens</i>				G5	S5			Y
Spring Peeper	<i>Pseudacris crucifer</i>				G5	S5			Y
Western Chorus Frog (Carolinian population)	<i>Pseudacris triseriata</i>				G5TNR	S4			Y
Wood Frog	<i>Rana sylvatica</i>				G5	S5			Y
REPTILES									
Dekay's Brownsnake	<i>Storeria dekayi</i>				G5	S5			Y
Eastern Gartersnake	<i>Thamnophis sirtalis</i>				G5T5	S5			Y
Snapping Turtle	<i>Chelydra serpentina</i>	SC, Schedule 1	SC	SC	G5	S3			Y
MAMMALS									
Beaver	<i>Castor canadensis</i>				G5	S5			Y
Eastern Cottontail	<i>Sylvilagus floridanus</i>				G5	S5			Y
Meadow Vole	<i>Microtus pennsylvanicus</i>				G5	S5			Y
Mink	<i>Mustela vison</i>				G5	S4			Y
Muskrat	<i>Ondatra zibethicus</i>				G5	S5			Y
Porcupine	<i>Erethizon dorsatum</i>				G5	S5			Y
Raccoon	<i>Procyon lotor</i>				G5	S5			Y
Striped Skunk	<i>Mephitis mephitis</i>				G5	S5			Y
White-footed Mouse	<i>Peromyscus leucopus</i>				G5	S5			Y
White-tailed Deer	<i>Odocoileus virginianus</i>				G5	S5			Y
BIRDS									
American Crow	<i>Corvus brachyrhynchos</i>				G5	S5B			Y
American Goldfinch	<i>Carduelis tristis</i>				G5	S5B			Y
American Robin	<i>Turdus migratorius</i>				G5	S5B			Y
American Woodcock	<i>Scolopax minor</i>				G5	S4B	Increase ¹	High Concern ³	Y
Bald Eagle	<i>Haliaeetus leucocephalus</i>		SC		G5	S2N, S4B	Recovery Objective ¹		Y
Barn Swallow	<i>Hirundo rustica</i>	THR, Schedule 1	THR	THR	G5	S4B	Recovery Objective ¹		Y
Black-and-white Warbler	<i>Mniotilta varia</i>				G5	S5B			Y
Black-capped Chickadee	<i>Poecile atricapilla</i>				G5	S5			Y
Blue Jay	<i>Cyanocitta cristata</i>				G5	S5			Y
Brown-headed Cowbird	<i>Molothrus ater</i>				G5	S4B			Y
Canada Goose	<i>Branta canadensis</i>				G5	S5	Decrease ¹		Y

Species		SAR Status		Conservation Rank and Rarity Status					Confirmed During Field Investigations
Common Name	Scientific Name	National (SARA)	Provincial (SARO List, ESA)	National (COSEWIC)	Global (G-rank)	Provincial (S-rank)	Provincial Conservation Priorities ¹	National Conservation Priorities ^{2,3}	
Chipping Sparrow	<i>Spizella passerina</i>				G5	S5B			Y
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>				G5	S4B			Y
Common Grackle	<i>Quiscalus quiscula</i>				G5	S5B			Y
Common Yellowthroat	<i>Geothlypis trichas</i>				G5	S5B			Y
Downy Woodpecker	<i>Picoides pubescens</i>				G5	S5			Y
European Starling	<i>Sturnus vulgaris</i>				G5	SNA			Y
Hairy Woodpecker	<i>Picoides villosus</i>				G5	S5			Y
House Finch	<i>Carpodacus mexicanus</i>				G5	SNA			Y
House Sparrow	<i>Passer domesticus</i>				G5	SNA			Y
House Wren	<i>Troglodytes aedon</i>				G5	S5B			Y
Killdeer	<i>Charadrius vociferus</i>				G5	S5B, S5N	Increase ¹	Moderate Concern ³	Y
Mallard	<i>Anas platyrhynchos</i>				G5	S5	Maintain Current ¹		Y
Mourning Dove	<i>Zenaidura macroura</i>				G5	S5			Y
Northern Cardinal	<i>Cardinalis cardinalis</i>				G5	S5			Y
Northern Flicker	<i>Colaptes auratus</i>				G5	S4B	Increase ¹		Y
Northern Waterthrush	<i>Parkesia noveboracensis</i>				G5	S5B			Y
Osprey	<i>Pandion haliaetus</i>				G5	S5B			Y
Red-tailed Hawk	<i>Buteo jamaicensis</i>	NAR	NAR		G5	S5			Y
Red-winged Blackbird	<i>Agelaius phoeniceus</i>				G5	S4			Y
Rock Pigeon	<i>Columba livia</i>				G5	SNA			Y
Song Sparrow	<i>Melospiza melodia</i>				G5	S5B			Y
Swainson's Thrush	<i>Catharus ustulatus</i>				G5	S4B			Y
Tree Swallow	<i>Tachycineta bicolor</i>				G5	S4B			Y
Turkey Vulture	<i>Cathartes aura</i>				G5	S5B			Y
Yellow Warbler	<i>Dendroica petechia</i>				G5	S5B			Y
INSECTS									
Monarch	<i>Danaus plexippus</i>	SC, Schedule 1	SC	END	G4	S2N, S4B			Y

Anuran Call Count Study – Fixed Point Observation Datasheet

Project Name: Adelaide St. North Project #: 476 793 Surveyor(s): KV, MD
 Station #: A1-S GPS Unit ID: 43.091116, -81.258274
 Date: 08/04/2019 Start time: 21:30 End time: 21:35
 Temp (°C): 62 Beaufort Wind Speed: 6 Wind Dir: E Cloud Cover (%): 70 Precipitation (mm): 0

Habitat Description:

- wide open grassy MAM
 - public park
 - Residential close by
- Incidental Wildlife:

Comments (other noises):

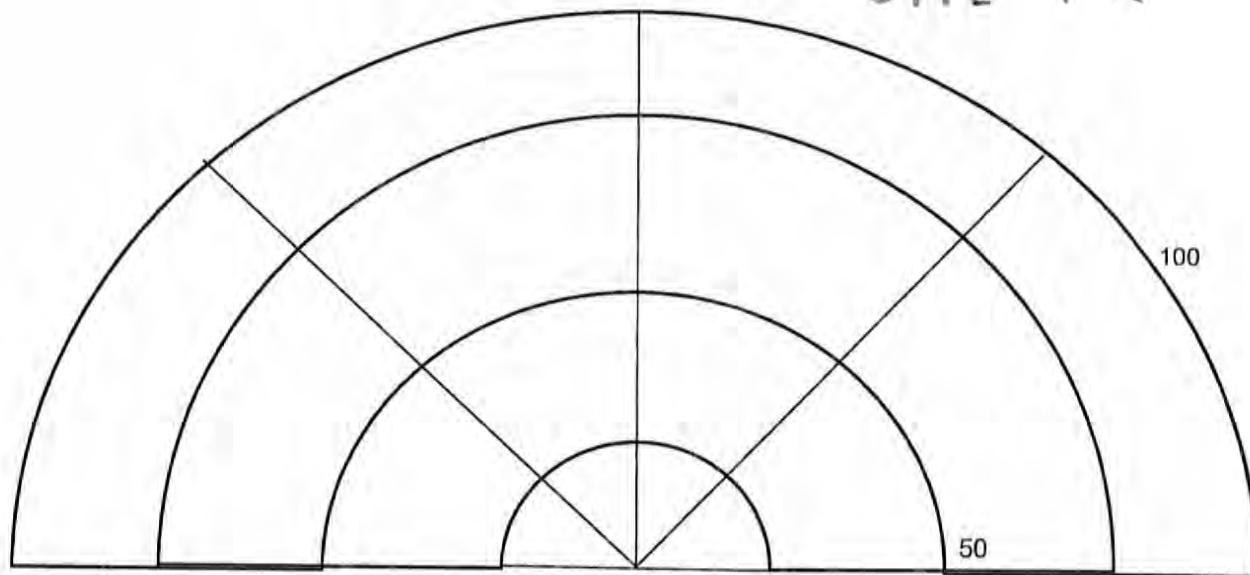
- Busy street

Species	From Observer						Abundance (FC=Full Chorus)		
	A (0<100 m)		B (>100m)		C (both)		A	B	C
AMTO	1	2	3	1	2	3	1	2	3
BCFR	1	2	3	1	2	3			
BULL	1	2	3	1	2	3			
WCFR	1	2	3	1	2	3			
GRTF	1	2	3	1	2	3			
FOTO	1	2	3	1	2	3			
GRFR	1	2	3	1	2	3			
MIFR	1	2	3	1	2	3			
NLFR	1	2	3	1	2	3			
PIFR	1	2	3	1	2	3			
SPPE	1	2	3	①	2	3		2	
WOFO	1	2	3	1	2	3			

From Observer:	A	Inside 100 m	Call Levels:	1	Individuals do not overlap, can be counted	Abundance	Any #	Individuals if counted or
		B		Outside 100 m	2			
	C	Both Inside and Outside 100 m	3	Full chorus, not abundance estimate				

Heading: W

SPPE-1-2



Anuran Call Count Study – Fixed Point Observation Datasheet

Project Name: Adelaide Street North Project #: 476 743 Surveyor(s): KV, MD
 Station #: ACT-N GPS Unit ID: 43.041146, -81.258017
 Date: 03/04/2019 Start time: 21:38 End time: 21:42
 Temp (°C): 6°C Beaufort Wind Speed: 6 Wind Dir: E Cloud Cover (%): 70 Precipitation (mm): 0

Habitat Description:

- large phrag MAM
 - Residential area

Incidental Wildlife:

Comments (other noises):

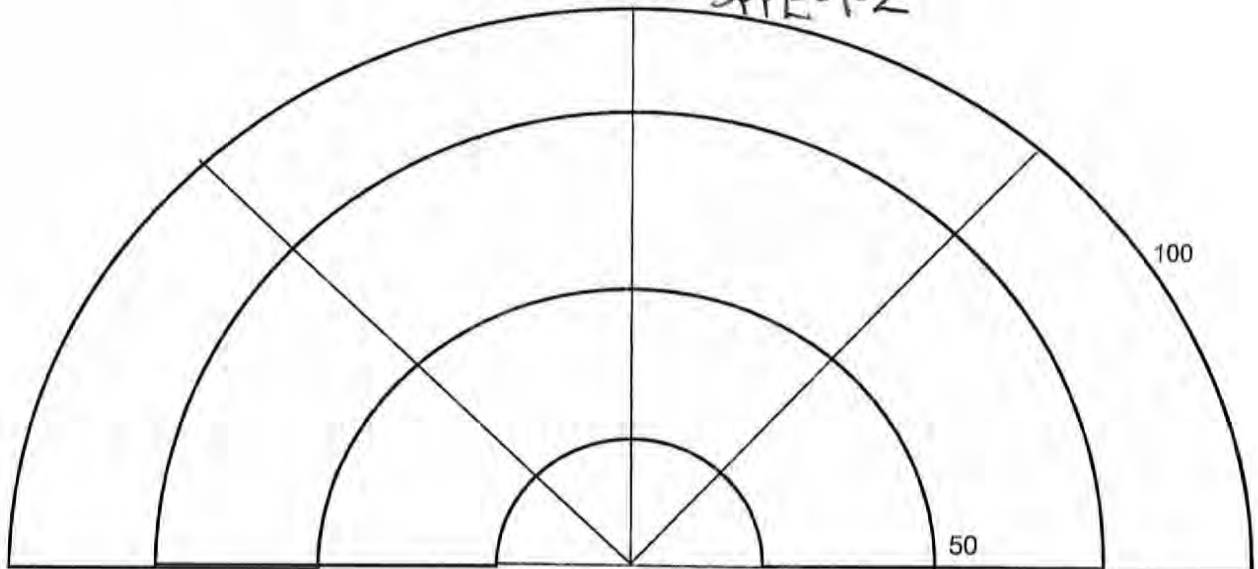
- loud busy street

Species	From Observer									Abundance (FC=Full Chorus)		
	A (0<100 m)			B (>100m)			C (both)			A	B	C
AMTO	1	2	3	1	2	3	1	2	3			
BCFR	1	2	3	1	2	3	1	2	3			
BULL	1	2	3	1	2	3	1	2	3			
WCFR	1	2	3	1	2	3	1	2	3			
GRTF	1	2	3	1	2	3	1	2	3			
FOTO	1	2	3	1	2	3	1	2	3			
GRFR	1	2	3	1	2	3	1	2	3			
MIFR	1	2	3	1	2	3	1	2	3			
NLFR	1	2	3	1	2	3	1	2	3			
PIFR	1	2	3	1	2	3	1	2	3			
SPPE	1	2	3	①	2	3	1	2	3		2	
WOFO	1	2	3	1	2	3	1	2	3			

From Observer:	A	Inside 100 m	Call Levels:	1	Individuals do not overlap, can be counted	Abundance	Any #	Individuals if counted or
		B		Outside 100 m	2			
	C	Both Inside and Outside 100 m	3	Full chorus, not abundance estimate				

Heading: E

SPPE-1-2



Anuran Call Count Study – Fixed Point Observation Datasheet

Project Name: Adelaide St. N. Project #: 476793 Surveyor(s): SV, MD
 Station #: A12 GPS Unit ID: 43.046982, -81.259219
 Date: 08/04/2019 Start time: 21:15 End time: 21:20
 Temp (°C): 7.2 Beaufort Wind Speed: 6 Wind Dir: E Cloud Cover (%): 70 Precipitation (mm): 0

Habitat Description:

- Ditch with phrag
 - next to development,
 resident ind

Incidental Wildlife:

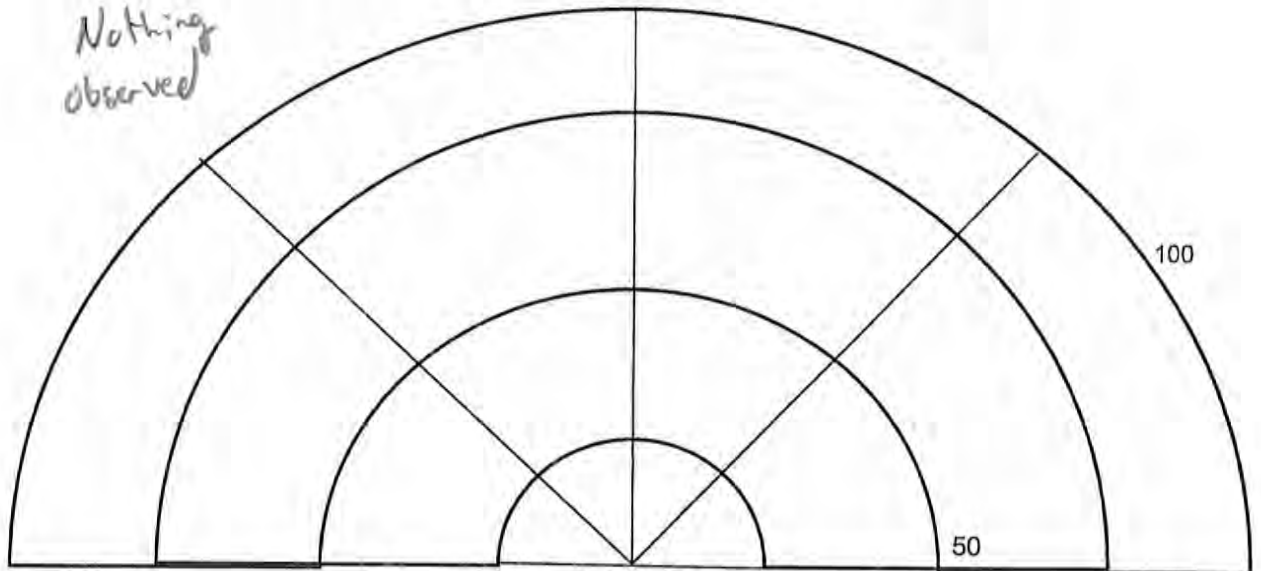
Comments (other noises):

- loud, busy street
 - Habitat not really present

Species	From Observer						Abundance (FC=Full Chorus)		
	A (0<100 m)		B (>100m)		C (both)		A	B	C
AMTO	1	2	3	1	2	3	1	2	3
BCFR	1	2	3	1	2	3			
BULL	1	2	3	1	2	3			
WCFR	1	2	3	1	2	3			
GRTF	1	2	3	1	2	3			
FOTO	1	2	3	1	2	3			
GRFR	1	2	3	1	2	3			
MIFR	1	2	3	1	2	3			
NLFR	1	2	3	1	2	3			
PIFR	1	2	3	1	2	3			
SPPE	1	2	3	1	2	3			
WOFO	1	2	3	1	2	3			

From Observer:	A	Inside 100 m	Call Levels:	1	Individuals do not overlap, can be counted	Abundance	Any #	Individuals if counted or
		B		Outside 100 m	2			
	C	Both Inside and Outside 100 m	3	Full chorus, not abundance estimate				

Heading: S



Anuran Call Count Study – Fixed Point Observation Datasheet

Project Name: Adelaide St North Project #: 476793 Surveyor(s): KV, MD
 Station #: Ac3 GPS Unit ID: 43.046723, -81.261031
 Date: 08/04/2019 Start time: 21:05 End time: 21:10
 Temp (°C): 22 Beaufort Wind Speed: 6 Wind Dir: E Cloud Cover (%): 10 Precipitation (mm): 0

Habitat Description:

- water crossing at intersection
 - phrag in ditch

Incidental Wildlife:

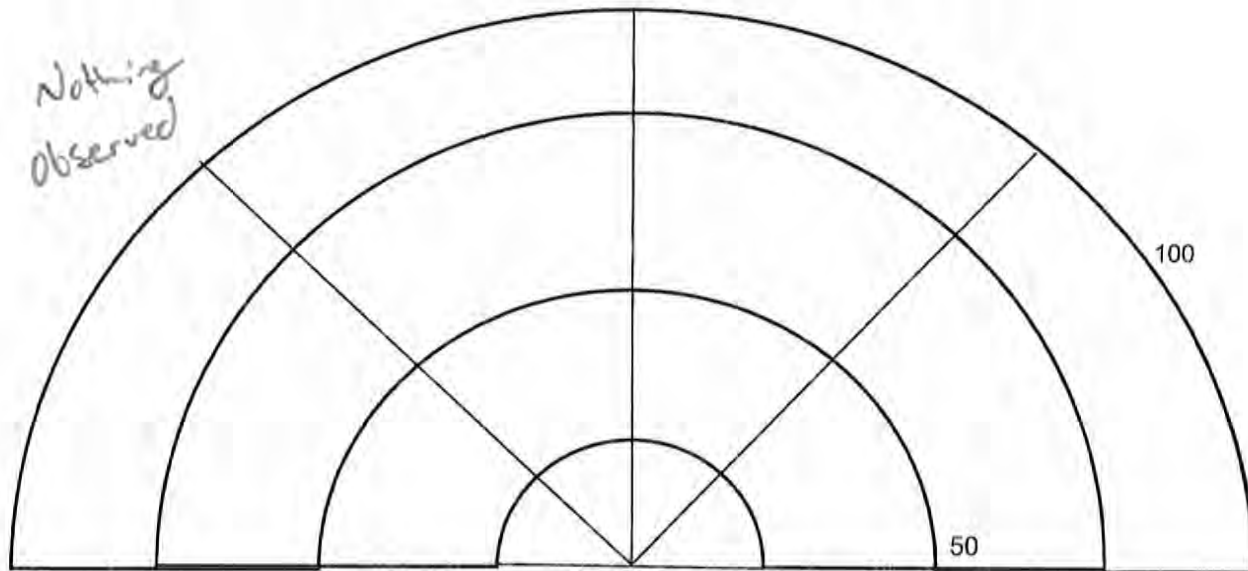
Comments (other noises):

- Busy, noisy intersection
 - small culvert with minor flow

Species	From Observer						Abundance (FC=Full Chorus)		
	A (0<100 m)		B (>100m)		C (both)		A	B	C
AMTO	1	2	3	1	2	3	1	2	3
BCFR	1	2	3	1	2	3	1	2	3
BULL	1	2	3	1	2	3	1	2	3
WCFR	1	2	3	1	2	3	1	2	3
GRTF	1	2	3	1	2	3	1	2	3
FOTO	1	2	3	1	2	3	1	2	3
GRFR	1	2	3	1	2	3	1	2	3
MIFR	1	2	3	1	2	3	1	2	3
NLFR	1	2	3	1	2	3	1	2	3
PIFR	1	2	3	1	2	3	1	2	3
SPPE	1	2	3	1	2	3	1	2	3
WOFO	1	2	3	1	2	3	1	2	3

From Observer:	A	Inside 100 m	Call Levels:	1	Individuals do not overlap, can be counted	Abundance	Any #	Individuals if counted or
	B	Outside 100 m		2	Individuals sometimes overlap, abundance can be estimated			
	C	Both Inside and Outside 100 m		3	Full chorus, not abundance estimate			

Heading: W



Anuran Call Count Study – Fixed Point Observation Datasheet

Project Name: Adelade St. North Project #: 476792 Surveyor(s): KV, MD

Station #: ACH GPS Unit ID: 43050181, - 81.202773

Date: 08/04/2019 Start time: 20:50 End time: 20:57

Temp (°C): 7°C Beaufort Wind Speed: 6 Wind Dir: E Cloud Cover (%): 70 Precipitation (mm): 0

Habitat Description:

- Small swam along roadside
 - Small watercourse flowing through

Incidental Wildlife:

- American Woodcock observed flying by, also heard calling in wetland
 - white-tailed Deer x2 in field

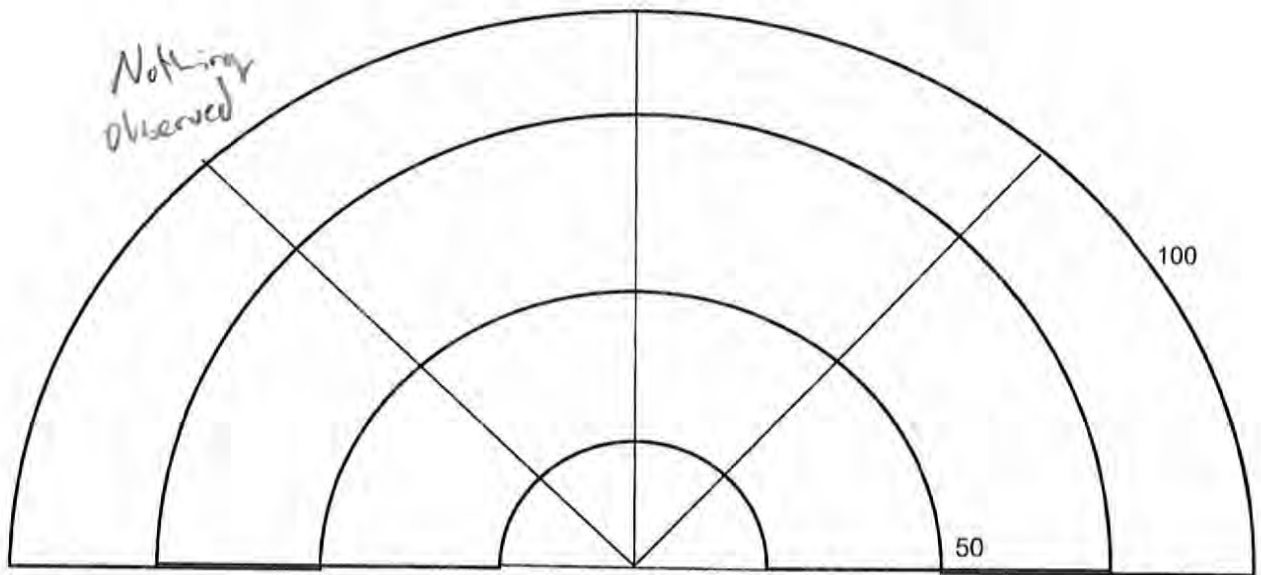
Comments (other noises):

- loud busy street

Species	From Observer						Abundance (FC=Full Chorus)		
	A (0<100 m)		B (>100m)		C (both)		A	B	C
AMTO	1	2	3	1	2	3	1	2	3
BCFR	1	2	3	1	2	3			
BULL	1	2	3	1	2	3			
WCFR	1	2	3	1	2	3			
GRTF	1	2	3	1	2	3			
FOTO	1	2	3	1	2	3			
GRFR	1	2	3	1	2	3			
MIFR	1	2	3	1	2	3			
NLFR	1	2	3	1	2	3			
PIFR	1	2	3	1	2	3			
SPPE	1	2	3	1	2	3			
WOFO	1	2	3	1	2	3			

From Observer:	A	Inside 100 m	Call Levels:	1	Individuals do not overlap, can be counted	Abundance	Any #	Individuals if counted or
		B		Outside 100 m	2			
	C	Both Inside and Outside 100 m	3	Full chorus, not abundance estimate				

Heading: W



Anuran Call Count Study – Fixed Point Observation Datasheet

Project Name: Adelwick St. North Project #: 476793 Surveyor(s): KV, MD

Station #: ACS GPS Unit ID: 43.045682, -81.265251

Date: 08/04/2019 Start time: 20:30 End time: 20:40

Temp (°C): 7°C Beaufort Wind Speed: 6 Wind Dir: E Cloud Cover (%): 70 Precipitation (mm): 0

Habitat Description:

- wet field in proximity to private pond

Incidental Wildlife:

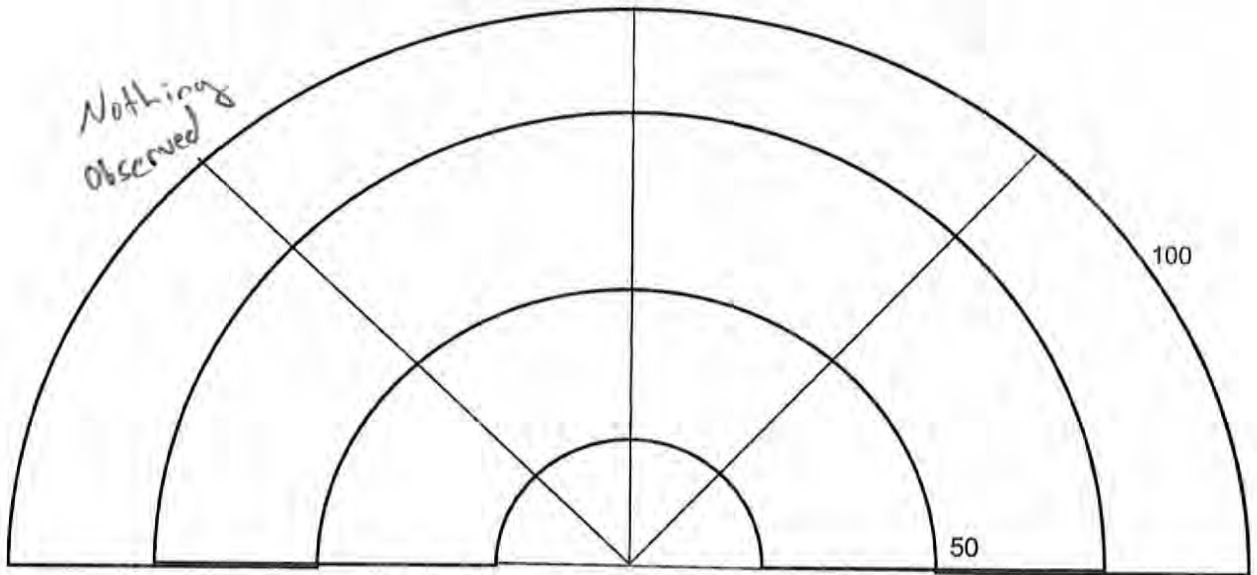
Comments (other noises):

- Busy street
- calling of WCFR in distant wetland, next pond

Species	From Observer						Abundance (FC=Full Chorus)		
	A (0<100 m)		B (>100m)		C (both)		A	B	C
AMTO	1	2	3	1	2	3	1	2	3
BCFR	1	2	3	1	2	3			
BULL	1	2	3	1	2	3			
WCFR	1	2	3	1	2	3			
GRTF	1	2	3	1	2	3			
FOTO	1	2	3	1	2	3			
GRFR	1	2	3	1	2	3			
MIFR	1	2	3	1	2	3			
NLFR	1	2	3	1	2	3			
PIFR	1	2	3	1	2	3			
SPPE	1	2	3	1	2	3			
WOFO	1	2	3	1	2	3			

From Observer:	A	Inside 100 m	Call Levels:	1	Individuals do not overlap, can be counted	Abundance	Any #	Individuals if counted or
		B		Outside 100 m	2			
	C	Both Inside and Outside 100 m	3	Full chorus, not abundance estimate				

Heading: N



Anuran Call Count Study – Fixed Point Observation Datasheet

Project Name: Adelaide Project #: ACI-5 Surveyor(s): MD

Station #: _____ GPS Unit ID: _____

Date: 27-05-19 Start time: 10:06 End time: 10:09

Temp (°C): 14 Beaufort Wind Speed: 0 Wind Dir: 184 Cloud Cover (%): 80 Precipitation (mm): 0

Habitat Description:

-Wetted
-Covered in Phragmites

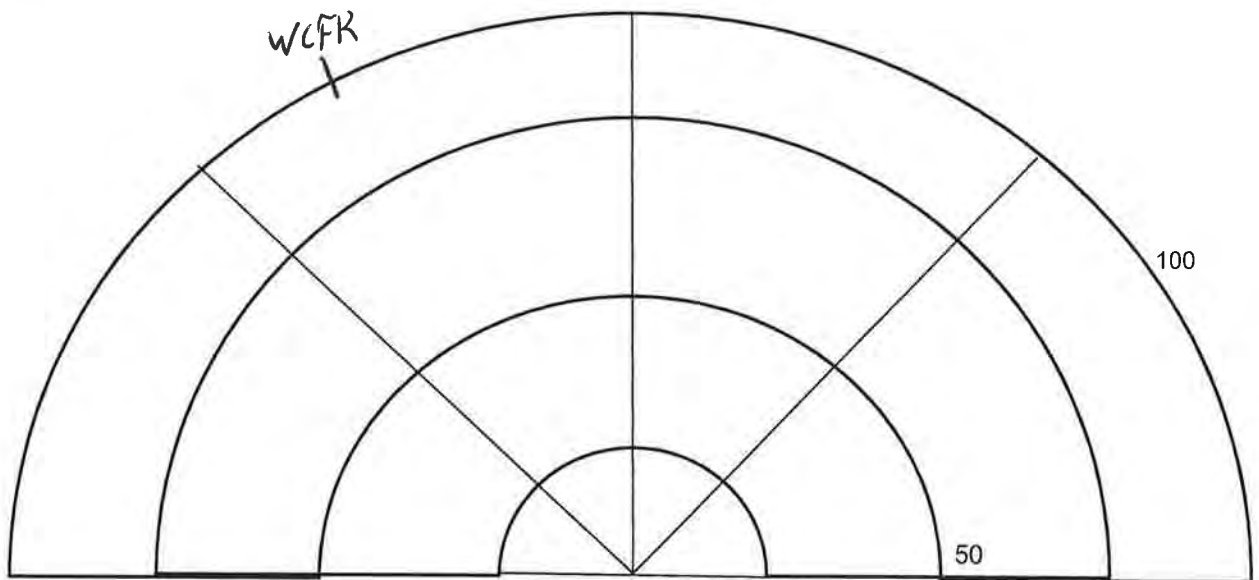
Incidental Wildlife:

Comments (other noises):

Species	From Observer						Abundance (FC=Full Chorus)		
	A (0<100 m)		B (>100m)		C (both)		A	B	C
AMTO	1	2	3	1	2	3	1	2	3
BCFR	1	2	3	1	2	3			
BULL	1	2	3	1	2	3			
WCFR	1	2	3	1	2	3			
GRTF	1	2	3	1	2	3			
FOTO	1	2	3	1	2	3			
GRFR	1	2	3	1	2	3			
MIFR	1	2	3	1	2	3			
NLFR	1	2	3	1	2	3			
PIFR	1	2	3	1	2	3			
SPPE	1	2	3	1	2	3			
WOFO	1	2	3	1	2	3			

From Observer:	A	Inside 100 m	Call Levels:	1	Individuals do not overlap, can be counted	Abundance	Any #	Individuals if counted or
		B		Outside 100 m	2			
	C	Both Inside and Outside 100 m	3	Full chorus, not abundance estimate				

Heading: W



Anuran Call Count Study – Fixed Point Observation Datasheet

Project Name: Adelaide st Project #: AC1-N Surveyor(s): MD

Station #: AC1-N GPS Unit ID: _____

Date: 27-05-19 Start time: 10:00am End time: 12:30

Temp (°C): 14 Beaufort Wind Speed: 0 Wind Dir: NE Cloud Cover (%): 80 Precipitation (mm): 0

Habitat Description:

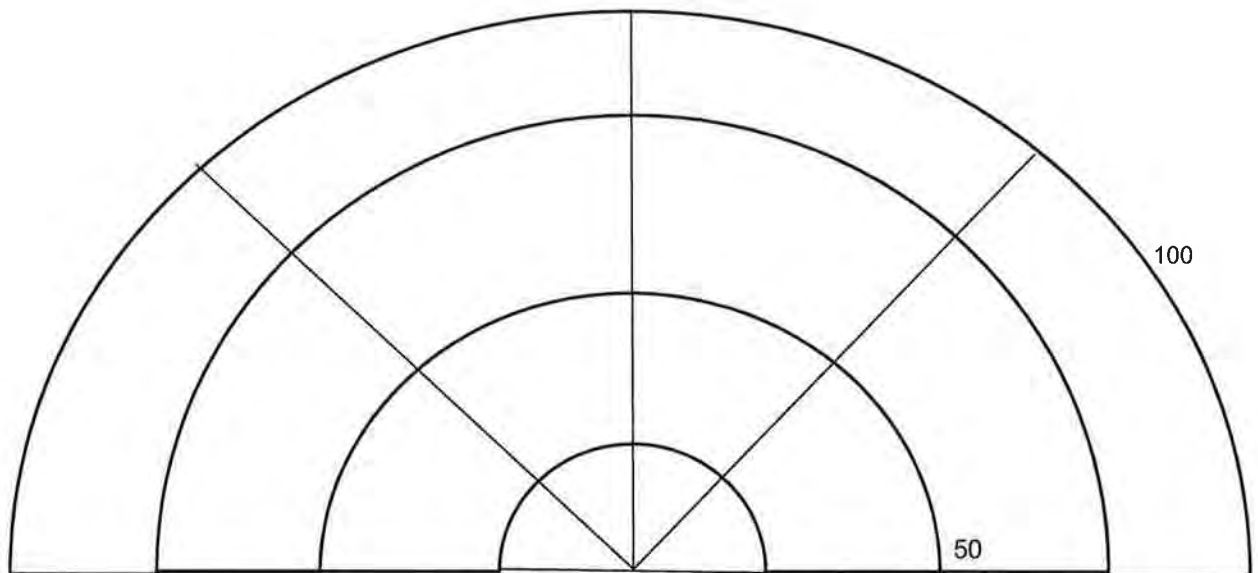
Incidental Wildlife:

Comments (other noises):

Species	From Observer						Abundance (FC=Full Chorus)		
	A (0<100 m)		B (>100m)		C (both)		A	B	C
AMTO	1	2	3	1	2	3			
BCFR	1	2	3	1	2	3			
BULL	1	2	3	1	2	3			
WCFR	1	2	3	1	2	3			
GRTF	1	2	3	1	2	3			
FOTO	1	2	3	1	2	3			
GRFR	1	2	3	1	2	3			
MIFR	1	2	3	1	2	3			
NLFR	1	2	3	1	2	3			
PIFR	1	2	3	1	2	3			
SPPE	1	2	3	1	2	3			
WOFO	1	2	3	1	2	3			

From Observer:	A	Inside 100 m	Call Levels:	1	Individuals do not overlap, can be counted	Abundance	Any #	Individuals if counted or
	B	Outside 100 m		2	Individuals sometimes overlap, abundance can be estimated			
	C	Both Inside and Outside 100 m		3	Full chorus, not abundance estimate			

Heading: E



No calls

Anuran Call Count Study – Fixed Point Observation Datasheet

Project Name: Adelaido Project #: AL2 Surveyor(s): MD

Station #: _____ GPS Unit ID: _____

Date: 27-05-19 Start time: 10:48 End time: 10:51

Temp (°C): 14 Beaufort Wind Speed: 0 Wind Dir: N/A Cloud Cover (%): 80 Precipitation (mm): 0

Habitat Description:

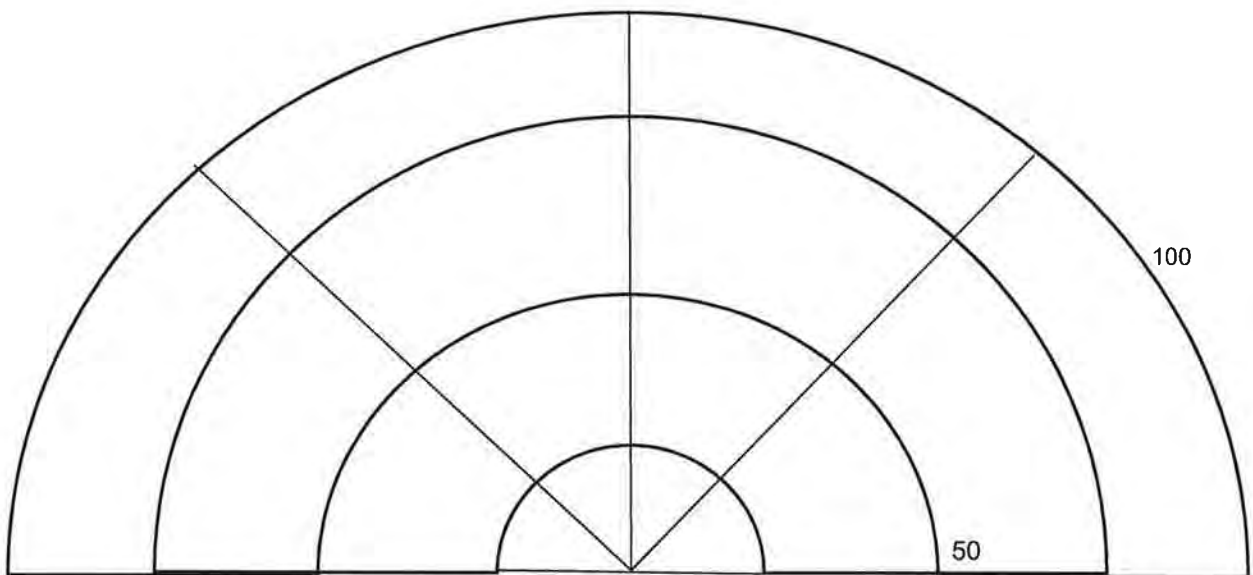
Incidental Wildlife:

Comments (other noises):

Species	From Observer						Abundance (FC=Full Chorus)		
	A (0<100 m)		B (>100m)		C (both)		A	B	C
AMTO	1	2	3	1	2	3			
BCFR	1	2	3	1	2	3			
BULL	1	2	3	1	2	3			
WCFR	1	2	3	1	2	3			
GRTF	1	2	3	1	2	3			
FOTO	1	2	3	1	2	3			
GRFR	1	2	3	1	2	3			
MIFR	1	2	3	1	2	3			
NLFR	1	2	3	1	2	3			
PIFR	1	2	3	1	2	3			
SPPE	1	2	3	1	2	3			
WOFO	1	2	3	1	2	3			

From Observer:	A	Inside 100 m	Call Levels:	1	Individuals do not overlap, can be counted	Abundance	Any #	Individuals if counted or
	B	Outside 100 m		2	Individuals sometimes overlap, abundance can be estimated			
	C	Both Inside and Outside 100 m		3	Full chorus, not abundance estimate			

Heading: 5



No calls

Anuran Call Count Study – Fixed Point Observation Datasheet

Project Name: Adelaida Project #: AL3 Surveyor(s): MD

Station #: _____ GPS Unit ID: _____

Date: 27-05-19 Start time: 10:55 End time: 12:58

Temp (°C): 4 Beaufort Wind Speed: 0 Wind Dir: N/A Cloud Cover (%): 80 Precipitation (mm): 0

Habitat Description:

- grass wetland
- Ditches / phrag

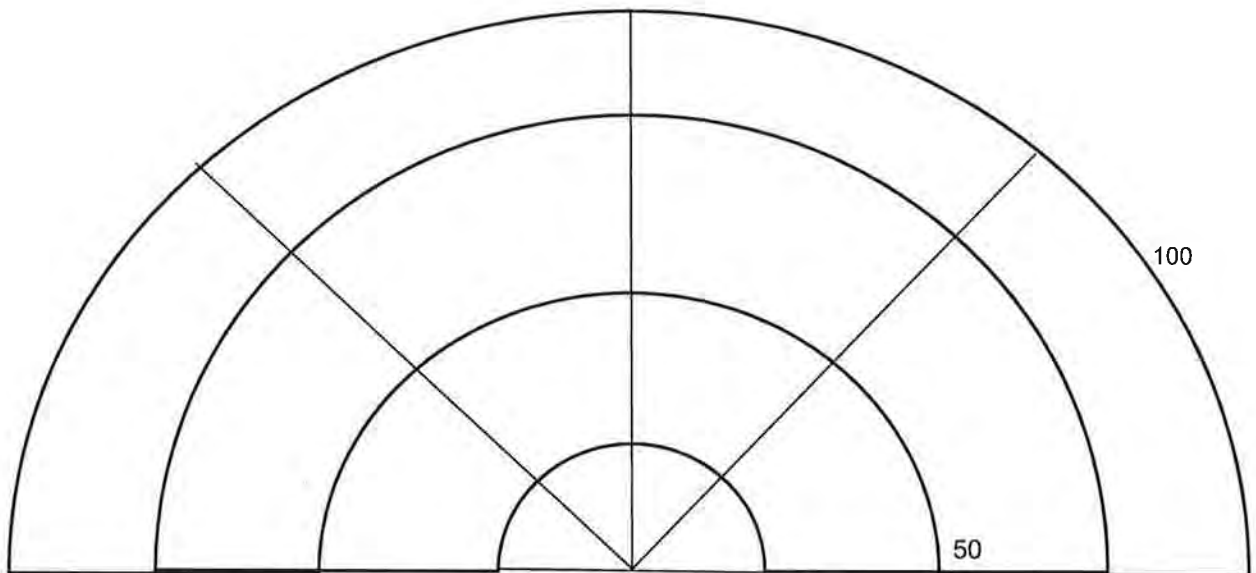
Incidental Wildlife:

Comments (other noises):

Species	From Observer						Abundance (FC=Full Chorus)		
	A (0<100 m)		B (>100m)		C (both)		A	B	C
AMTO	1	2	3	1	2	3	1	2	3
BCFR	1	2	3	1	2	3	1	2	3
BULL	1	2	3	1	2	3	1	2	3
WCFR	1	2	3	1	2	3	1	2	3
GRTF	1	2	3	1	2	3	1	2	3
FOTO	1	2	3	1	2	3	1	2	3
GRFR	1	2	3	1	2	3	1	2	3
MIFR	1	2	3	1	2	3	1	2	3
NLFR	1	2	3	1	2	3	1	2	3
PIFR	1	2	3	1	2	3	1	2	3
SPPE	1	2	3	1	2	3	1	2	3
WOFO	1	2	3	1	2	3	1	2	3

From Observer:	A	Inside 100 m	Call Levels:	1	Individuals do not overlap, can be counted	Abundance	Any #	Individuals if counted or
	B	Outside 100 m		2	Individuals sometimes overlap, abundance can be estimated			
C	Both Inside and Outside 100 m	3	Full chorus, not abundance estimate					

Heading: N



NO CALLS

Anuran Call Count Study – Fixed Point Observation Datasheet

Project Name: Adelaide Project #: AC4 Surveyor(s): MD

Station #: AC4 GPS Unit ID: _____

Date: 27-05-19 Start time: 11:05 End time: 11:08

Temp (°C): 14 Beaufort Wind Speed: 1 Wind Dir: E Cloud Cover (%): 90 Precipitation (mm): 0

Habitat Description:

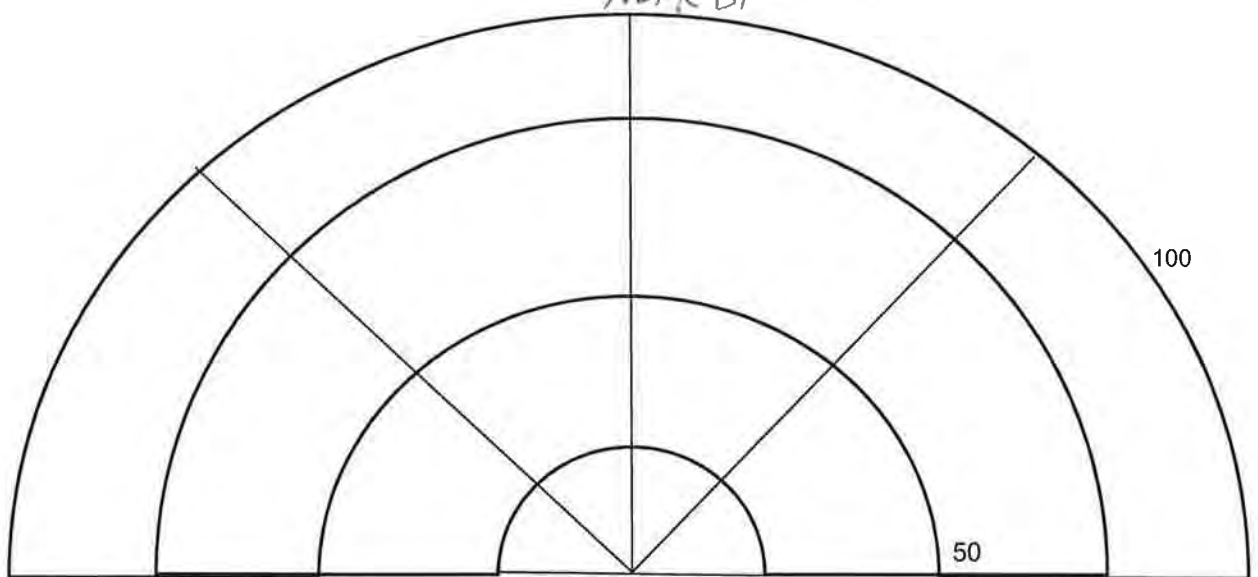
Incidental Wildlife:

Comments (other noises):

Species	From Observer						Abundance (FC=Full Chorus)		
	A (0<100 m)		B (>100m)		C (both)		A	B	C
AMTO	1	2	3	1	2	3			
BCFR	1	2	3	1	2	3			
BULL	1	2	3	1	2	3			
WCFR	1	2	3	1	2	3			
GRTF	1	2	3	1	2	3			
FOTO	1	2	3	1	2	3			
GRFR	1	2	3	1	2	3			
MIFR	1	2	3	1	2	3			
NLFR	1	2	3	1	2	3			
PIFR	1	2	3	1	2	3			
SPPE	1	2	3	1	2	3			
WOFO	1	2	3	1	2	3			

From Observer:	A	Inside 100 m	Call Levels:	1	Individuals do not overlap, can be counted	Abundance	Any #	Individuals if counted or
	<input checked="" type="checkbox"/>	Outside 100 m		2	Individuals sometimes overlap, abundance can be estimated	1		
	<input type="checkbox"/>	Both Inside and Outside 100 m		3	Full chorus, not abundance estimate			

Heading: N
NLFR B1



Anuran Call Count Study – Fixed Point Observation Datasheet

Project Name: Adelaide Project #: AGS Surveyor(s): M.H.

Station #: _____ GPS Unit ID: _____

Date: 27-05-19 Start time: 10:00 End time: 11:03

Temp (°C): 17 Beaufort Wind Speed: 1 Wind Dir: E Cloud Cover (%): 80 Precipitation (mm): 0

Habitat Description:

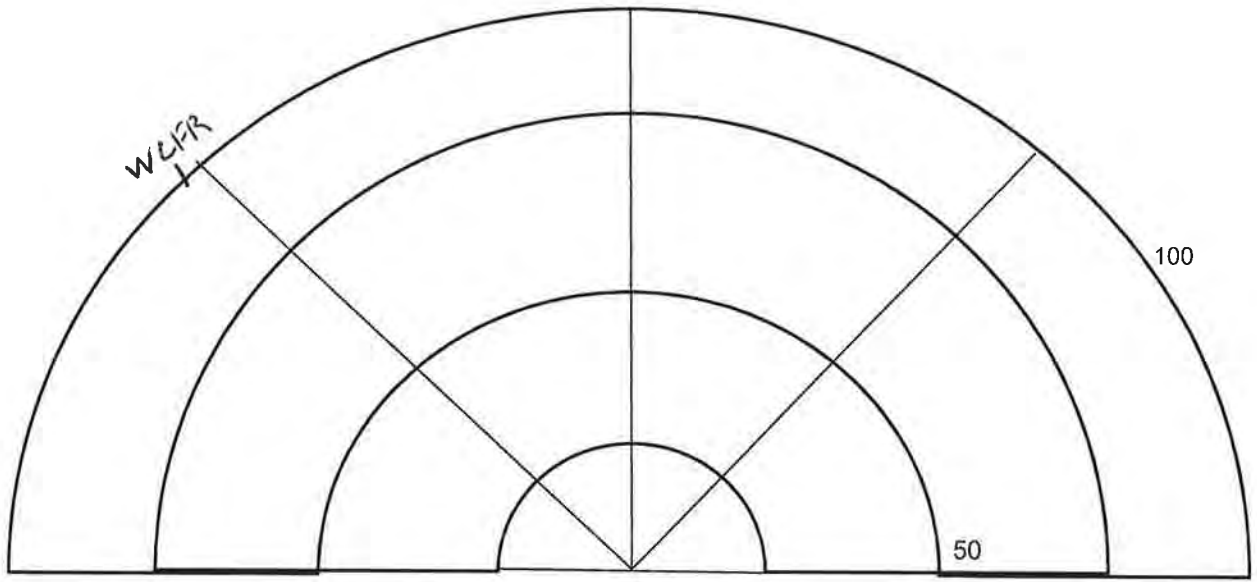
Incidental Wildlife:

Comments (other noises):

Species	From Observer						Abundance (FC=Full Chorus)		
	A (0<100 m)		B (>100m)		C (both)		A	B	C
AMTO	1	2	3	1	2	3	1	2	3
BCFR	1	2	3	1	2	3	1	2	3
BULL	1	2	3	1	2	3	1	2	3
WCFR	1	2	3	1	2	3	1	2	3
GRTF	1	2	3	1	2	3	1	2	3
FOTO	1	2	3	1	2	3	1	2	3
GRFR	1	2	3	1	2	3	1	2	3
MIFR	1	2	3	1	2	3	1	2	3
NLFR	1	2	3	1	2	3	1	2	3
PIFR	1	2	3	1	2	3	1	2	3
SPPE	1	2	3	1	2	3	1	2	3
WOFO	1	2	3	1	2	3	1	2	3

From Observer:	A	B	C	Call Levels:	1	2	3	Abundance	Any #	Individuals if counted or
	Inside 100 m	Outside 100 m	Both Inside and Outside 100 m		Individuals do not overlap, can be counted	Individuals sometimes overlap, abundance can be estimated	Full chorus, not abundance estimate			

Heading: N



Anuran Call Count Study – Fixed Point Observation Datasheet

Project Name: Addicks Project #: _____ Surveyor(s): MD

Station #: AC1-5 GPS Unit ID: _____

Date: 06/11/2019 Start time: 9:40 End time: 9:43

Temp (°C): 18 Beaufort Wind Speed: 1 Wind Dir: W Cloud Cover (%): 0 Precipitation (mm): 0

Habitat Description:

Phrag wetland

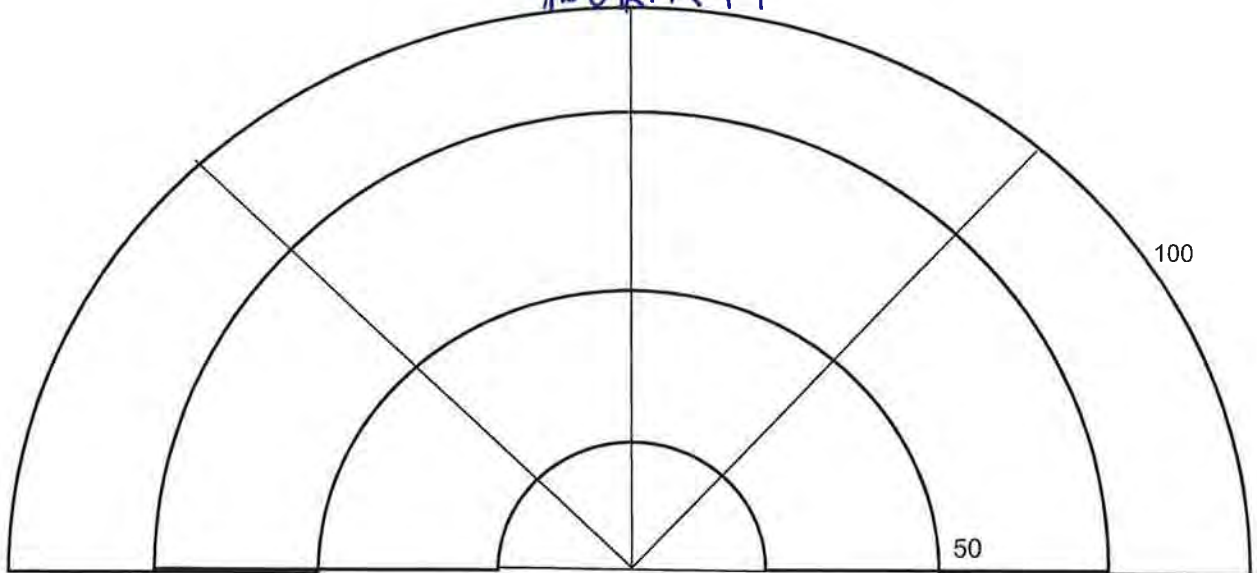
Incidental Wildlife:

Comments (other noises):

Species	From Observer						Abundance (FC=Full Chorus)		
	A (0<100 m)		B (>100m)		C (both)		A	B	C
AMTO	1	2	3	1	2	3	1	2	3
BCFR	1	2	3	1	2	3	1	2	3
BULL	1	2	3	1	2	3	1	2	3
WCFR	1	2	3	1	2	3	1	2	3
GRTF	1	2	3	1	2	3	1	2	3
FOTO	1	2	3	1	2	3	1	2	3
GRFR	1	2	3	①	2	3	1	2	3
MIFR	1	2	3	1	2	3	1	2	3
NLFR	1	2	3	1	2	3	1	2	3
PIFR	1	2	3	1	2	3	1	2	3
SPPE	1	2	3	1	2	3	1	2	3
WOFO	1	2	3	1	2	3	1	2	3

From Observer:	A	Inside 100 m	Call Levels:	1	Individuals do not overlap, can be counted	Abundance	Any #	Individuals if counted or
	B	Outside 100 m		2	Individuals sometimes overlap, abundance can be estimated			
C	Both Inside and Outside 100 m	3	Full chorus, not abundance estimate					

Heading: W
106 GRFR-1-1



Anuran Call Count Study – Fixed Point Observation Datasheet

Project Name: AA et al Project #: _____ Surveyor(s): MD
 Station #: ACT-N GPS Unit ID: _____
 Date: 04/11/2019 Start time: 9:44 End time: 9:48
 Temp (°C): 18 Beaufort Wind Speed: 1 Wind Dir: ✓ Cloud Cover (%): 0 Precipitation (mm): 0

Habitat Description:

Phragm Ditch

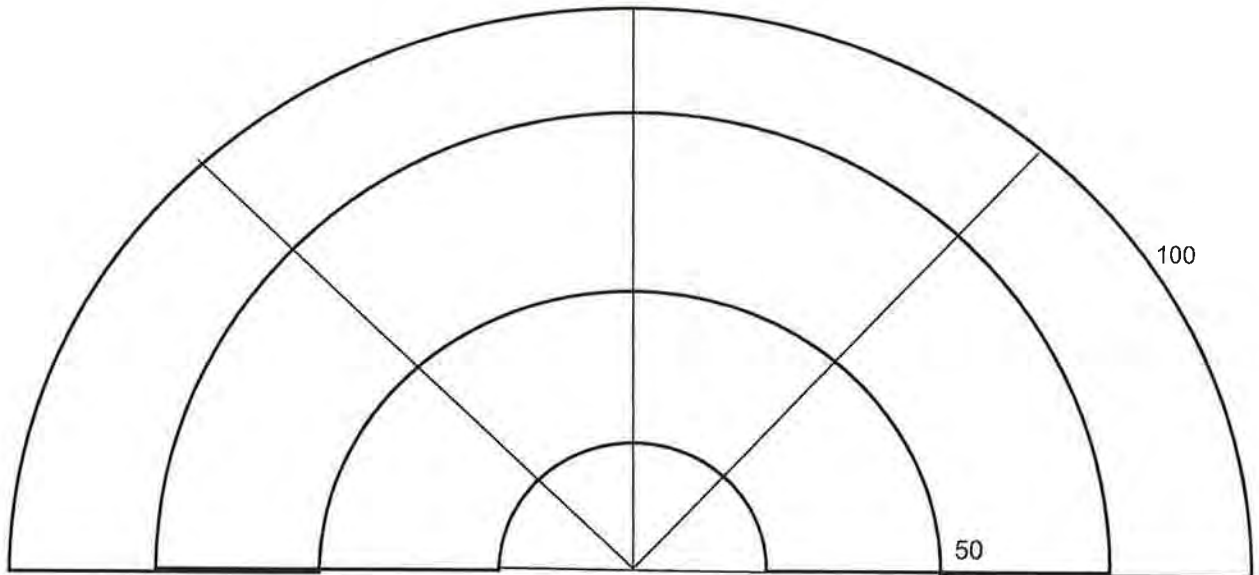
Incidental Wildlife:

Comments (other noises):

Species	From Observer						Abundance (FC=Full Chorus)		
	A (0<100 m)		B (>100m)		C (both)		A	B	C
AMTO	1	2	3	1	2	3	1	2	3
BCFR	1	2	3	1	2	3	1	2	3
BULL	1	2	3	1	2	3	1	2	3
WCFR	1	2	3	1	2	3	1	2	3
GRTF	1	2	3	1	2	3	1	2	3
FOTO	1	2	3	1	2	3	1	2	3
GRFR	1	2	3	1	2	3	1	2	3
MIFR	1	2	3	1	2	3	1	2	3
NLFR	1	2	3	1	2	3	1	2	3
PIFR	1	2	3	1	2	3	1	2	3
SPPE	1	2	3	1	2	3	1	2	3
WOFO	1	2	3	1	2	3	1	2	3

From Observer:	A	Inside 100 m	Call Levels:	1	Individuals do not overlap, can be counted	Abundance	Any #	Individuals if counted or
		B		Outside 100 m	2			
	C	Both Inside and Outside 100 m	3	Full chorus, not abundance estimate	<u>No calls</u>			

Heading: E



Anuran Call Count Study – Fixed Point Observation Datasheet

Project Name: Ajelvide Project #: _____ Surveyor(s): MJ
 Station #: AC2 GPS Unit ID: _____
 Date: 06/11/19 Start time: 9:50 End time: 9:53
 Temp (°C): 17 Beaufort Wind Speed: 1 Wind Dir: W Cloud Cover (%): 0 Precipitation (mm): 0

Habitat Description: _____

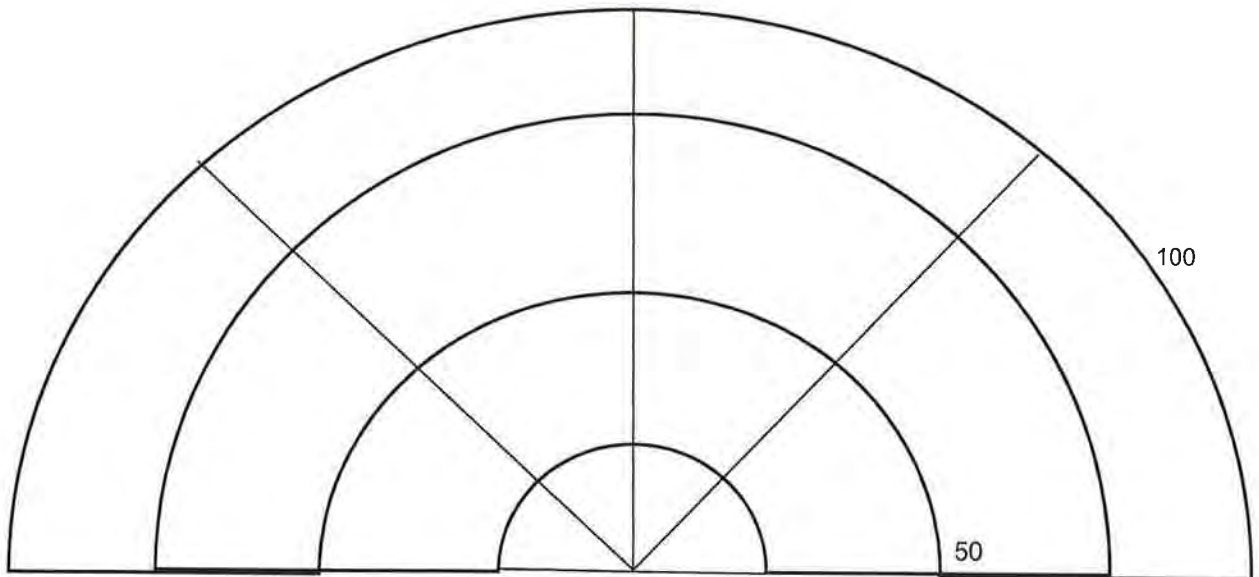
Incidental Wildlife: _____

Comments (other noises): _____

Species	From Observer						Abundance (FC=Full Chorus)		
	A (0<100 m)		B (>100m)		C (both)		A	B	C
AMTO	1	2	3	1	2	3			
BCFR	1	2	3	1	2	3			
BULL	1	2	3	1	2	3			
WCFR	1	2	3	1	2	3			
GRTF	1	2	3	1	2	3			
FOTO	1	2	3	1	2	3			
GRFR	1	2	3	1	2	3			
MIFR	1	2	3	1	2	3			
NLFR	1	2	3	1	2	3			
PIFR	1	2	3	1	2	3			
SPPE	1	2	3	1	2	3			
WOFO	1	2	3	1	2	3			

From Observer:	A	Inside 100 m	Call Levels:	1	Individuals do not overlap, can be counted	Abundance	Any #	Individuals if counted or
		B		Outside 100 m	2			
	C	Both Inside and Outside 100 m	3	Full chorus, not abundance estimate				

Heading: WE



Anuran Call Count Study – Fixed Point Observation Datasheet

Project Name: Adelaide Project #: _____ Surveyor(s): Mitch
 Station #: AC 3 GPS Unit ID: _____
 Date: 06/11/19 Start time: 10:00 End time: 10:03
 Temp (°C): 17 Beaufort Wind Speed: 1 Wind Dir: w Cloud Cover (%): 0 Precipitation (mm): 0

Habitat Description:

- Grasses / wetland marsh
 - Ditches surrounding

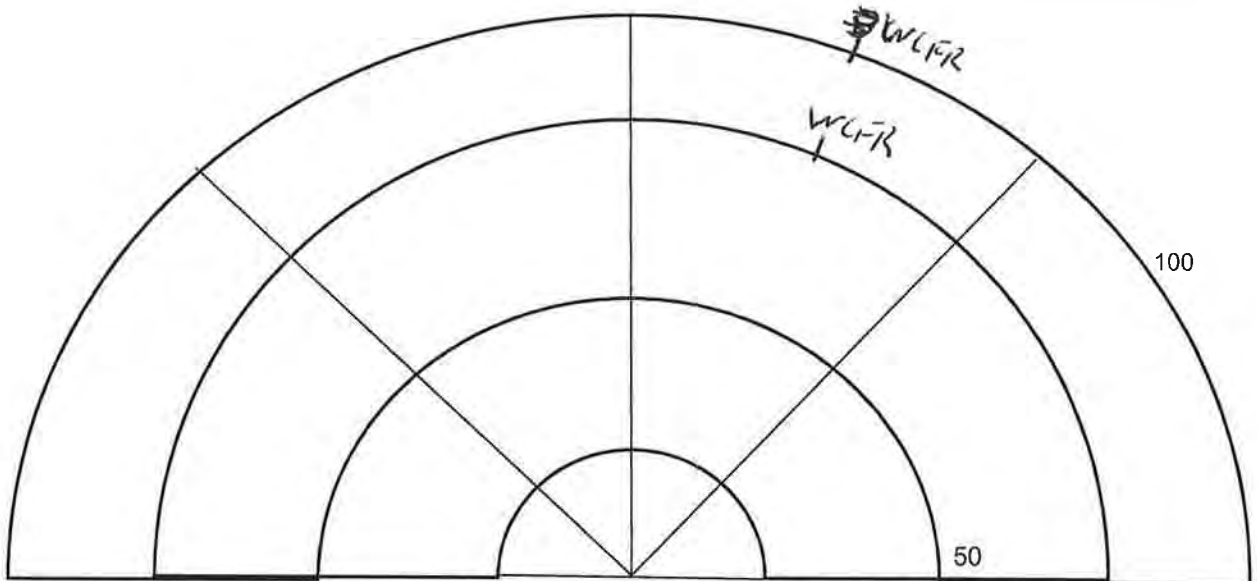
Incidental Wildlife:

Comments (other noises):

Species	From Observer						Abundance (FC=Full Chorus)		
	A (0<100 m)		B (>100m)		C (both)		A	B	C
AMTO	1	2	3	1	2	3	1	2	3
BCFR	1	2	3	1	2	3			
BULL	1	2	3	1	2	3			
WCFR	1	2	3	1	2	3	1	1	
GRTF	1	2	3	1	2	3			
FOTO	1	2	3	1	2	3			
GRFR	1	2	3	1	2	3			
MIFR	1	2	3	1	2	3			
NLFR	1	2	3	1	2	3			
PIFR	1	2	3	1	2	3			
SPPE	1	2	3	1	2	3			
WOFO	1	2	3	1	2	3			

From Observer:	A	Inside 100 m	Call Levels:	1	Individuals do not overlap, can be counted	Abundance	Any #	Individuals if counted or
		B		Outside 100 m	2			
	C	Both Inside and Outside 100 m	3	Full chorus, not abundance estimate				

Heading: N



Anuran Call Count Study – Fixed Point Observation Datasheet

Project Name: Adelaide Project #: _____ Surveyor(s): M. Hark
 Station #: AC4 GPS Unit ID: _____
 Date: 04/11/19 Start time: 10:16 End time: 10:19
 Temp (°C): 17 Beaufort Wind Speed: 1 Wind Dir: W Cloud Cover (%): 0 Precipitation (mm): 0

Habitat Description:

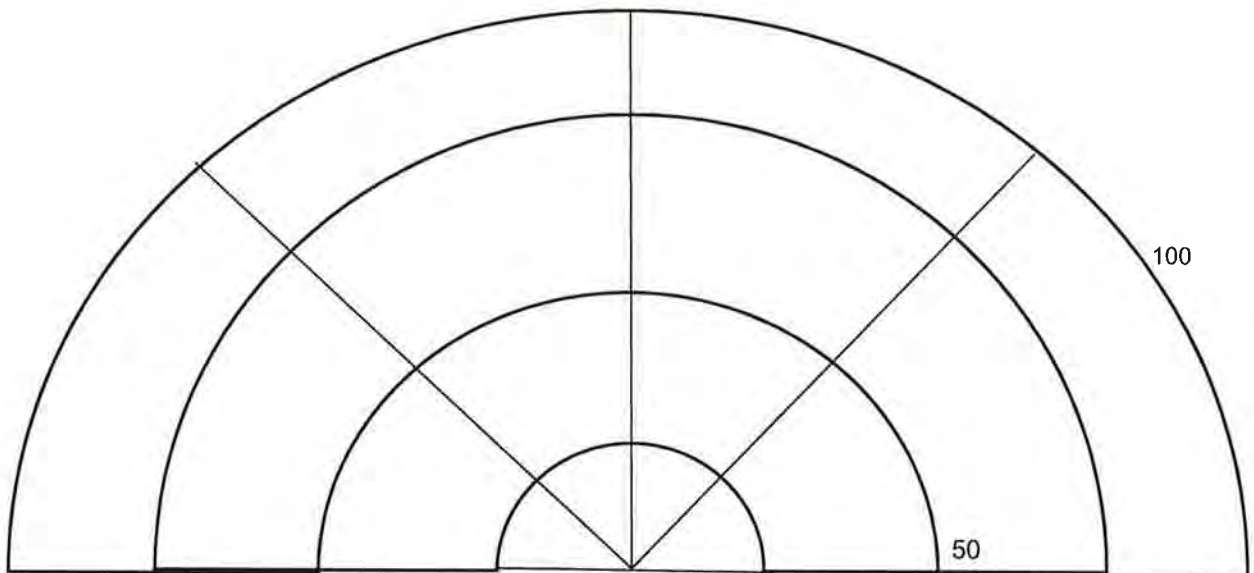
Incidental Wildlife:

Comments (other noises):

Species	From Observer									Abundance (FC=Full Chorus)		
	A (0<100 m)			B (>100m)			C (both)			A	B	C
AMTO	1	2	3	1	2	3	1	2	3			
BCFR	1	2	3	1	2	3	1	2	3			
BULL	1	2	3	1	2	3	1	2	3			
WCFR	1	2	3	1	2	3	1	2	3			
GRTF	1	2	3	1	2	3	1	2	3			
FOTO	1	2	3	1	2	3	1	2	3			
GRFR	1	2	3	1	2	3	1	2	3			
MIFR	1	2	3	1	2	3	1	2	3			
NLFR	1	2	3	1	2	3	1	2	3			
PIFR	1	2	3	1	2	3	1	2	3			
SPPE	1	2	3	1	2	3	1	2	3			
WOFO	1	2	3	1	2	3	1	2	3			

From Observer:	A	Inside 100 m	Call Levels:	1	Individuals do not overlap, can be counted	Abundance	Any #	Individuals if counted or
	B	Outside 100 m		2	Individuals sometimes overlap, abundance can be estimated	<u>None</u>		
	C	Both Inside and Outside 100 m		3	Full chorus, not abundance estimate			

Heading: N



Anuran Call Count Study – Fixed Point Observation Datasheet

Project Name: Adelaide Project #: _____ Surveyor(s): Mitch

Station #: AC 5 GPS Unit ID: _____

Date: 06/11/19 Start time: 10:07 End time: 10:10

Temp (°C): 17 Beaufort Wind Speed: 1 Wind Dir: W Cloud Cover (%): 0 Precipitation (mm): 0

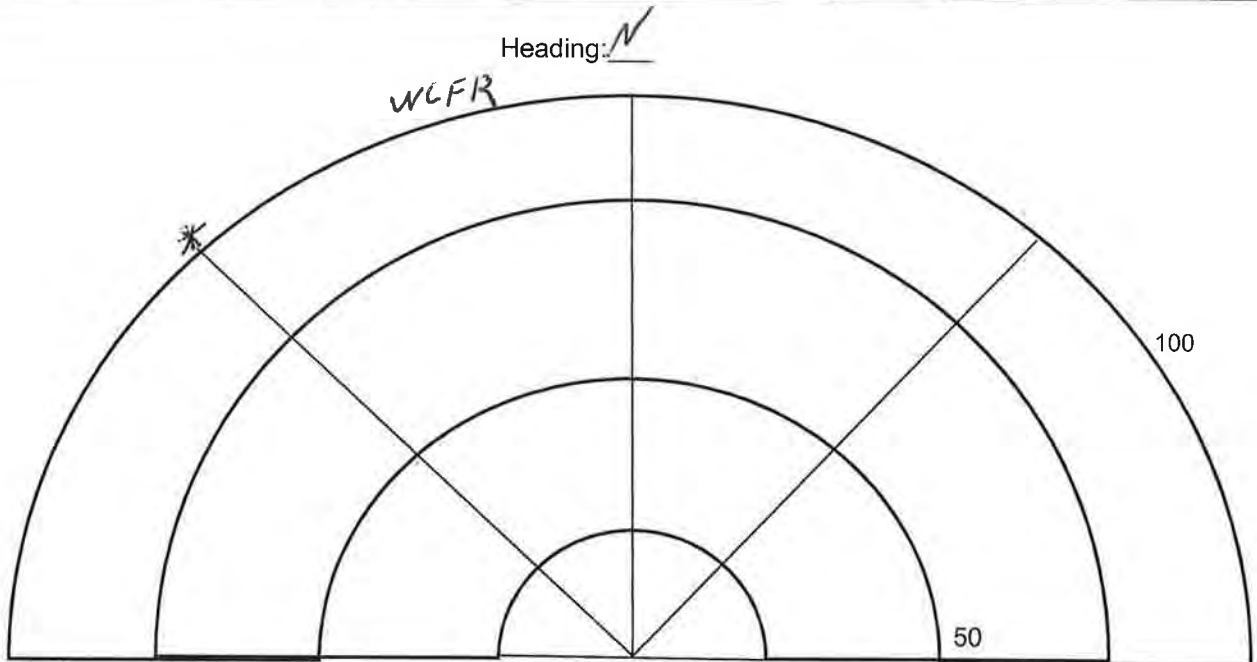
Habitat Description:
 - woodlot with
 - tall grass surrounding

Incidental Wildlife:

Comments (other noises):

Species	From Observer						Abundance (FC=Full Chorus)		
	A (0<100 m)		B (>100m)		C (both)		A	B	C
AMTO	1	2	3	1	2	3	1	2	3
BCFR	1	2	3	1	2	3			
BULL	1	2	3	1	2	3			
WCFR	1	2	3	1	2	3		2	
GRTF	1	2	3	1	2	3			
FOTO	1	2	3	1	2	3			
GRFR	1	2	3	1	2	3			
MIFR	1	2	3	1	2	3			
NLFR	1	2	3	1	2	3			
PIFR	1	2	3	1	2	3			
SPPE	1	2	3	1	2	3			
WOFO	1	2	3	1	2	3			

From Observer:	A	Inside 100 m	Call Levels:	1	Individuals do not overlap, can be counted	Abundance	Any #	Individuals if counted or
		B		Outside 100 m	2			
	C	Both Inside and Outside 100 m	3	Full chorus, not abundance estimate				



Appendix F

Significant Wildlife Habitat Assessment

Appendix F – Significant Wildlife Habitat Assessment

Definitions

Ecosite – Vegetation community type determined using the Ecological Land Classification (ELC) System for Southern Ontario (Lee et al., 1998)

SWH – Significant Wildlife Habitat

Candidate SWH – Criteria which an area must satisfy in order to potentially qualify as SWH. For areas identified as potential SWH, further studies should be conducted to confirm whether it is SWH

Presence of SWH in Study Area – Evaluation of whether the SWH type is present within the study area. ‘Absent’ indicates that no part of the study area satisfies the criteria for that SWH; ‘Candidate’ indicates that a portion of the study area satisfies the criteria for Candidate SWH; ‘Confirmed’ indicates that a portion of the study area satisfies the criteria for that SWH type.

Table F-1 – Significant Wildlife Habitat Assessment

HABITAT TYPE	INDICATOR SPECIES	ELC ECOSITE CODES	HABITAT CRITERIA	ASSESSMENT DETAILS
Seasonal Concentration Areas of Animals				
Waterfowl Stopover and Staging Areas (Terrestrial)	American Black Duck, Northern Pintail, Gadwall, Blue-winged Teal, Green-winged Teal, American Wigeon, Northern Shoveler, Tundra Swan	<p><u>Cultural Meadow</u> – CUM1 <u>Cultural Thicket</u> – CUT1 or THD</p> <p>Plus, evidence of annual spring flooding from meltwater or run-off within these Ecosites.</p>	<p>Candidate SWH Criteria</p> <ul style="list-style-type: none"> • Fields with sheet water during Spring (mid-March to May). • Fields flooding during spring melt and run-off provide important invertebrate foraging habitat for migrating waterfowl. • Agricultural fields with waste grains are commonly used by waterfowl, these are not considered SWH unless they have Spring sheet water. <p>Confirmed SWH Criteria (Field Studies confirm):</p> <ul style="list-style-type: none"> • Studies carried out and verified presence of an annual concentration of any listed species, evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”. • Any mixed species aggregations of 100 or more individuals required. • The area of the flooded field ecosite habitat plus a 100-300 m radius buffer dependent on local site conditions and adjacent land use is the significant wildlife habitat. • Annual use of habitat is documented from information sources or field studies (annual use can be based on studies or determined by past surveys with species numbers and dates). 	ABSENT – None of the indicator species were observed during the field investigations and no fields containing sheet water during in spring were identified.
Waterfowl Stopover and Staging Areas (Aquatic)	Canada Goose, Cackling Goose, Snow Goose, American Black Duck, Northern Pintail, Northern Shoveler, American Wigeon, Gadwall, Green-winged Teal, Blue-winged Teal, Hooded Merganser, Common Merganser, Lesser Scaup Greater Scaup, Long-tailed Duck, Surf Scoter, White-winged Scoter, Black Scoter, Ring-necked Duck, Common Goldeneye, Bufflehead, Redhead Ruddy Duck, Red-breasted Merganser, Brant, Canvasback, Ruddy Duck	<p><u>Shallow Marsh</u> – MAS1, MAS2, MAS3</p> <p><u>Shallow Water</u> – SAS1, SAM1, SAF1</p> <p><u>Swamp</u> – SWD1, SWD2, SWD3, SWD4, SWD5, SWD6, SWD7</p>	<p>Candidate SWH Criteria</p> <ul style="list-style-type: none"> • Ponds, marshes, lakes, bays, coastal inlets, and watercourses used during migration. Sewage treatment ponds and storm water ponds do not qualify as a SWH, however a reservoir managed as a large wetland or pond/lake does qualify. • These habitats have an abundant food supply (mostly aquatic invertebrates and vegetation in shallow water). <p>Confirmed SWH Criteria (Field Studies confirm):</p> <ul style="list-style-type: none"> • Aggregations of 100 or more individuals of listed species for 7 days, results in >700 waterfowl use days. • Areas with annual staging of ruddy ducks, canvasbacks, and redheads are SWH. • The combined area of the ELC ecosites and a 100-m radius area is the SWH. • Wetland area and shorelines associated with sites identified within the SWHTG Appendix K are significant wildlife habitat. • Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”. • Annual Use of Habitat is Documented from Information Sources or Field Studies (Annual can be based on completed studies or determined from past surveys with species numbers and dates recorded). 	ABSENT – Aggregations of waterfowl were not observed during field investigations. The Arva Moraine PSW (portion within the Study Area) is not considered suitable as a significant staging area.
Shorebird Migratory Stopover Area	Greater Yellowlegs, Lesser Yellowlegs, Marbled Godwit, Hudsonian Godwit, Black-bellied Plover, American Golden- Plover, Semipalmated Plover, Solitary Sandpiper, Spotted Sandpiper, Pectoral Sandpiper, White-rumped Sandpiper, Baird’s Sandpiper, Least Sandpiper, Purple Sandpiper, Stilt Sandpiper, Short-billed Dowitcher, Red-necked Phalarope, Whimbrel, Ruddy, Turnstone, Sanderling, Dunlin	<p><u>Beach/Bar</u> – BB01, BB02, BBS1, BBS2, BBT1, BBT2</p> <p><u>Sand Dune</u> – SD01, SDS2, SDT1</p> <p><u>Meadow Marsh</u> – MAM1, MAM2, MAM3, MAM4, MAM5</p>	<p>Candidate SWH Criteria</p> <ul style="list-style-type: none"> • Shorelines of lakes, rivers and wetlands, including beach areas, bars and seasonally flooded, muddy and un-vegetated shoreline habitats. • Great Lakes coastal shorelines, including groynes and other forms of armour rock lakeshores, are extremely important for migratory shorebirds in May to mid-June and early July to October. • Stormwater retention ponds and sewage lagoons are not considered SWH. <p>Confirmed SWH Criteria (Field Studies confirm):</p> <ul style="list-style-type: none"> • Presence of 3 or more of listed species and >1000 shorebird use days during spring or fall migration period. (shorebird use days are the accumulated number of shorebirds counted per day over the course of the fall or spring migration period). • Whimbrel stop briefly (<24 hrs.) during spring migration, any site with >100 Whimbrel used for 3 years or more is significant. • The area of significant shorebird habitat includes the mapped ELC ecosites plus a 100-m radius area. • Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”. 	ABSENT – None of the indicator species were observed during the field investigations. This habitat type is considered absent within the Study Area. The Arva Moraine PSW (portion within the Study Area) is not considered suitable as a significant stopover area.
Raptor Wintering Area	<p>Rough-legged Hawk, Red-tailed Hawk, Northern Harrier, American Kestrel, Snowy Owl</p> <p><u>Special Concern:</u> Short-eared Owl, Bald Eagle</p>	<p><u>Hawks/Owls:</u> Combination of ELC Community Series; need to have present one Community Series from each land class; <u>Forest</u> – FOD, FOM, FOC <u>Upland (Cultural)</u> – CUM, CUT, THD, CUS, CUW. <u>Bald Eagle:</u> Forest/Swamp series on shoreline areas adjacent to large rivers or adjacent to lakes with open water (hunting area). <u>Forest</u> – FOD, FOM, FOC</p>	<p>Candidate SWH Criteria</p> <ul style="list-style-type: none"> • The habitat provides a combination of fields and woodlands that provide roosting, foraging and resting habitats for wintering raptors. • Raptor wintering sites need to be >20 ha with a combination of forest and upland • Least disturbed sites, idle/fallow or lightly grazed field/meadow with adjacent woodlands. • Field area of the habitat is to be wind swept with limited snow depth or accumulation. • Eagle Sites have open water and large trees and snags available for roosting. <p>Confirmed SWH Criteria (Field Studies confirm):</p> <ul style="list-style-type: none"> • One or more Short-eared Owls; One or more Bald Eagles or; at least 10 individuals and two spp. of the listed hawk/owl spp. • To be significant a site must be used regularly (3 in 5 years) for a minimum of 20 days by the above number of birds. • The habitat for an Eagle winter site is the shoreline forest ecosites directly adjacent to the prime hunting area. 	ABSENT- There were no indicator species documented during the field investigation and no stick nests were observed. Raptor wintering habitat is not considered present within the Study Area. Suitable habitat may be found further north of the Project where larger woodland surrounded by agricultural fields are present.

HABITAT TYPE	INDICATOR SPECIES	ELC ECOSITE CODES	HABITAT CRITERIA	ASSESSMENT DETAILS
Bat Hibernacula	Big Brown Bat, Tri-coloured Bat	<p><u>Swamp</u> – SWD, SWM or SWC</p> <p><u>Crevice and Cave</u> – CCR1, CCR2, CCA1, CCA2</p> <p><u>Note:</u> buildings are not considered to be SWH.</p>	<ul style="list-style-type: none"> Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”. <p>Candidate SWH Criteria</p> <ul style="list-style-type: none"> Hibernacula may be found in abandoned caves, horizontal mine shafts (adits), abandoned underground foundations and areas of limestone bedrock with solution channels known as Karsts. Active mine sites should not be considered as SWH. The locations and site characteristics of bat hibernacula are relatively poorly known. <p>Confirmed SWH Criteria (Field Studies confirm):</p> <ul style="list-style-type: none"> All sites with confirmed hibernating bats are SWH. The area includes 200-m radius around the entrance of the hibernaculum for most developments and 1000-m for wind farms. Studies are to be conducted during the peak swarming period (Aug. – Sept.). Surveys should be conducted following methods outlined in the “Guideline for Wind Power Projects Potential Impacts to Bats and Bat Habitats”. 	<p>ABSENT – No caves, mine shafts, underground foundations or other suitable structures are present in the Study Area.</p>
Bat Maternity Colonies	Big Brown Bat, Silver-haired Bat	<p>Maternity colonies considered SWH are found in forested Ecosites.</p> <p>All ELC ecosites in ELC community Series:</p> <p><u>Forest</u> – FOD, FOM</p> <p><u>Swamp</u> – SWD, SWM</p>	<p>Candidate SWH Criteria</p> <ul style="list-style-type: none"> Maternity colonies can be found in tree cavities, vegetation and often in buildings (buildings are not considered to be SWH). Maternity roosts are not found in caves and mines in Ontario. Maternity colonies located in Mature deciduous or mixed forest stands with >10/ha large diameter (>25 cm dbh) wildlife trees. Female Bats prefer wildlife trees (snags) in early stages of decay class 1 -3 or classes 1 or 2. Northern Myotis prefer contiguous tracts of older forest cover for foraging and roosting in snags and trees. Silver-haired Bats prefer older mixed or deciduous forest and form maternity colonies in tree cavities and small hollows. Older forest areas with at least 21 snags/ha are preferred. <p>Confirmed SWH Criteria (Field Studies confirm):</p> <ul style="list-style-type: none"> Maternity colonies with confirmed use by: <ul style="list-style-type: none"> >10 Big Brown Bats >5 Adult female Silver-haired Bats The area of the habitat includes the entire woodland or the forest stand ELC Ecosite containing the maternity colonies. Evaluation methods for maternity colonies should be conducted following methods outlined in the “Guideline for Wind Power Projects Potential Impacts to Bats and Bat Habitats”. 	<p>ABSENT –The woodlands within the Study Area are primarily successional communities or do not provide sufficient snag trees to support this habitat type. Therefore, this habitat type is not considered present.</p>
Turtle Wintering Areas	<p>Midland Painted Turtle</p> <p><u>Special Concern:</u></p> <p>Northern Map Turtle Snapping Turtle</p>	<p>Snapping and Midland Painted Turtles</p> <p><u>Swamp</u> – SW</p> <p><u>Marsh</u> – MA</p> <p><u>Open Water</u> – OA</p> <p><u>Shallow Water</u> – SA</p> <p><u>Open Fen</u> – FEO</p> <p><u>Open Bog</u> – BOO</p> <p>Northern Map Turtle; Open Water areas such as deeper rivers or streams and lakes with current can also be used as over-wintering habitat.</p>	<p>Candidate SWH Criteria</p> <ul style="list-style-type: none"> For most turtles, wintering areas are in the same general area as their core habitat. Water has to be deep enough not to freeze and have soft mud substrates. Over-wintering sites are permanent waterbodies, large wetlands, and bogs or fens with adequate Dissolved Oxygen. Man made storage ponds such as sewage lagoons or storm water ponds should not be considered SWH. <p>Confirmed SWH Criteria (Field Studies confirm):</p> <ul style="list-style-type: none"> Presence of 5 or more over-wintering Midland Painted Turtles is significant. One or more Northern Map Turtle or Snapping Turtle over-wintering within a wetland is significant. The mapped ELC ecosite area with the over wintering turtles is the SWH. If the hibernation site is within a stream or river, the deep-water pool where the turtles are over wintering is the SWH. Over wintering areas may be identified by searching for congregations (Basking Areas) of turtles on warm, sunny days during the fall (Sep. – Oct) or spring (Mar. - April). Congregation of turtles is more common where wintering areas are limited and therefore significant. 	<p>CANDIDATE – The shallow aquatic community associated with Powell Drain may provide overwintering habitat for turtles. Studies would be required to confirm the significance of this habitat type.</p> <p>See Figure 6, Appendix A.</p>

HABITAT TYPE	INDICATOR SPECIES	ELC ECOSITE CODES	HABITAT CRITERIA	ASSESSMENT DETAILS
Reptile Hibernaculum	Eastern Gartersnake, Northern Watersnake, Northern Red-bellied Snake, Northern Brownsnake, Smooth Green Snake, Northern Ring-necked Snake Special Concern: Milksnake, Eastern Ribbonsnake	Habitat may be found in any ecosite other than very wet ones. Talus, Rock Barren, Crevice, Cave, and Alvar sites may be directly related to these habitats. Observations or congregations of snakes on sunny warm days in the spring or fall is a good indicator.	Candidate SWH Criteria <ul style="list-style-type: none"> For snakes, hibernation takes place in sites located below frost lines in burrows, rock crevices and other natural or naturalized locations. The existence of features that go below frost line; such as rock piles or slopes, old stone fences, and abandoned crumbling foundations assist in identifying candidate SWH. Areas of broken and fissured rock are particularly valuable since they provide access to subterranean sites below the frost line. Wetlands can also be important over-wintering habitat in conifer or shrub swamps and swales, poor fens, or depressions in bedrock terrain with sparse trees or shrubs with sphagnum moss or sedge hummock ground cover. Confirmed SWH Criteria (Field Studies confirm): <ul style="list-style-type: none"> Presence of snake hibernacula used by a minimum of five individuals of a snake sp. or; individuals of two or more snake spp. Congregations of a minimum of five individuals of a snake sp. or; individuals of two or more snake spp. near potential hibernacula (e.g. foundation or rocky slope) on sunny warm days in Spring (Apr/May) and Fall (Sept/Oct). Note: If there are Special Concern species present then the site is SWH. Note: Sites for hibernation possess specific habitat parameters (e.g. temperature, humidity, etc.) and consequently are used annually, often by many of the same individuals of a local population. Other critical life processes (e.g. mating) often take place in close proximity to hibernacula. As such, the feature in which the hibernacula is located plus a 30-m radius is the SWH. 	ABSENT- No concentrations of snakes were observed during visual encounter surveys or other field investigations. There were no burrows, fissures or rock piles observed that would support reptile hibernaculum.
Colonially – Nesting Bird Breeding Habitat (Bank and Cliff)	Cliff Swallow, Northern Rough – winged Swallow (this species is not colonial but can be found in Cliff Swallow colonies).	Eroding banks, sandy hills, borrow pits, steep slopes, and sand piles. Cliff faces, bridge abutments, silos, barns. Habitat found in the following ecosites: <u>Cultural Meadow</u> – CUM1 <u>Cultural Thicket</u> – CUT1, THD <u>Cultural Savannah</u> – CUS1 <u>Bluff</u> – BL01, BLS1, BLT1 <u>Cliff</u> – CLO1, CLS1, CLT1	Candidate SWH Criteria <ul style="list-style-type: none"> Any site or areas with exposed soil banks, undisturbed or naturally eroding that is not a licensed/permitted aggregate area. Does not include man-made structures (bridges or buildings) or recently (2 years) disturbed soil areas, such as berms, embankments, and soil or aggregate stockpiles. Does not include a licensed/permitted Mineral Aggregate Operation. Confirmed SWH Criteria (Field Studies confirm): <ul style="list-style-type: none"> Presence of 1 or more nesting sites with 8 or more cliff swallow pairs or 50 bank swallow pairs and rough-winged swallow pairs during the breeding season. A colony identified as SWH will include a 50m radius habitat area from the peripheral nests. Field surveys to observe and count swallow nests are to be completed during the breeding season (May-July). Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”. 	ABSENT – Although Cliff Swallows were observed foraging over the study area during breeding bird surveys, no nesting sites were located in the study area. No suitable banks or cliffs are present in the Study Area.
Colonially – Nesting Bird Breeding Habitat (Trees/Shrubs)	Great Blue Heron, Black-crowned Night-Heron, Great Egret, Green Heron	<u>Swamp</u> – SWM2, SWM3, SWM5, SWM6, SWD1, SWD2, SWD3, SWD4, SWD5, SWD6, SWD7 <u>Fen</u> – FET1	Candidate SWH Criteria <ul style="list-style-type: none"> Nests in live or dead standing trees in wetlands, lakes, islands and peninsulas. Shrubs and occasionally emergent vegetation may also be used. Most nests in trees are 11 to 15 m from ground, near the top of the tree. Confirmed SWH Criteria (Field Studies confirm): <ul style="list-style-type: none"> Presence of 5 or more active nests of Great Blue Heron. The edge of the colony and a minimum 300 m area of habitat or extent of the Forest Ecosite containing the colony or any island <15.0 ha with a colony is the SWH. Confirmation of active heronries must be achieved through site visits conducted during the nesting season (April to August) or by evidence such as the presence of fresh guano, dead young and/or eggshells. 	ABSENT –No heronries were observed in the Study Area during breeding bird surveys.
Colonially – Nesting Bird Breeding Habitat (Ground)	Herring Gull, Great Black-backed Gull, Little Gull, Ring-billed Gull, Common Tern, Caspian Tern, Brewer’s Blackbird	Any rocky island or peninsula (natural or artificial) within a lake or large river. Close proximity to watercourses in open fields or pastures with scattered trees or shrubs (Brewer’s Blackbird). <u>Meadow Marsh</u> – MAM1-6 <u>Shallow Marsh</u> – MAS1-3 <u>Cultural Meadow</u> – CUM <u>Cultural Thicket</u> – CUT, THD <u>Cultural Savannah</u> – CUS	Candidate SWH Criteria <ul style="list-style-type: none"> Nesting colonies of gulls and terns are on islands or peninsulas (natural or artificial) associated with open water or in marshy areas, lakes or large rivers (two-lined on a 1: 50,000 NTS map). Brewers Blackbird colonies are found loosely on the ground or in low bushes in close proximity to streams and irrigation ditches within farmlands. Confirmed SWH Criteria (Field Studies confirm): <ul style="list-style-type: none"> Presence of >25 active nests for Herring Gulls or Ring-billed Gulls, >5 active nests for Common Tern or >2 active nests for Caspian Tern. Presence of 5 or more pairs for Brewer’s Blackbird. Any active nesting colony of one or more Little Gull and Great Black-backed Gull is significant. The edge of the colony and a minimum 150 m area of habitat, or the extent of the ELC ecosites containing the colony or any island <3.0 ha with a colony is the SWH. Studies would be done during May/June when actively nesting. Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”. 	ABSENT – No nests belonging to any of the listed bird species were identified in the Study Area during breeding bird surveys.

HABITAT TYPE	INDICATOR SPECIES	ELC ECOSITE CODES	HABITAT CRITERIA	ASSESSMENT DETAILS
Migratory Butterfly Stopover Areas	Painted Lady, Red Admiral <u>Special Concern:</u> Monarch	Combination of ELC Community Series; need to have present one Community Series from each landclass: Field and Forest <u>Cultural Meadow</u> – CUM <u>Cultural Thicket</u> – CUT, THD <u>Cultural Savannah</u> – CUS <u>Forest:</u> FOC, FOD, FOM <u>Cultural Plantation</u> – CUP Anecdotally, a candidate site for butterfly stopover will have a history of butterflies being observed.	Candidate SWH Criteria <ul style="list-style-type: none"> A butterfly stopover area will be a minimum of 10 ha in size with a combination of field and forest habitat present, and will be located within 5 km of Lake Ontario. The habitat is typically a combination of field and forest, and provides the butterflies with a location to rest prior to their long migration south. The habitat should not be disturbed, fields/meadows with an abundance of preferred nectar plants and woodland edge providing shelter are requirements for this habitat. Staging areas usually provide protection from the elements and are often spits of land or areas with the shortest distance to cross the Great Lakes. Confirmed SWH Criteria (Field Studies confirm): <ul style="list-style-type: none"> The presence of Monarch Use Days (MUD) during fall migration (Aug/Oct). MUD is based on the number of days a site is used by Monarchs, multiplied by the number of individuals using the site. Numbers of butterflies can range from 100-500/day, significant variation can occur between years and multiple years of sampling should occur. MUD of >5000 or >3000 with the presence of Painted Ladies or White Admiral's is to be considered significant. 	ABSENT – The Study Area is not located within 5 km of Lake Erie and is therefore not eligible to be significant migratory butterfly stopover habitat.
Landbird Migratory Stopover Areas	All migratory songbirds. Canadian Wildlife Service Ontario website: http://www.ec.gc.ca/nature/default.asp?lang=En&n=421B7A9D-1 All migrant raptors species: Ontario Ministry of Natural Resources: Fish and Wildlife Conservation Act, 1997. Schedule 7: Specially Protected Birds (Raptors).	All Ecosites associated with these ELC Community Series; <u>Forest</u> – FOC, FOM, FOD <u>Swamp</u> – SWC, SWM, SWD	Candidate SWH Criteria <ul style="list-style-type: none"> Woodlots need to be >5 ha in size and within 5 km of Lake Erie and Lake Ontario. If woodlands are rare in an area of shoreline, woodland fragments 2-5 ha can be considered for this habitat. If multiple are located along the shoreline those woodlands <2km from Lake Ontario are more significant. Sites have a variety of habitats; forest, grassland and wetland complexes. The largest sites are more significant. Woodlots and forest fragments are important habitats to migrating birds, these features located along the bank and located within 5km of Lake Erie and Ontario are Candidate SWH. Confirmed SWH Criteria (Field Studies confirm): <ul style="list-style-type: none"> Use of the woodlot by >200 birds/day and with >35 spp with at least 10 bird spp. recorded on at least 5 different survey dates. This abundance and diversity of migrant bird species is considered above average and significant. Studies should be completed during spring (Apr./May) and fall (Aug/Oct) migration using standardized assessment techniques. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects." 	ABSENT – The study area is not located within 5 km of Lake Erie and is therefore not eligible to be significant landbird migratory stopover habitat.
Deer Winter Congregation Areas	White-tailed Deer	All Forested Ecosites with these ELC Community Series; <u>Forest</u> – FOC, FOM, FOD <u>Swamp</u> – SWC, SWM, SWD Conifer plantations much smaller than 50 ha may also be used.	Candidate SWH Criteria <ul style="list-style-type: none"> Woodlots need to be >100 ha in size. Or if woodlots are rare in a planning area woodlots > 50 ha. Deer movement during winter in the southern areas of Eco-region 7E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands. Large woodlots >100ha and up to 1500 ha are known to be used annually by densities of deer that range from 0.1-1.5 deer/ha Woodlots with high densities of deer due to artificial feeding are not significant. Confirmed SWH Criteria <ul style="list-style-type: none"> Deer management is an MNRF responsibility, deer winter congregation areas considered significant will be mapped by MNRF. Use of the woodlot by white-tailed deer will be determined by MNRF, all woodlots exceeding the area criteria are significant, unless determined not to be significant by MNRF. Studies should be completed during winter (Jan/Feb) when >20 cm of snow is on the ground using aerial survey techniques, ground or road surveys or a pellet count deer density survey. 	ABSENT –MNRF did not indicate that any deer winter congregation areas are present in the Study Area. This habitat type is considered absent.
Rare Vegetation Communities				
Cliffs and Talus Slopes	N/A	Any ELC Ecosite within Community Series: <u>Talus</u> – TAO, TAS, TAT <u>Cliff</u> – CLO, CLS, CLT	Candidate SWH Criteria <ul style="list-style-type: none"> A Cliff is vertical to near vertical bedrock >3 m in height. A Talus Slope is rock rubble at the base of a cliff made up of coarse rocky debris. <ul style="list-style-type: none"> Most cliff and talus slopes occur along the Niagara Escarpment. Confirmed SWH Criteria (Field Studies confirm): <ul style="list-style-type: none"> Confirm any ELC Vegetation Type for Cliffs or Talus Slopes. 	ABSENT – None of the listed Ecosites are present in the Study Area.
Sand Barren	N/A	<u>Sand Barren</u> – SB01, SBS1, SBT1	Candidate SWH Criteria <ul style="list-style-type: none"> Sand Barrens typically are exposed sand, generally sparsely vegetated and caused by lack of moisture, periodic fires and erosion. They have little or no soil and the underlying rock protrudes through the surface. Usually located within other types of natural habitat such as forest or savannah. Vegetation can vary from patchy and barren to tree covered but less than 60%. Confirmed SWH Criteria (Field Studies confirm):	ABSENT – None of the listed Ecosites are present in the Study Area.

HABITAT TYPE	INDICATOR SPECIES	ELC ECOSITE CODES	HABITAT CRITERIA	ASSESSMENT DETAILS
			<ul style="list-style-type: none"> • A sand barren area greater than > 0.5 ha in size. • Sand Barrens containing any characteristic plant species should be considered significant. • ELC Ecosite Area for the sand barren is the SWH • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics). 	
Alvar	<ul style="list-style-type: none"> • <i>Carex crawei</i> • <i>Panicum philadelphicum</i> • <i>Eleocharis compressa</i> • <i>Scutellaria parvula</i> • <i>Trichostema brachiatum</i> 	<p><u>Alvar</u> – ALO1, ALS1, ALT1 <u>Coniferous Forest</u> – FOC1, FOC2 <u>Cultural Meadow</u> – CUM2 <u>Cultural Savannah</u> – CUS2 <u>Cultural Thicket</u> – CUT2-1 <u>Cultural Woodland</u> – CUW2</p>	<p>Candidate SWH Criteria</p> <ul style="list-style-type: none"> • An alvar is typically a level, mostly unfractured calcareous bedrock feature with a mosaic of rock pavements and bedrock overlain by a thin veneer of soil. The hydrology of alvars may be complex, with alternating periods of inundation and drought. Vegetation cover varies from sparse lichen-moss associations to grasslands and shrublands and comprising a number of characteristic or indicator plant. Undisturbed alvars can be phyto- and zoogeographically diverse, supporting many uncommon or are relict plant and animals species. Vegetation cover varies from patchy to barren with a less than 60% tree cover. <p>Confirmed SWH Criteria (Field Studies confirm):</p> <ul style="list-style-type: none"> • An Alvar site > 0.5 ha in size. • Field studies identify one or more of the 6E Plant Indicator species • Site must not be dominated by exotic or introduced species (<50%). The alvar must be in excellent condition and fit in with surrounding landscape with few conflicting land uses. 	ABSENT – None of the listed Ecosites are present in the Study Area.
Old Growth Forest	N/A	<p><u>Forest</u> – FOD, FOC, FOM <u>Swamp</u> – SWD, SWC, SWM</p>	<p>Candidate SWH Criteria</p> <ul style="list-style-type: none"> • Old Growth forests are characterized by exhibiting the greatest number of old-growth characteristics, such as mature forest with large trees that has been undisturbed. Heavy mortality or turnover of over-storey trees resulting in a mosaic of gaps that encourage development of a multi-layered canopy and an abundance of snags and downed woody debris. <p>Confirmed SWH Criteria (Field Studies confirm):</p> <ul style="list-style-type: none"> • Stands 30 ha or greater in size or with at least 10 ha interior habitat assuming 100-m buffer at edge of forest. • Field Studies will determine: • If dominant trees species of the ecosite are >140 years old, then stand is Significant Wildlife Habitat. • The stand will have experienced no recognizable forestry activities. • The area of Forest Ecosites combined to make up the stand is the SWH. 	ABSENT – None of the listed Ecosites are present in the Study Area.
Savannah	N/A	<p><u>Tallgrass Savannah</u> – TPS1, TPS2 <u>Tallgrass Woodland</u> – TPW1, TPW2 <u>Cultural Savannah</u> – CUS2</p>	<p>Candidate SWH Criteria</p> <ul style="list-style-type: none"> • A Savannah is related to tallgrass prairie, but includes trees, which vary from 25 – 60% canopy cover. The open areas between the trees are dominated by prairie species, while forest species are found beneath the tree canopy. • In ecoregion 7E, known Tallgrass Prairie and savannah remnants are scattered between Lake Huron and Lake Erie, near Lake St. Clair, north of and along the Lake Erie shoreline, in Brantford and in the Toronto area (north of Lake Ontario). <p>Confirmed SWH Criteria (Field Studies confirm):</p> <ul style="list-style-type: none"> • No minimum size to site though remnant sites such as railway right of ways are not considered to be SWH. • Site must be restored or a natural site. • Field studies confirm one or more of the Savannah indicator species listed in SWHTG Appendix N should be present. • Note: Savannah plant spp. list from Ecoregion 7E should be used. • Area of the ELC Ecosite is the SWH. • Site must not be dominated by exotic or introduced species. 	ABSENT – None of the listed Ecosites are present in the Study Area.
Tallgrass Prairie	N/A	<p><u>Open Tallgrass Prairie</u> – TPO1, TPO2</p>	<p>Candidate SWH Criteria</p> <ul style="list-style-type: none"> • Tallgrass Prairie is an open vegetation with less than <25% tree cover, and dominated by prairie species, including grasses. • In ecoregion 7E, known Tallgrass Prairie and savannah remnants are scattered between Lake Huron and Lake Erie, near Lake St. Clair, north of and along the Lake Erie shoreline, in Brantford and in the Toronto area (north of Lake Ontario). <p>Confirmed SWH Criteria (Field Studies confirm):</p> <ul style="list-style-type: none"> • No minimum size to site. • Site must be restored or a natural site. Remnant sites such as railway right of ways are not considered to be SWH. • Field studies confirm one or more of the Tallgrass Prairie Indicator Species listed (used Eco-Region 7E in Appendix N) is a SWH. • Area of the ELC Ecosite is the SWH. • Site must not be dominated (e.g. <50%) by exotic or introduced species. 	ABSENT – None of the listed Ecosites are present in the Study Area.

HABITAT TYPE	INDICATOR SPECIES	ELC ECOSITE CODES	HABITAT CRITERIA	ASSESSMENT DETAILS
Other Rare Vegetation Communities	N/A	<p><u>S1 – Extremely rare</u> – usually 5 or fewer occurrences in the province, or very few remaining hectares.</p> <p><u>S2 – Very rare</u> – usually between 5 and 20 occurrences in the province, or few remaining hectares.</p> <p><u>S3 – Rare to uncommon</u> – usually between 20 and 100 occurrences in the province; may have fewer occurrences, but with some extensive examples remaining.</p>	<ul style="list-style-type: none"> • ELC Ecosite codes that have the potential to be a rare ELC Vegetation Type as outlined in Appendix M. • The OMNRF/NHIC will have up to date listing for rare vegetation communities. • Field studies should confirm if an ELC Vegetation Type is a rare vegetation community based on listing within Appendix M of the SWHTG. • Area of the ELC vegetation type polygon is the SWH. 	ABSENT – None of the listed Ecosites are present in the Study Area.
Specialized Habitat for Wildlife				
Waterfowl Nesting Area	American Black Duck, Northern Pintail Northern Shoveler Gadwall, Blue-winged Teal, Green-winged Teal Wood Duck, Hooded Merganser, Mallard	<p>All upland habitats located adjacent to these wetland ELC Ecosites are Candidate SWH.</p> <p><u>Shallow Marsh</u> – MAS1, MAS2, MAS3 <u>Shallow Water</u> – SAS1, SAM1, SAF1 <u>Meadow Marsh</u> – MAM1, MAM2, MAM3, MAM4, MAM5, MAM6 <u>Swamp</u> – SWT1, SWT2, SWD1, SWD2, SWD3, SWD4</p> <p>Note: includes adjacency to Provincially Significant Wetlands.</p>	<p>Candidate SWH Criteria</p> <ul style="list-style-type: none"> • A waterfowl nesting area extends 120 m from a wetland (>0.5 ha) or a wetland (>0.5ha) and any small wetlands (0.5ha) within 120m or a cluster of 3 or more small (<0.5 ha) wetlands within 120 m of each individual wetland where waterfowl nesting is known to occur. • Upland areas should be at least 120 m wide so that predators such as raccoons, skunks, and foxes have difficulty finding nests. • Wood Ducks, and Hooded Mergansers utilize large diameter trees (>40 cm dbh) in woodlands for cavity nest sites. <p>Confirmed SWH Criteria (Field Studies confirm):</p> <ul style="list-style-type: none"> • Presence of 3 or more nesting pairs for listed species excluding Mallards, or; • Presence of 10 or more nesting pairs for listed species including Mallards. • Any active nesting site of an American Black Duck is considered significant. • Nesting studies should be completed during the spring breeding season (April - June). Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”. • A field study confirming waterfowl nesting habitat will determine the boundary of the waterfowl nesting habitat for the SWH, this may be greater or less than 120 m from the wetland and will provide enough habitat for waterfowl to successfully nest. 	ABSENT – There were no confirmed waterfowl nests documented during the breeding bird surveys. This habitat type is not considered present.
Bald Eagle and Osprey Nesting, Foraging and Perching Habitat	Osprey <u>Special Concern Species</u> Bald Eagle	<p><u>Forest</u> – FOD, FOM, FOC <u>Swamp</u> – SWD, SWM, SWC (directly adjacent to riparian areas – rivers, lakes, ponds and wetlands).</p>	<p>Candidate SWH Criteria</p> <ul style="list-style-type: none"> • Nests are associated with lakes, ponds, rivers or wetlands along treed shorelines, islands, or on structures over water. • Osprey nests are usually at the top of a tree whereas Bald Eagle nests are typically in super canopy trees in a notch within the tree’s canopy. • Nests located on man-made objects such as telephone or hydro poles will not normally be considered as SWH, however the MNRF District retains discretion regarding significance of constructed nesting platforms. <p>Confirmed SWH Criteria (Field Studies confirm):</p> <ul style="list-style-type: none"> • One or more active Osprey or Bald Eagle nests in an area. • Some species have more than one nest in a given area and priority is given to the primary nest with alternate nests included within the area of the SWH. • For an Osprey, the active nest and a 300-m radius around the nest or the contiguous woodland stand is the SWH, maintaining large undisturbed shorelines with large trees within this area is important. • For Bald Eagle the active nest and a 400-800 m radius around the nest is the SWH. Area of the habitat 400-800 m is dependant on the site lines from the nest to the development and inclusion of perching and foraging habitat. • To be significant the site must be used annually. When found inactive the site must be known to be inactive for >= 3 years or suspected of not being used for > 5 years before being considered not significant. • Observational studies to determine nest site use. Perching sites and foraging areas need to be done from early March to mid August. • Evaluation methods to follow “Bird and Bird Habitats: Guidelines or Wind Power Projects”. 	ABSENT – An Osprey and Eagle were observed during field investigations as fly-overs only. There were no nests observed within the areas assessed as part of the field investigations. Habitat for these species is considered absent and not discussed further.
Woodland Raptor Nesting Habitat	Northern Goshawk Cooper’s Hawk Sharp-shinned Hawk, Red-shouldered Hawk, Barred Owl, Broad-winged Hawk	<p>May be found in all forested ELC Ecosites. May also be found in:</p> <p><u>Swamp</u> – SWD, SWC (directly adjacent to riparian areas – rivers, lakes, ponds and wetlands) SWM <u>Coniferous Plantations</u> – CUP3</p>	<p>Candidate SWH Criteria</p> <ul style="list-style-type: none"> • All natural or conifer plantation woodland/forest stands >30 ha with 4 ha of interior habitat. • Stick nests found in a variety of intermediate-aged to mature. conifer, deciduous or mixed forests within tops or crotches of trees. Species such as Coopers Hawk nest along forest edges sometimes on peninsulas or small off-shore islands. • In disturbed sites, nests may be used again, or a new nest may be in close proximity to old nest. <p>Confirmed SWH Criteria (Field Studies confirm):</p> <ul style="list-style-type: none"> • Presence of 1 or more occupied nests from species list is considered significant. • Red-shouldered Hawk and Northern Goshawk – A 400-m radius around the nest or 28 ha of suitable habitat is the SWH. • Barred Owl – A 200-m radius around the nest is the SWH. 	ABSENT – None of the requisite ELC communities within the Study Area meet the size requirement to support woodland raptor nesting habitat. As such, this habitat type is considered absent and not discussed further.

HABITAT TYPE	INDICATOR SPECIES	ELC ECOSITE CODES	HABITAT CRITERIA	ASSESSMENT DETAILS
			<ul style="list-style-type: none"> Broad-winged Hawk, Coopers Hawk, Great Horned Owl, Red-tailed Hawk – A 100-m radius around the nest is the SWH. Sharp-Shinned Hawk – A 50-m radius around the nest is the SWH. Conduct field investigations from mid-March to end of May. The use of call broadcasts can help in locating territorial (courting/ nesting) raptors and facilitate the discovery of nests by narrowing down the search area. 	
Turtle Nesting Areas	Midland Painted Turtle <u>Special Concern Species:</u> Northern Map Turtle Snapping Turtle	Exposed mineral soil (sand or gravel) areas adjacent (<100 m) or within the following ecosites: <u>Shallow Marsh</u> – MAS1, MAS2, MAS3 <u>Shallow Water</u> – SAS1, SAM1, SAF1 <u>Open Bog</u> – B001 <u>Open Fen</u> – FE01	Candidate SWH Criteria <ul style="list-style-type: none"> Best nesting habitat for turtles are close to water and away from roads and sites less prone to loss of eggs by predation from skunks, raccoons or other animals. For an area to function as a turtle-nesting area, it must provide sand and gravel that turtles are able to dig in and are located in open, sunny areas. Nesting areas on the sides of municipal or provincial road embankments and shoulders are not SWH. Sand and gravel beaches adjacent to undisturbed shallow weedy areas of marshes, lakes, and rivers are most frequently used. Confirmed SWH Criteria (Field Studies confirm): <ul style="list-style-type: none"> Presence of 5 or more nesting Midland Painted Turtles is a SWH. The area or collection of sites within an area of exposed mineral soils where the turtles nest, plus a radius of 30-100 m around the nesting area dependent on slope, riparian vegetation and adjacent land use is the SWH. Travel routes from wetland to nesting area are to be considered within the SWH. As part of the 30-100 m habitat. One or more Northern Map Turtle or Snapping Turtle nesting is a SWH. Field investigations should be conducted in prime nesting season typically late spring to early summer. Observational studies observing the turtles nesting is the recommended method. 	<p>CANDIDATE – The portion of the PSW south of Sunningdale Road East has the potential to support turtle nesting habitat. A snapping turtle was observed near Powell Drain during the July 2019 field investigations.</p> <p>See Figure 6, Appendix A.</p>
Seeps and Springs	Wild Turkey, Ruffed Grouse, Spruce Grouse, White-tailed Deer, Salamander spp.	Seeps/Springs are areas where groundwater comes to the surface. Often, they are found within headwater areas within forested habitats. Any forested Ecosite within the headwater areas of a stream could have seeps/springs.	Candidate SWH Criteria <ul style="list-style-type: none"> Any forested area (with <25% meadow/field/pasture) within the headwaters of a stream or river system. Seeps and springs are important feeding and drinking areas especially in the winter will typically support a variety of plant and animal species. Confirmed SWH Criteria (Field Studies confirm): <ul style="list-style-type: none"> Presence of a site with 2 or more seeps/springs should be considered SWH. The area of ELC forest ecosite containing the seeps/springs is the SWH. The protection of the function of the feature considering the slope, vegetation, height of trees and groundwater condition need to be considered in delineation the habitat. 	ABSENT – No seeps or springs were identified in the Study Area through field or background studies.
Amphibian Breeding Habitat (Woodland)	Eastern Newt, Blue-spotted Salamander, Spotted Salamander, Gray Treefrog, Spring Peeper, Western Chorus Frog, Wood Frog	<u>Forest</u> – FOC, FOM FOD <u>Swamp</u> – SWC SWM SWD	Candidate SWH Criteria <ul style="list-style-type: none"> Presence of a wetland, lake or pond of area >500 m2 (about 25-m diameter) within or adjacent (within 120 m) to a woodland (no minimum size). The wetland, lake or pond and surrounding forest, would be the Candidate SWH. Some small wetlands may not be mapped and may be important breeding pools for amphibians. Woodlands with permanent ponds or those containing water in most years until mid-July are more likely to be used as breeding habitat. Confirmed SWH Criteria (Field Studies confirm): <ul style="list-style-type: none"> Presence of breeding population of 1 or more of the listed newt/salamander or 2 or more with listed frog species with at least 20 individuals (adults, juveniles, eggs/larval masses) or 2 or more of the listed frog species with call codes of 3. A combination of observational study and call count surveys will be required during the Spring (March-June) when amphibians are concentrated around suitable breeding habitat within or near the woodland/wetland. The habitat is the wetland area plus a 230m radius of woodland area. If a wetland area is adjacent to a woodland, a travel corridor connecting the wetland to the woodland is to be included in the habitat. 	ABSENT – This habitat type is not considered present as none of the woodlands within the Study Area had vernal pools. The woodlands where amphibians were documented were associated with swamp communities. These swamp communities were considered with respect to Amphibian Breeding Habitat (Wetlands).
Amphibian Breeding Habitat (Wetlands)	Eastern Newt, American Toad Spotted, Salamander, Four-toed Salamander, Blue-spotted Salamander, Gray Treefrog, Western Chorus Frog, Northern Leopard Frog, Pickerel Frog, Green Frog, Mink Frog, Bullfrog	Typically, these wetland ecosites will be isolated (>120 m) from woodland ecosites, however, larger wetlands containing predominantly aquatic species (e.g., Bull Frog) may be adjacent to woodlands. <u>Swamp</u> – SW <u>Marsh</u> – MA <u>Fen</u> – FE <u>Bog</u> – BO <u>Open Water</u> – OA	Candidate SWH Criteria <ul style="list-style-type: none"> Wetlands > 500 m2 (about 25-m diameter), supporting high species diversity are significant; some small or ephemeral habitats may not be identified on MNR mapping and could be important amphibian breeding habitats. Presence of shrubs and logs increase significance of pond for some amphibian species because of available structure for calling, foraging, escape and concealment from predators. Bullfrogs require permanent water bodies with abundant emergent vegetation. Confirmed SWH Criteria (Field Studies confirm): <ul style="list-style-type: none"> Presence of breeding population of 1 or more of the listed salamander species or 3 or more of the listed frog or toad species with at least 20 breeding individuals (adults, juveniles, eggs/larval masses) or Wetland with confirmed breeding Bullfrogs is significant. The ELC ecosite area and the shoreline are the SWH. A combination of observational study and call count surveys will be required during the Spring (March-June) when amphibians are concentrated around suitable breeding habitat within or near the wetlands. 	<p>CANDIDATE – Amphibian call surveys were completed within the marsh communities found in the Study Area. The only community that had multiple species documented was the PSW and adjacent dugout pond and marsh south of Sunningdale Road East on the west side of Adelaide Road North; Three species were documented and none were at a call code of 3. The number of individuals for each species was not determined. For the swamp communities, only one species was recorded and at a call code of 3. As a conservative approach, regardless of breeding activity results, all wetlands will be considered cSWH given how loud the traffic was during the surveys and the difficulty to hear calls.</p>

HABITAT TYPE	INDICATOR SPECIES	ELC ECOSITE CODES	HABITAT CRITERIA	ASSESSMENT DETAILS
		<u>Shallow Water</u> - SA	<ul style="list-style-type: none"> If a SWH is determined for Amphibian Breeding Habitat (Wetlands) then Amphibian Movement Corridors are to be considered (see Table 3.10, Animal Movement Corridors). 	See Figure 6, Appendix A.
Woodland Area- Sensitive Bird Breeding Habitat	Yellow-bellied Sapsucker, Red-breasted Nuthatch, Veery Blue-headed Vireo, Northern Parula, Black-throated Green Warbler, Blackburnian Warbler, Black-throated Blue Warbler	All Ecosites associated with these ELC Community Series: <u>Forest</u> - FOC, FOM FOD <u>Swamp</u> - SWC SWM SWD	<p>Candidate SWH Criteria</p> <ul style="list-style-type: none"> Habitats where interior forest breeding birds are breeding, typically large mature (>60 yrs. old) forest stands or woodlots >30 ha. Interior forest habitat is at least 100 m from forest edge habitat. <p>Confirmed SWH Criteria (Field Studies confirm):</p> <ul style="list-style-type: none"> Presence of nesting or breeding pairs of 3 or more of the listed wildlife species. Note: any site with breeding Cerulean Warblers or Canada Warblers is to be considered SWH Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects". 	ABSENT - Interior forest habitat is not present in the Study Area.
Habitat for Species of Conservation Concern (SoCC)				
Marsh Breeding Bird Habitat	American Bittern, Virginia Rail Sora, Common Moorhen, American Coot Pied-billed Grebe, Marsh Wren, Sedge Wren, Common Loon, Green Heron, Trumpeter Swan <u>Special Concern:</u> Black Tern Yellow Rail	<u>Marsh</u> - MAM1-6 <u>Shallow Water</u> - SAS1, SAM1, SAF1 <u>Fen</u> - FE01 <u>Bog</u> - BO01 For Green Heron: All SW, MA and CUM1 sites.	<p>Candidate SWH Criteria</p> <ul style="list-style-type: none"> Nesting occurs in wetlands. All wetland habitat is to be considered as long as there is shallow water with emergent aquatic vegetation present. For Green Heron, habitat is at the edge of water such as sluggish streams, ponds and marshes sheltered by shrubs and trees. Less frequently, it may be found in upland shrubs or forest a considerable distance from water. <p>Confirmed SWH Criteria (Field Studies confirm):</p> <ul style="list-style-type: none"> Presence of 5 or more nesting pairs of Sedge Wren or Marsh Wren or breeding by any combination of 4 or more of the listed species. Note: any wetland with breeding of 1 or more Trumpeter Swans, Black Terns, Green Heron or Yellow Rail is SWH. Area of the ELC ecosite is the SWH. Breeding surveys should be done in May/June when these species are actively nesting in wetland habitats. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects". 	ABSENT - Breeding bird surveys did not identify any of the listed species in the Study Area. This habitat type is considered not present.
Open Country Bird Breeding Habitat	Upland Sandpiper, Grasshopper, Sparrow, Vesper Sparrow, Northern Harrier, Savannah Sparrow <u>Special Concern:</u> Short-eared Owl	<u>Cultural Meadow</u> - CUM1, CUM2	<p>Candidate SWH Criteria</p> <ul style="list-style-type: none"> Large grasslands areas (includes natural and cultural fields and meadows) >30 ha. Field/meadow not Class 1 or 2 agricultural lands, and not being actively used for farming (i.e. no row cropping or intensive hay or livestock pasturing in the last 5 years). Grassland sites considered significant should have a history of longevity, either abandoned fields, mature hayfields and pasturelands that are at least 5 years or older. The indicator bird species are area sensitive requiring larger field/meadow areas than the common Field/meadow species. <p>Confirmed SWH Criteria (Field Studies confirm):</p> <ul style="list-style-type: none"> Presence of nesting or breeding of 2 or more of the listed species. A field with 1 or more breeding Short-eared Owls is to be considered SWH. The area of SWH is the contiguous ELC ecosite field areas. Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects". 	ABSENT - Large grasslands >30 ha are not present within the Study Area.
Shrub/Early Successional Bird Breeding Habitat	Indicator Spp: Brown Thrasher, Clay-coloured Sparrow, Common Spp. Field Sparrow, Black-billed Cuckoo, Eastern Towhee, Willow Flycatcher <u>Special Concern:</u> Yellow-breasted Chat Golden-winged Warbler	<u>Cultural Thicket</u> - CUT1, CUT2, THD <u>Cultural Savannah</u> - CUS1, CUS2 <u>Cultural Woodland</u> - CUW1, CUW2 Patches of shrub ecosites can be complexed into a larger habitat for some bird species.	<p>Candidate SWH Criteria</p> <ul style="list-style-type: none"> Large field areas succeeding to shrub and thicket habitats >10 ha in size. Shrub land or early successional fields, not class 1 or 2 agricultural lands, not being actively used for farming (i.e. no row-cropping, haying or live-stock pasturing in the last 5 years). Shrub thicket habitats (>10 ha) are most likely to support and sustain a diversity of these species. Shrub and thicket habitat sites considered significant should have a history of longevity, either abandoned fields or pasturelands. <p>Confirmed SWH Criteria (Field Studies confirm):</p> <ul style="list-style-type: none"> Presence of nesting or breeding of 1 indicator species and at least 2 of the common species. A field with breeding Yellow-breasted Chat or Golden-winged Warbler is to be considered as SWH. The area of the SWH is the contiguous ELC ecosite area. Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects". 	ABSENT - Large successional habitat >10 ha is not present within the Study Area. None of the indicator species were documented during the breeding bird surveys.

HABITAT TYPE	INDICATOR SPECIES	ELC ECOSITE CODES	HABITAT CRITERIA	ASSESSMENT DETAILS
<p>Terrestrial Crayfish</p>	<p>Chimney or Digger Crayfish; (<i>Fallicambarus fodiens</i>)</p> <p>Devil Crayfish or Meadow Crayfish; (<i>Cambarus Diogenes</i>)</p>	<p><u>Meadow Marsh</u> – MAM1-6 <u>Shallow Marsh</u> – MAS1-3 <u>Swamp</u> – SWD, SWT, SWM</p> <p>CUM1 with inclusions of above meadow marsh ecosites can be used by terrestrial crayfish.</p>	<p>Candidate SWH Criteria</p> <ul style="list-style-type: none"> Wet Meadow and edges of shallow marshes (no minimum size) should be surveyed for terrestrial crayfish. Constructs burrows in marsh, mudflats, meadow, the ground can't be too moist. Can often be found far from water. Both species are semi-terrestrial burrower, which spends most of its life within burrows consisting of a network of burrows, usually the soil is not too moist so the tunnel is well formed. <p>Confirmed SWH Criteria (Field Studies confirm):</p> <ul style="list-style-type: none"> Presence of 1 or more individuals of species listed or their chimneys (burrows) in suitable marsh meadow or terrestrial sites. The area of the ELC polygon is the SWH. Surveys should be done in adult breeding season (April to late June) and in late summer-early August in nearby temporary or permanent water for juveniles. 	<p>CONFIRMED – Terrestrial crayfish habitat was confirmed by NRSI in 2016 in the marsh community at the corner of Sunningdale Road East and Adelaide Street North. One burrow was documented in 2016 which was not confirmed during the 2019 field investigations. Although not confirmed, conditions remain suitable for this species and is therefore, assumed present.</p> <p>CANDIDATE – Although terrestrial crayfish were not documented during the 2019 field investigations, this species is known to occur within the Study Area and suitable habitat is present in the PSW. As a result, the PSW will be considered candidate habitat for terrestrial crayfish. Targeted surveys would be required to confirm presence/absence.</p> <p>See Figure 6, Appendix A.</p>
<p>Special Concern and Rare Wildlife Species</p> <p>All Special Concern and Provincially Rare (S1-S3, SH) plant and animal species. Lists of these species are tracked by the Natural Heritage Information Centre (NHIC).</p>	<p>All Special Concern and Provincially Rare (S1, S2, S3, SH) plant and animal species. Lists of these species are tracked by the NHIC</p>	<p>All plant and animal element occurrences (EOs) within a 1 km or 10 km grid.</p> <p>Older EOs were recorded prior to GPS being available, therefore location information may lack accuracy.</p>	<p>Candidate SWH Criteria</p> <ul style="list-style-type: none"> When an element occurrence is identified within a 1 or 10 km grid for a Special Concern or provincially Rare species; linking candidate habitat on the site needs to be completed to ELC Ecosites <p>Confirmed SWH Criteria (Field Studies confirm):</p> <ul style="list-style-type: none"> Assessment/inventory of the site for the identified special concern or rare species needs to be completed during the time of year when the species is present or easily identifiable. The area of the habitat to the finest ELC scale that protects the habitat form and function is the SWH, this must be delineated through detailed field studies. The habitat needs to be easily mapped and cover an important life stage component for a species e.g. specific nesting habitat or foraging habitat. 	<p>The SoCC screening is provided in Table F-2 of this Appendix.</p> <p>CONFIRMED - The following species were confirmed present within the Study Area:</p> <ul style="list-style-type: none"> Snapping Turtle (PSW associated with Powell Drain). A mature Snapping Turtle was observed in the Subject Lands, in the upstream floodplain of Powell Drain, west of Adelaide Street in July 2019. The muddy flats observed in this section of the drain could provide overwintering habitat for the species, and the woody debris and occasional boulder provide potential basking habitat. Monarch was observed incidentally throughout the Study Area. Habitat for this species is considered for the meadow communities north of Sunningdale Road East. <p>CANDIDATE - The following species or their habitat have the potential to occur within the Study Area:</p> <ul style="list-style-type: none"> Midland Painted Turtle and Northern Map Turtle (PSW associated with Powell Drain) <p>See Figure 6, Appendix A.</p>
<p>Animal Movement Corridors</p>				
<p>Amphibian Movement Corridors</p>	<p>Eastern Newt, American Toad, Spotted Salamander, Four-toed Salamander, Blue-spotted Salamander, Gray Treefrog, Western Chorus Frog, Northern Leopard Frog, Pickerel Frog, Green Frog, Mink Frog, Bullfrog</p>	<p>Corridors may be found in all ecosites associated with water.</p> <p>Corridors will be determined based on identifying the significant breeding habitat for these species in Table 1.1.</p>	<p>Candidate SWH Criteria</p> <ul style="list-style-type: none"> Movement corridors between breeding habitat and summer habitat. Movement corridors must be determined when Amphibian Breeding Habitat (Wetland) is confirmed as SWH. <p>Confirmed SWH Criteria</p> <ul style="list-style-type: none"> Field Studies must be conducted at the time of year when species are expected to be migrating or entering breeding sites. Corridors should consist of native vegetation, roadless area, no gaps such as fields, waterways or bodies, and undeveloped areas are most significant. Corridors should be at least 200 m wide with gaps <20 m and if following riparian area with at least 15 m of vegetation on both sides of waterway. Shorter corridors are more significant than longer corridors; however, amphibians must be able to get to and from their summer and breeding habitat. Corridors should have several layers of vegetation and should be unbroken by roads, waterways or bodies and undeveloped areas are most significant. 	<p>CANDIDATE – Potential amphibian movement corridors have been identified within the PSW units located north and south of Sunningdale Road East.</p> <p>See Figure 6, Appendix A.</p>

Table F-2: SoCC Assessment

Species		SAR Status		Conservation Rank and Rarity Status					Confirmed During Field Investigations	Assessment
Common Name	Scientific Name	National (SARA)	Provincial (SARO List, ESA)	National (COSEWIC)	Global (G-rank)	Provincial (S-rank)	Provincial Conservation Priorities ¹	National Conservation Priorities ^{2,3}		
REPTILES										
Eastern Milksnake	<i>Lampropeltis triangulum</i>	SC, Schedule 1		SC	G5	S4			N	Unlikely - Not confirmed during field investigations and is not anticipated to be found within the Project. Although the background review identified records from 2013 within the Study Area, the project is unlikely to encounter this species.
Midland Painted Turtle	<i>Chrysemys picta marginata</i>			SC	G5T5	S4			N	High - The background review has recent records of Midland Painted Turtle and Northern Map Turtle within the map square that overlaps the Study Area. Powell Drain and the associated PSW have the potential to provide habitat for these species.
Northern Map Turtle	<i>Graptemys geographica</i>	SC, Schedule 1	SC	SC	G5	S3			N	
Snapping Turtle	<i>Chelydra serpentina</i>	SC, Schedule 1	SC	SC	G5	S3			Y	Confirmed - A confirmed snapping turtle was observed in the upstream floodplain of Powell Drain, west of Adelaide Street in July 2019.
BIRDS										
Urban/Suburban Habitat										
Bald Eagle	<i>Haliaeetus leucocephalus</i>		SC		G5	S2N, S4B	Recovery Objective ¹		Y	Unlikely - This species was observed as a fly-over only. No stick nests were observed.
Killdeer	<i>Charadrius vociferus</i>				G5	S5B, S5N	Increase ¹	Moderate Concern ³	Y	Confirmed - This species was confirmed during field investigations. This species is tolerant of disturbance and often nests in open areas in urbanized areas, including disturbed areas and construction sites.
Purple Martin	<i>Progne subis</i>				G5	S4B	Increase ¹		N	Unlikely - Not confirmed during field investigations and is not anticipated to be found within the Project.
Grassland Habitat										
Eastern Kingbird	<i>Tyrannus tyrannus</i>				G5	S4B	Increase ¹		N	Unlikely - None of these species were observed during field investigations. There is limited grassland habitat present in the Study Area.
Savannah Sparrow	<i>Passerculus sandwichensis</i>				G5	S4B	Increase ¹		N	
Vesper Sparrow	<i>Pooecetes gramineus</i>				G5	S4B	Increase ¹		N	
Shrub/Successional Habitat										
Brown Thrasher	<i>Toxostoma rufum</i>				G5	S4B	Increase ¹		N	Unlikely - None of these species were confirmed during field investigations.
Eastern Towhee	<i>Pipilo erythrophthalmus</i>				G5	S4B	Increase ¹		N	
Woodland Habitat										
American Woodcock	<i>Scolopax minor</i>				G5	S4B	Increase ¹	High Concern ³	Y	High - These species were observed during the field investigations. Habitat potential is present within the PSW and naturalized areas beyond the Study Area. The Project is not expected to result in direct impacts to these species or their habitat.
Northern Flicker	<i>Colaptes auratus</i>				G5	S4B	Increase ¹		Y	
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>				G5	S5B	Increase ¹		N	Unlikely - This species was not observed during the field investigations. The Study Area has limited habitat for this species as it prefers dense forests. Habitat is present in the woodland east of the Study Area and a portion of the PSW west of the Project.
Eastern Wood-Pewee	<i>Contopus virens</i>	SC, Schedule 1	SC	SC	G5	S4B	Increase ¹		N	Unlikely - This species was not observed during the field investigations and is considered not present.

Species		SAR Status		Conservation Rank and Rarity Status					Confirmed During Field Investigations	Assessment
Common Name	Scientific Name	National (SARA)	Provincial (SARO List, ESA)	National (COSEWIC)	Global (G-rank)	Provincial (S-rank)	Provincial Conservation Priorities ¹	National Conservation Priorities ^{2,3}		
Wetland / Riparian Habitat										
Belted Kingfisher	<i>Ceryle alcyon</i>				G5	S4B	Increase ¹		N	Unlikely - None of these species were confirmed during field investigations.
Black Tern	<i>Chlidonias niger</i>		SC		G4G5	S3B	Recovery Objective ¹	Moderate Concern ²	N	
Green Heron	<i>Butorides virescens</i>				G5	S4B	Increase ¹		N	
Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>				G5	S4B	Increase ¹		N	
Sora	<i>Porzana carolina</i>				G5	S4B	Assess/Maintain ¹	Moderate Concern ²	N	
Spotted Sandpiper	<i>Actitis macularia</i>				G5	S5	Increase ¹	Moderate Concern ³	N	
Wood Duck	<i>Aix sponsa</i>				G5	S5	Increase ¹		N	
INSECTS										
Monarch	<i>Danaus plexippus</i>	SC, Schedule 1	SC	END	G4	S2N, S4B			Y	Confirmed - This species was observed during the field investigations. Habitat for this species includes the cultural meadow communities and anywhere where milkweed is present.

Definitions, Acronyms and Symbols

Global G-rank

- G1:** Critically Imperiled (at very high risk of extinction)
- G2:** Imperiled (at high risk of extinction)
- G3:** Vulnerable (at moderate risk of extinction)
- G4:** Apparently Secure (Uncommon but not rare)
- G5:** Secure (common, widespread and abundant)
- GU:** Unrankable (currently unrankable due to lack of information)
- GNR:** Unranked (global rank not yet assessed)
- GNA:** Not Applicable (species is not a suitable target for conservation activities)
- T:** Denotes that the rank applies to a subspecies or variety
- B:** Breeding
- N:** Non-breeding

COSEWIC: Committee on the Status of Endangered Wildlife in Canada

ESA: Endangered Species Act

SARA: Species at Risk Act

SARO: Species at Risk in Ontario

SARA or ESA designation

- END** - Endangered
- THR** - Threatened
- SC** - Special Concern

- NAR** - Not at Risk

Provincial S-rank

- S1:** Critically Imperiled (i.e. fewer than 5 occurrences in the nation and/or province)
- S2:** Imperiled (i.e. fewer than 20 occurrences in the nation and/or province)
- S3:** Vulnerable (i.e. 20-80 occurrences in the nation and/or province)
- S4:** Apparently Secure (uncommon, but not rare in the nation and/or province)
- S5:** Secure (common, widespread and abundant in the nation and/or province)
- SNA:** Not Applicable (species is not a suitable target for conservation activities)

- SHB:** Breeding is not confirmed in Ontario
- S#S#:** Range Rank (range of uncertainty about the status of the species or community)
- S#?:** Rank is Uncertain
- S?:** Not Ranked Yet
- B:** Breeding migrants/vagrants
- N:** Non-breeding migrants/vagrants

Provincial Conservation Priorities

- Recovery¹** - Species at Risk
- Increase¹** - Population in decline
- Maintain Current¹** - Appears to be stable or increasing

National Conservation Priorities

- High Concern^{2,3}** - Species population is known or thought to be declining
- Moderate Concern^{2,3}** - Species population is either a) declining with moderate threats or disturbance; b) stable with known potential threats and moderate to restricted distributions; or c) relatively small with relatively restricted distributions
- Not Currently At Risk^{2,3}** - All other species for which information was available

Appendix G

Fish Species List

Appendix G – Fish Species

Definitions/References

STATUS

ESA – Ontario *Endangered Species Act*. Species are listed as Endangered (**END**), Threatened (**THR**), and Special Concern (**SC**).

SARA – Canadian *Species at Risk Act*. **END, THR, and SC** categories as above.

COSEWIC – The Committee on the Status of Endangered Wildlife in Canada. **END, THR, and SC** categories as above.

SRANK – Subnational rankings for Ontario: **S1** - extremely rare; **S2** - very rare; **S3** - rare to uncommon; **S4** - common and apparently secure; **S5** - very common and demonstrably secure; **SNA** - not ranked, usually refers to non-native species; **SX** – extirpated; **SH** – historic; **SE** – exotic; **SNR/SU** – unranked, usually due to lack of information.

DATA SOURCES

- 1) Fish records for the Powell Drain tributary of Stoney Creek were provided by the Aylmer Ministry of Natural Resources and Forestry (MNR) office in correspondence from Jason Webb, Management Biologist on October 31, 2018.
- 2) Land Information Ontario (LIO) Ontario Open Data: Aquatic Resources, provided by the MNR. No fish or mussel data was available.
- 3) Fisheries and Oceans Canada (DFO) Aquatic SAR Mapping had no records of at-risk fish and mussel species within the study area.
- 4) Direct observation of fish species by Parsons collected during community surveys in July, 2019.

Appendix H

Species at Risk Assessment

Table H-1: SAR Assessment

Species		SAR Status		Conservation Rank and Rarity Status					Confirmed During Field Investigations (Y/N)	Habitat	Assessment
Common Name	Scientific Name	National (SARA)	Provincial (SARO List, ESA)	National (COSEWIC)	Global (G-rank)	Provincial (S-rank)	Provincial Conservation Priorities ¹	National Conservation Priorities ^{2,3}			
REPTILES											
Blanding's Turtle	<i>Emydoidea blandingii</i>		THR		G4	S3			N	Shallow water marshes, bogs, ponds or swamps, or coves in larger lakes with soft muddy bottoms and aquatic vegetation; basks on logs, stumps, or banks; surrounding natural habitat is important in summer as they frequently move from aquatic habitat to terrestrial habitats; hibernates in bogs; not readily observed (MNRF, 2000)	Unlikely - This species was not confirmed during field investigations and only historical records exist.
Eastern Hog-nosed Snake	<i>Heterodon platirhinos</i>	THR, Schedule 1	THR	THR	G5	S3			N	The Eastern Hog-nosed Snake specializes in hunting and eating toads, and usually only occurs where toads can be found. Eastern Hog-nosed Snakes prefer sandy, well-drained habitats such as beaches and dry forests where they can lay their eggs and hibernate. They use their up-turned snout to dig burrows below the frost line in the sand where eggs are deposited. (Ontario, 2016)	Unlikely - This species was not confirmed during field investigations and only historical records exist.
Queensnake	<i>Regina septemvittata</i>	END, Schedule 1	END	END	G5	S2			N	Inhabits waterbodies such as streams, rivers and lakes where crayfish are abundant. Prefers clear water, rocky or gravel bottoms and areas with abundant cover.	Unlikely - This species was not confirmed during field investigations and only historical records exist.
Spiny Softshell	<i>Apalone spinifera</i>	END, Schedule 1	END	END	G5	S2			N	This species uses highly aquatic habitats during its life cycle and prefers sandy substrates for nesting, shallow soft bottom areas for nursery habitat, deep pools for hibernation, and riffle areas for foraging (MNRF 2018).	Unlikely - This species was not confirmed during field investigations. Habitat potential is not considered within the Study Area. This species may be present within Stoney Creek which is located outside of the Study Area.
MAMMALS											
American Badger (Southwestern Ontario population)	<i>Taxidea taxus jacksoni</i>	END, Schedule 1	END	END	G5	S2			N	In Ontario, badgers are found in a variety of habitats, such as tall grass prairie, sand barrens and farmland. These habitats provide badgers with small prey, including groundhogs, rabbits and small rodents. Badgers are nocturnal and can occupy a large home range, this leads to observations of the species to be fairly rare. (Ontario, 2016)	Unlikely - This species was not confirmed during field investigations. Habitat within the Study Area is limited and dominated by wetland, with the exception of the cultural meadow communities north of Sunningdale Road East. The Project is not expected to encroach within the meadow communities.
Eastern Small-footed Myotis	<i>Myotis leibii</i>		END		G4	S2S3			N	Roosts in caves, mine shafts, crevices or buildings that are in or near woodland; hibernates in cold dry caves or mines; maternity colonies in caves or buildings; hunts in forests (MNRF, 2000)	Low - These species were not confirmed during field investigations, however, habitat is present in the wooded areas within the Study Area.
Little Brown Myotis	<i>Myotis lucifugus</i>	END, Schedule 1	END	END	G3	S4			N	Uses caves, quarries, tunnels, hollow trees or buildings for roosting; winters in humid caves; maternity sites in dark warm areas such as attics and barns; feeds primarily in wetlands, forest edges (MNRF, 2000). Roosts in crevices and cavities in dead or dying trees, or sometimes beneath naturally loose bark on species like Shagbark Hickory (MNRF, 2017).	
Northern Myotis	<i>Myotis septentrionalis</i>	END, Schedule 1	END	END	G1G2	S3			N	Hibernates during winter in mines or caves; during summer males roost alone and females form maternity colonies of up to 60 adults; roosts in houses, manmade structures but prefers hollow trees or under loose bark; hunts within forests, below canopy (MNRF, 2000)	
Tricolored Bat	<i>Perimyotis subflavus</i>	END, Schedule 1	END	END	G2G3	S3?			N	Open woods near water; roosts in trees, cliff crevices, buildings or caves; hibernates in damp, draft-free, warm caves, mines, or rock crevices (MNRF, 2000). Prefers roosts in foliage within or below the canopy, mostly in oak species but also sometimes in maples. Clusters of dead or dying leaves on live branches are preferred (MNRF, 2017).	

Species		SAR Status		Conservation Rank and Rarity Status					Confirmed During Field Investigations (Y/N)	Habitat	Assessment
Common Name	Scientific Name	National (SARA)	Provincial (SARO List, ESA)	National (COSEWIC)	Global (G-rank)	Provincial (S-rank)	Provincial Conservation Priorities ¹	National Conservation Priorities ^{2,3}			
BIRDS											
Barn Swallow	<i>Hirundo rustica</i>	THR, Schedule 1	THR	THR	G5	S4B	Recovery Objective ¹		Y	Nests are typically built in man-made buildings, such as barns, with unpainted rough wood.	Confirmed - This species was confirmed present during field investigations. No nests were confirmed, only foraging habitat.
Bobolink	<i>Dolichonyx oryzivorus</i>	THR, Schedule 1	THR	THR	G5	S4B	Recovery Objective ¹		N	Tall grasslands, such as pastures and hayfields or shrubby overgrown fields or other open areas.	Low - This species was not recorded during the field investigations. Potential habitat for this species may be located north of Sunningdale Road East in the agricultural fields and cultural meadow communities.
Canada Warbler	<i>Cardellina canadensis</i>	THR, Schedule 1	SC	THR	G5	S4B	Recovery Objective ¹		N	Canada warbler can be found in a wide range of forest habitat types, but is commonly associated with moist, mixedwood forests that contain a well-developed understory (Conway, 1999). In portions of its range, this species has been observed to be more abundant in forest edges (Conway, 1999).	Unlikely - This species was not recorded during the breeding bird surveys and is not considered present in the Study Area. There is limited forested habitat that would support this species.
Chimney Swift	<i>Chaetura pelagica</i>	THR, Schedule 1	THR	THR	G4G5	S4B, S4N	Recovery Objective ¹		N	Urban settlements in chimneys or other manmade structures.	Unlikely - This species was not recorded during the field investigations and habitat that would support nesting is not present.
Common Nighthawk	<i>Chordeiles minor</i>	THR, Schedule 1	SC	SC	G5	S4B	Recovery Objective ¹		N	Preferred nesting habitats include bare ground in open areas in association with clearings such as fields, clear cuts, ponds and wetlands that are used for aerial foraging (Poulin et al, 1996).	Low - This species was not recorded during the field investigations. Potential habitat for this species may be located north of Sunningdale Road East where there are fields, wetlands, thickets and a small wooded community.
Eastern Meadowlark	<i>Sturnella magna</i>	THR, Schedule 1	THR	THR	G5	S4B	Recovery Objective ¹		N	Tall grasslands, such as pastures and hayfields or shrubby overgrown fields or other open areas.	Low - This species was not recorded during the field investigations. Potential habitat for this species may be located north of Sunningdale Road East in the agricultural fields and cultural meadow communities.
Northern Bobwhite	<i>Colinus virginianus</i>	END, Schedule 1	END	END	G4G5	S1	Recovery Objective ¹		N	Open habitats, with a mixture of grasslands, croplands and dense brush.	Unlikely - This species was not recorded during the breeding bird surveys and is not considered present in the Study Area.
Wood Thrush	<i>Hylocichla mustelina</i>	THR, Schedule 1	SC	THR	G4	S4B	Maintain Current ¹		N	Prefers moist deciduous or mixed forest with deciduous sapling growth; near pond or swamp; hardwood forest edges; must have some trees higher than 12 m (COSEWIC, 2012b; MNRF, 2000)	Unlikely - This species was not confirmed the field investigations and habitat is not considered present in the Study Area.
PLANTS											
False-rue Anemone	<i>Enemion biternatum</i>	THR, Schedule 1	THR	THR	G5	S2			N	Habitat includes rich mesic woodlands, thickets, and river floodplains	Unlikely - The background review identified historical records from 1994 of this species, specifically map square 17MH7866 in the northern portion of the study area. A botanical inventory was completed which did not confirm the presence of this species. As such, this species is not considered present.

Definitions, Acronyms and Symbols

Global G-rank

- G1:** Critically Imperiled (at very high risk of extinction)
- G2:** Imperiled (at high risk of extinction)
- G3:** Vulnerable (at moderate risk of extinction)
- G4:** Apparently Secure (Uncommon but not rare)
- G5:** Secure (common, widespread and abundant)
- GU:** Unrankable (currently unrankable due to lack of information)
- GNR:** Unranked (global rank not yet assessed)
- GNA:** Not Applicable (species is not a suitable target for conservation activities)
- T:** Denotes that the rank applies to a subspecies or variety
- B:** Breeding
- N:** Non-breeding

COSEWIC: Committee on the Status of Endangered Wildlife in Canada

ESA: Endangered Species Act

SARA: Species at Risk Act

SARO: Species at Risk in Ontario

SARA or ESA designation

- END** - Endangered
- THR** - Threatened
- SC** - Special Concern

- NAR** - Not at Risk

Provincial S-rank

- S1:** Critically Imperiled (i.e. fewer than 5 occurrences in the nation and/or province)
- S2:** Imperiled (i.e. fewer than 20 occurrences in the nation and/or province)
- S3:** Vulnerable (i.e. 20-80 occurrences in the nation and/or province)
- S4:** Apparently Secure (uncommon, but not rare in the nation and/or province)
- S5:** Secure (common, widespread and abundant in the nation and/or province)
- SNA:** Not Applicable (species is not a suitable target for conservation activities)

- SHB:** Breeding is not confirmed in Ontario
- S#S#:** Range Rank (range of uncertainty about the status of the species or community)
- S#?:** Rank is Uncertain
- S?:** Not Ranked Yet
- B:** Breeding migrants/vagrants
- N:** Non-breeding migrants/vagrants

Provincial Conservation Priorities

- Recovery¹** - Species at Risk
- Increase¹** - Population in decline
- Maintain Current¹** - Appears to be stable or increasing

National Conservation Priorities

- High Concern^{2,3}** - Species population is known or thought to be declining
- Moderate Concern^{2,3}** - Species population is either a) declining with moderate threats or disturbance; b) stable with known potential threats and moderate to restricted distributions; or c) relatively small with relatively restricted distributions
- Not Currently At Risk^{2,3}** - All other species for which information was available

Appendix I

Tree Assessment Report

TREE ASSESSMENT REPORT

ADELAIDE STREET NORTH MUNICIPAL CLASS ENVIRONMENTAL
ASSESSMENT

FROM FANSHAWE PARK ROAD EAST TO SUNNINGDALE ROAD EAST

LONDON ONTARIO

DRAFT - revised

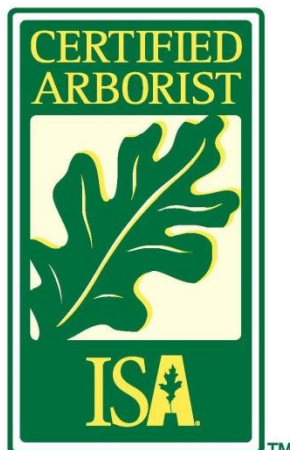
Prepared

NOVEMBER 2019

NOTE THAT THIS REPORT IS PRELIMINARY AND
HAS BEEN PROVIDED FOR REVIEW ONLY. THIS
REPORT WILL BE FINALIZED UPON REVIEW AND
APPROVAL OF THE DESIGN TEAM.

Prepared by

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RKLA Project # 18-191

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INTRODUCTION

Ron Koudys Landscape Architects Inc. (RKLA) was retained by Parsons to conduct a tree inventory and assessment in conjunction with the proposed widening and upgrading of Adelaide Street North and associated infrastructure works in London, Ontario.

This report outlines the potential impacts of the preferred road design concept on trees within or close to the limits of the preferred road design concept and makes recommendations for tree removal and preservation strategies.

In total, 151 trees were identified, reviewed, and are addressed in this report.

This report should be read in conjunction with the preliminary plan and profile drawing for the preferred road design concept that has been prepared for the project.

EXECUTIVE SUMMARY

No rare or endangered species were observed during the tree inventory. All trees observed are common and typical of the varied current land uses.

Species Breakdown

The following list outlines the species and quantity of each species identified in this inventory.

23	Acer platanoides	3	Pyrus spp
13	Picea pungens var. glauca	3	Quercus rubra
12	Acer freemanii	3	Syringa reticulata 'Ivory Silk'
12	Gleditsia triacanthos var. inermis	3	Ulmus spp.
9	Celtis occidentalis	2	Acer campestre
7	Pinus nigra	2	Aesculus hippocastanum
6	Picea abies	1	Acer negundo
6	Tilia cordata	1	Betula papyrifera
5	Acer rubrum	1	Catalpa speciosa
5	Acer saccharinum	1	unknown
5	Pinus sylvestris	1	Liriodendron tulipefera
4	Fraxinus spp	1	Phellodendron amurense
4	Picea omorika	1	Quercus alba
4	Populus tremuloides	1	Salix babylonica
4	Sorbus aucuparia	1	Salix spp
3	Acer saccharum	1	Zelkova serrata
3	Populus deltoides		

Tree Ownership Breakdown

The following list outlines the general ownership of the 151 trees identified.

City owned trees	61
Privately owned trees	85
Boundary trees (straddling line between private property and City property)	5
Total tree quantity	151

Tree Removal and Preservation Recommendations Summary

Trees to be removed	City owned trees	33 (tree id #: 21, 22, 26, 29, 30, 32, 33, 34, 38, 42, 43, 44, 45, 51, 56, 76, 81, 88, 89, 98, 116, 118, 119, 121, 122, 126, 129, 137, 147, 148, 149, 150, and 151)
	Privately owned trees*	5 (tree id #: 46, 48, 87, 139, and 140)
	Boundary trees*	2 (tree id #: 24 and 142)
Trees to be preserved	City owned trees	28 (tree id#: 9, 12-16, 35, 50, 54, 55, 57-69, 73, 79, 95, 96, and 97)
	Privately owned trees	80 (tree id #: 1-8, 10, 11, 17-20, 23, 25, 27, 28, 31, 36, 37, 39, 40, 41, 47, 49, 52, 53, 70, 71, 72, 74, 75, 77, 78, 80, 82-86, 90, 91, 92, 94, 99-111, 113, 114, 115, 117, 120, 123, 124, 125, 127, 128, 130-136, 138, 141, 143, 145, and 146)
	Boundary trees	3 (tree id#: 93, 112, 144)

*Consent is required from private landowners to remove privately owned trees and boundary trees

Note that this arborist report has been prepared using the latest drawings and information provided by the client. Any subsequent design or site plan changes affecting trees may require revisions to this report. Any new information or drawings are to be provided to RCLA prior to report submission to planning authorities.

ASSIGNMENT & SCOPE

The scope of this tree inventory and assessment is Adelaide Street North from Fanshawe Park Road East to 350m north of Sunningdale Road East, and Sunningdale Road East from Blackwater Road west of Adelaide Street North to Stoney Creek Community Centre Entrance east of Adelaide Street North. See figure 1.

Our firm was retained by Parsons to undertake an assessment of the existing trees located within the outlined scope to inform design decisions and establish a preservation strategy and a removals plan for the existing trees within the City ROW and any trees adjacent to the ROW on private property that may be affected by the preferred road design concept.

The report outlines specific trees to preserve; trees to remove; and recommendations for pre-construction, the construction period, and post-construction to mitigate potential construction impacts.



Figure 1 - scope of inventory
Not to scale

METHODOLOGY & HEALTH ASSESSMENT

Field work was completed on September 28, 2018 and October 22, 2019 by RKLA staff member Michelle Peeters, ISA certified arborist ON 2129A. Trees were assessed using the standard ISA evaluation criteria based upon tree vigour data, a detailed site-examination, and a review of the preferred road design concept plan and profile. The base plan and topographical survey were supplied Parsons. A comprehensive inventory of all trees ≥ 10 cm DBH (diameter at breast height) within the scope of service was completed. Trees were NOT tagged. Each tree was assigned a number which is identified in the table below and on the tree preservation plan. Tree numbers used include 1 through 151.

The following information was recorded for each tree:

- Species
- Diameter at breast height (DBH) (centimeters)
- Crown radius (meters)
- Crown Condition (overall general vigour of crown)
- Structural Condition (good, fair, poor)
- General Comments

The tree data collected was analyzed in conjunction with the preferred road design concept. This information was synthesized to make recommendations on which trees to preserve, which trees to remove and recommendations for preconstruction, during construction, and post construction strategies for minimizing damage for trees to be preserved.

Health Assessment Criteria

Trees were assessed following accepted arboricultural techniques and best practices using a limited visual inspection that included a 360 degree visual examination of the above-ground parts of each tree for structural defects (including cavities and wounds), scars, external indicators of internal decay, evidence of insect presence, discoloured or deformed foliage, canopy and root distribution, and the overall condition of the tree. Evaluation of tree health was based on visible tree health indicators including live buds, foliage condition, deadwood, structural defects, form, and signs of disease or insect infestation. Quantitative health assessments included in the inventory are explained here:

Crown Condition Classification

- 5 Healthy: less than 10% crown decline
- 4 Slight decline: 11% - 30% crown decline
- 3 Moderate decline: 31% - 60% crown decline
- 2 Severe decline: 61% - 90% crown decline
- 1 Dead

Structural Condition Classification

Good: Defects if present are minor (e.g. twig dieback, small wounds); defective tree part is small (e.g. 5-8 cm diameter limb) providing little if any risk.

Fair: Defects are numerous or significant (e.g. dead scaffold limbs); defective parts are moderate in size (e.g. limb greater than 5-8 cm in diameter).

Poor: Defects are severe (trunk cavity in excess of 50%); defective parts are large (e.g. majority of crown).

Dead: Tree exhibits no signs of life.

Critical Root Zones and Tree Preservation Barriers

The critical root zone of a tree is the portion of the root system that is the minimum necessary to maintain tree vitality and stability. Critical root zones are commonly prescribed by municipal bylaws based solely on DBH and/or drip line, and are typically expressed as a circular shape around the tree. There are a number of other factors, however, that are considered when establishing a critical root zone, particularly in a streetscape setting where there are physical barriers such as sidewalks and curbs that have shaped and limited typical root development patterns.

Factors that inform location and extent of a tree preservation barriers to protect the critical root zone include: species tolerance to root loss and other construction impacts (as established by authoritative resources and professional experience), tree trunk size (DBH), tree health and vigour, structural condition, landscape context, soil type, moisture availability, topography, ground cover, crown size and balance (drip line), current physical root restrictions, visible root arrangement, relationship to neighbouring trees, relationship between tree and proposed construction, type of proposed construction, etc.

Critical root zones will be protected in the field with tree preservation barriers.

INVENTORY DATA AND PRESERVATION/REMOVAL RECOMMENDATIONS

The following data was collected on September 27, 2018 (trees 1 - 138), and on October 22, 2019 (trees 139 - 151).

Recommendations are based on a combination of tree data and requirements of the preferred road design concept.

Grey indicates recommended removal.

Green indicates recommended preservation - feasibility of preservation to be confirmed during detailed design.

GENERAL INFORMATION				SIZE		HEALTH			RECOMMENDATION		
ID #	BOTANICAL NAME	COMMON NAME	LOCATION	DBH (cm) ~ = approx	CANOPY RADIUS (m)	CROWN CONDITION	STRUCTURAL CONDITION	COMMENTS	PROPOSED ACTION	RATIONALE	CONSENT AND PRESERVATION REQUIREMENTS
1	<i>Acer saccharum</i>	Sugar Maple	1537 Adelaide St N	27	3.5	5	GOOD	minor dieback, buttressing trunk, no root flare	preserve	Private property, no expected construction impacts	
2	<i>Quercus rubra</i>	Red Oak	1537 Adelaide St N	17	3	1	POOR	dead	preserve - inform owner of dead tree and recommend removal	Private property, no expected construction impacts	
3	<i>Quercus rubra</i>	Red Oak	1537 Adelaide St N	23	3.5	5	GOOD	full form	preserve	Private property, no expected construction impacts	
4	<i>Picea abies</i>	Norway Spruce	600 Fanshawe Park Rd E	-40	4	5	GOOD	elevated root plate	preserve	Private property, no expected construction impacts	

5	<i>Picea abies</i>	Norway Spruce	600 Fanshawe Park Rd E	-40	4	5	GOOD	elevated root plate	preserve	Private property, no expected construction impacts	
6	<i>Picea abies</i>	Norway Spruce	600 Fanshawe Park Rd E	-40	4	5	GOOD	elevated root plate	preserve	Private property, no expected construction impacts	
7	<i>Picea abies</i>	Norway Spruce	600 Fanshawe Park Rd E	-40	4	5	GOOD	elevated root plate	preserve	Private property, no expected construction impacts	
8	<i>Picea abies</i>	Norway Spruce	600 Fanshawe Park Rd E		4	5	GOOD	elevated root plate	preserve	Private property, no expected construction impacts	
9	<i>Gleditsia triacanthos var. inermis</i>	Honeylocust	City ROW	25	3	5	GOOD	in boulevard	preserve	No direct conflict with construction	
10	<i>Acer platanoides 'Royal Red'</i>	Royal Red Norway Maple	600 Fanshawe Park Rd E	11	1.5	5	POOR	metal stakes, girdled from stake wire at 50cm	preserve - inform owner of poor condition and recommend removal	Private property, no expected construction impacts	
11	<i>Picea abies</i>	Norway Spruce	600 Fanshawe Park Rd E	88	4	4	GOOD	limbed up to 4m, pruned, lean towards west, uneven crown	preserve	Private property, no expected construction impacts	
12	<i>Gleditsia triacanthos var. inermis</i>	Honeylocust	City ROW	21	4	5	GOOD	boulevard tree, hydro pruned	preserve	No direct conflict with construction	
13	<i>Ulmus spp.</i>	Elm	City ROW	30	4	5	GOOD	boulevard tree, exposed roots	preserve	No direct conflict with construction	
14	<i>Celtis occidentalis</i>	Hackberry	City ROW	9	1	5	GOOD	boulevard tree	preserve	No direct conflict with construction	
15	<i>Acer saccharinum</i>	Silver Maple	City ROW	13	2	4	FAIR	boulevard tree, slight lean towards road, uneven crown, girdling roots	preserve	No direct conflict with construction	
16	<i>Ulmus spp.</i>	Elm	City ROW	25	3.5	5	GOOD	boulevard tree, scars from pruning cuts, insect damage on leaves	preserve	No direct conflict with construction	
17	<i>Gleditsia triacanthos var. inermis</i>	Honeylocust	600 Fanshawe Park Rd E	21	4	5	GOOD	on slope, excellent	preserve	Private property, no expected construction impacts	
18	<i>Gleditsia triacanthos var. inermis</i>	Honeylocust	600 Fanshawe Park Rd E	24	4	5	GOOD	on slope, excellent	preserve	Private property, no expected construction impacts	
19	<i>Gleditsia triacanthos var. inermis</i>	Honeylocust	1595 Adelaide St N	23	4.5	5	GOOD	on slope with rocks on low side, excellent	preserve	Private property, no expected construction impacts	
20	<i>Gleditsia triacanthos var. inermis</i>	Honeylocust	1595 Adelaide St N	26	4.5	5	GOOD	on slope with rocks on low side, excellent	preserve	Private property, no expected construction impacts	
21	<i>Quercus alba</i>	White Oak	City ROW	31	4	4	GOOD	boulevard tree, scaffold branch almost equal to main stem, circling roots on street side	remove	direct conflict with proposed road alignment	N/A
22	<i>Acer saccharinum</i>	Silver Maple	City ROW	29	5	5	GOOD	boulevard tree, dense leaves and buds, bulbous base	remove	direct conflict with proposed road alignment	N/A

23	<i>Picea pungens var. glauca</i>	Colorado Blue Spruce	1595 Adelaide St N	29	2.5	3	FAIR	on slope, rocks at base, general decline from the top down	preserve	Private property, no expected construction impacts	
24	<i>Picea pungens var. glauca</i>	Colorado Blue Spruce	BOUNDARY - 1595 Adelaide St N and City ROW	9	1	1	FAIR	dead, on slope, rocks at base	remove	condition and proximity to pedestrian path	consent to remove boundary tree required
25	<i>Picea pungens var. glauca</i>	Colorado Blue Spruce	1595 Adelaide St N	23	3	2	GOOD	on slope, rocks at base, significant decline	preserve, inform owner of poor condition and recommend removal	Private property, no expected construction impacts, poor overall condition	
26	<i>Celtis occidentalis</i>	Hackberry	City ROW	25	4.5	5	GOOD	minor epicormic growth from trunk	remove	direct conflict with proposed road alignment	N/A
27	<i>Tilia cordata</i>	Littleleaf Linden	1593 Adelaide St N	25	4	5	GOOD	slight slope, rocks at base	preserve	Private property, no expected construction impacts	
28	<i>Tilia cordata</i>	Littleleaf Linden	1593 Adelaide St N	28	4	2	POOR	included bark at primary union	preserve, inform owner of poor condition and recommend removal	Private property, no expected construction impacts, poor overall condition	
29	<i>Acer saccharum</i>	Sugar Maple	City ROW	18	2	5	FAIR	boulevard tree, narrow form, major defects at base, mechanical damage	remove	direct conflict with proposed road alignment	N/A
30	<i>Quercus rubra</i>	Red Oak	City ROW	25	4	5	GOOD	boulevard tree	remove	conflict with proposed road alignment	N/A
31	<i>Picea pungens var. glauca</i>	Colorado Blue Spruce	1593 Adelaide St N	30	3	5	GOOD	in garden	preserve	Private property, no expected construction impacts	
32	<i>Gleditsia triacanthos var. inermis</i>	Honeylocust	City ROW	30	5	5	GOOD	boulevard tree, exposed roots, minor interior dieback	remove	conflict with proposed road alignment	N/A
33	<i>Gleditsia triacanthos var. inermis</i>	Honeylocust	City ROW	26	5	5	GOOD	boulevard tree, exposed roots, minor interior dieback	remove	conflict with proposed road alignment	N/A
34	<i>Gleditsia triacanthos var. inermis</i>	Honeylocust	City ROW	31	5	5	GOOD	boulevard tree, low scaffold on west side	remove	conflict with proposed road alignment	N/A
35	<i>Acer platanoides 'Emerald Queen'</i>	Emerald Queen Norway Maple	City ROW	28	4.5	5	GOOD	clustered union, minor bowed trunk	preserve	No direct conflict with construction	
36	<i>Acer platanoides</i>	Norway Maple	2081 Philbrook Drive	35	5	5	GOOD	exposed girdled roots, in garden	preserve	Private property, no expected construction impacts	
37	<i>Catalpa speciosa</i>	Catalpa Tree	2081 Philbrook Drive	79	7	5	POOR	major cavity at primary union, low union, exposed roots, major vertical wound on main stem, exposed roots	preserve, inform owner of poor condition and recommend removal	Private property, no expected construction impacts, poor overall condition	
38	<i>Acer saccharinum</i>	Silver Maple	City ROW	106	10	5	poor	boulevard tree, major cavity x 2, significant included bark to base, potential hazard	remove	direct conflict with proposed road alignment and condition	N/A
39	<i>Pinus nigra</i>	Austrian Pine	2081 Philbrook Drive	34	3	4	GOOD	limbed up 3m, browning needles	preserve	Private property, no expected construction impacts	

40	<i>Pinus sylvestris</i>	Scotch Pine	2081 Philbrook Drive	23	2	4	GOOD	limbed up 2m, browning needles	preserve	Private property, no expected construction impacts	
41	<i>Picea pungens var. glauca</i>	Colorado Blue Spruce	2081 Philbrook Drive	25	2	5	GOOD	in garden, bowed trunk	preserve	Private property, no expected construction impacts	
42	<i>Acer saccharinum</i>	Silver Maple	City ROW	104	9	5	FAIR	boulevard tree, elevated root plate, minor cavities in minor stem	remove	direct conflict with proposed road alignment	N/A
43	<i>Populus deltoides</i>	Eastern Cottonwood	City ROW	68, 51	8	5	GOOD	boulevard tree, ultistem 2, union at grade, in swale	remove	conflict with proposed road alignment	N/A
44	<i>Populus deltoides</i>	Eastern Cottonwood	City ROW	38, 36	9	5	FAIR	boulevard tree, ultistem 2, union just above grade, suppressed, lean west, near watermain	remove	conflict with proposed road alignment	N/A
45	<i>Populus deltoides</i>	Eastern Cottonwood	City ROW	53	9	5	GOOD	boulevard tree, open crown, near watermain	remove	conflict with proposed road alignment	N/A
46	<i>Populus tremuloides</i>	Trembling Aspen	1625 Adelaide St N	35	3	1	POOR	major basal damage, no bark at base	remove	condition and proximity to pedestrian path	consent to remove from private property required
47	<i>Populus tremuloides</i>	Trembling Aspen	1625 Adelaide St N	35	4	3	FAIR	thin crown	preserve	wild area beside SWM pond, no expected construction impacts	
48	<i>Populus tremuloides</i>	Trembling Aspen	1625 Adelaide St N	20	3	1	POOR	dead	remove	condition and proximity to pedestrian path	consent to remove from private property required
49	<i>Salix spp</i>	Willow	1625 Adelaide St N	10 - 30	7	5	FAIR	Multistem 7, low primary union	preserve	wild area beside SWM pond, limited expected construction impacts	
50	<i>Acer freemanii</i>	Freeman Maple	City ROW	11	1.5	5	GOOD	boulevard tree, minor epicormic growth	preserve	design considers tree location	
51	<i>Fraxinus spp</i>	Ash	City ROW	6 - 10	3	5	POOR	Multistem 4, 1 stem dead, low branched, shrub form	remove	poor condition, species under threat of Emerald Ash borer, low branches encroaching into sidewalk	N/A
52	<i>Fraxinus spp</i>	Ash	1675 Adelaide St N	10 - 15	3.5	5	FAIR	Multistem - likely formed from single stem affected by Emerald Ash Borer	preserve	wild area beside SWM pond, no expected construction impacts	
53	<i>Fraxinus spp</i>	Ash	1675 Adelaide St N	20	4	5	FAIR	Multistem - likely formed from single stem affected by Emerald Ash Borer	preserve	wild area beside SWM pond, no expected construction impacts	
54	<i>Zelkova serrata</i>	Zelkova Tree	City ROW	10	1	5	FAIR	boulevard tree, included bark at tight unions, typical of species	preserve	design considers tree location	
55	<i>Phellodendron amurense</i>	Amur Cork Tree	City ROW	7	1.5	5	GOOD	boulevard tree, good form, trunk guard	preserve	design considers tree location	

56	<i>Fraxinus spp</i>	Ash	City ROW	15	5	2	POOR	suckers, dead leader, shrub understory	remove	poor condition, species under threat of Emerald Ash borer, low branches encroaching into sidewalk	N/A
57	<i>Syringa reticulata</i> <i>'Ivory Silk'</i>	Ivory Silk Lilac Tree	City ROW	2	1	5	GOOD	boulevard tree, excellent, lichen on trunk	preserve	design considers tree location	
58	<i>Acer campestre</i>	Hedge Maple	City ROW	13	2	5	GOOD	boulevard tree, low crown	preserve	design considers tree location	
59	<i>Ulmus spp.</i>	Elm	City ROW	16	2.5	5	GOOD	boulevard tree, low crown	preserve	design considers tree location	
60	<i>Acer campestre</i>	Hedge Maple	City ROW	13	2	5	GOOD	boulevard tree, split on southwest side of trunk, healing	preserve	design considers tree location	
61	<i>Celtis occidentalis</i>	Hackberry	City ROW	8	1.5	5	GOOD	boulevard tree, uneven crown	preserve	design considers tree location	
62	<i>Celtis occidentalis</i>	Hackberry	City ROW	8	1.5	5	GOOD	boulevard tree	preserve	design considers tree location	
63	<i>Celtis occidentalis</i>	Hackberry	City ROW	8	1	5	GOOD	boulevard tree, low crown	preserve	design considers tree location	
64	<i>Celtis occidentalis</i>	Hackberry	City ROW	10	1.5	5	GOOD	boulevard tree	preserve	design considers tree location	
65	<i>Celtis occidentalis</i>	Hackberry	City ROW	8	1.5	5	GOOD	boulevard tree	preserve	design considers tree location	
66	<i>Celtis occidentalis</i>	Hackberry	City ROW	7	1	5	GOOD	boulevard tree	preserve	No direct conflict with construction	
67	<i>Betula papyrifera</i>	Paper Birch	City ROW	10, 5, 5	2	5	FAIR	Multistem 3, by decorative wall at street corner	preserve	No direct conflict with construction	
68	<i>Acer freemanii</i>	Freeman Maple	City ROW	3	1	5	GOOD	boulevard tree, low crown	preserve	No direct conflict with construction	
69	<i>Acer freemanii</i>	Freeman Maple	City ROW	18	3	5	GOOD	boulevard tree, included bark, co-dominant leaders	preserve	design considers tree location	
70	<i>Syringa reticulata</i> <i>'Ivory Silk'</i>	Ivory Silk Lilac Tree	2000 Blackwater Rd	12	1.5	5	GOOD	low crown	preserve	Private property, no expected construction impacts	
71	<i>Syringa reticulata</i> <i>'Ivory Silk'</i>	Ivory Silk Lilac Tree	2000 Blackwater Rd	11	1.5	5	GOOD	slight lean to street	preserve	Private property, no expected construction impacts	
72	<i>Picea omorika</i>	Serbian Spruce	2000 Blackwater Rd	12	2	5	GOOD	minor yellowing of leaves	preserve	Private property, no expected construction impacts	
73	<i>Liriodendron tulipifera</i>	Tulip Tree	City ROW	12	2.5	5	GOOD	boulevard tree, minimal root flare, uneven crown	preserve	design considers tree location	
74	<i>Picea omorika</i>	Serbian Spruce	2000 Blackwater Rd	12	1.5	5	GOOD	thin lower crown	preserve	Private property, no expected construction impacts	
75	<i>Picea omorika</i>	Serbian Spruce	2000 Blackwater Rd	10	1	5	GOOD	thin crown	preserve, inform owner of poor condition and recommend removal	Private property, no expected construction impacts, poor overall condition	
76	dead		City ROW	5	-	1	DEAD		remove	dead	N/A
77	<i>Aesculus hippocastanum</i>	Horse Chestnut	2000 Blackwater Rd	6	2	2	POOR	significant lean - looks as though it was hit by a vehicle	preserve, inform owner of poor condition and recommend removal	Private property, no expected construction impacts, poor overall condition	

78	<i>Picea omorika</i>	Serbian Spruce	2000 Blackwater Rd	12	1.5	5	GOOD	dead lower limbs	preserve	Private property, no expected construction impacts	
79	<i>Celtis occidentalis</i>	Hackberry	City ROW	16	2.5	5	GOOD	boulevard tree, low crown	preserve	design considers tree location	
80	<i>Aesculus hippocastanum</i>	Horse Chestnut	2000 Blackwater Rd	10	2	4	POOR	major split in trunk	preserve, inform owner of poor condition and recommend removal	Private property, no expected construction impacts, poor overall condition	
81	<i>Acer rubrum</i>	Red Maple	City ROW	7	1	4	FAIR	boulevard tree, epicormic growth, significant basal damage, low crown	remove	direct conflict with proposed path	N/A
82	<i>Tilia cordata</i>	Littleleaf Linden	1825 Adelaide St N	10	2	5	GOOD		preserve	Private property, no expected construction impacts	
83	<i>Tilia cordata</i>	Littleleaf Linden	1825 Adelaide St N	12	2	5	GOOD	basal damage on parking lot side	preserve	Private property, no expected construction impacts	
84	<i>Acer saccharum</i>	Sugar Maple	1845 Adelaide St N	14	2	5	GOOD	minor buttressing trunk	preserve	Private property, no expected construction impacts	
85	<i>Acer rubrum</i>	Red Maple	1845 Adelaide St N	16	2.5	5	GOOD	co-dominant leaders, elevated exposed roots at base	preserve	Private property, no expected construction impacts	
86	<i>Acer rubrum</i>	Red Maple	1845 Adelaide St N	13	2.5	5	GOOD	bulbous roots	preserve	Private property, no expected construction impacts	
87	<i>Acer rubrum</i>	Freeman Maple	1845 Adelaide St N	14	2	5	POOR	bulbous roots, on slope Oct 22, 2019 notes: significant bark splitting and cracking along entire trunk	remove	conflict with proposed cycle track alignment	consent to remove from private property required
88	<i>Acer freemanii</i>	Freeman Maple	City ROW	51	5	4	POOR	boulevard tree, significant hydropruning on street side, no leader, major cavity	remove	direct conflict with watermain corridor and condition	N/A
89	<i>Acer freemanii</i>	Freeman Maple	City ROW	38	3	3	POOR	low union, co-dominant leaders, major cavity	remove	direct conflict with watermain corridor and condition	N/A
90	<i>Acer platanoides</i>	Norway Maple	1740 Adelaide St N	36	5	5	GOOD	wide flare, exposed roots, vertical scar on southwest side	preserve	Private property, no expected construction impacts	
91	<i>Acer platanoides</i>	Norway Maple	1740 Adelaide St N	36	4.5	5	FAIR	vertical scar on southwest side, exposed girdled roots	preserve	Private property, limited expected construction impacts	
92	<i>Acer platanoides</i>	Norway Maple	1740 Adelaide St N	38	6	5	GOOD	wide flare, girdled wire, exposed roots, overhead wire in main branch	preserve	Private property, no expected construction impacts	
93	<i>Acer platanoides</i>	Norway Maple	BOUNDARY TREE - 1720 Adelaide St N and City ROW	58	7	5	FAIR	very low branched, no flare, major cavity at primary union	preserve - lower branches on street side will need to be removed	Private property, limited expected construction impacts	
94	<i>Salix babylonica</i>	Weeping Willow	1720 Adelaide St N	35,35,50, 25, 19,27	8	5	FAIR	MS-6, exposed damage roots, gnarly base, union at grade	preserve	Private property, no expected construction impacts	

95	<i>Acer freemanii</i>	Freeman Maple	City ROW	21	3	5	GOOD	vertical fissures on trunk	preserve	Private property, no expected construction impacts	
96	<i>Acer freemanii</i>	Freeman Maple	City ROW	19	3	5	GOOD	included bark at primary union	preserve	Private property, no expected construction impacts	
97	<i>Acer freemanii</i>	Freeman Maple	City ROW	18	3	5	FAIR	significant southwest injury, bark peeling, slowly healing	preserve	Private property, no expected construction impacts	
98	<i>Acer negundo</i>	Manitoba Maple	City ROW	12 - 20	5	5	FAIR	multistem 5, on slope, low branched	remove	conflict with proposed sidewalk alignment and watermain corridor	N/A
99	<i>Acer platanoides</i>	Norway Maple	1600 Adelaide St N	50	7.5	5	FAIR	on grassy slope, top of slope, exposed roots	preserve	Private property, limited expected construction impacts	preservation feasibility to be confirmed during detailed design
100	<i>Picea pungens var. glauca</i>	Colorado Blue Spruce	1600 Adelaide St N	30	2.5	5	GOOD	co-dominant leaders, low union, included bark	preserve	Private property, limited expected construction impacts	preservation feasibility to be confirmed during detailed design
101	<i>Picea pungens var. glauca</i>	Colorado Blue Spruce	1600 Adelaide St N	20	2	5	GOOD		preserve	Private property, limited expected construction impacts	preservation feasibility to be confirmed during detailed design
102	<i>Picea pungens var. glauca</i>	Colorado Blue Spruce	1600 Adelaide St N	15	2	5	GOOD		preserve	Private property, limited expected construction impacts	preservation feasibility to be confirmed during detailed design
103	<i>Picea pungens var. glauca</i>	Colorado Blue Spruce	1600 Adelaide St N	20	2	5	GOOD		preserve	Private property, limited expected construction impacts	preservation feasibility to be confirmed during detailed design
104	<i>Picea pungens var. glauca</i>	Colorado Blue Spruce	1600 Adelaide St N	30	2	5	GOOD		preserve	Private property, limited expected construction impacts	preservation feasibility to be confirmed during detailed design
105	<i>Picea pungens var. glauca</i>	Colorado Blue Spruce	1600 Adelaide St N	20	2	5	GOOD		preserve	Private property, limited expected construction impacts	preservation feasibility to be confirmed during detailed design
106	<i>Acer platanoides</i>	Norway Maple	600 Grenfell Dr	27	4	4	GOOD	minor dead branch, on slope	preserve	Private property, limited expected construction impacts	preservation feasibility to be confirmed during detailed design
107	<i>Pinus nigra</i>	Austrian Pine	600 Grenfell Dr	49	5	5	GOOD	exposed roots, in garden	preserve	Private property, limited expected construction impacts	preservation feasibility to be confirmed during detailed design
108	<i>Pinus nigra</i>	Austrian Pine	600 Grenfell Dr	41	5	5	GOOD	on slope, major exposed roots	preserve	Private property, limited expected construction impacts	preservation feasibility to be confirmed during detailed design

109	<i>Acer platanoides</i>	Norway Maple	600 Grenfell Dr	32	4.5	5	GOOD	on slope, major exposed roots	preserve	Private property, limited expected construction impacts	preservation feasibility to be confirmed during detailed design
110	<i>Acer platanoides</i>	Norway Maple	600 Grenfell Dr	24	4	5	GOOD	on slope, majorly suppressed	preserve	Private property, limited expected construction impacts	preservation feasibility to be confirmed during detailed design
111	<i>Pinus nigra</i>	Austrian Pine	600 Grenfell Dr	44	4.5	5	GOOD	in garden	preserve	Private property, limited expected construction impacts	preservation feasibility to be confirmed during detailed design
112	<i>Acer rubrum</i>	Red Maple	BOUNDARY TREE - 600 Grenfell Dr and City ROW	53	6.5	5	FAIR	minimal root flare, exposed roots, uneven crown	preserve	limited expected construction impacts	preservation feasibility to be confirmed during detailed design
113	<i>Acer platanoides</i>	Norway Maple	600 Grenfell Dr	32	6	5	GOOD	top of slope, exposed roots	preserve	Private property, limited expected construction impacts	preservation feasibility to be confirmed during detailed design
114	<i>Pinus nigra</i>	Austrian Pine	600 Grenfell Dr	35	5	5	GOOD	excellent	preserve	Private property, limited expected construction impacts	preservation feasibility to be confirmed during detailed design
115	<i>Acer saccharinum</i>	Silver Maple	600 Grenfell Dr	96	6.5	5	FAIR	poor form, exposed damaged roots	preserve	Private property, limited expected construction impacts	preservation feasibility to be confirmed during detailed design
116	<i>Pyrus spp</i>	Pear Tree	City ROW	15, 10, 5	2	5	FAIR	boulevard tree, multistem 3, suckers emerging from base	remove	conflict with watermain corridor	N/A
117	<i>Acer platanoides 'Royal Red'</i>	Royal Red Norway Maple	601 Grenfell Dr	15	3.5	5	GOOD		preserve	Private property, limited expected construction impacts	
118	<i>Sorbus aucuparia</i>	Mountain Ash	City ROW	15	3	5	GOOD	boulevard tree, low crown	remove	conflict with watermain corridor	N/A
119	<i>Pyrus spp</i>	Pear Tree	City ROW	14	2	5	FAIR	boulevard tree, witches broom through canopy, epicormic growth, bulbous base	remove	conflict with watermain corridor	N/A
120	<i>Acer platanoides 'Royal Red'</i>	Royal Red Norway Maple	601 Grenfell Dr	15	3	5	GOOD		preserve	Private property, limited expected construction impacts	
121	<i>Sorbus aucuparia</i>	Mountain Ash	City ROW	13	2	5	GOOD	boulevard tree, low crown	remove	conflict with watermain corridor	N/A
122	<i>Sorbus aucuparia</i>	Mountain Ash	City ROW	26	4	5	GOOD	boulevard tree, low crown, epicormic growth, minor dieback interior	remove	conflict with watermain corridor	N/A
123	<i>Acer platanoides</i>	Norway Maple	1580 Adelaide St N	49	6	5	GOOD	low clustered unions	preserve	Private property, limited expected construction impacts	
124	<i>Acer platanoides</i>	Norway Maple	1580 Adelaide St N	45	6	5	GOOD	exposed damaged roots	preserve	Private property, limited expected construction impacts	
125	<i>Acer platanoides</i>	Norway Maple	1580 Adelaide St N	56	6	5	GOOD	slight lean northeast	preserve	Private property, limited expected construction impacts	

126	<i>Pyrus spp</i>	Pear Tree	City ROW	20	2	4	POOR	boulevard tree, suckers emerging from base	remove	conflict with watermain corridor	N/A
127	<i>Acer platanoides</i>	Norway Maple	1580 Adelaide St N	47	6	5	POOR	large dead branch, weak union, on slope, low crotch	preserve	Private property, limited expected construction impacts	
128	<i>Acer platanoides</i>	Norway Maple	1580 Adelaide St N	37	6	5	FAIR	exposed damaged roots, minor dead wood, 3 leaders	preserve	Private property, limited expected construction impacts	
129	<i>Sorbus aucuparia</i>	Mountain Ash	City ROW	17	3	5	GOOD	low crown, minor interior dead wood	remove	conflict with watermain corridor	N/A
130	<i>Acer platanoides</i>	Norway Maple	1580 Adelaide St N	43	5	5	GOOD	exposed damaged roots, wide root flare	preserve	Private property, limited expected construction impacts	
131	<i>Acer platanoides</i>	Norway Maple	1580 Adelaide St N	42	7	5	GOOD	wide root flare, exposed damage roots	preserve	Private property, limited expected construction impacts	
132	<i>Acer platanoides</i>	Norway Maple	1580 Adelaide St N	46	7	5	GOOD		preserve	Private property, limited expected construction impacts	
133	<i>Acer platanoides 'Royal Red'</i>	Royal Red Norway Maple	1570 Adelaide St N	40	4	5	GOOD	exposed damaged roots	preserve	Private property, limited expected construction impacts	
134	<i>Pinus nigra</i>	Austrian Pine	1570 Adelaide St N	48	5	5	GOOD	limbed up 8m	preserve	Private property, limited expected construction impacts	
135	<i>Acer freemanii</i>	Freeman Maple	614 Fanshawe Park Rd E	45	7	5	GOOD	wide root flare	preserve	Private property, limited expected construction impacts	
136	<i>Acer freemanii</i>	Freeman Maple	614 Fanshawe Park Rd E	37	3	1	POOR	dead	preserve, inform owner of poor condition and recommend removal	Private property, limited expected construction impacts and poor condition	
137	<i>Pinus nigra</i>	Austrian Pine	prev. 614 Fanshawe Park Rd E / newly acquired property by the City	34	4.5	5	GOOD	limbed up 3m, no root flare, browning needles	remove	conflict with proposed sidewalk alignment	N/A
138	<i>Gleditsia triacanthos var. inermis</i>	Honeylocust	1536 Adelaide St N	42	5	5	GOOD	large pruning cuts, in garden	preserve	Private property, limited expected construction impacts	
139	<i>Acer freemanii</i>	Freeman Maple	1845 Adelaide St N	18	3	5	GOOD	exposed roots at base	remove	conflict with proposed cycle track alignment	consent to remove from private property required
140	<i>Acer freemanii</i>	Freeman Maple	1845 Adelaide St N	16	2	4	POOR	cracking bark along entire trunk, codominant leaders with tight union	remove	conflict with proposed cycle track alignment and condition	consent to remove from private property required
141	<i>Gleditsia triacanthos var. inermis</i>	Honeylocust	1835 Adelaide St N	15	2.5	5	GOOD		preserve	Private property, limited expected construction impacts	
142	<i>Tilia cordata</i>	Littleleaf Linden	BOUNDARY TREE - 1835 Adelaide St N and City ROW	18	2.5	5	GOOD	canopy heavy to the south, tight unions	remove	proposed sidewalk alignment	consent required from land owners

143	<i>Tilia cordata</i>	Littleleaf Linden	1835 Adelaide St N	22	3	5	GOOD	on slight slope	preserve	Private property, limited expected construction impacts	
144	<i>Picea pungens var. glauca</i>	Colorado Blue Spruce	BOUNDARY TREE - 2253 Blackwater Road and City ROW	-8	1	5	GOOD		preserve	Private property, limited expected construction impacts	
145	<i>Picea pungens var. glauca</i>	Colorado Blue Spruce	2253 Blackwater Road	-8	1	5	GOOD		preserve	Private property, limited expected construction impacts	
146	<i>Gleditsia triacanthos var. inermis</i>	Honeylocust	2251 Blackwater Road	-6	1	5	GOOD		preserve	Private property, no expected construction impacts	
147	<i>Populus tremuloides</i>	Trembling Aspen	City ROW	-40	5	5	GOOD		remove	direct conflict with proposed sidewalk	N/A
148	<i>Pinus sylvestris</i>	Scotch Pine	City ROW	-10	2	5	GOOD		remove	direct conflict with proposed sidewalk	N/A
149	<i>Pinus sylvestris</i>	Scotch Pine	City ROW	-12	2.5	5	GOOD		remove	direct conflict with proposed sidewalk	N/A
150	<i>Pinus sylvestris</i>	Scotch Pine	City ROW	-20	3	5	GOOD		remove	direct conflict with proposed sidewalk	N/A
151	<i>Pinus sylvestris</i>	Scotch Pine	City ROW	-15	3	5	GOOD		remove	direct conflict with proposed sidewalk	N/A

POTENTIAL CONSTRUCTION IMPACTS

Several 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 affected by the construction process, or by the construction itself. It is imperative that the design team and the construction crew understand the potential for, and the causes of tree damage. Trees recommended for preservation may experience some or all of the following potential construction impacts. Strategies and methods to avoid these impacts are outlined in the Construction Impact Mitigation Recommendations section of this report.

Soil Compaction

Soil compaction is caused by heavy or repeated compression or vibration of the soil around the tree. Soil compaction reduces the amount and size of macro and micro pore space that is vital for subsurface movement of air and water. The harmful effects of soil compaction include, but are not limited to: slower water infiltration, poor aeration, reduced root growth and an overall increased susceptibility to biotic and abiotic stressors.

Grade Changes

Lowering of the grade around trees has immediate and long term effects on trees. Lowering of grade requires immediate root loss from cutting the roots which results in water stress from the root removal and potential reduced structural stability. Note that it is commonly accepted that healthy trees can tolerate the removal of approximately 33% to 50% of their root zone, with sensitivity to extent of acceptable removal dependent on individual species characteristics, root loss distribution, and site specific conditions (*ref. Trees and Development: A Technical Guide to*

Preservation of Trees During Land Development by Nelda Matheny and James R. Clark, 1998. Pg 72).

Raising the grade around a tree can be equally damaging. The addition of fill over the root zone of a tree alters the roots' ability for normal water and gas exchange that is necessary for healthy root growth and stability. Fill essentially suffocates the roots and can lead to the eventual decline of the tree.

Mechanical Damage

Mechanical damage is caused by physical contact with a tree that damages the tree to any degree. During land development and construction activities, there is an increased risk of minor and fatal mechanical damage to trees from construction equipment. Minor damage can create entry points for insects and pathogens, and fatal damage can cause irreparable structural damage.

Increased Exposure

Trees can experience increased exposure to sun or wind when neighbouring trees are removed. Sudden and increased exposure to these elements to trees that have developed in a sheltered location are susceptible to leaf scald and instability or failure.

Soil Contamination

Soil health around a tree can be compromised by contamination from spills or leaks of fuels, solvents, or other construction related fluids.

Water Availability

Grading and servicing requirements for development can affect water availability for trees. Trees may experience a loss of available water due to a lowered water table or the capture or redirection of subsurface and/or overland flow. Conversely, trees may experience an increase of available water due to changes in site grading and storm water retention efforts.

The successful survival of the trees to be preserved is largely dependent on adhering to the recommendations that follow.

CONSTRUCTION IMPACT MITIGATION RECOMMENDATIONS

The following general recommendations are provided to guide the removal process, mitigate construction impacts, and ensure compliance with regulatory requirements. Some of the recommendations listed below are noted to be undertaken by an ISA certified arborist.

Pre-construction recommendations

1. Prior to any construction activity, tree preservation fencing is to be installed as per the attached tree preservation drawings and detail. See appendix A and B.
2. Where high quality specimens to be preserved are adjacent to areas subject to intensive construction activities, these trees are to have additional protection measures implemented to protect their trunks from mechanical damage. These measures may include surrounding the trunk with wood planks. Trees that require additional protection

will be clearly identified on the tree preservation plan with detailed information on specific protection measures.

3. Trees to be removed are to be marked with spray paint by the project arborist or landscape architect prior to any tree removal operations. All removals to be undertaken by an ISA certified arborist.
4. In accordance with the Migratory Birds Convention Act, 1994 and to coincide with the appropriate bat timing windows, all removals must take place from October 1st to March 31st to avoid disturbing nesting migratory birds and bats. If trees, shrubs or ground vegetation removal occurs between April 1st and September 30th, a 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.
5. Care should be taken during the felling operation to avoid damaging the branches, stems, trunks, and roots of the trees to be preserved. Where possible, all trees are to be felled towards the construction zone to minimize impacts on adjacent vegetation. All removals to be undertaken by an ISA certified arborist.
6. It is recommended that the existing ground-layer vegetation at the base of trees remain intact so as not to disturb the soil around the base of the existing trees.
7. Final site grading plans should ensure that the existing soil moisture conditions are maintained.
8. Some trees may be candidates for pre-construction root pruning to help reduce stress and prepare the tree for nearby construction activity. These trees to be identified on the tree preservation plan. To be undertaken by an ISA certified arborist.

Recommendations related to the construction process

1. Tree preservation fencing is to be maintained in good condition and effective for the duration of construction until all construction activity is complete or as per the project arborist or landscape architect.
2. Tree preservation fencing is to remain intact as per the tree preservation drawings, and can only be temporarily removed with the express written consent from the project arborist or landscape architect. Should tree preservation fencing be temporarily relocated or moved, it is to be reinstated as per the tree preservation plans as soon as possible.
3. Where underground servicing exists or is proposed within a critical root zone, alternative excavation methods such as trenchless or vacuum excavation is to be used where soil and site conditions allow to prevent root damage. Alternative excavation methods must be coordinated with the consulting engineer during the design process. Locations where alternative excavation methods are required will be noted on the tree preservation drawings.
4. No construction, excavation, adding of fill, stockpiling of construction material, or heavy equipment is permitted within the critical root zone.

5. When excavation near a tree is required, and it is anticipated that roots will be severed and exposed, duration of exposure is to be minimized to prevent root desiccation.
6. During the excavation process, roots 25mm or larger that are severed and exposed should be hand pruned to leave a clean-cut surface. *To be undertaken by an ISA certified arborist.* Exposed severed roots that cannot be covered in soil on the same day as the cuts are made are to be kept moist. Exposed roots are to be kept moist by covering them with water soaked burlap or any other means available to prevent them from drying out. Adequate moisture levels are to be maintained until such time as topsoil and sod has been replaced satisfactorily or as otherwise directed by the contract administrator.
7. Avoid idling heavy equipment under or within close proximity to trees to be preserved to prevent canopy damage from exposure to the heat of the exhaust.
8. Broken branches on trees within the subject site to be preserved should be cleanly cut as soon as possible after the damage has occurred. *To be undertaken by an ISA certified arborist.* Should branches on City owned trees be damaged by or during construction, the contractor is to notify the local municipal forestry or urban forestry department as soon as possible. No person(s) other than City staff or the City's designated contractor may perform work on any City tree.
9. Open trenching within a critical root zone is prohibited. Alternative excavation methods such as horizontal boring and vacuum excavation are required where proposed services or installation requirements conflict with critical root zones. If, during construction, there is concern regarding the feasibility of employing trenchless excavation methods, the contractor is to immediately inform the contract administrator, consulting engineer and consulting arborist on the project.
10. Form concrete sidewalk, if proposed, with fibre expansion material in place of wood forms where roots conflict with existing concrete sidewalks.
11. Sidewalks to be replaced that are in close proximity to trees should remain in place as long as possible or until the replacement sidewalks are ready to be installed. Existing aggregate base material to be left in place if suitable.
12. Regular communication with the site supervisor and regular monitoring of the site by the project arborist or landscape architect is recommended to ensure proper procedures are followed and protection barriers are maintained. It is the responsibility of the site supervisor to promptly contact the project arborist if any concerns or questions arise regarding trees.
13. Watering of preserved trees may be required during construction. Watering details including frequency, timing, method, and volume will be determined by the consulting arborist and the contract administrator.

Post-construction recommendations

1. Avoid discharging rain water leaders adjacent to retained trees. This may result in an overly moist environment which will cause the tree roots to rot.

2. After all work is completed, snow fences and other barriers can be removed under the direction of the project arborist or landscape architect.
3. A final review must be undertaken by the project arborist or landscape architect to ensure that all mitigation measures as described above have been met.
4. Post construction monitoring of trees may be required. Monitoring schedule to be determined with design team and City consensus.

CITY OF LONDON TREE PROTECTION

Note that this project is located in the City of London. It follows therefore, that all applicable City of London rules, regulations, and by laws are to be respected. The City of London has several by-laws and specifications related to trees that must be understood and followed by the design team, the contractor, and all sub-contractors working on projects within the City.

All project parties to be aware of and familiar with the following City of London documents in their entirety and potential penalties noted therein for noncompliance:

*City of London - Boulevard Tree Protection By-law
CP-22 - in force and effect March 5, 2019*

*City of London 2019 Design Specifications and Requirements Manual (updated August 2019)
Section 12 - Tree Planting and Protection Guidelines
Section 12.5.3 states:*

“Failure to maintain an approved Tree Protection Plan will result in a warning by the City with 1 day to comply and bring the tree protection measures in line with the approved Tree Protection Plan. A second infraction may be dealt with by the issuance of a Stop Work order and possible fines as per the Boulevard Tree Protection By-law or the Tree Conservation By-law or as listed in the Standard Contract Documents for Municipal Construction Section 5 part B.”

*Standard Contract Documents for Municipal Construction (2019 Edition)
Section B - Part 5 - Tree Planting and Protection Guidelines*

PENALTY TABLE

Infraction	Diameter at breast height *	Additional Penalty
Tree damaged by Constructor or Sub-Contractor	Under 10cm.	\$500
	10cm > 35cm	\$800
	35cm > 61cm	\$1,600
	61cm > 100cm	\$2,300
	Larger than 100cm	\$3,300
	To be deducted per incident, in addition to any other fines associated with tree damage	\$250 **
Failure to maintain or remove (without permission of Construction Administration) tree protection zone barrier	To be deducted per incident, in addition to any other fines associated with tree damage	\$250 **
* Diameter of tree 1.5m above ground level		
** Plus administration fees		

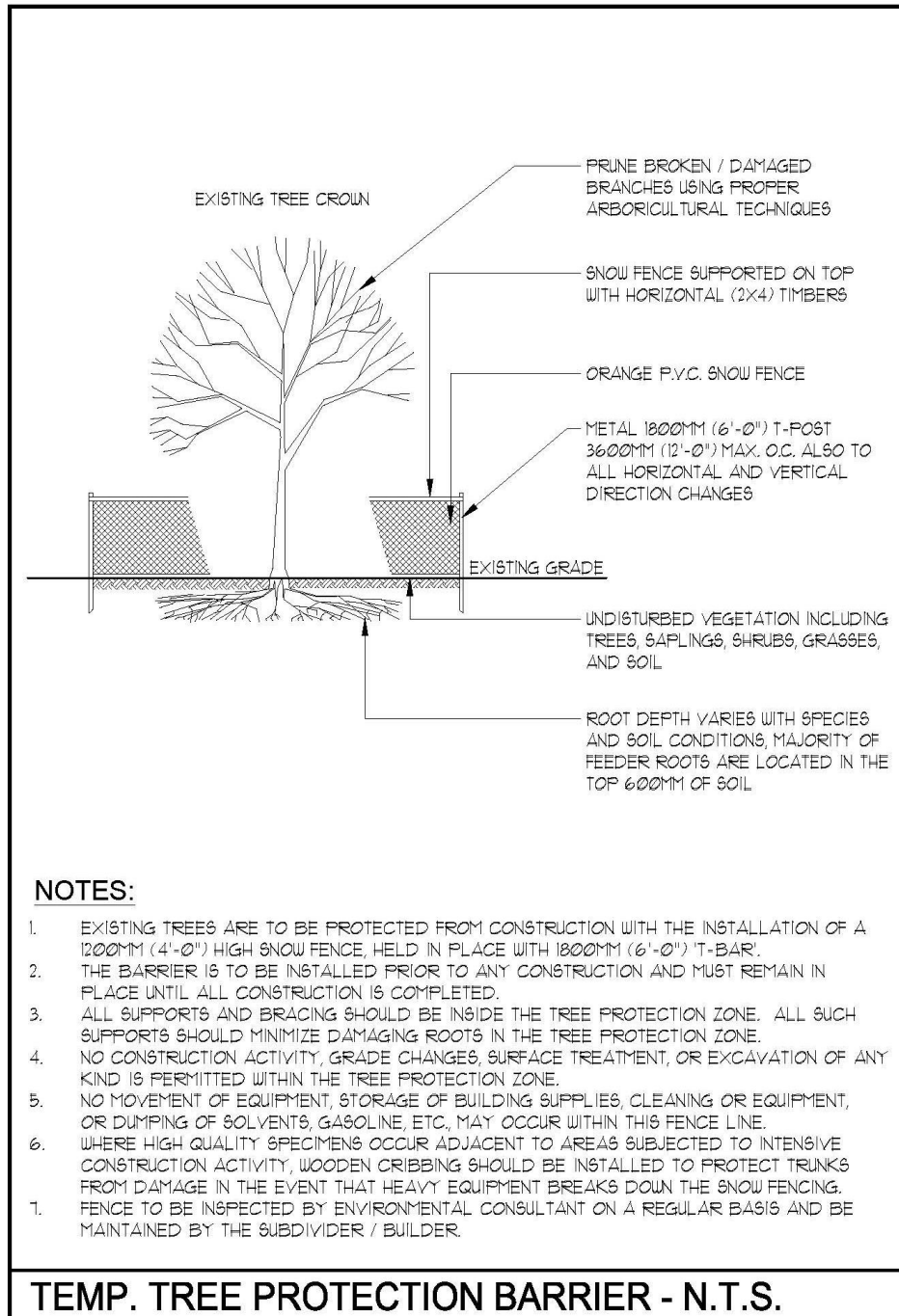
Penalty Table from page 229 of Standard Contract Documents for Municipal Construction (2019 Edition)

DISCLAIMER

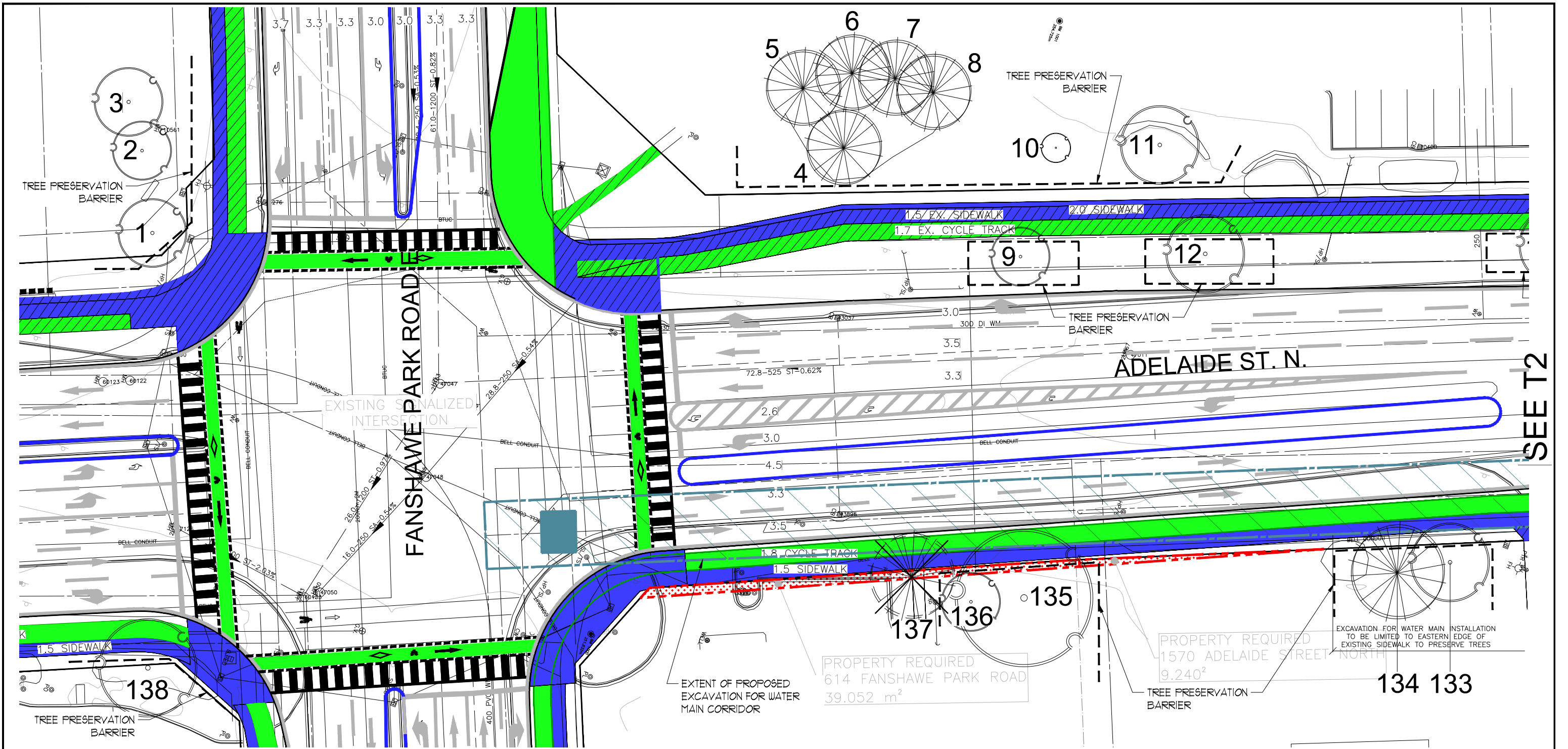
Trees have been assessed using standard arboricultural techniques. This includes a visual examination of the above-grade parts of each tree to observe structural defects, scars, external indications of decay, evidence of insects, deterioration of foliage, general condition of the trees and their immediate habitat, and the proximity of targets, including people and property. None of the trees examined were dissected, cored, probed, or climbed, and detailed root crown examinations involving excavation were not undertaken. Trees are living organisms and their health and vigour changes over time, and are dependent on multiple factors. They are susceptible to changes in site conditions, such as recent development, and to seasonal variations in weather. Reasonable efforts have been made to ensure that the trees recommended for preservation are able to withstand changing site conditions; however, we cannot guarantee that the assessed trees or their parts will remain intact. It is both professionally and practically impossible to predict with certainty the health and structural capacity of any single tree or group of trees in all circumstances. A tree that remains standing will always pose a varying degree of risk in the presence of a target. All trees may fail provided that they are exposed to the necessary combinations of stresses. The risk for failure is only eliminated if the tree is removed. It is the recommendation of this report that trees be re-assessed periodically to determine ongoing levels of risk. The assessment presented in this report is valid only at the time of inspection.

Note that this arborist report has been prepared using the latest drawings and information provided by the client. Any subsequent design or site plan changes affecting trees may require revisions to this report. Any new information or drawings are to be provided to RKL A prior to report submission to planning authorities.

APPENDIX A – TREE PROTECTION ZONE FENCE DETAILS



DRAFT



SEE T2

FOR REVIEW ONLY

LEGEND

	TREE PRESERVATION BARRIER		EXISTING DECIDUOUS TREES TO BE PRESERVED - TREE NUMBER		EXISTING DECIDUOUS TREES TO BE REMOVED - TREE NUMBER		PROPOSED SIDEWALK
	EXISTING CONIFEROUS TREES TO BE PRESERVED - TREE NUMBER		EXISTING CONIFEROUS TREES TO BE REMOVED - TREE NUMBER		EXISTING MULTI USE PATHWAY		EXISTING SIDEWALK
	PROPOSED MULTI USE PATHWAY						

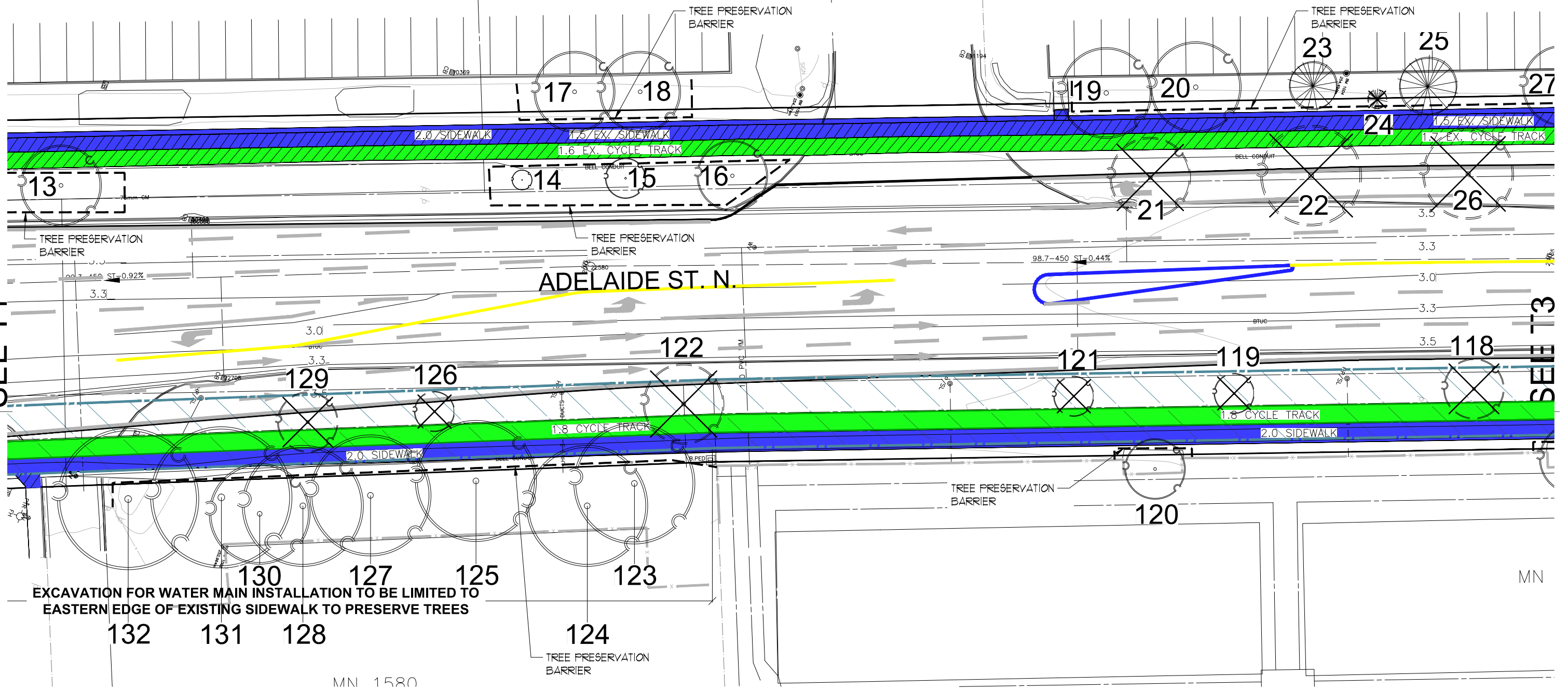
RON KOUDYS
LANDSCAPE ARCHITECTS INC.
388 Oxford Street East, London, Ontario, N6A 1V7
Tel: (519) 667-3322, Fax: (519) 645-2474

STREET TREE ASSESSMENT - ADELAIDE STREET NORTH
FANSHAWE PARK ROAD EAST TO SUNNINGDALE ROAD EAST
LONDON, ON

PROJECT NUMBER: 18-191 Ld	SCALE: 1:400
DRAWN BY: RKLA Inc.	DATE: 2019.11.11
DRAWING NUMBER:	T-1

MN 600

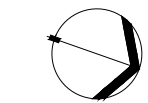
MN 1595



FOR REVIEW ONLY

LEGEND

- TREE PRESERVATION BARRIER
- EXISTING DECIDUOUS TREES TO BE PRESERVED - TREE NUMBER
- EXISTING DECIDUOUS TREES TO BE REMOVED - TREE NUMBER
- EXISTING CONIFEROUS TREES TO BE PRESERVED - TREE NUMBER
- EXISTING CONIFEROUS TREES TO BE REMOVED - TREE NUMBER
- PROPOSED SIDEWALK
- EXISTING SIDEWALK
- EXISTING MULTI USE PATHWAY
- PROPOSED MULTI USE PATHWAY



TITLE:

STREET TREE ASSESSMENT - ADELAIDE STREET NORTH
 FANSHAW PARK ROAD EAST TO SUNNINGDALE ROAD EAST
 LONDON, ON

PROJECT NUMBER:

18-191Ld

SCALE:

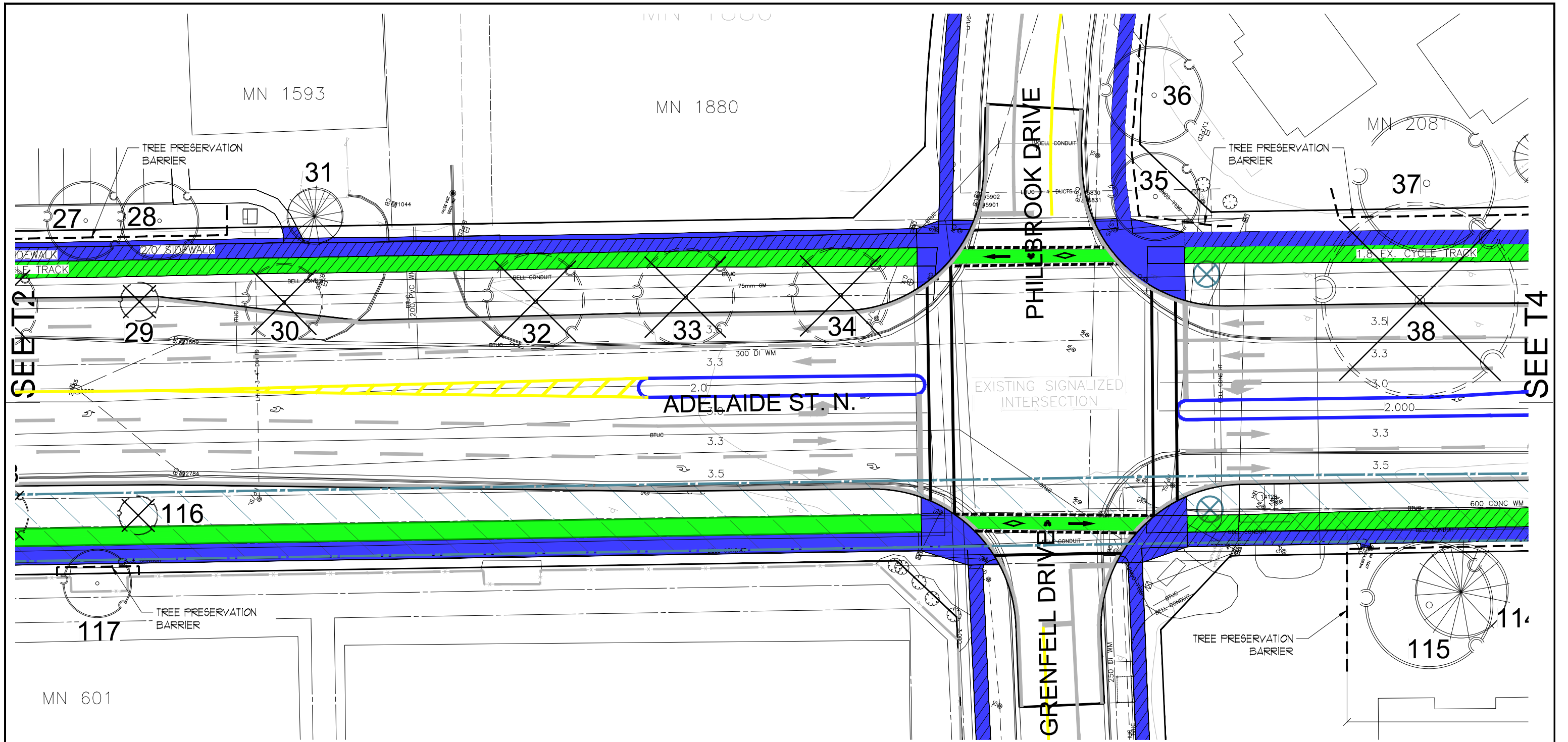
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DRAWN BY: RKLA Inc.

DATE: 2019.11.11

DRAWING NUMBER:

T-2



SEE T2

SEE T4

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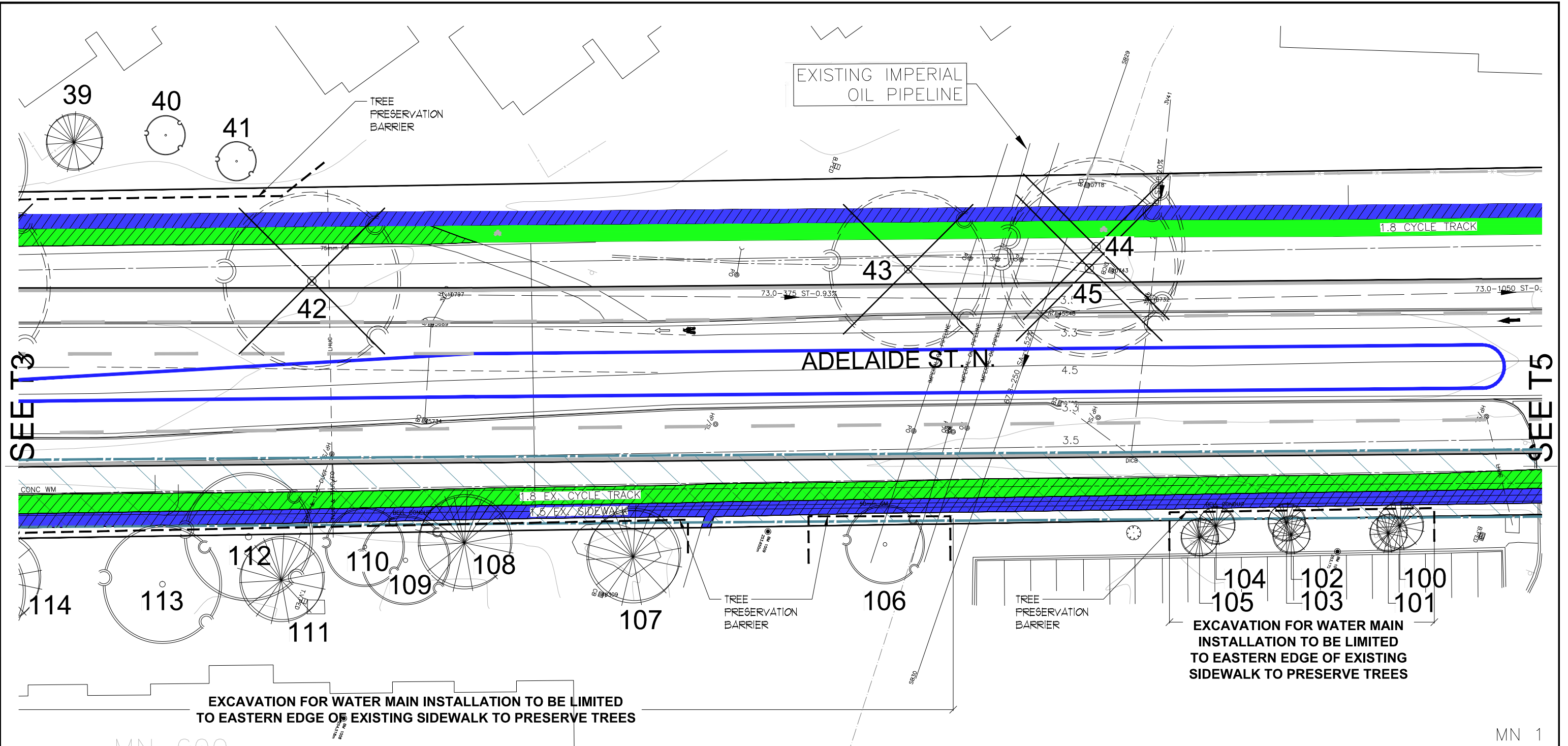
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	EXISTING CONIFEROUS TREES TO BE PRESERVED ← TREE NUMBER		EXISTING CONIFEROUS TREES TO BE REMOVED ← TREE NUMBER		EXISTING MULTI USE PATHWAY		PROPOSED MULTI USE PATHWAY



TITLE:

STREET TREE ASSESSMENT - ADELAIDE STREET NORTH
 FANSHAWE PARK ROAD EAST TO SUNNINGDALE ROAD EAST
 LONDON, ON

PROJECT NUMBER: 18-191Ld	SCALE: 1:400
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DRAWING NUMBER:	T-3



SEE T3

SEE T5

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LEGEND

	TREE PRESERVATION BARRIER		EXISTING DECIDUOUS TREES TO BE PRESERVED ← TREE NUMBER		EXISTING DECIDUOUS TREES TO BE REMOVED ← TREE NUMBER		PROPOSED SIDEWALK
	EXISTING CONIFEROUS TREES TO BE PRESERVED ← TREE NUMBER		EXISTING CONIFEROUS TREES TO BE REMOVED ← TREE NUMBER		EXISTING SIDEWALK		EXISTING MULTI USE PATHWAY
					PROPOSED MULTI USE PATHWAY		

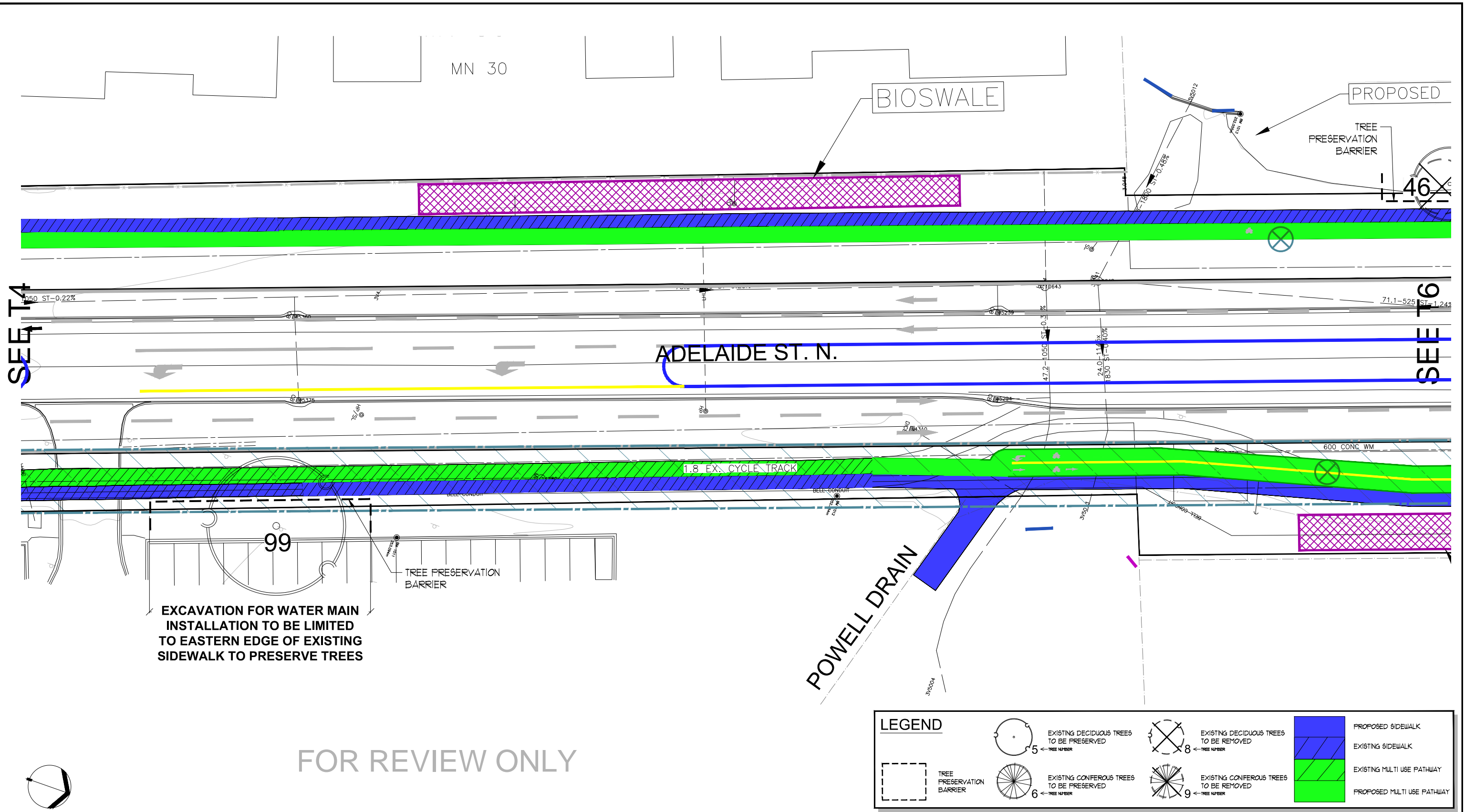
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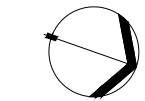
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**STREET TREE ASSESSMENT - ADELAIDE STREET NORTH
FANSHAWE PARK ROAD EAST TO SUNNINGDALE ROAD EAST
LONDON, ON**

PROJECT NUMBER: 18-191Ld	SCALE: 1:400
DRAWN BY: RKLA Inc.	DATE: 2019.11.11
DRAWING NUMBER:	T-4



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TITLE:

STREET TREE ASSESSMENT - ADELAIDE STREET NORTH
FANSHAWE PARK ROAD EAST TO SUNNINGDALE ROAD EAST
LONDON, ON

PROJECT NUMBER:

18-191Ld

SCALE:

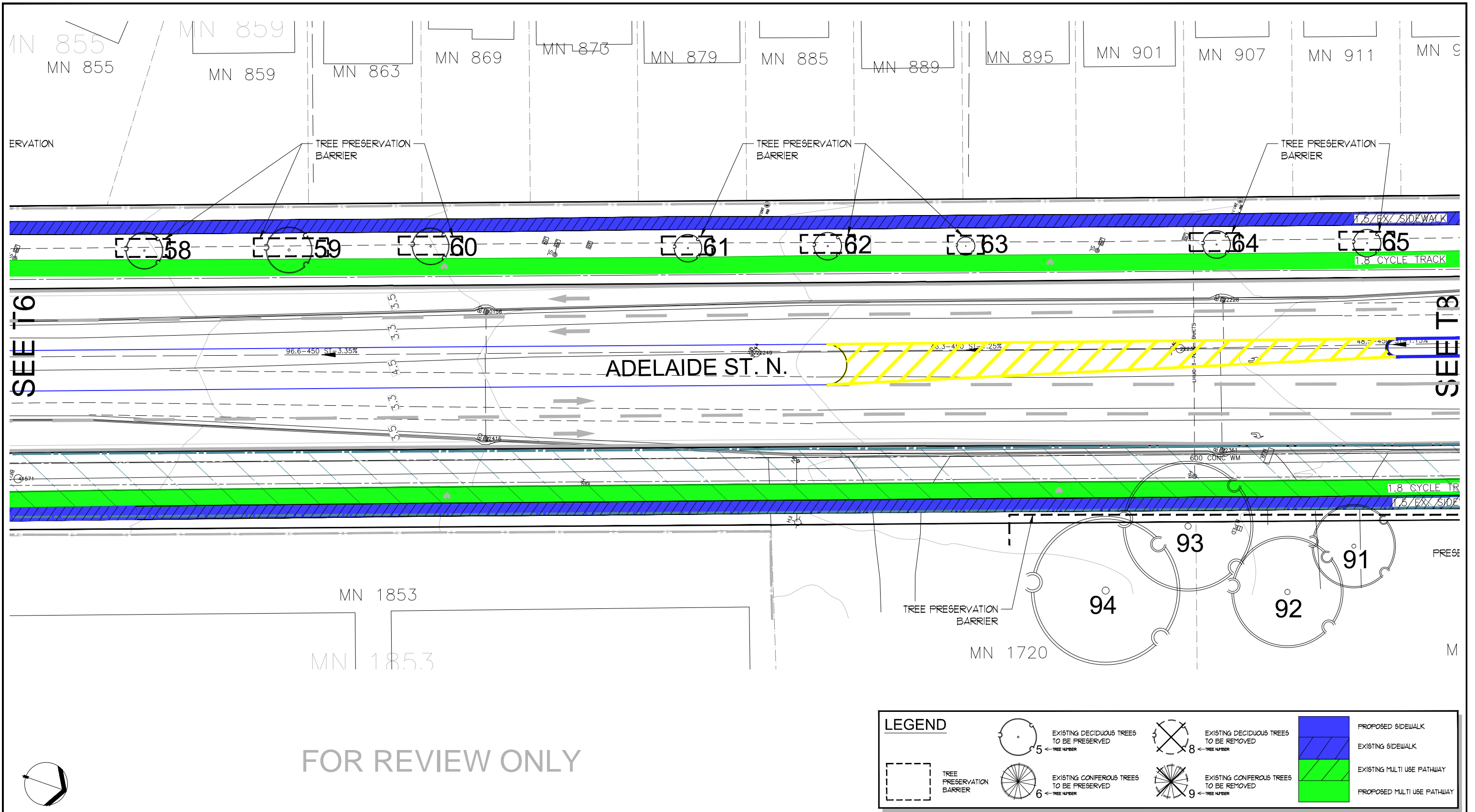
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DATE: 2019.11.11

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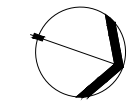
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FOR REVIEW ONLY

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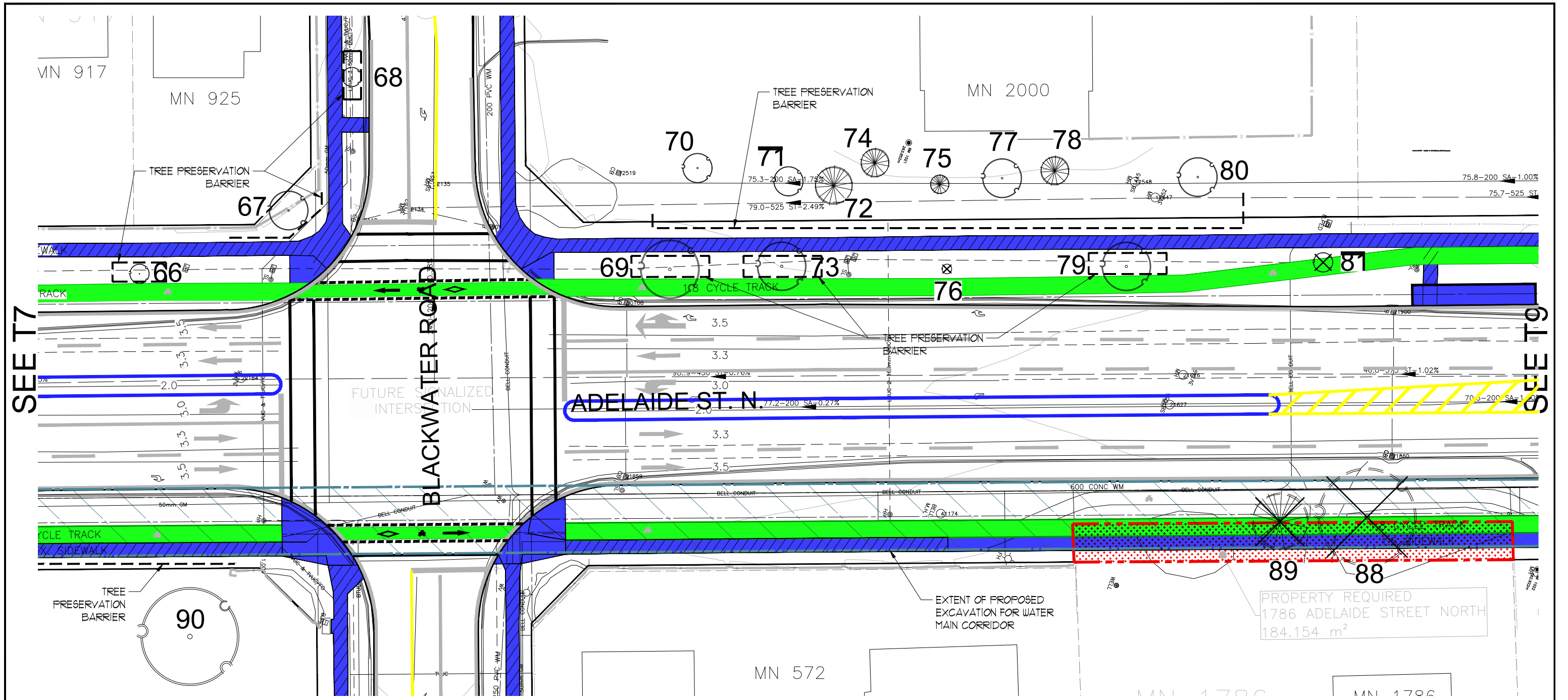
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	EXISTING CONIFEROUS TREES TO BE PRESERVED ← TREE NUMBER		EXISTING CONIFEROUS TREES TO BE REMOVED ← TREE NUMBER		EXISTING SIDEWALK		EXISTING MULTI USE PATHWAY
							PROPOSED MULTI USE PATHWAY



TITLE:

STREET TREE ASSESSMENT - ADELAIDE STREET NORTH
FANSHAW PARK ROAD EAST TO SUNNINGDALE ROAD EAST
LONDON, ON

PROJECT NUMBER: 18-191Ld	SCALE: 1:400
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DRAWING NUMBER: T-7	



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LEGEND

	TREE PRESERVATION BARRIER		EXISTING DECIDUOUS TREES TO BE PRESERVED - TREE NUMBER		EXISTING DECIDUOUS TREES TO BE REMOVED - TREE NUMBER		PROPOSED SIDEWALK
	EXISTING CONIFEROUS TREES TO BE PRESERVED - TREE NUMBER		EXISTING CONIFEROUS TREES TO BE REMOVED - TREE NUMBER		EXISTING SIDEWALK		EXISTING MULTI USE PATHWAY
	PROPOSED MULTI USE PATHWAY						



TITLE: **STREET TREE ASSESSMENT - ADELAIDE STREET NORTH**
FANSHAWE PARK ROAD EAST TO SUNNINGDALE ROAD EAST
LONDON, ON

PROJECT NUMBER: 18-191Ld	SCALE: 1:400
DRAWN BY: RKLA Inc.	DATE: 2019.11.11
DRAWING NUMBER: T-8	

MN 690

MN 680

100 SA=1.00% 75.7-525 ST=1.05% 591446 34253 75.5-200 SA=1.83% 75.3-375 ST=1.88%

TREE PRESERVATION BARRIER

82

83

1.8 CYCLE TRACK

SEE T8

SEE T10

200 SA=1.00% 52.2-375 ST=1.02% ADELAIDE ST. N.

1.8 CYCLE TRACK

1/2 R SIDEWALK


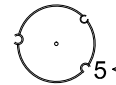







MN 1796
MN 1796

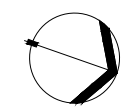
EXTENT OF PROPOSED EXCAVATION FOR WATER MAIN CORRIDOR

MN 1830
MN 1830

FOR REVIEW ONLY

LEGEND

	TREE PRESERVATION BARRIER		EXISTING DECIDUOUS TREES TO BE PRESERVED ← TREE NUMBER 5		EXISTING DECIDUOUS TREES TO BE REMOVED ← TREE NUMBER 8		PROPOSED SIDEWALK
			EXISTING CONIFEROUS TREES TO BE PRESERVED ← TREE NUMBER 6		EXISTING CONIFEROUS TREES TO BE REMOVED ← TREE NUMBER 9		EXISTING MULTI USE PATHWAY
							EXISTING SIDEWALK
							PROPOSED MULTI USE PATHWAY



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FANSHAWE PARK ROAD EAST TO SUNNINGDALE ROAD EAST
LONDON, ON

PROJECT NUMBER: 18-191Ld	SCALE: 1:400
DRAWN BY: RKLA Inc.	DATE: 2019.11.11
DRAWING NUMBER:	T-9

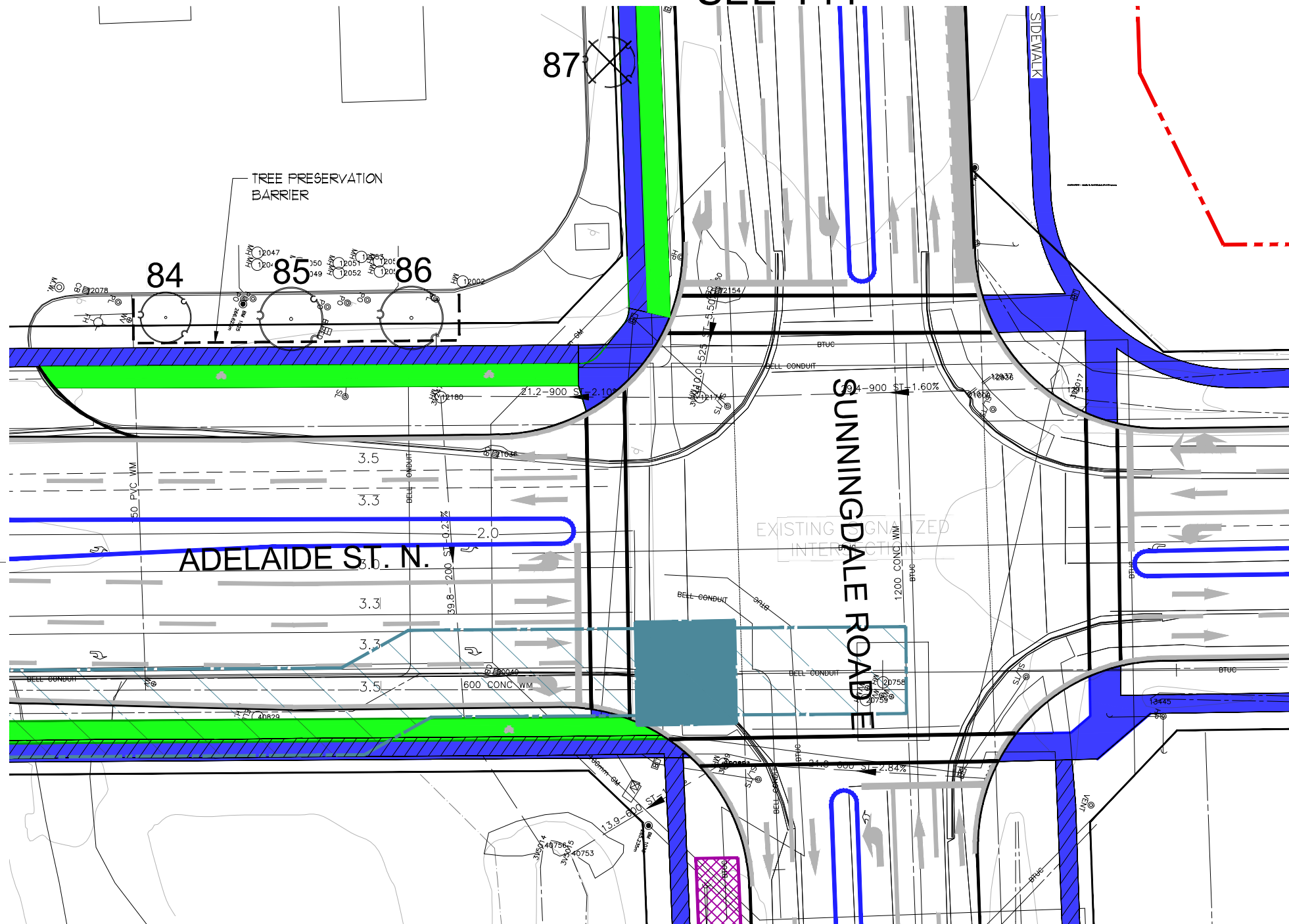
SEE T11

SEE T9

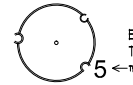



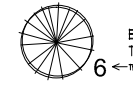




SEE T17

SEE T14

FOR REVIEW ONLY



LEGEND

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	TREE PRESERVATION BARRIER		EXISTING CONIFEROUS TREES TO BE PRESERVED ← TREE NUMBER		EXISTING SIDEWALK
			EXISTING CONIFEROUS TREES TO BE REMOVED ← TREE NUMBER		EXISTING MULTI USE PATHWAY
					PROPOSED MULTI USE PATHWAY



TITLE:

STREET TREE ASSESSMENT - ADELAIDE STREET NORTH
FANSHAW PARK ROAD EAST TO SUNNINGDALE ROAD EAST
LONDON, ON

PROJECT NUMBER:

18-191Ld

SCALE:

1:400

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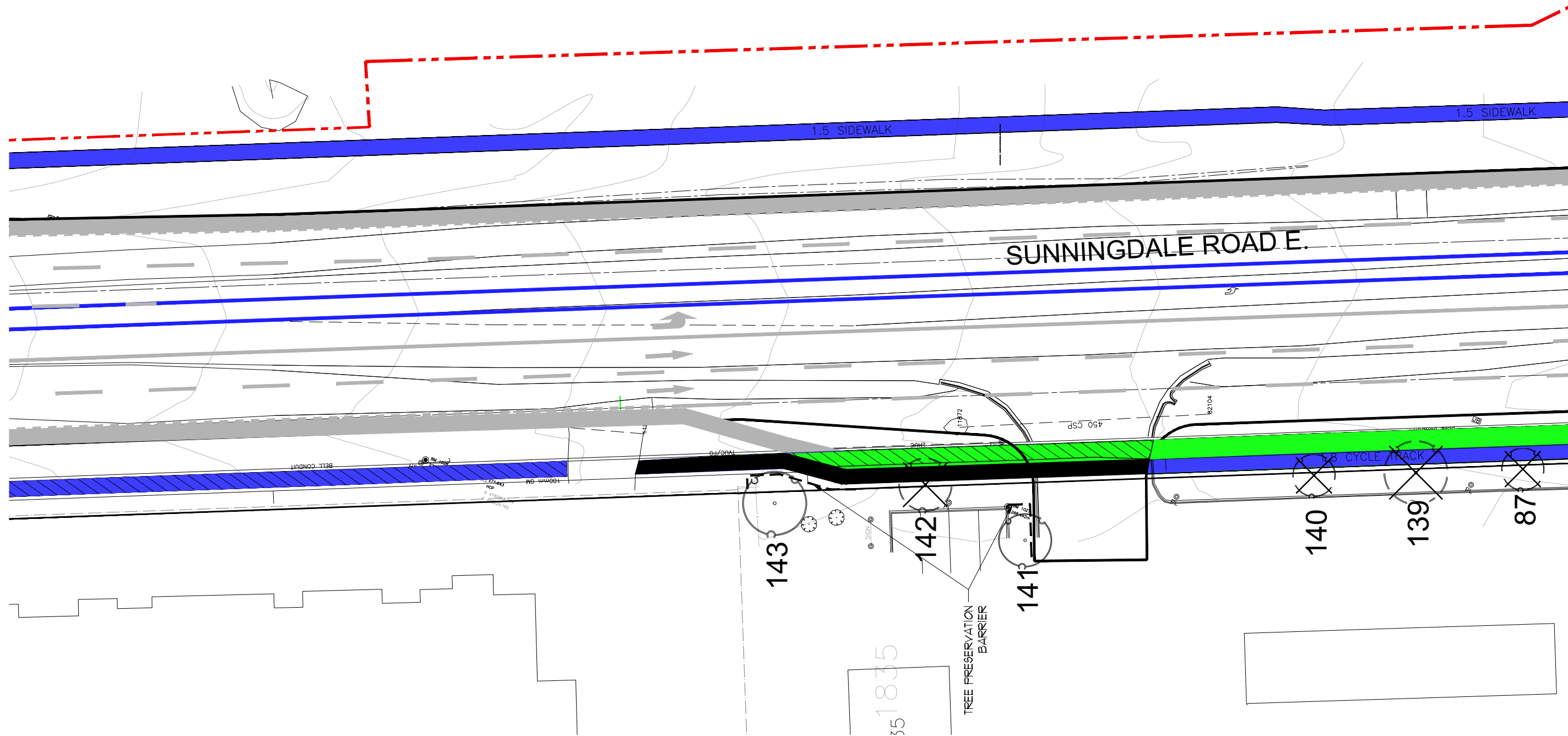
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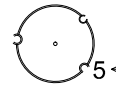






SEE T12

SEE T10



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LEGEND

	TREE PRESERVATION BARRIER		EXISTING DECIDUOUS TREES TO BE PRESERVED ← TREE NUMBER		EXISTING DECIDUOUS TREES TO BE REMOVED ← TREE NUMBER		PROPOSED SIDEWALK
			EXISTING CONIFEROUS TREES TO BE PRESERVED ← TREE NUMBER		EXISTING CONIFEROUS TREES TO BE REMOVED ← TREE NUMBER		EXISTING MULTI USE PATHWAY
							PROPOSED MULTI USE PATHWAY



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PROJECT NUMBER: 18-191Ld	SCALE: 1:400
DRAWN BY: RKLA Inc.	DATE: 2019.11.11
DRAWING NUMBER:	T-11

SEE T13


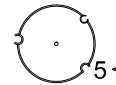







SEE T11

SUNNINGDALE ROAD E.

AN 2230

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LEGEND

	TREE PRESERVATION BARRIER		EXISTING DECIDUOUS TREES TO BE PRESERVED ← TREE NUMBER 5		EXISTING DECIDUOUS TREES TO BE REMOVED ← TREE NUMBER 8		PROPOSED SIDEWALK
			EXISTING CONIFEROUS TREES TO BE PRESERVED ← TREE NUMBER 6		EXISTING CONIFEROUS TREES TO BE REMOVED ← TREE NUMBER 9		EXISTING SIDEWALK
							EXISTING MULTI USE PATHWAY
							PROPOSED MULTI USE PATHWAY

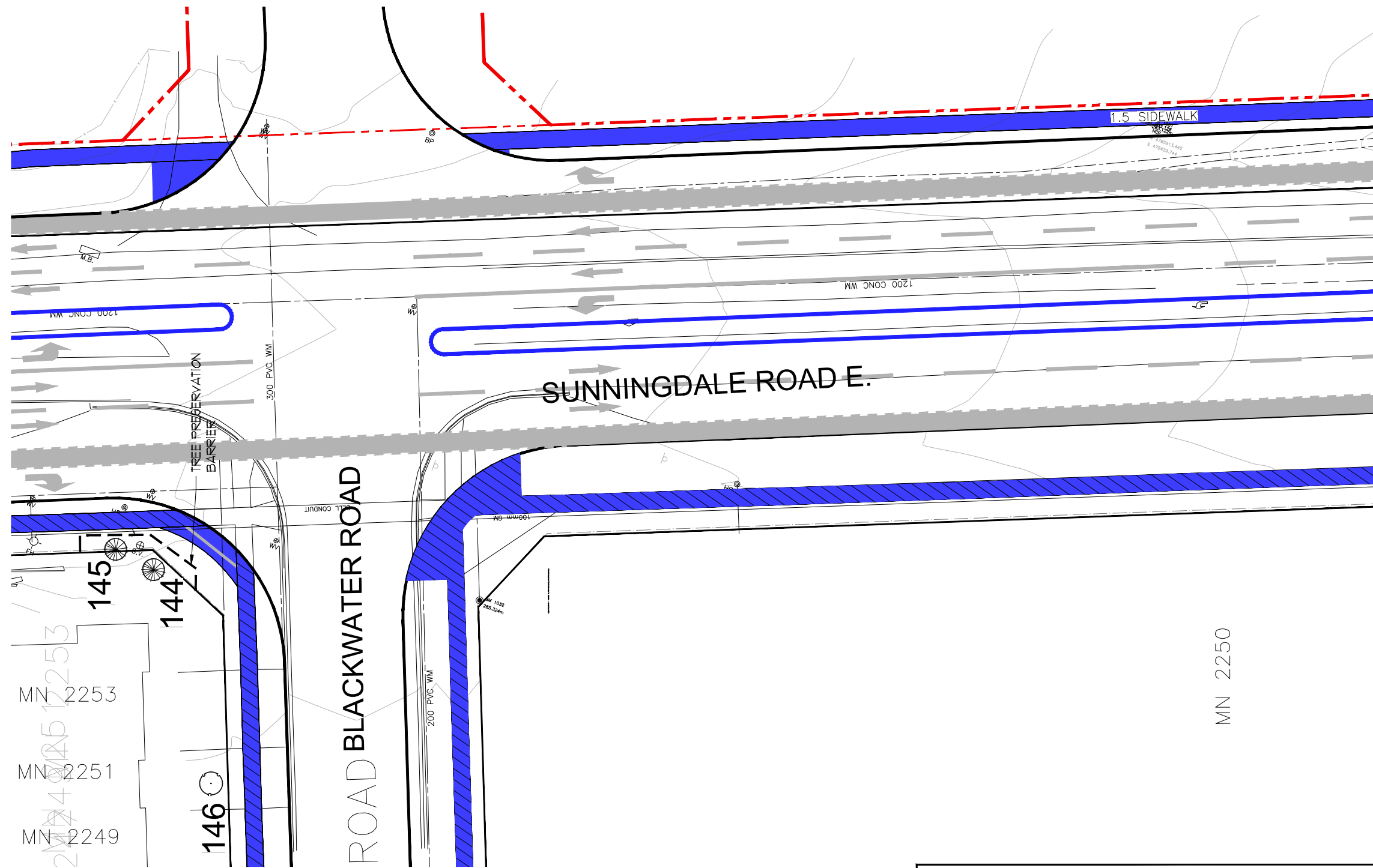


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PROJECT NUMBER: 18-191Ld	SCALE: 1:400
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DRAWING NUMBER:	T-12


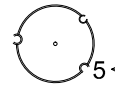







LIMIT OF TREE INVENTORY



SEE T12

FOR REVIEW ONLY

LEGEND

	TREE PRESERVATION BARRIER		5 EXISTING DECIDUOUS TREES TO BE PRESERVED ← TREE NUMBER		8 EXISTING DECIDUOUS TREES TO BE REMOVED ← TREE NUMBER		PROPOSED SIDEWALK
			6 EXISTING CONIFEROUS TREES TO BE PRESERVED ← TREE NUMBER		9 EXISTING CONIFEROUS TREES TO BE REMOVED ← TREE NUMBER		EXISTING SIDEWALK
							EXISTING MULTI USE PATHWAY
							PROPOSED MULTI USE PATHWAY



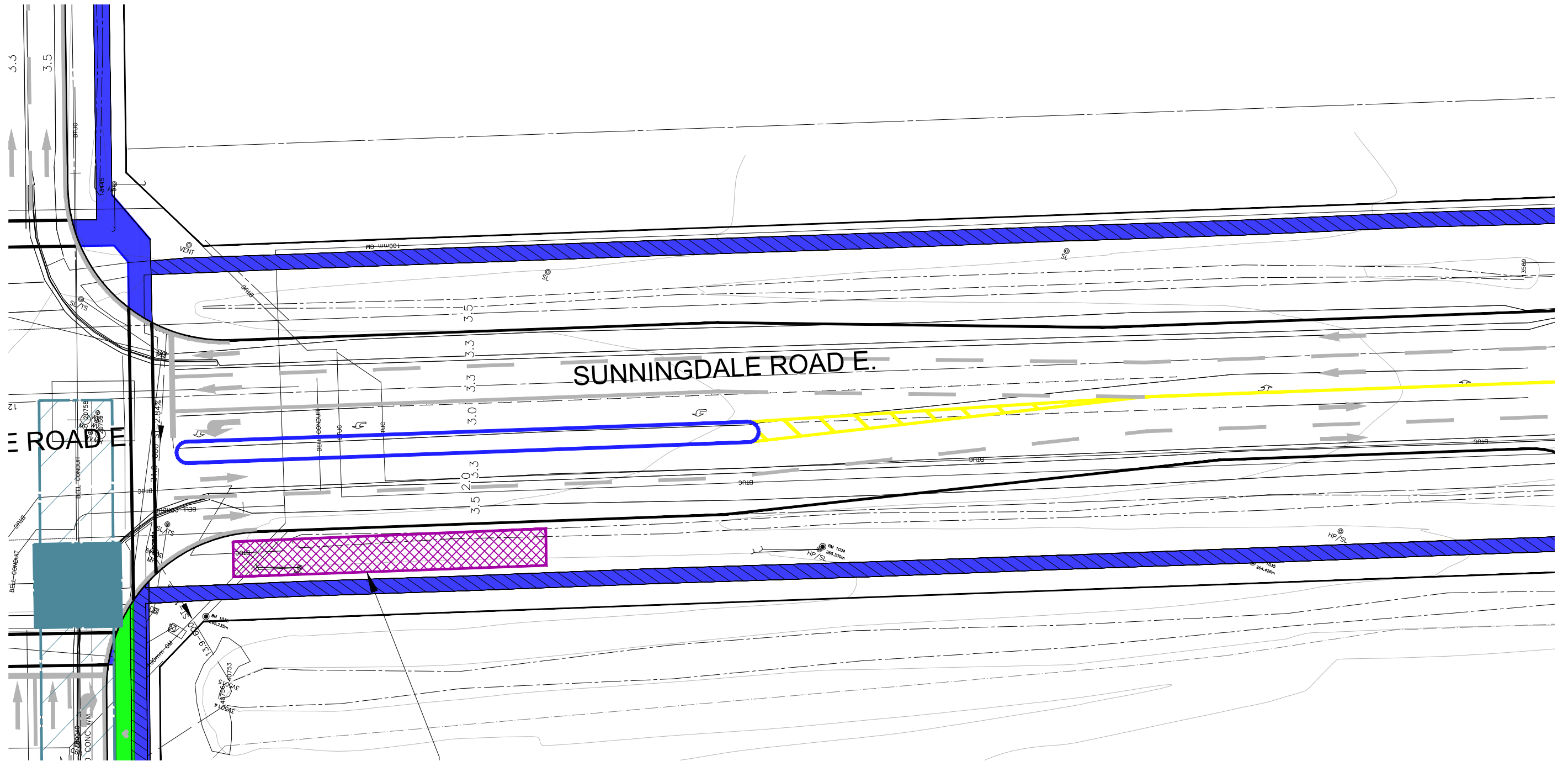
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STREET TREE ASSESSMENT - ADELAIDE STREET NORTH
FANSHAWE PARK ROAD EAST TO SUNNINGDALE ROAD EAST
LONDON, ON

PROJECT NUMBER: 18-191Ld	SCALE: 1:400
DRAWN BY: RKLA Inc.	DATE: 2019.11.11
DRAWING NUMBER:	T-13


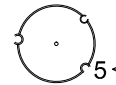







SEE T10

SEE T15



FOR REVIEW ONLY

LEGEND

	TREE PRESERVATION BARRIER		EXISTING DECIDUOUS TREES TO BE PRESERVED ← TREE NUMBER 5		EXISTING DECIDUOUS TREES TO BE REMOVED ← TREE NUMBER 8		PROPOSED SIDEWALK
			EXISTING CONIFEROUS TREES TO BE PRESERVED ← TREE NUMBER 6		EXISTING CONIFEROUS TREES TO BE REMOVED ← TREE NUMBER 9		EXISTING MULTI USE PATHWAY
							EXISTING SIDEWALK
							PROPOSED MULTI USE PATHWAY




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LONDON, ON

PROJECT NUMBER:

18-191Ld

SCALE:

1:400

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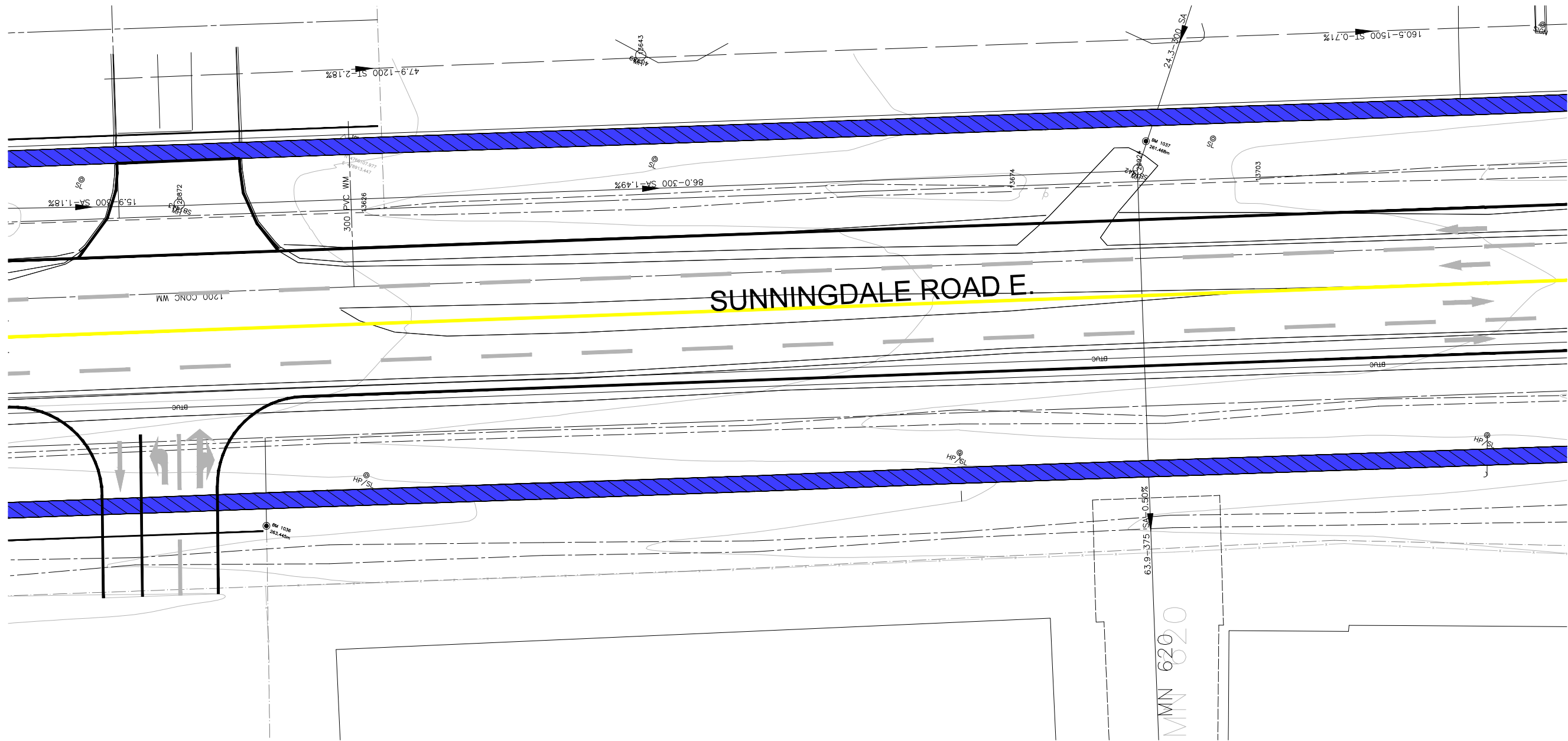
DATE: 2019.11.11

DRAWING NUMBER:

T-14

SEE T14

SEE T16



FOR REVIEW ONLY

LEGEND

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			EXISTING CONIFEROUS TREES TO BE PRESERVED ← TREE NUMBER		EXISTING CONIFEROUS TREES TO BE REMOVED ← TREE NUMBER		EXISTING MULTI USE PATHWAY
							PROPOSED MULTI USE PATHWAY



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FANSHAWE PARK ROAD EAST TO SUNNINGDALE ROAD EAST
LONDON, ON

PROJECT NUMBER:

18-191Ld

SCALE:

1:400

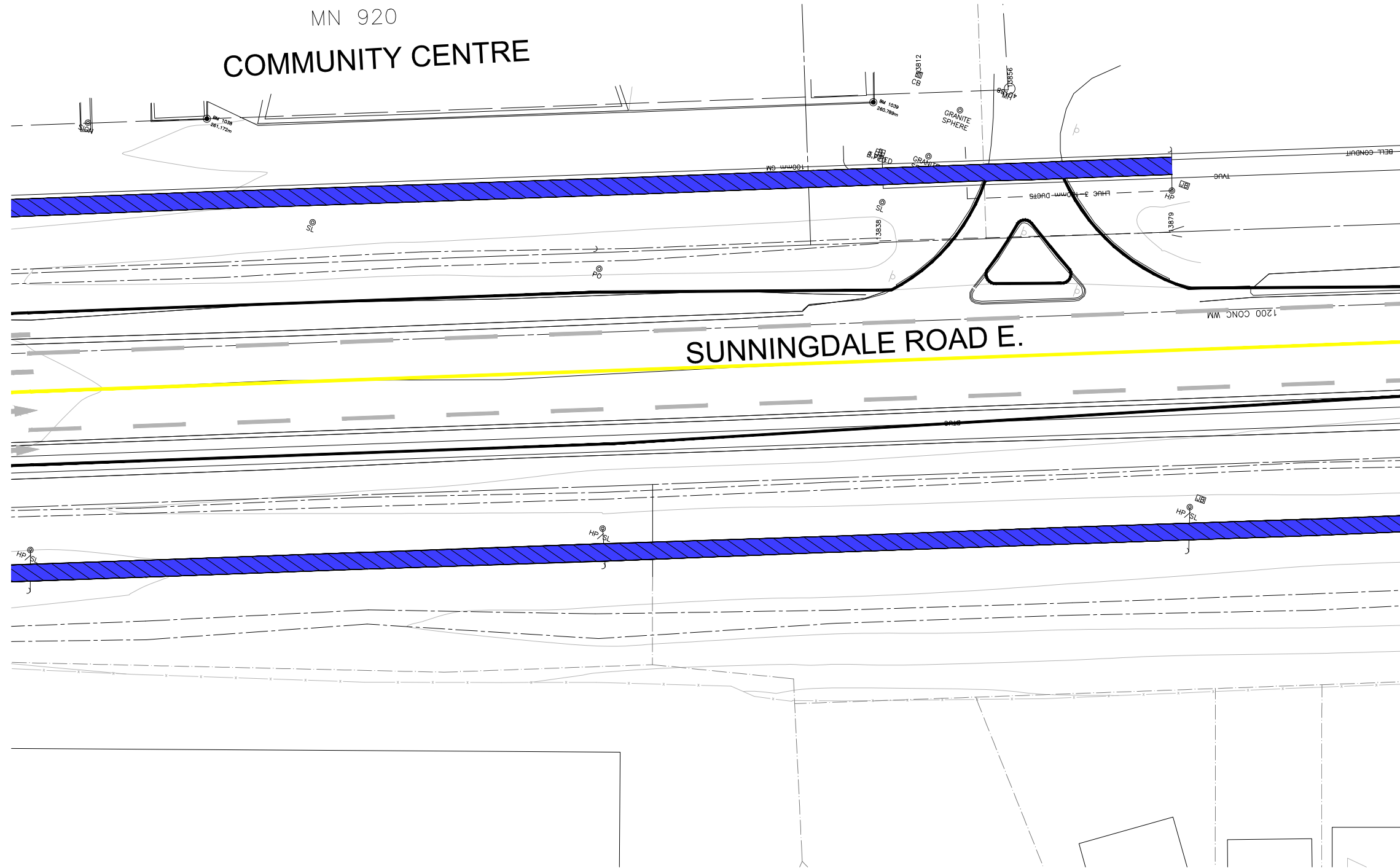
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DATE: 2019.11.11

DRAWING NUMBER:

T-15

MN 920
COMMUNITY CENTRE

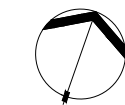


SEE T15

LIMIT OF TREE INVENTORY

FOR REVIEW ONLY

LEGEND	
	TREE PRESERVATION BARRIER
	EXISTING DECIDUOUS TREES TO BE PRESERVED ← TREE NUMBER
	EXISTING DECIDUOUS TREES TO BE REMOVED ← TREE NUMBER
	EXISTING CONIFEROUS TREES TO BE PRESERVED ← TREE NUMBER
	EXISTING CONIFEROUS TREES TO BE REMOVED ← TREE NUMBER
	PROPOSED SIDEWALK
	EXISTING SIDEWALK
	EXISTING MULTI USE PATHWAY
	PROPOSED MULTI USE PATHWAY



RON KOUDYS
LANDSCAPE
ARCHITECTS INC.
388 Oxford Street East, London, Ontario, N6A 1V7
Tel: (519) 667-3322, Fax: (519) 645-2474

TITLE:

STREET TREE ASSESSMENT - ADELAIDE STREET NORTH
FANSHAW PARK ROAD EAST TO SUNNINGDALE ROAD EAST
LONDON, ON

PROJECT NUMBER:

18-191Ld

SCALE:

1:400

DRAWN BY: RKLA Inc.

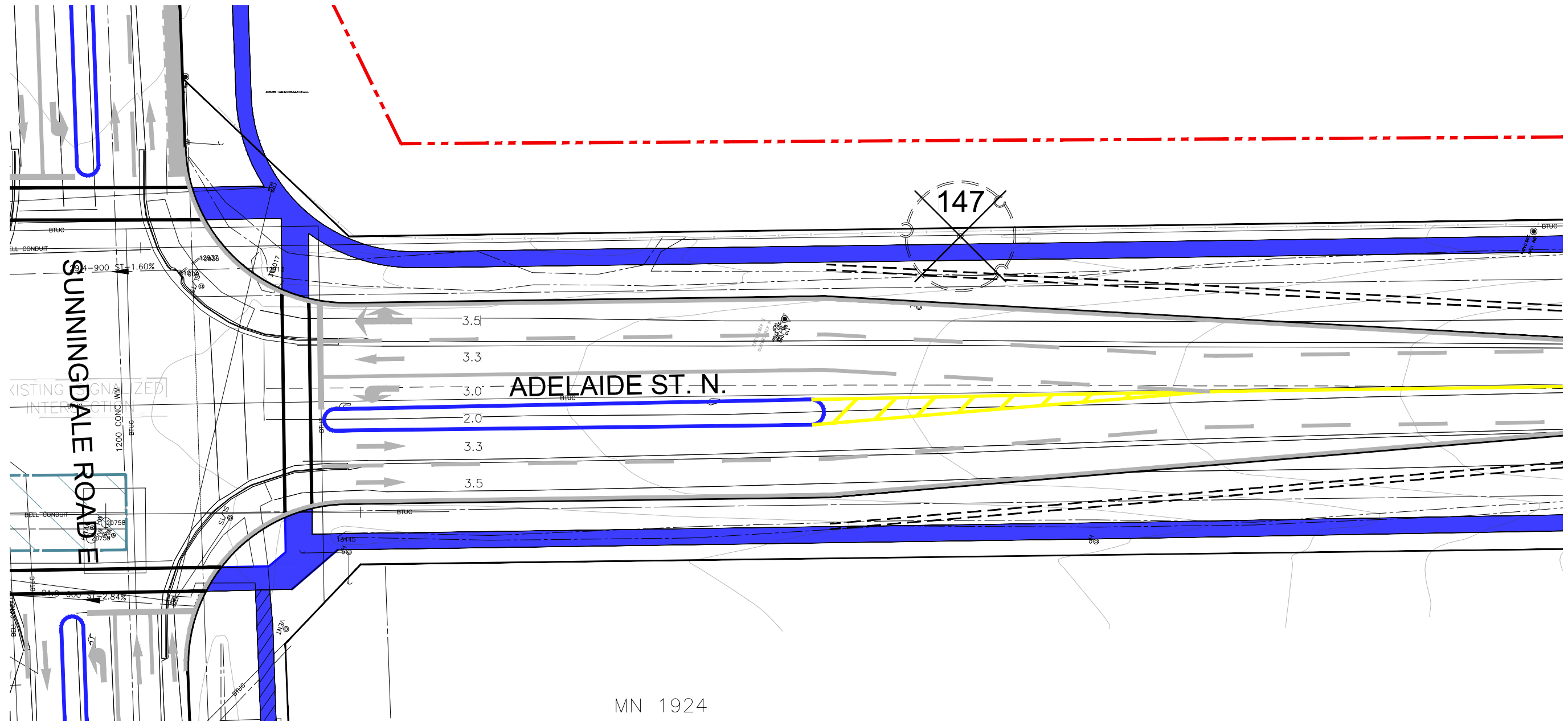
DATE: 2019.11.11

DRAWING NUMBER:

T-16


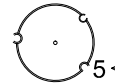






SEE T10

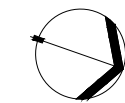
SEE T18



FOR REVIEW ONLY

LEGEND

	TREE PRESERVATION BARRIER		EXISTING DECIDUOUS TREES TO BE PRESERVED ← TREE NUMBER		EXISTING DECIDUOUS TREES TO BE REMOVED ← TREE NUMBER		PROPOSED SIDEWALK
			EXISTING CONIFEROUS TREES TO BE PRESERVED ← TREE NUMBER		EXISTING CONIFEROUS TREES TO BE REMOVED ← TREE NUMBER		EXISTING MULTI USE PATHWAY
							PROPOSED MULTI USE PATHWAY




**RON KOUDYS
LANDSCAPE
ARCHITECTS INC.**
388 Oxford Street East, London, Ontario, N6A 1V7
Tel: (519) 667-3322, Fax: (519) 645-2474

TITLE:

STREET TREE ASSESSMENT - ADELAIDE STREET NORTH
FANSHAWE PARK ROAD EAST TO SUNNINGDALE ROAD EAST
LONDON, ON

PROJECT NUMBER:

18-191Ld

SCALE:

1:400

DRAWN BY: RKLA Inc.

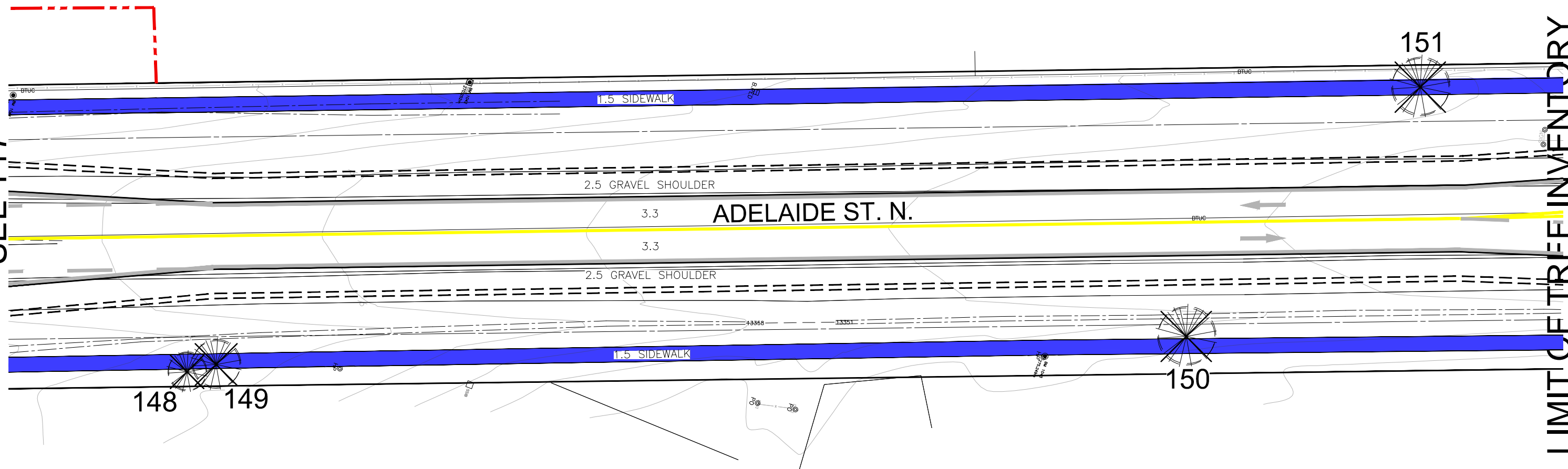
DATE: 2019.11.11

DRAWING NUMBER:

T-17

SEE T17

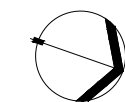
LIMIT OF TREE INVENTORY



FOR REVIEW ONLY

LEGEND

	TREE PRESERVATION BARRIER		EXISTING DECIDUOUS TREES TO BE PRESERVED ← TREE NUMBER		EXISTING DECIDUOUS TREES TO BE REMOVED ← TREE NUMBER		PROPOSED SIDEWALK
			EXISTING CONIFEROUS TREES TO BE PRESERVED ← TREE NUMBER		EXISTING CONIFEROUS TREES TO BE REMOVED ← TREE NUMBER		EXISTING MULTI USE PATHWAY
							PROPOSED MULTI USE PATHWAY



RON KOUDYS
LANDSCAPE ARCHITECTS
388 Oxford Street East, London, Ontario, N6A 1V7
Tel: (519) 667-3322, Fax: (519) 645-2474

TITLE:

STREET TREE ASSESSMENT - ADELAIDE STREET NORTH
FANSHAWE PARK ROAD EAST TO SUNNINGDALE ROAD EAST
LONDON, ON

PROJECT NUMBER:

18-191Ld

SCALE:

1:400

DRAWN BY: RKLA Inc.

DATE: 2019.11.11

DRAWING NUMBER:

T-18

APPENDIX C - TREE PHOTOS

All photographs taken by M Peeters of RKL A during field work.
September 27, 2018 (trees 1 - 138), and
October 22, 2019 (trees 139 - 151).

DRAFT



Tree # 1 – Sugar Maple
1537 Adelaide St. N.



Tree # 2 – Red Oak
1537 Adelaide St. N.



Tree # 3 – Red Oak
1537 Adelaide St. N.



Trees # 4-8 – Norway Spruce
600 Fanshawe Park Road



Tree # 9 – Honeylocust
600 Fanshawe Park Road



Tree # 10 – Royal Red Norway Maple
600 Fanshawe Park Road



Tree # 11 – Norway Spruce
600 Fanshawe Park Road



Tree # 12 – Honeylocust
600 Fanshawe Park Road



Tree # 13 – Elm
600 Fanshawe Park Road



Tree # 14 – Hackberry
600 Fanshawe Park Road



Tree # 15– Silver Maple
600 Fanshawe Park Road



Tree # 16 – Elm
600 Fanshawe Park Road



Tree # 17 – Honeylocust
600 Fanshawe Park Road



Tree # 18 - Honeylocust
600 Fanshawe Park Road



Tree # 19 - Honeylocust
1595 Adelaide St. North



Tree # 20 – Honeylocust
1595 Adelaide St. North



Tree # 21 – White Oak
1595 Adelaide St. North



Tree # 22 – Silver Maple
1595 Adelaide St. North



Tree # 23 – Colorado Blue Spruce
1595 Adelaide St. N



Tree # 24 – Colorado Blue Spruce
1595 Adelaide St. N



Tree # 25 – Colorado Blue Spruce
1595 Adelaide St. N



Tree # 26 – Hackberry
1595 Adelaide St. N



Tree # 27 – Littleleaf Linden
1595 Adelaide St. N



Trees # 28 – Littleleaf Linden
1595 Adelaide St. N



Tree # 29 – Sugar Maple
1595 Adelaide St. N



Tree # 30 – Red Oak
1593 Adelaide St. N



Tree # 31 – Colorado Blue Spruce
1593 Adelaide St. N



Tree # 32 – Honeylocust
1880 Phillbrook Dr.



Tree # 33 - Honeylocust
1880 Phillbrook Dr.



Tree # 34 – Honeylocust
1880 Phillbrook Dr.



Tree # 35 – Emerald Queen Norway Maple Tree
2081 Phillbrook Dr.



36 – Norway Maple
2081 Phillbrook Dr.



Tree # 37 – Northern Catalpa
2081 Phillbrook Dr.



Tree #38 – Silver Maple
2081 Phillbrook Dr.



Tree # 39 – Austrian Pine
2081 Phillbrook Dr.



Tree # 40 – Scotch Pine
Tree # 41 – Colorado Spruce
2081 Phillbrook Dr.



Tree # 42 – Silver Maple
2081 Phillbrook Dr.



Tree # 43 – Eastern Cottonwood
2081 Phillbrook Dr.



Trees # 44 & 45 – Eastern Cottonwood
30 Adelaide St. N



Trees # 46 & 47 – Trembling Aspen
1625 Adelaide St. N



Tree # 48 – Trembling Aspen
1625 Adelaide St. N



Tree # 49 – Willow spp.
1625 Adelaide St. N



Tree # 50 – Freeman Maple
1675 Adelaide St. N



Tree # 51 – Ash spp.
1675 Adelaide St. N



Tree # 52 – Ash spp.
1675 Adelaide St. N



Tree # 53 – Ash spp.
1675 Adelaide St. N



Tree # 54 – Zelkova
1675 Adelaide St. N



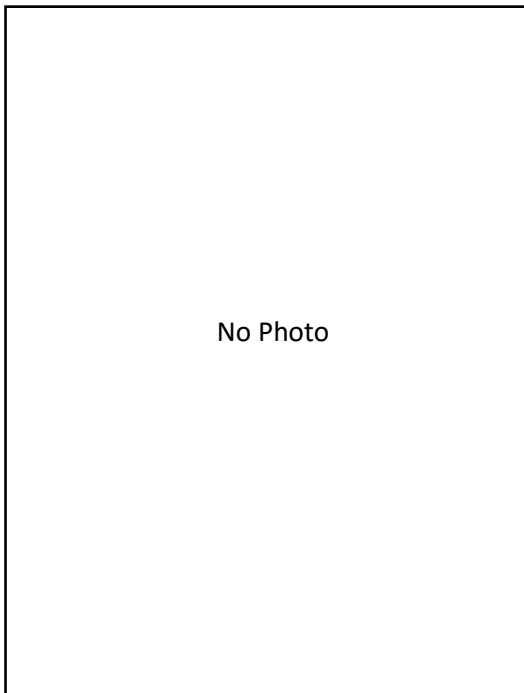
Tree # 55 – Amur Cork Tree
1675 Adelaide St. N



Tree # 56 – Ash spp.
1675 Adelaide St. N



Tree # 57 – Ivory Silk Tree Lilac
855 Garibaldi Ave / Adelaide St. N



Tree # 58 – Hedge Maple
859 Garibaldi Ave / Adelaide St. N



Tree # 59 – Elm
859 Garibaldi Ave / Adelaide St. N



Tree # 60 – Hedge Maple
869 Garibaldi Ave / Adelaide St. N



Tree # 61 – Hackberry
879 Garibaldi Ave / Adelaide St. N



Trees # 62 & 63 – Hackberry
885 Garibaldi Ave / Adelaide St. N



Tree # 64 – Hackberry
895 Garibaldi Ave / Adelaide St. N



Tree # 65 – Hackberry
907 Garibaldi Ave / Adelaide St. N



Tree # 66 – Hackberry
925 Garibaldi Ave / Adelaide St. N



Tree # 67 – Paper Birch
925 Garibaldi Ave / Adelaide St. N



Tree # 68 – Freeman Maple
925 Garibaldi Ave / Adelaide St. N



Tree # 69 – Freeman Maple
2000 Blackwater Rd.



Tree # 70 – Ivory Silk Tree Lilac
2000 Blackwater Rd.



Tree # 71 – Ivory Silk Tree Lilac
2000 Blackwater Rd.



Tree # 72 – Serbian Spruce
2000 Blackwater Rd.



Tree # 73 – Tulip Tree
2000 Blackwater Rd.



Tree # 74 – Serbian Spruce
2000 Blackwater Rd.



Tree # 75 – Serbian Spruce
2000 Blackwater Rd.



Tree # 76 - unknown
2000 Blackwater Rd.



Tree # 75 – Serbian Spruce
2000 Blackwater Rd.



Tree # 76 - unknown
2000 Blackwater Rd.



Tree # 77 – Horse Chestnut
2000 Blackwater Rd.



Tree # 78 – Serbian Spruce
2000 Blackwater Rd.



Tree # 79 – Hackberry
2000 Blackwater Rd.



Tree # 80 – Horse Chestnut
2000 Blackwater Rd.



Tree # 81 – Red Maple
690 Adelaide St. N



Tree # 82 – Littleleaf Linden
1825 Adelaide St. N



Tree # 83 – Littleleaf Linden
1825 Adelaide St. N



Tree # 84 – Sugar Maple
1825 Adelaide St. N



Tree # 85 – Red Maple
1825 Adelaide St. N



Tree # 86 – Red Maple
1825 Adelaide St. N



Tree # 87 – Freeman Maple
1825 Adelaide St. N



Tree # 88 – Freeman Maple
1786 Adelaide St. N



Tree # 89 – Red Maple
1786 Adelaide St. N



Tree # 90 – Norway Maple
1740 Adelaide St. N



Tree # 91 – Norway Maple
1740 Adelaide St. N



Tree # 92 – Norway Maple
1740 Adelaide St. N



Tree # 93 – Norway Maple
1720 Adelaide St. N



Tree # 94 – Weeping Willow
1720 Adelaide St. N



Tree # 95 – Freeman Maple
506 Blackwater Pl.



Tree # 96 – Freeman Maple
509 Blackwater Pl.



Tree # 97 – Freeman Maple
509 Blackwater Pl.



Tree # 98 – Norway Maple
509 Blackwater Pl.



Tree # 99 – Norway Maple
1600 Adelaide St. N



Trees # 100 & 101 – Colorado Blue Spruce
1600 Adelaide St. N



Trees # 102 & 103 – Colorado Blue Spruce
1600 Adelaide St. N



Trees # 104 & 105 – Colorado Blue Spruce
1600 Adelaide St. N



Trees # 102 & 103 – Colorado Blue Spruce
1600 Adelaide St. N



Trees # 104 & 105 – Colorado Blue Spruce
1600 Adelaide St. N



Tree # 106 – Norway Maple
600 Adelaide St. N



Tree # 107 – Austrian Pine
600 Adelaide St. N



Tree # 108 – Austrian Pine
600 Adelaide St. N



Tree # 109 – Norway Maple
600 Adelaide St. N



Tree # 110 – Norway Maple
600 Adelaide St. N



Tree # 111 – Austrian Pine
600 Adelaide St. N



Tree # 112 – Red Maple
600 Adelaide St. N



Tree # 113 – Norway Maple
600 Adelaide St. N



Tree # 114 – Austrian Pine
Tree # 115 – Silver Maple
600 Adelaide St. N



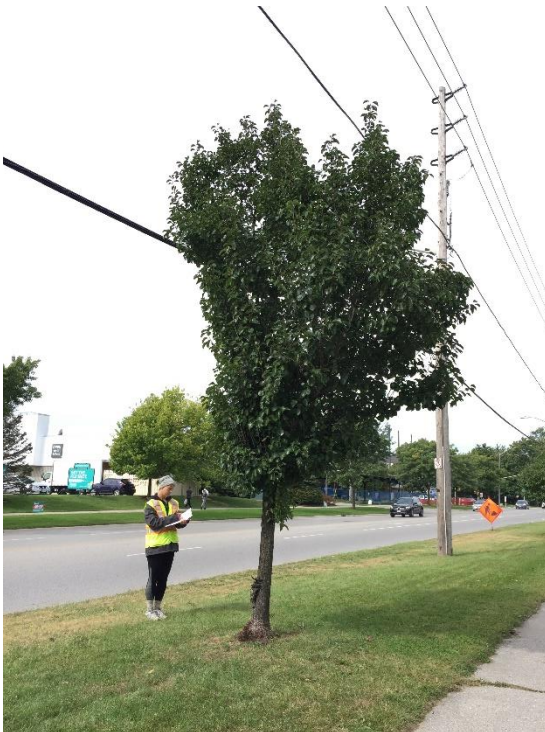
Tree # 116 – Pear
601 Adelaide St. N



Tree # 117 – Royal Red Norway Maple
601 Adelaide St. N



Tree # 118 – Mountain Ash
601 Adelaide St. N



Tree # 119 – Pear
601 Adelaide St. N



Tree # 120 – Royal Red Norway Maple
601 Adelaide St. N



Tree # 121 – Mountain Ash
601 Adelaide St. N



Tree # 122 – Mountain Ash
601 Adelaide St. N



Tree # 123 – Norway Maple
1580 Adelaide St. N



Tree # 124 – Mountain Ash
1580 Adelaide St. N



Tree # 125 – Mountain Ash
1580 Adelaide St. N



Tree # 126 – Pear
1580 Adelaide St. N



Tree # 127 – Norway Maple
1580 Adelaide St. N



Tree # 128 – Norway Maple
1580 Adelaide St. N



Tree # 129 – Mountain Ash
1580 Adelaide St. N



Tree # 130 – Norway Maple
1580 Adelaide St. N



Tree # 131 – Norway Maple
1580 Adelaide St. N



Tree # 132 – Norway Maple
1580 Adelaide St. N



Tree # 133 – Royal Red Norway Maple
1570 Adelaide St. N



Tree # 134 – Austrian Pine
1570 Adelaide St. N



Tree # 135 – Freeman Maple
614 Fanshawe Park Rd.



Tree # 136 – Austrian Pine
614 Fanshawe Park Rd.



Tree # 137 – Austrian Pine
614 Fanshawe Park Rd.



Tree # 138 - Honeylocust
1536 Fanshawe Park Rd.



Tree # 139 – Freeman Maple
1845 Adelaide Rd N



Tree # 140 - Freeman Maple
1845 Adelaide Rd N



Tree # 141 – Honeylocust
1835 Adelaide Rd N



Tree # 142 - Littleleaf Linden
BOUNDARY - 1835 Adelaide Rd N and City ROW



Tree # 143 – Littleleaf Linden
1835 Adelaide Rd N



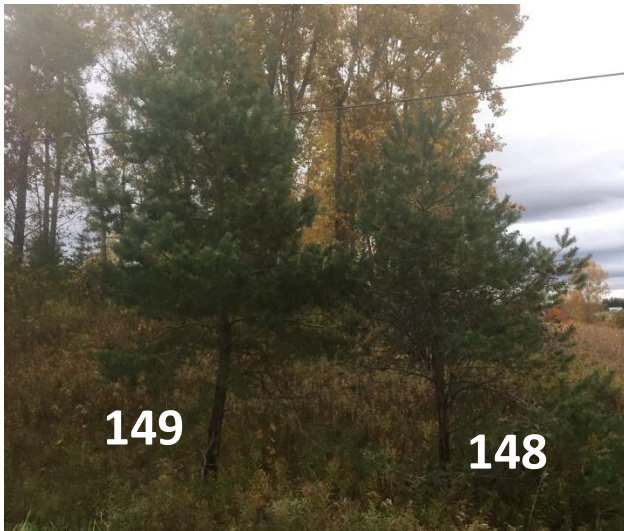
Tree # 144 and 145- Colorado Blue Spruce
1845 Adelaide Rd N and BOUNDARY TREE - with City



Tree # 146 – Honeylocust
2251 Blackwater Road



Tree # 147 - Trembling Aspen
City ROW



Tree # 148 & # 149 – Scotch Pine
City ROW



Tree # 150 - Scotch Pine
City ROW



Tree # 151 - Scotch Pine

City ROW

Appendix J

Resumes

Tisha Doucette, B.Sc (Hons.), EP

ECOLOGICAL SERVICES MANAGER

Tisha Doucette is a Certified Environmental Professional (EP) and Project Manager with more than 17 years of experience leading ecological inventories, impact assessments, and the acquisition of environmental permits and approvals. Tisha has a broad-based knowledge and understanding of a wide variety of natural environmental disciplines as well as current environmental issues.

Ms. Doucette has a proven ability to coordinate a multidisciplinary team of experts and specialist pertaining to aquatic and terrestrial impact assessments, wildlife habitat management, and species at risk. She is particularly practiced in the development of environmental mitigation measures and habitat enhancement / compensation plans. Ms. Doucette offers the technical expertise as well as the management capability to coordinate the ecological services required to meet legislative requirements and to obtain environmental approvals pertinent to the project.

WORK EXPERIENCE

PARSONS PROJECTS

Class EA and Ecological Services

Natural Science Services on Retainer, throughout southwestern Ontario - MTO West Region - Management of all assignments related to this three-year natural sciences services retainer. Parsons' ecological services group has been awarded, for a second term, a retainer assignment to provide natural sciences services for projects throughout MTO's West Region. Assignments will include: various ecological inventories (terrestrial and aquatic); the assessment of potential project impacts; Species At Risk (SAR) surveys; development of environmental mitigation measures; acquisition of required environmental permits; environmental monitoring during construction and post-construction environmental monitoring (2014-2017).

Natural Science Services on Retainer, throughout southwestern Ontario - MTO West Region - Management of all assignments related to this two-year natural sciences retainer assignment. The ecological services group has been awarded 25 separate assignments, including aquatic and terrestrial inventories and impact assessment, the development of mitigation measures and acquisition of agency approvals. Other services have included post-construction environmental monitoring and reporting in accordance with agency permits and approvals (2012-2014).

Highway 401 Widening, Region of Waterloo, G.W.P. 4-00-00 - Coordination of the Class EA Study and natural environmental inventories for the reconstruction and widening of Highway 401 from 0.5 km west of Regional Road 8 easterly to 0.5 km east of Regional Road 24. This project includes the widening of the existing Highway 401 6 lane cross section to 10 lanes including the replacement and widening of the Speed River bridges. Public consultation has been continuous throughout the Detailed Design including two Public Information Centres. This project included the acquisition of the following environmental permits: Navigable Protection Program, Endangered Species Act (Wavy-rayed lampmussel, Barn Swallow), Noise Bylaw exemptions, DFO Support as per the MTO/DFO/OMNRF Fisheries Protocol (2011 - 2014).

EDUCATION

- B.Sc. Ecology & Evolution (Honours) Western University
- Environmental Technology Diploma, C.A.A.T., Fanshawe College.

EMPLOYMENT HISTORY

- 2003 to present – Parsons Inc., London
- 2001-2003 – Ministry of Natural Resources and Forestry

CERTIFICATIONS

- Canadian Certified Environmental Professional in Natural Resource Management and Environmental Management
- MTO RAQS registered for Class EA Process
- MTO RAQS registered for Fisheries Assessment
- MTO RAQS registered for Environmental Inspection During Construction
- Temperate Wetland Restoration (OMNRF)
- CPR and First Aid – St. John's Ambulance

Highway 24 Reconstruction and Replacement of the Whitemans Creek Bridge, MTO- West Region

Managed and coordinated the environmental assessment study including natural resource inventories and impact assessments for this assignment. Environmental considerations for the study area included the presence of several Species At Risk (SAR), a Provincially Significant Wetland (PSW), a cold water Provincial Fish Sanctuary, numerous groundwater seeps, highly erodible soils and a wildlife linkage /corridor area. Breeding bird surveys, incidental wildlife (mammal and herptofaunal), site specific search for American badger dens, and fisheries assessments were all key components of the natural resource inventories. Federal approvals (*Fisheries Act, Navigable Waters Protection Act*) were required for this project, and an Environmental Screening Report pursuant to the *Canadian Environmental Assessment Act (CEAA)* was prepared and all approvals were obtained. At the completion of the design phase, Parsons Ecological services team provided on-site environmental monitoring services to oversee the environmental protection measures (2008-2012).

Environmental Assessment Study of Bostwick Road, including the extension of Bradley Avenue, City of London:

Coordination of a Schedule 'C' Environmental Assessment (EA) to identify the preferred alignment for Bostwick Road west of Wharnclyffe Road and the Bradley Avenue extension where it intersects Bostwick Road in support of the implementation strategy of the Southwest Area plan (SWAP), including the management of the Environmental Impact Study (EIS).

Bobs Lake Dam Replacement Detailed Impact Analysis, Bolingbroke: Management of the Detailed Impact Analysis (DIA) study as per Parks Canada guidelines for the construction of a new dam and demolition of the existing dam at the outlet of Bobs Lake in eastern Ontario. Key aspects of the study included: identification of fish and mussel habitats; screening for Species at Risk; water quality measurements; assessment of potential impacts; and development of mitigation measures specific to project requirements.

Dingman B-4 Stormwater Management Facility, City of London: Management and coordination of the Class Environmental Assessment and Scoped Environmental Impact Study for stormwater servicing. Ecological investigations included three-season vegetation surveys, breeding bird and amphibian surveys; Ecological Land Classification, wildlife surveys, fisheries and aquatic habitat assessment including benthic invertebrate sampling. Consultation included one Public Information Centre (PIC), agency engagement and First Nations.

Central Thames River Subwatershed Study, City of London, Ontario Coordination of ecological services including the collection of and amalgamation of existing aquatic and terrestrial data features within the Central Thames Subwatershed in the City of London.

Green Valley Drain, City of London, ON: Oversight and coordination of the ecological assessment, development of mitigation measures and two-year post-construction monitoring.

Mud Creek Subwatershed Study Update, City of London, Ontario Coordination of ecological services including the collection and summary of existing aquatic and terrestrial habitat features within the Mud Creek Subwatershed in the City of London.

Old Victoria Storm Water Management Facility #2, London, Ontario – City of London Coordination of the Environmental Impact Study associated with the creation of a SWM pond adjacent to the Thames River.

Twinning of the Thames River Bridge (Veterans Memorial Parkway), City of London

Managed the ecological services for the twinning of the Thames River Bridge in London, Ontario. The Thames River supports a diverse, warmwater fish community and several documented SAR. Three (3) new in-water bridge piers were required for the widening which resulted in the requirement for *Fisheries Act* authorization. The Wavy-rayed Lampmussel, an Endangered SAR listed on Schedule 1 of the *Species at Risk Act (SARA)* was confirmed present within the impacted area. Both a compensation plan for loss of fish habitat and location and monitoring plan for the displaced freshwater mussels was prepared. Ms. Doucette obtained the required permits and approvals in a timely fashion allowing for the project to proceed on schedule. (2003-2004)

Highway 7 Rehabilitation, Stratford, Ontario - MTO West Region

Management of the Class EA process including public consultation, ecological inventories, assessment of ecological impacts and the development of environmental mitigation measures. This Preliminary and Detailed Design and Class

EA study was conducted in accordance with the requirements of the Class EA for Provincial Transportation Facilities (MTO 2000) and was classified as a Group “B” project. (2012-2013).

Highway 3, Canfield, Haldimand County G.W.P. 3507-02-00–Coordination of the Class EA Study and natural environmental inventories for the assessment of drainage improvement alternatives within the community of Canfield. This assignment was classified as a Group ‘B’ project in accordance with the Class EA for Provincial Transportation Facilities (MTO 2000). Public consultation was continuous throughout the Preliminary and Detailed Design phases and includes three Public Information Centres (PICs) (2010-2013).

Fountain Street Bridge Rehabilitation, Region of Waterloo: Management /coordination of the natural environment review of the study area surrounding the Fountain Street Bridge over the Grand River. Included extensive background information review, assessment of fish and mussel habitat around the bridge structure and within Blair Creek.

Highway 23 Structure Replacements and Rehabilitation, MTO- West Region

Management of the Class EA Study and coordination of ecological inventories for fish and fish habitat, botanical inventories and community classification, dedicated avian surveys as well as incidental wildlife surveys were key components to this study. Background investigations noted Black Redhorse (*Moxostoma duquesnei*), a provincially and nationally listed Threatened species as a documented species with the study area. An OMNR Permit for Species Protection and Recovery Clause 17(2)(b) was acquired therefore to undertake a fisheries assessment. The field studies confirmed the species was not present and further permitting was not required. This project illustrates Ms. Doucette’s ability to lead a team of technical specialists to complete a comprehensive study that meets legislative requirements and is on schedule. (2010 – 2011)

MTO Design-Build Contract 2013-6018 –Highway 596, Alice Creek Culvert Replacement

Development and administration of the Environmental Management System (EMS) and Environmental Management Plan (EMP) for the replacement of the Alice Creek culvert on Highway 596, including the development of environmental mitigation measures and oversight and monitoring during construction.

MTO Design-Build Contract 2013-6010 –Replacement of Three Structures, Highway 614, Manitouwadge

Development and administration of the Environmental Management System (EMS) and Environmental Management Plan (EMP) for the replacement of three structural culverts along Highway 614, Manitowadge, including the development of environmental mitigation measures and oversight and monitoring during construction.

MTO Design-Build Contract 2012-2014 – Replacement of the CNR Overhead Structure, Highway 12, Midland

Preparation and administration of an Environmental Management Plan (EMP) including development of environmental mitigation measures and contract specifications. Coordination of Environmental Monitoring / Inspection services during construction. (2012-2013)

MTO Design-Build Contract 2011-2028 – Replacement of the CNR Overhead, Highway 12, Orillia

Preparation and administration of an Environmental Management Plan, including the coordination of the Class EA Study and ecological inventories for the assessment of impacts and development of environmental mitigation measures including contract specifications. Provided Environmental Monitoring / Inspection services during construction. (2012-2012)

MTO Design-Build Contract 2010-2028 – Replacement of Structural Culvert at Fairchild Creek, Highway 8, City of Hamilton

Preparation of an Environmental Management Plan and coordination of the Class EA Study and ecological inventories for the assessment of impacts and development of environmental mitigation measures and contract specifications. Provided Environmental Monitoring / Inspection services during construction. (2010-2011).

Highway 21 Rehabilitation, County of Huron G.W.P. 136-98-00 Coordination of environmental specialties ensuring that inventories are completed within the appropriate season, assessments and reporting are as per Ministry protocols and applicable approvals are attained within in a timely fashion. (2008 – 2009).

PARSONS

Highway 402 and County Road 79, County of Lambton and Ontario Ministry of Transportation Coordination of the Provincial Class Environmental Assessment, Group “B” for the detailed design of new interchange ramps, structure rehabilitation, and roadway improvements. (2007 – 2008)

Coordination of environmental monitoring services during and post construction for the following contracts:

- Highway 401 Widening, Cambridge, ON – MTO Contract 2014-3014
- Stoney Creek Erosion Control Wetland, London, ON - City of London
- Sunningdale Storm Water Management Pond, London, ON - City of London
- Kilally Retaining Wall Repair, London, ON - City of London
- Highway 7 Rehabilitation, Rockwood, ON - MTO
- Highway 40 Rehabilitation and Intersection Improvements, Sarnia, ON, MTO
- Highway 401 – Provincial Road, Windsor ON, MTO Contract 2007-3043
- Highway 401 – Belle River Road, MTO Contract 2008-3003
- Highway 401 – Wellington Road, MTO Contract 2006-3034
- Highway 402 – Mandaumin Road to Oil Heritage Road, MTO Contract 2006-3029
- Highway 401 – French Line, MTO Contract 2005-3046
- Highway 6 - Fergus, MTO Contract 2006-3032
- Airport Road Widening (formerly Highway 100), City of London
- Highway 401, Tilbury – Contract 2004-3002
- Highway 402, Warwick – Contract 2003-3019
- Highway 401, Kitchener – Contract 2002-3001
- Highway 403 and Highway 24 Interchange
- Highway 3 – St. Thomas, Contract 2000-48
- Highway 21 – Forest, Contract 2000-43
- Highway 3 – Big Otter Creek, Contract 2000-40
- Highway 401 – Iona Station, Contract 2000-23
- Highway 4 – Exeter, Contract 2000-14

Courtney L. Beneteau, M.Sc.

FISHERIES BIOLOGIST / FRESHWATER MUSSEL SPECIALIST

Courtney Beneteau has extensive experience conducting fisheries and aquatic habitat assessments throughout Ontario. She is proficient at preparing Fish and Fish Habitat Existing Conditions and Impact Assessment Reports including: thorough descriptions of fish habitat and community inventories, mitigation measures, compensation plans, and enhancement opportunities. Courtney is experienced with the SAR permitting processes in Ontario and has completed several freshwater fish and mussel surveys for SAR. As a Freshwater Mussel Specialist, Courtney leads relocation operations, post-relocation surveys, and data analysis and reporting. In addition, she has experience monitoring a wide range of construction projects; ensuring mitigation and environmental protection measures are functional and effective, making recommendations for additional and/or alternative measures for improvement. This hands-on experience during contract execution gives her a unique perspective which enables creative solutions and foresight in the design process.

WORK EXPERIENCE

McGregor Creek Mussel Relocation, Highway 401, Chatham, ON: Lead the SAR mussel relocation, including SARA permit acquisition in advance of weir repair work in McGregor Creek. Performed post-relocation monitoring, data collection and analysis, and report preparation and submission.

Bostwick Road Realignment, City of London, ON: Performed fish community and aquatic habitat surveys to establish the existing conditions. Identified and assessed impacts to the aquatic ecosystem of the proposed road realignment project and mitigation measures for inclusion into the Environmental Impact Study and Environmental Study Report.

Dingman Creek Erosion Control Wetland, City of London, ON: Post-construction monitoring of fish communities and constructed fish habitats for the Erosion Control Wetland constructed adjacent to Dingman Creek. Preparation of technical memos to provide environmental updates and recommendations for improvement.

Stoney Creek Erosion Control Wetland – Stormwater Management Facility, City of London, ON: Monitored environmental protection measures for the creation of an erosion control wetland. Ensured compliance with contract environmental requirements including groundwater monitoring, ESC measures, the installation of fishways, turtle nesting mounds, landscaping and native vegetation salvage. Post-construction monitoring of wetland. This project involved the discovery of a SAR mussel and subsequent regular communication with the MNRF and DFO. Courtney organized the emergency relocation of the Rainbow mussel following a bank washout of Stoney Creek which included commercial divers, completed follow-up post relocation monitoring, data collection and analysis, and report preparation and submission.

Mud Creek Subwatershed Study Update, City of London, ON: Collected and amalgamated existing study information on aquatic habitat features within the Mud Creek Subwatershed, and completed additional field surveys (fisheries surveys, aquatic habitat assessments) to address data gaps. Prepared a summary of existing conditions and ecological constraints for inclusion in the final project report. Assisted with base-flow monitoring.

YEARS OF EXPERIENCE

11

EDUCATION

- M.Sc., Environmental Science, University of Windsor – Great Lakes Institute for Environmental Research 2007
- B.Sc., Biology – Honours Genetics, University of Western Ontario 2005

EMPLOYMENT HISTORY

- 2009-Present
Parsons Inc.
- 2007-2009
Great Lakes Institute for environmental Research
- 2008
Leadley Environmental
- 2005-2007
University of Windsor

CERTIFICATIONS

- Ontario Stream Assessment Protocol
- ROM Fish Identification
- ROM Species at Risk Identification
- DFO Freshwater Mussel Identification
- MTO/DFO/MNR Fisheries Protocol Training
- Class 2 Electrofishing
- Marine Emergency Duties (MED A3)
- First Aid and CPR
- WHMIS Training
- Pleasure Craft Operator

MTO RAQS REGISTRATIONS

- Fisheries Assessment Specialist
- Fisheries Contracts Specialist

Central Thames River Subwatershed Study, City of London, ON: Collected and amalgamated existing data concerning aquatic features within the Central Thames Subwatershed in the City of London. Prepared a summary of existing conditions and ecological constraints.

Sunningdale Stormwater Management Facility #4 and Compensation Area, City of London, ON: Monitoring environmental protection measures for the creation of a storm water management facility and compensation area. Ensuring compliance with contract environmental requirements including groundwater monitoring (piezometers and staff gauges), ESC measures and landscaping. Post-construction monitoring of compensation wetland.

MTO Retainer Assignments (consecutive awards), Various Locations in Southwest Ontario: Completed assessments of aquatic environmental features on 47 (to date) MTO projects throughout Southwestern Ontario. Projects consisted of fish and fish habitat assessments, bird assessments, vegetation assessments, and turtle surveys and required Species at Risk review, Licence to Collect Fish permit applications and consultation with government agencies. Prepared environmental contracts requirements.

Species at Risk (SAR) Mussel Relocation, Highway 401, Cambridge, ON: Lead the SAR mussel relocations and post-relocation monitoring for a multi-year construction project. Habitat enhancement measures for additional project impact mitigation for the SAR mussel included: improved host fish species habitat, extended SAR mussel surveys, and increased Contractor awareness. Performed post-relocation monitoring, data collection and analysis, and report preparation and submission. Ensured compliance with all ESA Permit stipulations including design and execution of a semi-quantitative mussel survey in the Speed River.

Bobs Lake Dam Replacement Detailed Impact Analysis, Bolingbroke, ON: Detailed Impact Analysis study as per Parks Canada guidelines for the construction of a new dam and demolition of the existing dam at the outlet of Bobs Lake in eastern Ontario. Key aspects of the study included: identification of fish and mussel habitats; screening for Species at Risk; water quality measurements; assessment of potential impacts; and development of mitigation measures specific to project requirements.

Highway 401 Widening and Speed River Bridge Replacements, Cambridge, ON: Completed fisheries existing conditions and impact assessment for the Speed River Bridge replacements and eight culvert crossings. Developed mitigation measures and provided notification to DFO for anticipated construction works at all locations. Discovered SAR freshwater mussel (Wavy-rayed Lampmussel) in the river; prepared ESA Information Gathering Form, Avoidance Alternatives Form, and Overall Benefit Application Form for the mussel SAR. The Overall Benefit application included a detailed mussel relocation plan, and subsequent monitoring.

Creek Road EA and Preliminary Design, Niagara Region, ON: Completed fish and fish habitat field surveys to permit impact assessment of the proposed project and mitigation measures for inclusion into the Environmental Impact Study and Environmental Study Report.

West Vaughn Sewer Servicing, Region of York: Completed fish habitat and water quality assessments at 18 watercourse crossings of proposed pipeline. Redside Dace habitat mapping at one crossing. Liaison with MNRF and DFO to confirm Redside Dace Species At Risk (SAR) permitting/exemption requirements. Input into sewer alignment and above-ground tunneling shaft locations to avoid impacts to SAR (Redside Dace) and minimize impacts to fish and fish habitat. Preparation of a Natural Environment Summary and numerous risk and mitigation tables.

Idle Lines Removal from Sir Adam Beck Generating Stations, Niagara Falls, Hydro One: Completed ecological components of a National Energy Board application for removal of idle international power lines. Included: extensive Species at Risk review; vegetation inventory in proposed construction areas and along rare cliff habitats adjacent to access roads; and provision of mitigation and protection measures for valued ecosystem components such as migratory bird stopover habitat in the Niagara River.

Highway 3 – Cayuga, MTO (Advanced) Contract 2012-3007: Supervised in-water work including caisson and cofferdam installation in the Grand River from a barge. Prepared a Mitigation Plan requesting an in-water timing extension on behalf of the MTO, which was supported by the DFO. Maintained daily MTO Construction Inspection Checklists.

Beaverdams Road Stormwater Management, Niagara, Ontario: Completed an assessment of aquatic environmental features on a proposed SWM lot in the City of Niagara Falls. Included fish habitat assessment, Species at Risk review, and consultation with government agencies.

Fountain Street Bridge Rehabilitation, Region of Waterloo: Completed a natural environment review of the study area surrounding the Fountain Street Bridge over the Grand River. Included extensive background information review, assessment of fish and mussel habitat around the bridge structure and within Blair Creek.

Mitchel Dender, M.Sc.

FISHERIES BIOLOGIST

Mitchel Dender is a Fisheries Biologist who has diverse experience throughout Southwestern Ontario in conducting fisheries and aquatic habitat assessments. As an Environmental Specialist, Mitchel has provided environmental monitoring services on multiple major MTO construction projects. While monitoring, he ensures mitigation and environmental protection measures such as; fisheries/water quality protection, erosion and sedimentation control, vegetation and cover establishment, unwatering, temporary flow passage, stream diversions, cofferdam construction, containment of effluent and dust during construction, any applicable management and disposal of construction wastes, including effluent from concrete operation materials. Mitchel ensures mitigation measures are functional and effective and makes recommendations for additional and/or alternative measures for improvement as required. Following monitoring inspections, he prepares MTO Construction Inspection Checklists and Environmental Monitoring Reports, commenting on contractor compliance with MTO's EA commitments, contract SPs, and agency authorizations/ permits to keep in close communication with all interested parties (MTO, OMNR, DFO, CA, etc.).

WORK EXPERIENCE

Fisheries Biologist. Ministry of Transportation of Ontario, Highway 401 Bridge over Ojibway Parkway, Windsor, Ontario, Canada.

Parsons is providing construction administration and inspection services for a collection of structures (referred to as Bridge B-1) on Highway 401 that will cross over Ojibway Parkway, the Essex Terminal Railway, and the Perimeter Access Road. Currently, Highway 401 terminates just east of Ojibway Parkway but is planned to be connected to a new international crossing (the Gordie Howe International Bridge) and the Canadian Inspection Plaza currently being procured as a public-private partnership and managed by the Windsor-Detroit Bridge Authority. These structures will be constructed at the western terminus of the parkway to connect Highway 401 to the future Canadian Inspection Plaza and international crossing. Mitchel performs field investigations to address data gaps in the existing conditions and background data and completes detailed impact assessments for the preferred bridge replacement alternatives to determine the need for Fisheries and Oceans Canada to review the project. During construction Mitchel inspections he provides Environmental Monitoring Reports, commenting on contractor compliance with MTO's EA commitments, contract SPs, and agency authorizations/ permits to keep in close communication with all interested parties (MTO, OMNR, DFO, CA, etc.).

Environmental Specialist. Ministry of Transportation of Ontario, 2017-3009 – Highway 401 Reconstruction DB, Elgin County.

Mitchel conducted regular inspections to confirm the effectiveness of the Construction Environmental Management Plan (CEMP) and make recommendations to improve or comply, as required. Following each inspection, he provided Environmental Monitoring Reports, commenting on contractor compliance with MTO's EA commitments, contract SPs, and agency authorizations/ permits to keep in close communication with all interested parties (MTO, OMNR, DFO, CA, etc.).

YEARS OF EXPERIENCE

Total: 6

With Parsons: 3

EDUCATION

- M.Sc., Environmental Science, University of Windsor – Great Lakes Institute for Environmental Research 2017
- B.E.S., Environmental Studies, University of Windsor, 2013

EMPLOYMENT HISTORY

- Parsons Inc. London ON
- Great Lakes Institute for Environmental Research

CERTIFICATIONS

- ROM Fish Identification
- ROM Species at Risk Identification
- Class 2 Electrofishing
- First Aid and CPR
- WHMIS Training
- Pleasure Craft Operator
- PADI – Open Water Dive Certification
- Class 2 Electrofishing
- Erosion and Sediment Control Practitioner (ESCP)
- Certified Professional of Erosion and Sediment Control – In Training (CPESC-IT)
- Certified Inspector of Sediment and Erosion Control (CISEC)

PARSONS

Fisheries Biologist. Ministry of Transportation of Ontario, Natural Sciences Services Retainer No. 3, London, Ontario, Canada. Parsons is providing environmental services to the Ministry of Transportation of Ontario on an assignment basis. Mitchel completed in-field aquatic habitat and fish community surveys and determined the project impacts and necessary mitigation measures to avoid serious harm to fish. Mitchel prepares environmental contract requirements for the client.

Fisheries Biologist. Ministry of Transportation of Ontario, Natural Sciences Services Retainer No. 2, London, Ontario, Canada.

Parsons' ecological services group was awarded a second natural sciences services retainer assignment to provide services for projects throughout the Ministry of Transportation's Western Region. Mitchel completed assessments of aquatic and terrestrial environmental features on various projects throughout southwestern Ontario. Projects consisted of fish and fish habitat assessments, bird assessments, vegetation assessments, and turtle surveys and required species at risk reviews, licence to collect fish permit applications, and consultations with government agencies. Prepared environmental contract requirements for the client.

Highway 400/11 Bridge Replacement– MTO 2016-2013. Environmental Specialist. Barrie, ON. Mitchel conducted regular inspections to confirm the effectiveness of the Erosion and Sediment Controls, Bird Nesting Preventative Measures and Spill Prevention Measures to provide recommendations, as required. Following each inspection, he provided Environmental Monitoring Reports, commenting on contractor compliance with EA commitments, contract SPs, and agency authorizations/ permits.

Fisheries Biologist. Ministry of Transportation of Ontario, Replacement of Three Bridges in the Cochrane Area, Cochrane, Ontario, Canada. Parsons is providing the detailed designs for replacement of two bridges on Highway 668 and one bridge on Highway 579 in the northeastern region of Ontario. Mitchel undertook field investigations to address data gaps in the existing conditions and background data and completed detailed impact assessments for the preferred bridge replacement alternatives, determining the need for review of the project by Fisheries and Oceans Canada.

Creek Road EA and Preliminary Design, Niagara Region, ON. Completed fish and fish habitat field surveys to permit impact assessment of the proposed project. Determined mitigation measures to minimize impacts to the aquatic ecosystems for inclusion into the Environmental Impact Study and Environmental Study Report.

Dingman Creek Erosion Control Wetland, City of London, ON. Post-construction monitoring of fish communities and constructed fish habitats for the Erosion Control Wetland constructed adjacent to Dingman Creek. Preparation of technical memos to provide environmental updates and recommendations for improvement.

Highway 401/40 Interchange Reconfiguration & Highway 401 Eastbound Lane Reconstruction. Monitored environmental protection measures including, erosion and sediment controls, vegetation clearing, and in-water work. Ensured compliance with contract environmental requirements including in-water timing restrictions, reviewing contractor temporary water passage proposals and reviewing and on-site supervising of de-fishing operations. Maintained weekly environmental monitoring reports. Assessments were completed as per the MTO/DFO/OMNR Fisheries Protocol for Protecting Fish and Fish Habitat on Provincial Transportation Undertakings, Version 2, 2013

McGregor Creek SAR Mussel Relocation, Highway 40, Chatham, ON. Assisted in the SARA permitting and ESA approval, mussel relocation prior to in-water emergency

works to repair a weir. Undertaking post-relocation monitoring, data collection, and reporting, ensuring fulfilment of all SAR permit/approval requirements.

Species at Risk (SAR) Mussel Relocation, Highway 401, Cambridge, ON. Assisted in the SAR mussel relocations and post-relocation monitoring for a multi-year construction project. Habitat enhancement measures for additional project impact mitigation for the SAR mussel included: improved host fish species habitat, extended SAR mussel surveys, and increased Contractor awareness.

Highway 401 Widening and Speed River Bridge Replacements, Cambridge, ON. Assisted in fisheries existing conditions and impact assessment for the Speed River Bridge replacements and eight culvert crossings.

Highway 401 Norwich Avenue Interchange Improvements – MTO 2016-3008. Assisted in the monitoring of environmental protection measures including, erosion and sediment controls, vegetation clearing, and in-water work. Ensured compliance with contract environmental requirements including in-water timing restrictions, reviewing contractor temporary water passage proposals and reviewing and on-site supervising of de-fishing operations. Maintained weekly environmental monitoring reports.

Highway 401 Tilbury Highway Reconstruction and Culvert Replacement – MTO 2016-3001. Assisted in the monitoring of environmental protection measures including, erosion and sediment controls, vegetation clearing, and in-water work. Ensured compliance with contract environmental requirements including in-water timing restrictions, reviewing contractor temporary water passage proposals and reviewing and on-site supervising of de-fishing operations. Maintained weekly environmental monitoring reports. Assessments were completed as per the MTO/DFO/OMNR Fisheries Protocol for Protecting Fish and Fish Habitat on Provincial Transportation Undertakings, Version 2, 2013

Highway QEW Walkers Line and Dorval Drive Bridge Rehabilitation and Culvert Replacements – MTO 2016-2029. Assisted in the monitoring of environmental protection measures including, erosion and sediment controls, vegetation clearing, and in-water work (Species at Risk Fish). Ensured compliance with contract environmental requirements including in-water timing restrictions, reviewing contractor temporary water passage proposals and reviewing and on-site supervising of de-fishing operations. Maintained weekly environmental monitoring reports. Assessments were completed as per the MTO/DFO/OMNR Fisheries Protocol for Protecting Fish and Fish Habitat on Provincial Transportation Undertakings, Version 2, 2013

Publications

- **Mitchel G.E. Dender**, Pauline Capelle, Oliver P. Love, Daniel D. Heath, John. W. Heath, Christina A.D Semeniuk. Adaptive phenotypic integration benefits a key performance trait in salmonid aquaculture. *Proc. R. Soc. B.*
- **Mitchel G.E. Dender**. Using phenotypic integration to explain inter-population variation in growth of Chinook salmon (*Oncorhynchus tshawytscha*). Thesis.
- Adriana R. Forest, **Mitchel G.E. Dender**, Trevor E. Pitcher, Christina A. D. Semeniuk. Rearing environment and aggression affect feeding success of Chinook salmon offspring sired by alternative reproductive tactics. *Ethology*.
- Janisse, K., Capelle, P. M., Heath, J. W., **Dender, M. G.E**, Heath, D. D., & Semeniuk, C. A. (2019). Life in captivity: Varied behavioural responses to novel setting and food types in first-generation hybrids of farmed and wild juvenile Chinook salmon (*Oncorhynchus tshawytscha*). *Canadian Journal of Fisheries and Aquatic Sciences*.
- Christina A.D. Semeniuk, Pauline Capelle, **Mitchel G.E. Dender**, Robert Devlin, Brian Dixon, Jane Drown, John Heath, Russel Hepburn, Dennis M. Higgs, Kevyn Janisse, Sarah Lehnert, Oliver P. Love, Jessica Mayrand, Megan Mickel, Trevor E. Pitcher, Bryan Neff, Shawna L. Semple, Jennifer L., Smith, Shelby Toews, Kyle Wellband and Daniel Heath. Domestic-wild hybridization to improve aquaculture performance in Chinook salmon. *Aquaculture*.

KYLE VANIN

TECHNICIAN IV

Kyle Vanin has experience conducting research while managing people and performing equipment operations and maintenance in compliance with health and safety standards. He uses his research and analytical skills to complete multiple research reports and manage projects. Kyle is a proactive and motivated team member using computer technologies and geospatial information systems to manage natural resources.

WORK EXPERIENCE

Terrestrial Ecologist. Ministry of Transportation of Ontario, Natural Sciences Services Retainer No. 3, London, Ontario, Canada. 07/2018-08/2019. Parsons is providing environmental services to the Ministry of Transportation of Ontario on an assignment basis. Kyle was responsible for inventorying the terrestrial environment in and around culvert sites proposed for rehabilitation. Sites were visited pre-construction to gather information pertaining to the natural environment. Information gathered was formatted in a report and submitted to MTO describing the existing environmental conditions such as vegetation composition and the presence of birds, mammals, amphibians and reptiles. Kyle provided the MTO with Impact Assessment reports as well as recommendations for environmental protection during construction. Post-construction monitoring was also carried out to ensure that re-naturalization of the area was provided once the construction was complete.

Terrestrial Ecologist/Environmental Inspector. Ministry of Transportation of Ontario, Replacement and New Installation of 22 Sign Support Structures on Highways 401, 410, 403, and Queen Elizabeth Way, Greater Toronto Area, Ontario, Canada. 08/2018-01/2019. Parsons is providing removal of ground-mounted signage and detailed design and construction of overhead sign support structures, including tri-chord, cantilever, tri-chord cantilever, and monotube static sign support structures. Kyle was responsible for providing environmental classification of the areas proposed for construction, mainly pertaining to existing terrestrial conditions and Species at Risk. Kyle provided environmental construction monitoring for the duration of the project and made recommendations pertaining to the installation and maintenance of Erosion and Sediment Control (ESC) measures.

Terrestrial Monitoring Technician and Crew Lead. University of Toronto and Ministry of Natural Resources and Forestry. 05/2016-09/2017. Kyle successfully arranged, scheduled, and sampled more than 150 vegetation plots within the Lake Simcoe Watershed. Implemented knowledge regarding the identification of trees, shrubs, and herbaceous vegetation to carry out the vegetation sampling protocol designed by the University of Toronto and funded by the Ministry of Natural Resources and Forestry in the Lake Simcoe Watershed. Applied various modules to assess characteristics of vegetation plots. Modules for sampling consisted of identifying flora (ground vegetation, shrubs, trees) to compile a complete species list, which required a high degree of knowledge pertaining to appropriately identifying common, uncommon, and rare flora species within the environment; measuring the diameter of trees contained within the plot (diameter at breast height) as well as the average height of trees; assessing trees for insects and parasites (Emerald Ash Borer, Asian Longhorn Beetle, European Gypsy Moth) and disease and pathogens (Dutch Elm Disease, Beech Bark Disease, Black Knot); observing and recording tree canopy

YEARS OF EXPERIENCE

Total: 8

With Parsons: 1

COMPUTER/SOFTWARE SKILLS

- ArcMap
- ArcGIS
- SXBlue satellite receiver
- Microsoft Office Suite

health and canopy cover; recording invasive species and abundance (Common Buckthorn, Dog Strangling Vine, Garlic Mustard); and recording physical geographical characteristics such as total vegetative cover, topographical positioning, and drainage characteristics. Implemented geospatial techniques while conducting field sampling. Applied navigation techniques using ArcMAP GIS10 geospatial software linked with an SXBlue satellite receiver to navigate to predefined vegetation plots to carry out the vegetation sampling protocol. Also applied geospatial techniques in an office setting using ArcMAP GIS10 to input and extract information regarding plots to be sampled during the current field season. Used Microsoft Access for data input. Input data collected from field sampling into the University of Toronto's vegetation sampling protocol database. Balanced the work schedule to accommodate time for field sampling and time in the office for entering data collected from field sampling. Used email and networking systems to compose and submit progress updates and engage with other teams based in different locations. Performed field sampling while ensuring health and safety measures were acknowledged and applied in the workplace by all team members and made decisions based on situations that could define the quality of field sampling. Field sampling was often conducted in areas where potential hazards such as wildlife (Black Bears, Coyotes), poisonous and toxic plants (Poison Ivy, Stinging Nettle), and stinging and biting insects (Bees, Red Ants) were present. Environmental factors such as heat exhaustion, working around water, and severe weather (thunderstorms, high winds) were also present or possible at times during field sampling. All these factors were considered in accordance with health and safety standards to a high degree of awareness and professionalism. Achieved vegetation sampling while supervising and coordinating junior staff. Allocated responsibilities to balance project work and engage junior staff, resulting in project completion in a designated time frame. Provided guidance and leadership while mentoring junior staff to educate and develop their professional integrity, public relations skills, and time management allocation. Engaged in mentoring junior staff by professionally educating identification skills of vegetation such as trees, shrubs, and herbaceous ground cover. Provided mentoring and education of natural heritage features such as wetland ecosystems (swamps, marshes, thickets, fens and bogs) and upland forest ecosystems (dry forested woodlands, damp forested woodlands, plantations).

Habitat Technician. Ministry of Natural Resources and Forestry. 12/2014-09/2015.

Kyle successfully implemented, arranged, scheduled, and field sampled more than 200 sites to identify provincially significant wetlands using the Ontario Wetland Evaluation System. Identified more than 15 major wetland ecosystem complexes based on present vegetation and the presence of fish and wildlife inhabiting the Lakes Simcoe Watershed, the Kawartha Lakes, and other locations in southern Ontario within the Greater Toronto Area. Applied knowledge and identification skills to collect information regarding trees, shrubs, and aquatic and wetland plants and habitats within Ontario and to accurately identify ecosystems using both the Ecological Land Classification System and the Ontario Wetlands Evaluation System. Partook in the collection and preservation of plant specimens found to be significant within the area and submitted collections to the Royal Ontario Museum. Conducted wildlife surveys, including wildlife food surveys, where trees, shrubs, and other fruit-bearing vegetation were assessed in terms of seasonal production and yield capacity. Also conducted nighttime amphibian surveys in which areas of high concentrations of frogs and salamanders were surveyed at night for physical presence and vocalization. The presence of species of fish, reptiles, birds, waterfowl,

and mammals was also recorded daily during wetland evaluations to acquire and update records within the Ministry of Natural Resources and Forestry's natural heritage database. Implemented various geospatial techniques while conducting field sampling, such as using Garmin GPS technology and ArcMAP GIS10 geospatial software linked with an SXBlue satellite receiver. These devices were heavily utilized for field navigation, accurately defining wetland complex boundaries, and accurately pinpointing areas in which species at risk were located. Also used high-resolution orthographic aerial photographs to define boundaries around wetland complexes and water drainage dynamics. Also used ArcMAP GIS 10 geospatial software in an office setting to input and extract information pertaining to physical characteristics (topography, vegetation composition, and drainage dynamics), to input and extract information pertaining to the presence and abundance of flora and fauna protected by the Endangered Species Act, and to produce a thorough wetland evaluation for the purpose of preserving and promoting natural heritage features in southern Ontario. Used Microsoft Word and Excel for data input and to create formal reports in the certified format pertaining to the Ontario Wetland Evaluation System requirement standards on multiple wetland evaluations completed (ex. Scugog Point Wetland Complex Evaluation, Holland Marsh Wetland Complex Evaluation). Managed public relations and created a relationship with the public to explain the Conservation Land Tax Incentive Program to encourage the protection of natural heritage wetland systems within southern Ontario and to engage and promote landowners to actively take part in protecting natural heritage systems.

Fisheries Technician. Ministry of Natural Resources and Forestry. 08/2013-11/2013. Kyle successfully operated the Ministry of Natural Resources and Forestry-owned fishway structures located in Norval and Streetsville on the Credit River in southern Ontario for a whole field season. Operated the structures daily to gather data pertaining to fish species presence and population abundance and health. Implemented identification techniques to distinguish fish species, including various species of minnow, trout, and salmon found present within the Credit River Watershed. Implemented capture-recapture techniques such as the surgical insertion of passive integrated transponder tags on adult Atlantic Salmon protected by the Endangered Species Act and the insertion of anchor tags on common sport fish such as Rainbow Trout and Brown Trout. These techniques were applied to monitor the progression upstream, daily habits, and life cycle of the individuals. Conducted electrofishing to gather information on tributary streams of the Credit River and to gather information regarding the presence and health of Atlantic Salmon and other fish species, including invasive species such as Round Goby. Implemented appropriate scientific protocols for data collection while exercising appropriate health and safety procedures pertaining to working in and around water. Exercised classification skills of appropriate habitat and reproduction conditions for various species of fish, recognized best management practices, and implemented restoration techniques such as river bank stabilization. Partook in the collection of fish eggs and male gametes for hatchery rearing efforts conducted by the Ministry of Natural Resources and Forestry. Implemented knowledge and identification skills regarding species of fish and wildlife, including aging and sexing through visual observation of physical characteristics. Worked closely with landowners, volunteers, and school groups to educate and involve them in particular programs and to convey importance of environmental impacts and why restoration projects are necessary and beneficial.

CRAIG PEZIK

ENVIRONMENTAL TECHNICIAN

Craig has excellent environmental analytical abilities and strong public communication and teamwork skills. He is proficient in visual and audio identification of flora and fauna, especially birds and has extensive knowledge of native Ontario wildlife ecology.

Craig has diverse technical experience that includes several areas of the natural sciences (e.g., terrestrial wildlife, trees/vegetation). Craig has experience with Geographic Information Systems (GIS), Ecological Land Classification (ELC), Ontario Wetland Evaluation System (OWES), and orthophoto interpretation. Craig has competencies in ArcMap and MS Office software packages. He is certified in the Ontario Breeding Bird Network (OBBN), Ontario Stream Assessment Protocol (OSAP), Fish Identification, Class 2 Backpack Electrofishing, and possess valid G license and Pleasure Craft Operators card. He also has professional and extensive personal experience completing bird point count surveys, amphibian call surveys, bird banding, and radio telemetry.

PROJECT EXPERIENCE

Metrolinx RER Package 1 and Package 2 Existing Station Upgrades (9), Rehabilitations (24), and New Station Construction (4), Hamilton to Toronto, Ontario. Craig completed natural environment studies to document existing conditions, mitigate project effects, and assess impacts of the project on the environment through agency consultation, review of background information (e.g., on-line resources, previous studies), and field studies. He completed assessments of potential for species specific habitat to occur based on species habitat preferences and observed existing conditions. He identified and confirmed significant natural heritage features as defined by the Government of Ontario and the City of Ottawa such as: Significant Woodlands, Significant Wildlife Habitat, habitat for Species at Risk, Areas of Natural or Scientific Interest. He produced results summaries that included the study findings, identification of sensitive features, recommendations for mitigation measures, identified permitting requirements, and next steps.

City of Ottawa, Earl Armstrong Road Extension Environmental Assessment Study, Ottawa, Ontario. Parsons completed an Environmental Assessment (EA) study to establish the future right-of-way requirements for the proposed extension of Earl Armstrong Road from Albion Road to Hawthorne Road. Craig's role included gathering background information on the existing environmental conditions and completing 3 seasons of field surveys to characterize the natural system (e.g., breeding bird surveys, amphibian call surveys, aquatic characterization, ELC), and compiling records to aid in identifying provincially rare species and/or Species at Risk (SAR).

City of Ottawa, Ottawa River Outfalls Rehabilitation, Ottawa, Ontario. The City of Ottawa identified 22 storm water outfalls to the Ottawa River that required repairs or rehabilitation. Outfalls were located on the shores of the Ottawa River or submerged within the river, across a wide range of adjacent land uses. Craig was instrumental in completing a suite of natural environment surveys (e.g., breeding birds, aquatics, amphibians, ELC) and reporting to determine the sensitivity of the outfall areas, assess the impacts of the repairs, and provided mitigation options to limit the impacts of the work on the environment, and identify permitting and approvals requirements.

WORK EXPERIENCE

CREDIT VALLEY CONSERVATION, Mississauga, ON. June 2017 – August 2017 - Educational Instructor

- Led hikes educating multicultural groups about health benefits of ecological functions, native species identification, and importance of Conservation Authorities

YEARS OF EXPERIENCE

2

EDUCATION

- Sir Sandford Fleming College, Lindsay, ON:
Fish and Wildlife Technician, January 2016 – April 2017 (Completed all terms on Dean's List and graduated with Honours)
Fish and Wildlife Technologist, September 2017 – April 2018 (Completed all terms on Dean's List and graduated with Honours)

PARSONS

- Delivered educational in-class presentations to groups of 20 - 100 people
- Prepared educational material customized to various levels of environmental knowledge

ECOMEDIC, Elmvale, ON. April 2017 – August 2017 - Forest Management Plan Assistant

- Met with landowners to discuss management goals of forest
- Performed site visits to perform inventory of forest, wildlife features, and signs (wildflowers, trees, bird, mammal)
- Devised invasive species management plans for landowners
- Created species inventory maps of client properties

BEACH EYE CARE, Wasaga Beach, ON. October 2011 – September 2015 - Optometric Assistant

- Scheduled meetings, and appointments for patients and staff
- Performed medical pretesting on patients, including patient history and relayed pertinent information to optometrist
- Developed new office protocol to increase efficiency
- Edged glasses lenses to within strict parameters
- Educated patients on a variety of medical procedures and conditions

PROFILE

Ms. Martine Esraelian is a terrestrial ecologist with more than 13 years of technical and hands on field experience in terrestrial and aquatic ecosystems. She has worked with a portfolio of clients both nationally and internationally, across all major sectors including renewable energy (hydro, solar, and wind), infrastructure, mining, and oil and gas.

Ms. Esraelian has knowledge and understanding of municipal, provincial, federal, and international legislation for obtaining necessary permits and approvals to ensure regulatory compliance. She has worked on a diversity of projects and studies, including environmental assessments (EAs; provincial, federal, and international), natural heritage studies, wetland evaluations, constraints assessments, due diligence reports, Phase I environmental site assessments (ESAs), dam safety assessments, environmental compliance reports, habitat enhancement plans, biodiversity action plans, and various construction, operational, and species management plans.

Ms. Esraelian has extensive knowledge and experience completing terrestrial and aquatic field investigations, including species at risk (SAR), wildlife (breeding bird, herpetofauna, mammals, fisheries, and benthic macroinvertebrate) and vegetation surveys and monitoring, wildlife habitat assessments, botanical inventories, ecological land classification (ELC) characterization and mapping, wetland evaluations and community delineations, tree health assessments, and construction monitoring.

WORK EXPERIENCE

Infrastructure / Detailed Design Projects

Replacement of Three Bridges, Cochrane, Ontario, Canada. Responsible for the terrestrial ecology components of the projects, including completing fieldwork, species at risk screenings and preparing the natural science existing conditions report and impact assessment.

East Region Highway and Bridge Design Retainer, Ontario, Canada. Responsible for the terrestrial ecology components of the projects, including completing fieldwork, species at risk screenings and preparing the natural science existing conditions report and impact assessments for various projects throughout the East Region.

Mud Creek Detailed Design. Jacobs (formerly CH2M). London, Ontario: Completed a data gap analysis and follow-up field inventories to verify existing conditions and natural heritage features identified in the Mud Creek EA. Agency consultation was also completed to discuss SAR permitting and compensation of natural heritage features. Field inventories included verifying vegetation communities and boundaries, snag tree survey for bats and a tree inventory to support the arborist assessment. Findings from the field inventories were incorporated into the detailed design and compensation plan.

One River Master Plan Class EA. Jacobs (formerly CH2M). London, Ontario: Completed the terrestrial ecology portion of the EA and field inventories. Field inventories included breeding bird surveys, ELC vegetation community characterization and mapping, tree inventory, invasive species mapping and SAR assessment.

German Solar Projects. German Solar Corporation. Southwestern Ontario: Preparation of the natural heritage and water assessments reports required for issuance of a Renewable Energy Approval (REA) for 23 solar projects, each with a nameplate capacity of <500 kW. Fieldwork included documenting existing conditions, characterizing vegetation communities, delineating wetland boundaries and high water marks, verifying presence/absence of SAR, and assessment/evaluation to

YEARS OF EXPERIENCE

- 13

EDUCATION

- B.Sc. Conservation Biology & Environmental Science – Trent University, 2006
- Ecosystem Management Technician Diploma – Sir Stanford Fleming College, 2000

CERTIFICATES & TRAINING

- ISA Certified Arborist 2019
- Certified Inspector of Sediment and Erosion Control (CISEC)
- MNRF Data Sensitivity Training
- Ontario Wetland Evaluation System
- Butternut Health Assessment (BHA)
- Ecological Land Classification
- Ontario Reptile and Amphibian Field Survey Training Course
- Turtle Management Workshop
- Padi Scuba Diving

EMPLOYMENT HISTORY

- 2019-Present
Parsons Inc.
- 2018 - 2019
Matrix Solutions Inc.
- 2010-2018
Hatch LTD.
- 2008-2009
Colville Consulting Inc.
- 2007-2008
MNRF
- 2003-2004
Regional Municipality of Niagara
- 2001-2003
City of St. Catharine's

PARSONS

determine significance of wildlife habitats. Also involved in attending public information centres and responding to any environmental concerns identified by the public. Currently working with the client to develop a pollinator habitat enhancement program.

Sanitary Trunk Sewer (STS) Rehabilitation Project – Mendota, Queensway, Long Branch, Silver Creek and West Humber. Jacobs (formerly CH2M). Etobicoke, Ontario: Project manager and assisted with field inventories related to ELC and tree inventories. ELC included characterizing vegetation communities and mapping boundaries to support Jacobs with the Natural Heritage Existing Conditions Report. A tree inventory and health assessment, including surveying using high precision survey grade GPS, was completed as part of the arborist assessments.

Dufferin Street Schedule C Municipal Class EA. Hatch Ltd. Vaughn, Ontario: Addressed agency comments and updating the Natural Heritage Existing Conditions Report and associated mapping. Assisted with preparing an environmental effects assessment related to natural heritage features for Hatch to include in the Class EA.

Rutherford Go Station Project. Metrolinx. Vaughn, Ontario: Assisted with completing SAR surveys. This included a bat habitat assessment and targeted visual encounter surveys for the Blanding's Turtle.

Barrie Rail Expansion Project. Metrolinx. Bradford, Ontario: Completed a wetland assessment to verify the limits of the existing Holland Marsh Provincially Significant Wetland as part of a constraints assessment for the Line 9 Site. This included a desktop study to map the extent of the wetland using GIS, followed by field verification. The field surveys included staking the limits of the wetland using a high precision GPS unit. The results of the assessment were used to update the formal evaluation report. The field studies also included characterizing the existing environment and natural features present, with recommendations for additional studies.

Light Rail Project. Confidential Client. Montreal, Quebec: Completed baseline terrestrial studies to document existing conditions, verify and assess wetlands, characterize vegetation communities, and assess general wildlife habitat and habitat for SAR. Assisted with preparing the environmental impact assessment (EIA) report to assess potential effects of the project and recommend appropriate mitigation measures.

Niagara on the Lake Wastewater Treatment Plant Federal Environmental Assessment. Hatch Mott MacDonald. Niagara on the Lake, Ontario: Assisted in preparing the federal EA/class EA harmonization environmental report and addressing federal comments.

Steeles Avenue Widening Class EA. Region of Halton. Milton, Ontario: Completed follow up terrestrial field investigations to characterize the vegetation communities for a transportation infrastructure project following the ELC system.

Environmental Impact Study

Adelaide Street North Municipal Class Environmental Assessment

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