Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

Schedule B Class Environmental Assessment
Adelaide Wastewater Treatment Plant
Climate Change Resiliency
Project File

Prepared for:
City of London

Prepared by:
Matrix Solutions Inc.

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Prepared for the City of London, May 2022

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Executive Summary

The City of London, consistent with its declaration of a climate emergency in 2019 and subsequent *Climate Emergency Action Plan* (City of London 2022a), initiated a Municipal Class Environmental Assessment (EA) to assess and identify optimum flood mitigation strategies at the Adelaide Wastewater Treatment Plant (WWTP). The EA was completed to identify a preferred solution for increasing resilience to flooding at the WWTP. A previous climate change risk analysis completed for the WWTP indicated increased resilience to flooding was a top priority in addressing the effects of climate change. The EA was also undertaken with regard given to the *Climate Change Adaptation for Wastewater Treatment Plants* standard published by CSA Group (CSA Group 2018).

Significant portions of the Adelaide WWTP, located at 1201 Adelaide Street North, are within the regulatory floodplain of the nearby Thames River. Floodplain mapping completed by the Upper Thames Conservation Authority (UTRCA) indicates predicted flooding resulting from a 1:250-year regulatory flow event. Under these conditions, large portions of the WWTP would be inundated, potentially resulting in substantial flood damage to existing infrastructure.

Early in the EA process, a long list of potential flood mitigation options was developed and analyzed to determine a suitable mitigation strategy for the WWTP. Long-list options included conveyance improvements, site-level flood protection, diversion of flows, online storage, and WWTP operational measures. A hydraulic study examined the feasibility of each long-list option, and it was determined that site-level flood protection (berm/floodwall) offered the optimal balance of flood protection, construction effort, cost, and minimized disturbance. The results of the hydraulic study of long-list items were presented in a Public Information Centre (PIC) held online on October 6, 2021, which also included an overview of the project, alternative site-level flood protection solutions, alternative effluent pump station options, and an invitation for public comment.

Following the first PIC, three different configurations of site-level flood protection solutions were analyzed to determine the solution that best addressed the evaluation criteria. These criteria included the degree of flood protection provided, economic impact, environmental impact, and social impact. To predict the effects of different available solutions, several studies were completed including a hydraulic study, an environmental impact study (EIS), an archaeological Stage 1 study, and a comprehensive analysis of flood-protection compatibility with existing infrastructure.

Each of the different site-level flood protection solutions examined at the Adelaide WWTP requires an effluent pump station to lift water from the plant into the Thames River when river levels are too high for gravity drainage. Since treated water, stormwater, and emergency bypasses all leave the plant at different locations, it was important to evaluate options for effluent pumping. An opportunity was also identified to use the additional capacity of the existing raw pump station to convey bypasses directly to the receiving water or into an equalization tank. Various effluent pump station options were evaluated according to criteria of technical, economic, environmental, and social impacts.

The preferred new effluent pump option consists of a new equalization storage tank to the north, to capture wastewater when peak flow is higher than treatment capacity, and a new effluent pump station to lift treated water. This option was found to provide improved resiliency and protection for the environment and public from bypass events. It also uses the existing infrastructure at site to convey flow into the equalization tank and is compatible with future WWTP expansion needs.

A preferred integrated solution based on the preferred site-level protection and effluent pump station options will protect critical WWTP infrastructure and ensure treated effluent from the WWTP is lifted to the flooded Thames River during periods when the river is too high for gravity drainage. The new equalization tank to the north will reduce the likelihood of a bypass and allow the captured wastewater to be treated after a high flow event.

An evaluation of available site-level flood protection solutions and pump station solutions was presented at a second online PIC held on March 9, 2022. The PIC presented an overview of technical studies supporting the evaluation of alternative solutions, with a preliminary preferred solution of “berm with raised entranceway” presented. This solution will also include the preferred new effluent pumping station option previously described. In summary, a berm is proposed within the existing fenceline of the plant, although some minor encroachments beyond the fence will be required in some places, including at the north of the site. A raised entrance roadway will be required to ensure continuous flood protection and safe access to the south during times of river flooding.

Resilience for potential climate change effects has been incorporated into the preferred solution in accordance with UTRCA recommendations regarding Thames River flood levels. Flood mitigation works will be implemented to protect against the 1:250-year flood level plus a freeboard allowance of 0.6 m. This additional height is intended to account for potential future effects of climate change and increased flood flows in the river.

From an ecological perspective, the EIS identified a number of natural heritage features adjacent to the WWTP, but no direct impact to natural features is predicted by implementation of the preferred solution. Indirect impacts can be reduced through mitigation strategies developed during detailed design. The archaeological study identified no areas of archaeological potential within area required for implementing the integrated preferred solution for the Adelaide WWTP.

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Appendix B Hydraulic Study (Matrix 2021)
Appendix C Environmental Impact Study (Matrix 2022)
Appendix D Stage 1 Archaeological Assessment (ARA 2022)
Appendix E Consultation Report (Matrix 2022)
Appendix F Cost Estimates

1 Introduction

The City of London (the City) is undertaking a Schedule B Municipal Class Environmental Assessment (EA) to develop mitigation approaches to provide climate change resiliency to the Adelaide Wastewater Treatment Plant (WWTP) located along the Thames River in London, Ontario (Figure 1). In 2019, the City declared a climate emergency and has developed a *Climate Emergency Action Plan* (City of London 2022a) to deepen its commitment to protecting its economy, ecosystems, and community through adaptation and mitigation initiatives. The City is completing this EA, and a concurrent EA study for their Greenway WWTP, as part of their climate action plan. These EAs target mitigation of impacts of flooding from the Thames River, providing resilience to current risks and to future climate-related risks of flooding.

The Upper Thames Conservation Authority (UTRCA) has updated floodplain mapping within the Thames River corridor to reflect the 1:250-year regulatory flood event. This updated mapping has revealed that significant portions of the Adelaide WWTP is inundated during the regulatory event. To investigate potential mitigation strategies, the City retained Matrix Solutions Inc. to support the Adelaide Class EA process. Matrix has worked alongside CIMA+, who have addressed required operational requirements related to the Adelaide WWTP.

The goal of the EA study is to determine a feasible flood mitigation solution that fits within available WWTP lands and adequately addresses various environmental-, ecological-, social-, financial-, and policy-related constraints. The EA study process has included meaningful engagement with Indigenous communities, various stakeholders, public agencies, and the general public.

1.1 Problem and Opportunity Statement

At the start of the EA process, the following problem, opportunity, and summary statements were developed. These statements summarized the basis for completing the EA and were presented to the public at Public Information Centre No. 1.

1.1.1 Problem Statement

In April 2019, the City declared a climate emergency to deepen its commitment to protecting its economy, ecosystems, and communities from climate change through adaptation and mitigation initiatives. The Adelaide WWTP, located along the Thames River at 1201 Adelaide Street North, is inundated during severe floods (e.g., 1:250-year event). As part of these climate change resiliency initiatives, the City of London has an interest in providing flood protection and climate resiliency at this critical WWTP infrastructure and reducing the environmental impacts of flooding.

1.1.2 Opportunity Statement

The Schedule B Municipal Class EA seeks to identify a preferred flood protection approach to improve asset resilience, enhance treatment capabilities, and improve plant safety. Potential approaches to protect these critical infrastructure assets and reduce the environmental impacts of flooding approaches will, to the extent possible, minimize impacts to land ownership, land-use conditions, and existing infrastructure.

The City secured federal funding through the Disaster Mitigation and Adaptation Fund (DMAF) for this project, as well as for climate change resiliency improvements at the Greenway WWTP.

The EA was coordinated with the long-term planning underway for the City's WWTPs. Coordination has ensured that resiliency opportunities identified in the EA will serve the City well into the future.

1.1.3 Summary Statement

The Adelaide WWTP is vulnerable to severe flooding. The EA has identified a preferred flood protection approach to improve asset resilience, enhance treatment capabilities, and improve plant safety. An acceptable flood protection solution will, to the extent possible, minimize impacts to land ownership, land-use conditions, and existing infrastructure.

1.2 Study Area

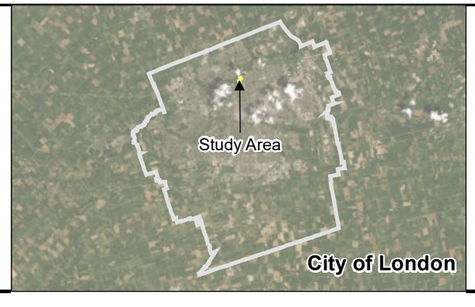
The Adelaide WWTP is located at 1201 Adelaide Street North, on the southern floodplain of north branch of the Thames River. The plant is bordered by Adelaide Street to the east and the City's operations centre and storage yard to the south (Figure 1). Additional land uses within the floodplain adjacent to the WWTP include recreation (the North London Athletic Fields) and natural areas (the Huron Woods).

The EA study area includes the Adelaide WWTP and adjacent City operations centre and storage yards as outlined in Figure 1. As well, various technical studies completed for the EA (e.g., hydraulics, archaeological) have included additional area beyond the study area, according to requirements of adequate context for each study. Areas of interest beyond the study area are outlined in each of the technical studies completed in this EA.



Adelaide WWTP Study Area

Flow Direction



Notes:

(1) This figure is meant to be read with the attached Project File, Climate Change Resiliency Class EA for the Adelaide WWTP (April 2022) and is subject to the same limitations and conditions stated in the report.

(2) The study area extends south beyond the current boundaries of the Adelaide WWTP to encompass potential future expansion.

1:7,000 metres

75 0 75 150

NAD 1983 UTM Zone 17N

Reference: Contains information licensed under the Open Government Licence – Ontario. Imagery (2020) Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community.

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

City of London

Class Environmental Assessment for the Adelaide Wastewater Treatment Plant Climate Resiliency

Adelaide Study Area

Date:	Project:	Submitter:	Reviewer:
May 2022	32667	M. Samson	S. Braun

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Figure 1

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2 Environmental Assessment and Planning Context

2.1 Municipal Class Environmental Assessment

The Class EA for the Adelaide WWTP climate change resiliency follows the Municipal Class EA process outlined in the *Municipal Class Environmental Assessment Manual* (MEA 2015), under the *Ontario Environmental Assessment Act*, Revised Statutes of Ontario (R.S.O.) 1990, Chapter E.18, as amended, and includes amendments through the *COVID-19 Economic Recovery Act, 2020*. This process (Figure 2) allows for strategic planning of multiple integrated systems that impact the environment (defined as the natural, social, cultural, built, and economic environments). The consultation process for this project complies with the *Code of Practice for Consultation in Ontario's Environmental Assessment Process* (MOE 2014).

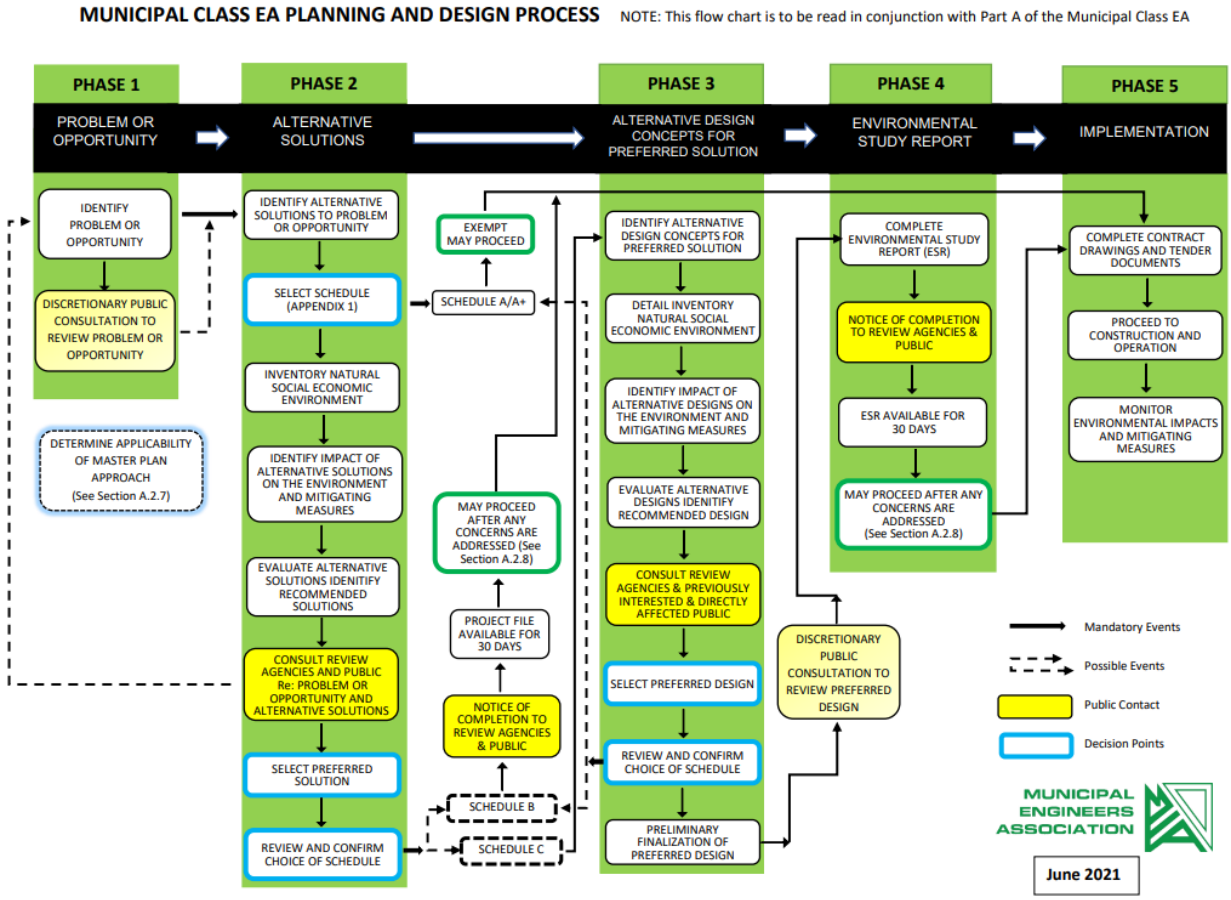


Figure 2 Municipal Class Environmental Assessment Process (MEA 2015)

For this project, the Class EA process has been carried out under the Terms of Reference established in the Municipal Class EA document, prepared by the Ontario Municipal Engineers Association in October 2000 (as amended in 2007, 2011, and 2015). Figure 2 illustrates the Municipal Class EA process and the phases are defined as follows in the EA manual (MEA 2015):

"**Phase 1** Identify the problem (deficiency) or opportunity

Phase 2 Identify alternative solutions to address the problem or opportunity by taking into consideration the existing environment and establish a preferred solution that accounts for public and review agency input. At this point, determine the appropriate Schedule for the undertaking and document decisions in a Project File for Schedule B projects, or proceed through the following Phases for Schedule C projects.

Phase 3 Examine alternative methods of implementing the preferred solution, based upon the existing environment, public and review agency input, anticipated environmental effects and methods of minimizing negative effects and maximizing positive effects.

Phase 4 Document, in an Environmental Study Report a summary of the rationale, and the planning, design and consultation process of the project as established through the above Phases, and make such documentation available for scrutiny by review agencies and the public.

Phase 5 Complete contract drawings and documents, and proceed to construction and operation; monitor construction for adherence to environmental provisions and commitments. Where special conditions dictate, also monitor the operation of the completed facilities."

There are several classifications or schedules associated with municipal infrastructure projects defined as follows in the EA manual (MEA 2015):

- "Schedule A (Phases 1 and 5)
    - generally includes normal or emergency operational and maintenance activities
    - the environmental effects of these activities are usually minimal and, therefore, these projects are pre-approved

- Schedule A+ (Phases 1 and 5)
    - in 2007, MEA introduced Schedule A+. These projects are pre-approved, however the public is to be advised prior to project implementation. The manner in which the public is advised is to be determined by the proponent. Schedule A+ is discussed in Section A.1.2.2.
- Schedule B (Phases 1, 2, and 5)
    - generally includes improvements and minor expansions to existing facilities
    - there is the potential for some adverse environmental impacts and therefore the proponent is required to proceed through a screening process including consultation with those who may be affected
- Schedule C (Phases 1 through 5)
    - generally includes the construction of new facilities and major expansions to existing facilities
    - these projects proceed through the environmental assessment planning process outlined in the Class EA"

A project that is carried out following an approved Municipal Class EA process will comply with Section 16 (formerly known as Part II) of the *Environmental Assessment Act*. However, if during the project planning and consultation process there are agency or public concerns that cannot be resolved, the concerned party may request that the project comply with Section 16 of the *Environmental Assessment Act* and undertake a higher level of assessment known as a "Section 16 Order."

Amendments to the Section 16 Order have been implemented to focus on issues relating to Aboriginal and treaty rights. The updated guidelines (MECP 2021) indicate that a Section 16(6) Order can be requested to the Minister if the requestor has outstanding concerns that a project going through a Class EA process may have a potential adverse impact on constitutionally protected Aboriginal and treaty rights and it is believed that an Order may prevent, mitigate, or remedy this impact.

A Section 16 Order should try to be resolved with the project proponent first and should not be requested with the intent to solely delay or stop the planning and implementation of a Class EA project. If the issue cannot be resolved, a Section 16 Order request must be submitted to both

the Ontario Ministry of the Environment, Conservation and Parks (MECP) and the Director of Environmental Assessment Branch via mail, email, fax, or hand delivery after the proponent has issued a Notice of Completion. The proponent should also be sent a copy of the request. MECP will review the request, consider evaluation criteria, consult with other technical staff, and make a recommendation to the Minister. The Minister can request an individual Class EA for the project or apply further conditions to the Class EA that may entail further study, monitoring, and/or consultation.

2.1.1 Schedule Selection

The *Class Environmental Assessment for the Adelaide Wastewater Treatment Plant Climate Change Resiliency* has been completed under Schedule B of the Municipal Class EA process as the project involves works undertaken in a watercourse for the purposes of flood control or erosion control, which may include:

- constructing berms along a watercourse for purposes of flood control in areas subject to damage by flooding
- constructing a new pumping station or increase pumping station capacity by adding or replacing equipment and appurtenances, where new equipment is located in a new building or structure
- establishing sewage flow equalization tankage in existing sewer system, or at existing sewage treatment plants, or at existing pumping stations for influent and/or effluent control.

Throughout the EA process, the public has been actively engaged and consulted in a collaborative manner to gather feedback throughout the project. Two Public Information Centres (PIC) were held to introduce the project to the public and provide an opportunity for interested parties to identify any concerns or local information that will support the EA process. Additionally, the City's *Get Involved* website provided updated project content and feedback opportunities throughout the duration of the study. Any requests for an order to comply with Part II of the *Environmental Assessment Act* will be applied to the project upon the final Project File review.

2.2 Provincial Policy Statement

The *Provincial Policy Statement, 2020* (PPS; MMAH 2020) provides policy direction on matters of provincial interest related to land use planning and development, with the intention to protect resources, public health and safety, and the quality of the natural and built

environment. The PPS contains policies that protect Ontario's natural heritage and water resources. These policies have been referenced in later portions of portions of this EA report and been incorporated into the evaluation process of alternative solutions, including the preferred solution.

In addition to natural heritage and water resources focussed policies, the EA complies with the following climate-focussed PPS components:

- ensuring that necessary infrastructure and public service facilities are or will be available to meet current and projected needs
- preparing for the regional and local impacts of a changing climate
- ensure that these systems are provided in a manner that prepares for the impacts of a changing climate; is feasible and financially viable over their lifecycle; and protects human health and safety, and the natural environment

2.3 Wastewater Treatment Operations Master Plan

The Adelaide WWTP EA has been completed to ensure integration with the City's recently completed Wastewater Treatment Operations Master Plan (City of London 2022b). Anticipated flood mitigation works for the Adelaide WWTP are referenced in the master plan. Coordination details with the City's master plan are addressed within the CIMA+ document contained in Appendix A titled *Effluent Pumping Evaluation Memorandum* (CIMA+ 2022).

2.4 Climate Change

2.4.1 Reference Documents and Process

This Class EA has been funded in part by the federal DMAF. Within the application process for DMAF funding, the severity and frequency of various climate-associated factors (such as increased rainfall, rising temperatures, wind speeds, etc.) were addressed within the context of the Adelaide WWTP to determine the most significant vulnerabilities to future climate change. Through this process, flooding resulting from large flows on the Thames River was identified as posing the greatest risk to the infrastructure and functionality of the Adelaide WWTP.

The application process for DMAF funding satisfies many of the risk assessment approaches outlined in the Canadian Standards Association (CSA) National Standard for Canada titled *Climate change adaptation for wastewater treatment plants* (CSA Standard; CSA Group 2018). The CSA Standard is a resource for design, operation, and retrofit strategies and criteria

intended to enhance resilience of WWTPs and was referenced during the completion of the EA project.

The preparation of a greenhouse gas mitigation assessment was required for this DMAF project as an Infrastructure Canada requirement (Investing in Canada Program). This greenhouse gas mitigation assessment was completed separately by Stantec (2021) and outside of the Class EA.

Along with the CSA Standard, the provincial guideline entitled *Considering Climate Change in the Environmental Assessment Process* (MOECC 2017) was consulted to ensure applicable recommendations were pursued for the project. With flooding at the forefront of climate change concerns for the Adelaide WWTP, the project sought alternatives that would safeguard the WWTP from high-risk flooding and thereby ensure continuity of operation, minimized bypasses, and prevention of damage to infrastructure.

2.4.2 Resilience and Flood Mitigation Targets

Existing floodplain mapping outlining the floodplain associated with a 1:250-year storm event (i.e., a flood with a 0.4% chance of occurrence in any given year) was produced by UTRCA prior to the start of this EA project. Matrix evaluated alternative flood mitigation designs at the Adelaide WWTP that addressed the 1:250-year storm event in accordance with stated EA project objectives and the EA problem statement.

The potential for additional resilience to flood events beyond the 1:250-year storm event was also considered. At the recommendation of UTRCA, flood mitigation alternative solutions being considered for the Adelaide WWTP included an extra height of protection, also known as “freeboard”, in hydraulic designs. A 0.6 m design height of freeboard was determined through previous study and consideration by UTRCA to be a reasonable allowance for providing resilience to future climate change conditions. Accordingly, the feasibility of achieving a 0.6 m freeboard over and above the regulatory flood height was set as a general design basis for alternate solutions being considered within the EA.

3 Existing Conditions

3.1 Thames River Floodplain Hydraulics

Matrix completed a study in 2021 analyzing the hydraulic character of the Thames River and floodplain in the vicinity of the study area (Appendix C). The study also explored the potential impacts from various flood mitigation strategies that are outlined in later sections of this report (Section 4.1).

Analysis was carried out using one-dimensional and two-dimensional HEC-RAS models of the Thames River that were supplied by UTRCA. The models covered an approximately 4 km long reach of the Thames River and associated floodplains in the vicinity of the study area. This length of river analysis was required to establish an existing conditions baseline such that different flood mitigation approaches could be evaluated for their predicted effects. Floodplain area analyzed within the EA study is indicated in Figure 3, which is reproduced from the above-referenced hydraulics report. Typical flood depths at the Adelaide WWTP during a regulatory event are predicted to be in the range of 0.2 to 0.8 m.

The design flow stipulated for hydraulic analyses is the 1:250-year regulatory storm event (1,000 m^3/s). This flow had been determined by UTRCA through previous hydrologic study. Considerations for climate change were not part of the existing conditions analysis; instead, climate change considerations were integrated into the various mitigation solutions being evaluated.

As outlined in the Matrix (Matrix 2021) hydraulics study and described in later portions of this EA summary document, hydraulic models were modified as necessary to simulate floodplain response from the various proposed mitigation strategies. Results from these analyses were interpreted and utilized to complete a high-level screening for flood mitigation approaches (outlined further in Section 4 of this EA document).

3.2 Natural Environment

An Environmental Impact Study (EIS) was initiated by Matrix in 2021 (completed in 2022; Matrix 2022a) to characterize the existing natural heritage conditions within and adjacent to the WWTP. The study area for the EIS includes the EA study area lands and an additional area extending approximately 50 m beyond the fenceline. The lands surrounding the Adelaide WWTP are a combination of residential and commercial land-uses to the east, open-space/public park land to the north and northwest, and natural lands to the south and southwest.



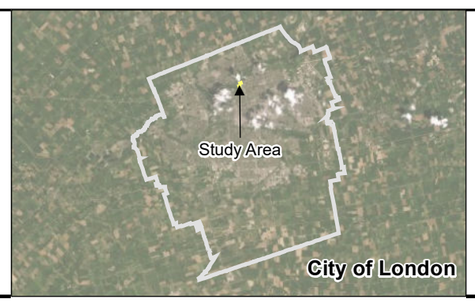
Adelaide WWTP Study Area

Flow Direction

1D Model 1: 250 year Regulatory Flood Max Depth (m)

High : 7.69

Low : 0



Notes:

(1) This figure is meant to be read with the attached Project File, Climate Change Resiliency Class EA for the Adelaide WWTP (April 2022) and is subject to the same limitations and conditions stated in the report.

(2) Flood Depths are based on the 2020 UTRCA 2D model revised to calculate water levels using shallow wave equations (full momentum).

1:7,000

metres

75 0 75 150

NAD 1983 UTM Zone 17N

Reference: Contains information licensed under the Open Government Licence – Ontario. Imagery (2020) Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community.

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

City of London

Class Environmental Assessment for the Adelaide Wastewater Treatment Plant Climate Resiliency

Adelaide Flood Extents and Depth

Date:	Project:	Submitter:	Reviewer:
April 2022	32667	M. Samson	S. Braun

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Figure 3

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The EIS contains a comprehensive background review of the natural environment, some targeted ecological field studies (ecological land classification, habitat assessments, bird surveys), and desktop characterization (species at risk and significant wildlife habitat screening). The EIS is included in this EA document as Appendix D.

Natural heritage features of note identified in close proximity to the study area include deciduous woodlands, cultural meadow and thicket, sections of unevaluated wetland, and potential habitat for species at risk and/or significant wildlife habitat. Typically, habitat features were only identified outside of the WWTP fenceline. An area to the north of the WWTP, where flood protection may extend past the existing plant footprint, contains a small 0.04 ha meadow marsh dominated by *Phragmites australis*, which is an aggressive invasive grass species. Aside from this feature, given that flood remediation efforts are anticipated to be contained within the WWTP itself, no other direct impacts to significant natural heritage features are anticipated. Indirect impacts may result from site-level flood protection, and impact mitigation strategies will be required to ensure no net negative impacts occur to significant features located in closer proximity to the Adelaide WWTP.

3.3 Archaeological Assessment

Archaeological Research Associates Ltd. completed a Stage 1 archaeological assessment (Appendix E). The assessment included a background review of the contextual landscape, historical records, previous archaeological studies, and current conditions within the study area and surrounding lands. Background sources include the Ontario Archaeological Sites database, review of previous archaeological work in the local area, review of historical mapping, and aerial imagery interpretation.

Several features with archaeological potential were identified in proximity to the WWTP including three primary water sources associated with the Thames River and Stoney Creek, a fluvial terrace, three historical roadways, and twelve historical structures. The background review did not identify any features suggesting the study area has potential for deeply buried archaeological resources.

In summary, the Stage 1 assessment determined that the study area contains areas of variable archaeological potential, areas of no archaeological potential, and lands that have been previously assessed. No significant areas of archaeological potential are identified within the study area or in immediately abutting areas potentially impacted by flood mitigation works.

3.4 Social Environment

The nearby Thames River provides significant opportunity for many recreational and environmentally-focused uses, and includes a walking trail system commonly referred to as the Thames Valley Parkway. The lands surrounding the Adelaide WWTP include an open public park to the north and northwest which hosts many (and many types of) athletic fields. Various natural lands are located to the south and southwest. Lands to the east include a combination of residential and commercial land-uses fronting to Adelaide Street.

3.5 Wastewater Treatment Plant Characteristics

The Adelaide WWTP is described in a document completed by CIMA+ (CIMA+ 2022; Appendix A). In summary, the Adelaide WWTP peak treatment capacity is rated at 105 million litres per day (MLD). An existing raw sewage pumping station has a larger peak capacity at 204 MLD. The WWTP has three distinct outlet locations, including one for treated effluent, one for stormwater, and a third location that provides outlet for emergency bypasses.

The current elevation of the outlet pipe conveying treated effluent from the WWTP is located significantly below the elevation of the regulatory storm flood level. Accordingly, all flood mitigation alternative solutions being considered must include a method to lift treated effluent from the WWTP to above the regulatory flood level of the nearby Thames River. For the plant to continue to effectively operate during a regulatory storm event, it must be able to have a flood free outlet for its discharge. The anticipated method of lifting treated effluent is a new effluent pumping station, which is outlined in later sections of this report.

3.6 Utilities, Local Drainage, and Groundwater

The lands within and adjacent to the Adelaide WWTP contain substantial amounts of buried infrastructure, including sanitary sewers and lines related to delivery and discharge to/from the plant. Additionally, storm sewers are located at or near the site, including a storm trunk that conveys runoff from Adelaide Street. Buried facilities were identified on the site (see Figure 3, Matrix hydraulic report Appendix C). At the time of final design, a more rigorous subsurface utility engineering program and location plan will be required to coordinate construction and to ensure accurate locates for storm, sanitary, water, gas, telecom, and hydroelectric lines.

3.7 Source Water Protection

An objective of the EA is to minimize environmental impacts, including provision of source water protection through compliance with the *Clean Water Act, 2006*.

Referencing MECP's online tool *Source Protection Information Atlas*, portions of the study area at the storage yard and operations centre are identified as being close to or within a low-level (score 0) Significant Groundwater Recharge Area (SGRA). A portion of the study area, again at the storage yard and operations centre, is also located close to or just within a Highly Vulnerable Aquifer (HVA).

The SGRA designation covering a small portion of the operations centre is considered a low risk and was not considered further in this EA. The HVA designation, which covers a portion of the storage yard and operations centre, has a consistent risk level of "6" throughout.
This designation indicates surficial soil layers which are considered thin or permeable and located over an underground water supply or aquifer. It is noted that no portion of the study area is located within or near a Wellhead Protection Area, Intake Protection Zone, nor Event Based Area.

Some of the anticipated construction works will likely occur within or close to the identified areas of HVA designation. Impacts to the HVA are not anticipated by proposed works within the study area; however, localized impacts from construction should be considered further at the detailed phase of the project. Flood protection options being considered in this EA are not anticipated to provide additional threats to the underlying aquifer, nor exacerbate existing risks.

3.8 Potential Site Contamination

Prior to construction, and at the time of final design, the management of past and current historical sites will be identified and considered in mitigation plans. For this project, there are no historical waste disposal sites (i.e., large or small landfills) in and around the study area. Underground storage tanks on-site are associated with the WWTP and are outside the areas of anticipated construction of flood mitigation works.

4 Development of Alternative Solutions

4.1 Hydraulic Analysis and High-level Screening

As outlined in Section 3.1 of this EA document, a study analyzing the hydraulic character of the Thames River floodplain was completed by Matrix in 2021 (Appendix C). It assessed the existing hydraulic condition of the floodplain as well as exploring the potential impacts from multiple flood mitigation strategies.

Existing conditions hydraulic models were modified as necessary to simulate various proposed mitigation strategies being considered. These strategies were initially approached from a purely hydraulic point of view, recognizing that other environmental, social, economic, and other technical issues, will also determine the overall suitability of approach.

In summary, the study assessed the following long list of flood mitigation approaches to determine their overall feasibility, practicality, and effectiveness from a hydraulic standpoint:

- conveyance improvements to the Thames River channel, which included:
    - widening of the Thames River corridor
    - lowering of the Thames River
    - improvements/modifications to the floodplain
    - replacement of Adelaide Street Bridge
- site-level flood protection (e.g., berms and flood walls)
- diversion of flows
- online storage to reduce upstream flood flows
- operational measures at the WWTP

Results from the hydraulic analyses were interpreted and utilized to complete a high-level screening for determining the most feasible flood mitigation approach. The hydraulic study contains recommendations for flood mitigation based on the high-level screening evaluation of the long list of options completed (see Appendix C, Table 1). Most of the long list of approaches were determined to not be practically feasible, either due to the extensive scale of effort, cost, and/or environmental impacts that would result in order to achieve satisfactory flood protection. Rejected approaches included conveyance improvements, upstream diversion, and online storage. Replacement of the Adelaide Street Bridge would not fully satisfy flood protection targets. Operational changes at the WWTP would be difficult to implement, and not be cost-effective compared to other more feasible and available options for flood protection.

The only mitigation approach identified as being hydraulically effective, feasible to implement, and most potentially capable of satisfying other EA study targets was “site-level flood protections” (e.g., berm/floodwall). Hydraulic modelling indicated that placing site-level flood protection works in the floodplain around the Adelaide WWTP would not result in any significant impacts to upstream and downstream areas of the Thames River corridor.

The preliminary hydraulic study therefore recommended that site-level flood protection approaches form the basis of a short-list of alternative solutions being considered to address the problem/opportunity statements developed for this EA.

4.2 Short List of Alternative Solutions for Flood Protection

The site-level flood protection approaches considered involve a combination of floodwalls, berms/dykes, placement of temporary measures (i.e., sandbag flood barriers), and/or localized raising of roads and grades to achieve flood protection. After consideration of various combinations, three distinct alternative solutions for site-level flood protection were formulated for further evaluation. A fourth option, the so-called “do nothing” option, was also included as a point of comparison. Each alternative solution is outlined subsequently.

4.2.1 Alternative Solution 1: Berm with Raised Entrance Way

This solution is depicted in Figure 4, with flood mitigation relying mainly upon an earthen berm along the southern, western, and northern perimeter of the WWTP. The berm needs to be integrated with a raised and widened entry roadway between the entranceway on Adelaide Street up to the City’s southeastern works yard, which is already located above the regulatory flood level. Berms have been assumed to be designed with 2.5 to 1 side slopes (horizontal to vertical), and with a minimum top width of 2 m. Top of berm and roadway elevations would be constructed to the predicted regulatory flood event plus 0.6 m of freeboard.

4.2.2 Alternative Solution 2: Berm with Temporary Measures at Entrance Way

Similar to Alternative Solution 1, Alternative Solution 2 depicted in Figure 5 also relies on an earthen berm along the southern, western, northern, perimeter of the WWTP. In place of raising the entryway, an additional berm would be located along the east side of the WWTP to integrate with the southeastern works yard. This solution would require a temporary measure such as dam of sandbags or some other readily available and quickly assembled temporary measure to be installed during flood conditions to protect the main entranceway at the northeastern end of the WWTP. Temporary flood measures across the WWTP entranceway would be put in place in response to reports of extreme weather and/or river flooding. Permanent earth berms surrounding the site would be constructed per design parameters outlined Alternative Solution 1.

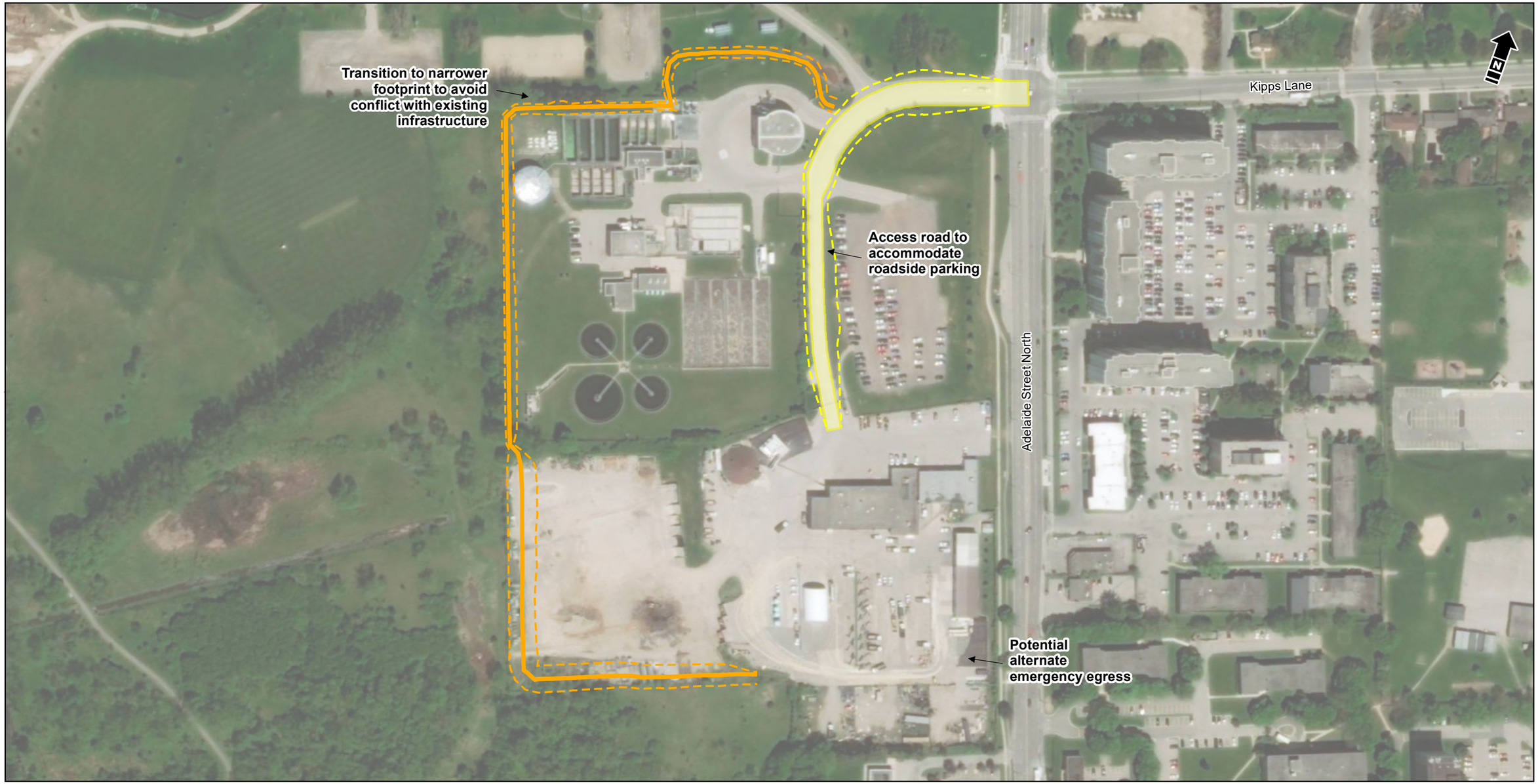
4.2.3 Alternative Solution 3: Berm with Raised Entrance Way and Protected Parking Area

This solution, similar to Alternative Solutions 1 and 2, relies on an earthen berm along the southern, western, and northern perimeter of the WWTP. Alternative Solution 3, which is

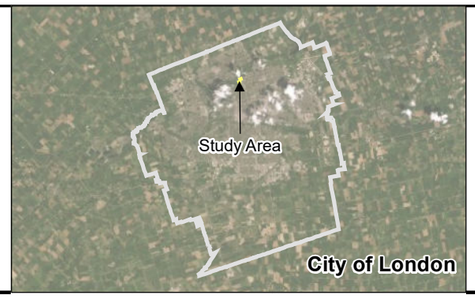
depicted in Figure 6, would also require a berm parallel to Adelaide Street to provide flood protection from the east. This eastern berm would need to be integrated into a new raised entranceway road. Berms would transition at the southeastern works yard which is above the 1:250-year flood elevation level. Earth berms would be constructed per design parameters outlined Alternative Solution 1.

4.2.4 Option 4: Do Nothing

The Do-nothing approach would result in no flood protection measures to be put in place for the WWTP. It does not address the problem of flood protection.



Road
Toe of Road Slope
Top of Berm
Toe of Slope



Notes:
(1) This figure is meant to be read with the attached Project File, Climate Change Resiliency Class EA for the Adelaide WWTP (April 2022) and is subject to the same limitations and conditions stated in the report.

1:2,250 metres
25 0 25 50
NAD 1983 UTM Zone 17N

Reference: Contains information licensed under the Open Government Licence – Ontario. Imagery (2020) Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community.

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City of London
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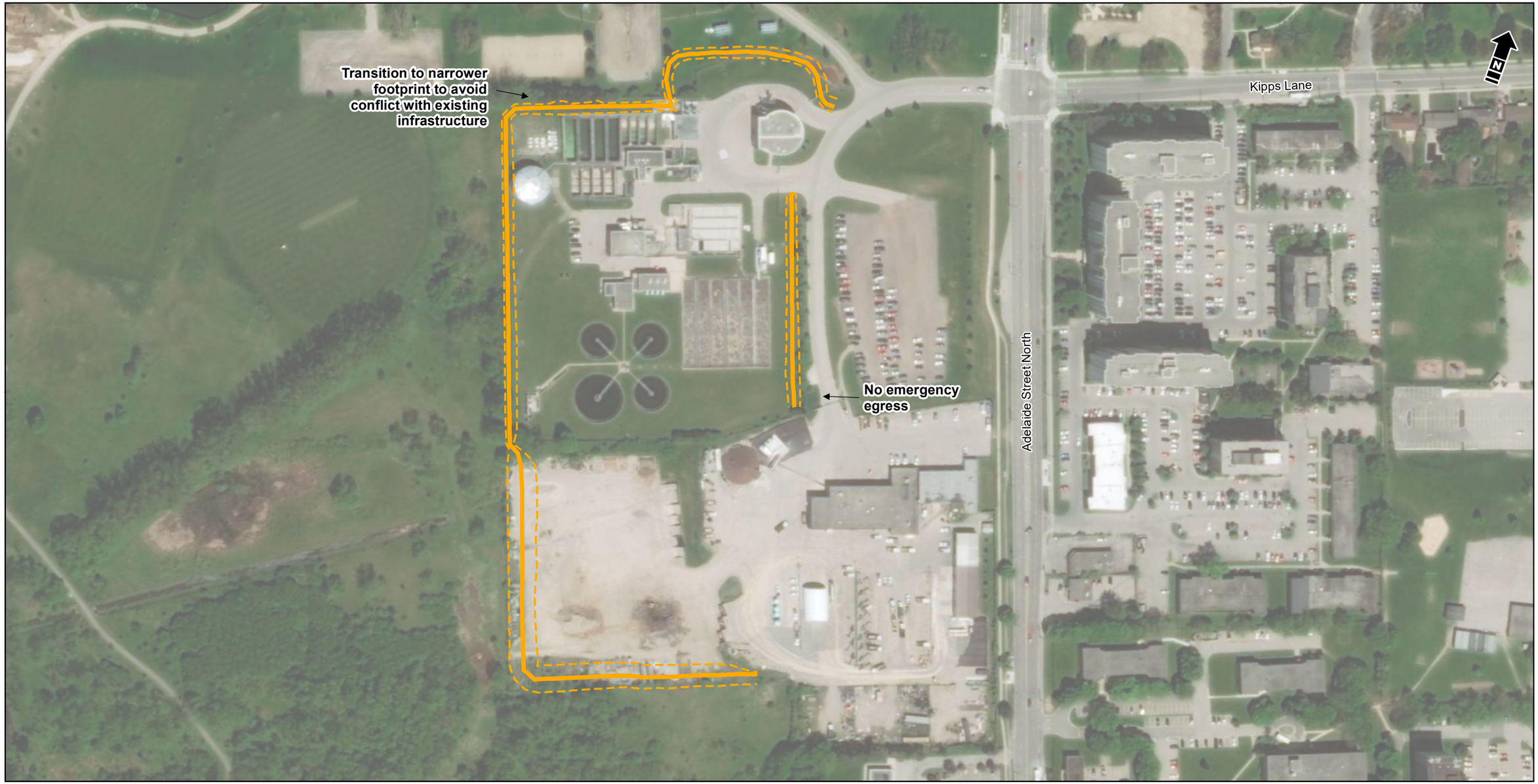
Option 1 - Berm with Raised Entrance Way

Date:	Project:	Submitter:	Reviewer:
April 2022	32667	M. Samson	S. Braun

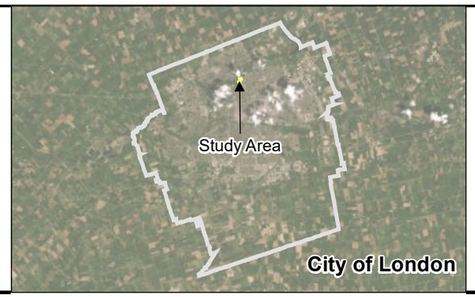
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Figure 4

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Top of Berm
Toe of Slope



Notes:
(1) This figure is meant to be read with the attached Project File, Climate Change Resiliency Class EA for the Adelaide WWTP (April 2022) and is subject to the same limitations and conditions stated in the report.

1:2,250 metres
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City of London
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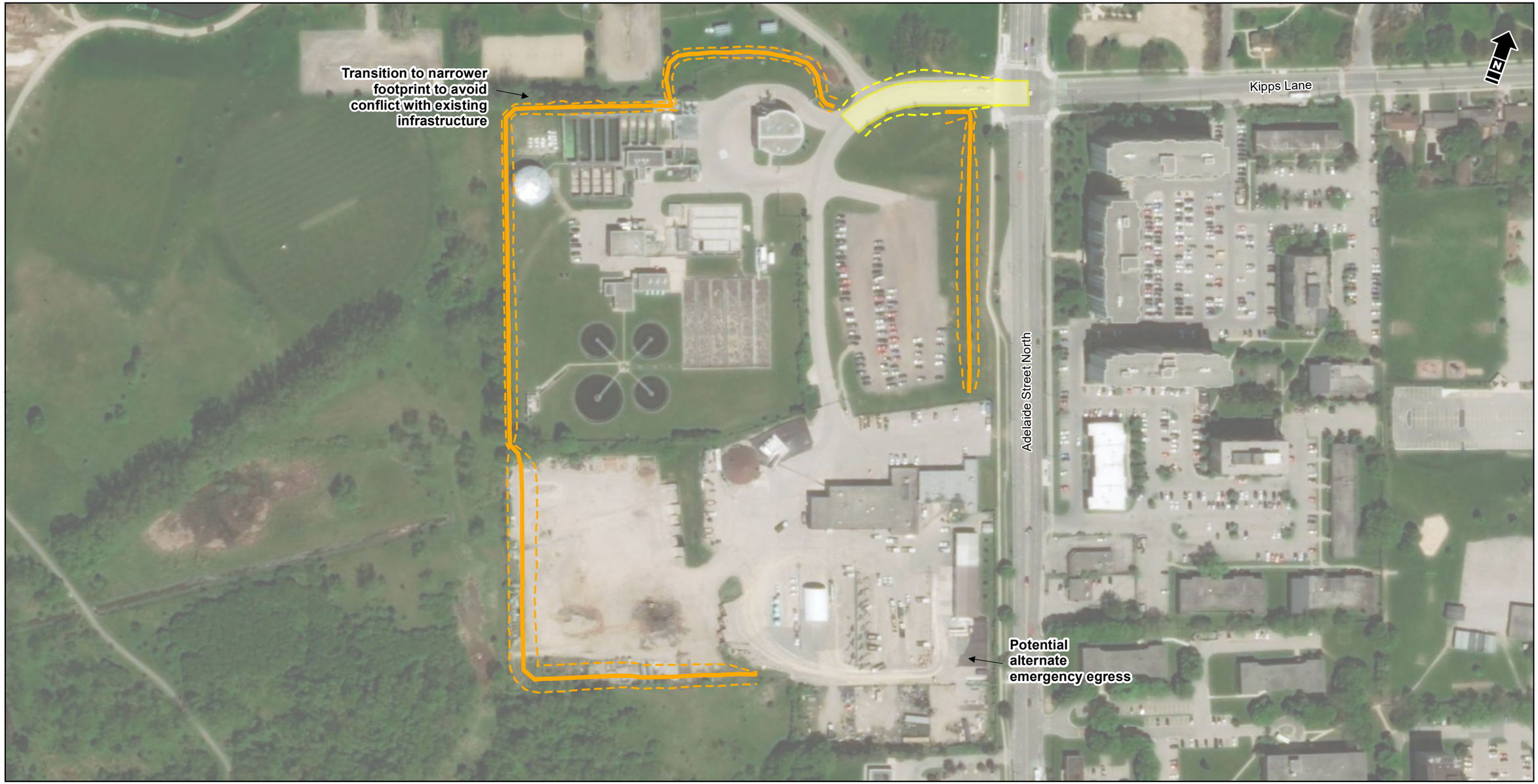
Option 2 - Berm with a Temporary Measure at Entrance Way in Response to Flood Forecasts

Date:	Project:	Submitter:	Reviewer:
April 2022	32667	M. Samson	S. Braun

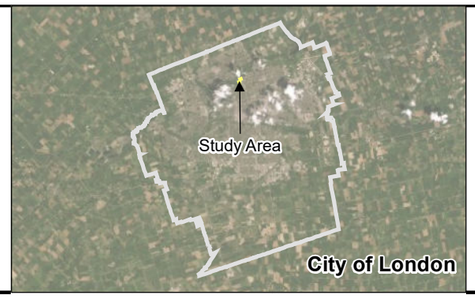
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Figure 5

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Road
Toe of Road Slope
Top of Berm
Toe of Slope



Notes:
(1) This figure is meant to be read with the attached Project File, Climate Change Resiliency Class EA for the Adelaide WWTP (April 2022) and is subject to the same limitations and conditions stated in the report.

1:2,250 metres
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NAD 1983 UTM Zone 17N

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City of London
Class Environmental Assessment for the Adelaide Wastewater Treatment Plant Climate Resiliency

Option 3 - Berm Extended to Provide Protection at the Parking Lot

Date:	Project:	Submitter:	Reviewer:
April 2022	32667	M. Samson	S. Braun

Disclaimer: The information contained herein may be compiled from numerous third party materials that are subject to periodic change without prior notification. While every effort has been made by Matrix Solutions Inc. to ensure the accuracy of the information presented at the time of publication, Matrix Solutions Inc. assumes no liability for any errors, omissions, or inaccuracies in the third party material.

Figure 6

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4.3 Short List of Alternative Solutions for Wastewater Treatment Plant Infrastructure

Each of the different site-level flood protection solutions examined at the Adelaide WWTP requires an effluent pump station to lift water from the plant into the Thames River when river levels are too high for gravity drainage. Since treated water, stormwater, and emergency bypasses all leave the plant at different locations, it was important to evaluate options for effluent pumping. An opportunity was also identified to use the additional capacity of the existing raw pump station to convey bypasses directly to the receiving water or into an equalization tank.

Alternative solutions were formulated to include different options for the raw (inlet) pump station, equalization tank, and effluent pump station. These alternative solutions are outlined by CIMA+ in their technical memorandum included in Appendix A (CIMA+ 2022).

An effluent pumping station is required for all flood protection and alternative WWTP infrastructure solutions being considered in this EA (except for the do nothing alternative). Sufficient preliminary design work has been completed by CIMA+ to ensure that the required pump station can be feasibly located within the study area.

5 Evaluation of Alternative Solutions

5.1 Criteria and Methodology

Each of the three short-listed alternative solutions for site-level flood protection measures, as identified in Section 4, were evaluated according to the following typical EA criteria:

- technical performance:
- economic impact
- environmental impact
- social impact

Additional details for each of the above criteria, including standard descriptions and detailed ones tailored to the study area, are contained in the following subsections. Each of the three alternative solutions (per Section 4.2) and the do nothing scenario have been assigned a value representing its predicted qualities and performance according to these individual criteria. Values assigned range from low, low-medium, medium, medium-high, and high.
Assigned values are listed in Table 1 and are outlined further in Section 5.2 of this report.

Various effluent pump station options (per Section 4.3) were evaluated according to similar overall criteria of technical performance, economic impact, environmental impact, and social impact. The evaluation methodology for pump station alternative solutions is outlined in Section 4 of the technical memorandum completed by CIMA+ (CIMA+ 2022; Appendix A).

Additional detail and context regarding evaluation criteria for the site-level flood protection solutions being considered follows subsequently.

5.1.1 Technical Performance

Overall criteria for evaluating solutions' technical performance include:

- level of flood protection
- constructability
- climate change resiliency
- WWTP operations

Previous hydraulic modelling work completed by Matrix within the hydraulic report (Appendix C) established that the placement of site-level flood protection works (e.g., berms and flood walls) within the floodplain would not significantly nor adversely affect the conveyance capacity of the Thames River. The Matrix study established that site-level works would not significantly raise predicted water levels during a regulatory flood; accordingly, all EA alternative solutions are seen to be equal from the context of their predicted hydraulic effects. The predicted effects are negligible and are not considered further in the evaluation process.

The effect of various alternative solutions on existing flood storage contained within the Thames River floodplain remains a criterion for determining technical performance. Loss of flood storage, which is different than loss of conveyance capacity, is not as apparent a constraint. Storage volume contained in a floodplain dampens and lowers downstream flow rates, meaning hydraulic conveyance requirements will be less with these lower flows. The effect of floodplain storage on reducing flows in the adjacent river/floodplain is not a pronounced effect, and especially not for individual sites. Flood storage matters more within a larger watershed-scale and cumulative context. Loss of localized amounts of floodplain storage usually can be shown to have negligible effect, but generally it is to be avoided where feasible due to the larger cumulative effects of its loss. Preservation of floodplain storage to the extent that is practical will result in overall positive effects.

Alternative solutions being considered are judged by their ability to perform adequately to achieve technical objectives, including meeting flood protection objectives that translate to robust flood protection during periods of high-water levels. Berms proposed in all of the alternative solutions (except for the do nothing approach) will be able to protect to a flood level of the regional storm plus a freeboard of 0.6 m. Accordingly, the alternative solutions are not differentiated by their ability to perform to this criterion, and all are seen to be equally able to achieve good climate change and flood resiliency.

An important criterion of technical performance that does, however, provide differentiation between alternative solutions is provision of safe ingress and egress (i.e., flood-safe access) during a regional storm flood. Another is how WWTP operational planning would have to adapt (i.e., it matters whether an alternative solution is passive after installation or alternatively if it requires active operational planning and coordination).

5.1.2 Costs

Criteria for determining costs include:

- capital costs
- operating costs

Estimates of capital and operating costs have been prepared for each of the alternative solutions and are contained in Appendix G. Estimates are meant to provide direct comparison to the major components of each alternative solution (extent and overall scope of berm and road improvements). Many of the itemized costs are seen to be incurred by all alternative solutions through general construction, implementation, and post-implementation (mobilization, site staging, fencing, signage, removals, land acquisition, post-implementation site-level stormwater management, etc.). Accordingly, the differences in overall capital costs are less pronounced due to many common costs to each alternative.

Operating costs are relatively small and similar for each of the alternative solutions. They were therefore not a significant item in the overall evaluation.

5.1.3 Environmental Impacts

Overall criteria for evaluating environmental impacts include:

- ecology; direct and indirect impacts
- archaeological potential

Site-level flood solutions ideally integrate well with existing infrastructure and landscape, including with existing and anticipated WWTP infrastructure. The Adelaide WWTP and adjacent works yard to the south are bordered on the south and east by natural lands and a steep valley ridge to the southeast. North and northeast of the property is a public recreational area. East of the WWTP is a parking area and Adelaide Street. Integration with these features were explored in the evaluation process.

Environmental impacts are generally anticipated to be minimal and temporary, as flood protection measures are to be contained within the existing WWTP property and other disturbed or modified areas adjacent to Adelaide Street. The northern flood protection feature is anticipated to extend slightly beyond the existing WWTP footprint, which will impact a small (0.4 ha) drainage meadow marsh. This marsh was noted to be dominated by invasive species in the EIS. Effects on this meadow marsh and other nearby environmental features are not significantly differentiated by the choice of alternative solution.

The potential exists for indirect impacts such as introduction of contaminants and sediment and also the incidental impacts to terrestrial wildlife during construction activities. Risks of these impacts can be mitigated through good implementation of best management practices and wildlife exclusion strategies. Again, the potential for indirect effects is not significantly differentiated by the choice of alternative solution due to similar footprint and approach.

5.1.4 Social Impacts

Overall criteria for evaluating potential social impacts include:

- policy considerations
- recreational uses
- safety
- public Input

The use of predominantly natural materials for passive flood protection (earthen berms) is anticipated to aid in maintaining the overall aesthetic of the adjacent recreational areas. Solutions that involve modification of the entryway road and active construction within the WWTP perimeter may temporarily affect ease of public access to the park.

Overall, site-level flood protection of the WWTP will enhance the integrity of essential public infrastructure, including the enjoyment and use of surrounding lands. The existing WWTP, which is not flood protected (represented by the do nothing option), is vulnerable to poor plant operation and performance during extreme wet weather conditions, including bypasses and

overflows to the Thames River and onto surrounding floodplain lands. These pressures also pose a potential safety risk to nearby residents and all places downstream on the Thames River.

The reduced ability or temporary inability to treat wastewater during floods also has policy implications. Avoidance of WWTP operational shutdown has many other potential social impacts, including temporary employment impacts.

5.2 Detailed Evaluation of Site-level Alternative Solutions

Table 1 summarizes the evaluation of alternative solutions being considered for site-level flood protection. The evaluation includes the cost comparison of the options as well as qualitative evaluations of each option for technical feasibility, costs, environmental impact, and social impacts. Brief summary notes highlight main differences and additional considerations.

The evaluation of effluent pump station options (per Section 4.3) is outlined in Section 5 of the technical memorandum completed by CIMA+ (CIMA+ 2022; Appendix A). The choice of a preferred alternative solution for a pump station configuration was identified as being independent from the choice of the preferred site-level flood protection solution.

Table 1 Evaluation Matrix of Alternative Site-Level Flood Protection Solutions

Alternative Solution	Technical Performance	Cost[(1)]	Environmental Impacts	Social Impacts
Solution 1: Berm with raised entrance way	• robust passive flood protection • minimized risk to wastewater treatment plant (WWTP) infrastructure under regional storm conditions • ingress and egress maintained; some parking potentially preserved along road for operations personnel • floodplain storage loss approximately 52,000 m^3	$3.1M	• minimal direct impacts anticipated as flood protection measures are to be generally contained within the existing WWTP footprint and other disturbed or modified areas • indirect impacts can be managed through best management practices • no areas of archaeological significance	• maintains natural aesthetic at berms • potential short-term public disruption during implementation • passive protection of essential public infrastructure
RATING >>>	**HIGH**	**HIGH**	**LOW**	**LOW**
Solution 2: Berm and temporary measures at entrance way in response to floods	• flood protection relies on non-passive temporary measures; not as robust, but will be effective if temporary measures implemented correctly • integration of flood protection with WWTP operations required, with potential human error or deficiencies in execution causing inundation during floods • ingress and egress not maintained during extreme events • floodplain storage loss approximately 52,000 m^3	$2.3M (slightly higher operational costs)	• minimal direct impacts anticipated as flood protection measures are to be generally contained within the existing WWTP footprint and other disturbed or modified areas • indirect impacts of construction can be managed through best management practices • increased risk of downstream environmental impacts due to requirement for active protection of the WWTP works • no areas of archaeological significance	• maintains natural aesthetic • potential short-term public disruption during implementation • significantly reduced parking areas available during floods • non-passive protection of essential public infrastructure increases many risks including risks of social impacts to sports fields and reduced enjoyment of natural areas
RATING >>>	**LOW-MEDIUM**	**HIGH**	**LOW**	**HIGH**
Solution 3: Berm with raised entrance way and protected parking area	• robust passive flood protection • minimized risk to WWTP infrastructure under regional storm conditions • ingress and egress maintained during floods with large parking area preserved for operations personnel • floodplain storage loss significantly higher at approximately 74,000 m^3	$2.9M	• minimal direct impacts anticipated as flood protection measures are to be generally contained within the existing WWTP footprint and other disturbed or modified areas • indirect impacts can be managed through best management practices • no areas of archaeological significance	• maintains natural aesthetic • potential short-term public disruption during implementation • passive protection of essential public infrastructure
RATING >>>	**MEDIUM-HIGH**	**HIGH**	**LOW**	**LOW**
Do nothing	• does not address flood risk at WWTP	N/A[(2)]	• flood risk to WWTP represents an ongoing risk of substantial negative environmental impacts	• flood risk at WWTP represents continued risk to WWTP occupants during flood events.
RATING >>>	**LOW**	**HIGH**	**MEDIUM**	**HIGH**

Notes:

shading indicates preferred alternative solutions
shading indicates preferred
shading indicates functional, not preferred
shading indicated not preferred

(1) Does not include costs for pump station works (site-level flood protection works only). Pump station costs are contained in Appendix A.

(2) Costs for do nothing include zero capital costs until restoration/repair works required by flood inundation, which could then exceed $30M.

WWTP - wastewater treatment plant

6 Preferred Solution

6.1 Confirmation of Preferred Flood Protection Solution

Alternative Solutions 1 and 3 have been assessed as the most viable flood protection strategies of the short-list alternative solutions considered. Option 2 does not maintain emergency ingress and egress, and its reliance on placement of temporary measures in response to flood forecasts introduces potential risks for both flood protection integrity and human safety. The do nothing option does not address flood protection of the WWTP, address climate resiliency, nor does it provide any meaningful alternative to maintaining critical infrastructure during a regulatory flood event.

Alternative Solutions 1 and 3 are similar in cost, with Alternative Solution 1 being slightly more expensive due to the extent of required road elevation improvements. Alternative Solution 3 represents an approximate 50% increase in flood storage lost within the floodplain due to isolation of the parking lot west of Adelaide Street. Alternative Solution 1 continues to have available parking facilities within the WWTP complex and works yard, and the potential for additional street parking exists from a slight widening of the improved and raised entryway road. Accordingly, the prospect of protecting the existing gravel parking lot per Alternative Solution 3 is difficult to justify given its impact on the floodplain.

Considering all items outlined in Table 1, Alternative Solution 1 is identified as the preferred alternative solution for this project.

6.2 Preferred Solution - Wastewater Treatment Plant Pump Station Options

The preferred solution for WWTP as identified in the CIMA+ report (CIMA+ 2022; Appendix A) is “Option 4A: Building equalization tank storage to the north.” The option incorporates the inlet pump station which will direct incoming flows to the equalization tank.

This option includes an effluent pumping station to lift treated WWTP effluent 0.60 m above the regulatory flood level in the Thames River.

6.3 Confirmation of Schedule Type

Project progression and resulting preferred solution allow confirmation that a Schedule B Class EA process remains appropriate. The preferred solution and anticipated levels of potential impacts remain consistent with criteria outlined in Section 2.1.1 of this document.

7 Public and Agency Consultation

Consultation during the decision-making process is a key feature of the Municipal Class EA process and the public has been actively engaged and consulted in a collaborative manner to gather feedback throughout the project. Those consulted throughout the process include Indigenous Communities, relevant agencies, and stakeholders, which include landowners within 500 m of the project location.

As a Schedule B Municipal Class EA project, there were the following points of contact:

- Notice of Commencement
- PIC No. 1
- PIC No. 2
- Notice of Completion

A brief description of each point of contact is provided below and a record of the consultation for the EA is provided in the consultation report (Matrix 2022b) in Appendix F, which includes notices, materials from PICs, and a feedback log.

Overall, there were no negative comments received to the presented alternatives and the preferred alternative.

7.1 Notice of Commencement

A Notice of Commencement was distributed to the project contact list comprising Indigenous Communities, agencies, and stakeholders. The MECP were contacted to formally initiate the EA process. MECP provided a *Response to Notice of Commencement* letter dated June 22, 2021, to explicitly indicate investigative requirements and due diligence with respect to policy, the environment, and consultation.

7.2 First Nations and Indigenous Consultation

Appropriate and considerate engagement with Indigenous Communities was a priority for this EA project. The project team was guided by reference documents outlined by the MECP.

The City sent out individual letters accompanying project notices to the following Indigenous Communities:

- Aamjiwnaang First Nation
- Caldwell First Nation

- Chippewas of the Thames First Nation
- Delaware Nation at Moraviantown
- Kettle and Stoney Point First Nation
- Munsee Delaware Nation
- Oneida Nation of the Thames
- Walpole Island First Nation

Feedback received and record of interaction is contained in the consultation report (Matrix 2022b) contained in Appendix F. On the basis of feedback received, no treaty rights impacts have been identified. Throughout completion of the project, no reason has been given to believe that this project will adversely affect a treaty right.

7.3 Public Information Centre No. 1

PIC No. 1 was held on Wednesday, October 6, 2021, to introduce the project to the public, present the preliminary alternative solutions, and evaluation criteria. The event was hosted virtually from 6:30 p.m. to 7:00 p.m. Participants were invited to register for the PIC through the City's *Get Involved* project webpage. After the PIC, a virtual recording of the meeting and a copy of the slideshow presentation were made available to the public on the City's *Get Involved* page. Slides from PIC No. 1 are reproduced in Appendix F.

7.4 Public Information Centre No. 2

PIC No. 2 was held on Wednesday, March 9, 2022, to evaluation design alternatives, review constraints, and present the preferred solution. The event was hosted virtually from 3:00 p.m. to 4:00 p.m. Participants were invited to register for the PIC through the *Get Involved* project webpage. After the PIC, a virtual recording of the meeting and a copy of the slideshow presentation were made available to the public on the City's *Get Involved* page. Slides from PIC No. 2 are reproduced in Appendix F.

7.5 Notice of Completion

Following City council's adoption of the Class EA preferred solution (and resolution) at its meeting on May 19, 2022, a Notice of Completion was distributed to the project contact list. The Notice of Completion advertised the final EA document and indicated that the public would have a minimum of 30-day period to review and comment on the EA document.

8 Project Implementation and Next Steps

8.1 Mitigation Measures and Monitoring

In the next phase of the project, mitigation measures must be set in place to safeguard natural heritage features near the project area during construction. Design and construction plans must follow best management practices to minimize negative impacts, protect the environment, and encourage overall environmental improvements. Environmental monitoring will be conducted during construction and post-construction to ensure the design continues to serve as intended and does not negatively impact the surrounding area. A detailed list of mitigation and monitoring measures is included in the EIS contained in Appendix D.

These measures include, but are not limited to, the following:

- respecting construction timing windows with respect to migrating birds and aquatic habitat/working in the dry
- applying best construction practices
- preventing wildlife mortality and disturbance
- preventing terrestrial disturbance
- implementing erosion and sediment controls during construction
- protecting Species at Risk

The construction of the berm and entrance way road within the Adelaide WWTP study area is anticipated to result in an isolated, temporary disturbance and loss of habitat while construction is taking place; however, long-term impacts are not anticipated. An overall net benefit is anticipated once the new vegetation has reached maturity.

Construction of the berms, entrance road, and other flood mitigation measures should incorporate a management strategy for reducing greenhouse gas emissions through use of methodologies and equipment types such as reduced idling, electric vehicles etc.

A monitoring program of the site's completed berms to ensure continued effective performance under flood conditions should be outlined by a qualified geotechnical engineer and incorporated into WWTP operations and maintenance programs. The berms, although used infrequently, will become part of the WWTP's critical infrastructure ensuring operational resiliency - including under conditions of changing climate.

8.1.1 Air Quality, Dust, and Noise

The monitoring of air quality is assumed to be regularly checked under the current WWTP operations. Annual substance releases are reported to the federal *National Pollutant Release Inventory* and the information is publicly available. There are no long-term impacts to air quality associated with the preferred solution, as the fixed structures will add no additional emissions. Construction work for the mitigation options will be temporary and pollutant releases relating to equipment will be controlled to be considered negligible. Pertinent construction best management practices related to fugitive dust, excessive noise, and air quality will be required to be incorporated in the future construction plans.

8.1.2 Surface Water and Groundwater

Surface water features adjacent to the WWTP include small wetland pockets to the south and west of the plant, as well as a linear drainage channel originating at a stormwater outfall approximately 35 m west of the plant. Wetland features adjacent to the plant may indicate surface water-groundwater interaction, although groundwater indicating plant species such as Watercress (*Rorippa nasturtium-aquaticum*) were only noted within the drainage channel. Further details can be found in the environmental impact study (Matrix 2022a) in the Appendix D.

Drainage patterns have minimal impacts on a watershed scale. The preferred solution would allow water that would typically flood the WWTP to drain to the same place. Furthermore, groundwater drainage patterns are not anticipated to change given the nature of the mitigation solution.

Direct impacts to adjacent surface and groundwater features are not anticipated due to minimal disturbance to areas outside of the existing plant boundaries. Indirect impacts during project implementation can be mitigated by using best management practices including isolation of work areas, erosion and sediment control measures, and adequate buffers between natural receptors and staging areas.

8.2 Excess Materials Management

To support proper management of excess construction soil, the future design phase and construction plans will ensure compliance with Ontario Regulation 406/19: On-Site and Excess Soil Management as part of the *Environmental Protection Act*. There is potential opportunity to use excavated soil as part of the proposed berm; however, imported soil is anticipated to be required. Should future plans determine excess soil available, the management of the soils will comply to the *Environmental Protection Act* as well as the latest requirements of MECP.

8.3 Entranceway Road Changes

Proposed alterations to the existing entrance road to the plant will need to fully consider access and accommodation of large multi-axle vehicles such as sludge trucks that routinely enter and exit the plant from Adelaide Street. Detailed design of the raised entrance will need to ensure that vertical grade transitions and horizontal turning radii are sufficient for all anticipated uses.

8.4 Stormwater Management Plan & Adelaide Street Storm Sewer

The preferred flood protection solution will result in uninterrupted flow barrier being placed around the existing WWTP and works yard to the south. Changes in surface drainage resulting from implementing the flood protection solution will warrant completion of a stormwater management plan to address drainage at the site. During times of flood, stormwater runoff from the study area will no longer have an outlet(s) to drain via gravity to the Thames River. Localized stormwater management features may be able to be employed to detain stormwater until such time it can be drained by gravity. Otherwise, accommodation will be required within the design of the effluent pump station to ensure runoff is conveyed off site during times of flood.

Any existing or new storm drainage works that outlet outside of the flood protection berms will require backflow prevention devices on them. Otherwise, water from the floodplain outside of the berms will flow into the WWTP study area.

Careful consideration must also be given to piped storm flows entering externally to the WWTP study area, including those storm sewers such as the Adelaide Street trunk sewer, that conveys flow through the site. Local drains servicing the WWTP site, if connected to an external sewer, will potentially be a source of flooding, with runoff entering the study area during times of flood.

8.5 Permits and Approvals

At the detailed design stage, the following permits and approvals may be required:

- **UTRCA Permit:** any works within their regulation limit (under Ontario Regulation 157/06) will require a permit through the UTRCA.
- ***Endangered Species Act*** **(ESA) Permit:** under Section 17 (2) (c) of the ESA, 2007, it identifies permits for activities which may contravene the ESA. Permits related to habitat destruction would require an Overall Benefit Permit. No requirements are anticipated for this ESA permitting within EIS documentation completed for the project.

- **Environmental Compliance Approval (ECA) amendment**: will be required from the MECP for the installation of the new pump station and equalization tank.

The City would be able to grant itself permission for tree removals as required, given adherence to recommendations outlined in the EIS documentation completed for this project. Similarly, any required park occupancy permit would be available to the City as required.

9 References

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Appendix A
Effluent Pumping Evaluation Memorandum (CIMA+ 2022)

City of London

Class Environmental Assessment for the Adelaide Wastewater Treatment Plant Climate Change Resiliency

Effluent Pumping Evaluation Memorandum

Wednesday, April 20, 2022

T001505A

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Engineering for **people**

Technical Memorandum

Adelaide WWTP Class EA
Climate Change Resiliency
Equalization Tank Evaluation

Project no T001505A

Prepared by:

Stacey Holt, P.Eng.

Verified by:

Kelly Frensch, M.Eng., P.Eng.

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1 Introduction

The City of London (the City) Council declared a Climate Emergency in April, 2019. As part of this declaration, the City is adopting a variety of initiatives to combat Climate Change through mitigation and adaptation.

The Adelaide Wastewater Treatment Plant (WWTP), located at 1201 Adelaide Street North, is owned and operated by the City of London under ECA 7397-96SPH7, issued on April 17, 2013. The plant has a current rated capacity of 36,400 m^3/d. Significant portions of the Adelaide WWTP are within the regulatory floodplain of the nearby Thames River. Floodplain mapping completed by the Upper Thames Conservation Authority (UTRCA) indicates predicted flooding resulting from a 1 in 250-year regulatory flow event. Under these conditions large portions of the WWTP would be inundated, potentially resulting in substantial flood damage to existing infrastructure.

Early in the EA process, a long-list of potential flood mitigation options were developed and analyzed to determine a suitable mitigation strategy for the WWTP. Long-list options explored included conveyance improvements, site-level flood protection, diversion of flows, online storage, and WWTP operational measures. A hydraulic study examined the feasibility of each long-list option, and it was determined that site-level flood protection (berm/floodwall) offered the optimal balance of flood protection, construction effort, cost, and minimized disturbance.

Each of the different site-level flood protection solutions examined at the Adelaide WWTP require an effluent pump station to lift water from the plant into the Thames River when river levels are too high for gravity drainage. Since treated water, stormwater and emergency bypasses all leave the plant at different locations, it was important to evaluate options for effluent pumping.

1.1 Purpose

The purpose of this technical memorandum is to review and evaluate options for effluent pumping to lift treated water, and emergency bypasses from the Adelaide WWTP before recommending a preliminary preferred option.

1.2 Existing WWTP Infrastructure

The Adelaide WWTP has two activated sludge treatment plants, referred to as Section 1 and Section 2. Based on current flows received at the plant, Section 1 is currently out of service and used for approximately 5000 m^3 of equalization storage during peak flow events. Section 2 has recently undergone a process evaluation and was determined to

have an average day treatment capacity of between 25,000 and 30,000 m^3/day (London, 2022).

In 2022 the City completed a Wastewater Treatment Operations Master Plan. The Master Plan identified short term needs to recover capacity of Section 1 and add additional equalization storage. A plant expansion was also identified through the Master Plan and is anticipated for 2034.

A simplified flow diagram of the Adelaide WWTP is provided in the figure below. The existing influent (or raw sewage) pump station has a peak capacity of approximately 204 MLD and the plant has a peak treatment design flow between 90 – 105 MLD after restoration of Section 1.

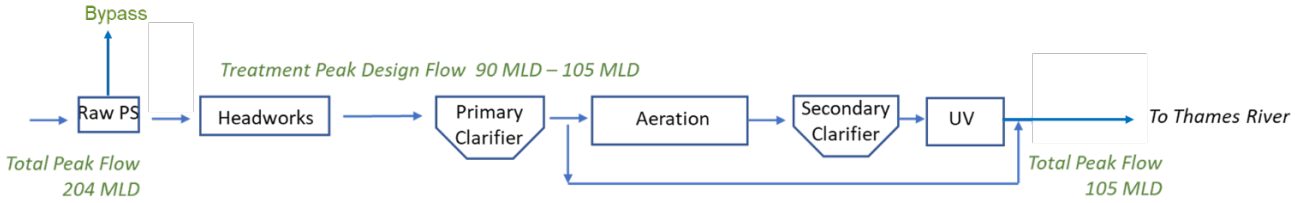


Figure 1: Existing WWTP Infrastructure

2 Design Criteria

The following design criteria, developed through discussions between CIMA+, the City and Matrix Solutions Inc. (Matrix), have formed the basis for identification of alternative solutions:

- Ability to lift treatment plant flows above the 1:250 regulatory flood elevation of 242.8m (using datum CGVD28) with a safety factor of 0.6m resulting in an elevation of 243.4m;
- Compatible with the Wastewater Treatment Operations Master Plan (2022):
    - Restoration of Section 1 and flow equalization improvements in the short term (1-3 years)
    - Expansion of the Adelaide WWTP anticipated in 2034
- Ability to convey all peak flow of 204 MLD consistent with the capacity of the influent pump station when river levels are high;
- Allow for full treatment plant operation up to the existing peak treatment capacity of 105 MLD with flexibility to convey 204 MLD after plant expansion;
- Gravity bypass from Plant 1 is not required during flood events;
- Onsite stormwater can be directed to onsite dry pond or swales, and in an extreme weather event portable transfer pumps can be used to transfer stormwater.
- The City of London owns the property within the treatment plant boundary, the public works yard to the south, and the open space to the north and west towards the river.

All effluent pump alternative solutions must also consider findings from the environmental impact study (Matrix, 2022), and archaeological assessment (ARA, 2022) developed for this project.

3 Identification of Alternative Solutions

In accordance with Phase 2 of the Municipal Class EA process, alternative solutions have been identified to address the existing opportunities and constraints associated with the Adelaide WWTP effluent pump station.

All alternatives below are compatible with the earlier short listed flood level protection alternatives. The preferred approach of site level flood protection will require an effluent pump station. All effluent pump stations must have a minimum capacity of 105 MLD and be compatible with the future plant expansion.

The following general alternative solutions were identified:

- **Option P1:** Maintain existing emergency bypass
- **Option P2:** Build a pipeline directly from existing pump station to river
- **Option P3:** Build a pipeline directly from the existing pump station to larger effluent pump station
- **Option P4a:** Build an equalization storage tank to the north
- **Option P4b:** Build an equalization storage tank to the south

All options will require the addition of back flow prevention infrastructure to the existing gravity discharge system leaving the wastewater treatment boundary. All options will also follow the mitigation measures recommended in the environmental impact assessment designed to reduce impact to the natural heritage features and terrestrial habitat communities.

All new effluent pump stations would be located within or close to the existing treatment plant's fence line. The environmental impact study has identified the area within the fence line as open/disturbed and small portion of the area just north of the fence line is identified as a meadow marsh that would need particular consideration at the design and construction phases. The archaeology assessment identified this area as having no archaeological potential.

3.1 Option P1: Maintain Existing Emergency Bypass

Option P1 would maintain the existing emergency bypass and a new 105 MLD effluent pump station would be constructed to direct treated water into the Thames River when river levels are too high for gravity drainage. Excess flows would be bypassed using the existing 204 MLD influent pump station to lift to the surface drainage system toward the river. Option P1 is shown in Figure 2.

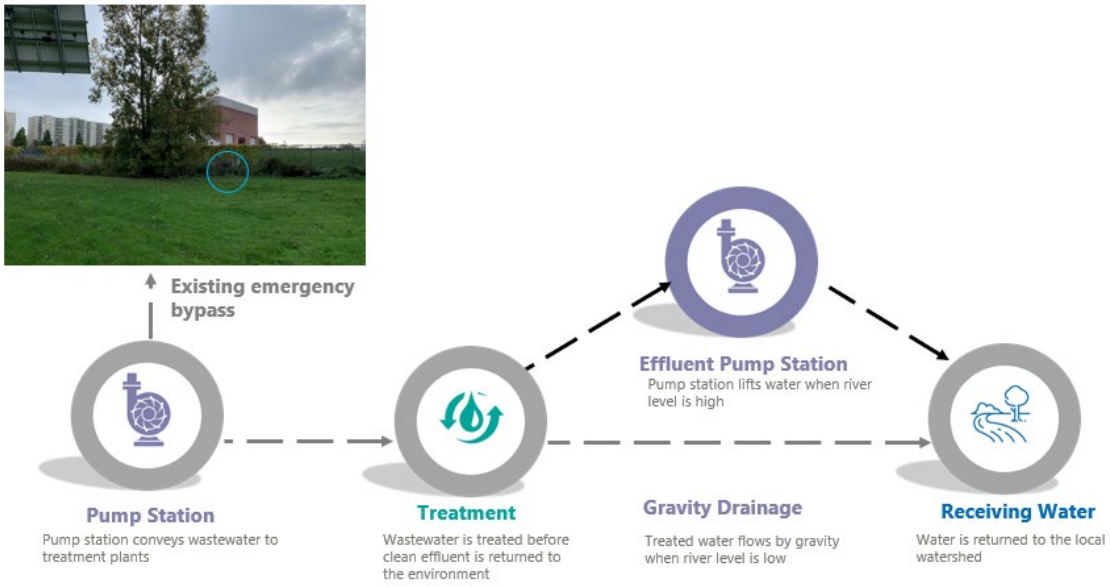


Figure 2: Option P1 - Maintain Existing Emergency Bypass

For this option, existing infrastructure (represented by the grey circles in Figure 2) would remain including the inlet pump station, treatment process and receiving water.

The existing pumped emergency bypass would be maintained which discharges to a grass or turf area from where it is then conveyed overland to a stormwater catch basin.

3.2 Option P2: Building Pipeline Directly from Pump Station to River

Option P2 involves construction of a new pipe for emergency bypass to the river using the existing plant outfall. A new effluent pump station would be constructed to direct treated water to the Thames River when river levels are too high for gravity drainage. Option P2 is summarized in Figure 3.

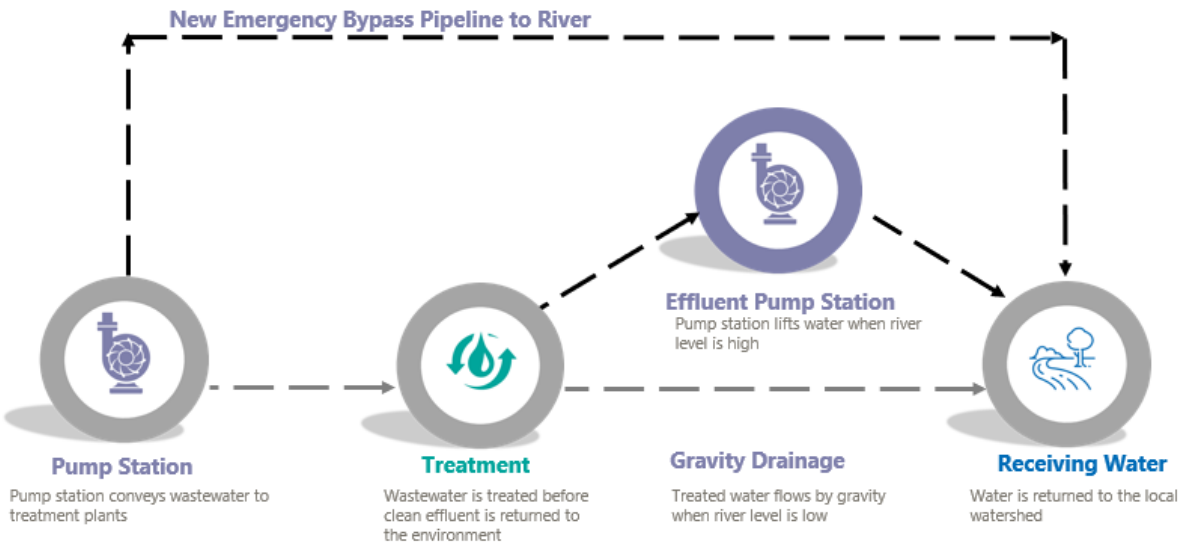


Figure 3: Option P2- Building Pipeline Directly from Pump Station to River

For this option, existing infrastructure would remain including the existing outfall. A new effluent pump station and new pipeline to the river would be constructed.

Construction of the pipeline will occur through areas identified in the archaeological assessment as either having no archeological potential or as being previously assessed with no further work required.

Construction of the pipeline would include possible disruptions to a mineral cultural meadow near the wastewater treatment plant fence line. It's anticipated that the existing 900mm storm pipeline near the wastewater treatment plant fence line could be re-used to convey the bypass towards the river but will require minor modifications to access chambers along the existing pipeline.

3.3 Option P3: Build Pipeline Directly from Pump Station to Larger Effluent Pump Station

Option P3 would include the construction of a new pipeline built for emergency bypass to a 204 MLD effluent pump station capable of lifting all flows from the WWTP to the river. Option P3 is summarized in Figure 4.

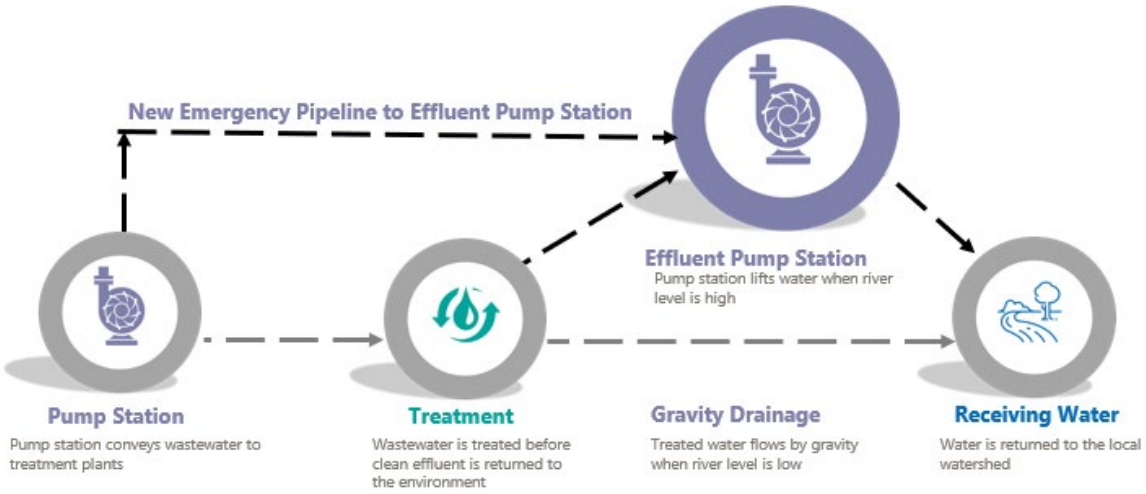


Figure 4: Option P3 - Build Pipeline Directly from Pump Station to Larger Effluent Pump Station

In this option, a gravity bypass from the influent pump station would convey wastewater to the effluent pump station. A larger effluent pump station would be required that is capable of lifting both treated effluent and bypass when the river level is high.

The gravity bypass to the effluent pump station would be constructed within the treatment plant boundary. The environmental impact study has identified this area as open/disturbed, and the archaeology assessment identified this area as having no archaeological potential. Construction of this gravity bypass may limit the areas available within the treatment plant boundary to expand future infrastructure.

This option will require a deeper and larger effluent pump station to be constructed, which will require more complex geotechnical and dewatering design and construction considerations.

Downstream of the effluent pump station a larger pipe is required to connect the effluent pump station to the receiving water. This area was identified as a candidate for significant wildlife habitat with areas of mineral cultural meadows and woodland identified.

3.4 Option P4: Construction of Equalization Storage

Option 4 is the construction of an equalization storage tank to capture wastewater when peak flows are higher than the plant treatment capacity. A new pump station would be needed to direct treated water into the Thames River when river levels are too high for gravity drainage. Option P4 is summarized in Figure 5.

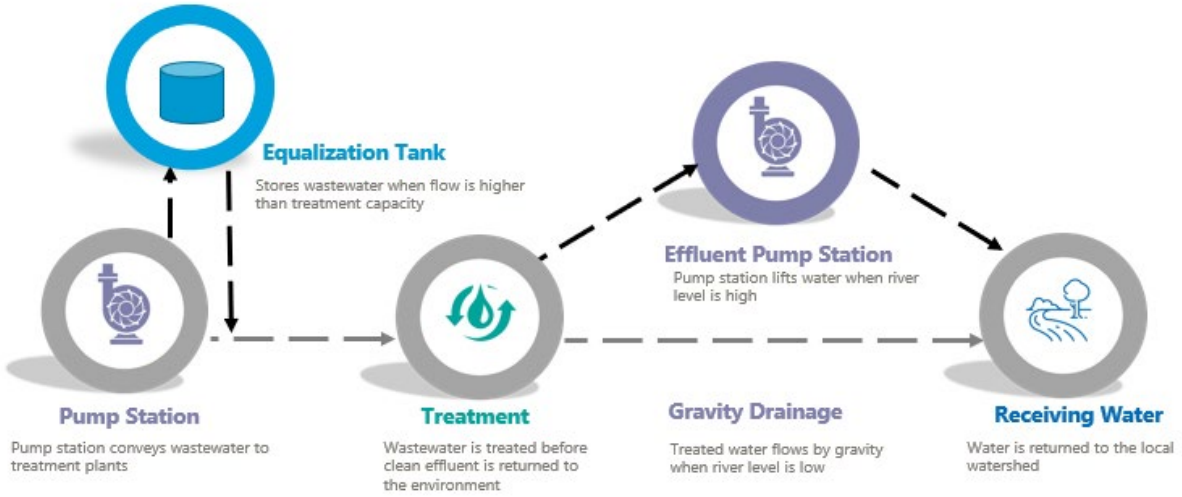


Figure 5: Option P4 - Build Equalization Storage

Using equalization tanks when peak flow is higher than the plant treatment capacity reduces the likelihood of a bypass and allows the captured wastewater to be treated after the peak flow event. If the equalization volume was exceeded, then it would be able to flow by gravity from a high point in the tank to the river.

The City has found that current practices of using Section 1 for equalization of approximately 5000 m^3 has been useful and able to capture most wet weather events. Through previous work completed by IBI and the City, it was determined that an equalization volume of 6,000 m^3 would be beneficial to capture wet weather events after Section 1 is restored and mitigate bypass events before the next plant expansion.

Two potential locations were identified for the equalization storage tank; P4a and P4b are both highlighted on Figure 6. The equalization tank needs to be located close to the existing inlet pump station. The proposed locations are either to the north of the existing pump station or to the south.

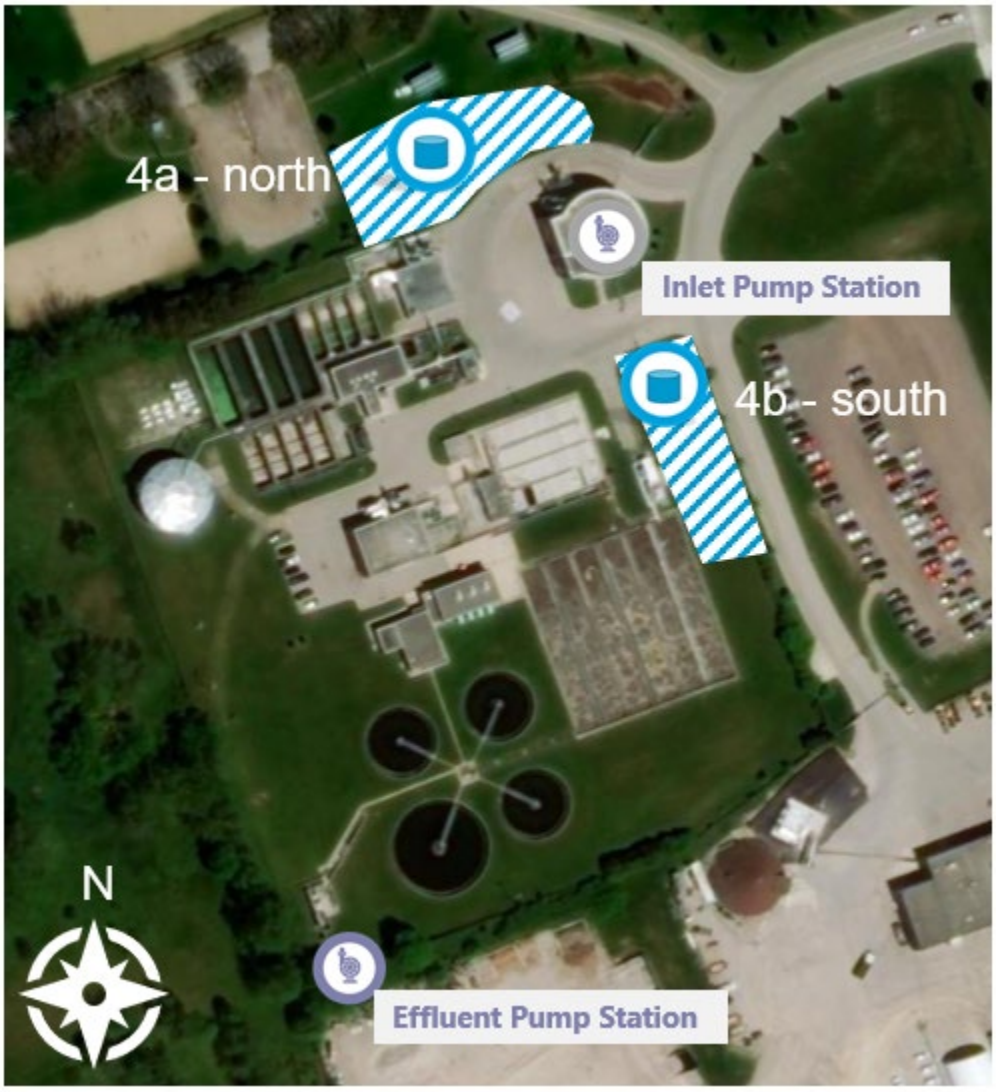


Figure 6: Option P4 Potential Equalization Storage Tank Locations

The environmental impact study identified the option to the north (4a) area as having a small meadow marsh with the majority of the area being identified as mostly open and disturbed. The option to the south (4b) was found to be an open and disturbed area.

The archaeological study found that the area to the north (4a) has been previously assessed and no further work is required. The area to the south (4b) has no archaeological potential.

The option to the north (4a) is not expected to conflict with the future expansion of the treatment plant, but the option to the south (4b) may interfere with the ability to expand wastewater infrastructure during the next plant expansion.

For both options it will be possible for the public to view the exterior of the storage tank.

4 Evaluation Methodology

The evaluation methodology consists of descriptive or qualitative evaluation of the alternative options and identification of advantages and disadvantages of each option with respect to the evaluation criteria. In this respect, comparisons can be made between options.

Some criteria were evaluated using quantitative means, including costs. High-level estimates were generated for these criteria to perform an evaluation using a relative rating provided for each alternative as it compares to each of the other alternatives.

An evaluation matrix was prepared describing the specific advantages and disadvantages that each alternative option offers for each criterion under consideration. For each option, detailed information is provided with a description of:

- Risk and/or potential impacts for each criterion
- Approaches to mitigating risks and/or impacts
- Scoring rationale and scores, based on degree of impact and/or mitigation required

Scores will be assigned as shown in Table 1.

Table 1: Scoring Legend

Score	Description
Low	Option provides low impact with regards to given criteria
Medium	Option provides medium impact with regards to given criteria
High	Option provides high impact with regards to given criteria

The evaluation criteria that were applied to the site level flood protection options previously evaluated are also applied to evaluate the effluent pump station options and are summarized in Table 2.

Table 2: Summary of Evaluation Criteria

Technical	Economic	Environment	Social
• Level of flood protection • Construction Approaches • Climate Change Resiliency • Wastewater Treatment Plant Operations	• Capital Costs • Operational and Maintenance Costs	• Ecology • Archaeology • Water Quality	• Policy Considerations • Public Input • Public Land-Use (e.g. recreational) • Public Safety

5 Detailed Evaluation of Alternative Solutions

The detailed evaluation of the alternative options was carried out in Table 3 according to the evaluation criteria and methodology criteria summarized in Section 4. Each alternative was assessed under each criterion and assigned a score. Potential risks and scoring rationale are provided for each option under each criterion. The alternative that scored the highest is considered to provide the most overall benefit to the project and thus, has been selected as the preliminary preferred solution.

Table 3: Evaluation of Alternative Solutions

Criteria	Option P1: Maintain Existing Emergency Bypass	Option P2: Build Pipeline Directly from Existing Pump Station to River	Option P3: Build Pipeline Directly from Pump Station to Larger Effluent Pump Station	Option P4A: Building Equalization Tank Storage to the North	Option 4B: Building Equalization Tank Storage to the South
Rating >>>	**Medium**	**Medium**	**High**	**Low**	**Medium**
Technical	Uses existing infrastructure but new pump station. Less technical complexity.	Installation of new pipeline to river using existing outfall.	Complex construction. Deeper and larger effluent pump station to life water and emergency bypass when river is high.	Improved resiliency and operator flexibility.	Improved resiliency and operational flexibility. Location may conflict with future WWTP expansion.
Rating >>>	**Low**	**Medium – Low**	**High**	**Medium-High**	**Medium-High**
Economic	$5M Minimizes economic impacts.	$6M	$14M	$10.5M	$10.5M
Rating >>>	**High**	**Medium**	**Medium**	**Low**	**Low**
Environment	Direct environmental impact when emergency bypass occurs.	Emergency bypass is directed into river. Construction impacts the environmental space.	Emergency bypass is directed into the river. Impacts mostly limited to existing treatment plant area.	Improved protection of the environment from bypass. Some local impacts on existing park (turf) areas, including small meadow marsh.	Improved protection of the environment from bypass.
Rating >>>	**High**	**Medium**	**Medium**	**Low-Medium**	**Low-Medium**
Social	Emergency sewage discharge in space with public access.	Protects critical infrastructure. Pipeline construction will disrupt use of the public space.	Protects critical infrastructure.	Improved protection of the public space. New tanks visible to public, adjacent to park.	Improved protection of the public space. New tank visible to public within WWTP.

Shading indicates preferred alternative solution

6 Conclusion

Based on the evaluation of each alternative option against the list of criteria, it was found that Option P4A is the preliminary preferred solution. Although this option has a medium-high cost compared to the others, it offers improved resiliency and operator flexibility to manage peak flows and improves the protection of the environment during bypass events. This option also provides added protection of the public space by minimizing adverse bypass events.

The integrated preliminary preferred solution is a berm with raised entrance road (as per the analysis completed by Matrix) with equalization storage and an effluent pump station. This integrated preliminary preferred solution is shown in Figure 7. Further details for the preliminary preferred solution will be explored in subsequent preliminary and detailed designs.

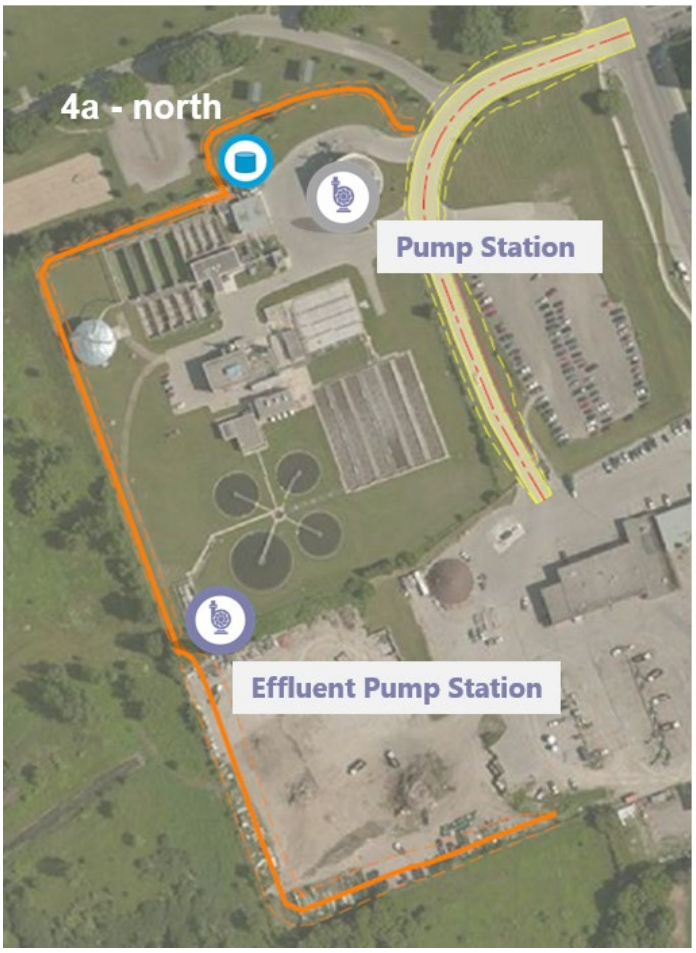


Figure 7: Preliminary Preferred Solution

7 References

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A

Appendix A : Figures of Options

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LONDON, ON, N6J 2X5

London CANADA

PROJECT NAME:

ADELAIDE WWTP
CLASS EA

SHEET TITLE:

OPTION P1
MAINTAIN EXISTING
EMERGENCY BYPASS

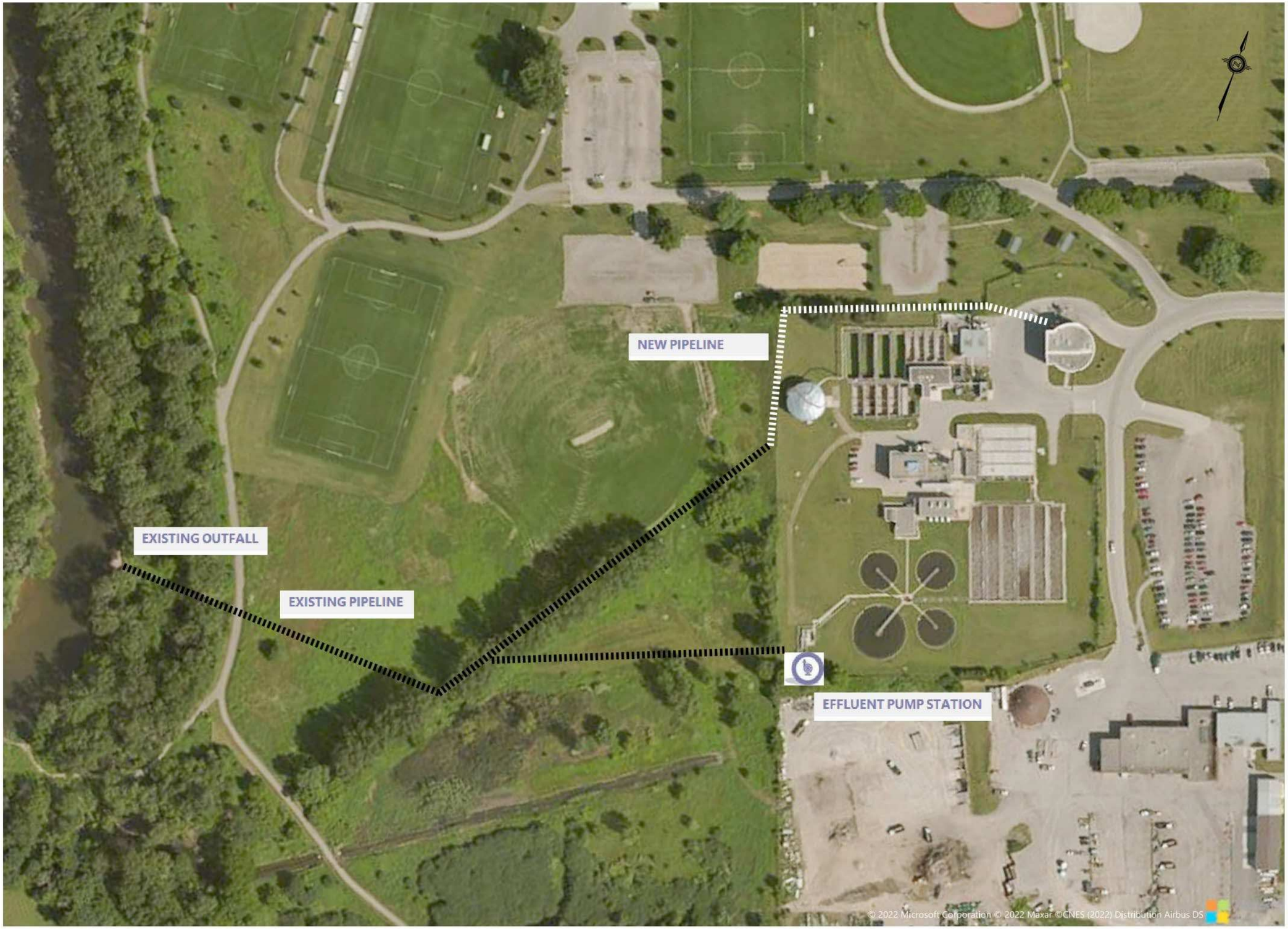
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PROJECT NAME:

ADELAIDE WWTP
CLASS EA

SHEET TITLE:

OPTION P2
BUILD PIPELINE
DIRECTLY FROM EXISTING
PUMP STATION TO RIVER

DISCIPLINE:

CIVIL

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CONSULTANT(S):
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London CANADA
CITY OF LONDON
PUMPING STATION 1201
ADELAIDE STREET NORTH
LONDON, ON, N6J 2X5

PROJECT NAME:
ADELAIDE WWTP
CLASS EA

SHEET TITLE:
OPTION P3
BUILD PIPELINE DIRECTLY
FROM PUMP STATION TO
LARGE EFFLUENT PUMP STATION

DISCIPLINE:
CIVIL

DRAFTER:	SCALE:
DESIGNER:	DATE:
APPROVER:	CHECKER:
PROJECT No:	DRAWING No:
SHEET No: of	

PRINT DATE: 11/29/2021 9:57:45 AM
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LONDON, ON, N6J 2X5

PROJECT NAME:

ADELAIDE WWTP
CLASS EA

SHEET TITLE:

OPTION P4A
BUILD EQUALIZATION STORAGE TANK TO THE NORTH

DISCIPLINE:

CIVIL

DRAFTER:	SCALE:
DESIGNER:	DATE:
APPROVER:	CHECKER:
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London CANADA

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PUMPING STATION 1201
ADELAIDE STREET NORTH
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PROJECT NAME:

ADELAIDE WWTP
CLASS EA

SHEET TITLE:

OPTION P4B
BUILD EQUALIZATION
STORAGE TANK TO THE
SOUTH

DISCIPLINE:

CIVIL

DRAFTER:	SCALE:
DESIGNER:	DATE:
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PROJECT No:	DRAWING No:
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Engineering
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Appendix B
Hydraulic Study (Matrix 2021)

Version 1.0
August 17, 2021 Matrix 32667-513

Marcy McKillop, P.Eng.
Environmental Services Engineer
Wastewater Treatment Operations
The City of London
109 Greenside Ave.
London, ON N6J 2X5

Subject: Climate Change Resiliency Class Environmental Assessment for the Adelaide Wastewater Treatment Plant - Hydraulic Analysis and High-level Screening of Flood Mitigation Approaches

Dear Marcy McKillop:

1 Introduction

Matrix Solutions Inc. is pleased to provide our hydraulic analysis and high-level screening of flood mitigation approaches to provide climate change resiliency at the Adelaide Wastewater Treatment Plant (WWTP) located along the Thames River in London, Ontario (Figure 1). This analysis and screening are part of Phase 1 of the Schedule B Municipal Class Environmental Assessment (EA) process being undertaken for this project. The City of London (the City) is completing this EA to protect critical WWTP infrastructure assets and reduce the impacts of flooding. The conclusions of this screening will form the basis for identifying a short list of flood mitigation alternatives to be assessed and evaluated, along with the "do nothing" in Phase 2 of the EA.

The study area for flood mitigation includes the Adelaide WWTP and the City's Operation Centre and storage yard located immediately south of the WWTP. Hydraulic models provided by the Upper Thames River Conservation Authority (UTRCA) were used to define existing conditions at the study area for the 1:250-year regulatory flood event. These models were among the tools used to assess flood mitigation. Matrix screened a long list of potential flood mitigation approaches to determine technical feasibility and to demonstrate options that are impractical. These approaches were screened based on their potential to reduce flood risk, their constructability, and their potential for reduction in environmental and upstream flood impacts and also with consideration given to policy.

The following flood mitigation approaches were screened in this assessment:

- conveyance improvements
- site-level flood protection (e.g., berms)
- flow diversions
- storage
- operation measures

The hydraulic analysis defined flooding conditions at the WWTP and the City's storage yard and showed that the City's Operation Centre is well above the 1:250-year flood plain (Figure 2). Based on these conditions and the screening of mitigation approaches, Matrix recommends that site-level flood protection (e.g., berms, floodwalls) form the basis of the alternative solutions developed to conceptual design in the next phase of the project. Details of the hydraulic analysis and high-level screening are provided herein.

1.1 Basis of Analysis

The following information was used in the hydraulic analysis and the high-level screening of flood mitigation approaches:

- one-dimensional (1D; UTRCA 2021a) and two-dimensional (2D; UTRCA 2021b) HEC-RAS models of the Thames River in the Adelaide WWTP area
- regulatory design flow of 1,000 m^3/s (1:250-year storm event) as defined in the UTRCA HEC-RAS model
- LiDAR topography (City of London 2017)
- City GIS data, including storm sewers, roads, and land parcels

2 Study Area

The Adelaide WWTP is located on the southern flood plain of the Thames River, bordered by Adelaide Street to the east and the City's Operations Centre and storage yard to the south (Figure 1). Additional land uses in the flood plain area around the WWTP include recreation (the North London Athletic Fields) and natural areas (the Huron Street Woods). These lands are being investigated as part of concurrent natural heritage and archaeological studies that will inform constraints and opportunities for flood mitigation in addition to the hydraulic analysis.

Impacts of infrastructure were considered in the high-level screening. Utilities and infrastructure have been identified near the WWTP (Figure 3). This infrastructure includes several sanitary and storm sewer mains up to 1,500 mm in diameter and utility poles located throughout the study area. Nearby watermains are located within the Adelaide Street right-of-way, and a 1,050 mm diameter watermain crosses the Thames River southwest of the WWTP. Potential impacts to existing infrastructure will be considered in the evaluation of

alternatives and developed in the next phase of the EA. Solutions will ideally minimize or avoid impacts where practical.

3 Hydraulic Modelling

Matrix received 1D (UTRCA 2021a) and 2D (UTRCA 2021b) HEC-RAS hydraulic models from the UTRCA. These models were used to define existing flooding conditions (Figure 2). Both models include a section of the Thames River, which is approximately 4 km long and encompasses the study area (Figures 4 and 5). Matrix reviewed these models to ensure they contained the necessary detail to allow for required screening of flood mitigation approaches, given that the models were initially developed at a larger scale and are now being used for this study to assess a more localized area. The 2D HEC-RAS model was revised to include the Adelaide Street Bridge structure as is currently defined in the 1D model. Modelling a bridge within the 2D version of HEC-RAS is a capability only recently supported within the latest version 6.0 of HEC-RAS. The modelling results from this revision indicated that the flood plain at the WWTP was not significantly impacted, and only minor water level increases (up to 10 cm) were observed upstream. No revisions were required to the 1D model.

These models show that the WWTP and storage yard are within the 1:250-year flood plain, whereas the Operations Centre is approximately 2 m above this flood plain. Depending on the hydraulic equations used, the typical 1:250-year flood depth is between 0.2 and 0.8 m at the WWTP and between 1.5 and 2.0 m at the storage yard. The variable flood depths calculated using these alternative hydraulic equations do not impact screening outcomes. However, the modelling approach and equations will need to be confirmed and discussed with the UTRCA to inform the conceptual design of alternative solutions in the next project phase.

The models indicate that a spill occurs across Adelaide Street North toward the WWTP during the regulatory event. This spill is key to flooding at the WWTP and is more hydraulically complex than typical riverine flooding, where flow overtops the riverbank onto the flood plain.

3.1 One-dimensional versus Two-dimensional

A 1D model assumes a single direction of flow between cross-sections, and a constant water level across each cross-section. A 2D model allows flows to proceed in multiple directions, with varying velocities and depths possible at each of the grid areas that make up the domain of the model. A 2D model best represents the spill across and along Adelaide Street, where flow is directed west toward the WWTP. The 2D model was used to screen proposed site-level flood protection approaches, since the Adelaide Street spill would remain following implementation. Scenarios without the spill across Adelaide Street were assessed using the 1D model. This 1D approach is the industry standard for modelling riverine flooding and has a faster computation time, thereby allowing for numerous modelling iterations to be assessed more quickly.

4 High-level Flood Mitigation Approaches

Table 1 summarizes results of hydraulic analyses and associated screening of the high-level flood mitigation options. The following subsections discuss the screened mitigation approaches to support the summary details and results. Using the 1D hydraulic model, Matrix determined that under existing conditions, approximately 500 m^3/s can be conveyed in the Thames River channel and flood plain without flooding the WWTP; similarly, only 250 m^3/s can be conveyed without flooding occurring in the adjacent storage yard. For comparison, the 1:250-year regulatory event is much larger here at 1,000 m^3/s. This comparison provides useful context in this study during consideration of different flood mitigation approaches.

4.1 Conveyance Improvements

Channel conveyance improvements seek to mitigate flooding by lowering water levels with an increased channel or flood plain capacity, or a combination of both.

Channel Widening

Using the existing 1D hydraulic model, Matrix estimated that the Thames River at the study area has a channel capacity of approximately 250 m^3/s before flows overtop the riverbanks and discharges into the flood plain. If flooding were to be eliminated at the WWTP (but not the adjacent storage yard) by increased conveyance, an additional 500 m^3/s of additional capacity would have to be made available. This would allow the full Regional storm of 1,000 m^3/s to be conveyed without flooding the WWTP. Based on these modelling results, the Thames River channel would require three times its existing capacity, requiring the Thames River to be widened roughly 100 m. Channel widening was screened out as a mitigation approach based on these significant environmental and land-use impacts and impractical construction requirements.

Channel Lowering

Channel lowering was screened out due to the relatively shallow Thames River average gradient of 0.2% at and downstream of the study area. This shallow gradient would require significant downstream disturbance to tie lowering back into the existing channel. For example, 1 m of lowering would need at least 500 m of downstream disturbance, given the 0.2% gradient. Additionally, a 1,050 mm diameter water main crosses below the Thames River just downstream of the WWTP (Figure 3), further constraining this mitigation approach.

Flood Plain Improvements

Conveyance improvements by lowering the existing south flood plain around the WWTP (i.e., the North London Athletic Fields) were assessed based on the requirement to provide an additional 500 m^3/s of conveyance. The typical width of the south flood plain is 250 m, and Matrix considers that it could potentially be lowered by up to 1 m, while maintaining its natural function. Additionally, using the 1D hydraulic model, Matrix estimated the typical flow velocity on the existing flood plain is approximately 0.6 m/s. Based on the available flood plain area for

lowering and existing velocities, flood plain lowering is not feasible to achieve 500 m^3/s of additional conveyance for flood mitigation.

Bridge Replacement

Matrix assessed an Adelaide Street Bridge replacement to improve hydraulic capacity and help eliminate the spill across Adelaide Street North. In the 2D model, the bridge was raised and widened to estimate the potential for lowering upstream water levels. The modelling demonstrated that only minor upstream water levels improvements (i.e., 10 to 30 cm lowering) are feasible at this location, which would be insufficient to eliminate the spill. The bridge replacement was therefore screened out as a flood mitigation approach. However, when the bridge is replaced at its lifecycle end, there is an opportunity to improve upstream flood conditions. The City of London Transportation Planning and Design department anticipates this bridge will be replaced in approximately 2060 (Grabowski 2021, Pers. Comm.).

4.2 Site-level Flood Protection

Matrix assessed site-level flood protection (e.g., berm, floodwall) by representing a berm around the WWTP and storage yard in the 2D model. Unlike the other mitigation approaches screened in this study, site-level flood protection blocks flow and restricts the available flood plain. This blocking of flow introduces the potential for upstream flood impacts (i.e., backwater). An upstream flood impact is unacceptable from a flood policy perspective and therefore is a critical consideration in the hydraulic analysis and screening.

The 2D hydraulic modelling completed indicates negligible or no upstream flood impacts resulting from implementation of site-level flood protection works. Based on these results, site-level flood protection was screened as a feasible flood mitigation approach. Additionally, this mitigation approach is considered more readily constructable, and it would also have less environmental and land-use impact as compared to the other mitigation approaches. These advantages are the result of site-level works being fully implemented only within the WWTP site boundary.

Implementing site-level flood protection at the WWTP would remove approximately 21,000 m^3 of flood storage[1] from the Thames River system. Extending protection to the storage yard would remove an additional 31,000 m^3. The existing flood plain storage is approximately 1.2 million cubic metres (estimated using the 1D HEC-RAS model) in the river reach encompassing the WWTP from Adelaide Street to roughly 1,500 m downstream. Considering the magnitude of the existing flood plain storage and regulatory storm event (1,000 m^3/s), as well as the regulated flow made available by storage above the upstream Fanshawe Dam, the downstream flood impacts resulting from storage loss at the subject site can be considered minor. Based on

[1] The estimated storage loss assumes the more conservative of the alternative hydraulics equations described in Section 3.

project discussions with the UTRCA and the City, Matrix will evaluate options to offset storage loss in the next phase of the study.

4.3 Flow Diversion

Approximately 500 m^3/s of the total 1:250-year event flow of 1,000 m^3/s can be conveyed through the flood plain without flooding the WWTP and so 500 m^3/s would need to be diverted for flood mitigation at the WWTP. As estimated for channel conveyance screening, the Thames River has a channel capacity of approximately 250 m^3/s. Therefore, the diversion (e.g., a channel or conduit) would need twice the conveyance capacity of the Thames River. Based on this result, flow diversion was screened out due to impractical construction and the significant disturbance that would be required.

4.4 Online Flood Storage

The Fanshawe Dam, located upstream of the study area, regulates Thames River flows. Matrix assessed the feasibility of mitigating WWTP flooding by further regulating flows through provision of additional online storage upstream of the Fanshawe Dam. The online storage added at the Fanshawe Dam would need to reduce the peak 1:250-year flow at the WWTP from 1,000 to 500 m^3/s. Online storage was screened out as a flood mitigation approach because this flow reduction would require significant costs and property acquisition upstream of the Fanshawe Dam.

4.5 Operation Measures

Operation measures for flood mitigation could include equipment upgrades (e.g., tankage repair/refurbishment) and plant safety and operational procedures in response to flood forecasts issued by the UTRCA for flows downstream of Fanshawe Dam. Other measures may include temporary options that can be implemented, such as placing sandbags in anticipation of extreme floods. Potential operation measures were assessed and will not be able to achieve project objectives. Operation based measures would only be pursued if no hydraulically feasible approaches were available. Because feasible approaches were identified in the screening, operation measures were screened out from this study.

5 Recommendations

Matrix recommends that site-level flood protection approaches (e.g., berms, floodwalls) form the basis of the short-list of alternative solutions developed to conceptual design in the EA project's next phase. This recommendation relies on the key outcome of the hydraulic analysis completed by Matrix, which demonstrates that this mitigation approach results in no or negligible upstream flood impacts (i.e., backwater). In addition, the comparative advantage of site-level flood protection is that it is expected to be fully implemented within the study area. As a result, site-level flood protection is considered more readily constructable, with less

environmental and land use impacts compared to the other approaches that were screened out in this assessment.

6 Next Steps

The short list of alternatives is anticipated to reflect different approaches of site-level flood protection, including berms and floodwalls, and to consider permanent (e.g., raised road) versus non-permanent (e.g., temporary barrier) approaches to protecting the WWTP entrance. The conceptual alternatives will be assessed and evaluated against criteria that include technical, economic, environmental, social, and policy-related considerations.

Additionally, development of alternative solutions will include the following next steps:

- incorporating results from background reports (i.e., geotechnical) and the concurrent archaeology and natural heritage studies into the conceptual designs
- selecting, with input from UTRCA, which of the alternative 2D hydraulic modelling equations should be used as the basis for conceptual design
- defining conceptual requirements for a pumping station, anticipated as part of a flood mitigation solution
- evaluating options to offset floodplain storage loss
- developing a climate change resiliency design criteria to address future climate adaptation requirements (e.g., freeboard)

7 Closure

We trust that this letter report suits your present requirements. If you have any questions or comments, please contact Andrew Doherty at 226.314.1924 or Stephen Braun at 289.323.0975.

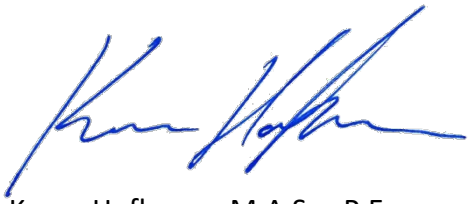
Yours truly,

Matrix Solutions Inc.



Melani-Ivy Samson, M.A.Sc., E.I.T.
Water Resources EIT

Reviewed by



Karen Hofbauer, M.A.Sc., P.Eng.
Senior Water Resources Engineer

MS/vc
Attachments

Copy: Stephanie Schreiner, Mark Shifflett, and Brent Verscheure

Disclaimer

Matrix Solutions Inc. certifies that this report is accurate and complete and accords with the information available during the project. Information obtained during the project or provided by third parties is believed to be accurate but is not guaranteed. Matrix Solutions Inc. has exercised reasonable skill, care, and diligence in assessing the information obtained during the preparation of this report.

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Contributors

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Andrew Doherty, P.Eng.	Water Resources Engineer	Reporting
Karen Hofbauer, M.A.Sc., P.Eng.	Senior Water Resources Engineer	Hydraulic modelling technical lead and senior technical review
Stephen Braun, P.Eng.	Senior Water Resources Engineer	Senior technical review

Version Control

Version	Date	Issue Type	Filename	Description
V0.1	09-July-2021	Draft	32667-531 Adelaide Hydraulic Memo 2021-07-09 draft V0.1.docx	Issued to client for review
V0.2	20-July-2021	Draft	32667-531 Adelaide Hydraulic Memo 2021-07-20 draft V0.2.docx	Issued to UTRCA for review
V1.0	17-Aug-2021	Final	32667-531 Adelaide Hydraulic Memo 2021-08-17 final V1.0.docx	Issued to client

References

City of London. 2017. *City of London LiDAR Data*. Last modified date December 7, 2017; .laz files.

Grabowski K. (2021), Transportation Design Engineer, City of London. Email. July 26, 2021.

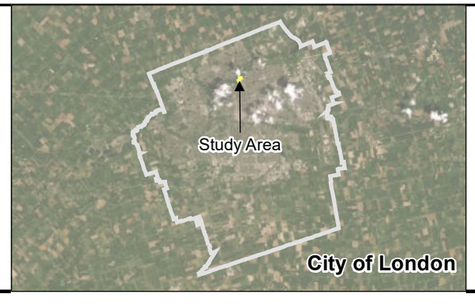
Upper Thames River Conservation Authority (UTRCA). 2021a. *One-dimensional HEC-RAS Model, Adelaide*. May 2021.

Upper Thames River Conservation Authority (UTRCA). 2021b. *Two-dimensional HEC-RAS Model, Adelaide*. May 2021.



Adelaide WWTP Study Area

Flow Direction



Notes:

(1) This figure is meant to be read with the attached memorandum, Climate Change Resiliency Class EA for the Adelaide WWTP - Hydraulic Analysis and High-Level Screening of Flood Protection Alternatives (July 2021) and is subject to the same limitations and conditions stated in the memorandum.

(2) The study area extends south beyond the current boundaries of the Adelaide WWTP to encompass potential future expansion.

1:7,000 metres

75 0 75 150

NAD 1983 UTM Zone 17N

Reference: Contains information licensed under the Open Government Licence – Ontario. Imagery (2020) Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community.

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

City of London

Class Environmental Assessment for the Adelaide Wastewater Treatment Plant Climate Resiliency

Adelaide Study Area

Date:	Project:	Submitter:	Reviewer:
July 2021	32667	M. Samson	A. Doherty

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Figure 1

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Adelaide WWTP Study Area

Flow Direction

1D Model 1: 250 year Regulatory Flood Max Depth (m)

High : 7.7

Low : 0

Reference: Infrastructure data obtained from the City of London's Open Data catalogue. Imagery (2020) Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community.



Notes:

(1) This figure is meant to be read with the attached memorandum, Climate Change Resiliency Class EA for the Adelaide WWTP - Hydraulic Analysis and High-Level Screening of Flood Protection Alternatives (July 2021) and is subject to the same limitations and conditions stated in the memorandum.

(2) Flood Depths are based on the 2020 UTRCA 2D model revised to calculate water levels using shallow wave equations (full momentum).

1:7,000 metres

75 0 75 150

NAD 1983 UTM Zone 17N

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

City of London

Class Environmental Assessment for the Adelaide Wastewater Treatment Plant Climate Resiliency

Adelaide Flood Extents and Depth

Date:	Project:	Submitter:	Reviewer:
July 2021	32667	M. Samson	A. Doherty

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Figure 2

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- Adelaide WWTP Study Area
- Flow Direction
- Sanitary Sewer
- Storm Sewer
- Watermain
- Utility Pole



Notes:
(1) This figure is meant to be read with the attached memorandum, Climate Change Resiliency Class EA for the Adelaide WWTP - Hydraulic Analysis and High-Level Screening of Flood Protection Alternatives (July 2021) and is subject to the same limitations and conditions stated in the memorandum.

1:7,000
75 0 75 150 metres
NAD 1983 UTM Zone 17N

Reference: Contains information licensed under the Open Government Licence – Ontario. Sewers and utility data obtained from the City of London's Open Data Catalogue. Imagery (2020) Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community.

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City of London
Class Environmental Assessment for the Adelaide Wastewater Treatment Plant Climate Resiliency

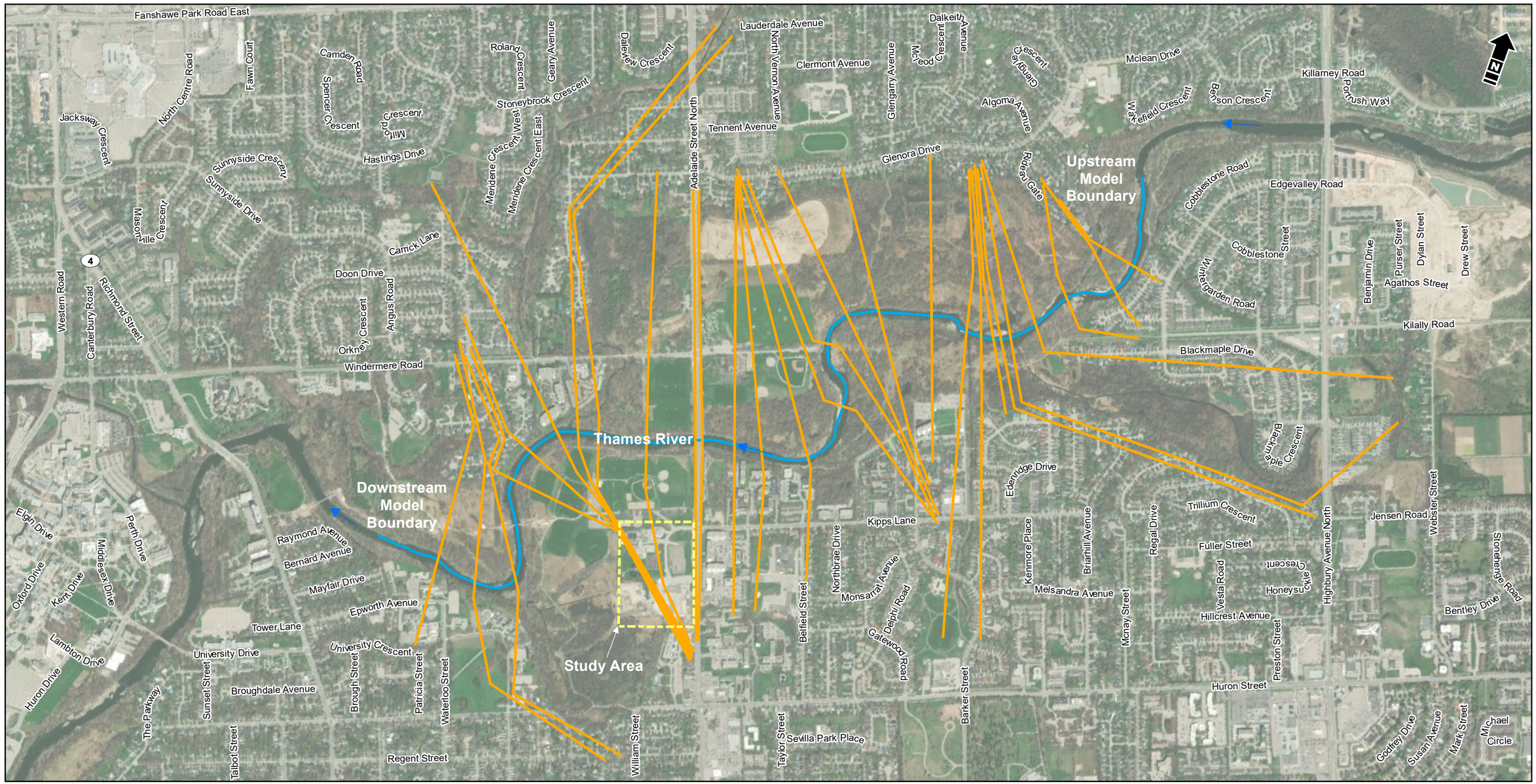
Adelaide Infrastructure

Date:	Project:	Submitter:	Reviewer:
July 2021	32667	M. Samson	A. Doherty

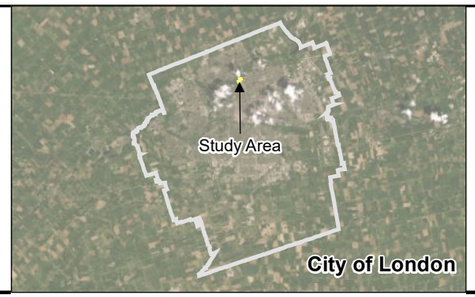
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Figure 3

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Adelaide WWTP Study Area
Flow Direction
HEC-RAS Cross-Sections
HEC-RAS River



Notes:
(1) This figure is meant to be read with the attached memorandum, Climate Change Resiliency Class EA for the Adelaide WWTP - Hydraulic Analysis and High-Level Screening of Flood Protection Alternatives (July 2021) and is subject to the same limitations and conditions stated in the memorandum.

(2) The HEC-RAS cross-sections were obtained from the 2021 UTRCA 1D HEC-RAS model.

1:15,000
150 0 150 300 metres
NAD 1983 UTM Zone 17N

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City of London
Class Environmental Assessment for the Adelaide Wastewater Treatment Plant Climate Resiliency

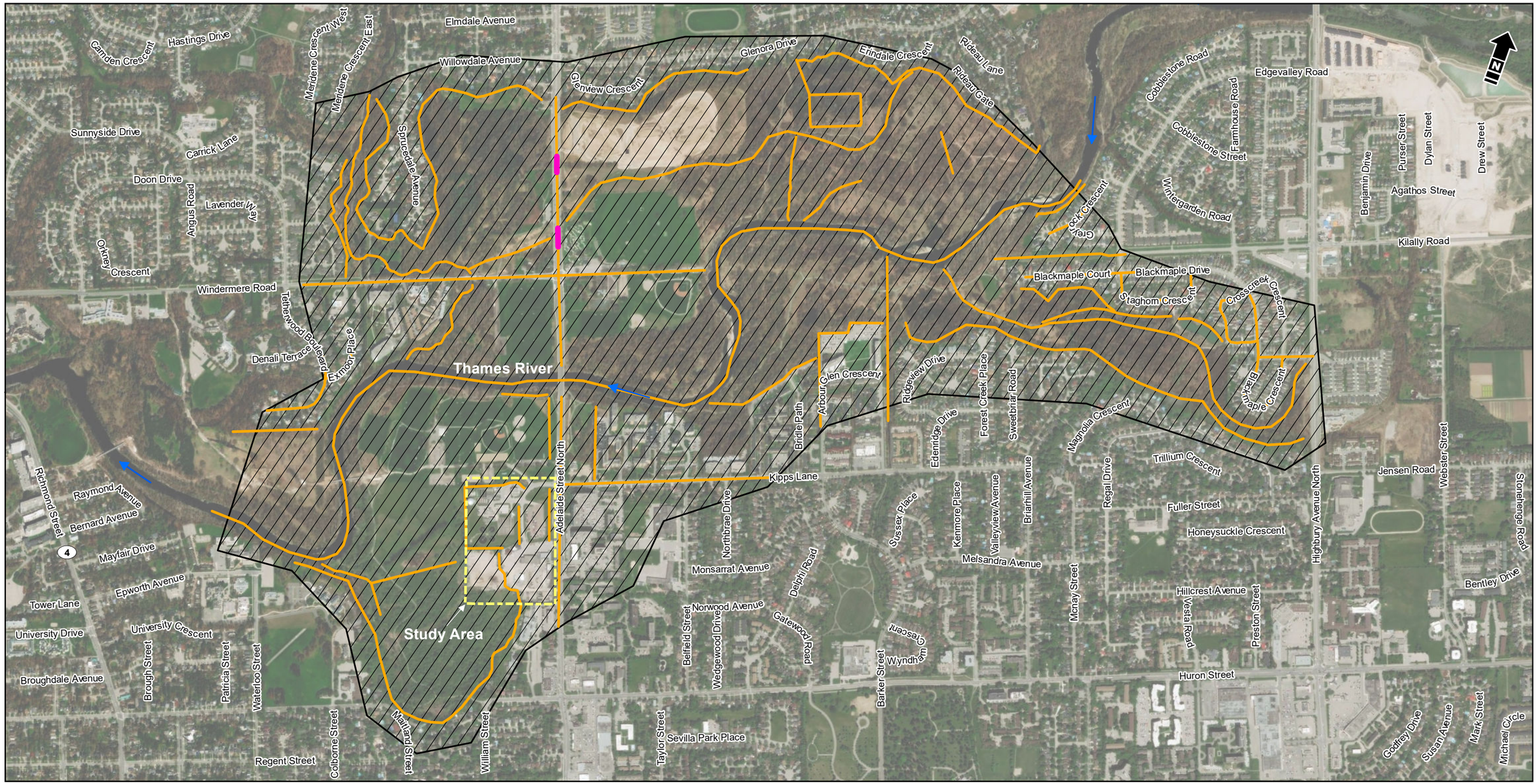
Adelaide 1D HEC-RAS Cross-Sections

Date:	Project:	Submitter:	Reviewer:
July 2021	32667	M. Samson	A. Doherty

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Figure 4

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- Adelaide WWTP Study Area
- 2D Model Extent
- Flow Direction
- Culvert
- 2D Model Breakline



Notes:
(1) This figure is meant to be read with the attached memorandum, Climate Change Resiliency Class EA for the Adelaide WWTP - Hydraulic Analysis and High-Level Screening of Flood Protection Alternatives (July 2021) and is subject to the same limitations and conditions stated in the memorandum.

(2) The HEC-RAS model components were obtained from the 2020 UTRCA 2D HEC-RAS model.

1:12,500 metres
100 0 100 200
NAD 1983 UTM Zone 17N

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

City of London
Class Environmental Assessment for the Adelaide Wastewater Treatment Plant Climate Resiliency

Adelaide 2D HEC-RAS Elements

Date:	Project:	Submitter:	Reviewer:
July 2021	32667	M. Samson	A. Doherty

Figure 5

Disclaimer: The information contained herein may be compiled from numerous third party materials that are subject to periodic change without prior notification. While every effort has been made by Matrix Solutions Inc. to ensure the accuracy of the information presented at the time of publication, Matrix Solutions Inc. assumes no liability for any errors, omissions, or inaccuracies in the third party material.

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I:\City\London\32667\Figures\And\Tables\EA\2021\Report\Hydraulic\Memos\Figure-5-Adelaide_2D_HEC-RAS.mxd - Tabloid_L - 09-Jul-21, 01:55 PM - sylam - TID004

Table 1 Summary of the High-Level Screening of Flood Mitigation Approaches

No.	Flood Mitigation Approach	Screening Approach	Screening Hydraulic Analysis	Screening Results	Screening Outcome
Conveyance Improvement					
1	Channel Widening	• estimate the channel widening requirements to facilitate a high-level assessment of constructability • consider impacts to land-use and infrastructure	• used the 1D hydraulic model to estimate that 500 m^3/s of conveyance improvements is required to mitigate flooding at the WWTP, compared to the 1:250-year regulatory event of 1,000 m^3/s • used the 1D hydraulic model to estimate that Thames River has a channel capacity of 250 m^3/s meaning that channel widening would need to roughly triple the existing capacity (with additional widening to mitigate flooding at the storage yard) • modelled 25 m of channel widening over 1.2 km long river section to quantify partial flood mitigation	• not practically feasible due to significant environmental, land-use impacts, and construction requirements • based on conveyance requirements, the Thames River would need to be widened roughly 100 m to mitigate flooding at the WWTP • widening the channel 25 m would lower flood levels at the WWTP by approximate 0.15 m (compared to the typical, existing flood depth that is between 0.2 m and 0.8 m)	not recommended
2	Channel Lowering	• assess opportunity for channel lowering based on required channel disturbance, infrastructure constraints, and land-use impacts	• used the 1D hydraulic model to define the Thames River channel gradient (0.2%) through the study area • estimated the downstream disturbance extents required to tie channel lowering back into existing channel	• not practically feasible due to the relatively flat gradient of the Thames River • significant downstream disturbance to tie lowering back into the existing channel (e.g., 1 m lowering would require at least 500 m of downstream disturbance) • channel lowering is additionally constrained by a 1,050 mm watermain that crosses the Thames River downstream of the WWTP	not recommended
3	Flood plain Improvement	• estimate conveyance improvement requirements and compare this to the available flood plain lands at the study area	• used the 1D hydraulic model to estimate that 500 m^3/s of conveyance improvements required to mitigate flooding at the WWTP, compared to the 1:250-year regulatory event of 1,000 m^3/s	• not feasible to achieve required conveyance in the flood plain area identified for potential improvements	not recommended
4	Bridge Replacement	• assess opportunity to improve hydraulic conveyance by replacing the Adelaide Street Bridge with a larger structure	• modelled wider/raised Adelaide Street Bridge using the 2D model in HEC-RAS 6.0 to estimate upstream water levels improvements and potential to mitigate the spill across Adelaide Street	• not feasible because modelling indicated that a larger bridge could lower upstream water levels by 0.2 m-0.3 m, and this improvement would not eliminate the spill at Adelaide nor mitigate flooding at the WWTP	not recommended

No.	Flood Mitigation Approach	Screening Approach	Screening Hydraulic Analysis	Screening Results	Screening Outcome
			Site Level Flood Protection		
5	Floodwall/Berm/Dyke	• determine the extents of a floodwall/berm/dyke based on existing flood conditions • estimate upstream flood impacts (i.e., backwater)	• represented site-level flood protection extents in the 2D model to assess upstream flood impacts (i.e., backwater) • estimated flood plain storage loss resulting from site-level flood protection by calculating the volume based on existing conditions at the WWTP and used this to inform potential downstream flood impacts	• feasible to implement site-level flood protection from a hydraulic and policy perspective because 2D modelling indicated that there are no or negligible upstream flood impacts (i.e., backwater) • implementing flood mitigation would remove approximately 21,000 m^3 of flood storage loss and an additional 31,000 m^3 at the storage yard (negligible volume compared to the 1:250-year regulatory event, existing storage in the river reach encompassing the Adelaide WWTP, and the regulated flow made available by storage above the upstream Fanshawe Dam) • downstream flood impacts resulting from this storage loss are considered to be relatively negligible; however, the potential requirement to offset this storage loss will need to be addressed at the next phase of the study	recommended
			Diversions		
6	Local Flow Diversion	• estimate the diversion requirements and dimensions of a channel/conduit • consider impacts to land-use and infrastructure	• used the 1D hydraulic model to estimate that 500 m^3/s of diversion required to mitigate flooding at the WWTP (additional requirements to mitigate flooding at the storage yard), compared to the 1:250-year regulatory event of 1,000 m^3/s • used the 1D hydraulic model to estimate that Thames River has a channel capacity of 250 m^3/s to then approximate the required dimensions of a channel/conduit to divert flooding away from the WWTP	• not practically feasible due to constructability and significant disturbance that would be required • diversion channel/conduit would require approximately twice the capacity of the Thames River channel to mitigate flooding at the WWTP • land-use impacts will be significant (i.e., the athletic fields)	not recommended
			Storage		
7	Online Storage	• consider online storage based on the required flow reduction at the study area to mitigate flooding	• used the 1D hydraulic model to estimate that online storage is required to reduce peak flows by 500 m^3/s during the 1:250-year regulatory event of 1,000 m^3/s	• not practically feasible because the storage to reduce the 1:250-year event flow from 1000 m^3/s to 500 m^3/s requires significant cost and property acquisition upstream of the Fanshawe Dam	not recommended
			Operation Measures		
8	Equipment Upgrades Operational Procedures in Response to Flood Forecast	• assess potential to achieve study objectives • consider if no hydraulically feasible flood mitigation approaches are available	• n/a	• potential policy measures were assessed as not fully achieving the study objectives and would only be pursued if no hydraulically feasible approaches were available • because feasible approaches were identified in the screening, policy measures were screened out from this study	not recommended

Appendix C
Environmental Impact Study (Matrix 2022)

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

Environmental Impact Study
Adelaide Wastewater Treatment Plan
London, Ontario

Prepared for:
The City of London

Prepared by:
Matrix Solutions Inc.

Version 1.0
March 2022
Guelph, Ontario

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Environmental Impact Study

Adelaide Wastewater Treatment Plant

City of London

Prepared for City of London, March 2022



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Disclaimer

Matrix Solutions Inc. certifies that this report is accurate and complete and accords with the information available during the project. Information obtained during the project or provided by third parties is believed to be accurate but is not guaranteed. Matrix Solutions Inc. has exercised reasonable skill, care, and diligence in assessing the information obtained during the preparation of this report.

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Version Control

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V0.1	19-Oct-2021	Draft	32667-531 Greenway and Adelaide EIS R 2021-10-20 draft V0.1.docx	Issued to client for review
V0.2	26-Nov-2021	Draft revised	32667-531 Adelaide EIS R 2021-11-26 draft V0.2.docx	Report split into two; revisions issued to client
V1.0	04-Mar-2022	Final	32667-531 Adelaide EIS R 2022-03-03 final V1.0.docx	Issued to client

Executive Summary

The City of London retained Matrix Solutions Inc. to complete two Municipal Class Environmental Assessments (EA) to address climate change resiliency measures at the Greenway Wastewater Treatment Centre (WWTC) and Adelaide Wastewater Treatment Plant (WWTP). The two facilities have been identified as vulnerable to severe flooding and the EA will seek to identify a preferred flood protection approach to improve asset resilience, enhance treatment capabilities, and improve plant safety.

This report will focus on the natural heritage features and functions of the Adelaide WWTP, with the Greenway WWTP discussed in a separate report. The purpose of the Environmental Impact Study (EIS) was to define and record the natural heritage features, discuss implications and constraints to the proposed short list of alternatives, and recommend mitigation measures to offset any potential negative impacts to protected features. The short list of alternatives for Adelaide WWTP recommended developing a berm with varying entrance protection.

Matrix combined information from the ecological field studies with relevant information from background reviews to identify significant features within the Adelaide WWTP study area. The results indicated several natural heritage features, which included:

- significant woodlands
- wetlands (unevaluated)
- candidate significant wildlife habitat
- candidate and confirmed species at risk (SAR)
- fish and fish habitat

The most significant ecological functions identified within the Adelaide WWTP study area include the significant woodland located to the south of the WWTP. A confirmed avian SAR (Chimney swift) was observed flying over the study area but does not have confirmed nesting sites within the study area; therefore, it is not anticipated to be directly impacted during construction activities.

The major undertakings of the flood mitigation alternatives at the Adelaide WWTP include the creation of a berm that would encapsulate the northern, western, and southern boundaries of the WWTP and would also include varying degrees of flood protection (raise entrance, temporary measures, and berm) for the east side of the property, which largely includes a parking lot. The north and east portions of the study area, where the berm and raised entrance are to be erected, are already disturbed (parking lot and manicured lawn) and will include minimal vegetation removal. The majority of the natural heritage features within the site are

located along the west and south side of the property. It has been recommended within the mitigation measures that the construction of the berm should not impede with the significant woodland located directly south of the proposed berm. Tree protection fencing for this area should be located outside of the dripline to keep the significant woodland intact and to minimize impact. Along the western side of the proposed berm there will be some vegetation removal, which is located within 25 m of a stormwater outfall that outlets into the Thames River. Mitigation measures have been recommended to protect this outfall and the Thames River from erosion, sedimentation, and spills. Any trees removed should be replaced at a 3:1 ratio, which will result in a long-term, net benefit for the area once the trees and vegetation reach maturity.

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1 Introduction

The City of London (the City) retained Matrix Solutions Inc. to complete two Municipal Class Environmental Assessments (EAs) to address climate change resiliency measures at the Greenway Wastewater Treatment Centre (WWTC) and Adelaide Wastewater Treatment Plants (WWTP) in London, Ontario. The two facilities have been identified as vulnerable to severe flooding, and the EA will seek to identify a preferred flood protection approach to improve asset resilience, enhance treatment capabilities, and improve plant safety.

One component of the EA process is the completion of an Environmental Impact Study (EIS). An EIS is required to identify and evaluate existing Natural Heritage Features within and adjacent to the study area, assess impacts and net effects of the project to Natural Heritage Features, and provide environmental management recommendations in accordance with all applicable municipal, provincial, and federal policies and regulations. This report will focus on the natural heritage features and functions of the Adelaide WWTP, with the Greenway WWTP discussed in a separate report.

1.1 Study Area

The study area includes the fenced in area of the WWTP and the 50 m surrounding the facility.

The Adelaide WWTP is located at 1153 Adelaide Street North #0B1 (Figure 1). Adelaide is approximately 300 m from the Thames River, which is considered significant valleyland. It is bounded to the north by the North London Athletic Fields, to the south and east by residential and commercial lands, and to the southwest by an undeveloped natural area.

1.2 Study Objectives

The objective of the EIS is to define and record the natural heritage features within each facility's study area, discuss implications and constraints to the proposed short list of alternative designs and recommend mitigation measures to offset any potential negative impacts to protected features. The short list of alternatives recommends developing a berm with varying entrance protections for the Adelaide WWTP.

This EIS document was completed to meet the objectives and criteria as defined within the approved Terms of Reference (Appendix A) as well as applicable federal, provincial, and municipal policies and guidelines as defined in Section 2.

Easting (m)

479400 479550 479700 479850 480000 480150

Northing (m)

4762800 4762650 4762500 4762350 4762200



Study Area
Adelaide Wastewater Treatment Plant Limits
Highway
Road

1:3,000 metres
30 0 30 60
NAD 1983 UTM Zone 17N

Reference: Contains information licensed under the Open Government Licence – Ontario. Imagery (2020) Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community.

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

City of London
Greenway and Adelaide Wastewater Treatment Plants

Adelaide Study Area

Date:	Project:	Submitter:	Reviewer:
February 2022	32667	K. Reis	R. Leppington

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Figure 1

I:\City of London\32667\Figures And Tables\EA\2021\Report\EIS_Reporting\Adelaide\Figure 1-Adelaide _Study_Area.mxd - Tabbed_L - 11-Feb-22, 11:59 AM - mwright - TID005

2 Regulatory Framework

This section provides an overview of key federal, provincial, and local environmental legislation, policies, and regulations that are directly applicable/relevant to the Adelaide study area.
This policy framework provides guidance on the protection of natural heritage features and the evaluation of significance. Features identified within the study area were evaluated against relevant federal, provincial, and municipal planning policies applicable to the local site context, to determine natural heritage constraints and recommend appropriate mitigation measures to minimize risks of negative impacts to the environment.

2.1 Federal Legislation

2.1.1 Species at Risk Act

Species classified as extirpated, endangered, and threatened in Schedule 1 of the *Species at Risk Act* (SARA) are protected under the provisions of SARA. This includes protection to the species and their critical habitat. Critical habitat is defined as those habitats necessary for the survival or recovery of a listed species, as identified in the recovery strategy or in an action plan for the species. While SARA applies to species on federal land, such as Canadian oceans and waterways, national parks, national wildlife areas, some migratory bird sanctuaries, and First Nations reserve lands, it also applies to species at risk (SAR) migratory birds protected under the *Migratory Birds Convention Act* (MBCA) and fish, anywhere they occur. Therefore, SARA only applies to SAR migratory birds, fish, and mussels for this project.

General prohibitions (does not apply to Special Concern species except for provisions related to EAs, in which case, all Schedule 1 species apply) that apply:

- kill, harm, harass, capture, or take an individual of a species listed in Schedule 1 of SARA as Endangered, Threatened, or Extirpated (Section 32[1] of SARA)
- possess, collect, buy, sell, or trade an individual, or any part or derivative of a species listed in Schedule 1 of SARA as Endangered, Threatened, or Extirpated (Section 32[2] of SARA)
- damage or destroy the residence (e.g., nest or den) of one or more individuals of a species listed in Schedule 1 of SARA as Endangered or Threatened, or that an activity is listed as Extirpated, if a recovery strategy has recommended the reintroduction of the Extirpated species (Section 33 of SARA)

Destruction of critical habitat of any listed Endangered species or of any listed Threatened species if the following apply:

- the critical habitat is on federal land, in the exclusive economic zone of Canada, or on the continental shelf of Canada
- the listed species is an aquatic species
- the listed species is a species of migratory birds protected by the MBCA (Section 58[1] of SARA)

General habitat (necessary for the species survival and recovery) (S.80) by Emergency Order only:

- applies to all species, including aquatic and migratory birds on federal land or Exclusion Economic Zone (relates to the sea)
- migratory birds on non-federal lands or Exclusion Economic Zone (relates to the sea)
- all species, except aquatic and migratory birds, on non-federal lands or Exclusion Economic Zone (relates to the sea)

2.1.2 Fisheries Act

The *Fisheries Act* outlines the framework for the management and regulation of fisheries and the conservation and protection of fish and fish habitat within the fishing zones of Canada, all waters in the territorial sea of Canada, and all internal waters of Canada. The most recent revision to the *Fisheries Act* restricts activities that cause "death of fish, other than by fishing" as well as the "harmful alteration, disruption, or destruction of fish habitat (HADD; Government of Canada 2019)" and the release of substances that are known or suspected to be deleterious to fish or fish habitat.

Proposed works that are anticipated to directly or indirectly result in negative impacts to fish and fish habitat as described in the *Fisheries Act* will require a review by Fisheries and Oceans Canada (DFO) to determine whether the proposed activities may be permitted under the *Fisheries Act*. If so, the project may require an authorization or ministry approval under the *Fisheries Act* (DFO 2021a).

2.1.3 Migratory Birds Convention Act

The MBCA and associated regulations, including the Migratory Birds Regulations protect certain native species of migratory birds and their nests and eggs. Any migratory bird species that meets all three of the following criteria is protected under the MBCA:

- birds referred to in Article 1 of the Migratory Birds Convention, as amended under the 1995 Protocol, either directly by species name, directly by the listing of their family, or indirectly by interpretation of the original convention
- species that are native or naturally occurring in Canada:
    - A native migratory bird is one that is present entirely as a result of natural biological or ecological processes.
    - Species known to have regularly occurred in Canada. Although species that occur frequently (i.e., "accidentals") and that meet criteria 1 and 2 are not included on this list, they continue to be considered as having protection under the MBCA any time they occur in Canadian territory.

General prohibitions under the MBCA and associated regulations protect migratory birds, their nests, and eggs and prohibit the deposit of harmful substances in waters and areas frequented by them. It also prohibits deposition of harmful substances that have the potential to enter waters where they occur. The associated regulations also include an additional prohibition against the incidental take, which is defined as "the inadvertent harming, killing, disturbance or destruction of migratory birds, nests and eggs."

Environment and Climate Change Canada (ECCC) administers the MBCA and its associated regulations. Compliance with the MBCA and associated regulations is best achieved through a due diligence approach based on the consideration of avoidance guidelines on the ECCC website. Any vegetation removals would need to be completed outside of the breeding bird season for Zone C2 (April 10 to August 15) to avoid disturbing active nests of migratory birds protected under the MBCA (Government of Canada 2021).

2.2 Provincial Legislation, Policies, and Guidelines

2.2.1 Endangered Species Act

The *Endangered Species Act* (ESA) provides for the conservation and protection of fauna and flora species within the Province of Ontario that are at risk of extinction. Section 9(1) of the ESA prohibits the killing, harming, harassment, capture, taking, possession, transport, collection, buying, selling, leasing, trading, or offering to buy, sell, lease, or trade species listed as extirpated, endangered, or threatened on the Species at Risk in Ontario (SARO) list. Section 10(1) of the ESA prohibits damaging or destroying habitat of endangered or threatened species on the SARO list and may apply to extirpated species through special regulations. General habitat protection applies to all endangered and threatened species. Species-specific habitat protection is also given to those species with regulated habitat, as identified in Ontario Regulation 242/08. Species designated as special concern are not given species or habitat protection under the ESA; however, this designation aids in identification of significant wildlife habitat (SWH) at the municipal level.

Should an ESA protected species be encountered, impacts to the species or its habitat must be avoided or mitigated. Strategies to avoid contravention of the ESA include avoidance (e.g., through design modifications or timing of works), adherence to an applicable Notice of Activity, or by obtaining an Overall Benefit Permit.

2.2.2 Provincial Policy Statement

The Provincial Policy Statement, 2020 (PPS; MMAH 2020) provides policy direction related to land use planning and development in Ontario. The updated PPS, issued under Section 3 of the *Planning Act*, came into effect May 1, 2020, and applies to planning decisions made on or after that date. The PPS addresses the need to protect natural heritage features to ensure Ontario's long-term prosperity, environmental health, and social well-being.

Section 2.1 of the PPS provides direction to regional and local municipalities regarding planning policies for the protection and management of natural heritage features and resources. The natural heritage policies that are relevant to this project state (MMAH 2020):

> "2.1.1 Natural features and areas shall be protected for the long term.
>
> 2.1.2 The diversity and connectivity of natural features in an area, and the long term ecological function and biodiversity of natural heritage systems, 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.

2.1.3 Natural heritage systems shall be identified in Ecoregions 6E & 7E1, recognizing that natural heritage systems will vary in size and form in settlement areas, rural areas, and prime agricultural areas.

2.1.4 Development and site alteration shall not be permitted in: a) significant wetlands in Ecoregions 5E, 6E and 7E; and b) significant coastal wetlands.

2.1.5 Development and site alteration shall not be permitted in:

a) significant wetlands in the Canadian Shield north of Ecoregions 5E, 6E and 7E;
b) significant woodlands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River);
c) significant valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River);
d) significant wildlife habitat;
e) significant areas of natural and scientific interest; and
f) 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.

2.1.6 Development and site alteration shall not be permitted in fish habitat except in accordance with provincial and federal requirements.

2.1.7 Development and site alteration shall not be permitted in habitat of endangered species and threatened species, except in accordance with provincial and federal requirements.

2.1.8 Development and site alteration shall not be permitted on adjacent lands to the natural heritage features and areas identified in policies 2.1.4, 2.1.5, and, 2.1.6 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.

2.1.9 Nothing in policy 2.1 is intended to limit the ability of agricultural uses to continue."

2.2.2.1 Natural Heritage Reference Manual

The *Natural Heritage Reference Manual for the Natural Heritage Policies of the Provincial Policy Statement, 2005* (NHRM; MNR 2010) was developed to provide technical guidance for implementing the natural heritage policies of the PPS. Although not yet updated to reflect changes adopted by the 2020 PPS update, it still functions as an important tool for those involved in development and review of policy documents, review and approval of development applications, and matters before provincial boards and tribunals. The NHRM is organized by specific natural heritage policies and provides basic guidance materials in the main sections, supported by more technical material in its appendices. The NHRM provides criteria in which to evaluate natural heritage features for their significance as well as recommendations for mitigation. Natural heritage features covered under the NHRM include:

- significant habitat of endangered and threatened species
- significant wetlands and significant coastal wetlands
- significant woodlands
- significant valleylands
- SWH
- significant areas of natural and scientific interest (ANSIs)
- fish habitat

Some of these features (i.e., Provincially Significant Wetlands [PSWs] and ANSIs) are identified, often with input from consultants, by the Ontario Ministry of Natural Resources and Forestry (MNRF). Others are to be identified by the local area municipalities or planning authorities (i.e., significant woodlands, significant valleylands, SWH). Threatened and endangered species are designated at the provincial level, but their habitat is typically not identified or verified until site-specific studies are completed and, if present, confirmed by MNRF. It is expected that even where features have been identified at the provincial, regional, or local levels that verification and some level of refinement will be required at the site-specific level.

2.2.2.2 Significant Wildlife Habitat Technical Guide

Pre-dating the NHRM, the *Significant Wildlife Habitat Technical Guide* (SWHTG; MNR 2000) was prepared to assist planning authorities and other participants in the land use planning systems. The SWHTG provides a technical manual that presents information on the identification, description, and prioritization of SWH. The document describes in detail some of the techniques, issues, and processes identified in the NHRM and provides a compilation of relevant technical support materials and references. Though it is based on a former version of the NHRM, it provides additional information for evaluating SWH. In order to ensure a

comprehensive approach identifying and evaluating SWH, the SWHTG divides wildlife habitat into four categories:

- seasonal concentration areas
- rare vegetation communities or specialized habitats for wildlife
- habitats of species of conservation concern
- animal movement corridors

More recently, due to Ontario's size and biodiversity, MNRF also created SWH ecoregion criteria schedules that support the SWHTG and provide criteria that are reflective of regional significance. Information provided in the schedules includes descriptions of wildlife habitat, wildlife species, and the criteria required to determine SWH. For this project, the assessment of SWH follows the guidelines in *Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E* (MNRF 2015).

2.2.3 Conservation Authorities Act

Section 28(1) of the *Conservation Authorities Act* empowers conservation authorities with the ability to make regulations governing development that can have an impact on watercourses, water bodies, and other hazard lands such as floodplains and wetlands.

Adelaide WWTP is within the Upper Thames Region Conservation Authority (UTRCA) regulation limits. As such, development on these lands must adhere to the policies and regulations of Ontario Regulation 157/06: *Upper Thames River Conservation Authority: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses*.

Proposed developments or associated works that may impact UTRCA-regulated areas may require permitting from UTRCA.

2.2.3.1 Upper Thames River Conservation Authority Environmental Planning Policy Manual

The *Environmental Planning Policy Manual for the Upper Thames River Conservation Authority* was approved on June 28, 2006, and was revised on October 24, 2017 (UTRCA 2017).
The purpose of the manual is to provide local Upper Thames watershed policies that will guide development and site alteration while protecting, preserving, and enhancing the natural environment (UTRCA 2017).

The document identifies natural hazards (floodplains and slopes) and natural heritage resources (wetlands, woodlands, valleylands, wildlife habitat, threatened and endangered species,

aquatic/fish habitat, and life science areas), and illustrates the UTRCA protection and preservation policies for these features. The goal of this planning document is to protect natural heritage features from negative impacts and to maintain, restore, and enhance the biodiversity, ecological function, and connectivity of natural heritage features within the watershed (UTRCA 2017).

2.2.4 Accessibility for Ontarians with Disabilities Act

Ontario Regulation 413/12: *Integrated Accessibility Standards* provides for the development, implementation, and enforcement of accessibility standards in order to achieve accessibility for Ontarians with disabilities with respect to goods, services, facilities, accommodation, employment, buildings, structures, and premises on or before January 1, 2025.

2.3 Municipal Legislation, Policies, and Guidelines

2.3.1 The London Plan (City of London Official Plan)

The London Plan is the City's new official plan adopted by City council on June 23, 2016, and was approved by the Minister on December 28, 2016 (City of London 2016). The plan establishes a policy framework to guide the City's growth and development. The objectives and policies of this plan were drafted by City council to assist in making decisions for the physical development of the municipality, while having regard for relevant social, economic, and environmental matters.

The City has mapped the natural heritage system and identified areas as Green Space Place Type or Environmental Review Place Type. Natural heritage areas that are within the Green Space Place Type represent significant natural features and ecological functions. Natural heritage features and areas and other areas included in the Green Space Place Type include:

- fish habitat
- habitat of endangered species and threatened species
- PSWs
- significant woodlands and woodlands
- significant valleylands
- SWH
- ANSIs
- water resource systems
- Environmentally Significant Areas (ESAs)

- upland corridors
- potential naturalization areas
- adjacent lands

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

- unevaluated wetlands
- unevaluated vegetation patches
- other vegetation patches larger than 0.5 ha
- valleylands
- potential ESAs

The environmental policies section of *The London Plan* further describes the natural heritage features as well as the permitted and unpermitted development and alternation within these features.

Additionally, wetland areas fall within Policy 1334 of *The London Plan*, which states:

> "For non-provincially significant wetlands there shall be no net loss of the wetlands' features or functions. In some instances, and in consultation with the conservation authority having jurisdiction, the City may consider the replacement of wetlands rather than in situ protection where the features and functions of the wetland may be provided elsewhere and would enhance or restore the Natura Heritage System. Such replacement will be on at least a one-to-one land area basis except:
>
> 1. Where a wetland is between 0.1 ha and 0.5 ha, replacement may be considered at less than a one-to-one land area basis if there will be a net gain to wetland function and the overall natural heritage system; and
>
> 2. Where a wetland is less than 0.1 ha, the City may consider replacement on a less than on-to-one land area basis and/or additional measures to achieve no net loss of function."

2.3.2 City of London Environmental Management Guidelines

In 2007, the City completed and approved a set of six Environmental Management Guidelines (City of London 2007). These guidelines provide a consistent template, which has clear expectations and ensures that relevant issues are not overlooked and that unnecessary items are excluded.

The City's *Guidelines for the Preparation and Review of Environmental Impact Statements* was utilized most extensively during the planning process for this project to determine the scope of the EIS (City of London 2003). The project is subject to EIS requirements, as it is located within a significant river corridor (among other components discussed in Section 5 of this report). A review of the EIS Issues Summary Checklist was completed to scope the EIS and identify ecological data gaps within the Adelaide WWTP study area. The EIS final Terms of Reference was approved by the City on May 4, 2021 (Appendix A).

2.3.3 Thames Valley Corridor Plan

The *City of London Thames Valley Corridor Plan* (Dillon Consulting and D.R. Poulton 2011) recommends measures to protect and enhance the natural features within the Thames River Valley in support of *The London Plan* (City of London 2016). A key ecological goal of the *City of London Thames Valley Corridor Plan* is to preserve, enhance, and create ecological corridors and linkages between natural features in order to establish a continuous corridor along the Thames River and enhance linkages to tributary watersheds (Dillon Consulting and D.R. Poulton 2011).

2.3.4 Middlesex County Official Plan

The *Middlesex County Official Plan* was most recently consolidated in 2006 (Middlesex County 2006). Middlesex County surrounds the City, but the City itself is politically separate from Middlesex County.

The *Middlesex County Official Plan* endeavours to work with the City and provide seamless policy integration with *The London Plan*.

3 Study Approach and Methodology

Information pertaining to natural heritage resources within or adjacent to the Adelaide WWTP study area was obtained through a review of available background studies, databases, and field investigations.

3.1 Background Review

The following information sources were reviewed for records related to natural heritage features that have the potential or are known to occur within the Adelaide study area.

Initial background requests regarding terrestrial sensitivities and SAR were submitted to the Ministry of the Environment, Conservation and Parks (MECP) and to the UTRCA. In addition to

information provided by these regulatory agencies, other publicly available data sources were reviewed to determine potential species of conservation concern (SCC) and SAR whose occurrence ranges overlap with the study area. Background review material for the study area has also been obtained from available secondary source reports. The majority of background information was provided by the UTRCA. The sources reviewed are outlined in Table 1.

Table 1 Background Data Sources Reviewed

Source	Type	Description	Action Items
Ministry of Environment, Conservation and Parks (MECP; Markham 2021, Pers. Comm.)	Agency Correspondence	A project screening request was sent to MECP on May 12, 2021, for information related to natural heritage features and species at risk (SAR) potential within the study area. The MECP responded on August 27, 2021, indicating additional species at risk (SAR) and species of conservation concern (SCC), which were incorporated into Appendix B	Screening to consider two additional species • Kentucky Coffee-tree (threatened) • Red-headed Woodpecker (special concern; to be up-listed to endangered in 2022) ELC/habitat characterization to consider potential for Kentucky Coffee-tree presence. Avian survey to consider potential habitat for Red-headed Woodpecker.
Upper Thames Region Conservation Authority (UTRCA; Ramsey 2021, Pers. Comm.)	Agency Correspondence	A background request for natural heritage information was submitted to UTRCA on May 12, 2021. This information was received on June 9, 2021, and was incorporated into Appendix B.	UTRCA regulation mapping cross-referenced in determining regulatory requirements. Direction on in-water work and aquatic species provided. No in-water work or impact to watercourses/aquatic species anticipated. Wildlife exclusion strategies to be incorporated into impact mitigation.

Source	Type	Description	Action Items
Ministry of Natural Resources and Forestry (MNRF; Webb 2021, Pers. Comm.)	Agency Correspondence	A background request for natural heritage information was submitted to MNRF on May 12, 2021. This information was received on June 9, 2021, and was incorporated into Appendix B.	Direction on in-water work and aquatic species provided. No in-water work or impact to watercourses/aquatic species anticipated. Confirmed no Provincially Significant Wetlands or Areas of Natural and Scientific Interest (ANSIs), and no known significant wildlife habitat (SWH) within the study area.
Aquatic Species at Risk Maps (DFO 2021b)	Online Database	Aquatic SAR mapping is made available online by Fisheries and Oceans Canada for species listed endangered, threatened, or special concern under the *Species at Risk Act*. Results are included in Appendix C.	Aquatic SAR noted as present in adjacent watercourses. No in-water work or impact to watercourses/aquatic species anticipated.
Natural Heritage Information Center (NHIC) Make-a-Map: Natural Heritage Areas (NHA MaM) (MNRF 2021a)	Online Database	A web application that provides information on provincial parks, conservation reserves, and natural heritage features (i.e., ANSI, wetlands, woodlands, and natural heritage systems related to provincial policy plan areas, such as the Niagara Escarpment, Oak Ridges Moraine, and Greenbelt Plans.) The NHA MaM also provides NHIC data, which is organized into 1 km^2 map squares and includes information on SCC and SAR records. Results are included in Appendix C.	SAR and SCC added to screening. Data obtained used to inform SWH screening.

Source	Type	Description	Action Items
Lands Information Ontario (LIO) Geospatial Data (MNRF 2021b)	Online Database	LIO data is maintained by MNRF and provides key provincial geospatial data for Ontario. Shapefiles obtained from the LIO open datasets were used to show the natural features within the study area. Key datasets that were reviewed for the study area include policy plan areas, municipal land use designations, ANSIs, provincial parks and conservation areas, wetlands, woodlands, and watercourses.	LIO utilized to confirm boundaries as determined through consultation with regulatory entities.
Atlas of the Mammals of Ontario (Dobbyn 1994)	Online Atlas	The *Atlas of the Mammals of Ontario* shows the geographic distribution of mammals for three time periods: pre-1900, 1900 to 1969, and 1970 to 1993. A review of the 1970 to 1993 period was completed. Results are included in Appendix C.	SAR and SCC added to screening. Data obtained used to inform SWH screening. Leaf-off bat habitat survey completed to assess for potential at-risk bat species.
Ontario Reptile and Amphibian Atlas (ORAA; Ontario Nature 2015)	Online Atlas	The ORAA provides known ranges of reptiles and amphibian species in Ontario based on historic and current species occurrences. Results are included in Appendix C.	SAR and SCC added to screening. Data obtained used to inform SWH screening.
Ontario Breeding Bird Atlas Guide for Participants (OBBA; OBBA 2001)	Online Atlas	The OBBA provides a list of bird species that have been observed 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 study. Results are included in Appendix C.	SAR and SCC added to screening. Data obtained used to inform SWH screening.

Source	Type	Description	Action Items
Ontario Butterfly Atlas (OBA; TEA 2019)	Online Atlas	The OBA collects observations of butterflies within Ontario. Sightings were reviewed from 2016 onward. Results are included in Appendix C.	SAR and SCC added to screening. Data obtained used to inform SWH screening.
Important Bird Areas of Canada (IBA; Bird Studies Canada 2021)	Online Atlas	The IBA was reviewed to determine if there are any important bird areas within the study area. Reviewed and study area are not located within an important bird area.	No additional action required.
The London Plan (City of London 2016)	Online Mapping	*The London Plan* is the City of London's official plan, and schedules were reviewed to determine if there were any identified natural heritage features within the study area. Results are included in Appendix C	Used to inform documented natural heritage features and potential developmental constraints due to zoning and/or local by-laws.
Thames Valley Parkway North Branch Connection, Class Environmental Assessment Environmental Impact Study, Richmond Street to Adelaide Street (Dillon Consulting 2016)	Report	Environmental impact study for lands adjacent to and partially within the Thames River Valley between Richmond Street and Adelaide Street in London. Significant findings were incorporated into this report.	Used to inform on regional context for screening of SAR, SCC, and SWH. Screening to consider one additional species: • Butternut
One River Master Plan Environmental Assessment, River Characterization,	Report	The One River Master Plan Municipal Class Environmental Assessment (EA) was initiated to integrate the outcomes of the dam, Ribbon of the Thames	Used to inform on regional context for screening of SAR, SCC, and SWH.

Source	Type	Description	Action Items
City of London, Thames River (Matrix 2019)		design, and other various improvement projects along the Thames River and adjacent valley corridor. The EA included lands adjacent to the Thames River from "the Forks" to Springbank Dam. Significant findings were incorporated into this report.	
City of London Thames Valley Corridor Plan (Dillon Consulting and D.R. Poulton 2011)	Report	The *City of London Thames Valley Corridor Plan* recommends measures to protect and enhance the natural features within the Thames River Valley in support of *The London Plan*	Used to inform on regional context for screening of SAR, SCC, and SWH.

3.2 Analysis of Significance and Sensitivity

The ecological features identified within the study area are evaluated to determine the significance of each feature. Significance is based on regional, provincial, and federal designations, which are described in the following subsections.

3.2.1 Natural Area Designations

Natural area designations are those that are recognized as significant on official plans or in other policy planning documents. This includes ANSIs (provincially, regionally, or other), significant wetlands (provincially, regionally, or locally), significant woodlands, and ESAs. ANSIs and ESA are evaluated by the province or municipality, while of these designations, only wetlands and woodlands can be assessed for significance by non-government organizations.

3.2.2 Significant Wildlife Habitat Screening

MNRF provides specific guidance on identifying and assessing wildlife habitat in the SWHTG (MNR 2000), the *Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E* (MNRF 2015), and the NHRM (MNR 2010). The MNRF recognizes five main categories of wildlife habitat, each with several wildlife habitat types, each with criteria to evaluate significance. A description of each wildlife habitat category is 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” (MNR 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” (MNR 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” (MNR 2010).

- **Habitat for SCC:** defined as “habitats of species that are designated at the national level as Endangered or Threatened by COSEWIC [the Committee on the Status of Endangered Wildlife in Canada], which are not protected in regulation under Ontario's ESA [the *Endangered Species Act*]; habitats of species listed as Special Concern under the ESA on the SARO [Species at Risk in Ontario] List (formerly referred to as "Vulnerable" in the SWHTG); and habitats of species that are assigned a provincial (i.e., sub-national) conservation status rank of S1 to S3 and are not on the SARO List” (MNR 2010).

- **Animal movement corridors:** defined as “elongated, naturally vegetated parts of the landscape used by animals to move from one habitat to another” (MNR 2010).

3.2.3 Species at Risk Screening

The background review identified potential SAR that could occur within the Adelaide study area. All SAR identified were screened to determine the likelihood of occurrence and whether suitable habitat is present.

SAR are defined in this report to include the following provincial and federal designations:

- ESA (provincial): all provincially designated species that are listed as extirpated, endangered, or threatened on the SARO list and protected under the ESA; species listed as special concern are considered a SCC, as they are not protected under the ESA.

- SARA (federal): only applies to fish and migratory birds protected under the MBCA, anywhere they occur (e.g., includes non-federal land), that are designated as extirpated, endangered, and/or threatened under the SARA. All other species are only protected if special provisions or executive orders are made.

To determine if suitable habitat for SAR is available within the study area, the preferred habitat requirements for reported SAR were compared to vegetation communities, aquatic habitats, and niche habitats identified during field inventories and the background review. The results of the SAR habitat screening are provided in Section 6.7.

4 Field Methodology

Matrix staff completed field inventories within the Adelaide study area during the spring and summer of 2021 as part of the EIS. Field inventories completed by each staff member are provided in Table 2. Detailed methods are described in the following subsections.

Table 2 Field Survey Summary

Field Inventory	Date	Matrix Staff
Vegetation (Ecological Land Classification, Botanical Inventory, Invasive Species)	April 16, 2021 August 9, 2021 August 13, 2021	Peter De Carvalho
Bat Maternity Roosting Habitat Survey	April 16, 2021(Leaf-off)	Peter De Carvalho
Breeding Birds	June 4, 2021 June 24, 2021	Matthew Ilse
Incidental Observations	Collected during all site visits	All Staff

4.1.1 Ecological Land Classification

Vegetation community delineation was completed within the study area using aerial photography and refined thorough investigations in the field. The standard Ecological Land Classification (ELC) system for southern Ontario (Lee 2008; Lee et al. 1998) was applied. Details of the vegetation communities were recorded, including species composition and dominance, community structure, uncommon species or features, and evidence of anthropogenic disturbance. Vegetation community status rarity was assessed through National Heritage Information Centre vegetation community rankings (MNRF 2021c).

4.1.2 Botanical Inventories

A botanical inventory was completed during the field inventories for each of the vegetation communities. The field investigations were completed during spring and summer. A list of species was compiled to determine the presence of SCC, SAR, and invasive species. Habitats of SCC, SAR, and invasive species identified during the field inventories were mapped for the ELC community in which they encompassed.

Plants were identified to family, genus, species, subspecies, and hybrid level according to the Newmaster (1998) *Ontario Plant List* and cross-referenced with the *Database of Vascular Plants of Canada* (Brouillet et al. 2020) for scientifically accepted nomenclature.

4.1.3 Breeding Birds

Breeding bird surveys were conducted following the protocol outlined in the *Ontario Breeding Bird Atlas Guide for Participants* (OBBA 2001). The protocol states that two rounds of surveys should be completed between May 24 and July 10, between 05:00 and 10:00, and under reasonable weather conditions. Surveys should not be completed if there is heavy rain, heavy fog, or if winds are greater than 3 on the Beaufort scale (i.e., >19 km/hour). A total of six

stations were surveyed to reflect the different habitats within the study area. These stations were spaced approximately 300 m apart to reduce any overlap in observations between stations. Observations were made using direct (visual observation) and indirect (songs and alarm call) methods to identify the level of breeding evidence. Observations of breeding evidence for each species were recorded based on the definitions provided by the *Ontario Breeding Bird Atlas Guide of Participants* (OBBA 2001).

4.1.4 Bat Maternity Roosting Survey

The location of suitable bat maternity roosting habitat, including snags, was identified following the modified methodology of the Guelph District *Survey Protocol for Species at Risk Bats within Treed Habitats: Little Brown Myotis, Northern Myotis, and Tri-coloured Bat* (MNRF 2017). This scoped assessment will identify candidate SAR bat habitat and provide recommendations for subsequent studies, as appropriate.

Phase 1 Bat Habitat Suitability Assessment consists of evaluating the study area and deciding whether any area would be designated as a coniferous, deciduous, or mixed wooded ELC ecosite. Preliminary analyses indicated deciduous treed areas present adjacent to the Adelaide WWTP. These treed areas were surveyed for suitable maternity roost trees through a leaf-off habitat assessment.

Identifying suitable roost trees for Little Brown Myotis and Northern Myotis includes recording the location of all snags that exhibit appropriate attributes including cavities, loose bark, cracks, or knot holes. Identifying suitable roost trees for Tri-Coloured Bats includes recording the location of any Oak trees greater than 10 cm diameter at breast height (DBH), Maple trees greater than 10 cm DBH if the tree includes dead/dying leaf clusters, and any Maple tree greater than 25 cm DBH. A formal leaf-on habitat assessment was not completed, though the presence of appropriately sized Oak and Maple trees were noted during subsequent ELC field studies.

4.1.5 Incidental Wildlife

All wildlife observations were documented on all field visits. This included actual direct observations (including vocalizations) of individuals and signs of wildlife presence (i.e., tracks, scats, dens, nests, etc.).

4.1.6 Significant Wildlife Habitat and Species at Risk Assessment

An assessment of potential SWH and potential SAR habitat within the study area was conducted during the field surveys. The study area was assessed for habitat identified within

the criteria outlined in the *Significant Wildlife Habitat Technical Guide* (MNR 2000) and the *Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E* (MNRF 2015). Natural areas were also assessed for their potential to provide habitat for those SAR and SCC identified during background review or observed during field investigations.

5 Description of the Natural Environment

5.1 Terrain Setting

The Adelaide study area is located adjacent to the Thames River, one of the largest river systems in southern Ontario. The Thames River is set in southern Ontario in the Carolinian Zone (Ecoregion 7E), which extends from Windsor to Toronto. The Carolinian Zone is the most human-populated zone in Canada and hosts more species than any other region in Canada (Carolinian Canada 2021). However, development over the past few hundred years had reduced the biodiversity of the ecoregion by over 90%. Ongoing conservation measures and expanding urban populations and development makes this zone uniquely situated for governance and regulatory measures.

The study area are located within the Caradoc Sand Plains and London Annex physiographic regions of southern Ontario. This region generally consists of gravel alluvium, which is spread over the Thames River and includes fox fine sandy loam, berrien sandy loam, and burford gravely loam (Chapman and Putnam 1984).

5.2 Identified Natural Heritage Features

There are no ESAs, PSWs or locally significant wetlands, or ANSIs present within the study area.

The London Plan (City of London 2016) Map 5 (Natural Heritage) has identified a “Woodland” to the southeast, “Significant Valleyland” to the north of the Greenway study area, and a “Significant Woodland” to the south and southeast of the Adelaide study area (Appendix C). The “Significant Woodland” adjacent to the Adelaide study area is also known as the “Huron Street Woods (patch 00027)”.

5.3 Terrestrial Habitat

5.3.1 Vegetation Communities

Vegetation communities within the Adelaide study area are mapped on Figure 2 and described in further detail in Table 3. The Adelaide study area contains 14 ELC community types (7 terrestrial, 6 wetlands, and 1 terrestrial/wetland).

Table 3 Ecological Land Classification Communities - Adelaide Wastewater Treatment Plant

Ecological Land Classification Community Type	Community Description
FOD7-4 Fresh-Moist Black Walnut Lowland Deciduous Forest	This community defines the largest wooded areas of the study area south of the Adelaide Wastewater Treatment Plant (WWTP). The canopy was found to be variable, but mostly dominated by Black Walnut (*Juglans nigra*), with Manitoba Maple (*Acer negundo*) approaching co-dominance in sections. Common canopy constituents include Basswood (*Tilia americana*), Crack Willow (*Salix fragilis*), and Hackberry (*Celtis occidentalis*). Though most of these woodlands were found to be fresh-moist, a ridge on the easternmost FOD margin slopes upwards. This west-facing slope features a higher proportion of Sugar Maple (*Acer saccharum*) and Black Cherry (*Prunus serotina*). Understory is relatively open, and dominated by Manitoba Maple, European Buckthorn (*Rhamnus cathartica*), River Grape (*Vitis riparia*), young Green Ash (*Fraxinus pennsylvanica*), and willow species (*Salix sp.*), though margins and clearings are often choked with a dense shrub-layer dominated by European Buckthorn, young Manitoba Maple, and Red-osier Dogwood (*Cornus sericea*). Ground cover was variable, with no single species dominating. Growth form varied from forb to forb/graminoid mixed, to graminoid-dominated. There was also evidence of significant growth of Garlic Mustard (*Alliaria petiolata*) persisting from earlier in the growing season. Additionally, the understory was found to be frequently sparse, resulting in a high proportion of bare mineral soil. FOD7 ecosites can represent a transition between upland forest and lowland swamps.

Ecological Land Classification Community Type	Community Description
FOD7 Fresh-Moist Lowland Deciduous Forest	A linear wooded feature is present east of the Adelaide WWTP. The canopy of this forest is similar in composition to the FOD7-4 ecosites, but generally dominated by Eastern Cottonwood (*Populus deltoides*), with Black Walnut approaching co-dominance. Much of the woodland is surrounded by a pronounced margin dominated by shrubs (European Buckthorn, Salix sp.). FOD7 ecosites can represent a transition between upland forest and lowland swamps.
MAM2/MAS2/SWT2 Mineral Meadow Marsh/ Mineral Shallow Marsh/ Mineral Thicket Swamp	An approximately linear wet slough bisects the FOD7-4 ecosite southwest of the Adelaide WWTP. The dominant vegetation form within this slough vacillates between meadow marsh, shallow marsh, and thicket swamp ecosites. Meadow marsh ecosites were dominated by Reed Canary Grass, with common presence of Common Reed, Common Cattail, Purple Loosestrife, Spotted Jewelweed (*Impatiens capensis*), and sedges. Shallow marsh areas featured similar assemblage as meadow marsh but were inundated with standing water and had a higher proportion of emergent macrophytes (Common Cattail, Narrow-leaf Cattail). The thicket areas were dominated by willow species (Black, Slender - *Salix c.f. petiolaris*) with Red-osier Dogwood and River Grape common. It was also noted that the wettest portions of this ecosite contained Dodder (*Cuscuta gronovii*).
SWT2-2 Willow Mineral Thicket Swamp	A depression to the west of the Adelaide WWTP features several wetland types. Several areas are dominated by willow species (*Salix c.f. nigra*). Other common species include Red-osier Dogwood, young Eastern Cottonwood, and young Green Ash (*Fraxinus pennsylvanica*) The ground-layer was more sparse than adjacent non-thicket areas, but composition was generally similar. Common ground species included Reed-canary Grass (*Phalaris arundinacea*), Black Bulrush (*Scirpus atrovirens*), Softstem Bulrush (*Schoenoplectus tabernaemontani*), Purple Loosestrife (*Lythrum salicaria*), and sedges (*Carex sp.*).
MAM2-1 Reed-canary Grass Mineral Meadow Marsh	The areas not wet enough to contain standing water and not dominated by shrubs typically resemble meadow marsh dominated by Reed-canary Grass. Other common ground species include Black Bulrush, Softstem Bulrush, Purple Loosestrife, and sedges.

Ecological Land Classification Community Type	Community Description
MAS2-1 Cattail Mineral Meadow Marsh	A large area of persistent standing water was noted south of the FOD7 ecosite. This area was dominated by Common Cattail (*Typhus latifolia*), Narrow-leaf Cattail (*Typhus angustifolia*), and Common Reed (*Phragmites australis*). Actual depth was assumed to be >2 m and substrate was assumed to be mineral, though this was not confirmed in the field.
MAS2a Phragmites Mineral Meadow Marsh	A smaller depression southeast of the MAS2-1 ecosite was found to contain standing water. This depression was almost completely dominated by Common Reed, though Common Cattail, Narrow-leaved Cattail, and Purple Loosestrife were noted to persist at the margins.
MAS2b Mineral Shallow Marsh	A deep linear outlet channel runs generally east west to the west of the Adelaide WWTP. This channel was found to be full of water both in late spring (May) and in mid-summer (July). The channel is lined with large armour-stone, but significant vegetation growth was noted within the channel in sections. Species composition was variable but typically consisted of Jewelweed, Common Boneset (*Eupatorium perfoliatum*), Joe Pye Weed (*Eutrichium purpureum*), Common Cattail, Narrow-leaf Cattail, Phragmites, Black Bulrush, Softstem Bulrush, and willow species.
CUM1 Mineral Cultural Meadow	Large sections of open upland habitat are present within the Adelaide study area. Though species composition tends to be variable, they are typically graminoid-dominated. Reed-canary Grass is the most common species noted, though other grasses were found to be common (Orchard Grass - *Dactylis glomerata*; Kentucky Bluegrass - *Poa pratensis*; Timothy - *Phleum pratense*; Smooth Brome - *Bromus inermis*; Large Crab Grass - *Digitaria sanguinalis*). Common non-graminoid species include Common Dandelion (*Taraxacum officinale*), Bird's-foot Trefoil (*Lotus corniculatus*), Perforate St. John's Wort (*Hypericum perforatum*), and Canada Goldenrod (*Solidago canadensis*).
CUM1/MAM2-10 Mineral Cultural Meadow/ Forb Mineral Meadow Marsh	A section of open area northeast of the MAS2-1 ecosite formed contiguous area of upland cultural meadow and narrow linear depressions that were filled with water. This resulted in a mix of upland (CUM1) and lowland (MAM2-10 ecosites). The upland species were similar in composition to surrounding CUM1 ecosite assemblages.

Ecological Land Classification Community Type	Community Description
CUT1a Mineral Cultural Thicket	CUT1a ecosites feature a higher density of shrub species, but typically share the understory composition as adjacent CUM1 areas. Common shrub species include Common Ninebark (*Physocarpus opulifolius*), Gray Dogwood (*Cornus racemosa*), European Buckthorn, and River Grape.
CUT1b European Buckthorn Cultural Thicket	A large thicket comprised almost entirely of a continuous canopy of tall European Buckthorn was noted as present north of the FOD7-4 ecosites. This thicket featured very low species diversity and the understory was almost completely devoid of herbaceous species.
CUT1/CUM1 Mineral Cultural Meadow/ Mineral Cultural Thicket	Several portions of the study area were noted as having vegetation assemblages resembling CUM1 and CUT1a ecosites. These areas are denoted as CUT1/CUM1.
CUW1 Mineral Cultural Woodland	Small, wooded parcels are present throughout the study area. These are variable in composition, but typically either dominated by Trembling Aspen (*Populus tremuloides*), Manitoba Maple, or Black Walnut. These ecosites do not typically form a significant canopy and are often associated with robust shrub margins comprised of European Buckthorn, Gray Dogwood, River Grape, and Ninebark. Understory is typically similar to adjacent CUM1 areas.
D Open/Disturbed	Multiple areas were identified as having been heavily modified or disturbed within the Adelaide study area. This includes granular and paved pathways, informal trail systems, sports fields, and other manicured or landscaped areas. Manicured lawns are typically graminoid-dominated with sod-forming species interspersed with common weeds. Waste areas are similarly dominated by weedy or non-native species. Habitat potential in these areas is typically low, though lone mature trees do have potential to support nesting birds and mammals. A small drainage swale was noted at the northwest corner of the Adelaide WWTP. This small pocket contains meadow species including Purple Loosestrife, Red-osier Dogwood, and willow species. It is approximately 400 m^2 and isolated within a field of mowed grass. Habitat potential for this feature is low due to its small size and isolated nature.

The total community areas, as well as the area of each respective community within the 50 m study area boundary, are summarized in Table 4.

Table 4 Summary of Ecological Land Classification Community Areas

ELC Code	Total Area (m^2)	Area within 50 m Boundary
CUM1	37,748	13,747
CUM1/CUT1	3,271	-
CUM1/MAM2-10	2,446	198
CUT1a	3,199	1,040
CUT1b	8,554	815
CUW1	3,808	3,447
D	142,592	48,378
FOD7	5,220	-
FOD7-4	86,453	6,305
MAM2	421	421
MAM2/MAS2/SWT2	5,976	484
MAM2-1	3,504	921
MAS2-1	2,876	-
MAS2a	928	928
MAS2b	1,051	100
SWT2-2	1,965	-



- Study Area
- Adelaide Wastewater Treatment Plant Limits
- Highway
- Road
- Breeding Bird Survey Point

ELC Code | Description

- CUM1 | CUM1 - Mineral Cultural Meadow
- CUM1 | Mineral Cultural Meadow
- CUM1/CUT1 | Mineral Cultural Meadow/Mineral Cultural Thicket
- CUM1/MAM2-10 | Mineral Cultural Meadow/Forb Mineral Meadow Marsh
- CUT1a | Mineral Cultural Thicket
- CUT1b | European Buckthorn Cultural Thicket
- CUW1 | Mineral Cultural Woodland
- D | Open/Disturbed
- FOD7 | FOD7 - Fresh-Moist Cottonwood Lowland Deciduous Forest
- FOD7-4 | Fresh-Moist Black Walnut Lowland Deciduous Forest
- MAM2 | Infiltration Channel Meadow Marsh
- MAM2-1 | Reed-canary Grass Mineral Meadow Marsh
- MAM2/MAS2/SWT2 | Mineral Meadow Marsh/Mineral Shallow Marsh/Mineral Thicket Swamp
- MAS2-1 | Cattail Mineral Shallow Marsh
- MAS2a | Phragmites Mineral Thallow Marsh
- MAS2b | Forb Mineral Shallow Marsh
- SWT2-2 | SWT2-2 - Willow Mineral Thicket Swamp
- SWT2-2 | Willow Mineral Thicket Swamp

ELC Code	Total Area (m²)	Area Within 50m Boundary (m²)
CUM1	37,748	13,747
CUM1/CUT1	3,271	-
CUM1/MAM2-10	2,446	198
CUT1a	3,199	1,040
CUT1b	8,554	815
CUW1	3,808	3,447
D	142,592	48,378
FOD7	5,220	-
FOD7-4	86,453	6,305
MAM2	421	421
MAM2/MAS2/SWT2	5,976	484
MAM2-1	3,504	921
MAS2-1	2,876	-
MAS2a	928	928
MAS2b	1,051	100
SWT2-2	1,965	-

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1:4,000 metres
40 0 40 80
NAD 1983 UTM Zone 17N

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

City of London
Greenway and Adelaide Wastewater Treatment Plants

Adelaide Wastewater Treatment Plant Ecological Land Classification Communities

Date:	Project:	Submitter:	Reviewer:
February 2022	32667	K. Reis	R. Leppington

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Figure 2

I:\City of London\32667\FiguresAndTables\EA\2021\Report\EIS_Reporting\Adelaide\Figure-2-Adelaide_Wastewater_Treatment_Plant_Ecological_Land_Classification_Communities.mxd - Tabloid_L - 08-Feb-22, 02:28 PM - lmwright - TID005

5.3.2 Flora

Based on the background review, a total of one SAR and six SCC were identified as potentially occurring within the Adelaide study area. These SAR and SCC species and their potential to occur within the habitat found within the Adelaide study area are discussed further in Sections 6.6 and 6.3, respectively.

A total of 145 vascular plant species were observed within the Adelaide study area. A complete vascular plant list is provided in Appendix D. Of these species, 11 are considered S4, 56 are considered S5, and 78 are considered SNA/SNR. No SAR or SCC ranked species were observed within the Adelaide study area.

5.4 Wildlife and Wildlife Habitat

5.4.1 Birds

Based on the background review, there were a total of 128 avian species identified as having a potential to occur within the Adelaide study area. Of the 128 species identified, 9 SAR and 2 SCC were noted within the Adelaide study area. These SAR and SCC species and their potential to occur within the habitat found within the Adelaide study area are discussed further in Sections 6.6 and 6.3, respectively.

A total of 36 bird species were observed during surveys within the Adelaide study area (Appendix E). Only one SAR was observed within the Adelaide study area: Chimney Swift. The Chimney Swift was observed as a flyover near the river and not a breeder for the Adelaide study area. SAR birds are discussed further in Section 6.6. No bird SCC were observed within the Adelaide study area.

5.4.2 Herpetofauna

5.4.2.1 Adelaide Study Area

No site-specific field surveys were conducted for herptofauna within the Adelaide study area. However, the background review noted a total of 23 herpetofauna species that have a potential to occur within the Adelaide study area. Of the 23 species identified, there are 4 SAR and 3 SCC noted within the Adelaide study area. These SAR and SCC species and their potential to occur within the habitat found within the Greenway study area are discussed further in Sections 6.6 and 6.3, respectively.

5.4.3 Mammals

Based on the background review, there are a total of 40 mammal species that have a potential to occur within the study area. Of the 40 species identified, 4 SAR were noted within the study area and no SCC. The SAR were assessed to identify the habitat potential within the study area within Section 6.6.

5.4.3.1 Bat Maternity Roosting Survey

Species at Risk Habitat

The Tri-coloured Bat and the two Myotis species require different roosting habitat characteristics. Little Brown Myotis and Northern Myotis roost in tree cavities, crevices, and under loose exfoliating bark in wooded areas located near water. The Tri-coloured Bat most often roost in foliage (both dead and alive) within or below the canopy. Often, Oak (*Quercus sp.*) species are utilized for roosting because the leaves are retained longer in the fall season; however, Maple (*Acer sp.*) species are also used. Tri-Coloured Bats forage along riparian corridors and open water.

Identifying suitable roost trees for Little Brown Myotis and Northern Myotis included recording the location of all snags that exhibit appropriate attributes including cavities, loose bark, cracks, or knot holes.

A total of 30 snags greater than 10 cm DBH were located within the Adelaide study area, of which 7 are considered high-quality snags (Table 5). These high-quality snags should be considered potential SAR bat habitat for Myotis SAR, and removal of high-quality habitat trees as identified in Table 5 should be treated as though candidate SAR bat habitat is being removed.

No formal leaf-on survey was conducted, but the FOD7-4, FOD7, and CUW1 ecosites were noted to contain Oak and/or Maple trees greater than 10 cm DBH. These areas should be assumed to contain habitat that may support Tri-colored Bat. Removal of mature Oak or Maple trees, or other project works that may otherwise result in significant encroachment/impacts within these ecosites, should be treated as potential impact to candidate Tri-colored Bat habitat.

Table 5 Summary of Little Brown Myotis and Northern Myotis Suitable Roost Trees within Adelaide Study Area (Leaf-off Survey)

Tree Number	Tree Species	Diameter at Breast Height	Height Class	Description	High-quality Snag?
1	Deciduous (dead)	58	3	Long dead, some remaining loose bark may provide bat maternity habitat potential	N
2	Manitoba Maple	43, 29	2	Declining tree, large cavity 2 m high, some sloughed bark	N
3	Manitoba Maple	38	3	Knothole at 5 m	N
4	Manitoba Maple	35	3	Cavity at 3 m	N
5	Ash sp. (dead)	23	4	Dead, main stem split at 3 m	N
6	Ash sp. (dead)(1)	38	1	Dead with fissured bark at 9 to 11 m	Y
7	American Basswood	43	1	Cavity at 9 m	N
8	Common Hackberry	144	1	Knothole at 5 m, sloughed bark at 8 m on one stem	N
9	Crack Willow	130, 89, 187	1	At least one large cavity at 6 m	N
10	Manitoba Maple(1)	157	1	Large hollow off main stem 9 m high	Y
11	Manitoba Maple	45	3	Fallen and hollowed at base	N
12	Common Hackberry	68	1	Knothole at 3 m, 7 m	N
13	Crack willow(1)	220	1	Broken branch forming new cavity plus sloughing bark at point of break	Y
14	Manitoba Maple(1)	97	2	Crown broken, dead stems w significant bark sloughing.	Y

Tree Number	Tree Species	Diameter at Breast Height	Height Class	Description	High-quality Snag?
15	Common Hackberry	165	1	Knothole at 6 m	N
16	Manitoba Maple	38, 67	1	Cavity 1 m from base	N
17	Crack Willow	350+	1	Declining tree, cavity noted at 5 m, sloughed bark at 8 m	N
18	Eastern Cottonwood	93, 71, 102	1	Cavity approximately 8 m from base	N
19	Crack Willow	200+	4	Multiple injuries, fissured and cracked at multiple spots 2 to 5 m high	N
20	American Basswood	22	4	Bent with conspicuous knot hole at 3 m	N
21	Crack Willow[(1)]	157	1	Shagging bark with apparent cavities from 4 to 11 m	Y
22	Crack Willow[(1)]	300+	1	Downed branches providing cavity shelter, cavity at 12 m	Y
23	Crack Willow	300+	1	Two dead stems, one hollow from 3 to 6+ m	N
24	American Basswood[(1)]	41, 33	2	Dead, main stem appears to be rotted, partially hallow	Y
25	Deciduous (dead)	40	4	Dead, some cavities near the top (6 m) and some sloughed bark at 5 m	N
26	Common Hackberry	123	1	Knotholes at 5, 6, and 8 m	N
27	American Basswood	18, 22	2	Knotholes (3) approximately 4 m high	N
28	Crack Willow	43	1	Fissured bark at 2 m	N

Tree Number	Tree Species	Diameter at Breast Height	Height Class	Description	High-quality Snag?
29	Manitoba Maple	34	2	Declining tree; twisted and cracked stem providing cavity 7 m high	N
30	Manitoba Maple	250+	1	Declining tree; sloughing bark on two dying stems	N

(1) high-quality snag trees

Significant Wildlife Habitat - Bat Maternity Colonies

As per the criteria from the *Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E* (MNRF 2015) and the Bats and Bat Habitats: Guidelines for Wind Power Projects (MNR 2011), forested ELC communities that have a snag density greater than 10 snags per hectare for trees greater than 25 cm DBH that are in early decay (i.e., decay class 1 to 3) are considered to be candidate SWH for bat maternity roosting habitat.

The forested ELC polygons within the Adelaide study area have a total of 1.88 ha; therefore, a total of 19 or more snags are required for the study area to be considered candidate SWH for bat maternity roosting habitat. Of the 30 total snags within the Adelaide study area, only 7 trees are considered to be high-quality maternity roosting trees (i.e., decay class 1 to 3; Table 6 and Figure 3).

Therefore, the forested communities within the study area are not considered SWH for bat maternity roosting.

Table 6 Summary of High-quality Snags per Ecological Land Classification Community Type, Adelaide Wastewater Treatment Plant

Ecological Land Classification Community	Surveyed Area (ha)	No. of High-quality Snags	Snag Density (snag/ha)
FOD7-4 West	0.16	1	6.25
FOD7-4 East	1.72	6	3.49
Total Area	**1.88**		



Study Area
Adelaide Wastewater Treatment Plant Limits
Highway
Road
High-Quality Bat Tree

1:3,000
metres
30 0 30 60
NAD 1983 UTM Zone 17N

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Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

City of London
Greenway and Adelaide Wastewater Treatment Plants

Adelaide Wastewater Treatment Plant High-Quality Bat Trees

Date:	Project:	Submitter:	Reviewer:
February 2022	32667	K. Reis	R. Leppington

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Figure 3

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5.4.4 Insects

Based on the background review, there are a total of 49 species within the Adelaide study area. Of these, two SCC species were noted within the Adelaide study area. No SAR were identified within either of the study area. The potential SCC noted in the background review were assessed to identify if their potential within the study area within Section 6.3.

5.5 Aquatic Resources

The North Thames River adjacent to the Adelaide WWTP originates near Mitchell and flows through St. Mary's before reaching Fanshawe Dam approximately 13 km upstream of the Forks. The North Thames River is regulated by Fanshawe Dam with one unregulated tributary, Medway Creek, contributing natural flows downstream of the reservoir (Matrix 2019).

5.5.1 Fish Community

Background fisheries data has largely been compiled from fish sampling records from DFO, Royal Ontario Museum, MNRF, and UTRCA (Table 7). The results of these records indicate the potential for 28 fish species within the Adelaide study area, which include 2 SAR and 1 SCC. The confirmed SAR species included Silver Shiner (*Notropis photogenis*), which is classified as threatened under the ESA and under SARA; and Black Redhorse (*Moxostoma duquesnei*), which is classified as threatened under the ESA and under SARA. The confirmed SCC includes the Northern Sunfish (*Lepomis peltastes*), which is classified as special concern under the ESA 2007 and SARA.

The study area for the Adelaide WWTP is located 300 m from the Thames River, though works will be limited to within the existing fenced facility. Although there are confirmed and candidate SAR and SCC within the Thames River, no in-water or close to water works will occur. As such, proposed works are not anticipated to result in any direct or indirect impacts to aquatic species or habitats. These species will therefore not be discussed further in the later sections.

Table 7 Historical Fisheries Data Within and Surrounding the Adelaide Study Area

Common Name	Scientific Name	SARA	ESA	UTRCA Data 2005-2020	DFO SAR Mapping
Black Redhorse	*Moxostoma duquesnei*	Threatened	Threatened	X	X
Bluegill	*Lepomis macrochirus*	-	-	X	-
Bluntnose Minnow	*Pimephales notatus*	-	-	X	-
Brassy Minnow	*Hybognathus hankinsoni*	-	-	X	-
Central Stoneroller	*Campostoma anomalum*	-	-	X	-
Common Carp	*Cyprinus carpio*	-	-	X	-
Common Shiner	*Luxilus cornutus*	-	-	X	-
Fantail Darter	*Etheostoma flabellare*	-	-	X	-
Greenside Darter	*Etheostoma blennioides*	-	-	X	-
Johnny Darter	*Etheostoma nigrum*	-	-	X	-
Largemouth Bass	*Micropterus salmoides*	-	-	X	-
Longnose Dace	*Rhinichthys cataractae*			X	-
Northern Hog Sucker	*Hypentelium nigricans*	-	-	X	-
Northern Pike	*Esox lucius*	-	-	X	-
Northern Sunfish (Great Lakes - Upper St. Lawrence populations)	*Lepomis peltastes*	Special Concern	Special Concern	-	X
Mimic Shiner	*Notropis volucellus*	-	-	X	-
Pumpkinseed	*Lepomis gibbosus*	-	-	X	-
Rainbow Darter	*Etheostoma caeruleum*	-	-	X	-
River Chub	*Nocomis micropogon*	-	-	X	-
Rock Bass	*Ambloplites rupestris*	-	-	X	-

Common Name	Scientific Name	SARA	ESA	UTRCA Data 2005-2020	DFO SAR Mapping
Roseyface Shiner	*Notropis rubellus*	-	-	X	-
Shorthead Redhorse	*Moxostoma macrolepidotum*	-	-	X	-
Silver Shiner	*Notropis photogenis*	Threatened	Threatened	-	X
Smallmouth Bass	*Micropterus dolomieu*	-	-	X	-
Spotfin Shiner	*Cyprinella spiloptera*	-	-	X	-
Stonecat	*Noturus flavus*	-	-	X	-
Stripped Shiner	*Luxilus chrysocephalus*	-	-	X	-
White Sucker	*Catostomus commersonii*	-	-	X	-

SARA - *Species at Risk Act*
ESA - *Endangered Species Act*
UTRCA - Upper Thames River Conservation Authority
DFO - Fisheries and Oceans Canada
MECP - Ontario Ministry of the Environment, Conservation and Parks

5.5.1.1 Mussel Community

Current mussel data was collected from federal and provincial databases. The UTRCA did not have any available mussel data for the Adelaide study area. Federal and provincial datasets indicated the potential for two species of mussels, which are also considered to be SAR (Table 8).

As discussed in Section 5.5.1 the Adelaide WWTP is located 300 m from the Thames River, though works will be limited to within the existing fenced facility. Although there are confirmed and candidate SAR within the Thames River, no in-water or close to water works will occur. As such, proposed works are not anticipated to result in any direct or indirect impacts to aquatic species or habitats. These species will therefore not be discussed further in the later sections.

Table 8 Historical Mussel Data Within and Surrounding the Adelaide Study Area

Common Name	Scientific Name	SARA	ESA	MECP data	DFO SAR Mapping
Round Pigtoe	*Pleurobema sintoxia*	END	END	X	
Wavy-rayed Lampmussel	*Lampsilis fasciola*	THR	SC		X

SARA - *Species at Risk Act*
ESA - *Endangered Species Act*
UTRCA - Upper Thames River Conservation Authority
DFO - Fisheries and Oceans Canada
MECP - Ontario Ministry of the Environment, Conservation and Parks

6 Significant Natural Heritage Features and Functions

Significant natural heritage features and functions include those listed in the Provincial Policy Statement (MMAH 2020), the NHRM (MNR 2010), the SWHTG (MNR 2000) and the *Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E* (MNRF 2015). The findings of the site investigations were cross-referenced with the criteria provided in these documents to identify the presence of or potential presence of significant natural heritage features.

The following significant features were noted as being present, or potentially present, within the study area:

- significant woodlands
- wetlands
- SWH
- fish and fish habitat
- linkages and corridors
- SAR

Significant features that are present within the study area are discussed further in Sections 6.1 to 6.8.

6.1 Significant Woodlands

Woodlands include treed areas, woodlots, or forested areas and vary in their level of significance at the local, regional, and provincial levels.

The City's official plan recognizes significant woodlands and woodlands, which are mapped on Map 5 (Natural Heritage) of the London Plan (City of London 2016). The map indicated that there is a significant woodland directly adjacent (within 5 m) to the Adelaide WWTP at its southeastern extent (Appendix C; Figure 3).

6.2 Wetlands

Wetlands include lands that are seasonally or permanently covered by shallow water, as well as lands where the water is close to or at the surface. In either case, the presence of abundant water has caused the formation of hydric soils and has favoured the dominance of either hydrophytic plants or water tolerant plants. Wetlands also vary in their level of significance at the local, regional, and provincial levels.

Although no PSWs or wetlands are identified on the City of London's Map 5 (Natural Heritage) within the study area, the field investigations identified wetland vegetation communities adjacent the Adelaide WWTP to the east (Figure 4). The City's environmental policies specify that wetlands identified via ELC are unevaluated wetlands and should be evaluated by a qualified person in accordance with the Ontario Wetland Evaluation System (OWES; MNRF 2014), with the evaluation approved by the MNRF, to determine its significance. Wetland areas within 50 m of the WWTP are below the size threshold for OWES evaluation to be applicable (Figure 2). Additionally, it is anticipated that no direct or indirect impacts to wetlands within natural areas are anticipated since works are to be generally contained within the existing WWTP footprint.

6.3 Significant Wildlife Habitat

The assessment of SWH follows the guidelines in the NHRM (MNR 2010) and the criteria from the *Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E* (MNRF 2015), with support from the SWHTG (MNR 2000) as appropriate. There are four categories of SWH which include the following:

- seasonal concentration areas of animals
- rare vegetation communities or specialized habitat for wildlife
- habitat for species of conservation concern
- animal movement corridors

Each of these categories includes various SWH types and with criteria to evaluate significance. These four categories were assessed based on the background studies and field investigations performed by Matrix. A full SWH evaluation is provided in Appendix F, and a summary of the

confirmed or candidate SWH is provided in Table 9. To support the evaluation of SCC habitat in Appendix F, a specific evaluation with regards to SCC and their potential to occur within the study area is provided in Appendix G.

Table 9 Significant Wildlife Habitat Assessment Summary for Adelaide Wastewater Treatment Plan and Greenway Wastewater Treatment Centre

Category	Wildlife Habitat	Adelaide Wastewater Treatment Plant
Seasonal Concentration Areas of Animals	Waterfowl Stopover and Staging Areas (Terrestrial)	Candidate - Open areas adjacent to wetlands west of facility may be subjected to sheet water flooding conditions following spring freshet.
	Waterfowl Stopover and Staging Areas (Aquatic)	Candidate - MAS2 ecosites present west of facility.
	Turtle Wintering Areas	Candidate - The larger MAS2 ecosite west of the facility may be suitable overwintering habitat.
Rare Vegetation Communities and Specialized Habitat for Wildlife	Waterfowl Nesting Area	Candidate - The contiguous wetland area containing MAM, MAS, and SWT ecosites south and west of the facility meets the areal ELC requirements for this habitat type.
	Amphibian Breeding Habitat (Woodland)	Candidate - the FOD7-4 ecosites likely support vernal pooling in the early spring.
	Amphibian Breeding Habitat (Wetland)	Candidate - the MAS ecosites may support wetland-breeding amphibians.
Habitat for Species of Conservation Concern	Special Concern and Rare Wildlife Species	Candidate • Eastern Wood Pewee • Grasshopper Sparrow • Snapping Turtle • Hackberry Emperor • Monarch Confirmed • none
	Marsh Breeding Bird Habitat	Candidate - the MAS ecosites within the study area contain shallow water with emergent aquatic vegetation.
	Terrestrial Crayfish	Candidate - cultural meadows adjacent to MAM2, MAS2, or SWT ecosites may support terrestrial crayfish habitat.

Category	Wildlife Habitat	Adelaide Wastewater Treatment Plant
Animal Movement Corridors	Amphibian Movement Corridor	Candidate - natural areas adjacent or within the contiguous natural corridor of the Thames River should be considered potential amphibian movement corridors.

6.4 Fish and Fish Habitat

Although the Thames River is not within the Adelaide study area, an outlet channel that directs water toward the Thames River (MAS2 on Figure 2) exists and indirectly supports fish habitat within the Thames River through the supply of water and nutrients. No impacts to the outlet culvert or channel are anticipated from the proposed flood protection options. Works are anticipated to be limited to within the existing WWTP boundary, and no in-water or close-to-water works will occur. The potential for indirect impacts to the outlet channel are to be mitigated using the measures identified in Section 9.

Fish and fish habitat are regulated by DFO under the *Fisheries Ac*. The *Fisheries Act* requires that projects avoid causing the death of a fish or a HADD of fish habitat unless authorized by the Minister or a designated representative. The assessment of risk of fish mortality or HADD is typically done through a self-assessment process.

6.5 Linkages and Corridors

Linkages and corridors are important features within a natural system. These features are continuous, often linear bands of vegetation in the landscape which provide opportunities to connect natural areas and provide cover for wildlife movement and dispersal of otherwise isolated populations.

The Thames River Valley has been designated as a significant valleyland within *The London Plan* (City of London 2016). This area represents a significant linkage for both terrestrial and aquatic organisms. The wooded riparian area along the edge of the Thames River provides a linkage to other natural areas within the Thames River Valley system.

6.6 Species at Risk

A list of SAR with potential to occur on or adjacent to the study area was complied from the background review and agency consultation. A total of 22 SAR were identified as potentially occurring within the Adelaide study area. Following the field investigations, further evaluation was completed for SAR probability of occurrence based on the observed habitat characteristics

within the study area. A full evaluation is provided in Appendix H, and a summary provided below in Table 10.

The results of the assessment indicated that seven species within Adelaide study area were considered to have potential habitat. One additional species was confirmed within the Adelaide study area (Table 10).

Table 10 Species at Risk Potential Presence within the Greenway and Adelaide Study Area

Species	ESA	SARA	Adelaide Wastewater Treatment Plant	Source
Butternut	END	END	Potential	Dillon Consulting 2016
Kentucky Coffee-tree	THR	THR	Potential	Markham 2021
Bank Swallow	THR	THR	N/A	Dillon Consulting 2016 Birds Canada 2021
Barn Swallow	THR	THR	N/A	Dillon Consulting 2016 Birds Canada 2021
Bobolink	THR	THR	Potential	Birds Canada 2021
Chimney Swift	THR	THR	Confirmed	Dillon Consulting 2016 Birds Canada 2021
Eastern Meadowlark	THR	THR	Potential	Birds Canada 2021
Redheaded Woodpecker	SC	THR	Potential	Markham 2021
Eastern Spiny Softshell	END	THR	N/A	Dillon 2021 Birds Canada 2021
Little Brown Myotis	END	END	Potential	Dobbyn 1994
Northern Myotis	END	END	Potential	Dobbyn 1994
Tricoloured Bat	END	END	Potential	Dobbyn 1994
Black Redhorse	THR	NAR	N/A	DFO 2021
Silver Shiner	THR	THR	N/A	DFO 2021
Rayed Bean	END	END	N/A	DFO 2021
Round Pigtoe	END	END	N/A	DFO 2021
Wavvy-rayed Lampmussel	THR	SC	N/A	DFO 2021

The species indicated as potentially occurring within the study area were not observed during the surveys conducted by Matrix; however, there is still likelihood that they could be present based on previous observations as well as suitable habitats within the study area. Species with confirmed identification within the study area may require additional habitat protection and considerations. These species and their habitat protections under the ESA are as follows:

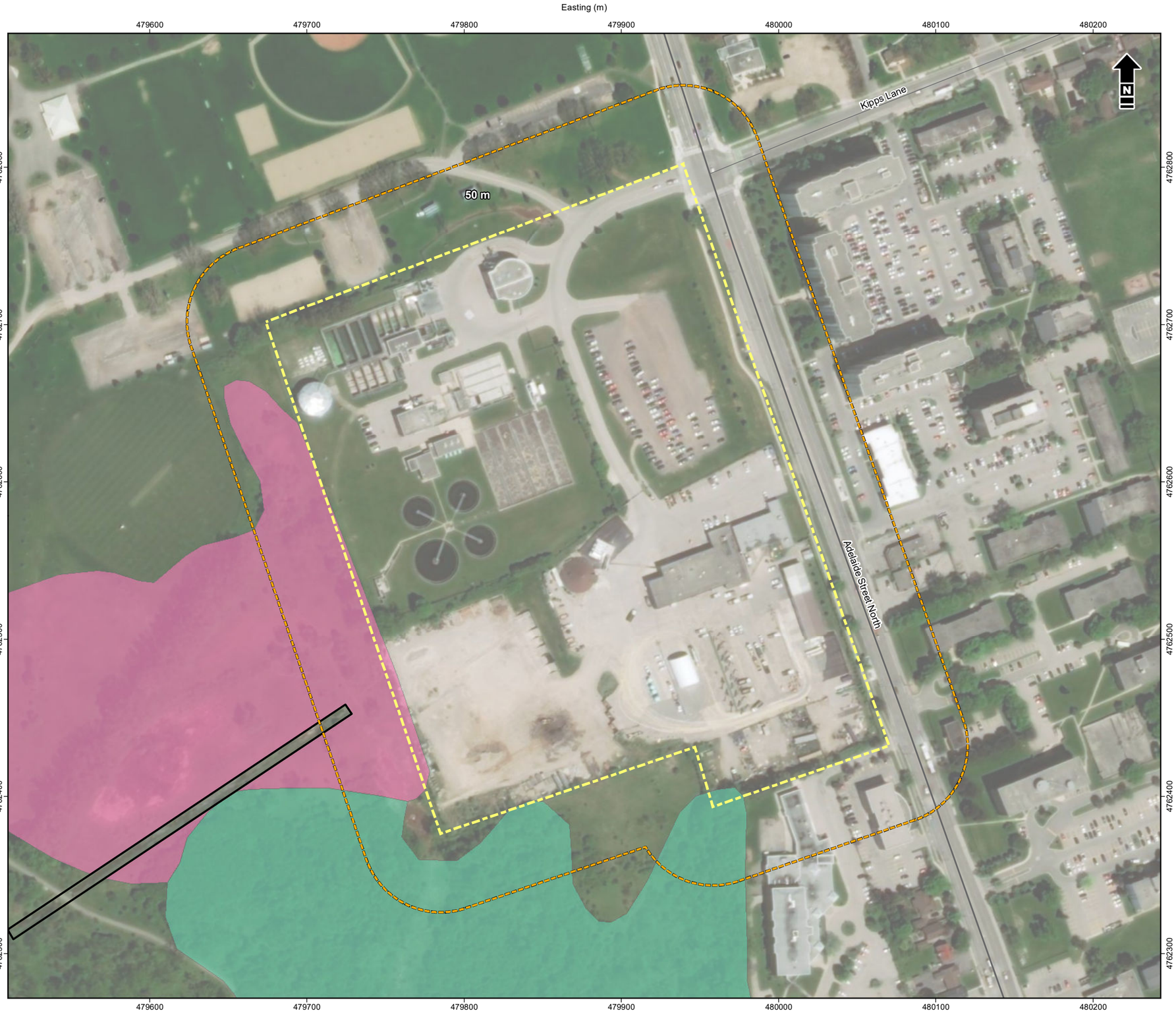
- **Chimney Swifts** were observed flying over the study area. The ESA general habitat protection identifies this species habitat as, human-made nesting/roosting feature, or a natural nesting/roosting tree cavity and the area within 90 m of the tree. Regular building use and building improvements that do not impair the function of the habitat are considered acceptable. The study area did not include any candidate nesting trees or chimneys and as a result are not considered further in the impact assessment for the study area.

6.7 Significant Features and Functions Summary

Based on the background review and site investigations to date, the potential and confirmed significant features and functions that are present within the study area are summarized in Table 11 and depicted in Figure 4.

Table 11 Confirmed and Candidate Significant Features within the Adelaide Study Area

Significant Feature	Adelaide Wastewater Treatment Plant
Significant Valleylands	None
Significant Woodland	Confirmed
Woodlands	N/A
Wetlands	Confirmed
Significant Wildlife Habitat	Candidate – Table 8
Fish and Fish Habitat	Confirmed - Indirect
Species at Risk	Confirmed and Potential – Table 9



Study Area
Adelaide Wastewater Treatment Plant Limits
Drainage Feature
Candidate SWH[1], Potential SAR[3] Habitat
Significant Woodland (London Plan), Potential SAR[3] Habitat, Candidate SWH[1]
Highway
Road

[1] SWH descriptions summarized in Appendix F
[2] SCC habitat descriptions summarized in Appendix G
[3] SAR habitat descriptions summarized in Appendix H

1:2,500
metres
25 0 25 50
NAD 1983 UTM Zone 17N

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ENVIRONMENT & ENGINEERING

City of London
Greenway and Adelaide Wastewater Treatment Plants

Significant Features and Functions Adelaide Wastewater Treatment Plant

Date:	Project:	Submitter:	Reviewer:	Figure
February 2022	32667	K. Reis	R. Leppington	4

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7 Flood Protection Alternatives

Matrix recommended that site-level flood protection approaches (e.g., berms) form the basis of the short list of alternative solutions developed to conceptual design. This recommendation relies on the key outcome of the hydraulic analysis completed by Matrix (2021a, 2021b), which demonstrates that this mitigation approach results in no or negligible upstream flood impacts (i.e., backwater). In addition, the comparative advantage of site-level flood protection is that it is expected to be fully implemented within the study area. As a result, site-level flood protection is considered more readily constructable, with less environmental and land use impacts compared to the other approaches that were screened out in this assessment.

A total of four options were selected for each site and are summarized in Table 12. Each option is also represented in Figures 5a to 5c.

Table 12 Shortlist of Alternatives for the Adelaide Study Area

Site-level Flood Protection	Adelaide Wastewater Treatment Plant
Option 1	Berm with Raised Entrance Way
Option 2	Berm with Temporary Measure at Entrance Way in Response Flood Forecasts
Option 3	Berm with Parking Lot Protection
Option 4	Do Nothing

The major undertakings of the flood mitigation alternatives at Adelaide WWTP include the creation of a berm which would encapsulate the north, west, and southern boundaries of the WWTP and would also include varying degrees of flood protection (raise entrance, temporary measures, and berm) for the east side of the property which largely includes the parking lot.

Easting (m)

479600 479700 479800 479900 480000 480100

Northing (m)

4762800 4762700 4762600 4762500 4762400

50 m

Kipps Lane

Adelaide Street North

N

MAM2

D

CUM1

CUW1

CUM1/MAM2-10

FOD7

SWT2-2

MAM2-1

MAS2-1

CUM1/CUT1

MAS2b

CUT1b

MAS2a

FOD7-4

MAM2/MAS2/SWT2

CUT1a

Study Area

Adelaide Wastewater Treatment Plant Limits

Highway

Road

Adelaide Footprint Options

Option 1

ELC Code | Description

- CUM1 | CUM1 - Mineral Cultural Meadow
- CUM1 | Mineral Cultural Meadow
- CUM1/CUT1 | Mineral Cultural Meadow/Mineral Cultural Thicket
- CUM1/MAM2-10 | Mineral Cultural Meadow/Forb Mineral Meadow Marsh
- CUT1a | Mineral Cultural Thicket
- CUT1b | European Buckthorn Cultural Thicket
- CUW1 | Mineral Cultural Woodland
- D | Open/Disturbed
- FOD7 | FOD7 - Fresh-Moist Cottonwood Lowland Deciduous Forest
- FOD7-4 | Fresh-Moist Black Walnut Lowland Deciduous Forest
- MAM2 | Infiltration Channel Meadow Marsh
- MAM2-1 | Reed-canary Grass Mineral Meadow Marsh
- MAM2/MAS2/SWT2 | Mineral Meadow Marsh/Mineral Shallow Marsh/Mineral Thicket Swamp
- MAS2-1 | Cattail Mineral Shallow Marsh
- MAS2a | Phragmites Mineral Thallow Marsh
- MAS2b | Forb Mineral Shallow Marsh
- SWT2-2 | SWT2-2 - Willow Mineral Thicket Swamp
- SWT2-2 | Willow Mineral Thicket Swamp

1:2,000 metres

20 0 20 40

NAD 1983 UTM Zone 17N

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City of London
Greenway and Adelaide Wastewater Treatment Plants

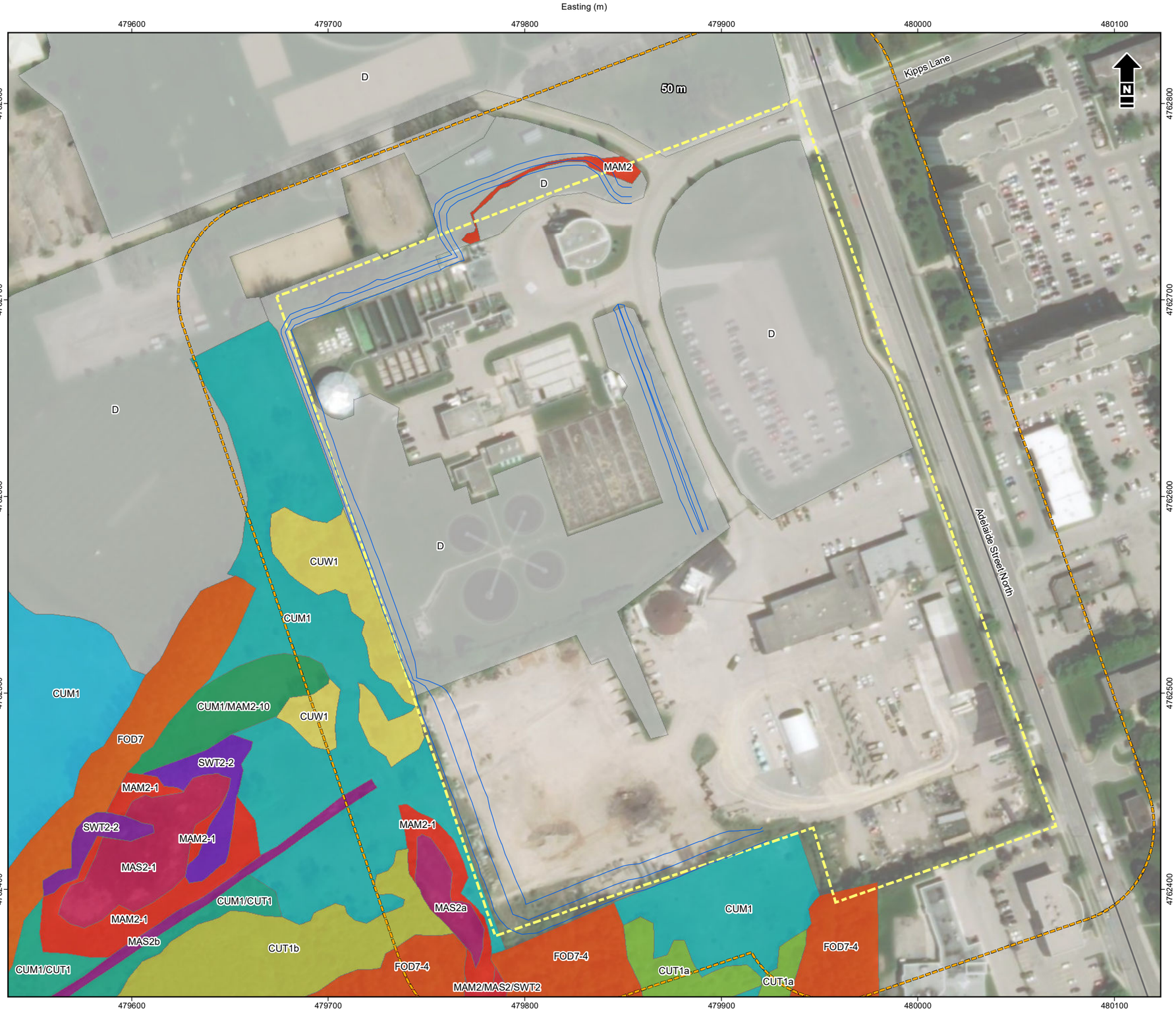
Adelaide Wastewater Treatment Plant Anticipated Impact Areas - Option 1

Date:	Project:	Submitter:	Reviewer:
May 2022	32667	K. Reis	R. Leppington

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Figure 5a

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Study Area
Adelaide Wastewater Treatment Plant Limits
Highway
Road

Adelaide Footprint Options

Option 2

ELC Code | Description

- CUM1 | CUM1 - Mineral Cultural Meadow
- CUM1 | Mineral Cultural Meadow
- CUM1/CUT1 | Mineral Cultural Meadow/Mineral Cultural Thicket
- CUM1/MAM2-10 | Mineral Cultural Meadow/Forb Mineral Meadow Marsh
- CUT1a | Mineral Cultural Thicket
- CUT1b | European Buckthorn Cultural Thicket
- CUW1 | Mineral Cultural Woodland
- D | Open/Disturbed
- FOD7 | FOD7 - Fresh-Moist Cottonwood Lowland Deciduous Forest
- FOD7-4 | Fresh-Moist Black Walnut Lowland Deciduous Forest
- MAM2 | Infiltration Channel Meadow Marsh
- MAM2-1 | Reed-canary Grass Mineral Meadow Marsh
- MAM2/MAS2/SWT2 | Mineral Meadow Marsh/Mineral Shallow Marsh/Mineral Thicket Swamp
- MAS2-1 | Cattail Mineral Shallow Marsh
- MAS2a | Phragmites Mineral Thallow Marsh
- MAS2b | Forb Mineral Shallow Marsh
- SWT2-2 | SWT2-2 - Willow Mineral Thicket Swamp
- SWT2-2 | Willow Mineral Thicket Swamp

1:2,000 metres
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NAD 1983 UTM Zone 17N

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City of London
Greenway and Adelaide Wastewater Treatment Plants

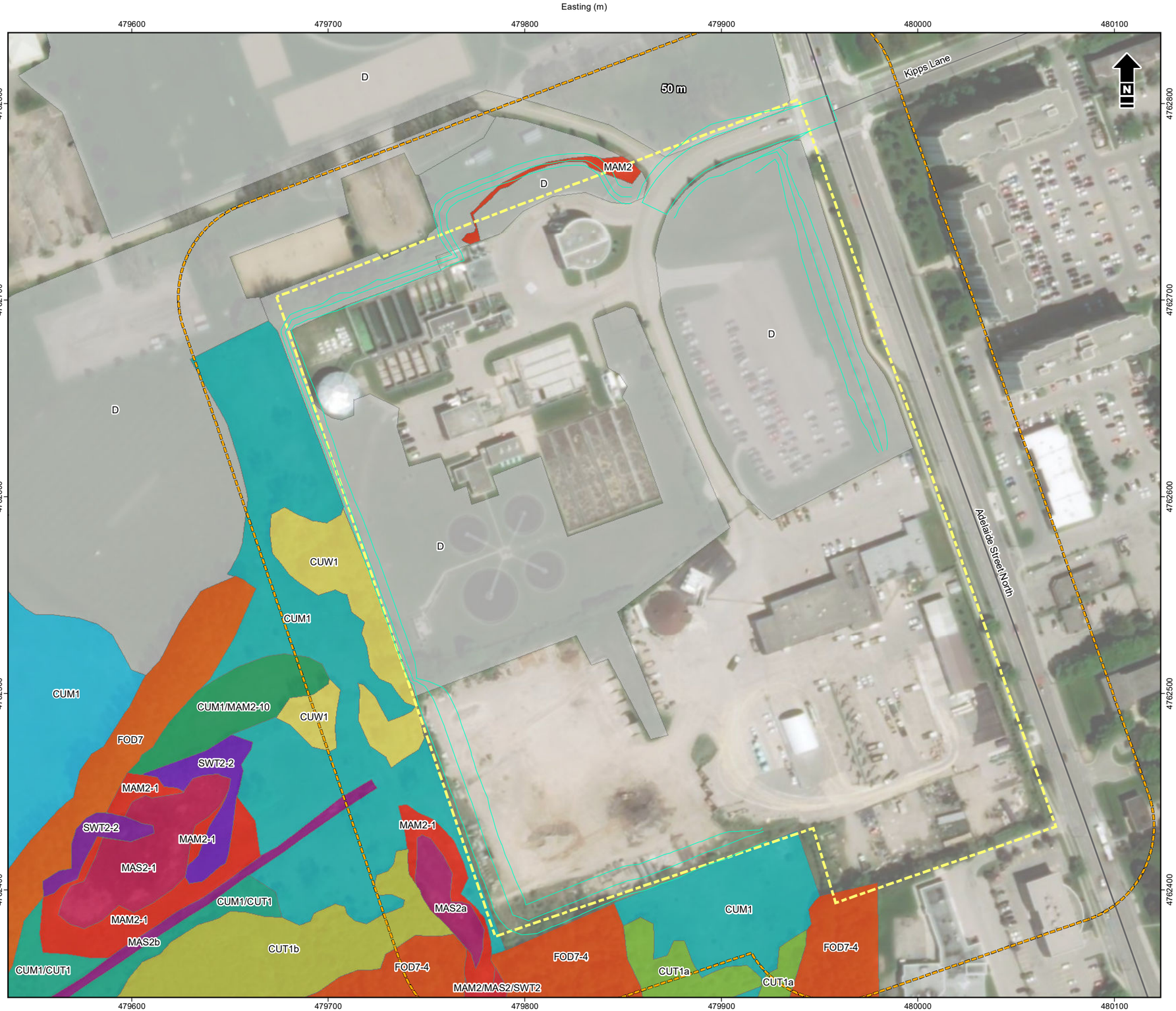
Adelaide Wastewater Treatment Plant Anticipated Impact Areas - Option 2

Date:	Project:	Submitter:	Reviewer:
May 2022	32667	K. Reis	R. Leppington

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Figure 5b

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Study Area
Adelaide Wastewater Treatment Plant Limits
Highway
Road

Adelaide Footprint Options

Option 3

ELC Code | Description

- CUM1 | CUM1 - Mineral Cultural Meadow
- CUM1 | Mineral Cultural Meadow
- CUM1/CUT1 | Mineral Cultural Meadow/Mineral Cultural Thicket
- CUM1/MAM2-10 | Mineral Cultural Meadow/Forb Mineral Meadow Marsh
- CUT1a | Mineral Cultural Thicket
- CUT1b | European Buckthorn Cultural Thicket
- CUW1 | Mineral Cultural Woodland
- D | Open/Disturbed
- FOD7 | FOD7 - Fresh-Moist Cottonwood Lowland Deciduous Forest
- FOD7-4 | Fresh-Moist Black Walnut Lowland Deciduous Forest
- MAM2 | Infiltration Channel Meadow Marsh
- MAM2-1 | Reed-canary Grass Mineral Meadow Marsh
- MAM2/MAS2/SWT2 | Mineral Meadow Marsh/Mineral Shallow Marsh/Mineral Thicket Swamp
- MAS2-1 | Cattail Mineral Shallow Marsh
- MAS2a | Phragmites Mineral Thallow Marsh
- MAS2b | Forb Mineral Shallow Marsh
- SWT2-2 | SWT2-2 - Willow Mineral Thicket Swamp
- SWT2-2 | Willow Mineral Thicket Swamp

1:2,000 metres
20 0 20 40
NAD 1983 UTM Zone 17N

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City of London
Greenway and Adelaide Wastewater Treatment Plants

Adelaide Wastewater Treatment Plant Anticipated Impact Areas - Option 3

Date:	Project:	Submitter:	Reviewer:
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Figure 5c

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7.1 Project Activities

Although there are four alternatives listed for each site, the construction footprint associated with the creation of a floodwall and/or berm will result in similar habitat alternation with the exception of “do nothing” option. Therefore, the impact assessment will focus on the following activities associated with floodwall/berm construction around the perimeter of the Greenway WTTC and the Adelaide WWTP that will influence the natural environment:

- construction access, staging, and laydown areas
- vegetation clearing, earthworks/grubbing, and disposal
- near-water construction works (Adelaide works will be within 25 m from an outlet channel into the Thames River)

The anticipated effects and mitigations of these construction works will be discussed further in Section 8.

8 Effects Assessment

The results of the natural heritage assessment indicated a number of ecological features that are present within the study area:

- significant woodlands
- wetlands
- SWH
- fish and aquatic habitat (indirect habitat at Adelaide)
- SAR

Each of these natural features are significant, as they support flora and fauna communities, connections between aquatic and terrestrial environments and, in the case of the SAR, support species that have limited habitats elsewhere both nationally and provincially. If the preferred alternative damages or interferes with these features and their function, habitat and species loss can occur.

Both direct and indirect impacts on natural heritage features and functions can occur as a result of the preferred alternative. Impacts and residual effects on natural heritage features were assessed based on the following criteria:

- duration: long or short-term
- extent: localized or expansive
- permanent: permanent or temporary
- severity: positive or negative

Most direct impacts occur during the construction phase of a project, and contain localized, short-term, temporary, negative effects that can be reduced through avoidance and proper construction practices. After construction, there may be longer-term, indirect impacts while the site recovers, and vegetation growth takes place. Typically, after the site revegetates, there is either a neutral or positive impact due to intentional native plantings, improved sediment control, and runoff control.

Predicted potential impacts associated with the short list of alternatives are described in the sections below including recommended mitigation measures and residual impacts (after mitigation).

8.1 Potential Impacts

The construction of a berms will require construction, permanent land alternation, and re-vegetation of the study area. Table 13 illustrates the potential impacts to the natural heritage features, as well as mitigation measures which should be followed to avoid serious harm. Once the mitigation measures are implemented, the residual effects are assessed to determine their duration, extent, severity, and permanence.

The greatest potential impacts are associated with the construction proximity to the significant woodland along the southern portion of the study area, wetlands along the west perimeter of the facility, as well as the outfall channel along the south-western side of the study area which drains directly into the Thames River, which is SAR habitat.

It is assumed that construction access and staging will utilize the pre-existing roads and parking lots within the study area.

Table 13 Impacts, Mitigations, and Net Effects of the Short List of Alternatives

Natural Heritage Features	Project Activity	Potential Impacts	Mitigation Measures	Net Effects Adelaide
• Fish and Aquatic Habitat • SAR • Habitat of SCC	• Near-water works to create the floodwall/berm along the western section of the Adelaide WWTP (25m from storm water outfall)	Habitat Loss and/or Alteration • temporary loss of habitat • soil compaction and rutting outside of construction zone • damage to edge trees (i.e., outside of construction zone) • changes in moisture regime • changes to the structure and composition of vegetation communities (e.g., introduction of invasive species) • fugitive dust • spills (e.g., fuel) • erosion and sedimentation	Timing Windows • 1A-4A Best Construction Practices • 1B-7B Prevention of Terrestrial Disturbance • 1D-3D, 5D-7D Erosion and Sedimentation Control • 1E-9E	• The vegetation clearing will result in a short-term, isolated, temporary disturbance to the natural features. • If the erosion and sediment controls are followed, no additional sedimentation should enter the existing stormwater drain. • No long-term negative impacts are anticipated following the mitigation measures.
		Disturbance/Avoidance of Habitat • increase noise during construction • increased human presence	Timing Widows • 1A -4A Prevention of Wildlife Mortality and Disturbance • 1C-5C	
		Injury or Incidental Take (particularly during migration to and/or emergence from hibernacula, nesting sites, or during natural travel patterns to and from habitats) • increased collision with machinery • removal of nests and eggs • smothering hibernacula or nesting sites	Timing Widows • 1A -4A Prevention of Wildlife Mortality and Disturbance • 1C-5C	

Natural Heritage Features	Project Activity	Potential Impacts	Mitigation Measures	Net Effects Adelaide
• Significant Woodlands • Wetlands • General Wildlife and Habitat • Potential SWH	• Vegetation clearing, earthworks/ grubbing to create the floodwall/berm along the north, west, and southern portion of the property adjacent to the Significant Woodland and wetlands	Habitat Loss and/or Alteration • temporary loss of habitat • soil compaction • changes in moisture regime • changes to the structure and composition of vegetation communities (e.g., introduction of invasive species) • fugitive dust • spills (e.g., fuel) • erosion and sedimentation	Timing Windows • 1A-2A, 4A Best Construction Practices • 2B, 4B, 6B, 7B Prevention of Terrestrial Disturbance • 1D-7D Erosion and Sedimentation Control • 1E-9E	• The vegetation clearing will result in a short term, isolated, temporary disturbance to the natural features. • As prescribed in the mitigations, construction activities should occur outside of the dripline of the Significant woodland. This will ensure no long-term negative impacts to this system.
		Disturbance/Avoidance of Habitat • increased noise during construction • increased human presence	Timing Widows • 1A-2A, 4A Prevention of Wildlife Mortality and Disturbance • 1C-5C	
		Injury or Incidental Take (particularly during migration to and/or emergence from hibernacula, nesting sites, or during natural travel patterns to and from habitats) • increased collision with machinery • removal of nests and eggs • smothering hibernacula or nesting site	Timing Widows • 1A, 2A, 4A Prevention of Wildlife Mortality and Disturbance • 1C-5C	

Natural Heritage Features	Project Activity	Potential Impacts	Mitigation Measures	Net Effects Adelaide
• General Wildlife and Habitat	• Construction access, staging, and laydown areas within both study areas	Habitat Loss and/or Alteration • temporary loss of habitat • soil compaction • changes in moisture regime • changes to the structure and composition of vegetation communities (e.g., introduction of invasive species) • fugitive dust • spills (e.g., fuel) • erosion and sedimentation	Timing Windows • 1A-2A, 4A Best Construction Practices • 2B, 4B, 6B, 7B Prevention of Terrestrial Disturbance • 1D-7D Erosion and Sedimentation Control 1E-9E	• It is assumed that construction access and staging will utilize the pre-existing roads and parking lots such as the Adelaide Parking lot, or the disturbed area to the south of the WWTP.
		Disturbance/Avoidance of Habitat • increased noise during construction • increased human presence	Timing Widows • 1A-2A, 4A Prevention of Wildlife Mortality and Disturbance 1C-5C	
		Injury or Incidental Take (particularly during migration to and/or emergence from hibernacula, nesting sites, or during natural travel patterns to and from habitats) • increased collision with machinery • removal of nests and eggs • smothering hibernacula or nesting site	Timing Widows • 1A, 2A, 4A Prevention of Wildlife Mortality and Disturbance 1C-5C	
• Fish and Aquatic Habitat • SAR Habitat of SCC	• Do nothing	Potential for Habitat Loss and/or Degradation during periods of high flood-levels. Inundation of the WWTP may impact the surrounding environment. • Flooding of the WWTP has the potential to cause catastrophic structural damage, uplifting of empty tanks and digestors, failure of structural footings. • This would in turn create a condition where receding floodwater with high sediment load, increased BOD, chemical contaminants, etc., to the surrounding natural environment.	None	In the event of a 250-year event, negative deleterious impacts to adjacent natural heritage features would be expected.

9 Mitigation Measures

The following outlines mitigation recommendations for construction and operational effects to the natural heritage features within the study area. These mitigation measures are designed to prevent or significantly reduce impacts to terrestrial habitat communities.

9.1 Timing Windows/Working in the Dry

The magnitude of effects to aquatic habitat and communities is related to the extent, timing, and duration of the project. The following mitigation measures are recommended:

- **1A**: Remove trees outside of the breeding bird window of April 10 to August 15 (Government of Canada 2021) and outside periods where other wildlife are migrating/emerging to hibernacula and/or nesting sites through consultation with UTRCA. If trees are to be removed during the breeding bird window, then an avian biologist must conduct a nesting survey before tree removals.
- **2A**: Confine the contractor to the minimum area necessary to perform the work.
- **3A**: In the event work needs to take place in the river, no in-water work should occur between March 15 and July 15 to protect spawning fish (MNRF 2021)
- **4A**: Ensure candidate SAR bat snag trees are protected during construction. If snag trees can not be avoided, it is recommended that snag removal occur between October 1 and March 31, of a given year.

9.2 Best Construction Practices

Implementation of best construction practices during construction will reduce the potential for spills or other materials/equipment entering the water. The following measures will be employed:

- **1B**: Control all equipment maintenance and refuelling to prevent any discharge of petroleum products. Conduct vehicular maintenance and refuelling at least 30 m from the watercourse, watercourse banks, and natural heritage features.
- **2B**: Implement surface protection measures to minimize soil compaction.
- **3B**: Store construction material, excess material, construction debris, and empty containers at least 30 m from the watercourse and banks to prevent entry.

- **4B**: Enlist a qualified environmental monitor onsite to provide advice and ensure that activities will not have any negative effects. Information for site-specific SAR should be posted in construction trailer.

- **5B**: Implement a stormwater management plan to maintain pre-construction drainage patterns and flows during all project phases.

- **6B**: Implement an emergency and response management plan to address the potential for spills.

- **7B**: Implement "Clean Equipment Protocol for Industry" (Halloran et al. 2013) to inspect and clean equipment for the purposes of invasive species prevention.

9.3 Prevention of Wildlife Mortality and Disturbance

Preventative measures during construction will reduce the potential mortality and disturbance of wildlife within the Study area, and should include the following:

- **1C**: Demarcate wildlife habitat to avoid offsite disturbance and to restrict construction activities to the work areas.

- **2C**: Implement traffic limits if onsite vehicle use is required.

- **3C**: Install exclusionary fencing to prevent wildlife from entering the construction site. Exclusionary fencing should not prohibit access to nearby habitats. Where required, redirect wildlife to areas where they can avoid the potential for incidental take, and still have access to habitats. Exclusionary fencing should be monitored daily throughout construction.

- **4C**: Inspect construction area for wildlife each morning before the commencement of construction activities. Removal of trapped wildlife should be completed by a qualified biologist.

- **5C**: Educate workers to be aware of potential wildlife occurrences and measures to take to minimized potential for injury or incidental take. Maintain a log to record and report incidents of injury and/or mortality.

9.4 Prevention of Terrestrial Disturbance

Preventative measures during construction will reduce the likelihood of disturbance and destruction of the terrestrial features, and should include the following:

- **1D**: Identify setbacks from natural features and trees with the installation of tree protection fencing along the disturbance limit (10 m). No construction activities are to occur outside of these fences (including overhead), nor the piling of construction materials.

- **2D**: Minimize the construction disturbance area to the extent feasible.

- **3D**: Retain an Arborist during detailed design to create a tree preservation plan to protect as many healthy, native trees as possible through the process.

- **4D**: Ensure floodwall and/or berm construction is located outside of the dripline for the Significant Woodland and boundary of wetlands adjacent to Adelaide WWTP

- **5D**: Implement a dust management plan for the suppression of fugitive dust.

- **6D**: Ensure that temporarily disturbed areas are restored with native vegetation and monitored during construction and post construction based on UTRCA and the cities specifications.

- **7D**: Develop a restoration plan to prescribe when and how disturbed areas will be restored. Plantings should consist of native trees, shrubs and seed mixes. Tree replacement should be at a 3:1 tree replacement ratio. Restoration plans for disturbed areas are to include an invasive species management component.

9.5 Erosion and Sediment Control

Effective erosion and sediment control (ESC) will be achieved throughout the project with careful planning and design, stringent construction supervision, monitoring of the site, and maintenance of control works throughout their operational life. ESC measures will include:

- **1E**: Develop an ESC plan to minimize the potential for erosion and construction-related sediment release into nearby natural features/water bodies and prepare ESC plan condition reports as part of the monitoring and maintenance plan.

- **2E**: Install ESC measures before groundbreaking.

- **3E**: Monitor and maintain ESC measures as per specifications.

- **4E**: Delineate storage, stockpiling, and staging areas prior to construction and inspected.

- **5F**: Install sediment control fence along the channel margins to prevent the entry of sediment into the watercourse.

- **6E**: Avoid construction during high volume rain events or significant snow melts/thaws. Construction will resume once soils have stabilized to avoid risk of erosion, soil compaction, or the potential for sediment release into nearby natural features/watercourses.

- **7E**: Direct discharge from sediment clean out to a filter bag or taken offsite for disposal.

- **8E**: Implement construction monitoring to ensure erosion and sediment measures are in place and working effectively. ESC should be checked weekly and after major rain events (>10 mm) to ensure it is installed and functioning properly. Daily monitoring will be completed by the contractor. Any deficiencies should be repaired immediately. A construction monitoring log should be maintained to ensure any deficiencies and corrective actions are documented.

- **9E**: Remove all temporary ESCs following construction once disturbed areas have stabilized.

9.6 Species at Risk

Terrestrial SAR species (i.e., plants, birds, snakes, and bats) identified in Table 11 in Section 6.7 are typically impacted by the loss of habitat and incidental encounters due to vegetation removal, site clearing activities, and construction activities. Aquatic SAR species (i.e., turtles, fish, and mussels) identified in Table 10 in Section 6.6 are all are associated with the Thames River and are typically impacted directly by in-water works through the destruction of habitat (which is not anticipated for the flood protection works at either site) or indirectly by near-water works (i.e., sedimentation, erosion, or other water quality issues arising from nearby construction machinery).

Indirect impacts to both terrestrial and aquatic SAR can be mitigated through the implementation of the mitigations identified in Sections 9.1 to 9.5.

SAR habitat is protected under the ESA; therefore, at the detailed design stage it will be important to confirm no direct impact to constraint natural areas (i.e., location of SAR and SAR habitat) as well as permitting report requirements under the ESA. Permitting and additional studies are discussed further in Section 11.

10 Residual Impacts After Mitigation

The construction of the berm within the Adelaide study area is anticipated to result in an isolated, temporary disturbance and loss of habitat while construction is taking place; however, the long-term impacts associated with this project are expected to create an overall net benefit once the new vegetation has reached maturity.

Within the Adelaide study area, the north and east portions of the site where the berm and raised entrance are to be erected are already disturbed and will include minimal vegetation removal. Any trees removed within this area will be replaced at a 3:1 ratio, which will result in a long-term net benefit for the area once the trees reach maturity. The majority of the natural heritage features within the site are located along the west and south side of the property. It has been recommended within the mitigation measures that the construction of the berm does not impede with the significant woodland located directly south of the proposed berm or the wetland communities located to the west. Tree protection fencing for this area should be located outside of the dripline in order to keep the significant woodland and wetlands intact. Along the western side of the proposed berm, there will be some vegetation removal, which is located within 25 m of a stormwater outfall that outlets into the Thames River. Mitigation measures have been put in place in order to protect this outfall and the Thames River from erosion, sedimentation, and spills. Any trees removed should be replaced at a 3:1 ratio, which will result in a long-term net benefit for the area once the trees and vegetation reach maturity.

11 Next Steps

11.1 Permitting

At the detailed design stage, potential requirements under the ESA and the City's tree protection bylaw will need to be confirmed. Specifically, the following:

- **UTRCA Permit:** any works with the regulation limit (under Ontario Regulation 157/06) will require a permit through the UTRCA.
- **ESA Permit:** under Section 17 (2) (c) of the ESA, 2007, it identifies permits for activities which may contravene the ESA. Permits related to habitat destruction would require an Overall Benefit Permit.
- **City of London Tree Bylaw Permit:** will be required for the removal of trees within the study area.

- **City of London Park Occupancy Permit:** depending on the footprint of disturbance a park occupancy permit may be required from the City's parks department.

11.2 Future Work

The impact assessment detailed within this EIS report is based on preliminary conceptual design details. Potential impacts and recommended mitigation should be revisited at the detailed design stage of the project as designs are finalized to ensure that negative impacts are minimized or eliminated through implementation of appropriate mitigation or compensation measures.

It is recommended that the following be completed in advance of finalizing construction documents to ensure requirements under the ESA are appropriately addressed and sufficient time is available to obtain the necessary permits. At the detailed design stage, the following additional studies are recommended:

- An OWES evaluation requirement is not anticipated for wetlands or wetland groups within the study area, as no wetland areas within this zone meet the minimum size criteria of 0.5 ha. If impacts to wetlands within the study area are anticipated, further characterization including delineation of wetland boundaries, more thorough OWES evaluation and confirmation of buffer/setbacks may be required.

- Confirm significant woodland boundary and buffer/setbacks. The significant woodland (i.e., Huron Street Woods) should be mapped in the field with a City ecologist. Once the boundaries are confirmed, an evaluation of the appropriate setback should be conducted.

- Although not identified during the initial ELC and floral inventory assessment, SAR tree absence should be confirmed by a tree inventory (by an ISA certified arborist) within the area of disturbance at the Adelaide facility.

    - If a Butternut is found, a Butternut health assessment is recommended on each specimen. If the Butternut is a pure species, no construction works are to occur within 25 m of Butternut. Any construction activities occurring within 25 m of the Butternut that could pose harm will be subject to an MECP Notice of Activity to register the project activities.

    - If a Kentucky Coffee-tree is found, no construction works are to occur within 25 m. Any construction activities occurring within 25 m of the Kentucky Coffee-tree may require MECP permitting under the ESA.

- Consultation with MECP with regards to the candidate SAR bat maternity roost habitat. MECP will confirm if additional bat acoustic surveys should be completed to confirm the presence or absence of potential SAR bats in an individual tree or forested area identified as potential maternity roosting habitat that will be impacted or removed. If SAR bats are present, approval for SAR bat habitat removal from the MECP will be required. Overall benefit permitting for SAR bats may include installation of compensation measures (i.e., bat boxes) to enhance bat roosting habitat adjacent to the facility where habitat is removed.

- Identified candidate SWH and potential SAR habitat will need to be reviewed in more detail once the area of impact is confirmed for this project. If impacts are anticipated to ELC polygons associated with SWH as defined in Appendix F, management and mitigation strategies will need to be considered to mitigate impacts to these features.

- Additional screening as required based on the future changes to species' listings or habitat regulations of the ESA.

12 Conclusion

The City retained Matrix to complete two Municipal Class EAs to address climate change resiliency measures at the Greenway WWTC and the Adelaide WWTP. The two facilities have been identified as vulnerable to severe flooding. The EAs will seek to identify a preferred flood protection approach to improve asset resilience, enhance treatment capabilities, and improve plant safety.

This report focused on the natural heritage features and functions of the Adelaide WWTP, with the Greenway WWTP to be discussed in a separate report. The purpose of the Environmental Impact Study (EIS) was to define and record the natural heritage features, discuss implications and constraints to the proposed short list of alternatives, and recommend mitigation measures to offset any potential negative impacts to protected features. The short list of alternatives for Adelaide WWTP recommended developing a berm with varying entrance protection.

Matrix combined information from the ecological field studies with relevant information from previous background studies to identify significant features within the study area. The results indicated a wide range of terrestrial and aquatic species and habitat features present or likely present within the study area. In the analysis of significance and function, several natural heritage features were identified, which included significant valleylands, significant woodlands and woodland, wetlands, SWH, fish and fish habitat, and SAR.

The most significant ecological functions identified within the Adelaide study area included the significant woodland and unevaluated wetlands. The confirmed avian SAR (Chimney Swift) was observed flying over the study area but did not have confirmed nesting sites within the study area and, therefore, was not anticipated to be directly impacted during construction activities. The major undertakings of the flood mitigation alternatives at Adelaide WWTP include the creation of a berm which would encapsulate the north, west, and southern boundaries of the WWTP and would also include varying degrees of flood protection (raise entrance, temporary measures, and berm) for the east side of the property which largely includes the parking lot. These construction activities, along with construction access, staging, and vegetation clearing, are anticipated to have localized temporary effects to the natural features during construction; however, no long-term negative impacts are expected following the prescribed mitigation measures.

Any long-term effects associated with these projects are expected to improve the natural features through increased native plantings. Appropriate approvals should be obtained during the detailed design phase of this project to ensure the natural features and functions within the study area are adequately protected.

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Appendix A
Terms of Reference

Appendix A

Environmental Impact Study
ISSUES SUMMARY CHECKLIST REPORT

Application Title: Greenway and Adelaide WWTP Climate Change Resiliency EA
Date Submitted: April 22, 2020
Proponent: City of London

Qualifications

Primary Consultant: Matrix Solutions Inc.
Key contact person: Andrew Doherty (adoherty@matrix-solutions.com)
Other consultant / field personnel:

Hydrogeology / Hydrology: Matrix Solutions
Biological – Flora: Matrix Solutions
Biological – Fauna: Matrix Solutions
Other: Prime Strategy and Planning, CIMA+

Context for Background Information

Subwatershed: Fork of Thames/Central London
Tributary Fact Sheet Number: n/a
Planning / Policy Area: Greenway WWTP- Southcrest; Adelaide WWTP - North London

Technical Advisory Review Team

- ☑ Ecologist Planner: Emily Williamson
- ☐ Planner for File:
- ☑ EEPAC: Sandy Levin
- ☑ Conservation Authority: Brent Verscheure
- ☑ Ministry of Natural Resources:
- ☐ Ministry of Municipal Affairs and Housing:
- ☐ Ministry of Agriculture and food:
- ☐ Other Review Groups (e.g., Community Associations , Field Naturalists):

To be identified in the broad EA consultation

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 Photography

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

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

List all supporting studies and reports available to provide background summary (e.g. subwatershed, hydrological, geo-technical, natural heritage etc.).

Check the first box if the information is relevant and required as part of this study. Check the second box if sufficient data is available.

Hydrogeological Studies for both sites (to be provided by the City)
Geotehnical Studies for both sites (to be provided by the City)
Greenway WWTP Expansion EIS (to be provided by the City)
One River Master Plan EA (Jacobs, 2018)
Thames Valley Corridor Plan - City of London (Dillon & DR Poulton Associates, 2011)
The Forks Watershed Report Card (UTRCA, 2017)
SLSR (2016) Dougan, TVC connection with Dillon doing the EIS (Emily to provide)

1.2.1 Terrain Setting

☑	☑	Soils (surface and subsurface)
☐	☐	Glacial geomorphology - landform type
☑	☑	Subwatershed
☑	☑	Topographic features
☐	☐	Ground water discharge
☑	☑	Shallow ground water/baseflow
☐	☐	Ground water discharge/aquifer
☐	☐	Aggregate resources

1.2.2 Hydrology

- ☑ ☑ Hydrological catchment boundary and of wetlands + determine the catchment areas of all wetlands
- ☑ ☑ Surface drainage pattern
- ☑ ☑ Watercourses (Permanent, Intermittent)
- ☑ ☑ Stream order (Headwater, 1st, 2nd, 3rd or higher)
- ☐ ☐ Agricultural Drains
- ☑ ☑ Downstream receiving watercourse
- ☑ ☑ Hazard Line (Map 6)

1.2.3 Natural Hazards

- ☑ ☐ 100 year Erosion Line
- ☑ ☑ Floodline mapping
- ☑ ☑ Max line mapping – UTRCA mapping + text based regulated areas

1.2.4 Vegetation

- ☑ ☑ Vegetation patch Number 00027 (Huron Street Woods)
- ☑ ☐ 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 Sites
- ☑ ☐ Rare Vegetation Communities

1.2.5 Flora

- ☑ ☐ Flora (Inventory dates, Source)

  Greenway WWTP Expansion EIS (to be provided by the City)

  flora and rare vegetation will be identified during the the ELC surveys

- ☑ ☐ Rare Flora (National, Provincial, Regional)

  Greenway WWTP Expansion EIS (to be provided by the City)

  flora and rare vegetation will be identified during the the ELC surveys

1.2.6 Fauna

☑ ☐ Fauna (Inventory dates; sources)

incidential observations will be recorded

Greenway WWTP Expansion EIS (to be provided by the City)

☑ ☐ Breeding Birds surveys to be completed
☑ ☐ Migratory Birds incidental observations will be recorded
☑ ☐ Amphibians incidental observations will be recorded
☑ ☐ Reptiles incidental observations will be recorded
☑ ☐ Mammals incidental observations will be recorded
☑ ☐ Butterflies incidental observations will be recorded
☑ ☐ Odonata incidental observations will be recorded
☑ ☐ Other
☑ ☐ Partners In Flight (PIF)

breeding bird survey to be conducted and incidental species observations will be noted during all site surveys

☑ ☐ Rare Fauna

1.2.7 Wildlife Habitat + as per MNRF 2015 Criteria, as amended from time to time, and all applicable Official Plan policies and In-force London Plan policies

☑ ☐ Species-At-Risk Regulated Habitat 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

☑ ☐ Wildlife trees (snags, cavities, x-large trees > 65 cm DBH)

☑ ☐ Forest Interior Birds

not present

☑ ☐ Area-sensitive birds

1.2.8 Aquatic Habitat

(SWS Aquatic Resource Management Reports)

☑ ☑ Fish Communities

UTRCA fisheries data
One River sampling data

☑ ☑ Fish spawning areas

☑ ☑ Fish migration routes

☑ ☑ Thermal refuge for fish

☑ ☑ Benthic inventory

UTRCA benthic data
City of London data

☑ ☑ Substrate

☑ ☑ Riparian habitat (extent and type)

Greenway has riparian habitat mapped in the One River EA

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. PPS 2.3.3)

- ☑ ☑ Valleylands
- ☑ ☑ Significant Watercourses (Thames River, Stoney Creek, Medway Creek, Dingman Creek, Pottersburg Creek, Wabuno Creek, Mud Creek, Stanton Creek (Drain), Kelly Creek (Drain)

  Thames River

- ☑ ☑ Upland Corridors / species migration routes
- ☑ ☑ Big Picture Cores and Corridors
- ☑ ☑ Linkages between aquatic and terrestrial areas (riparian habitat, runoff)
- ☑ ☑ Groundwater connections
- ☑ ☑ Patch clusters (mosaic of patches in the landscape)

1.3 Social Values

1.3.1 Human Use Values

- ☑ ☑ Recreational linkages for hiking, walking
- ☑ ☑ Nature appreciation, aesthetics
- ☑ ☑ Education, research
- ☑ ☐ Cultural / traditional heritage
- ☑ ☑ Social (parks and open space)
- ☐ ☐ Resources Products (e.g. timber, fish, furbearers, peat)
- ☐ ☐ Aggregate Resources

1.3.2 Land Use - Cultural

- ☑ ☑ Archaeological (pre 1500)
- ☑ ☑ Historical (post 1500 - present)
- ☑ ☑ Adjacent historical and archeological
- ☑ ☑ Future

1.3.3 Land Use - Active

- ☑ ☑ Archaeological (pre 1500)

- ☑ ☑ Historical (post 1500 - present)
- ☑ ☐ Adjacent historical and archeological
- ☑ ☑ 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 'S'. They also address the protection of environmental quality and ecological function with respect to water quality, fish habitat, groundwater recharge, headwaters and aquifers.

- ☑ **A component of a Subject Lands Status Report that is required to be included in the EIS is the evaluation of significance of all potential natural heritage features and areas recognized by In-force London Plan policies and/ or Official Plan policies.**

- ☑ **A component of a Subject Lands Status Report that is required to be included in the EIS is the confirmation and mapping of boundaries of all natural heritage features and areas.**

2.1 Environmentally Significant Areas

- ☐ Identified Environmentally Significant Areas (ESA)
- ☐ Name
- ☐ Potential ESAs - Expansion of an Existing ESA
- ☐ Name
- ☐ Potential ESA - Area not associated with an existing ESA
- ☐ Name

2.2 Wetlands

- ☐ Provincially Significant Wetlands
- ☐ Name
- ☐ Wetlands
- ☐ Name
- ☐ 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
- ☑ Vulnerable / Special Concern

2.5 Woodlands and Vegetation Patches

- ☑ Significant Woodlands
- ☑ Unevaluated Vegetation Patches and/ or other patches > 0.5ha

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
- ☑ Relationships between species and communities

3.2 Hydrological and Wetland Functions

- ☐ Groundwater 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

4.0 ADDITIONAL COMPONENTS AND NOTES

• EIS to show and demonstrate conformity with the Provincial Policy Statement (2020), in-force London Plan (as of Nov. 2019) policies, and current Official Plan policies (1989), Environmental Management Guidelines (2006).

General Project Infromation

Two parallel Schedule B Municipal Class Environmental Assessments to assess and develop flood mitigation concepts for climate change resiliency at the Greenway and Adelaide WWTPs in the City of London.

The project scope is summarized as follows:

1) Background Studies
- ecology assessment and environmental impact study
- stage 1 archaeology assessment (subcontracted to Archaeology Research Associates)
- define pumping/operation requirements at WWTPs (subcontracted to CIMA+)
- hydraulic screening and long-list of flood mitigation options

2) Conceptual Design
- develop short-list of conceptual flood mitigation options
- conceptual WWTP pumping options (subcontracted to CIMA+)
- evaluate and select preferred conceptual options
- reporting

3)Consultation (subcontractor support from PRIME Planning and Strategy)
-EA documentation
- consultation planning and execution
- stakeholder meetings
- Public Information Centers

Environmental Impact Study
- see attached memo outlining the draft Terms of Reference for the EIS for details
- Objected for the scoped EIS will be to characterize existing conditions, assess potential impacts from the proposed design alternatives for the WWTPs, provide recommendations and mitigations for the design and construction of the preferred climate resiliency measures for both WWTPs.
- One EIS report will be produced that will summarize both sites
- assumed study area is WWTP fence area plus area within 50m

Filed investigation for both sites will consist of the following:
- one season (summer) botanical inventory
- one season (summer) ELC
- breeding bird survey: two visits between May 24 and July 10
- bat habitat survey: two visits - leaf off in April, leaf on with ELC visit
- SAR screening - evaluate if habitat for SAR is present and the probability of species occurrence in study area
- assess potential of wildlife habitat (significant, sensitive/key habitats)
- incidental species observations during all site visits.

Appendix B
Correspondence

From:	Peter De Carvalho
To:	Karen Reis
Cc:	Robyn Leppington
Subject:	FW: [External] RE: SAR Information Request - Central London Sites MECP
Date:	September 14, 2021 11:13:21 AM
Attachments:	image001.png image002.png image003.png

Peter De Carvalho, M.Sc., EIT.
Restoration Specialist

MATRIX SOLUTIONS INC.
Environment & Engineering
650 Woodlawn Rd W Unit 7B, Guelph, ON N1K 1B8
D 226.314.1926 **C** 226.332.4392
www.matrix-solutions.com

2019 Canada's Greenest Employers

From: Species at Risk (MECP) <SAROntario@ontario.ca>
Sent: August 27, 2021 4:40 PM
To: Peter De Carvalho <pdecarvalho@matrix-solutions.com>
Subject: [External] RE: SAR Information Request - Central London Sites

Hello Peter,

RE: Species at Risk Data Request – City of London Wastewater Treatment Plants

I apologize for the delay in response. The Ministry of the Environment, Conservation and Parks (MECP) understands that Matrix Solutions Inc. is conducting natural heritage studies for lands associated with the Greenway Wastewater Treatment Centre and the Adelaide Wastewater Treatment Plant in the City of London, as identified in the information provided.

An initial species at risk (SAR) information screening has been completed under the *Endangered Species Act, 2007* (ESA) by MECP's Species at Risk Branch (SARB) for the above-noted project location with respect to endangered and threatened species in Ontario. The following species at risk, in addition to the species identified in the Matrix memo, are known to occur in the general area of the project and should be considered in any assessment of potential impacts to SAR and/or habitat:

Greenway Wastewater Treatment Centre

- Red Mulberry (endangered) – receives species and general habitat protection.
- Round Pigtoe (endangered) – receives species and general habitat protection.
- Kentucky Coffee-tree (threatened) – receives species and general habitat protection.

Adelaide Wastewater Treatment Plant

- Kentucky Coffee-tree (threatened) – receives species and general habitat protection.
- Red-headed Woodpecker – this species is currently listed as special concern but will be up-listed to endangered in 2022, which will trigger species and habitat protection.

Please note that this is an initial screening for endangered and threatened 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 Ontario's 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.

The position of SARB is based on the information that has been provided by you on behalf of the proponent. Should information not have been made available and considered in our review, or new information comes to light, or if on-site conditions and circumstances change, please contact SARB as soon as possible (SAROntario@ontario.ca) to discuss next steps.

Regards,

Kathryn Markham
Management Biologist
Permissions and Compliance Section, Species at Risk Branch
Ministry of the Environment, Conservation and Parks

From: Peter De Carvalho <pdecarvalho@matrix-solutions.com>
Sent: May 12, 2021 6:42 PM
To: Species at Risk (MECP) <SAROntario@ontario.ca>
Subject: SAR Information Request - Central London Sites

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Hi there,

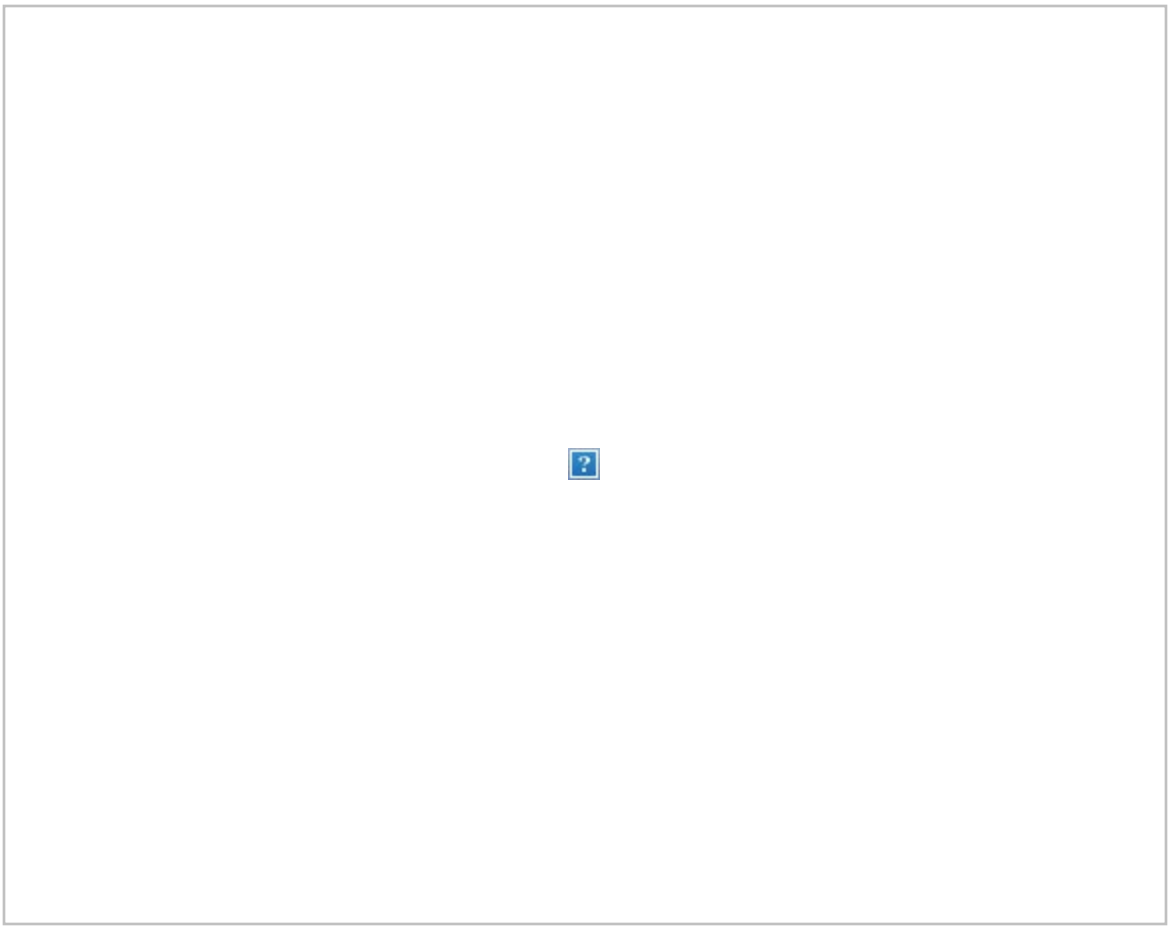
We're currently conducting a natural heritage background review for lands adjacent to the Thames River in London, Ontario. We've completed a background review using LIO, NHIC, iNaturalist, eBird, the OBBA, ORAA, and the Ontario Butterfly Atlas and carried out a preliminary desktop analysis based on the MNRF Natural Heritage Information Request Guide.

At this time we're requesting any additional SAR information from MECP records to evaluate constraints on and adjacent to these properties.

The two sites are the lands within 50 m of two wastewater treatment plants. The first is Greenway Wastewater Treatment Centre (109 Greenside Ave, London, ON N6J 2X5)



And the second is the Adelaide Wastewater Treatment Plant (1153 Adelaide St N #0B1, London, ON N5Y 2N4)



We have identified the following species as potentially present within our study areas:

Common Name	Scientific Name	ESA	SARA
Birds			
Bank Swallow	Riparia riparia	THR	THR
Barn Swallow	Hirundo rustica	THR	THR
Bobolink	Dolichonyx oryzivorus	THR	THR
Chimney Swift	Chaetura pelagica	THR	THR
Common Nighthawk	Contopus virens	SC	SC
Eastern Meadowlark	Sturnella magna	THR	THR
Eastern Wood-pewee	Contopus virens	SC	SC
Wood Thrush	Hylocichla mustelina	SC	THR
Aquatic			
Black Redhorse	Moxostoma duquesnei	THR	THR
Lake Sturgeon	Acipenser fulvescens pop 3	END	THR
Silver Shiner	Notropis photogenis	THR	THR
Wavy-rayed Lampmussel	Lampsilis fasciola	THR	SC
Rayed Bean	Villosa fabalis	END	END
Spotted Sucker	Minytrema melanops	SC	SC
Reptiles			
Blanding's Turtle	emydoidea blandingii	END	END
Eastern Foxsnake	Pantherophis vulpinus	END	END
Eastern Hog-nosed Snake	Heterodon platirhinos	THR	THR
Northern Map Turtle	Graptemys geographica	SC	SC
Queensnake	Regina septemvittata	END	END
Snapping Turtle	Chelydra serpentina	SC	SC
Spiny Softshell	Apalone spinifera	END	END
Invertebrates			
Monarch	Danaus plexippus	SC	SC
Mammals			
American Badger	Taxidea taxus jacksoni	END	END
Flora			
Broad Beech Fern	Phegopteris hexagonoptera	SC	SC
Butternut	Juglans cinerea	END	END

Any information you can provide regarding the natural heritage of the area and potential presence of additional SAR, SCC, or SWH would be greatly appreciated.

Thanks so much for your time,

Peter

Peter De Carvalho, M.Sc., EIT.
Restoration Specialist

MATRIX SOLUTIONS INC.
Environment & Engineering
650 Woodlawn Rd W Unit 7B, Guelph, ON N1K 1B8
D 226.314.1926 **C** 226.332.4392
www.matrix-solutions.com

2019 Canada's Greenest Employers



From:	Peter De Carvalho
To:	Karen Reis
Cc:	Robyn Leppington
Subject:	FW: [External] FW: Natural Heritage/SWH Information Request - Central London Sites MNRF
Date:	September 14, 2021 11:14:57 AM
Attachments:	image001.png image002.png image003.png

Peter De Carvalho, M.Sc., EIT.
Restoration Specialist

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2019 Canada's Greenest Employers

From: Webb, Jason (MNRF) <Jason.Webb@ontario.ca>
Sent: June 9, 2021 8:57 AM
To: Peter De Carvalho <pdecarvalho@matrix-solutions.com>
Subject: [External] FW: Natural Heritage/SWH Information Request - Central London Sites

Hello Peter,

Thank you for sending an email to the Ministry of Natural Resources and Forestry (MNRF) nrisc@ontario.ca email requesting background information for the wastewater treatment plants in London.

Please circulate any future related projects within the MNRF Aylmer District geography to MNRF.Ayl.Planners@ontario.ca.

As requested, please see the following information as it pertains to each site:

Greenway Wastewater Treatment Centre:

- In the event work needs to take place in the river, no in-water work should occur between **March 15 – July 15** to protect spawning fish
- The project is not located within proximity to a Provincially Significant Wetland Complex
- The project is not located within proximity to a provincially significant ANSI
- No known Significant Wildlife Habitat

Adelaide Wastewater Treatment Plant

- In the event work needs to take place in the river, no in-water work should occur between **March 15 – July 15** to protect spawning fish
- The project is not located within proximity to a Provincially Significant Wetland Complex
- The project is not located within proximity to a provincially significant ANSI
- No Known Significant Wildlife Habitat

The Ministry of Environment, Conservation and Parks (MECP) has now assumed responsibility for the Endangered Species Act (ESA), including species at risk (SAR) in Ontario. All future correspondence related to ESA or SAR should be sent to SAROntario@ontario.ca to reach the MECP directly.

Please let me know directly if you have any additional questions or require clarification.

Thanks,

Jason Webb
Management Biologist
Ministry of Natural Resources and Forestry
Aylmer District
226-559-4906
Jason.webb@ontario.ca

Please Note: As part of providing accessible customer service, please let me know if you have any accommodation needs or require communication supports or alternate formats.

From: Peter De Carvalho <pdecarvalho@matrix-solutions.com>
Sent: Wednesday, May 12, 2021 6:47 PM
To: NRISC (MNRF) <NRISC@ontario.ca>
Subject: Natural Heritage/SWH Information Request - Central London Sites

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Hi there,

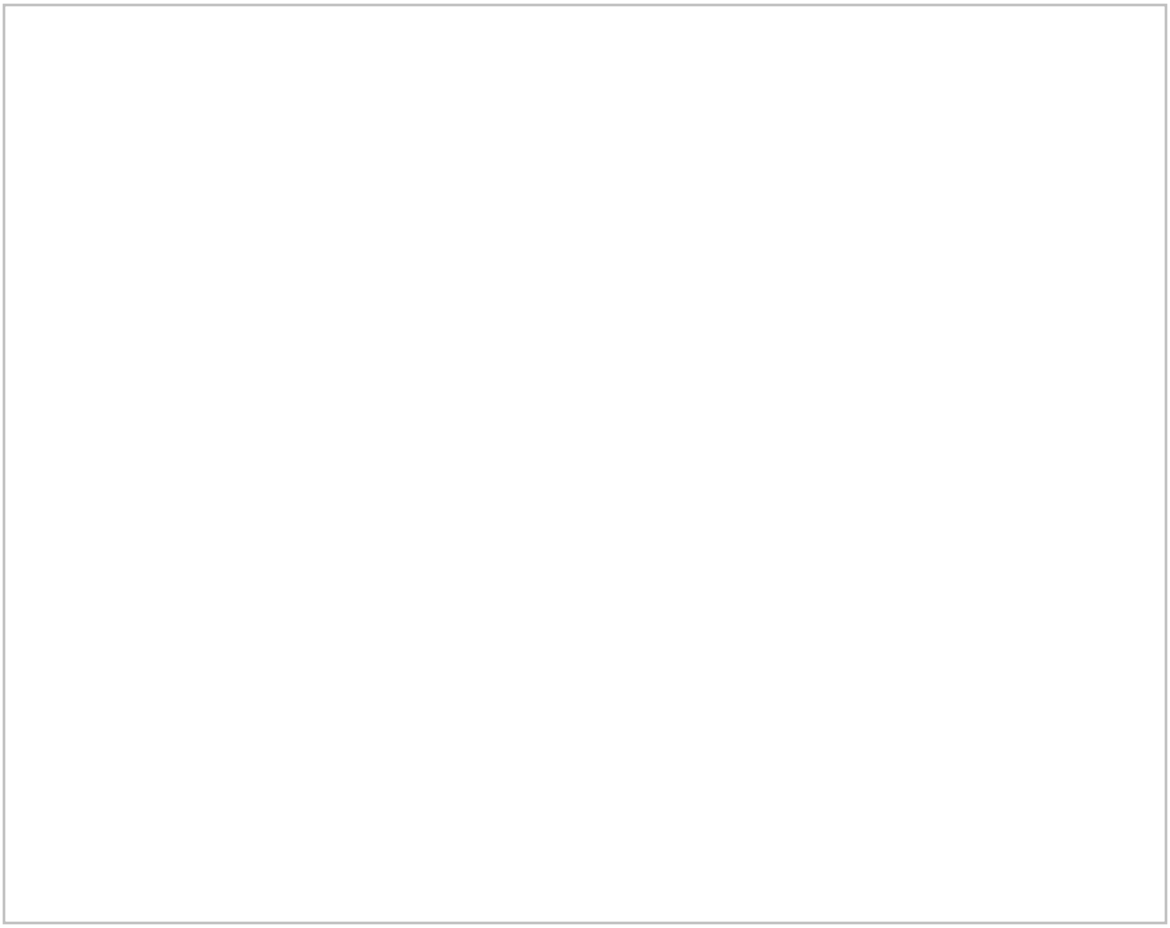
We're currently conducting a natural heritage background review for lands adjacent to the Thames River in London, Ontario. We've completed a background review using LIO, NHIC, iNaturalist, eBird, the OBBA, ORAA, and the Ontario Butterfly Atlas and carried out a preliminary desktop analysis based on the MNRF Natural Heritage Information Request Guide.

At this time we're requesting any additional natural heritage information (wetland assessments, SWH, other natural heritage features) from MNRF records to evaluate constraints on and adjacent to these properties.

The two sites are the lands within 50 m of two wastewater treatment plants. The first is Greenway Wastewater Treatment Centre (109 Greenside Ave, London, ON N6J 2X5)



And the second is the Adelaide Wastewater Treatment Plant (1153 Adelaide St N #0B1, London, ON N5Y 2N4)



Any information you can provide for these sites would be greatly appreciated.

Thanks for your help,

Peter

Peter De Carvalho, M.Sc., EIT.
Restoration Specialist

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From:	Peter De Carvalho
To:	Karen Reis
Cc:	Robyn Leppington
Subject:	FW: [External] Information Request - Greenway and Adelaide WWTP, London UTRCA
Date:	September 14, 2021 11:14:33 AM
Attachments:	IMAGE.png IMAGE.png IMAGE.png Greenway - regulations mapping.pdf Greenway - mussel records.pdf Greenway - fish records.pdf Greenway - benthic records.pdf Adelaide WTF - regulations mapping.pdf Adelaide WTP - fish records.pdf Adelaide WTP - benthic records.pdf image002.jpg

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Peter De Carvalho, M.Sc., EIT.
Restoration Specialist

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2019 Canada's Greenest Employers

From: Cari Ramsey <ramseyc@thamesriver.on.ca>
Sent: June 1, 2021 12:44 PM
To: Peter De Carvalho <pdecarvalho@matrix-solutions.com>
Cc: Brent Verscheure <VerscheureB@thamesriver.on.ca>; Robyn Leppington <rleppington@matrix-solutions.com>
Subject: [External] Information Request - Greenway and Adelaide WWTP, London

Hi Peter;

Attached is the information we have for the two WWTPs noted above:

Greenway
1. fish, mussel, and benthic records are attached
2. regulations mapping attached
3. ESA are present within 1km of the subject property - MNRF should be contacted for most up to date information
4, SARA species are present within 1km of the subject property - DFO should be contacted for most up to date information
5. Please note that we have records of some species at risk snakes and turtle in the area. Please brief all staff/contractors to be aware of the potential presence of these species when working with heavy machinery to ensure they avoid any juveniles and adults that may be inhabitating the area
6. Watercourses in the area are warm water, therefore in-water work can be done between July 1 - March 15.

Adelaide

1. fish and benthic records attached. There are no mussel records for that area.
2. regulations mapping attached
3. ESA are present within 1km of the subject property - MNRF should be contacted for most up to date information
4, SARA species are present within 1km of the subject property - DFO should be contacted for most up to date information
5. Please note that we have records of some species at risk snakes and turtle in the area. Please brief all staff/contractors to be aware of the potential presence of these species when working with heavy machinery to ensure they avoid any juveniles and adults that may be inhabitating the area
6. Watercourses in the area are warm water, therefore in-water work can be done between July 1 - March 15.

If you have any additional information you need please let me know.

Thanks!
Cari

Cari Ramsey
Environmental Regulations Technician/ Health and Safety Specialist
UTRCA
1424 Clarke Side Road
London, ON
N5V 5B9
(519)451-2800 ext. 289
ramseyc@thamesriver.on.ca
>>> Brent Verscheure 5/13/2021 11:55 AM >>>
Thank you for your inquiry and data request, Peter.
UTRCA staff will compile data and provide to you at our earliest opportunity.

Please be patient as this data request may take up to 3 weeks.

Regards,

Brent Verscheure
Land Use Regulations Officer
1424 Clarke Rd, London, ON N5V 5B9
Tel: 519-451-2800 Ext. 318
Email:verscheureb@thamesriver.on.ca
Web:www.thamesriver.on.ca

All UTRCA offices and buildings are closed to the public to help protect the public and staff from COVID-19. I am working remotely during this time and will be monitoring all messages and emails. We apologize for any inconvenience this may cause.

>>> Peter De Carvalho <pdecarvalho@matrix-solutions.com> 5/12/2021 7:04 PM >>>
Mr. Verscheure,

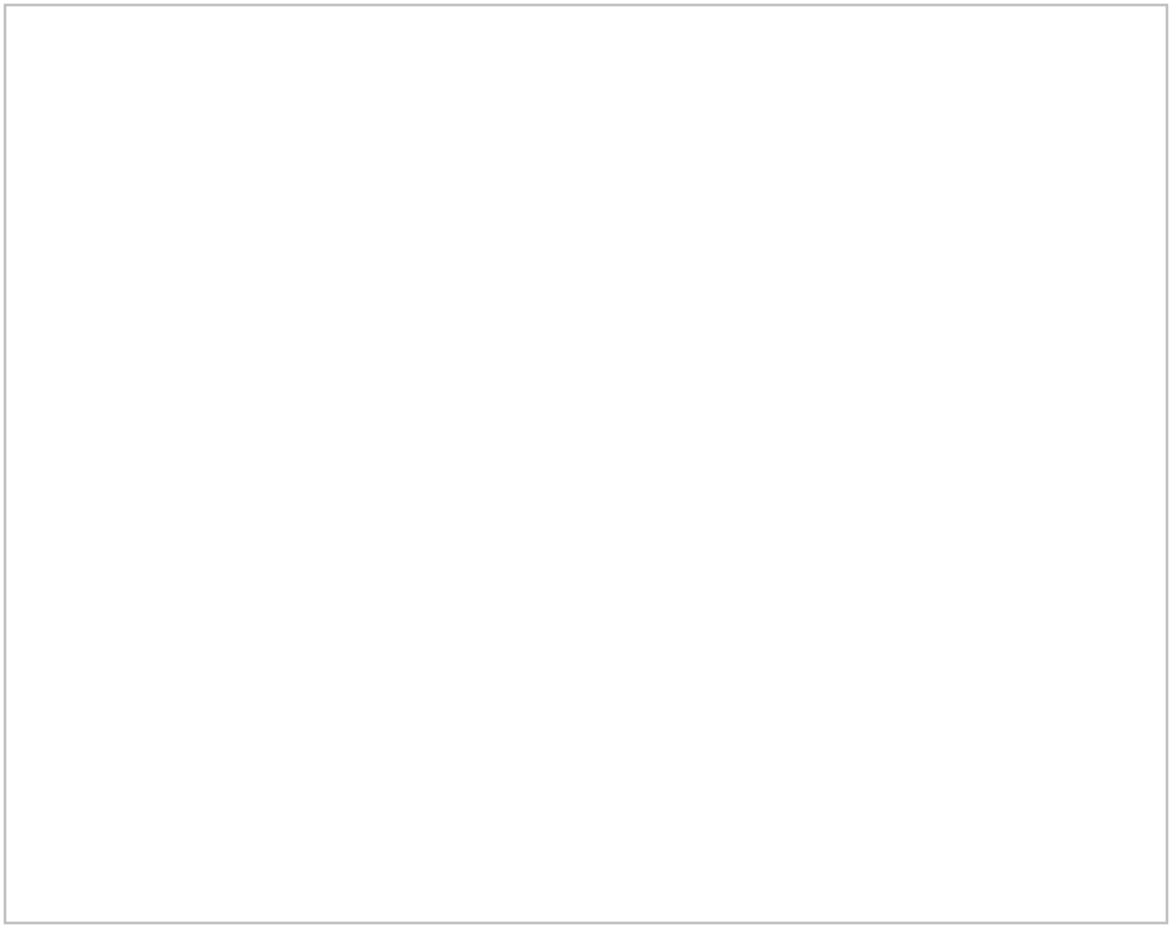
We're currently conducting a natural heritage background review for lands adjacent to the Thames River in London, Ontario in the vicinity of the Adelaide and Greenway wastewater treatment plants.

We've completed our preliminary desktop review and are now reaching out to request any available aquatic data (fish and mussel species, benthic invertebrates, water quality data *etc*.), terrestrial/wetland data (turtles, amphibians, vegetation assemblies, confirmed or candidate significant wildlife habitats, other records of species of conservation concern, *etc*.) and any information or data available for the Huron Street Woods to the south and west of the Adelaide site.

As mentioned, the two sites encompass the lands within the vicinity (appx 120 m) of two wastewater treatment plants. The first is Greenway Wastewater Treatment Centre (109 Greenside Ave, London, ON N6J 2X5)



And the second is the Adelaide Wastewater Treatment Plant (1153 Adelaide St N #0B1, London, ON N5Y 2N4)



Any information you can provide for these sites would be greatly appreciated.

Thanks very much for your help,

Peter

Peter De Carvalho, M.Sc., EIT.
Restoration Specialist

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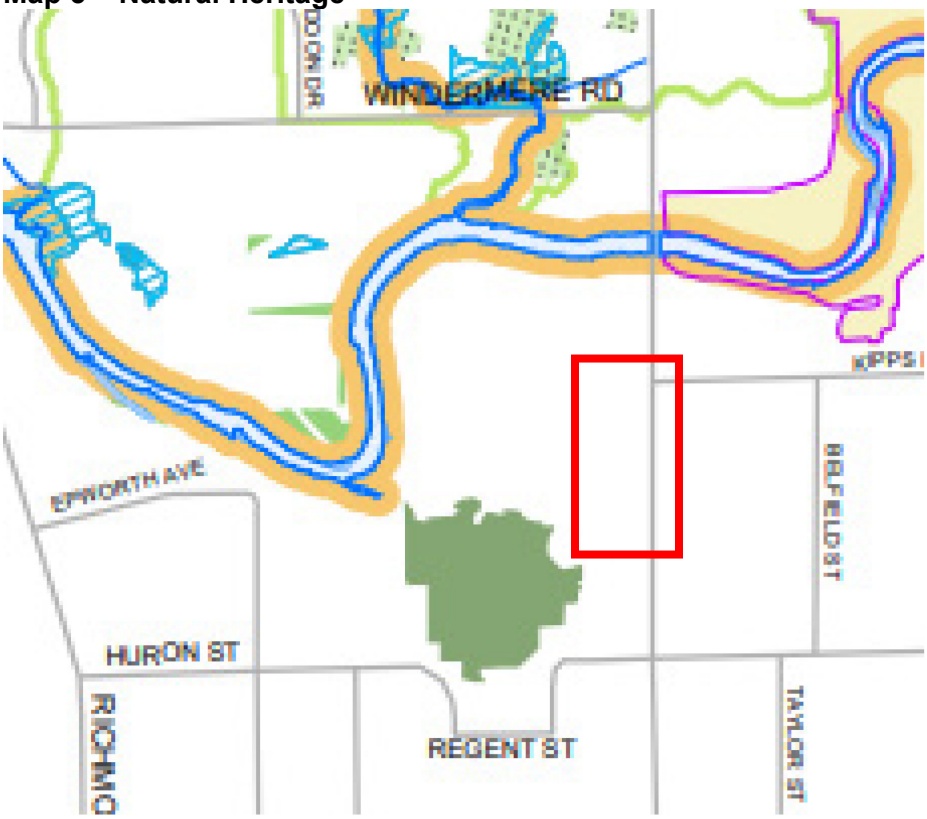
<The contents of this e-mail and any attachments are intended for the named recipient(s). This e-mail may contain information that is privileged, confidential and/or exempt from disclosure under applicable law. If you have received this message in error, are not the named recipient(s), or believe that you are not the intended recipient immediately notify the sender and permanently delete this message without reviewing, copying, forwarding, disclosing or otherwise using it or any part of it in any form whatsoever.>

Appendix C
Background Data

APPENDIX C

CITY OF LONDON OFFICIAL PLAN MAPPING

Adelaide Study Area
Map 5 – Natural Heritage



LEGEND

NATURAL HERITAGE SYSTEM

- Provincially Significant Wetlands
- Wetlands
- Unevaluated Wetlands
- Significant Woodlands
- Woodlands
- Significant Valleylands
- Valleylands
- Areas of Natural and Scientific Interest
- NAME 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
- STONEY CREEK Subwatershed Name

Table C1 Natural Heritage Information Centre - Species Results for Adelaide

OGF ID	Element Type	Common Name	Scientific Name	S-rank	SARO Status	COSEWIC Status	ATLAS NAD83 IDENT
870326	SPECIES	Spiny Softshell	*Apalone spinifera*		END	END	17MH7962
870326	SPECIES	Barn Swallow	*Hirundo rustica*		THR	THR	17MH7962
870326	SPECIES	Chimney Swift	*Chaetura pelagica*		THR	THR	17MH7962
870326	SPECIES	Bobolink	*Dolichonyx oryzivorus*		THR	THR	17MH7962
870326	SPECIES	Northern Map Turtle	*Graptemys geographica*		SC	SC	17MH7962
870326	SPECIES	Snapping Turtle	*Chelydra serpentina*		SC	SC	17MH7962
881436	SPECIES	Lowland Brittle Fern	*Cystopteris protrusa*				17MH8062
881436	SPECIES	Slender Mountain-mint	*Pycnanthemum tenuifolium*				17MH8062
881436	SPECIES	Hairy-fruited Sedge	*Carex trichocarpa*				17MH8062
881436	SPECIES	Striped Cream Violet	*Viola striata*				17MH8062
881436	SPECIES	Rigid Sedge	*Carex tetanica*				17MH8062
881436	SPECIES	Soft-hairy False Gromwell	*Lithospermum parviflorum*				17MH8062
881436	SPECIES	Bobolink	*Dolichonyx oryzivorus*		THR	THR	17MH8062

OGF - Ontario Geospatial Feature
SARO - Species at Risk Ontario
COSEWIC - Committee on the Status of Endangered Wildlife in Canada
END - endangered



Table C2 Ontario Reptile and Amphibian Atlas - Species Results for 17MH76

Species No.	Common Name	No. of Records	Earliest Year	Latest Year
1	Blanding's Turtle	1	1923	1923
3	Midland Painted Turtle	24	1986	2018
4	Northern Map Turtle	41	1986	2019
5	Red-eared Slider	6	2009	2018
6	Snapping Turtle	36	1986	2019
10	Dekay's Brownsnake	8	1921	2019
12	Eastern Gartersnake	27	1986	2019
13	Eastern Hog-nosed Snake	4	1965	1981
18	Milksnake	8	1986	2019
20	Queensnake	11	1955	1997
25	American Bullfrog	8	1994	2018
27	Gray Treefrog	213	1994	2017
28	Green Frog	124	1986	2019
30	Northern Leopard Frog	24	1987	2019
31	Pickerel Frog	11	2000	2009
32	Spring Peeper	285	1989	2017
33	Western Chorus Frog	147	1995	2017
34	Wood Frog	38	1986	1998
35	American Toad	132	1960	2019
40	Red-spotted Newt	1	2018	2018
41	Eastern Red-backed Salamander	10	1986	2019
44	Mudpuppy	2	2002	2010

Table C3 Ontario Reptile and Amphibian Atlas - Species Results for 17MH86

Species No.	Common Name	No. of Records	Earliest Year	Latest Year
3	Midland Painted Turtle	33	1986	2019
4	Northern Map Turtle	72	1985	2018
5	Red-eared Slider	1	2009	2009
6	Snapping Turtle	38	1970	2019
10	Dekay's Brownsnake	19	1952	2018
12	Eastern Gartersnake	43	1985	2019
13	Eastern Hog-nosed Snake	2	2013	2013
18	Milksnake	43	1985	2019
20	Queensnake	93	1964	2016
21	Red-bellied Snake	23	1986	2014
27	Gray Treefrog	12	1990	2013
28	Green Frog	43	1985	2018
30	Northern Leopard Frog	50	1985	2011
32	Spring Peeper	32	1986	2017
34	Wood Frog	4	1993	1994
35	American Toad	67	1962	2018
40	Red-spotted Newt	4	1990	2019
41	Eastern Red-backed Salamander	5	1989	1994
49	Five-lined Skink	1	2015	2015


Fanshawe Park Rd E
STONEYBROOK
CF Masonville Place
Richmond St
Stoney Creek Meadows
Adelaide St N
17MH76
SONVILLE
Western Rd
Windermere Rd
North London Athletic Fields
iversity Hospital
London Health...
Richmond St
Western University
BROUGHDALE
NORTH LONDON
Colborne St
St. Joseph's Hospital
Sarnia Rd
Western Rd
Gibbons Park
BISHOP HELLMUTH HERITAGE DISTRICT
UNIVERSITY
Kilally Rd
Kilally Valley Park
17MH86
Huron St
St Peters Cemetery
Robarts Provincia
School for the Dea
Huron St
CARLING
Cheapside St
Adelaide St N
Cheapside St
Oxford
Oxford St E
Quebec St
Oxford St E
Adelaide St N

Table C4 Ontario Butterfly Atlas - Species Results for 17MH76

Species No.	Common Name	Scientific Name	No. of Records	Earliest in Year (adults)	Latest in Year (adults)	Earliest Year	Latest Year
120	Aphrodite Fritillary	Speyeria aphrodite	1			(year not recorded)	(year not recorded)
8	Sleepy Duskywing	Erynnis brizo	1	24-May	24-May	1904	1904
40	Hobomok Skipper	Poanes hobomok	1	15-Jun	15-Jun	1904	1904
155	Eyed Brown	Lethe eurydice	1	25-Jun	25-Jun	1905	1905
85	Bog Copper	Lycaena epixanthe	1	27-Jul	27-Jul	1909	1909
63	Mustard White	Pieris oleracea	1	14-May	14-May	1950	1950
149	White Admiral	Limenitis arthemis arthemis	1	16-Jun	16-Jun	1977	1977
38	Delaware Skipper	Anatrytone logan	1	11-Jul	11-Jul	2018	2018
132	Pearl Crescent	Phyciodes tharos	1	16-Jun	16-Jun	2018	2018
154	Northern Pearly-Eye	Lethe anthedon	1	09-Jul	09-Jul	2019	2019
153	Tawny Emperor	Asterocampa clyton	2	22-Jun	16-Jul	1981	2002
88	Acadian Hairstreak	Satyrium acadica	2	26-Jun	04-Jul	2016	2016
91	Banded Hairstreak	Satyrium calanus	2	18-Jul	21-Jul	1912	2018
43	Dion Skipper	Euphyes dion	2	12-Jul	16-Jul	1909	2018
58	Eastern Tiger Swallowtail	Papilio glaucus	2	07-Jun	11-Aug	2018	2019
156	Appalachian Brown	Lethe appalachia	2	07-Jul	12-Jul	2019	2019
33	Long Dash Skipper	Polites mystic	3	18-May	01-Jul	1903	1909
35	Northern Broken-Dash	Wallengrenia egeremet	3	03-Jul	13-Jul	2002	2018
42	Broad-winged Skipper	Poanes viator	3	10-Jul	30-Jul	1904	2018
145	American Lady	Vanessa virginiensis	3	11-May	19-Aug	1972	2019
47	Dun Skipper	Euphyes vestris	3	16-Jul	13-Aug	1909	2019
92	Hickory Hairstreak	Satyrium caryaevorus	3	12-Jul	21-Jul	2018	2019
119	Great Spangled Fritillary	Speyeria cybele	3	23-Jun	07-Aug	2018	2019
157	Little Wood-Satyr	Megisto cymela	3	21-Jun	12-Aug	2018	2019
84	Bronze Copper	Lycaena hyllus	4	25-Jun	21-Sep	1902	2018
143	Lintner's Mourning Cloak	Nymphalis antiopa lintnerii	4	07-Apr	01-Sep	2013	2019
111	Azure sp.	Celastrina sp.	4	17-Apr	31-Jul	2017	2019
15	Wild Indigo Duskywing	Erynnis baptisiae	5	13-Jul	09-Sep	2018	2019
107	Eastern Tailed Blue	Cupido comyntas	5	13-Jul	16-Sep	2018	2019
158	Common Ringlet	Coenonympha tullia	5	03-Jun	24-Aug	2017	2019
146	Painted Lady	Vanessa cardui	6	27-Jun	16-Sep	1968	2019
159	Common Wood-Nymph	Cercyonis pegala	6	03-Jul	15-Aug	1970	2019
57	Eastern Giant Swallowtail	Papilio cresphontes	6	27-Jul	02-Sep	2018	2019
150	Red-spotted Purple	Limenitis arthemis astyanax	6	02-Aug	09-Sep	2019	2019
144	Milbert's Tortoiseshell	Aglais milberti	7	07-Jun	08-Oct	1968	2018
137	Eastern Comma	Polygonia comma	7	07-Apr	18-Oct	1908	2019
31	Tawny-edged Skipper	Polites themistocles	7	07-Jun	09-Jul	1903	2019
23	Least Skipper	Ancyloxypha numitor	7	07-Jun	01-Oct	2018	2019
136	Question Mark	Polygonia interrogationis	8	18-Mar	17-Sep	1965	2019
69	Clouded Sulphur	Colias philodice	9	21-Jun	27-Oct	2017	2019
151	Viceroy	Limenitis archippus	9	06-Jun	16-Sep	2018	2019
25	European Skipper	Thymelicus lineola	11	15-Jun	21-Jul	1910	2019
55	Black Swallowtail	Papilio polyxenes	12	27-May	30-Sep	1972	2019
147	Red Admiral	Vanessa atalanta	12	10-Apr	25-Sep	1908	2019
1	Silver-spotted Skipper	Epargyreus clarus	13	12-Jun	30-Aug	2016	2019
133	Northern Crescent	Phyciodes cocyta	15	02-Jun	04-Oct	2016	2019
30	Peck's Skipper	Polites peckius	17	06-Jun	01-Sep	1909	2019
65	Cabbage White	Pieris rapae	20	07-Jun	28-Sep	1909	2019
167	Monarch	Danaus plexippus	37	13-Jun	28-Sep	1968	2019

Table C5 Ontario Butterfly Atlas - Species Results for 17M86

Species No.	Common Name	Scientific Name	No. of Records	Earliest in Year (adults)	Latest in Year (adults)	Earliest Year	Latest Year
61	Checkered White	Pontia protodice	1	19-Oct	19-Oct	1894	1894
19	Common Checkered Skipper	Pyrgus communis	1			1895	1895
109	Northern Azure	Celastrina lucia	1	08-May	08-May	1901	1901
60	Spicebush Swallowtail	Papilio troilus	1			1999	1999
88	Acadian Hairstreak	Satyrium acadica	1	12-Jul	12-Jul	2004	2004
9	Juvenal's Duskywing	Erynnis juvenalis	1	15-Jun	15-Jun	2014	2014
15	Wild Indigo Duskywing	Erynnis baptisiae	1	31-Jul	31-Jul	2014	2014
31	Tawny-edged Skipper	Polites themistocles	1	15-Jun	15-Jun	2014	2014
63	Mustard White	Pieris oleracea	1	31-Jul	31-Jul	2014	2014
93	Striped Hairstreak	Satyrium liparops	1	31-Jul	31-Jul	2014	2014
144	Milbert's Tortoiseshell	Aglais milberti	1	15-Apr	15-Apr	2015	2015
1	Silver-spotted Skipper	Epargyreus clarus	1	11-Jul	11-Jul	2017	2017
35	Northern Broken-Dash	Wallengrenia egeremet	1	11-Jul	11-Jul	2017	2017
153	Tawny Emperor	Asterocampa clyton	1	23-Jul	23-Jul	2018	2018
57	Eastern Giant Swallowtail	Papilio cresphontes	2	21-Aug	25-Aug	1901	2003
30	Peck's Skipper	Polites peckius	2	15-Jun	11-Jul	2014	2017
132	Pearl Crescent	Phyciodes tharos	2	15-Jun	11-Jul	2014	2017
111	Azure sp.	Celastrina sp.	2	08-May	15-Jun	2014	2018
23	Least Skipper	Ancyloxypha numitor	2	15-Jun	10-Aug	2014	2019
40	Hobomok Skipper	Poanes hobomok	2	11-Jun	15-Jun	2014	2019
91	Banded Hairstreak	Satyrium calanus	2	05-Jul	06-Jul	2016	2019
145	American Lady	Vanessa virginiensis	2	27-May	05-Jul	2016	2019
20	Common Sootywing	Pholisora catullus	2	11-Jul	01-Aug	2017	2019
136	Question Mark	Polygonia interrogationis	2	06-Jul	11-Jul	2017	2019
154	Northern Pearly-Eye	Lethe anthedon	2	03-Jul	11-Jul	2017	2019
70	Orange Sulphur	Colias eurytheme	3	15-Jun	11-Jul	2014	2017
69	Clouded Sulphur	Colias philodice	3	05-Jul	11-Jul	2016	2017
107	Eastern Tailed Blue	Cupido comyntas	3	05-Jul	11-Sep	2016	2018
158	Common Ringlet	Coenonympha tullia	3	15-Jun	27-Jun	2014	2019
151	Viceroy	Limenitis archippus	3	01-Aug	11-Sep	2018	2019
108.1	Spring Azure	Celastrina ladon	4	21-Apr	06-May	1899	1904
150	Red-spotted Purple	Limenitis arthemis astyanax	4	23-Jun	07-Aug	2019	2019
119	Great Spangled Fritillary	Speyeria cybele	4	05-Jul	11-Jul	2016	2019
143	Mourning Cloak	Nymphalis antiopa	4	11-Jun	11-Jul	2012	2019
147	Red Admiral	Vanessa atalanta	4	14-Apr	06-Jul	2017	2019
25	European Skipper	Thymelicus lineola	5	15-Jun	11-Jul	2015	2018
159	Common Wood-Nymph	Cercyonis pegala	5	05-Jul	31-Jul	2014	2019
137	Eastern Comma	Polygonia comma	5	07-May	01-Aug	2015	2019
152	Hackberry Emperor	Asterocampa celtis	5	15-Jun	31-Aug	2018	2019
58	Eastern Tiger Swallowtail	Papilio glaucus	6	30-May	11-Jul	1995	2017
65	Cabbage White	Pieris rapae	6	08-May	11-Sep	2014	2018
55	Black Swallowtail	Papilio polyxenes	6	13-May	05-Jul	1965	2019
133	Northern Crescent	Phyciodes cocyta	7	15-Jun	06-Aug	2014	2018
157	Little Wood-Satyr	Megisto cymela	7	15-Jun	01-Aug	2004	2019
167	Monarch	Danaus plexippus	15	12-Jun	27-Sep	1901	2019

Table C6 Ontario Breeding Bird Atlas - Species List for Square 17MH76

Region	Square	Species	Breeding Evidence Max BE	Breeding Evidence Categ	Breeding Evidence #Sq	Breeding Evidence Atlasser Name
4	17MH76	Canada Goose	FY	CONF	1	3 atlassers
4	17MH76	Wood Duck	NE	CONF	1	Ryan Zimmerling
4	17MH76	Mallard	NE	CONF	1	Stephen Bucciarelli
4	17MH76	Ring-necked Pheasant	S	POSS	1	Bob McGee
4	17MH76	Ruffed Grouse	H	POSS	1	Stephen Bucciarelli
4	17MH76	Wild Turkey	FY	CONF	1	Stephen Bucciarelli
4	17MH76	Northern Bobwhite	T	PROB	1	Stephen Bucciarelli
4	17MH76	American Bittern	T	PROB	1	Stephen Bucciarelli
4	17MH76	Great Blue Heron	H	POSS	1	2 atlassers
4	17MH76	Green Heron	A	PROB	1	Stephen Bucciarelli
4	17MH76	Turkey Vulture	V	PROB	1	Stephen Bucciarelli
4	17MH76	Northern Harrier	CF	CONF	1	Dave Martin
4	17MH76	Sharp-shinned Hawk	AE	CONF	1	Stephen Bucciarelli
4	17MH76	Cooper's Hawk	NY	CONF	1	Stephen Bucciarelli
4	17MH76	Red-tailed Hawk	NY	CONF	1	2 atlassers
4	17MH76	American Kestrel	FY	CONF	1	Bob McGee
4	17MH76	Virginia Rail	A	PROB	1	Stephen Bucciarelli
4	17MH76	Sora	A	PROB	1	Stephen Bucciarelli
4	17MH76	Killdeer	DD	CONF	1	2 atlassers
4	17MH76	Rock Pigeon	NY	CONF	1	Stephen Bucciarelli
4	17MH76	Spotted Sandpiper	T	PROB	1	Dave Martin
4	17MH76	Common Snipe	H	POSS	1	Bob McGee
4	17MH76	American Woodcock	FY	CONF	1	Dave Martin
4	17MH76	Black Tern	S	POSS	1	
4	17MH76	Mourning Dove	FY	CONF	1	2 atlassers
4	17MH76	Yellow-billed Cuckoo	H	POSS	1	Stephen Bucciarelli
4	17MH76	Black-billed Cuckoo	CF	CONF	1	Bob McGee
4	17MH76	Eastern Screech-Owl	T	PROB	1	Stephen Bucciarelli
4	17MH76	Great Horned Owl	NY	CONF	1	Stephen Bucciarelli
4	17MH76	Long-eared Owl	H	POSS	1	Stephen Bucciarelli
4	17MH76	Common Nighthawk	P	PROB	1	Stephen Bucciarelli
4	17MH76	Chimney Swift	AE	CONF	1	Bill Lindley

Region	Square	Species	Breeding Evidence Max BE	Breeding Evidence Categ	Breeding Evidence #Sq	Breeding Evidence Atlasser Name
4	17MH76	Ruby-throated Hummingbird	T	PROB	1	2 atlassers
4	17MH76	Belted Kingfisher	AE	CONF	1	Bob McGee
4	17MH76	Red-bellied Woodpecker	NY	CONF	1	Dave Martin
4	17MH76	Yellow-bellied Sapsucker	FY	CONF	1	Bob McGee
4	17MH76	Downy Woodpecker	AE	CONF	1	Bob McGee
4	17MH76	Hairy Woodpecker	NY	CONF	1	2 atlassers
4	17MH76	Northern Flicker	NY	CONF	1	Dave Martin
4	17MH76	Eastern Wood-Pewee	T	PROB	1	Dave Martin
4	17MH76	Willow Flycatcher	CF	CONF	1	2 atlassers
4	17MH76	Least Flycatcher	S	POSS	1	Stephen Bucciarelli
4	17MH76	Eastern Phoebe	NY	CONF	1	Stephen Bucciarelli
4	17MH76	Great Crested Flycatcher	T	PROB	1	2 atlassers
4	17MH76	Eastern Kingbird	NE	CONF	1	Stephen Bucciarelli
4	17MH76	Warbling Vireo	A	PROB	1	Stephen Bucciarelli
4	17MH76	Red-eyed Vireo	NY	CONF	1	Stephen Bucciarelli
4	17MH76	Blue Jay	NY	CONF	1	Stephen Bucciarelli
4	17MH76	American Crow	NE	CONF	1	2 atlassers
4	17MH76	Horned Lark	T	PROB	1	Dave Martin
4	17MH76	Purple Martin	NY	CONF	1	Bob McGee
4	17MH76	Tree Swallow	NY	CONF	1	2 atlassers
4	17MH76	Northern Rough-winged Swallow	FY	CONF	1	Bob McGee
4	17MH76	Cliff Swallow	NY	CONF	1	Stephen Bucciarelli
4	17MH76	Barn Swallow	NY	CONF	1	2 atlassers
4	17MH76	Black-capped Chickadee	NE	CONF	1	Stephen Bucciarelli
4	17MH76	Red-breasted Nuthatch	V	PROB	1	Stephen Bucciarelli
4	17MH76	White-breasted Nuthatch	FY	CONF	1	2 atlassers
4	17MH76	Brown Creeper	FY	CONF	1	Stephen Bucciarelli
4	17MH76	Carolina Wren	NE	CONF	1	Bob McGee
4	17MH76	House Wren	NY	CONF	1	Stephen Bucciarelli
4	17MH76	Winter Wren	S	POSS	1	Stephen Bucciarelli
4	17MH76	Sedge Wren	A	PROB	1	Dave Martin
4	17MH76	Marsh Wren	CF	CONF	1	Stephen Bucciarelli
4	17MH76	Blue-gray Gnatcatcher	H	POSS	1	Stephen Bucciarelli

Region	Square	Species	Breeding Evidence Max BE	Breeding Evidence Categ	Breeding Evidence #Sq	Breeding Evidence Atlasser Name
4	17MH76	Eastern Bluebird	AE	CONF	1	Bob McGee
4	17MH76	Veery	S	POSS	1	Stephen Bucciarelli
4	17MH76	Wood Thrush	A	PROB	1	Dave Martin
4	17MH76	American Robin	NY	CONF	1	Stephen Bucciarelli
4	17MH76	Gray Catbird	NY	CONF	1	Stephen Bucciarelli
4	17MH76	Brown Thrasher	T	PROB	1	Dave Martin
4	17MH76	European Starling	NY	CONF	1	Stephen Bucciarelli
4	17MH76	Cedar Waxwing	NY	CONF	1	Stephen Bucciarelli
4	17MH76	Blue-winged Warbler	S	POSS	1	Bob McGee
4	17MH76	Yellow Warbler	CF	CONF	1	Bob McGee
4	17MH76	Chestnut-sided Warbler	T	PROB	1	Bob McGee
4	17MH76	Blackburnian Warbler	T	PROB	1	Stephen Bucciarelli
4	17MH76	American Redstart	T	PROB	1	Stephen Bucciarelli
4	17MH76	Common Yellowthroat	A	PROB	1	2 atlassers
4	17MH76	Eastern Towhee	A	PROB	1	Stephen Bucciarelli
4	17MH76	Chipping Sparrow	FY	CONF	1	Stephen Bucciarelli
4	17MH76	Field Sparrow	CF	CONF	1	Stephen Bucciarelli
4	17MH76	Vesper Sparrow	T	PROB	1	Stephen Bucciarelli
4	17MH76	Savannah Sparrow	FY	CONF	1	Stephen Bucciarelli
4	17MH76	Song Sparrow	NY	CONF	1	Stephen Bucciarelli
4	17MH76	Swamp Sparrow	DD	CONF	1	Dave Martin
4	17MH76	White-throated Sparrow	S	POSS	1	Bob McGee
4	17MH76	Scarlet Tanager	FS	CONF	1	Stephen Bucciarelli
4	17MH76	Northern Cardinal	NY	CONF	1	Bob McGee
4	17MH76	Rose-breasted Grosbeak	NY	CONF	1	2 atlassers
4	17MH76	Indigo Bunting	FY	CONF	1	Stephen Bucciarelli
4	17MH76	Bobolink	AE	CONF	1	Bob McGee
4	17MH76	Red-winged Blackbird	NE	CONF	1	Dave Martin
4	17MH76	Eastern Meadowlark	A	PROB	1	Stephen Bucciarelli
4	17MH76	Common Grackle	FY	CONF	1	3 atlassers
4	17MH76	Brown-headed Cowbird	FY	CONF	1	2 atlassers
4	17MH76	Orchard Oriole	FY	CONF	1	Stephen Bucciarelli
4	17MH76	Baltimore Oriole	NY	CONF	1	Stephen Bucciarelli

Region	Square	Species	Breeding Evidence Max BE	Breeding Evidence Categ	Breeding Evidence #Sq	Breeding Evidence Atlasser Name
4	17MH76	House Finch	NY	CONF	1	Stephen Bucciarelli
4	17MH76	American Goldfinch	NY	CONF	1	Stephen Bucciarelli
4	17MH76	House Sparrow	NY	CONF	1	2 atlassers

Table C7 Ontario Breeding Bird Atlas - Species List for Square 17MH86

Region	Square	Species	Breeding Evidence Max BE	Breeding Evidence Categ	Breeding Evidence #Sq	Breeding Evidence Atlasser Name
4	17MH86	Canada Goose	NE	CONF	1	2 atlassers
4	17MH86	Mute Swan	T	PROB	1	Bill Lindley
4	17MH86	Wood Duck	FY	CONF	1	Bill Lindley
4	17MH86	American Black Duck	NE	CONF	1	Bill Lindley
4	17MH86	Mallard	FY	CONF	1	Bill Lindley
4	17MH86	Blue-winged Teal	D	PROB	1	Bill Lindley
4	17MH86	Green-winged Teal	P	PROB	1	2 atlassers
4	17MH86	Ring-necked Pheasant	T	PROB	1	Bill Lindley
4	17MH86	Wild Turkey	FY	CONF	1	2 atlassers
4	17MH86	Pied-billed Grebe	D	PROB	1	Bill Lindley
4	17MH86	Double-crested Cormorant	NB	CONF	1	Bill Lindley
4	17MH86	American Bittern	FY	CONF	1	Bill Lindley
4	17MH86	Great Blue Heron	H	POSS	1	Bill Lindley
4	17MH86	Green Heron	FY	CONF	1	Bill Lindley
4	17MH86	Turkey Vulture	H	POSS	1	Bill Lindley
4	17MH86	Osprey	NE	CONF	1	Bill Lindley
4	17MH86	Bald Eagle	NY	CONF	1	2 atlassers
4	17MH86	Northern Harrier	CF	CONF	1	Bill Lindley
4	17MH86	Sharp-shinned Hawk	CF	CONF	1	Bill Lindley
4	17MH86	Cooper's Hawk	CF	CONF	1	Bill Lindley
4	17MH86	Red-shouldered Hawk	H	POSS	1	Bill Lindley
4	17MH86	Red-tailed Hawk	NY	CONF	1	Bill Lindley
4	17MH86	American Kestrel	FY	CONF	1	Bill Lindley
4	17MH86	Virginia Rail	T	PROB	1	Bill Lindley

Region	Square	Species	Breeding Evidence Max BE	Breeding Evidence Categ	Breeding Evidence #Sq	Breeding Evidence Atlasser Name
4	17MH86	Sora	T	PROB	1	Bill Lindley
4	17MH86	Common Gallinule	H	POSS	1	Bill Lindley
4	17MH86	American Coot	H	POSS	1	Bill Lindley
4	17MH86	Killdeer	DD	CONF	1	Bill Lindley
4	17MH86	Rock Pigeon	FY	CONF	1	Bill Lindley
4	17MH86	Spotted Sandpiper	NE	CONF	1	Bill Lindley
4	17MH86	Upland Sandpiper	AE	CONF	1	Bill Lindley
4	17MH86	Common Snipe	D	PROB	1	Bill Lindley
4	17MH86	American Woodcock	T	PROB	1	Bill Lindley
4	17MH86	Mourning Dove	FY	CONF	1	Bill Lindley
4	17MH86	Yellow-billed Cuckoo	NB	CONF	1	Bill Lindley
4	17MH86	Black-billed Cuckoo	FY	CONF	1	Bill Lindley
4	17MH86	Eastern Screech-Owl	T	PROB	1	Bill Lindley
4	17MH86	Great Horned Owl	CF	CONF	1	Bill Lindley
4	17MH86	Northern Saw-whet Owl	T	PROB	1	Bill Lindley
4	17MH86	Common Nighthawk	D	PROB	1	Bill Lindley
4	17MH86	Chimney Swift	AE	CONF	1	Bill Lindley
4	17MH86	Ruby-throated Hummingbird	FY	CONF	1	Bill Lindley
4	17MH86	Belted Kingfisher	AE	CONF	1	Bill Lindley
4	17MH86	Red-headed Woodpecker	T	PROB	1	Bill Lindley
4	17MH86	Red-bellied Woodpecker	CF	CONF	1	Bill Lindley
4	17MH86	Yellow-bellied Sapsucker	AE	CONF	1	Bill Lindley
4	17MH86	Downy Woodpecker	NY	CONF	1	Bill Lindley
4	17MH86	Hairy Woodpecker	AE	CONF	1	Bill Lindley
4	17MH86	Northern Flicker	CF	CONF	1	Bill Lindley
4	17MH86	Pileated Woodpecker	AE	CONF	1	Bill Lindley
4	17MH86	Eastern Wood-Pewee	T	PROB	1	2 atlassers
4	17MH86	Alder Flycatcher	NB	CONF	1	Bill Lindley
4	17MH86	Willow Flycatcher	FY	CONF	1	Ian Platt
4	17MH86	Least Flycatcher	T	PROB	1	2 atlassers
4	17MH86	Eastern Phoebe	NE	CONF	1	Bill Lindley
4	17MH86	Great Crested Flycatcher	NB	CONF	1	Bill Lindley
4	17MH86	Eastern Kingbird	NE	CONF	1	Bill Lindley

Region	Square	Species	Breeding Evidence Max BE	Breeding Evidence Categ	Breeding Evidence #Sq	Breeding Evidence Atlasser Name
4	17MH86	Yellow-throated Vireo	T	PROB	1	Bill Lindley
4	17MH86	Warbling Vireo	CF	CONF	1	Bill Lindley
4	17MH86	Red-eyed Vireo	NE	CONF	1	Bill Lindley
4	17MH86	Blue Jay	CF	CONF	1	Bill Lindley
4	17MH86	American Crow	CF	CONF	1	Bill Lindley
4	17MH86	Horned Lark	D	PROB	1	Bill Lindley
4	17MH86	Purple Martin	AE	CONF	1	Bill Lindley
4	17MH86	Tree Swallow	FY	CONF	1	Bill Lindley
4	17MH86	Northern Rough-winged Swallow	AE	CONF	1	2 atlassers
4	17MH86	Bank Swallow	AE	CONF	1	2 atlassers
4	17MH86	Cliff Swallow	FY	CONF	1	Bill Lindley
4	17MH86	Barn Swallow	FY	CONF	1	Bill Lindley
4	17MH86	Black-capped Chickadee	FY	CONF	1	Bill Lindley
4	17MH86	Red-breasted Nuthatch	AE	CONF	1	Bill Lindley
4	17MH86	White-breasted Nuthatch	CF	CONF	1	Bill Lindley
4	17MH86	Brown Creeper	T	PROB	1	Dave Martin
4	17MH86	Carolina Wren	A	PROB	1	Bill Lindley
4	17MH86	House Wren	FS	CONF	1	Bill Lindley
4	17MH86	Marsh Wren	P	PROB	1	Bill Lindley
4	17MH86	Golden-crowned Kinglet	CF	CONF	1	Bill Lindley
4	17MH86	Blue-gray Gnatcatcher	P	PROB	1	Bill Lindley
4	17MH86	Eastern Bluebird	FY	CONF	1	Bill Lindley
4	17MH86	Veery	H	POSS	1	Bill Lindley
4	17MH86	Wood Thrush	T	PROB	1	2 atlassers
4	17MH86	American Robin	NE	CONF	1	Bill Lindley
4	17MH86	Gray Catbird	CF	CONF	1	Bill Lindley
4	17MH86	Northern Mockingbird	T	PROB	1	Bill Lindley
4	17MH86	Brown Thrasher	CF	CONF	1	Bill Lindley
4	17MH86	European Starling	AE	CONF	1	Bill Lindley
4	17MH86	Cedar Waxwing	FY	CONF	1	Bill Lindley
4	17MH86	Yellow Warbler	NE	CONF	1	Bill Lindley
4	17MH86	Chestnut-sided Warbler	P	PROB	1	Bill Lindley
4	17MH86	Black-throated Green Warbler	S	POSS	1	Bill Lindley

Region	Square	Species	Breeding Evidence Max BE	Breeding Evidence Categ	Breeding Evidence #Sq	Breeding Evidence Atlasser Name
4	17MH86	Pine Warbler	CF	CONF	1	Bill Lindley
4	17MH86	American Redstart	T	PROB	1	2 atlassers
4	17MH86	Ovenbird	T	PROB	1	Bill Lindley
4	17MH86	Northern Waterthrush	T	PROB	1	Bill Lindley
4	17MH86	Mourning Warbler	T	PROB	1	2 atlassers
4	17MH86	Common Yellowthroat	NE	CONF	1	Bill Lindley
4	17MH86	Eastern Towhee	T	PROB	1	2 atlassers
4	17MH86	Chipping Sparrow	FY	CONF	1	Bill Lindley
4	17MH86	Field Sparrow	NE	CONF	1	Bill Lindley
4	17MH86	Vesper Sparrow	DD	CONF	1	Bill Lindley
4	17MH86	Savannah Sparrow	CF	CONF	1	Bill Lindley
4	17MH86	Grasshopper Sparrow	CF	CONF	1	Bill Lindley
4	17MH86	Song Sparrow	CF	CONF	1	Bill Lindley
4	17MH86	Swamp Sparrow	T	PROB	1	Bill Lindley
4	17MH86	White-throated Sparrow	T	PROB	1	Bill Lindley
4	17MH86	Scarlet Tanager	T	PROB	1	Bill Lindley
4	17MH86	Northern Cardinal	NE	CONF	1	Bill Lindley
4	17MH86	Rose-breasted Grosbeak	FY	CONF	1	Bill Lindley
4	17MH86	Indigo Bunting	CF	CONF	1	Bill Lindley
4	17MH86	Bobolink	D	PROB	1	Bill Lindley
4	17MH86	Red-winged Blackbird	NE	CONF	1	Bill Lindley
4	17MH86	Eastern Meadowlark	AE	CONF	1	Bill Lindley
4	17MH86	Common Grackle	FY	CONF	1	Bill Lindley
4	17MH86	Brown-headed Cowbird	FY	CONF	1	3 atlassers
4	17MH86	Orchard Oriole	NB	CONF	1	Bill Lindley
4	17MH86	Baltimore Oriole	AE	CONF	1	Bill Lindley
4	17MH86	House Finch	CF	CONF	1	Bill Lindley
4	17MH86	White-winged Crossbill	H	POSS	1	Bill Lindley
4	17MH86	American Goldfinch	FY	CONF	1	Bill Lindley
4	17MH86	House Sparrow	NY	CONF	1	Bill Lindley

FIGURE C1 Fisheries and Oceans Canada - Species at Risk Results (Adelaide)

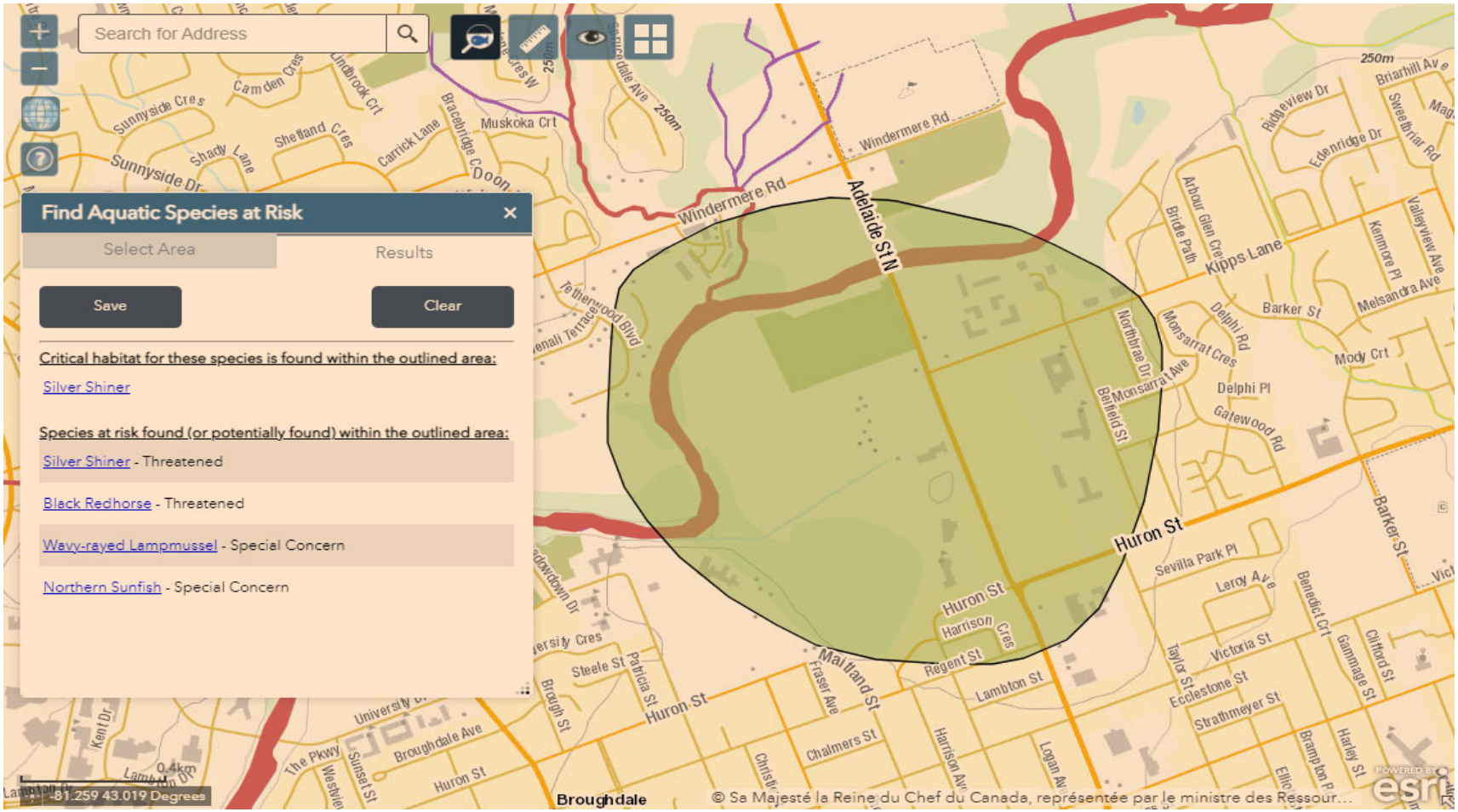


Table C8 Ontario Mammal Atlas Results

Common Name	Scientific Name	Provincial (S-rank)	National (SARA)	Provincial (ESA)
American Badger (Southwestern Ontario Population)	*Taxidea taxus jacksoni*	S1	END	END
Beaver	*Castor canadensis*	S5		
Big Brown Bat	*Eptesicus fuscus*	S4		
Coyote	*Canis latrans*	S5		
Deer Mouse	*Peromyscus maniculatus*	S5		
Eastern Chipmunk	*Tamias striatus*	S5		
Eastern Cottontail	*Sylvilagus floridanus*	S5		
Eastern Gray Squirrel	*Sciurus carolinensis*	S5		
Eastern Small-footed *Myotis*	*Myotis leibii*	S2S3	END	END
Eastern Red Bat	*Lasiurus borealis*	S4		
Ermine	*Mustela erminea*	S5		
Hairy-tailed Mole	*Parascalops breweri*	S4		
Hoary Bat	*Lasiurus cinereus*	S4		
House Mouse	*Mus musculus*	SNA		
Little Brown *Myotis*	*Myotis lucifugus*	S4	END	END
Long-tailed weasel	*Mustela frenata*	S4		
Masked Shrew	*Sorex cinereus*	S5		
Meadow Jumping Mouse	*Zapus hudsonicus*	S5		
Meadow Vole	*Microtus pennsylvanicus*	S5		
Mink	*Mustela vison*	S4		
Muskrat	*Ondatra zibethicus*	S5		
Northern *Myotis*	*Myotis septentrionalis*	S3	END	END
Northern Short-tailed Shrew	*Blarina brevicauda*	S5		
Norway Rat	*Rattus norvegicus*	SNA		
Porcupine	*Erethizon dorsatum*	S5		
Raccoon	*Procyon lotor*	S5		
Red Fox	*Vulpes vulpes*	S5		
Red Squirrel	*Tamiasciurus hudsonicus*	S5		
Silver-haired Bat	*Lasionycteris noctivagans*	S4		
Smoky Shrew	*Sorex fumeus*	S5		
Snowshoe Hare	*Lepus americanus*	S5		
Southern Flying Squirrel	*Glaucomys volans*	S4		
Star-nosed Mole	*Condylura cristata*	S5		
Striped Skunk	*Mephitis mephitis*	S5		
Tricolored Bat	*Perimyotis subflavus*	S3?	END	END

Common Name	Scientific Name	Provincial (S-rank)	National (SARA)	Provincial (ESA)
Virginia Opposum	*Didelphis virginiana*	S4		
White-footed Mouse	*Peromyscus leucopus*	S5		
White-tailed Deer	*Odocoileus virginianus*	S5		
Woodchuck	*Marmota monax*	S5		
Woodland Jumping Mouse	*Napaeozapus insignis*	S5		

SARA - *Species at Risk Act*

ESA - *Endangered Species Act*

END - endangered

Appendix D
Flora Inventory Results

Table D1 Adelaide Wastewater Treatment Plant - Flora Results 2021

Tree/Shrub/Herb/Grass	Scientific Name	Common Name	ESA	SARA	S-rank	CUM1	M1/MAM2	CUW1	FOD7	FO7-4	CUT1a	CUT1b	M2/MAS2/S	MAS2b	MAM2-1	MAS2a	MAS2-1	SWT2-2	CUT1/CUM1	D
Tree	*Ulmus americana*	American Elm	-	-	S5			x												
Herb	*Amphicarpaea bracteata*	American Hog-peanut	-	-	S5					x										
Tree	*Lonicera maackii*	Amur Honeysuckle	-	-	SNA					x										
Tree	*Acer ginnala*	Amur Maple	-	-	SNA														x	
Graminoid	*Poa annua*	Annual Bluegrass	-	-	SNA	x	x	x			x								x	x
Herb	*Erigeron annuus*	Annual Fleabane	-	-	S5					x	x								x	
Graminoid	*Scirpus atrovirens*	Black Bulrush	-	-	S5		x								x		x			
Tree	*Prunus serotina*	Black Cherry	-	-	SNR					x										
Tree	*Robinia pseudoacacia*	Black Locust	-	-	SNA		x	x											x	
Herb	*Medicago lupulina*	Black medic	-	-	SNA		x	x			x							x	x	x
Herb	*Rubus occidentalis*	Black Raspberry	-	-	S5					x	x								x	
Tree	*Juglans nigra*	Black Walnut	-	-	S4?			x	x	x	x		x					x	x	x
Tree	*Salix nigra*	Black Willow	-	-	S4		x											x		
Herb	*Solidago flexicaulis*	Broadleaf Goldenrod	-	-	S5	x	x		x											
Graminoid	*Andropogon virginicus*	Broomsedge	-	-	S4		x								x					
Herb	*Rudbeckia triloba*	Brown-eyed Susan	-	-	SNA		x													
Herb	*Cicuta bulbifera*	Bulb-bearing Water Hemlo	-	-	S5								x							
Herb	*Cirsium vulgare*	Bull Thistle	-	-	SNA					x	x				x			x		x
Herb	*Linaria vulgaris*	Butter-and-eggs	-	-	SNA			x												x
Herb	*Anemone canadensis*	Canada Anemone	-	-	S5					x										
Herb	*Solidago canadensis*	Canada Goldenrod	-	-	SNR	x	x	x	x	x	x								x	
Herb	*Cirsium arvense*	Canada Thistle	-	-	SNA	x	x	x	x	x	x				x			x	x	x
Graminoid	*Elymus canadensis*	Canada Wildrye	-	-	S5	x	x	x		x	x								x	
Tree	*Prunus virginiana*	Chokecherry	-	-	S5														x	
Shrub	*Apocynum cannabinum*	Clasping-leaf Dogbane	-	-	SNR					x										
Herb	*Fallopia scandens*	Climbing False Buckwheat	-	-	S4					x										
Shrub	*Solanum dulcamara*	Climbing Nightshade	-	-	SNA	x	x	x	x		x				x			x	x	x
Tree	*Malus pumila*	Common Apple	-	-	SNA															
Herb	*Eupatorium perfoliatum*	Common Boneset	-	-	S5		x						x	x	x		x	x		
Herb	*Arctium minus*	Common Burdock	-	-	SNA			x	x				x					x	x	x
Herb	*Typha latifolia*	Common Cattail	-	-	S5								x	x		x	x			
Herb	*Taraxacum officinale*	Common Dandelion	-	-	SNA			x	x		x	x	x					x	x	x
Shrub	*Sambucus nigra*	Common Elderberry	-	-	SNA															
Tree	*Celtis occidentalis*	Common Hackberry	-	-	S4			x		x									x	x
Herb	*Equisetum arvense*	Common Horsetail	-	-	S5		x						x		x			x		
Tree	*Syringa vulgaris*	Common Lilac	-	-	SNA			x												
Herb	*Asclepias syriaca*	Common Milkweed	-	-	S5	x	x		x		x								x	
Herb	*Leonurus cardiaca*	Common Motherwort	-	-	SNA			x	x											x
Herb	*Verbascum thapsus*	Common Mullein	-	-	SNA						x								x	
Herb	*Plantago major*	Common Plantain	-	-	SNA			x	x		x		x		x			x	x	x
Herb	*Ambrosia artemisiifolia*	Common Ragweed	-	-	S5			x											x	x
Graminoid	*Phragmites australis*	Common Reed	-	-	SNA		x						x	x	x	x	x	x	x	
Herb	*Hypericum perforatum*	Common St. John's Wort	-	-	SNA			x			x								x	
Herb	*Tanacetum vulgare*	Common Tansy	-	-	SNA	x	x	x			x				x				x	x
Herb	*Dipsacus fullonum*	Common Teasel	-	-	SNA		x	x	x		x								x	
Graminoid	*Phleum pratense*	Common Timothy	-	-	SNA					x	x								x	
Tree	*Salix fragilis*	Crack Willow	-	-	SNA				x	x										x
Herb	*Campanula rapunculoides*	Creeping Bellflower	-	-	SNA			x			x							x	x	x
Herb	*Lysimachia nummularia*	Creeping Jenny	-	-	SNA					x										
Herb	*Rumex crispus*	Curled Dock	-	-	SNA	x	x	x	x				x	x				x	x	
Herb	*Rudbeckia laciniata*	Cut-leaved Coneflower	-	-	S5		x			x										
Tree	*Populus deltoides*	Eastern Cottonwood	-	-	S5	x	x	x	x											x
Shrub	*Physocarpus opulifolius*	Eastern Ninebark	-	-	S5	x	x	x		x	x			x					x	
Tree	*Juniperus virginiana*	Eastern Red-cedar	-	-	S5		x	x				x								

Tree/Shrub/Herb/Grass	Scientific Name	Common Name	ESA	SARA	S-rank	CUM1	M1/MAM2-	CUW1	FOD7	FO7-4	CUT1a	CUT1b	M2/MAS2/S	MAS2b	MAM2-1	MAS2a	MAS2-1	SWT2-2	CUT1/CUM1	D
Tree	*Thuja occidentalis*	Eastern White Cedar	-	-	S5	x	x	x										x	x	
Herb	*Circaea Lutetiana*	Enchanter's Nightshade	-	-	S5					x										
Shrub	*Rhamnus cathartica*	European Buckthorn	-	-	SNA	x	x	x	x	x	x	x	x					x	x	x
Shrub	*Ligustrum vulgare*	European Privet	-	-	SNA			x	x	x	x							x	x	x
Herb	*Convolvulus arvensis*	Field Bindweed	-	-	SNA	x	x	x	x	x	x									x
Graminoid	*Carex vulpinoidea*	Fox Sedge	-	-	S5		x													
Shrub	*Rhus aromatica*	Fragrant Sumac	-	-	S4						x								x	
Graminoid	*Bromus ciliatus*	Fringed Brome	-	-	S5					x										
Herb	*Lotus corniculatus*	Garden Bird's-foot Trefoil	-	-	SNA	x	x	x		x	x				x				x	x
Herb	*Alliaria petiolata*	Garlic Mustard	-	-	SNA	x	x	x	x	x	x	x	x		x				x	x
Shrub	*Frangula alnus*	Glossy Buckthorn	-	-	SNA				x				x					x		
Herb	*Aegopodium podagraria*	Goutweed	-	-	SNA					x								x		x
Herb	*Ambrosia trifida*	Great Ragweed	-	-	S5		x						x						x	
Herb	*Chelidonium majus*	Greater Celandine	-	-	SNA				x											
Tree	*Fraxinus pennsylvanica*	Green Ash	-	-	S4			x	x	x	x	x							x	
Graminoid	*Setaria viridis*	Green Foxtail	-	-	SNA			x												
Shrub	*Cornus racemosa*	Grey Dogwood	-	-	S5	x	x	x		x	x								x	x
Herb	*Cuscuta gronovii*	Gronovius Dodder	-	-	S5								x							
Herb	*Glechoma hederacea*	Ground-ivy	-	-	SNA				x		x							x		x
Herb	*Epilobium parviflorum*	Hairy Willowherb	-	-	SNA		x													
Shrub	*Salix candida*	Hoary Willow	-	-	S5		x											x		
Herb	*Arisaema triphyllum*	Jack-in-the-Pulpit	-	-	S5					x										
Shrub	*Reynoutria japonica*	Japanese Knotweed	-	-	SNA						x	x								
Herb	*Polygonum virgininanum*	Jump seed	-	-	S4					x										
Graminoid	*Poa pratensis*	Kentucky Bluegrass	-	-	S5	x	x	x		x	x				x			x		x
Tree	*Tilia cordata*	Little-leaved Linden	-	-	SNA															x
Tree	*Acer negundo*	Manitoba Maple	-	-	S5		x	x	x	x	x	x	x					x	x	x
Herb	*Epilobium palustre*	Marsh Willowherb	-	-	S5								x							
Shrub	*Rosa multiflora*	Multiflora Rose	-	-	SNA													x	x	
Herb	*Typha angustifolia*	Narrowleaf Cattail	-	-	SNA								x	x		x	x			x
Herb	*Bidens cernua*	Nodding Beggarticks	-	-	S5					x							x			
Herb	*Alisma triviale*	Northern Water-plantain	-	-	S5								x							
Tree	*Acer Platanoides*	Norway Maple	-	-	SNA			x												
Herb	*Hieracium aurantiacum*	Orange Hawkweed	-	-	SNA															x
Graminoid	*Dactylis glomerata*	Orchard Grass	-	-	SNA		x	x		x	x				x				x	x
Tree	*Betula papyrifera*	Paper Birch	-	-	SNR														x	
Herb	*Eutrochium purpureum*	Purple Joe Pye Weed	-	-	S4		x			x			x	x	x		x	x		
Herb	*Lythrum salicaria*	Purple Loosestrife	-	-	SNA		x				x		x	x	x		x	x	x	x
Graminoid	*Elymus repens*	Quackgrass	-	-	SNA			x	x	x	x								x	
Herb	*Trifolium pratense*	Red Clover	-	-	SNA		x	x	x		x								x	x
Graminoid	*Festuca rubra*	Red Fescue	-	-	SNA														x	
Tree	*Pinus resinosa*	Red Pine	-	-	S5			x												x
Shrub	*Cornus sericea*	Red-osier Dogwood	-	-	S5								x					x		x
Graminoid	*Phalaris arundinacea*	Reed Canarygrass	-	-	S5	x	x	x	x		x		x	x	x	x	x	x	x	x
Herb	*Vitis riparia*	Riverbank Grape	-	-	S5	x	x	x	x	x	x	x	x					x	x	x
Shrub	*Eleagnus angustifolia*	Russian Olive	-	-	SNA						x									x
Tree	*Pinus sylvestris*	Scotch Pine	-	-	SNA			x												
Herb	*Prunella vulgaris*	Self-heal	-	-	S5			x	x											
Tree	*Acer saccharinum*	Silver Maple	-	-	S5															x
Graminoid	*Juncus tenuis*	Slender Rush	-	-	SNR		x													
Shrub	*Salix petiolaris*	Slender Willow	-	-	S5		x						x	x				x		
Herb	*Galium trifidum*	Small Bedstraw	-	-	SNR		x						x							
Herb	*Galium mollugo*	Smooth Bedstraw	-	-	SNA	x	x	x	x		x									x
Graminoid	*Bromus inermis*	Smooth Brome	-	-	SNA		x			x	x								x	
Graminoid	*Digitaria ischaemum*	Smooth Crabgrass	-	-	SNA															x
Graminoid	*Digitaria ischaemum*	Smooth Crabgrass	-	-	SNA			x												x

Tree/Shrub/Herb/Grass	Scientific Name	Common Name	ESA	SARA	S-rank	CUM1	M1/MAM2-	CUW1	FOD7	FO7-4	CUT1a	CUT1b	M2/MAS2/S	MAS2b	MAM2-1	MAS2a	MAS2-1	SWT2-2	CUT1/CUM1	D
Herb	*Crepis capillaris*	Smooth Hawk's-beard	-	-	SNA					x									x	x
Herb	*Saponaria officinalis*	Soapwort	-	-	SNA						x									
Herb	*Sonchus sp.*	Sow-thistle	-	-	-			x												x
Herb	*Impatiens capensis*	Spotted Jewelweed	-	-	S5		x		x	x	x	x	x	x	x		x	x		
Herb	*Centaurea stoebe*	Spotted Knapweed	-	-	SNA	x	x		x	x	x									
Shrub	*Rhus typhina*	Staghorn Sumac	-	-	S5			x	x		x								x	x
Herb	*Hackelia virginiana*	Stickseed	-	-	S5				x			x	x							
Herb	*Urtica dioica*	Stinging Nettle	-	-	S5				x				x						x	x
Tree	*Acer saccharum*	Sugar Maple	-	-	S5			x												
Herb	*Asclepias incarnata*	Swamp Milkweed	-	-	S5								x							
Herb	*Solidago altissima*	Tall Goldenrod	-	-	S5	x	x	x	x	x	x								x	
Shrub	*Lonicera tatarica*	Tatarian Honeysuckle	-	-	SNA			x	x		x								x	x
Herb	*Vicia cracca*	Tufted Vetch	-	-	SNA		x												x	
Tree	*Liriodendron tulipifera*	Tulip Tree	-	-	S4			x												
Herb	*Oxalis stricta*	Upright Yellow Wood-sorre	-	-	SNA			x	x		x									
Herb	*Parthenocissus quinquefolia*	Virginia Creeper	-	-	S4?			x	x	x	x								x	x
Herb	*Clematis virginiana*	Virginia Virgin's-bower	-	-	S5					x										
Herb	*Polygonum amphibium*	Water Smartweed	-	-	S5								x	x						
Herb	*Rorippa nasturtium-aquaticu*	Watercress	-	-	SNA								x							
Herb	*Silene latifolia*	White Campion	-	-	SNA		x			x	x									
Herb	*Trifolium repens*	White Clover	-	-	SNA		x												x	x
Tree	*Morus alba*	White Mulberry	-	-	SNA			x	x										x	
Tree	*Quercus alba*	White Oak	-	-	S5					x										
Herb	*Ageratina altissima*	White Snakeroot	-	-	S5		x			x										
Herb	*Melilotus albus*	White Sweet-clover	-	-	SNA		x				x								x	
Herb	*Verbena urticifolia*	White Vervain	-	-	S5	x	x		x	x		x								
Herb	*Daucus carota*	Wild Carrot	-	-	SNA	x	x		x	x	x				x				x	x
Herb	*Cichorium intybus*	Wild Chicory	-	-	SNA		x												x	x
Herb	*Allium vineale*	Wild Garlic	-	-	SNA		x				x								x	
Herb	*Mentha arvensis*	Wild Mint	-	-	SNR	x	x								x					
Shrub	*Ribes triste*	Wild Red Currant	-	-	S5	x	x													
Shrub	*Rubus idaeus*	Wild Red Raspberry	-	-	S5					x										
Shrub	*Salix sp.*	Willow	-	-	-		x		x	x			x	x	x		x	x	x	x
Herb	*Geum urbanum*	Wood Avens	-	-	SNA					x										
Graminoid	*Scirpus cyperinus*	Woolgrass	-	-	S5		x							x						
Herb	*Achillea millefolium*	Yarrow	-	-	SNA		x			x										x
Herb	*Geum aleppicum*	Yellow Avens	-	-	S5				x			x								

ESA - *Endangered Species Act*

SARA - *Species at Risk Act*

Appendix E
Breeding Bird Survey Results

Table E1 Breeding Bird Summary Results for Adelaide Wastewater Treatment Plant

Visit Number	Date	Weather
Visit 1:	June 4, 2021	15-16°C, 0 wind, 70-90% cloud cover, no precipitation
Visit 2:	June 24, 2021	18°C, 1-2 South wind, 40-90% cloud cover, no precipitation

Species		ESA Status	SARA Status	Visit 1: June 4, 2021						Visit 1: June 24, 2021						Highest Breeding Evidence						Comments
Common Name	Scientific Name			BBS-1	BBS-2	BBS-3	BBS4	BBS-5	BBS-6	BBS-1	BBS-2	BBS-3	BBS4	BBS-5	BBS-6	BBS-1	BBS-2	BBS-3	BBS4	BBS-5	BBS-6	
American Goldfinch	*Spinus tristis*			P:H 1		P:H 2						P:H 2 PR:P P:S				Possible		Probable				
American Redstart	*Setophaga ruticilla*			P:S 1	P:S 1	P:S 1		P:S 1	P:S 1	P:S 1	P:S 1			P:S 1		Possible	Possible	Possible		Possible	Possible	
American Robin	*Turdus migratorius*			P:S 2		P:S 2	P:S 3	P:H 8	P:S 3	P:S 1	P:S 2		P:S 5	C:FY 7	C:FY 9	Possible	Possible	Possible	Possible	Confirmed	Confirmed	
Baltimore Oriole	*Icterus galbula*						P:S 1		P:S 1					P:H 1					Possible	Possible	Possible	
Black-capped Chickadee	*Poecile atricapillus*					P:S 1	P:S 1					P:S 1						Possible	Possible			
Brown-headed Cowbird	*Molothrus ater*			P:S 1									P:S 1	P:S 1	P:H 1	Possible			Possible	Possible	Possible	
Blue Jay	*Cyanocitta cristata*				P:H 1	P:H 1					P:H 1						Possible	Possible				
Canada Goose	*Branta canadensis*								O:X 2												Observed	
Cedar Waxwing	*Bombycilla cedrorum*										P:H 1						Possible					
Chipping Sparrow	*Spizella passerina*												P:H 2						Possible			
Chimney Swift	*Chaetura pelagica*	Threatened	Threatened			O:X 1												Observed				BBS-3 Visit 1: Flyover.
Common Grackle	*Quiscalus quiscula*						P:H 1	P:H 2											Possible	Possible		
Downy Woodpecker	*Picoides pubescens*								P:H 1					P:H 1	P:H 1					Possible	Possible	
Eastern Kingbird	*Tyrannus tyrannus*																					
European Starling	*Sturnus vulgaris*				P:H 1	O:X 1	P:H 2			O:X 1						Observed	Possible	Observed	Possible			
Great Blue Heron	*Ardea herodias*								O:X 1												Observed	BBS-6 Visit 1: Flyover toward river.
Great Crested Flycatcher	*Myiarchus crinitus*										P:S 1				P:S 1		Possible				Possible	
Gray Catbird	*Dumetella carolinensis*			P:S 1	PR:A 2	P:H 1		P:S 1	P:H 1	P:S 1	P:S 2		P:S 1	P:S 1	P:S 1	Possible	Probable	Possible	Possible	Possible	Possible	
Hairy Woodpecker	*Picoides villosus*				P:S 1												Possible					
House Finch	*Haemorhous mexicanus*							PR:P 1												Probable		
House Sparrow	*Passer domesticus*			P:H 1									P:H 10			Possible			Possible			
House Wren	*Troglodytes aedon*			P:S 2	P:S 2	P:S 1		P:S 2	P:S 2		P:S 1	P:S 1		P:S 2		Possible	Possible	Possible		Possible	Possible	
Indigo Bunting	*Passerina cyanea*				P:S 1	P:S 1	P:S 1	P:S1			P:S 1	P:S 1					Possible	Possible	Possible	Possible		
Killdeer	*Charadrius vociferus*						PR:P 1				P:H 1		P:H 1		P:H 1		Possible		Probable		Possible	
Mallard	*Anas platyrhynchos*														O:X 1						Observed	BBS-6 Visit 2: Flying toward river.
Mourning Dove	*Zenaida macroura*										P:S 1						Possible					
Northern Cardinal	*Cardinalis cardinalis*				P:S 1	P:S 2		P:S 1	P:S 1	P:S 1	P:S 1				P:S 1	Possible	Possible	Possible		Possible	Possible	
Northern Pintail	*Anas acuta*							P:S 1												Possible		
Rose-breasted Grosbeak	*Pheucticus ludovicianus*							P:S 1							P:S 1					Possible	Possible	BBS-6 Visit 2: In trees toward river.
Red-bellied Woodpecker	*Melanerpes carolinus*			P:S 1												Possible						
Red-eyed Vireo	*Vireo olivaceus*					P:S 1				P:S 1		P:S 2						Possible				
Red-winged Blackbird	*Agelaius phoeniceus*			P:S 7 PR:A	P:S 1		P:H 2	P:S 3	P:S 5	PR:A 8 PR:P PR:V P:S C:FY	P:S 5 PR:P		P:S 2	P:S 4	P:H 8 P:S	Confirmed	Probable		Possible	Possible	Possible	
Song Sparrow	*Melospiza melodia*			P:S 2	P:S 2	P:H 2 P:S	P:S 1	P:S 2	P:S 2		P:S 1	P:S 1		P:S 1	P:S 2	Possible	Possible	Possible	Possible	Possible	Possible	
Warbling Vireo	*Vireo gilvus*			P:S 1			P:S 1	P:S 1	P:S 1				P:S 2	P:S 1	P:S 1	Possible			Possible	Possible	Possible	
Willow Flycatcher	*Empidonax traillii*				P:S 1												Possible					
Yellow Warbler	*Setophaga petechia*			P:S 2	P:S 1	P:S 1	P:S 1	P:S 2	P:S 3	P:S 1	P:H 1 P:S	P:S 4 PR:P PR:A	P:S 1	P:S 1	P:S 2	Possible	Possible	Probable	Possible	Possible	Possible	

	BBS-1	BBS-2	BBS-3	BBS4	BBS-5	BBS-6
Easting	479706	479797	479917	479763	479324	479477
Northing	4762512	4762373	4762412	4762991	4762775	4762547

Breeding Codes

Observed

O:X - Species observed during breeding season but no breeding evidence

Possible Breeding

P:S - Singing male present, or breeding calls hears, inits breeding season in suitable nesting habita

P:H - species observed during breeding season in suitable habitat

Probable Breeding

PR:P - Pair observed in their breeding season in suitable nesting habitat

PR:T - Permanent territory presumed through territorial behaviour on both visits

PR:D - Courtship or display between a male and a female or 2 males, including courship,feeding or copulatior

PR:V - Visiting probable nest site

PR:A - Agitated behaviour or anxiety calls of an adult

PR:B - Brood patch on adult female or cloacal protuberance on adult male

PR:N - Nest-building or exacation of nest hole

Confirmed Breeding

C:DD - Distraction display

C:NU - Used nest or eggshells found

C:FY - Recently fledged young or downy young, including young incapable of sustained flight

C:AE - Adult leaving or entering nest site

C:FS - Adult carrying fecal sac

C:CF - Adult carrying food for young

C:NE - Nest containing eggs

C:NY - Nest with young (seen or heard)

Note: use lower case if observed outside breeding bird survey time for point coun

ESA - *Endangered Species Act*

SARA - *Species at Risk Act*

Appendix F
Significant Wildlife Habitat Results

Table F1 Seasonal Concentration Areas of Animals

Wildlife Habitat	Wildlife Species	Candidate SWH ELC Ecosite Codes	Candidate SWH Habitat Criteria and Information Sources	Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
Waterfowl Stopover and Staging Areas (Terrestrial) **<u>Rationale:</u>** Habitat important to migrating waterfowl.	• American Black Duck • Northern Pintail • Gadwall • Blue-winged Teal • Green-winged Teal • American Wigeon • Northern Shoveler • Tundra Swan	CUM1 CUT1 • Plus evidence of annual spring flooding from melt water or run-off within these Ecosites. • Fields with seasonal flooding and waste grains in the Long Point, Rondeau, Lk. St. Clair, Grand Bend and Pt. Pelee areas may be important to Tundra Swans.	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 available. <u>Information Sources</u> • Anecdotal information from the landowner, adjacent landowners or local naturalist clubs may be good information in determining occurrence. • Reports and other information available from Conservation Authorities • Sites documented through waterfowl planning processes (e.g., EHJV implementation plan) • Field Naturalist Clubs • Ducks Unlimited Canada • Natural Heritage Information Centre (NHIC) Waterfowl Concentration Area	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 flooded field ecosite habitat plus a 100–300m radius, 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). • SWH MIST Index #7 provides development effects and mitigation measures.	• Candidate – Open areas adjacent to wetlands west of treatment plant may be subjected to sheet water flooding conditions following spring freshet

Wildlife Habitat	Wildlife Species	Candidate SWH ELC Ecosite Codes	Candidate SWH Habitat Criteria and Information Sources	Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
Waterfowl Stopover and Staging Areas (Aquatic) **Rationale:** Important for local and migrant waterfowl populations during the spring or fall migration or both periods combined. Sites identified are usually only one of a few in the eco-district.	• 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	MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 SWD1 SWD2 SWD3 SWD4 SWD5 SWD6 SWD7	• 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) Information Sources • Environment Canada • Naturalist clubs often are aware of staging/stopover areas. • OMNRF Wetland Evaluations indicate presence of locally and regionally significant waterfowl staging. • Sites documented through waterfowl planning processes (e.g., EHJV implementation plan) • Ducks Unlimited projects • Element occurrence specification by Nature Serve: http://www.natureserve.org • NHIC Waterfowl Concentration Area	Studies carried out and verified presence of: • Aggregations of 100 or more 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). • SWH MIST [cxlix] Index #7 provides development effects and mitigation measures.	• Candidate – MAS2 ecosites present west of treatment plant.

Wildlife Habitat	Wildlife Species	Candidate SWH ELC Ecosite Codes	Candidate SWH Habitat Criteria and Information Sources	Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
Shorebird Migratory Stopover Area **<u>Rationale:</u>** High quality shorebird stopover habitat is extremely rare and typically has a long history of use.	• Greater Yellowlegs • Lesser Yellowlegs • Marbled Godwit • Hudsonian Godwit • Black-bellied Plover • American Golden-Plover • Semipalmated Plover • Solitary Sandpiper • Spotted Sandpiper • Semipalmated 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	BBO1 BBO2 BBS1 BBS2 BBT1 BBT2 SDO1 SDS2 SDT1 MAM1 MAM2 MAM3 MAM4 MAM5	• 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. • Sewage treatment ponds and storm water ponds do not qualify as a SWH. <u>Information Sources</u> • Western hemisphere shorebird reserve network. • Canadian Wildlife Service (CWS) Ontario Shorebird Survey • Bird Studies Canada • Ontario Nature • Local birders and naturalist clubs • NHIC Shorebird Migratory Concentration Area	Studies confirming: • 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 (<24hrs) 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 shoreline ecosites plus a 100 m radius area [cxlviii] • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" [ccxi] • SWH MIST [cxlix] Index #8 provides development effects and mitigation measures.	• None – Habitat may be present at the nearby Thames River, but no shorelines exist within the study area.

Wildlife Habitat	Wildlife Species	Candidate SWH ELC Ecosite Codes	Candidate SWH Habitat Criteria and Information Sources	Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
Raptor Wintering Area **Rationale:** Sites used by multiple species, a high number of individuals and used annually are most significant	• Rough-legged Hawk • Red-tailed Hawk • Northern Harrier • American Kestrel • Snowy Owl **Special Concern:** • Short-eared Owl • Bald Eagle	Hawks/Owls: Combination of ELC Community Series; need to have present one Community Series from each land class; Forest: FOD, FOM, FOC. Upland: CUM; CUT; CUS; CUW. Bald Eagle: Forest community Series: FOD, FOM, FOC, SWD, SWM or SWC on shoreline areas adjacent to large rivers or adjacent to lakes with open water (hunting area).	• The habitat provides a combination of fields and woodlands that provide roosting, foraging and resting habitats for wintering raptors. • Raptor wintering (hawk/owl) sites need to be >20 ha[cxlviii, cxlix] with a combination of forest and upland.[xvi, xvii, xviii, xix, xx, xxi.] • Least disturbed sites, idle/fallow or lightly grazed field/meadow (>15 ha) with adjacent woodlands[cxlix] • 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[cxlix] Information Sources: • OMNRF Ecologist or Biologist • Naturalist clubs • NHIC Raptor Winter Concentration Area • Data from Bird Studies Canada • Results of Christmas Bird Counts • Reports and other information available from Conservation Authorities.	Studies confirm the use of these habitats by: • One or more Short-eared Owls or; One of more Bald Eagles or; At least 10 individuals and two of the listed hawk/owl species(E) • To be significant a site must be used regularly (3 in 5 years)[cxlix] for a minimum of 20 days by the above number of birds(E). • The habitat area for an Eagle winter site is the shoreline forest ecosites directly adjacent to the prime hunting area(E) • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWH MIST[cxlix] Index #10 and #11 provides development effects and mitigation measures.	• None – no habitat areas >20 ha are present.

Wildlife Habitat	Wildlife Species	Candidate SWH ELC Ecosite Codes	Candidate SWH Habitat Criteria and Information Sources	Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
Bat Hibernacula **<u>Rationale:</u>** Bat hibernacula are rare habitats in all Ontario landscapes.	• Big Brown Bat • Tri-coloured Bat	Bat Hibernacula may be found in these ecosites: CCR1 CCR2 CCA1 CCA2 (Note: buildings are not considered to be SWH)	• Hibernacula may be found in caves, mine shafts, underground foundations and Karsts. • Active mine sites should not be considered as SWH • The locations of bat hibernacula are relatively poorly known. <u>Information Sources</u> • OMNRF for possible locations and contact for local experts • NHIC Bat Hibernaculum • Ministry of Northern Development and Mines for location of mine shafts. • Clubs that explore caves (e.g. Sierra Club) • University Biology Departments with bat experts.	• All sites with confirmed hibernating bats are SWH[E]. • The area includes 200 m radius around the entrance of the hibernaculum[cxlviii, ccvii, E] for most development types and 1000 m for wind farms[ccv]. • Studies are to be conducted during the peak swarming period (Aug.–Sept.). Surveys should be conducted following methods outlined in the "Bats and Bat Habitats: Guidelines for Wind Power Projects"[ccv]. • SWH MIST[cxlix] Index #1 provides development effects and mitigation measures.	• None – Study area did not contain Hibernacula ecosites.

Wildlife Habitat	Wildlife Species	Candidate SWH ELC Ecosite Codes	Candidate SWH Habitat Criteria and Information Sources	Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
Bat Maternity Colonies **<u>Rationale:</u>** Known locations of forested bat maternity colonies are extremely rare in all Ontario landscapes.	• Big Brown Bat • Silver-haired Bat	Maternity colonies considered SWH are found in forested Ecosites. All ELC Ecosites in ELC Community Series: FOD FOM SWD SWM	• Maternity colonies can be found in tree cavities, vegetation and often in buildlings[xxii, xxv, xxvi, xxvii, xxxi] (buildings are not considered to be SWH). • Maternity roosts are not found in caves and mines in Ontario[xxii]. • Maternity colonies located in Mature deciduous or mixed forest stands[ccix, ccx, ccv] with >10/ha large diameter (>25 cm dbh) wildlife trees • Female Bats prefer wildlife tree (snags) in early stages of decay, class 1–3[ccxiv] or class 1 or 2.[ccxii] • 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[ccx, lxiv] <u>Information Sources</u> • OMNRF for possible locations and contact for local experts • University Biology Departments with bat experts.	• Maternity Colonies with confirmed use by: • >10 Big Brown Bats Ⓔ • >5 Adult Female Silver-haired Bats Ⓔ • The area of the habitat includes the entire woodland or a forest stand ELC Ecosite or an Ecoelement containing the maternity colonies Ⓔ. • Evaluation methods for maternity colonies should be conducted following methods outlined in the “Bats and Bat Habitats: Guidelines for Wind Power Projects”[ccv]. • SWH MIST[cxlix] Index #12 provides development effects and mitigation measures.	• None– an assessment was completed on the number of snag trees per hectare, and the study area did not meet the threshold for bat maternity roosting habitat.

Wildlife Habitat	Wildlife Species	Candidate SWH ELC Ecosite Codes	Candidate SWH Habitat Criteria and Information Sources	Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
Turtle Wintering Areas **<u>Rationale:</u>** Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant.	• Midland Painted Turtle **<u>Special Concern:</u>** • Northern Map Turtle • Snapping Turtle	Snapping and Midland Painted Turtles; ELC Community Classes; SW, MA, OA and SA, ELC Community Series; FEO and BOO Northern Map Turtle; Open Water areas such as deeper rivers or streams and lakes with current can also be used as over-wintering habitat.	• 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 water bodies, large wetlands, and bogs or fens with adequate Dissolved Oxygen[cix, cx, cxi, cxii] • Man-made ponds such as sewage lagoons or storm water ponds should not be considered SWH. <u>Information Sources</u> • EIS studies carried out by Conservation Authorities. • Field Naturalists Clubs • OMNRF Ecologist or Biologist • NHIC	• Presence of 5 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 (Sept.–Oct.) or spring (Mar.–May)[cvii]. • Congregation of turtles is more common where wintering areas are limited and therefore significant.[cix, cxcxi, cxii] • SWH MIST[cxlix] Index #28 provides development effects and mitigation measures for turtle wintering habitat.	• Candidate – The larger SAM2 ecosite west of the treatment plant may be suitable overwintering habitat.

Wildlife Habitat	Wildlife Species	Candidate SWH ELC Ecosite Codes	Candidate SWH Habitat Criteria and Information Sources	Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
Reptile Hibernaculum **Rationale:** Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant.	**Snakes:** • Eastern Gartersnake • Northern Watersnake • Northern Red-bellied Snake • Northern Brownsnake • Smooth Green Snake • Northern Ring-necked Snake **Special Concern:** • Milksnake • Eastern Ribbonsnake	For all snakes, 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.	• 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.[xliv, l, li, lii, cxii] • 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. Information Sources • In spring, local residents or landowners may have observed the emergence of snakes on their property (e.g. old dug wells). • Reports and other information available from Conservation Authorities. • Field Naturalist Clubs • University herpetologists • NHIC	Studies confirming: • 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)[E] • Note: If there are Special Concern Species present, then 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 (i.e. strong hibernation site fidelity). Other critical life processes (e.g. mating) often take place in close proximity to hibernacula. The feature in which the hibernacula is located plus a 30 m radius area is the SWH[E] • SWH MIST[cxlix] Index #13 provides development effects and mitigation measures for snake hibernacula.	• None – Features such as fractured bedrock, old foundations, caves, alvars, rock barrens not present.

Wildlife Habitat	Wildlife Species	Candidate SWH ELC Ecosite Codes	Candidate SWH Habitat Criteria and Information Sources	Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
Colonially-Nesting Bird Breeding Habitat (Bank and Cliff) **<u>Rationale:</u>** Historical use and number of nests in a colony make this habitat significant. An identified colony can be very important to local populations. All swallow population are declining in Ontario.	• 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: CUM1 CUT1 CUS1 BLO1 BLS1 BLT1 CLO1 CLS1 CLT1	• 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, soil, or aggregate stockpiles. • Does not include a licensed/permitted Mineral Aggregate Operation. <u>Information Sources</u> • Reports and other information available from Conservation Authorities. • Ontario Breeding Bird Atlas • Bird Studies Canada; *NatureCounts* http://www.birdscanada.org/birdmon/ • Field Naturalist Clubs	Studies confirming: • Presence of 1 or more nesting sites with 8[cxlix] or more cliff swallow pairs and/or rough-winged swallow pairs during the breeding season. • A colony identified as SWH will include a 50 m radius habitat area from the peripheral nests[ccvii] • Field surveys to observe and count swallow nests are to be completed during the breeding season. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWH MIST[cxlix] Index #4 provides development effects and mitigation measures	• None- Study area does not contain exposed banks that would support colonially nesting birds

Wildlife Habitat	Wildlife Species	Candidate SWH ELC Ecosite Codes	Candidate SWH Habitat Criteria and Information Sources	Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
Colonially-Nesting Bird Breeding Habitat (Tree/Shrubs) **<u>Rationale:</u>** Large colonies are important to local bird population, typically sites are only known colony in area and are used annually.	• Great Blue Heron • Black-crowned Night-Heron • Great Egret • Green Heron	SWM2 SWM3 SWM5 SWM6 SWD1 SWD2 SWD3 SWD4 SWD5 SWD6 SWD7 FET1	• 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. <u>Information Sources</u> • Ontario Breeding Bird Atlas,[ccv] colonial nest records. • Ontario Heronry Inventory 1991 available from Bird Studies Canada or NHIC (OMNRF). • NHIC Mixed Wader Nesting Colony • Aerial photographs can help identify large heronries. • Reports and other information available from Conservation Authorities. • MNRF District Offices. • Field Naturalist Clubs.	Studies confirming: • Presence of 2Ⓔ or more active nests of Great Blue Heron or other listed species. • The habitat extends from the edge of the colony and a minimum 300 m radius or extent of the Forest Ecosite containing the colony or any island <15.0 ha with a colony is the SWH.[cc, ccvii] • Confirmation of active heronries are to 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 • SWH MIST[cxlix] Index #5 provides development effects and mitigation measures.	• None- the study area did not contain any of the candidate ecosites

Wildlife Habitat	Wildlife Species	Candidate SWH ELC Ecosite Codes	Candidate SWH Habitat Criteria and Information Sources	Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
Colonially-Nesting Bird Breeding Habitat (Ground) **<u>Rationale:</u>** Colonies are important to local bird population, typically sites are only known colony in area and are used annually.	• 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 (two-lined on a 1:50,000 NTS map). Close proximity to watercourses in open fields or pastures with scattered trees or shrubs (Brewer's Blackbird) MAM1–6 MAS1–3 CUM CUT CUS	• Nesting colonies of gulls and terns are on islands or peninsulas associated with open water or in marshy areas. • Brewers Blackbird colonies are found loosely on the ground in or in low bushes in close proximity to streams and irrigation ditches within farmlands. <u>Information Sources</u> • Ontario Breeding Bird Atlas, rare/colonial species records • Canadian Wildlife Service • Reports and other information available from Conservation Authorities. • NHIC Colonial Waterbird Nesting Area • MNRF District Offices • Field Naturalist Clubs	Studies confirming: • 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 radius 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[cc, ccvii] • Studies would be done during May/June when actively nesting. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWH MIST[cxlix] Index #6 provides development effects and mitigation measures.	• None- the study area does not contain rocky islands or peninsulas. Suitable habitat may be present within sections of the nearby Thames River.

Wildlife Habitat	Wildlife Species	Candidate SWH ELC Ecosite Codes	Candidate SWH Habitat Criteria and Information Sources	Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
Migratory Butterfly Stopover Areas **<u>Rationale:</u>** Butterfly stopover areas are extremely rare habitats and are biologically important for butterfly species that migrate south for the winter.	• Painted Lady • Red Admiral <u>Special Concern</u> • Monarch	Combination of ELC Community Series; need to have present one Community Series from each landclass: <u>Field</u>: CUM CUT CUS <u>Forest</u>: FOC FOD FOM CUP Anecdotally, a candidate site for butterfly stopover will have a history of butterflies being observed.	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 Erie or Lake Ontario[cxlix]. • 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.[xxxii, xxxiii, xxxiv, xxxv, xxxvi] • 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. [cxlviii, cxlix] • 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.[xxxvii, xxxviii, xxxix, xl, xli] <u>Information Sources</u> • MNRF District Offices • NHIC • Agriculture Canada in Ottawa may have list of butterfly experts. • Field Naturalist Clubs • Toronto Entomologists Association • Conservation Authorities	Studies confirm: • The presence of Monarch Use Days (MUD) during fall migration (Aug/Oct)[xliii]. 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[xxxvii], significant variation can occur between years and multiple years of sampling should occur.[xl, xlii] • Observational studies are to be completed and need to be done frequently during the migration period to estimate MUD. • MUD of >5000 **or** >3000 with the presence of Painted Ladies or Red Admirals is to be considered significant.[E] • SWH MIST[cxlix] Index #16 provides development effects and mitigation measures.	• None- the study area is not within 5km from Lake Erie

Wildlife Habitat	Wildlife Species	Candidate SWH ELC Ecosite Codes	Candidate SWH Habitat Criteria and Information Sources	Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
Landbird Migratory Stopover Areas **<u>Rationale</u>:** Sites with a high diversity of species as well as high numbers are most significant.	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; FOC FOM FOD SWC SWM SWD	Woodlots >5 ha[Ⓔ] in size and within 5 km[iv, v, vi, vii, viii, ix, x, xi, xii, xiii, xiv, xv] 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 woodlands are located along the shoreline those Woodlands <2 km from Lake Erie and Lake Ontario are more significant[cxlix] • Sites have a variety of habitats; forest, grassland and wetland complexes[cxlix] • The largest sites are more significant[cxlix] • Woodlots and forest fragments are important habitats to migrating birds,[ccxviii] these features located along the shore and located within 5km of Lake Erie and Lake Ontario are Candidate SWH.[cxlviii] <u>Information Sources</u> • Bird Studies Canada • Ontario Nature • Local birders and field naturalist clubs • Ontario Important Bird Areas (IBA) Program	Studies confirm: • Use of the habitat 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 (Mar to May) and fall (Aug to Oct) migration using standardized assessment techniques. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWH MIST[cxlix] Index #9 provides development effects and mitigation measures.	• None – the study area is not within 5km from Lake Erie.

Wildlife Habitat	Wildlife Species	Candidate SWH ELC Ecosite Codes	Candidate SWH Habitat Criteria and Information Sources	Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
Deer Winter Congregation Areas **<u>Rationale</u>:** Deer movement during winter in the southern areas of Ecoregion 7E are not constrained by snow depth; however, deer will annually congregate in large numbers in suitable woodlands to reduce or avoid the impacts of winter conditions.[cxlviii]	White-tailed Deer	All Forested Ecosites with these ELC Community Series: FOC FOM FOD SWC SWM SWD Conifer plantations much smaller than 50 ha may also be used.	• Woodlots >100 ha in size or if large woodlots are rare in a planning area woodlots >50 ha[Ⓔ] • Deer movement during winter in the southern areas of Ecoregion 7E are not constrained by snow depth; however, deer will annually congregate in large numbers in suitable woodlands.[cxlviii] • Large woodlots > 100 ha and up to 1500 ha are known to be used annually by densities of deer that range from 0.1–1.5 deer/ha.[ccxxiv] • Woodlots with high densities of deer due to artificial feeding are not significant[Ⓔ]. <u>Information Sources</u> • MNRF District Offices • LIO/NRVIS	Studies confirm: • Deer management is an MNRF responsibility, deer winter congregation areas considered significant will be mapped by MNRF.[cxlviii] • 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,[ccxxiv] ground or road surveys, or a pellet count deer density survey.[ccxxv] • SWH MIST[cxlix] Index #2 provides development effects and mitigation measures.	• None- the study area does not contain woodlots >50ha

Table F2 Rare Vegetation Communities

Rare Vegetation Community	Candidate SWH ELC Ecosite Codes	Candidate SWH Habitat Description	Candidate SWH Detailed Information and Sources	Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
Cliffs and Talus Slopes **<u>Rationale</u>:** Cliffs and Talus Slopes are extremely rare habitats in Ontario.	Any ELC Ecosite within Community Series: TAO CLO TAS CLS TAT CLT	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	Most cliff and talus slopes occur along the Niagara Escarpment. <u>Information Sources</u> • The Niagara Escarpment Commission has detailed information on location of these habitats. • OMNRF Districts • NHIC has location information available on their website • Field Naturalist Clubs • Conservation Authorities	• Confirm any ELC Vegetation Type for Cliffs or Talus Slopes[lxxviii] • SWH MIST[cxlix] Index #21 provides development effects and mitigation measures.	• None- the study area does not contain any of the candidate ecosites.
Sand Barren **<u>Rationale</u>:** Sand barrens are rare in Ontario and support rare species. Most Sand Barrens have been lost due to cottage development and forestry	ELC Ecosites: SBO1 SBS1 SBT1 Vegetation cover varies from patchy and barren to continuous meadow (SBO1), thicket-like (SBS1), or more closed and treed (SBT1). Tree cover always ≤ 60%.	Sand Barrens typically are exposed sand, generally sparsely vegetated and caused by lack of moisture, periodic fires and erosion. 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%.	A sand barren area >0.5 ha in size[E]. <u>Information Sources</u> • OMNRF Districts • NHIC has location information available on their website. • Field Naturalist Clubs • Conservation Authorities	• Confirm any ELC Vegetation Type for Sand Barrens[lxxviii] • Site must not be dominated by exotic or introduced species (<50% vegetative cover are exotic sp.)[E]. • SWH MIST[cxlix] Index #20 provides development effects and mitigation measures.	• None- the study area does not contain any of the candidate ecosites.

Rare Vegetation Community	Candidate SWH ELC Ecosite Codes	Candidate SWH Habitat Description	Candidate SWH Detailed Information and Sources	Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
Alvar **<u>Rationale</u>:** Alvars are extremely rare habitats in Ecoregion 7E.	ALO1 ALS1 ALT1 FOC1 FOC2 CUM2 CUS2 CUT2-1 CUW2 **Five Alvar Indicator Species:** *1) Carex crawei* *2) Panicum philadelphicum* *3) Eleocharis compressa* *4) Scutellaria parvula* *5) Trichostema brachiatum* These indicator species are very specific to Alvars within Ecoregion 7E[Ⓔcxlix]	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 is 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 plants. Undisturbed alvars can be phyto- and zoogeographically diverse, supporting many uncommon or are relict plant and animal species. Vegetation cover varies from patchy to barren with a less than 60% tree cover.[lxxviii]	An Alvar site > 0.5 ha in size.[lxxv] Alvar is particularly rare in Ecoregion 7E where the only known sites are found in the western islands of Lake Erie.[cxcix] <u>Information Sources</u> • Alvars of Ontario (2000), Federation of Ontario Naturalists[lxxvi] • Ontario Nature – Conserving Great Lakes Alvars[ccviii] • NHIC has location information available on their website. • OMNRF Staff • Field Naturalist Clubs • Conservation Authorities	• Field studies that identify four of the five[Ⓔ] **Alvar Indicator Species**[lxxv, cxlix] at a Candidate Alvar site is Significant. • Site must not be dominated by exotic or introduced species (<50% vegetative cover are exotic sp.). • The alvar must be in excellent condition and fit in with surrounding landscape with few conflicting land uses[lxxv] • SWH MIST[cxlix] Index #17 provides development effects and mitigation measures.	• None- the study area does not contain any of the candidate ecosites.
Old Growth Forest **<u>Rationale</u>**: Due to historic logging practices and land clearance for agriculture, old growth forest is rare in Ecoregion 7E.	Forest Community Series: FOD FOC FOM SWD SWC SWM	Old Growth forests are characterized by 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.	Woodland area is >0.5 ha.[Ⓔ] <u>Information Sources</u> • OMNRF Forest Resource Inventory mapping • OMNRF Districts • Field Naturalist Clubs • Conservation Authorities • Sustainable Forestry License (SFL) companies will possibly know locations through field operations. • Municipal forestry departments	Field Studies will determine: • If dominant trees species of the forest are >140 years old, then the area containing these trees is Significant Wildlife Habitat[cxlviii] • The forested area containing the old growth characteristics will have experienced no recognizable forestry activities[cxlviii] (cut stumps will not be present) • The area of forest ecosites combined or an ecoelement within an ecosite that contain the old growth characteristics is the SWH. • Determine ELC vegetation types for the forest area containing the old growth characteristics[lxxviii] • SWH MIST[cxlix] Index #23 provides development effects and mitigation measures.	• None- The forest community did not contain a dominate tree community > 140 years.

Rare Vegetation Community	Candidate SWH ELC Ecosite Codes	Candidate SWH Habitat Description	Candidate SWH Detailed Information and Sources	Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
Savannah **<u>Rationale:</u>** Savannahs are extremely rare habitats in Ontario.	TPS1 TPS2 TPW1 TPW2 CUS2	A Savannah is a tallgrass prairie habitat that has tree cover between 25–60%[lxxix, lxxx, lxxxi, lxxxii, lxxxiii] 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).	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. <u>Information Sources</u> • NHIC has location data available on their website. • OMNRF Districts • Field Naturalists Clubs • Conservation Authorities	Field studies confirm one or more of the Savannah indicator species listed in [cxlix] Appendix N should be present[Ⓔ]. Note: Savannah plant spp. list from Ecoregion 7E should be used.[cxlviii] • Area of the ELC Ecosite is the SWH. • Site must not be dominated by exotic or introduced species (<50% vegetative cover are exotic sp.). • SWH MIST[cxlix] Index #18 provides development effects and mitigation measures.	• None- the study area does not contain any of the candidate ecosites.
Tallgrass Prairie **<u>Rationale:</u>** Tallgrass Prairies are extremely rare habitats in Ontario.	TPO1 TPO2	A Tallgrass Prairie has ground cover dominated by prairie grasses. An open Tallgrass Prairie habitat has < 25% tree cover[lxxix, lxxx, lxxxi, lxxxii, lxxxiii] 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).	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. <u>Information Sources</u> • OMNRF Districts • NHIC has location information available on their website. • Field Naturalists Clubs • Conservation Authorities	Field studies confirm one or more of the Prairie indicator species listed in [cxlix] Appendix N should be present.[Ⓔ] Note: Prairie plant spp. list from Ecoregion 7E should be used[cxlviii] • Area of the ELC Ecosite is the SWH. • Site must not be dominated by exotic or introduced species (<50% vegetative cover are exotic sp.). • SWH MIST[cxlix] Index #19 provides development effects and mitigation measures.	• None- the study area does not contain any of the candidate ecosites.

Rare Vegetation Community	Candidate SWH ELC Ecosite Codes	Candidate SWH Habitat Description	Candidate SWH Detailed Information and Sources	Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
Other Rare Vegetation Communities **<u>Rationale:</u>** Plant communities that often contain rare species which depend on the habitat for survival.	Provincially Rare S1, S2 and S3 vegetation communities are listed in Appendix M of the SWHTG.[cxlviii] Any ELC Ecosite Code that has a possible ELC Vegetation Type that is Provincially Rare is Candidate SWH.	Rare Vegetation Communities may include beaches, fens, forest, marsh, barrens, dunes and swamps.	ELC Ecosite codes that have the potential to be a rare ELC Vegetation Type as outlined in Appendix M.[cxlviii] The OMNRF/NHIC will have up to date listing for rare vegetation communities. <u>Information Sources</u> • NHIC has location information available on their website. • OMNRF Districts • Field Naturalists Clubs • Conservation Authorities	Field studies should confirm if an ELC Vegetation Type is a rare vegetation community based on listing within Appendix M of SWHTG.[cxlviii] • Area of the ELC Vegetation Type polygon is the SWH. • SWH MIST[cxlix] Index #37 provides development effects and mitigation measures.	• None – no rare vegetation communities as listed for Middlesex County on Appendix M of the SWHTG present.

Table F3 Specialized Habitat of Wildlife considered SWH

Specialized Wildlife Habitat	Wildlife Species	Candidate SWH ELC Ecosite Codes	Candidate SWH Habitat Criteria and Information Sources	Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
Waterfowl Nesting Area **<u>Rationale:</u>** Important to local waterfowl populations, sites with greatest number of species and highest number of individuals are significant.	• American Black Duck • Northern Pintail • Northern Shoveler • Gadwall • Blue-winged Teal • Green-winged Teal • Wood Duck • Hooded Merganser • Mallard	All upland habitats located adjacent to these wetland ELC Ecosites are Candidate SWH: • MAS1 • MAS2 • MAS3 • SAS1 • SAM1 • SAF1 • MAM1 • MAM2 • MAM3 • MAM4 • MAM5 • MAM6 • SWT1 • SWT2 • SWD1 • SWD2 • SWD3 • SWD4 **Note: includes adjacency to Provincially Significant Wetlands**	A waterfowl nesting area extends 120 m from a wetland (> 0.5 ha) or a wetland (>0.5 ha) and any small wetlands (0.5 ha) within 120 m 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. <u>Information Sources</u> • Ducks Unlimited staff may know the locations of particularly productive nesting sites. • OMNRF Wetland Evaluations for indication of significant waterfowl nesting habitat. • Reports and other information available from Conservation Authorities.	Studies confirmed: • 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"[ccxi] • 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[cxlviii] from the wetland and will provide enough habitat for waterfowl to successfully nest. • SWH MIST[cxlix] Index #25 provides development effects and mitigation measures.	• Candidate – The wetland complex if MAM, MAS, and SWT ecosites south and west of the treatment plant meets the areal ELC requirements for this habitat type.

Specialized Wildlife Habitat	Wildlife Species	Candidate SWH ELC Ecosite Codes	Candidate SWH Habitat Criteria and Information Sources	Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
Bald Eagle and Osprey Nesting, Foraging and Perching Habitat **<u>Rationale:</u>** Nest sites are fairly uncommon in Ecoregion 7E and are used annually by these species. Many suitable nesting locations may be lost due to increasing shoreline development pressures and scarcity of habitat.	Osprey **Special Concern** Bald Eagle	ELC Forest Community Series: FOD, FOM, FOC, SWD, SWM and SWC directly adjacent to riparian areas – rivers, lakes, ponds and wetlands	Nests are associated with lakes, ponds, rivers or wetlands along forested shorelines, islands, or on structures over water. • Osprey nests are usually at the top 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 are not to be included as SWH (e.g. telephone poles and constructed nesting platforms). <u>Information Sources</u> • NHIC compiles all known nesting sites for Bald Eagles in Ontario. • MNRF values information (LIO/NRVIS) will list known nesting locations. Note: data from NRVIS is provided as a point and does not represent all the habitat. • Nature Counts, Ontario Nest Records Scheme data. • OMNRF District • Check the Ontario Breeding Bird Atlas[ccv] or Rare Breeding Birds in Ontario for species documented. • Reports and other information available from Conservation Authorities. • Field Naturalists clubs	Studies confirm the use of these nests by: • One or more active Osprey or Bald Eagle nests in an area.[cxlviii] • 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[ccvii], maintaining undisturbed shorelines with large trees within this area is important.[cxlviii] • For a Bald Eagle the active nest and a 400–800 m radius around the nest is the SWH.[cvi, ccvii] Area of the habitat from 400–800 m is dependent on site lines from the nest to the development and inclusion of perching and foraging habitat.[cvi] • To be significant a 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.[ccvii] • 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 for Wind Power Projects"[ccxi] • SWH MIST[cxlix] Index #26 provides development effects and mitigation measures.	• None – no suitable ecosites are present adjacent to lakes, ponds, river or wetlands within the study area. Suitable BEONFP SWH may be present adjacent to the Thames River

Specialized Wildlife Habitat	Wildlife Species	Candidate SWH ELC Ecosite Codes	Candidate SWH Habitat Criteria and Information Sources	Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
Woodland Raptor Nesting Habitat **<u>Rationale:</u>** Nests sites for these species are rarely identified; these area sensitive habitats are often used annually by these species.	• Northern Goshawk • Cooper's Hawk • Sharp-shinned Hawk • Red-shouldered Hawk • Barred Owl • Broad-winged Hawk	May be found in all forested ELC Ecosites. May also be found in SWC, SWM, SWD, and CUP3	All natural or conifer plantation woodland/forest stands >30 ha with >4 ha of interior habitat.[lxxxviiii, lxxxix, xc, xci, xciii, xciv, xcv,xcvi, cxxxiii] Interior habitat determined with a 200 m buffer.[cxlviii] • 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 will be in close proximity to old nest. <u>Information Sources</u> • OMNRF Districts • Check the Ontario Breeding Bird Atlas[ccv] or Rare Breeding Birds in Ontario for species documented. • Check data from Bird Studies Canada. • Reports and other information available from Conservation Authorities.	Studies confirm: • Presence of 1 or more active nests from species list is considered significant.[cxlviii] • Red-shouldered Hawk and Northern Goshawk – A 400 m radius around the nest or 28 ha area of habitat is the SWH[ccvii] (the 28 ha habitat area would be applied where optimal habitat is irregularly shaped around the nest) • Barred Owl—A 200 m radius around the nest is the SWH.[ccvii] • Broad-winged Hawk and Coopers Hawk—A 100 m radius around the nest is the SWH.[ccvii] • Sharp-Shinned Hawk—A 50 m radius around the nest is the SWH.[ccvii] • Conduct field investigations from early 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. • SWH MIST[cxlix] Index #27 provides development effects and mitigation measures.	• None- the study area does not contain woodlands >30ha

Specialized Wildlife Habitat	Wildlife Species	Candidate SWH ELC Ecosite Codes	Candidate SWH Habitat Criteria and Information Sources	Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
Turtle Nesting Areas **<u>Rationale:</u>** These habitats are rare and when identified will often be the only breeding site for local populations of turtles.	• Midland Painted Turtle <u>Special Concern</u> • Northern Map Turtle • Snapping Turtle	Exposed mineral soil (sand or gravel) areas adjacent (<100 m)[cxlviii] or within the following ELC Ecosites: MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 BOO1 FEO1	• 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. <u>Information Sources</u> • Use Ontario Soil Survey reports and maps to help find suitable substrate for nesting turtles (well-drained sands and fine gravels). • Check the Ontario Herpetofaunal Summary Atlas records or other similar atlases for uncommon turtles; location information may help to find potential nesting habitat for them. • NHIC • Field Naturalist Clubs	Studies confirm: • Presence of 5 or more nesting Midland Painted Turtles[Ⓔ] • One or more Northern Map Turtle or Snapping Turtle nesting 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.[cxlviii] • Travel routes from wetland to nesting area are to be considered within the SWH as part of the 30–100 m area of habitat.[cxlix] • Field investigations should be conducted in prime nesting season typically late spring to early summer. Observational studies observing the turtles nesting is a recommended method. • SWH MIST[cxlix] Index #28 provides development effects and mitigation measures for turtle nesting habitat.	• None- The study area does not contain ecosites with exposed mineral soil suitable for turtle nesting.

Specialized Wildlife Habitat	Wildlife Species	Candidate SWH ELC Ecosite Codes	Candidate SWH Habitat Criteria and Information Sources	Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
Seeps and Springs **<u>Rationale:</u>** Seeps/Springs are typical of headwater areas and are often at the source of coldwater streams.	• 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.	• Any forested area (with <25% meadow/field/pasture) within the headwaters of a stream or river system.[cxvii, cxlix] • Seeps and springs are important feeding and drinking areas especially in the winter will typically support a variety of plant and animal species.[cxix, cxx, cxxi, cxxii, cxiii, cxiv] <u>Information Sources</u> • Topographical Map • Thermography • Hydrological surveys conducted by Conservation Authorities and MOE • Field Naturalists Clubs and landowners • Municipalities and Conservation Authorities may have drainage maps and headwater areas mapped	Field Studies confirm: • Presence of a site with two or more[E] seeps/springs should be considered SWH. • The area of an ELC forest ecosite or an ecoelement within ecosite containing the seeps/springs is the SWH. The protection of the recharge area considering the slope, vegetation, height of trees and groundwater condition need to be considered in delineation the habitat.[cxlviii] • SWH MIST[cxlix] Index #30 provides development effects and mitigation measures	• None- the study area does not contain any springs or seeps

Specialized Wildlife Habitat	Wildlife Species	Candidate SWH ELC Ecosite Codes	Candidate SWH Habitat Criteria and Information Sources	Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
Amphibian Breeding Habitat (Woodland) **<u>Rationale:</u>** These habitats are extremely important to amphibian biodiversity within a landscape and often represent the only breeding habitat for local amphibian populations	• Eastern Newt • Blue-spotted Salamander • Spotted Salamander • Gray Treefrog • Spring Peeper • Western Chorus Frog • Wood Frog	All Ecosites associated with these ELC Community Series: FOC FOM FOD SWC SWM SWD Breeding pools within the woodland or the shortest distance from forest habitat are more significant because they are more likely to be used due to reduced risk to migrating amphibians.	• Presence of a wetland, pond or woodland pool (including vernal pools) >500 m^2 (about 25 m diameter) within or adjacent (within 120 m) to a woodland (no minimum size).[clxxxii, lxiii, lxv, lxvi, lxvii, lxviii, lxix, lxx] 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.[cxlviii] <u>Information Sources</u> • Ontario Herpetofaunal Summary Atlas (or other similar atlases) for records • Local landowners may also provide assistance as they may hear spring-time choruses of amphibians on their property. • OMNRF Districts and wetland evaluations • Field Naturalist clubs • Canadian Wildlife Service Amphibian Road Call Survey • Ontario Vernal Pool Association: http://www.ontariovernalpools.org	Studies confirm; • Presence of breeding population of one or more of the listed newt/salamander species or two or more of the listed frog species with at least 20 individuals (adults or eggs masses) or two or more of the listed frog species with Call Level Codes of 3.[E] • A combination of observational study and call count surveys[cviii] will be required during the spring (March–June) when amphibians are concentrated around suitable breeding habitat within or near the woodland/wetlands. • The habitat is the wetland area plus a 230 m radius of woodland area.[lxiii, lxv, lxvi, lxvii, lxviii, lxix, lxx, lxxi] 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. • SWH MIST[cxlix] Index #14 provides development effects and mitigation measures.	• Candidate – the FOD7-4 ecosites likely support vernal pooling in the early spring.

Specialized Wildlife Habitat	Wildlife Species	Candidate SWH ELC Ecosite Codes	Candidate SWH Habitat Criteria and Information Sources	Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
Amphibian Breeding Habitat (Wetland) **<u>Rationale:</u>** Wetlands supporting breeding for these amphibian species are extremely important and fairly rare within Central Ontario landscapes.	• 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	ELC Community Classes SW, MA, FE, BO, OA and SA. Typically these wetland ecosites will be isolated (>120 m) from woodland ecosites; however, larger wetlands containing predominantly aquatic species (e.g. Bullfrog) may be adjacent to woodlands	• Wetlands >500 m^2 (about 25 m diameter),[ccvii] supporting high species diversity are significant; some small or ephemeral habitats may not be identified on MNRF mapping and could be important amphibian breeding habitats.[clxxxii] • 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. <u>Information Sources</u> • Ontario Herpetofaunal Summary Atlas (or other similar atlases) • Canadian Wildlife Service Amphibian Road Surveys and Backyard Amphibian Call Count. • OMNRF Districts and wetland evaluations. • Reports and other information available from Conservation Authorities.	Studies confirm: • Presence of breeding population of one or more of the listed newt/salamander species or two or more of the listed frog/toad species with at least 20 individuals (adults or eggs masses) or two or more of the listed frog/toad species with Call Level Codes of 3.Ⓔ **or;** Wetland with confirmed breeding Bullfrogs are significant.Ⓔ • The ELC ecosite wetland area and the shoreline are the SWH. • A combination of observational study and call count surveys[cviii] will be required during the spring (March–June) when amphibians are concentrated around suitable breeding habitat within or near the wetlands. • If a SWH is determined for Amphibian Breeding Habitat (Wetlands) then Movement Corridors are to be considered as outlined in Table 1.4.1 of this Schedule. • SWH MIST[cxlix] Index #15 provides development effects and mitigation measures.	• Candidate – the MAS ecosites may support wetland-breeding amphibians.

Specialized Wildlife Habitat	Wildlife Species	Candidate SWH ELC Ecosite Codes	Candidate SWH Habitat Criteria and Information Sources	Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
Woodland Area-Sensitive Bird Breeding Habitat **<u>Rationale:</u>** Large, natural blocks of mature woodland habitat within the settled areas of Southern Ontario are important habitats for area sensitive interior forest song birds.	• Yellow-bellied Sapsucker • Red-breasted Nuthatch • Veery • Blue-headed Vireo • Northern Parula • Black-throated Green Warbler • Blackburnian Warbler • Black-throated Blue Warbler • Ovenbird • Scarlet Tanager • Winter Wren • Pileated Woodpecker **Special Concern:** • Cerulean Warbler • Canada Warbler	All Ecosites associated with these ELC Community Series: FOC FOM FOD SWC SWM SWD	• Habitats where interior forest breeding birds are breeding, typically large mature (>60 yrs old) forest stands or woodlots >30 ha.[cv, cxxxi, cxxxii, cxxxiii, cxxxiv, cxxxv, cxxxvi, cxxxvii, cxxxviii, cxxxix, cxl, cxli, cxlii, cxliii, cxliv, cxlv, cxlvi, cl, cli, clii, cliii, cliv, clv, clvi, clvii, clviii, clix] • Interior forest habitat is at least 200 m from forest edge habitat. <u>Information Sources</u> • Local birder clubs. • Canadian Wildlife Service (CWS) for the location of forest bird monitoring. • Bird Studies Canada conducted a 3-year study of 287 woodlands to determine the effects of forest fragmentation on forest birds and to determine what forests were of greatest value to interior species • Reports and other information available from Conservation Authorities.	Studies confirm: • Presence of nesting or breeding pairs of three 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 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”[ccxi] • SWH MIST[cxlix] Index #34 provides development effects and mitigation measures.	• None- the study area does not contain any woodlands >30ha

Table F4 Habitat of Species of conservation Concern considered SWH

Wildlife Habitat	Species	Candidate SWH ELC Ecosite Codes	Candidate SWH Habitat Criteria and Information Sources	Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
Marsh Breeding Bird Habitat **Rationale:** Wetlands for these bird species are typically productive and fairly rare in Southern Ontario landscapes.	• American Bittern • Virginia Rail • Sora • Common Moorhen • American Coot • Pied-billed Grebe • Marsh Wren • Sedge Wren • Common Loon • Green Heron • Trumpeter Swan **Special Concern:** • Black Tern • Yellow Rail	MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 SAS1 SAM1 SAF1 FEO1 BOO1 For Green Heron: All SW, MA and CUM1 sites.	• Nesting occurs in wetlands. • All wetland habitat is to be considered as long as there is shallow water with emergent aquatic vegetation present.[cxxiv] • 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. Information Sources • OMNRF District and wetland evaluations. • Field Naturalist clubs • NHIC Records. • Reports and other information available from Conservation Authorities. • Ontario Breeding Bird Atlas.	Studies confirm: • Presence of five or more nesting pairs of Sedge Wren or Marsh Wren **or** breeding by any combination of four or more of the listed species.Ⓔ • Note: any wetland with breeding of one or more Black Terns, Trumpeter Swan, 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"[ccxi] • SWH MIST[cxlix] Index #35 provides development effects and mitigation measures.	• Candidate – the MAS ecosites within the study area contain shallow water with emergent aquatic vegetation.

Wildlife Habitat	Species	Candidate SWH ELC Ecosite Codes	Candidate SWH Habitat Criteria and Information Sources	Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
Open Country Bird Breeding Habitat **<u>Rationale:</u>** This wildlife habitat is declining throughout Ontario and North America. Species such as the Upland Sandpiper have declined significantly the past 40 years based on CWS (2004) trend records.	• Upland Sandpiper • Grasshopper Sparrow • Vesper Sparrow • Northern Harrier • Savannah Sparrow **Special Concern** • Short-eared Owl	CUM1 CUM2	• Large grassland areas (includes natural and cultural fields and meadows) >30 ha.[clx, clxi, clxii, clxiii, clxiv, clxv, clxvi, clxvii, clxviii, clxix] • Grasslands 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 grassland areas than the common grassland species. <u>Information Sources</u> • Agricultural land classification maps, Ministry of Agriculture • Local bird clubs • Ontario Breeding Bird Atlas • EIS Reports and other information available from Conservation Authorities.	Field Studies confirm: • Presence of nesting or breeding of two or more of the listed species.Ⓔ • A field with one 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”[ccxi] • SWH MIST[cxlix] Index #32 provides development effects and mitigation measures	• None- the study area does not include large grassland areas >30ha.

Wildlife Habitat	Species	Candidate SWH ELC Ecosite Codes	Candidate SWH Habitat Criteria and Information Sources	Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
Shrub/Early Successional Bird Breeding Habitat **Rationale**: This wildlife habitat is declining throughout Ontario and North America. The Brown Thrasher has declined significantly over the past 40 years based on CWS (2004) trend records.	Indicator Spp: • Brown Thrasher • Clay-coloured Sparrow Common Spp. • Field Sparrow • Black-billed Cuckoo • Eastern Towhee • Willow Flycatcher **Special Concern:** • Yellow-breasted Chat • Golden-winged Warbler	CUT1 CUT2 CUS1 CUS2 CUW1 CUW2 Patches of shrub ecosites can be complexed into a larger habitat for some bird species	Large field areas succeeding to shrub and thicket habitats >10 ha[clxiv] 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.[clxxiii] • Shrub and thicket habitat sites considered significant should have a history of longevity, either abandoned fields or pasturelands. Information Sources • Agricultural land classification maps, Ministry of Agriculture. • Local bird clubs • Ontario Breeding Bird Atlas • Reports and other information available from Conservation Authorities.	Field Studies confirm: • Presence of nesting or breeding of one of the indicator species and at least two of the common species.Ⓔ • A habitat with breeding Yellow-breasted Chat or Golden-winged Warbler is to be considered as Significant Wildlife Habitat.Ⓔ • The area of the SWH is the contiguous ELC ecosite field/thicket 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"[ccxi] • SWH MIST[cxlix] Index #33 provides development effects and mitigation measures.	• None- the study area does not contain large shrub/thicket habitats >10ha.

Wildlife Habitat	Species	Candidate SWH ELC Ecosite Codes	Candidate SWH Habitat Criteria and Information Sources	Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
Terrestrial Crayfish **<u>Rationale:</u>** Terrestrial Crayfish are only found within SW Ontario in Canada and their habitats are very rare.[ccii]	Chimney or Digger Crayfish; (*Fallicambarus fodiens)* Devil Crayfish or Meadow Crayfish; (*Cambarus Diogenes*)	MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 MAS1 MAS2 MAS3 SWD SWT SWM CUM1 with inclusions of above meadow marsh ecosites can be used by terrestrial crayfish.	Wet meadow and edges of shallow marshes (no minimum size) should be surveyed for terrestrial crayfish. • Constructs burrows in marshes, mudflats, meadows; the ground can't be too moist. Can often be found far from water. • Both species are a semi-terrestrial burrower which spends most of its life within burrows consisting of a network of tunnels. Usually the soil is not too moist so that the tunnel is well formed. <u>Information Sources</u> • Information sources from "Conservation Status of Freshwater Crayfishes" by Dr. Premek Hamr for the WWF and CNF March 1998	Studies Confirm: • Presence of one or more individuals of species listed or their chimneys (burrows) in suitable meadow marsh, swamp or moist terrestrial sites.[cci] • Area of ELC ecosite or an ecoelement area of meadow marsh or swamp within the larger ecosite area is the SWH. • Surveys should be done April to August in temporary or permanent water. Note the presence of burrows or chimneys are often the only indicator of presence, observance or collection of individuals is very difficult.[cci] • SWH MIST[cxlix] Index #36 provides development effects and mitigation measures.	• Candidate – cultural meadows adjacent to MAM2, MAS2, or SWT ecosites may support terrestrial crayfish habitat.
Special Concern and Rare Wildlife Species **<u>Rationale:</u>** These species are quite rare or have experienced significant population declines in Ontario.	All Special Concern and Provincially Rare (S1–S3, SH) plant and animal species. Lists of these species are tracked by the NHIC.	All plant and animal element occurrences (EO) within a 1- or 10-km grid. Older element occurrences were recorded prior to GPS being available; therefore, location information may lack accuracy	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.[lxxviii] <u>Information Sources</u> • NHIC will have Special Concern and Provincially Rare (S1–S3, SH) species lists with element occurrences data. • NHIC Website "Get Information": http://nhic.mnr.gov.on.ca • Ontario Breeding Bird Atlas • Expert advice should be sought as many of the rare spp. have little information available about their requirements.	Studies Confirm: • 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 be easily mapped and cover an important life stage component for a species e.g. specific nesting habitat or foraging habitat. • SWH MIST[cxlix] Index #37 provides development effects and mitigation measures.	Candidate – • Eastern Wood Pewee • Grasshopper Sparrow • Snapping Turtle • Hackberry Emperor • Monarch Confirmed – none •

Table F5 Animal Movement Corridors

Wildlife Habitat	Species	Candidate SWH ELC Ecosites	Candidate SWH Habitat Criteria and Information Sources	Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
Amphibian Movement Corridors **Rationale:** Movement corridors for amphibians moving from their terrestrial habitat to breeding habitat can be extremely important for local populations.	• 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	Corridors may be found in all ecosites associated with water. • Corridors will be determined based on identifying the significant breeding habitat for these species in Table 1.1	Movement corridors between breeding habitat and summer habitat. • Movement corridors must be determined when Amphibian breeding habitat is confirmed as SWH from Table 1.2.2 **(Amphibian Breeding Habitat –Wetland)** of this Schedule. Information Sources • MNRF District Office • NHIC • Reports and other information available from Conservation Authorities. • Field Naturalist Clubs	• 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, with several layers of vegetation. Corridors unbroken by roads, waterways or bodies, and undeveloped areas are most significant • Corridors should have at least 15 m of vegetation on both sides of waterway or be up to 200 m wide of woodland habitat and with gaps <20 m • Shorter corridors are more significant than longer corridors; however, amphibians must be able to get to and from their summer and breeding habitat • SWH MIST Index #40 provides development effects and mitigation measures	• Candidate – natural areas adjacent or within the contiguous natural corridor of the Thames River should be considered potential amphibian movement corridors.

Table F6 Significant Wildlife Habitat Expectations for Eco-districts within Eco-Region 7E

Ecodistrict	Wildlife Habitat and Species	Candidate SWH Ecosites and Habitat Description	Candidate SWH Habitat Criteria and Information	Confirmed SWH Defining Criteria	Candidate or Confirmed Habitat Present Adelaide WWTP
7E-2	**Bat Migratory Stopover Area** Rationale: Stopover areas for long distance migrant bats are important during fall migration. • Hoary Bat • Eastern Red Bat • Silver-haired Bat	No specific ELC types or habitat descriptions	• Long-distance migratory bats typically migrate during late summer and early fall from summer breeding habitats throughout Ontario to southern wintering areas. Their annual fall migration may concentrate these species of bats at stopover areas. • This is the only known bat migratory stopover habitats based on current information. <u>Information Sources</u> • OMNRF for possible locations and contact for local experts • University of Waterloo, Biology Department	• Long Point (42°35'N, 80°30'E, to 42°33'N, 80°03'E) has been identified as a significant stop-over habitat for fall migrating Silver-haired Bats, due to significant increases in abundance, activity and feeding that was documented during fall migration. • The confirmation criteria and habitat areas for this SWH are still being determined. • SWH MIST Index #38 provides development effects and mitigation measures	• None- the study area is not included within the known stopover areas

Appendix G
Species of Conservation Concern Assessment

Appendix G

Species of Conservation Concern Assessment
Adelaide Wastewater Treatment Plant

Table G1 Avian Species of Conservation Concern Assessment for Adelaide Wastewater Treatment Plant

Common Name	Scientific Name	Priority species[1]	ESA 2007	SARA 2002	Preferred Habitat[2]	Status and Observations
Eastern Wood-Pewee	*Contopus virens*	Regional Concern - Recovery Objective	SC	SC	Wooded habitats	Potential- Suitable habitat for this species is present in any mature wooded ecosite within the study area.
Grasshopper Sparrow	*Ammodramus savannarum*	Regional Concern - Increase	SC	SC	Open grassland areas with well-drained, sandy soil.	Potential -Suitable habitat for this species may be found within sections of CUM1 ecosite on the study area.

[1] Government of Canada 2014.
[2] Cornell lab of Ornithology 2021.

Table G2 Herpetofauna Species of Conservation Concern Assessment for Adelaide Wastewater Treatment Plant

Common Name	Scientific Name	S-rank	ESA 2007	SARA 2002	Preferred Habitat[1]	Status and Observation
Eastern Ribbonsnake	*Thamnophis sauritus*	S4	SC	SC	Aquatic habitats with forested riparian zone	Unlikely- the Thames river and the riparian zone is outside of the study area
Snapping Turtle	*Chelydra serpentina*	S4	SC	SC	Prefers shallow aquatic habitats and gravel/sand banks for nesting.	Candidate – The larger MAS2-1 ecosite may be suitable habitat to support this species.
Northern Map Turtle	*Graptemys geographica*	S3	SC	SC	Aquatic habitats with mollusc prey and basking areas	Unlikely- the Thames river and the riparian zone is outside of the study area

Notes:
[1] Ontario Nature 2021

Table G3 Insects Species of Conservation Concern Assessment for Adelaide Wastewater Treatment Plant

Common name	Scientific name	S-Rank	ESA 2007	SARA 2002	Preferred Habitat[1]	Status and Observation
Hackberry Emperor	*Asterocampa celtis*	S3	-	-	Habitats which support Hackberry trees	Potential – Hackberry trees are present within treed ecosites on the study area.
Monarch	*Danaus plexippus*	S2N, S4B	SC	SC	Caterpillars are confined to meadows and open areas where milkweed grows. Adult butterflies can be found in more diverse habitats.	Potential – Common milkweed is present within CUM1 ecosites on the study area.

Notes:
[1] IUCN 2021

Table G4 Fish Species of Conservation Concern Assessment for Adelaide Wastewater Treatment Plant

Common name	Scientific name	S-rank	ESA 2007	SARA 2002	Preferred Habitat[1]	Status and Observation
Northern Sunfish (Great Lakes - Upper St. Lawrence populations)	*Lepomis peltastes*	S5	SC	SC	Shallow vegetated areas of quiet, slow flowing rivers and streams, as well as warm lakes and ponds	None- the Thames River is located outside of the study area, and is not anticipated to be impacted.

[1] IUCN 2021

Table G5 Plant Species of Conservation Concern Assessment for Adelaide Wastewater Treatment Plant

Common name	Scientific Name	S-rank	ESA 2007	SARA 2002	Preferred Habitat[1]	Status and Observation
Lowland Brittle Fer	*Cystopteris protrusa*	S2S3	-	-	In soil of moist, deciduous forests	Unlikely- the study area did not include the preferred habitat, and the species was not observed during the 2020 field study.
Slender Mountain-mint	*Pycnanthemum tenuifolium*	S3	-	-	Typically grows in dry, open, rocky woods, dry prairies and fields.	Unlikely- the study area did not include the preferred habitat, and the species was not observed during the 2020 field study.
Hairy Fruited Sedge	*Carex trichocarpa*	S3	-	-	Openings in bottomlands, marshes, wet meadows, wet thickets along streams and rivers	Unlikely- the study area did not include the preferred habitat, and the species was not observed during the 2020 field study.
Striped Cream Violet	*Viola striata*	S3	-	-	Riparian or alluvial woods, floodplains in silty loam, meadows	Unlikely- the study area did not include the preferred habitat, and the species was not observed during the 2020 field study.
Rigid Sedge	*Carex tetanica*	S3?	-	-	Calcareous fens, bogs, and swales	Unlikely- the study area did not include the preferred habitat, and the species was not observed during the 2020 field study.
Soft-hairy False Gromwell	*Lithospermum parviflorum*	S2	-	-	Dry, open, rocky or gravelly hillsides, fields, thickets, and prairies in calcareous regions.	Unlikely- the study area did not include the preferred habitat, and the species was not observed during the 2020 field study.

[1]FNAA 2020

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Appendix H
Species at Risk Assessment

Appendix H

Species at Risk Habitat Assessment

Table H1 Habitat Assessment for Potential Species at Risk within Adelaide Wastewater Treatment Plant

Common name	Scientific Name	ESA	SARA	Habitat Requirements (MECP 2021)	Year and General Location of Species Record	Observations and Likelihood of Occurrence within Study area
Flora (1)						
Kentucky Coffee-tree	*Gymnocladus dioicus*	THR	THR	This tree is found in floodplains and river valleys	MECP records for Adelaide WWTP	Potential – Suitable habitat for this species is present within treed ecosites on the study area.
Butternut	*Juglans cinerea*	END	END	This species prefers moist, well-drained soil, often found along streams. Also found on well-drained gravel sites.	This species was identified within the Thames Valley Parkway North Branch Connection, Class Environmental Assessment Environmental Impact Study (Dillon Consulting 2016)	Potential – Suitable habitat for this species is present within treed ecosites on the study area. This species was no observed within the study area during the 2021 field study.
Birds (9)						
Bank Swallow	*Riparia riparia*	THR	THR	Bank swallows nest in burrows in natural and human-made settings where there are vertical faces in silt and sand deposits.	This species was identified within the Thames Valley Parkway North Branch Connection, Class Environmental Assessment Environmental Impact Study (Dillon Consulting 2016). Species identified within OBBA 10 km square	Unlikely – The study area does not contain the preferred habitat for this species.
Barn Swallow	*Hirundo rustica*	THR	THR	This species prefers human-made structures, such as open barns, bridges, or culverts to build their nests.	This species was identified within the Thames Valley Parkway North Branch Connection, Class Environmental Assessment Environmental Impact Study (Dillon Consulting 2016). Species identified within *OBBA* 10 km square.	Unlikely – The study area does not contain the preferred habitat for this species.
Bobolink	*Dolichonyx oryzivorus*	THR	THR	This species prefers open prairie or meadow habitat and builds its nests on the ground in the dense grasses.	Species identified within OBBA 10 km square.	Potential – Open meadow habitat is present within CUM1 ecosites on the study area.
Chimney Swift	*Chaetura pelagica*	THR	THR	This species establishes colonies within unused chimneys to roost or build their nest.	This species was identified within the Thames Valley Parkway North Branch Connection, Class Environmental Assessment Environmental Impact Study (Dillon Consulting 2016). Species identified within OBBA 10 km square.	Confirmed – The species was identified during the breeding bird survey flying over the study area. The study area does not contain suitable chimneys for nesting, and therefore it is assumed that this species is nesting within one of the surrounding neighbourhoods. Since no habitat exists within study area, no further impact assessment is required.
Common Nighthawk	*Chordeiles minor*	SC	THR	Open areas with little to no ground vegetation, such as, forest clearings, rock barrens, peat bogs, lakeshores, and mine tailings.	Species identified within OBBA 10 km square.	Unlikely – The study area does not contain the preferred habitat for this species.

Common name	Scientific Name	ESA	SARA	Habitat Requirements (MECP 2021)	Year and General Location of Species Record	Observations and Likelihood of Occurrence within Study area
Eastern Meadowlark	*Sturnella magna*	THR	THR	This species primarily breeds in prairie and grassland habitats, but may also breed in croplands, orchards, or overgrown fields.	Species identified within OBBA 10 km square.	Potential – Open meadow habitat is present within CUM1 ecosites on the study area.
Northern Bobwhite	*Colinus virginianus*	END	END	This species nests in savannahs, grasslands, around abandoned farm fields, along brushy fencerows.	Species identified within OBBA 10 km square.	Unlikely – The study area does not contain the preferred habitat for this species.
Red-headed Woodpecker	*Melanerpes erythrocephalus*	SC	THR	This species prefers forest communities with an open understory.	MECP records for Adelaide WWTP	Potential – Suitable habitat for this species may be present within any wooded ecosite on the study area.
Wood Thrush	*Hylocichla mustelina*	SC	THR	This species prefers mature, unfragmented, deciduous forests.	Species identified within OBBA 10 km square.	Unlikely – The study area does not contain the preferred habitat for this species.
Herpetofauna (4)						
Eastern Spiny Softshell	*Apalone spinifera*	END	THR	This species prefers slow-moving large water bodies or rivers with soft, muddy bottoms and aquatic vegetation. Nests are located near water on sandy beaches or gravel banks with sun.	This species was identified within the Thames Valley Parkway North Branch Connection, Class Environmental Assessment Environmental Impact Study (Dillon Consulting 2016). Species identified within NHIC 1km square	None – This species inhabits the Thames River which is not included in the study area, and is not likely to be impacted by construction works.
Eastern Hog-nosed Snake	*Heterodon platirhinos*	THR	THR	This species prefers sandy, well-drained soils to burrow and lay eggs. Such as beaches and dry forests.	Species identified within ORAA 10km square	Unlikely – The study area does not contain the preferred habitat for this species.
Five-lined Skink (Carolinian population)	*Plestiodon fasciatus*	END		The Carolinian population can be found under woody debris in clearings with sand dunes, open forested areas, and wetlands.	Species identified within ORAA 10km square	Unlikely – The study area does not contain the preferred habitat for this species.
Queensnake	*Regina septemvittata*	END	THR	This species prefers water bodies with clear water, rocky or gravel bottoms, and an abundance of crayfish. Suitable hibernation sites include abutments of old bridges and crevices in bedrock.	Species identified within ORAA 10km square	None – This species inhabits the Thames River which is not included in the study area, and is not likely to be impacted by construction works.
Mammals (4)						
Eastern Small-footed Myotis	*Myotis leibii*	END	END	Day and maternity roosts typically in cavities of trees, under rocks, in bedrock fissures, under bridges, culverts, abandoned buildings, etc. Hibernate in caves and abandoned mines.	Species distribution in the province poorly understood. Suitable habitat potential assessed for due diligence.	Unlikely – Though suitable roosting habitat may be present in the form of tree cavities, this species prefers rock crevices and anthropogenic structures. No overwintering habitat present.

Common name	Scientific Name	ESA	SARA	Habitat Requirements (MECP 2021)	Year and General Location of Species Record	Observations and Likelihood of Occurrence within Study area
Little Brown Myotis	*Myotis lucifugus*	END	END	Mature trees, roost within cavities and under loose bark. Can also utilize anthropogenic structures such as abandoned buildings, barns, and attics. Hibernate in caves and abandoned mines.	Species potential based on the Mammal atlas of Ontario	Potential – The FOD and CUW ecosites contain mature trees that may contain suitable day and maternity roosting features as cavities and loose bark. No overwintering habitat present.
Northern Myotis	*Myotis septentrionalis*	END	END	Mature trees, roost within cavities and under loose bark. Can also utilize anthropogenic structures such as abandoned buildings, barns, and attics. Hibernate in caves and abandoned mines.	Species potential based on the Mammal atlas of Ontario	Potential – The FOD and CUW ecosites contain mature trees that may contain suitable day and maternity roosting features as cavities and loose bark. No overwintering habitat present.
Tri-colored Bat	*Perimyotis subflavus*	END	END	Mature trees, with preference for downed foliage of oak and maple species. Has been observed to utilize anthropogenic structures such as abandoned buildings, barns, and attics. Hibernate in caves and abandoned mines.	Species distribution in the province poorly understood. Suitable habitat potential assessed for due diligence.	Potential – The FOD and CUW ecosites contain mature trees that may contain suitable day and maternity roosting features as cavities and loose bark. No overwintering habitat present.
Fish (2)						
Black Redhorse	*Moxostoma duquesnei*	THR	NAR	This species prefers pools and riffle of medium-sized rivers that are usually less than 2 m deep. This species has been observed in moderate to fast currents, with sandy or gravel substrates.	Species identified within the Thames River adjacent to the Adelaide facility during 2002-2012 studies (Ramsey 2021, Pers. Comm.)	None – This species inhibits the Thames River which is not included in the study area, and is not likely to be impacted by construction works.
Silver Shiner	*Notropis photogenis*	THR	THR	This species prefers deep riffles or pools of medium to large rivers with moderate to high gradients. Preferred substrates are variable.	Critical habitat and species presence were documented by Fisheries and Oceans Canada (DFO 2019)	None – This species inhibits the Thames River which is not included in the study area, and is not likely to be impacted by construction works.
Mussels (2)						
Round Pigtoe	*Pleurobema sintoxia*	END	END	This species is found in rivers of various sizes with deep water and sandy, rocky, or mud bottoms. Host species for larvae include Bluegill (*Lepomis macrochirus*), Spotfin shiner (*Cyprinella spiloptera*), Bluntnose minnow (*Pimephales notatus*), and Northern redbelly dace (*Chrosomus eos*).	Species potential or presence identified by the MECP	None – This species inhibits the Thames River which is not included in the study area, and is not likely to be impacted by construction works.

Common name	Scientific Name	ESA	SARA	Habitat Requirements (MECP 2021)	Year and General Location of Species Record	Observations and Likelihood of Occurrence within Study area
Wavy-rayed Lampmussel	*Lampsilis fasciola*	THR	SC	This species prefers riffle areas of clear, small to medium sized streams and rivers of various sizes with gravel and sand stabilized with cobble and boulders. Larvae hosts for this species include: Smallmouth Bass and Largemouth Bass	Species was documented within DFO SAR records (DFO 2019)	None – This species inhibits the Thames River which is not included in the study area, and is not likely to be impacted by construction works.

ESA - *Endangered Species Act*
SARA - *Species at Risk Act*

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Appendix D
Stage 1 Archaeological Assessment (ARA 2022)

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

DRAFT

Stage 1 Archaeological Assessment
Greenway and Adelaide Wastewater Treatment Plants
Climate Change Resiliency Project
Municipal Class Environmental Assessment
City of London
Part of Lots 32–34, Concession B Broken Front
Geographic Township of Westminster
Part of Lot 13, Concession 3
Geographic Township of London
Former Middlesex County, Ontario

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ARA File #2021-0007

12/04/2022

Original Report

EXECUTIVE SUMMARY

Under a contract awarded in February 2021, Archaeological Research Associates Ltd. carried out a Stage 1 assessment of lands with the potential to be impacted by the Greenway and Adelaide Wastewater Treatment Plants (WWTPs) Climate Change Resiliency Project in the City of London, Ontario. The assessment was carried out as part of a Schedule 'B' Municipal Class Environmental Assessment (EA) in accordance with the *Environmental Assessment Act*. This report documents the background research and potential modelling involved in the investigation and presents conclusions and recommendations pertaining to archaeological concerns.

This project will seek to identify a preferred flood protection approach to improve asset resilience, enhance treatment capabilities, and improve plant safety. Potential approaches include a flood barrier, an effluent pumping station, and other upgrades to protect these critical infrastructure assets and reduce the environmental impacts of flooding. The investigative area includes lands outside of the Greenway and Adelaide WWTPs as part of the analysis of alternative flood mitigation solutions.

The Stage 1 assessment was conducted in July 2021 under Project Information Form #P1021-0009-2021. The investigation encompassed the entire study area. Legal permission to enter and conduct all necessary fieldwork activities within the assessed lands was granted by the property owner. At the time of assessment, the study area consisted of administrative structures, processing facilities, parking areas, walkways, roadways, recreational areas and grassed and wooded lands.

The Stage 1 assessment determined that the study area comprises a mixture of areas of archaeological potential, areas of no archaeological potential and previously assessed lands of no further concern. It is recommended that all areas of archaeological potential that could be impacted by the project be subject to a Stage 2 property assessment in accordance with Section 2.1 of the 2011 *Standards and Guidelines for Consultant Archaeologists*. The specific areas of impact will be determined during detailed design and construction.

It is highly likely that the Norton site (AfHh-86) will continue into the unassessed southern portion of the Greenway WWTP parcel. The presence of this site must be considered during the selection of the preferred flood protection approach, and this area should be avoided to ensure the continued preservation of the deposit. If it cannot be avoided, then the Stage 2 survey should proceed to determine the extent of the site. A Stage 3 site-specific assessment and Stage 4 mitigation of development impacts may be required.

The identified areas of no archaeological potential and previously assessed lands of no further concern do not require any additional assessment. Given that there are still outstanding archaeological concerns within the subject lands, no ground alterations or development of any kind may occur until the required investigation is complete, a recommendation that the lands require no further archaeological assessment is made, and the associated report is entered into the Ontario Public Register of Archaeological Reports.

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ABBREVIATIONS

ARA – Archaeological Research Associates Ltd.
CIF – Contract Information Form
MHSTCI – Ministry of Heritage, Sport, Tourism and Culture Industries
PIF – Project Information Form
S&Gs – Standards and Guidelines for Consultant Archaeologists
WWTP – Wastewater Treatment Plant

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1.0 PROJECT CONTEXT

1.1 Development Context

Under a contract awarded in February 2021, Archaeological Research Associates Ltd. (ARA) carried out a Stage 1 assessment of lands with the potential to be impacted by the Greenway and Adelaide Waste Water Treatment Plants (WWTPs) Climate Change Resiliency Project in the City of London, Ontario. The assessment was carried out as part of a Schedule 'B' Municipal Class Environmental Assessment (EA) in accordance with the *Environmental Assessment Act*. This report documents the background research and potential modelling involved in the investigation and presents conclusions and recommendations pertaining to archaeological concerns.

This project will seek to identify a preferred flood protection approach to improve asset resilience, enhance treatment capabilities, and improve plant safety. Potential approaches include a flood barrier, an effluent pumping station, and other upgrades to protect these critical infrastructure assets and reduce the environmental impacts of flooding. The investigative area includes lands outside of the Greenway and Adelaide WWTPs as part of the analysis of alternative flood mitigation solutions.

ARA's study area consists of four irregularly-shaped parcels with a total area of 35.30 ha (Map 1). These parcels are located south of the Thames River and are generally bounded by developed properties, roadways and/or overgrown lands. Each parcel was assigned a unique identifier to facilitate recording and discussion (i.e., Adelaide WWTP, Adelaide Grading, Greenway WWTP and Greenway Grading). In legal terms, the study area falls on multiple lots and concessions in the Geographic Townships of London and Westminster, former Middlesex County (Table 1).

Table 1: Parcel Locations

Parcel Identifier(s)	Lot(s)	Concession	Geographic Township	County
Adelaide WWTP and Adelaide Grading	13	3	London	Middlesex
Greenway WWTP	33–34	Concession B Broken Front	Westminster	Middlesex
Greenway Grading	32	Concession B Broken Front	Westminster	Middlesex

The Stage 1 assessment was conducted in July 2021 under Project Information Form (PIF) #P1021-0009-2021. The investigation encompassed the entire study area. Legal permission to enter and conduct all necessary fieldwork activities within the assessed lands was granted by the property owner. In compliance with the objectives set out in Section 1.0 of the 2011 *Standards and Guidelines for Consultant Archaeologists* (*S&Gs*), this investigation was carried out in order to:

- Provide information concerning the geography, history and current land condition of the study area;
- Determine the presence of known archaeological sites in the study area;
- Present strategies to mitigate project impacts to such sites, if they are located;
- Evaluate in detail the archaeological potential of the study area; and

- Recommend appropriate strategies for Stage 2 archaeological assessment, if some or all of the study area has archaeological potential.

The Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI) is asked to review the results and recommendations presented herein and enter the report into the Ontario Public Register of Archaeological Reports. ARA did not engage with any Indigenous groups over the course of the subject investigation.

1.2 Historical Context

After a century of archaeological work in southern Ontario, scholarly understanding of the historical usage of the area has become very well-developed. With occupation beginning in the Palaeo period approximately 11,000 years ago, the greater vicinity of the study area comprises a complex chronology of Indigenous and Euro-Canadian histories. Section 1.2.1 summarizes the region's settlement history, whereas Section 1.2.2 documents the study area's past and present land uses. Multiple previous archaeological reports containing relevant background information were obtained during the research component of the study. These reports are summarized in Section 1.3.3, and the references (including title, author and PIF number) appear in Section 7.0.

1.2.1 Settlement History

1.2.1.1 Pre-Contact

The Pre-Contact history of the region is lengthy and rich, and a variety of Indigenous groups inhabited the landscape. Archaeologists generally divide this vibrant history into three main periods: Palaeo, Archaic and Woodland. Each of these periods comprise a range of discrete sub-periods characterized by identifiable trends in material culture and settlement patterns, which are used to interpret past lifeways. The principal characteristics of these sub-periods are summarized in Table 2.

Table 2: Pre-Contact Settlement History
(Wright 1972; Ellis and Ferris 1990; Warrick 2000; Munson and Jamieson 2013)

Sub-Period	Timeframe	Characteristics
Early Palaeo	9000–8400 BC	Gainey, Barnes and Crowfield traditions; Small bands; Mobile hunters and gatherers; Utilization of seasonal resources and large territories; Fluted projectiles
Late Palaeo	8400–7500 BC	Holcombe, Hi-Lo and Lanceolate biface traditions; Continuing mobility; Campsite/Way-Station sites; Smaller territories are utilized; Non-fluted projectiles
Early Archaic	7500–6000 BC	Side-notched, Corner-notched (Nettling, Thebes) and Bifurcate traditions; Growing diversity of stone tool types; Heavy woodworking tools appear (e.g., ground stone axes and chisels)
Middle Archaic	6000–2500 BC	Stemmed (Kirk, Stanly/Neville), Brewerton side- and corner-notched traditions; Reliance on local resources; Populations increasing; More ritual activities; Fully ground and polished tools; Net-sinkers common; Earliest copper tools
Late Archaic	2500–900 BC	Narrow Point (Lamoka), Broad Point (Genesee) and Small Point (Crawford Knoll) traditions; Less mobility; Use of fish-weirs; True cemeteries appear; Stone pipes emerge; Long-distance trade (marine shells and galena)
Early Woodland	900–400 BC	Meadowood tradition; Crude cord-roughened ceramics emerge; Meadowood cache blades and side-notched points; Bands of up to 35 people

Sub-Period	Timeframe	Characteristics
Middle Woodland	400 BC–AD 600	Saugeen tradition; Stamped ceramics appear; Saugeen projectile points; Cobble spall scrapers; Seasonal settlements and resource utilization; Post holes, hearths, middens, cemeteries and rectangular structures identified
Middle/Late Woodland Transition	AD 600–900	Gradual transition between Saugeen and Algonquian lifeways; Princess Point tradition emerges elsewhere (i.e., in the vicinity of the Grand and Credit Rivers)
Late Woodland (Early)	AD 900–1300	Glen Meyer tradition; Settled village-life based on agriculture; Small villages (0.4 ha) with 75–200 people and 4–5 longhouses; Semi-permanent settlements
Late Woodland (Middle)	AD 1300–1400	Uren and Middleport traditions; Classic longhouses emerge; Larger villages (1.2 ha) with up to 600 people; More permanent settlements (30 years)
Late Woodland (Late)	AD 1400–1600	Pre-Contact Neutral tradition; Larger villages (1.7 ha); Examples up to 5 ha with 2,500 people; Extensive croplands; Also, hamlets, cabins, camps and cemeteries; Potential tribal units; Fur trade begins ca. 1580; European trade goods appear

Although Iroquoian-speaking populations tended to leave a much more obvious mark on the archaeological record and are therefore emphasized in the Late Woodland entries above, it must be understood that Algonquian-speaking populations also represented a significant presence in southern Ontario. Due to the sustainability of their lifeways, archaeological evidence directly associated with the Anishinaabeg remains elusive, particularly when compared to sites associated with the more sedentary agriculturalists. Many artifact scatters in southern Ontario were likely camps, chipping stations or processing areas associated with the more mobile Anishinaabeg, utilized during their travels along the local drainage basins while making use of seasonal resources. This part of southern Ontario represents the ancestral territory of various Indigenous groups, each with their own land use and settlement pattern tendencies.

1.2.1.2 Post-Contact

The arrival of European explorers and traders at the beginning of the 17th century triggered widespread shifts in Indigenous lifeways and set the stage for the ensuing Euro-Canadian settlement process. Documentation for this period is abundant, ranging from the first sketches of Upper Canada and the written accounts of early explorers to detailed township maps and lengthy histories. The Post-Contact period can be effectively discussed in terms of major historical events, and the principal characteristics associated with these events are summarized in Table 3.

Table 3: Post-Contact Settlement History
(Smith 1846; Goodspeed 1889; Coyne 1895; Lajeunesse 1960; Ellis and Ferris 1990; Surtees 1994; AO 2015)

Historical Event	Timeframe	Characteristics
Early Exploration	Early 17th century	Brûlé explores southern Ontario in 1610/11; Champlain travels through in 1613 and 1615/1616, making contact with a number of Indigenous groups (including the Algonquin, Huron-Wendat and other First Nations); European trade goods become increasingly common and begin to put pressure on traditional industries
Increased Contact and Conflict	Mid- to late 17th century	Conflicts between various First Nations during the Beaver Wars result in numerous population shifts; European explorers continue to document the area, and many Indigenous groups trade directly with the French and English; 'The Great Peace of Montreal' treaty established between roughly 39 different First Nations and New France in 1701
Fur Trade Development	Early to mid-18th century	Growth and spread of the fur trade; Peace between the French and English with the Treaty of Utrecht in 1713; Ethnogenesis of the Métis; Hostilities between French and British lead to the Seven Years' War in 1754; French surrender in 1760

Historical Event	Timeframe	Characteristics
British Control	Mid-18th century	*Royal Proclamation* of 1763 recognizes the title of the First Nations to the land; Numerous treaties subsequently arranged by the Crown; First land cession under the new protocols is the Seneca surrender of the west side of the Niagara River in 1764; The Niagara Purchase (Treaty 381) in 1781 included this area
Loyalist Influx	Late 18th century	United Empire Loyalist influx after the American Revolutionary War (1775–1783); British develop interior communication routes and acquire additional lands; Between the Lakes Purchase completed with the Mississaugas in 1784 and confirmed in 1792 (Treaty 3); McKee Purchase (Treaty 2) completed in 1790; *Constitutional Act* of 1791 creates Upper and Lower Canada
County Development	Late 18th to early 19th century	Kent and Suffolk Counties established in 1792; London Township Purchase (Treaty 6) completed in 1796; London District and Middlesex County formed in 1798; Substantial communities began to develop along the Thames River at this time; Long Woods Purchase (Treaty 21) completed in 1822; By 1826, the Town of London was formally laid out; Huron Tract Purchase (Treaty 29) completed in 1827; Independent after the abolition of the district system in 1849
Township Formation	Early 19th century	London: The Township of London was first surveyed by Col. Burwell beginning in 1812, but it was not completed until the end of the War of 1812; London was the largest township in Middlesex County; The first land was patented in 1812 to Hon. John Hale, though permanent settlement was not undertaken until 1817/1818; In 1818, a British ship of Irish emigrants arrived and settled in the township; The settlement of London, laid out in 1826, became the District town
		Westminster: Base Line Road south of the Thames River was surveyed by S.T. Watson in 1809/1810; A. McMillan and N. Fairchild occupied Lots 45–48, Concession 1 at this time; Northern branch of the Talbot Road later surveyed by Col. Burwell; Remainder of the township surveyed by Col. Bostwick in 1820; Patents were issued as early as 1812; Unlike some neighbouring townships, the lands were not granted to absentees or sold to speculators prior to 1817; The first permanent settlers were Jos. Odell, Jon. Odell and J. Lester, who settled on Concession 1 in 1811; By 1817, the township had a population of 428 and contained 107 homesteads, 2 schools, 1 grist mill and 1 saw mill
Township Development	Mid-19th to early-20th century	London: The Town of London was incorporated in 1840 and had a population of ~3,500; The Township of London had a population of 3,955 by 1842, consisting mostly of British immigrants with a few Canadians and Americans; By 1846, 35,483 ha had been taken up, with 7,774 ha under cultivation; 6 saw mills and 3 grist mills were in operation at that time; The principal community was the City of London, but other settlements developed at Arva (St. Johns), Birr, Elginfield, Denfield, Ilderton, Vanneck, Bryanston, Kensigton, London East and Petersville
		Westminster: Population reached 3,376 by 1842, consisting mainly of Canadians, Americans and Pennsylvanian Dutch; By 1846, 22,944 ha had been taken up, with 6,779 ha under cultivation; 4 grist mills and 2 saw mills in operation at that time; Westminster had a population of 4,525 in 1850, with 3 grist mills, 2 carding machines, 1 fulling mill and several schools; Traversed by the Great Western Railway (1854), London & Port Stanley Railway (1856) and London & Lake Erie Railway (1906); By 1870/71, the population increased to 6,380, with 1,173 houses; Principal communities at Lambeth, Tempo, Glanworth, Belmont, Byron, Nilestown and Westminster (Hall's Mills)

1.2.2 Past and Present Land Use

1.2.2.1 Overview

During Pre-Contact and Early Contact times, the vicinity of the study area would have comprised a mixture of coniferous trees, deciduous trees and open areas. Indigenous communities would have managed the landscape to some degree. During the early 19th century, Euro-Canadian settlers arrived in the area and began to clear the forests for agricultural and settlement purposes. The Adelaide parcels were located north of the historical community of London, whereas the Greenway

parcels were situated to the southwest. The land use at the time of assessment can be classified as a mixture of administrative, infrastructural, recreational and green space.

1.2.2.2 Mapping and Imagery Analysis

In order to gain a general understanding of the study area's past land uses, two historical settlement maps, two topographic maps and two aerial images were examined during the research component of the study. Specifically, the following resources were consulted:

- *Tremaines' Map of the County of Middlesex, Canada West* (1862) (OHCMP 2019);
- The *Illustrated Historical Atlas of the County of Middlesex, Ont.* (1878) (MU 2001);
- Topographic maps from 1913 and 1915 (OCUL 2021); and
- Aerial images from 1942 and 1967 (WU 2021).

The limits of the study area are shown on georeferenced versions of the consulted historical resources in Map 2–Map 8. The study area traversed multiple properties during the late 19th and early 20th century, and a summary of identifiable occupants and land uses appears in Table 4.

Table 4: Occupational History and Past Land Uses

Parcel Identifier	ca. 1862	ca. 1878	Early to mid-20th century
Adelaide WWTP	Depicted as being divided into small lots with no occupants listed; Parcels are west of Adelaide Street North, south of the North Thames River and north of Huron Street	Occupied by Edward Winnett; A farm and two structures are shown in the southern portion of the parcel west of Adelaide Street North	Agricultural lands west of Adelaide Street North; Bounded by a deciduous woodlot to the southwest; Two brick/stone structures (red) and one wooden (black) structure appear in the southeast portion of the parcel; By 1967 the northwestern and southeastern parts of the parcel had been developed
Adelaide Grading		Part of Winnett's holding fronting the North Thames River; No structures visible	Agricultural lands south of the North Thames River and west of Adelaide Street North; One pocket of deciduous forest in the centre; Property remained agricultural into the mid-20th century
Greenway WWTP	Occupied west to east by Thomas Jarvis, Samuel Jarvis and John Bogue, respectively; The Thames River is depicted to the north; No structures are visible in the vicinity of the parcel	Occupied west to east by G. Norton, R. Jarvis and T. and J. Kent, respectively; No structures visible	Cleared agricultural land south of the London Street Railway; Numerous wood and brick structures indicated along Pipe Line Road and associated laneways; Nearest structure is depicted to the east of the parcel; By 1942 the majority of the parcel had been developed into the WWTP facilities that were further expanded by 1967
Greenway Grading	Part of Alexander MacArthur's holdings south of the Thames River and southwest of the Great Western Railway; No structures indicated in the vicinity of the parcel, though a home is depicted further to the southeast	No occupants indicated; Lot has been divided into smaller parcels; Traversed by The Cove associated with the nearby Thames River; London appears to be expanding westward along the Great Western Railway; Nearest structures appear to the east along the rail line	Cleared lands between the Great Western Railway to the north and the London Street Railway in the south; Path of The Cove appears to have been altered in the east with the connection to the Thames River filled in; By 1942 the parcel appears to be situated within overgrown lands which were again cleared by 1967

1.3 Archaeological Context

The Stage 1 assessment (property inspection) was conducted on July 16, 2021, under PIF #P1021-0009-2021. The limits of the study area were confirmed using georeferenced aerial imagery showing artificial and natural formations in relation to the subject lands.

The archaeological context of any given study area must be informed by 1) the condition of the property as found (Section 1.3.1), 2) a summary of registered or known archaeological sites located within a minimum 1 km radius (Section 1.3.2) and 3) descriptions of previous archaeological fieldwork carried out within the limits of, or immediately adjacent to the property (Section 1.3.3).

1.3.1 Condition of the Property

The parcels lie within the deciduous forest region, which is the southernmost forest region in Ontario and is dominated by agricultural and urban areas. This region generally has the greatest diversity of tree and vegetation species, while at the same time having the lowest proportion of forest. It has most of the tree and shrubs species found in the Great Lakes–St. Lawrence forest (e.g., white pine, red pine, hemlock, white cedar, yellow birch, sugar and red maples, basswood and red oak), and also contains black walnut, butternut, tulip, magnolia, black gum, many types of oaks, hickories, sassafras and red bud (MNRF 2021).

In terms of local physiography, the Adelaide parcels fall within the Stratford Till Plain, whereas the Greenway parcels are within the Caradoc Sand Plains and London Annex. The Stratford Till Plain consists of a broad clay plain characterized by ground moraines interrupted by terminal moraines extending from London to Listowel. The till, comprising brown calcareous silty clay, is a product of the Huron ice lobe. The area tends to be muddy and prone to abundant rain and snow as a result of its location east of Lake Huron (Chapman and Putnam 1984:133–135). The Caradoc Sand Plains and London Annex occupies lands east and west of London and covers an area of roughly 777 km^2. This region consists of small plains of sand or other light-textured, water-laid deposits that differ from the adjacent moraines and clay plains (Chapman and Putnam 1984:146).

According to the earlier Ontario Soil Survey, the Adelaide WWTP and Adelaide Grading parcels consist primarily of Burford gravelly loam, although areas of muck were documented in the southwestern part of the former and bottom land was identified along the North Thames River in the latter. Burford gravelly loam is characterized by undulated to rolling topography and good drainage qualities, whereas muck is nearly flat and has very poor natural drainage and bottom land is typically undulating and has variable drainage (EFS 1931). The Greenway WWTP and Greenway Grading parcels consist entirely of bottom lands. The soils within the parcels were not mapped during the later Ontario Soil Survey (Hagerty and Kingston 1992).

The subject lands fall within The Forks drainage basin, which is under the jurisdiction of the Upper Thames River Conservation Authority (UTRCA 2017). The water sources in the vicinity of each parcel are summarized in Table 5.

Table 5: Water Sources

Parcel Identifier	Proximity to Water Sources
Adelaide WWTP	Traversed by a tributary of the North Thames River and located 284 m south of the North Thames River
Adelaide Grading	Located 27 m southwest of the North Thames River, 105 m south of Stoney Creek and 156 m northwest of a tributary of the North Thames River
Greenway WWTP	Traversed by a tributary of the Thames River and located 28 m south of the Thames River and 390 m west of The Cove
Greenway Grading	Located 30 m east of The Cove, 47 m southwest of the Thames River and 157 m southwest of a tributary of the Thames River

At the time of assessment, the study area consisted of administrative structures, processing facilities, parking areas, walkways, roadways, recreational areas and grassed and wooded lands. Soil conditions were ideal for the activities conducted. No unusual physical features were encountered that affected the results of the Stage 1 assessment.

1.3.2 Registered or Known Archaeological Sites

The Ontario Archaeological Sites Database and the Ontario Public Register of Archaeological Reports were consulted to determine whether any registered or known archaeological resources occur within a 1 km radius of the study area. The available search facility returned a total of 32 registered sites located within at least a 1 km radius (the facility returns sites in a rectangular area, rather than a radius, potentially resulting in returns beyond the specified distance). In terms of other known resources (e.g., Isolated Non-Diagnostic Find Spots, Leads or unreported deposits), no unregistered sites were identified within a 1 km radius. The sites are summarized in Table 6.

Table 6: Registered or Known Archaeological Sites

Parcel Identifier(s)	Borden No. / ID No.	Site Name / Identifier	Time Period	Affinity	Site Type	Distance from Study Area
Adelaide WWTP and Adelaide Grading	AgHh-2	Freel	Woodland, Early	Indigenous	Burial	> 1 km
	AgHh-25	-	Archaic, Late	Indigenous	Unspecified	> 1 km
	AgHh-26	Black Kat	Woodland	Indigenous	Hamlet	> 1 km
	AgHh-27	-	Unspecified	Unspecified	Findspot	> 1 km
	AgHh-28	-	Archaic, Early	Indigenous	Unspecified	> 1 km
	AgHh-32	-	Pre-Contact	Indigenous	Scatter	> 1 km
	AgHh-66	-	Pre-Contact	Indigenous	Scatter	> 1 km
	AgHh-72	-	Post-Contact	Euro-Canadian	Scatter	300 m–1 km
	AgHh-75	-	Pre-Contact	Indigenous	Scatter	> 1 km
	AgHh-77	Orkney Crescent Ossuary	Woodland, Late	Indigenous, Neutral	Ossuary	300 m–1 km
	AgHh-94	Thornwood	Woodland, Late	Indigenous, Iroquoian	Camp/Campsite	> 1 km
	AgHh-260	-	Post-Contact	Euro-Canadian	Cabin	300 m–1 km
	AgHh-261	-	Archaic, Early	Indigenous	Findspot	300 m–1 km
	AgHh-264	-	Woodland	Indigenous	Camp/Campsite	300 m–1 km
	AgHh-265	-	Pre-Contact	Indigenous	Camp/Campsite	300 m–1 km

Parcel Identifier(s)	Borden No. / ID No.	Site Name / Identifier	Time Period	Affinity	Site Type	Distance from Study Area
Greenway WWTP and Greenway Grading	AfHh-13	-	Pre-Contact	Indigenous	Unspecified	> 1 km
	AfHh-14	The Third Site	Pre-Contact	Indigenous	Camp/Campsite	> 1 km
	AfHh-15	-	Pre-Contact	Indigenous	Camp/Campsite	> 1 km
	AfHh-16	-	Pre-Contact	Indigenous	Camp/Campsite	> 1 km
	AfHh-17	-	Pre-Contact	Indigenous	Scatter	> 1 km
	AfHh-86	Norton	Woodland, Late	Indigenous	Longhouse, Midden, Village	Within
	AfHh-224	Mud Creek 1	Pre-Contact	Indigenous	Findspot	> 1 km
	AfHh-230	Mud Creek 6	Pre-Contact	Indigenous	Findspot	300 m–1 km
	AfHh-231	Mud Creek 7	Pre-Contact	Indigenous	Findspot	300 m–1 km
	AfHh-232	-	Pre-Contact	Indigenous	Unspecified	300 m–1 km
	AfHh-233	Taylor 2	Woodland, Early, Middle, Late	Indigenous, Iroquoian	Camp/Campsite	300 m–1 km
	AfHh-238	Taylor	Woodland, Middle, Late	Indigenous, Iroquoian	Camp/Campsite	300 m–1 km
	AfHh-356	Bowman	Pre-Contact	Indigenous		> 1 km
	AfHh-357	Old Indian Cornfields	Post-Contact	Euro-Canadian, Ojibwe	Agricultural	50 m–300 m
	AfHh-386	Beaverbrook Avenue	Woodland, Early	Indigenous	Camp/Campsite	300 m–1 km
	AfHh-931	Chi Oziisigobiminzhiig	Woodland	Indigenous	Camp/Campsite	300 m–1 km
	AfHh-935	Oakland 1	Post-Contact, Pre-Contact	Indigenous, Euro-Canadian	Camp/Campsite, Scatter	> 1 km

The Norton site (AfHh-86) is located partially within the Greenway WWTP parcel. As a relevant archaeological resource that could impact fieldwork strategy decisions and recommendations, this site is fully discussed in Section 1.3.3. The Old Indian Cornfields (AfHh-357) is located between 50 and 300 m away from the Greenway Grading parcel and must also be considered as a relevant feature of archaeological potential. The remaining sites represent more distant archaeological resources located over 300 m away.

1.3.3 Previous Archaeological Work

A review of available archaeological management plans and/or other archaeological potential mapping was undertaken to inform the assessment process. Specifically, the City of London's *Archaeological Management Plan* was examined for information that could influence the choice of fieldwork techniques or recommendations. The associated mapping indicates that the Greenway WWTP parcel, the Greenway Grading parcel, the eastern part of the Adelaide Grading parcel and the majority of the Adelaide WWTP parcel have potential for Indigenous and Euro-Canadian archaeological materials (Map 9).

Reports documenting assessments conducted within the subject lands and assessments that resulted in the discovery of sites within adjacent lands were also sought during the research component of the study. In order to ensure that all relevant past work was identified, an investigation was launched to identify reports involving assessments within 50 m of the study area. The investigation

determined that there are multiple available reports documenting previous archaeological fieldwork within the specified distance. The relevant results and recommendations are summarized below as required by Section 7.5.8 Standards 4–5 of the 2011 *S&Gs* (Map 10–Map 11; SD Map 1).

1.3.3.1 Norton Site (Stage 4)

In Spring and Summer 1988, a Stage 4 excavation was conducted for the Norton Site (AfHh-86) under Licence #87-16 and #87-17 (ASI 1992). The excavated area abuts the southeastern edge of the Greenway WWTP parcel. While the Norton Site was first documented in 1939, it was rediscovered in Fall 1987 during the assessment for a proposed watermain through Kensal Park. Based on the results of a Stage 3 assessment, it was determined that salvage excavation was necessary. The excavation revealed portions of nine parallel longhouses, dozens of subsurface features, a midden and an eastern and western palisade line (SD Map 2). It was determined that the site represented a Late Woodland village dating from ca. A.D. 1400–1450 that clearly extended beyond the excavated area in all directions. It was recommended that the immediate site area be preserved as a public park and that a thorough archaeological investigation be carried out in advance of any future development in the area (ASI 1992:78–79).

1.3.3.2 Thames Valley Parkway (Stage 1–2)

In October 1996, Stage 1 and 2 assessments were carried out for Phase 1 of the proposed Thames Valley Parkway in Greenway Park under Licence #97-001 (MHC 1997). The assessed area is within 50 m of the northwestern edge of the Greenway WWTP parcel. The investigation did not result in the identification of any archaeological materials. It was recommended that no further assessment or mitigative measures be required within the project corridor (MHC 1997:10).

1.3.3.3 North London Soccer Complex Expansion (Stage 1–2)

In August 2000, Stage 1 and 2 assessments were carried out for the proposed expansion of the North London Soccer Complex under CIF #2000-002-086 (AI 2000). The assessed area overlaps most of the western portion of the Adelaide Grading parcel and northwestern and northeastern sections of the Adelaide WWTP parcel. The investigation did not result in the identification of any archaeological materials. It was recommended that no further assessment be required within the lands required for the expansion (AI 2000:8). The overlapping areas of previous assessment are therefore of no further archaeological concern.

1.3.3.4 Greenway Park Soccer Field and Parking (Stage 1–2)

In August 2007, Stage 1 and 2 assessments were carried out in advance of a new soccer field and associated parking area within Greenway Park under CIF #P064-154-2007 (TMHC 2007). The assessed area falls within 50 m of the western limit of the Greenway WWTP parcel. The investigation did not result in the identification of any archaeological materials. It was recommended that no further assessment be required within the lands to be impacted by the proposed construction (TMHC 2000:13–15).

1.3.3.5 Kensal Park Improvements (Stage 1–3 and Stage 4 Monitoring)

In March and April 2010, Stage 1 and 2 assessments were carried out in advance of improvements to Kensal Park under CIF #P083-035-2010 (TMHC 2010a). The assessed area abuts the southern extent of the Greenway WWTP parcel. Kensal Park was known contain a provincially significant Late Woodland village designated as the Norton site (AfHh-86). The investigation resulted in the discovery of four general locations of archaeological materials: Areas 1–4 (SD Map 3). Area 1 appeared to represent a periphery activity area of the Norton site, Areas 2 and 3 were likely associated with the village and Area 4 was potentially a separate occupation site.

Areas 1 and 2 were found to be of sufficient distance from the proposed area of impact that they were recommended for further work only if impacts were planned in the immediate area. Area 3 fell within the site's protective buffer zone and would not be impacted by the improvements. As such, no further work was recommended for these three areas. It was recommended that Area 4 be avoided by project redesign or subject to a Stage 3 site-specific assessment (TMHC 2010a:35–37).

It was subsequently determined that the project design could not be altered, and the Stage 3 assessment of Area 4 was conducted between April and May 2010 under CIF #P083-0030-2010 (TMHC 2010b). The assessed area falls within 50 m of the southwest portion of the Greenway WWTP parcel. The assessment resulted in the recovery of both Indigenous and Euro-Canadian artifacts. The Indigenous artifacts were not diagnostic while the Euro-Canadian artifacts were of 19th century and modern origin. The Indigenous and Euro-Canadian components were diffusely scattered and found to possess low integrity due to disturbances caused by the installation of a watermain. Area 4 was not recommended for Stage 4 excavation, but it was noted that all construction through Area 4 should be subject to archaeological monitoring (TMHC 2010b:17).

In April 2011, an additional Stage 2 assessment was carried out in advance of proposed improvements to a sanitary sewer running through Kensal Park to the adjacent WWTP under PIF #P083-092-2011 (TMHC 2011a). The assessed area overlaps the southeast portion of the Greenway WWTP parcel. The investigation did not result in the identification of any archaeological materials. Given that the required sewer upgrades would be adjacent to the Norton site (AfHh-86), it was recommended that archaeological monitoring occur during construction to ensure that there are no impacts to deeply buried archaeological deposits (TMHC 2011a:9).

Between June 2010 and September 2011, Stage 4 archaeological monitoring was conducted during construction activities associated with improvements to Kensal Park and the sanitary sewer upgrades under PIF #P083-046-2010 (TMHC 2011b). The assessed area also overlaps the southeast portion of the Greenway WWTP parcel. The archaeological monitoring resulted in the identification of a series of post moulds in the northeastern corner of the property, which likely represented an outside activity area. These post moulds were fully documented. The impacted areas were deemed free of archaeological concern as construction proceeded. Due to the significance of the Norton site, it was recommended that all proposed construction activities within the park and just beyond it within the WWTP property be subject to archaeological monitoring (TMHC 2011b:18).

1.3.3.6 Greenway WWTP and Park Improvements (Stage 1–3 and Partial Stage 4)

In August 2014, Stage 1 and 2 assessments were carried out in advance of improvements to the Greenway Pollution Control Plant (Greenway WWTP) and Greenway Park under PIF #P324-0042-2014 (TMHC 2015a). The proposed improvements to the Greenway Pollution Control Plant included the addition of new buildings, plant facilities, parking areas, access routes and utility installations which would necessitate the realignment of a pathway and the removal of a parking lot within Greenway Park. A new parking area within Greenway Park was also planned to replace the one that was to be removed. The assessed area overlaps the western and southcentral parts of the Greenway WWTP parcel. The investigation resulted in the discovery of one site: Location 1. Location 1 consisted of a scatter of non-diagnostic lithic artifacts that was likely related to the Norton site (AgHh-86). The site was found to have further CHVI and required a Stage 3 site-specific assessment and Stage 4 mitigation of development impacts due to its association with the Norton site; the remaining lands were not recommended for further work (TMHC 2015a:23–24).

The Stage 3 site-specific assessment of Location 1 was conducted in August 2014 under PIF #P324-0074-2015 (TMHC 2015a). The assessed area overlaps the southeastern part of the Greenway WWTP parcel (SD Map 4). The assessment resulted in the recovery of both Indigenous and Euro-Canadian artifacts. The Indigenous artifacts were contemporary with those encountered during archaeological assessments of the Norton site and demonstrated Location 1's association with it. One cultural feature was identified, though its exact function was unclear. The Euro-Canadian artifacts reflected the use of the adjacent area as parkland. The Indigenous component was found to be of further CHVI and the portion of the site within the area of impact required Stage 4 mitigation of development impacts (TMHC 2015a:30–32).

A partial Stage 4 excavation of the Norton site was conducted in September 2014 under PIF #P324-0047-2014 (TMHC 2015b). The excavated area overlaps the southeastern part of the Greenway WWTP (SD Map 5). The investigation involved block excavation, feature excavation and mechanical topsoil removal. Numerous cultural features were encountered, including ash pits, a refuse pit, a hearth and post moulds. The Indigenous archaeological materials included lithic debitage, formal and informal lithic artifacts, pottery sherds, a ceramic pipe fragment, a fire cracked rock, faunal remains and botanical remains. One Adena point dating to the Early Woodland (900 BC—1 AD) was recovered from Feature 1 (refuse pit). However, the point was determined to be a curio rather than representing an earlier occupation of the site. Euro-Canadian archaeological materials were also encountered, most of which were modern in origin though a small quantity of historical artifacts were observed that dated from the 19th century. As earlier assessments had suggested, the village site was found to extend north into the Greenway WWTP property. The portion of the site within the area of impact was fully excavated and was not recommended for further assessment (TMHC 2015b:33–34). The portions of the site outside of the area of impact have further CHVI and it was recommended that avoidance and protection measures be implemented prior to construction. The excavated portion of the site and the overlapping areas of previous assessment are therefore of no further archaeological concern.

1.3.3.7 Thames Valley Parkway Expansion (Stage 1–3)

In November 2014, a Stage 1 assessment was conducted for the proposed expansion of the Thames Valley Parkway between Richmond Street and Adelaide Street under PIF #P042-0415-2014 (FAC 2017). The assessed area abuts the western edge of the Adelaide Grading parcel and is adjacent to its northeastern corner. The investigation identified a mixture of areas of archaeological potential and areas of no archaeological potential. It was recommended that all areas of archaeological potential be subject to Stage 2 assessment prior to development (FAC 2017:15).

The Stage 2 assessment for the detailed design was conducted in June and July 2018, under PIF #P115-0028-2018 (FAC 2019). The assessed area overlaps the western edge of the Adelaide Grading parcel. The assessment resulted in the identification of two archaeological sites: AgHh-260 and AgHh-261. Both sites were recommended for Stage 3 site-specific assessments, and it was also recommended that further assessment be conducted for any additional areas required for construction (FAC 2019:24–25). The sites are located over 300 m away from the Adelaide parcels.

In April and May 2019, Stage 2 and Stage 3 assessments were conducted for additional lands (staging areas and borrow pit) required for the project under PIF #P324-0389-2019 and #P324-0390-2019 (TMHC 2019a). The assessed area overlaps the western edge of the Adelaide Grading parcel. The Stage 2 assessment resulted in one positive test pit yielding three artifacts. The positive test pit was located within the AgHh-260 site limits and was immediately subject to an additional Stage 3 assessment. The Stage 3 assessment determined the AgHh-260 represented the remains of a Euro-Canadian homestead and the diagnostic artifacts dated primarily between ca 1830 and 1860. A small Indigenous component was also identified at the site, though it was derived from disturbed contexts. The site was found to have further CHVI and was recommended for Stage 4 mitigation of development impacts prior to development (TMHC 2019a:16–18).

1.3.3.8 One River Master Plan (Stage 1)

In 2017, a Stage 1 assessment was conducted in support of the One River Master Plan Environmental Assessment under PIF #P457-0058-2017 (Golder 2019). The assessed area overlaps the northern half of the Greenway WWTP parcel and the majority of the Greenway Grading parcel. The assessment identified a mixture of areas of archaeological potential and areas of no archaeological potential. It was recommended that all areas of archaeological potential that could be impacted by the project be subject to Stage 2 assessment, and it was also noted that additional work would be necessary for four sites, one cemetery and the Thames River if any impacts were proposed (Golder 2019:15).

1.3.3.9 North London Athletic Fields (Stage 1–2)

In May 2018, Stage 1 and 2 assessments were carried out in advance of new beach volley ball courts within the North London Athletic Fields under PIF #P324-0322-2018 (TMHC 2018). The assessed area falls within 50 m of the northeastern portion of the Adelaide Grading parcel. The investigation did not result in the identification of any archaeological materials. It was recommended that no further assessment be required within the project lands (TMHC 2018:12).

1.3.3.10 Baseball Fields Lighting (Stage 1–2)

In October 2019, Stage 1 and 2 assessments were carried out in advance of improvements to baseball field lighting within the North London Athletic Fields under PIF #P324-0460-2019 (TMHC 2019b). The assessed area traverses the northeastern portion of the Adelaide Grading parcel. The investigation did not result in the identification of any archaeological materials. It was recommended that no further assessment be required within the project lands (TMHC 2019b:12). The overlapping area of previous assessment is therefore of no further archaeological concern.

2.0 STAGE 1 BACKGROUND STUDY

2.1 Background

The Stage 1 assessment involved background research to document the geography, history, previous archaeological fieldwork and current land condition of the study area. This desktop examination included research from archival sources, archaeological publications and online databases. It also included the analysis of a variety of historical maps and aerial imagery. The results of the research conducted for the background study are summarized below.

With occupation beginning approximately 11,000 years ago, the greater vicinity of the study area comprises a complex chronology of Pre-Contact and Post-Contact histories (Section 1.2.1). Artifacts associated with Palaeo, Archaic, Woodland and Early Contact traditions are well-attested in the City of London, and Euro-Canadian archaeological sites dating to pre-1900 and post-1900 contexts are likewise common. The presence of 32 previously identified sites in the surrounding area demonstrates the desirability of this locality for early settlement (Section 1.3.2). The investigation confirmed that one of these sites falls within the subject lands. Background research identified multiple areas of previous assessment within the study area (Section 1.3.3).

The natural environment of the study area would have been attractive to both Indigenous and Euro-Canadian populations as a result of proximity to the Thames River and its tributaries. The areas of well-drained soils within the Adelaide parcels would have been ideal for agriculture, and the diverse local vegetation would also have encouraged settlement throughout Ontario's lengthy history. Euro-Canadian populations would have been particularly drawn to Adelaide Street North, Huron Street, Kipp's Lane, Wildwood Avenue, Forest Hill Avenue, Chelsea Avenue, Riverside Drive, Beaverbrook Avenue, Forward Avenue and Pipe Line Road, all of which were historically-surveyed thoroughfares, as well as the London Street and Great Western Railways.

In summary, the background study included an up-to-date listing of sites from the Ontario Archaeological Sites Database (within at least a 1 km radius), the consideration of previous local archaeological fieldwork (within at least a 50 m radius), the analysis of historical maps (at the most detailed scale available) and the study of aerial imagery. A review of an archaeological management plan was also carried out. ARA therefore confirms that the standards for background research set out in Section 1.1 of the 2011 *S&Gs* were met.

2.2 Field Methods (Property Inspection)

In order to gain first-hand knowledge of the geography, topography and current condition of the subject property, a property inspection was conducted on July 16, 2021. Environmental conditions were ideal during the inspection, with partly cloudy skies, diffuse lighting and a temperature of 24 °C. ARA therefore confirms that fieldwork was carried out under weather and lighting conditions that met the requirements set out in Section 1.2 Standard 2 of the 2011 *S&Gs*.

The study area was subjected to random spot-checking in accordance with the requirements set out in Section 1.2 of the 2011 *S&Gs*. The inspection confirmed that all surficial features of archaeological potential were present where they were previously identified and did not result in

the identification of any additional features of archaeological potential not visible on mapping (e.g., relic water channels, patches of well-drained soils, etc.).

The inspection determined that several parts of the study area were disturbed by past construction activities, and sloped lands were identified within the Greenway WWTP parcel. No other natural features (e.g., permanently wet lands, overgrown vegetation, heavier soils than expected, etc.) or significant built features (e.g., heritage structures, landscapes, plaques, monuments, cemeteries, etc.) that would affect assessment strategies were identified.

2.3 Analysis and Conclusions

In addition to relevant historical sources and the results of past archaeological assessments, the archaeological potential of a property can be assessed using its soils, hydrology and landforms as considerations. Section 1.3.1 of the 2011 *S&Gs* recognizes the following features or characteristics as indicators of archaeological potential: previously identified sites, water sources (past and present), elevated topography, pockets of well-drained sandy soil, distinctive land formations, resource areas, areas of Euro-Canadian settlement, early transportation routes, listed or designated properties, historic landmarks or sites, and areas that local histories or informants have identified with possible sites, events, activities or occupations.

The Stage 1 assessment resulted in the identification of multiple features of archaeological potential in the vicinity of the study area (Map 12–Map 13; SD Map 6). The closest and most relevant indicators of archaeological potential (i.e., those that would directly affect survey interval requirements) are summarized in Table 7. Background research did not identify any features indicating that the study area had potential for deeply buried archaeological resources.

Table 7: Features of Potential

Parcel Identifier(s)	Features of Potential
Adelaide WWTP and Adelaide Grading	3 primary water sources (the North Thames River, a tributary of the North Thames River and Stoney Creek), 1 physiographic landform (fluvial terrace), 3 historical roadways (Adelaide Street North, Huron Street and Kipp's Lane) and 12 historical structure localities (4 late 19th-century homes and 8 early 20th-century homes)
Greenway WWTP and Greenway Grading	5 primary water sources (the Thames River, The Cove and tributaries of the Thames River), 2 previously identified sites (AfHh-86 and AfHh-357), 7 historical roadways (Wildwood Road, Forest Hill Avenue, Chelsea Avenue, Riverside Drive, Beaverbrook Avenue, Forward Avenue and Pipe Line Road), 2 historical railways (the London Street and Great Western Railways), 9 historical structures (early 20th-century homes) and 1 historical community (London)

Although proximity to a feature of archaeological potential is a significant factor in the potential modelling process, current land conditions must also be considered. Section 1.3.2 of the 2011 *S&Gs* emphasizes that 1) quarrying, 2) major landscaping involving grading below topsoil, 3) building footprints and 4) sewage/infrastructure development can result in the removal of archaeological potential, and Section 2.1 states that 1) permanently wet areas, 2) exposed bedrock and 3) steep slopes (> 20°) can also be considered as having no archaeological potential. Areas previously assessed and not recommended for further work also require no further assessment.

The City of London's *Archaeological Management Plan* indicates that the Greenway WWTP parcel, the Greenway Grading parcel, the eastern part of the Adelaide Grading parcel and the majority of the Adelaide WWTP parcel have potential for Indigenous and Euro-Canadian archaeological materials (Map 9). However, this modelling was not the result of a property-specific assessment and therefore does not fully account for land-use history and current conditions. One known location of archaeological materials traverses the Greenway WWTP parcel: the Norton site (AfHh-86). Although the identified portion of the site within the southeastern part of parcel has been fully excavated, there is clear potential for the site to continue to the southwest (i.e., along the parcel boundary). Multiple previously assessed areas of no further concern were also identified within the study area, none of which warrant additional assessment.

ARA's visual inspection, coupled with the analysis of historical sources and digital environmental data, resulted in the identification of several areas of no archaeological potential within the unassessed lands. Specifically, deep land alterations have resulted in the removal of archaeological potential from various structural footprints, parking areas and accessways within the Adelaide WWTP and Greenway WWTP parcels (Image 1–Image 6). These areas have clearly been impacted by past earth-moving/construction activities, resulting in the disturbance of the original soils to a significant depth and severe damage to the integrity of any archaeological resources. Lands sloped > 20° were documented in the southwestern portion of the Greenway WWTP parcel (Image 7).

The remainder of the study area has potential for Indigenous and Euro-Canadian archaeological materials or requires test pit survey to confirm disturbance. The areas of archaeological potential include various grassed and wooded lands (Image 8–Image 16). It seems likely that the sports fields in the eastern portion of the Adelaide Grading parcel and the southeastern portion of the Greenway Grading parcel have been disturbed by past construction activities, but the extent of disturbance could not be verified based on the inspection alone. Accordingly, these lands have been categorized as areas of archaeological potential and must be empirically tested to confirm that archaeological potential has been removed.

In summary, the Stage 1 assessment determined that the study area comprises a mixture of areas of archaeological potential, areas of no archaeological potential and previously assessed lands of no further concern. The potential modelling results are presented in Map 14–Map 15. The study area limits are depicted as a layer in these maps.

3.0 RECOMMENDATIONS

The Stage 1 assessment determined that the study area comprises a mixture of areas of archaeological potential, areas of no archaeological potential and previously assessed lands of no further concern. It is recommended that all areas of archaeological potential that could be impacted by the project be subject to a Stage 2 property assessment in accordance with Section 2.1 of the 2011 *S&Gs*. The specific areas of impact will be determined during detailed design and construction.

The grassed and/or wooded lands in the western portion of the Adelaide Grading parcel, the southern and northeastern portions of the Greenway WWTP parcel and the northwestern portion of the Greenway Grading parcel must be assessed using the test pit survey method. A survey interval of 5 m is warranted due to the proximity of the lands to the identified features of archaeological potential. Given the likelihood that the sports fields in the eastern portion of the Adelaide Grading parcel and the southeastern portion of the Greenway Grading parcel were previously impacted, a combination of visual inspection and test pit survey should be utilized to confirm the extent of disturbance in accordance with Section 2.1.8 of the 2011 *S&Gs*. This will allow for the empirical evaluation of the integrity of the soils and the depth of any impacts. If disturbance cannot be confirmed, then a test pit survey interval of 5 m must be maintained.

Each test pit must be excavated into at least the first 5 cm of subsoil, and the resultant pits must be examined for stratigraphy, potential features and/or evidence of fill. The soil from each test pit must be screened through mesh with an aperture of no greater than 6 mm and examined for archaeological materials. If archaeological materials are encountered, all positive test pits must be documented, and intensification may be required.

It is highly likely that the Norton site (AfHh-86) will continue into the unassessed southern portion of the Greenway WWTP parcel. The presence of this site must be considered during the selection of the preferred flood protection approach and this area should be avoided to ensure the continued preservation of the deposit. If it cannot be avoided, then the Stage 2 survey should proceed to determine the extent of the site. A Stage 3 site-specific assessment and Stage 4 mitigation of development impacts may be required.

The identified areas of no archaeological potential and previously assessed lands of no further concern do not require any additional assessment. Given that there are still outstanding archaeological concerns within the subject lands, no ground alterations or development of any kind may occur until the required investigation is complete, a recommendation that the lands require no further archaeological assessment is made, and the associated report is entered into the Ontario Public Register of Archaeological Reports.

4.0 ADVICE ON COMPLIANCE WITH LEGISLATION

Section 7.5.9 of the 2011 *S&Gs* requires that the following information be provided for the benefit of the proponent and approval authority in the land use planning and development process:

- This report is submitted to the Minister of Heritage, Sport, Tourism and Culture Industries as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological fieldwork and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the MHSTCI, a letter will be issued by the ministry stating that there are no further concerns with regard to alterations to archaeological sites by the proposed development.
- It is an offence under Sections 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed archaeological fieldwork on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeology Reports referred to in Section 65.1 of the *Ontario Heritage Act*.
- Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48 (1) of the *Ontario Heritage Act*.
- Archaeological sites recommended for further archaeological fieldwork or protection remain subject to Section 48 (1) of the *Ontario Heritage Act* and may not be altered, or have artifacts removed from them, except by a person holding an archaeological licence.
- The *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33 requires that any person discovering human remains must notify the police or coroner and the Registrar at the Ministry of Government and Consumer Services.

5.0 IMAGES



Image 1: Adelaide WWTP – Disturbed Lands
(July 16, 2021; Facing South)



Image 2: Adelaide WWTP – Disturbed Lands
(July 16, 2021; Facing East)



Image 3: Adelaide WWTP – Disturbed Lands
(July 16, 2021; Facing West)



Image 4: Adelaide WWTP – Disturbed Lands
(July 16, 2021; Facing Southeast)



Image 5: Greenway WWTP – Disturbed Lands
(July 16, 2021; Facing South)



Image 6: Greenway WWTP – Disturbed Lands (Background)
(July 16, 2021; Facing North)

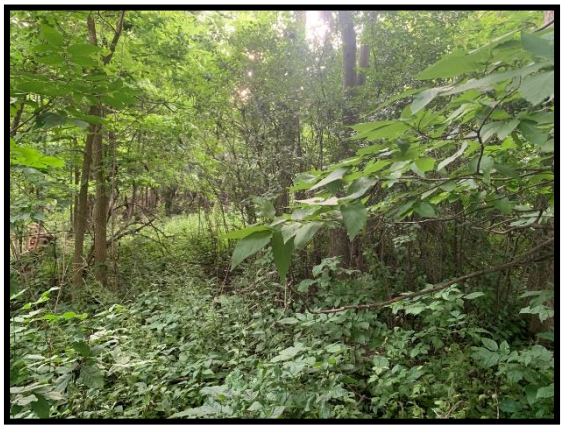


Image 7: Greenway WWTP – Sloped Lands
(July 16, 2021; Facing East)



Image 8: Greenway WWTP – Area of Potential
(July 16, 2021; Facing North)



Image 9: Greenway WWTP – Area of Potential
(July 16, 2021; Facing West)



Image 10: Adelaide Grading – Area of Potential
(July 16, 2021; Facing Southeast)



Image 11: Greenway Grading – Area of Potential
(July 16, 2021; Facing East)



Image 12: Greenway Grading – Area of Potential
(July 16, 2021; Facing Northeast)



Image 13: Adelaide Grading – Area of Potential
(July 16, 2021; Facing East)



Image 14: Adelaide Grading – Area of Potential
(July 16, 2021; Facing South)

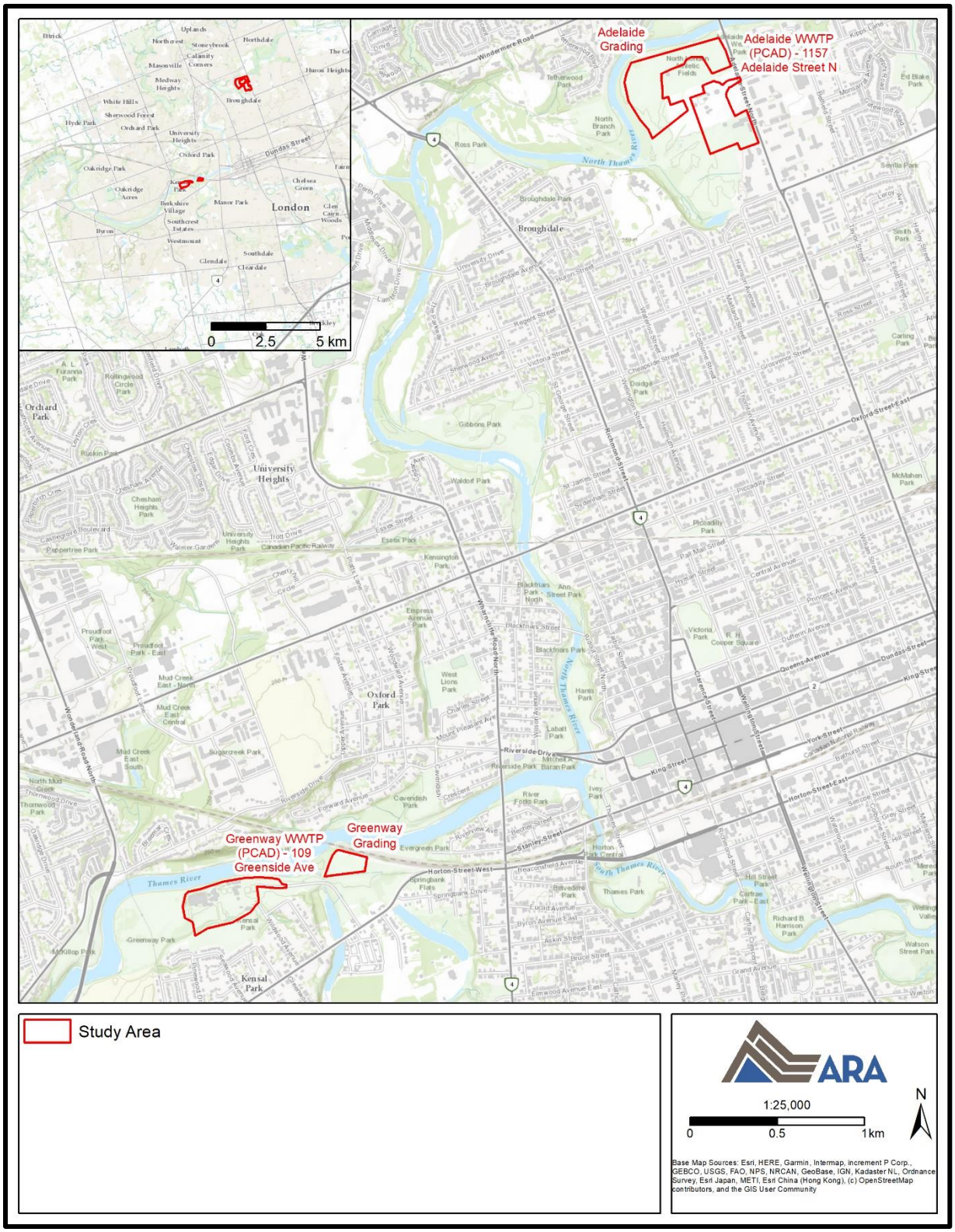


Image 15: Adelaide Grading – Area of Potential
(July 16, 2021; Facing North)

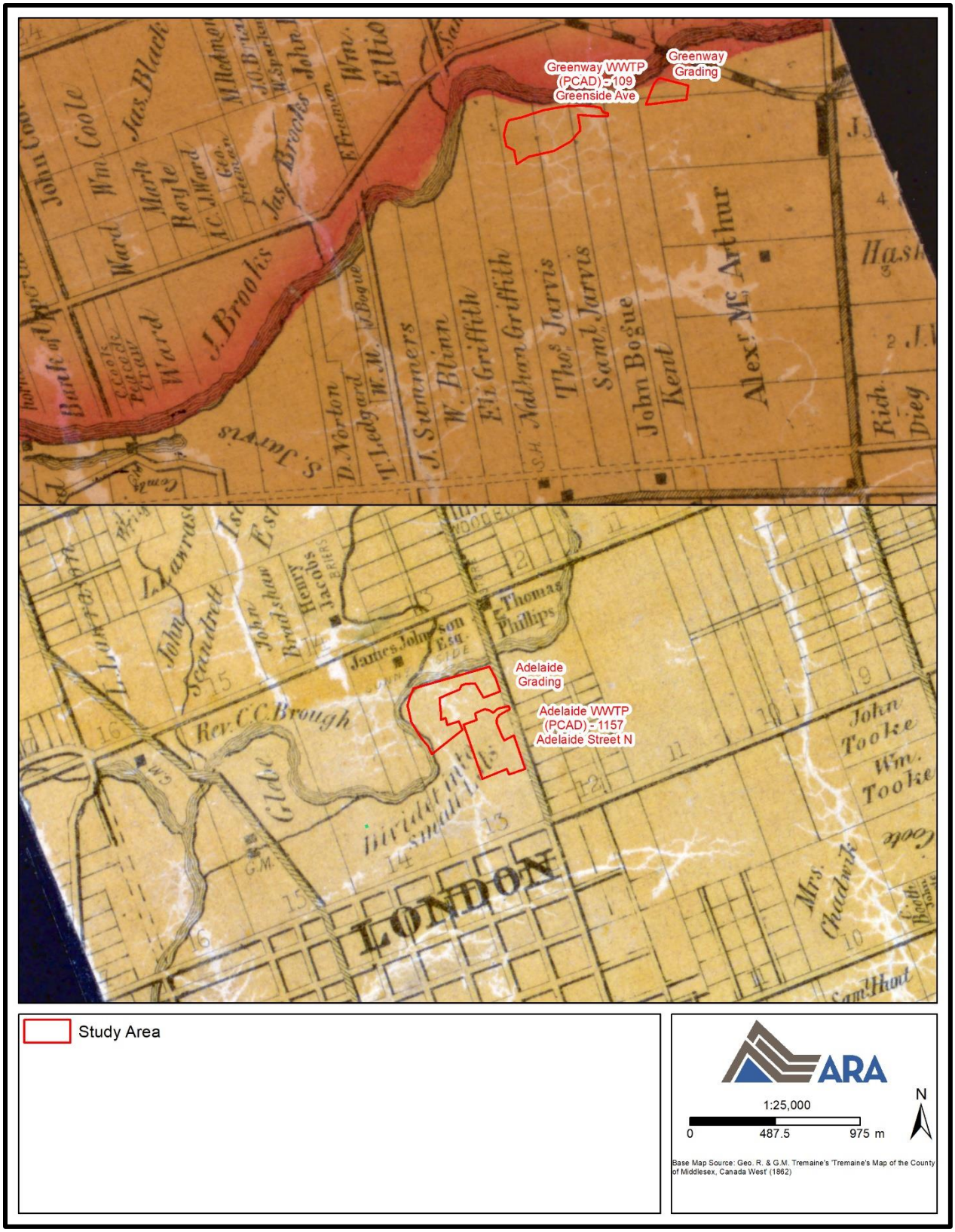


Image 16: Greenway Grading – Area of Potential
(July 16, 2021; Facing West)

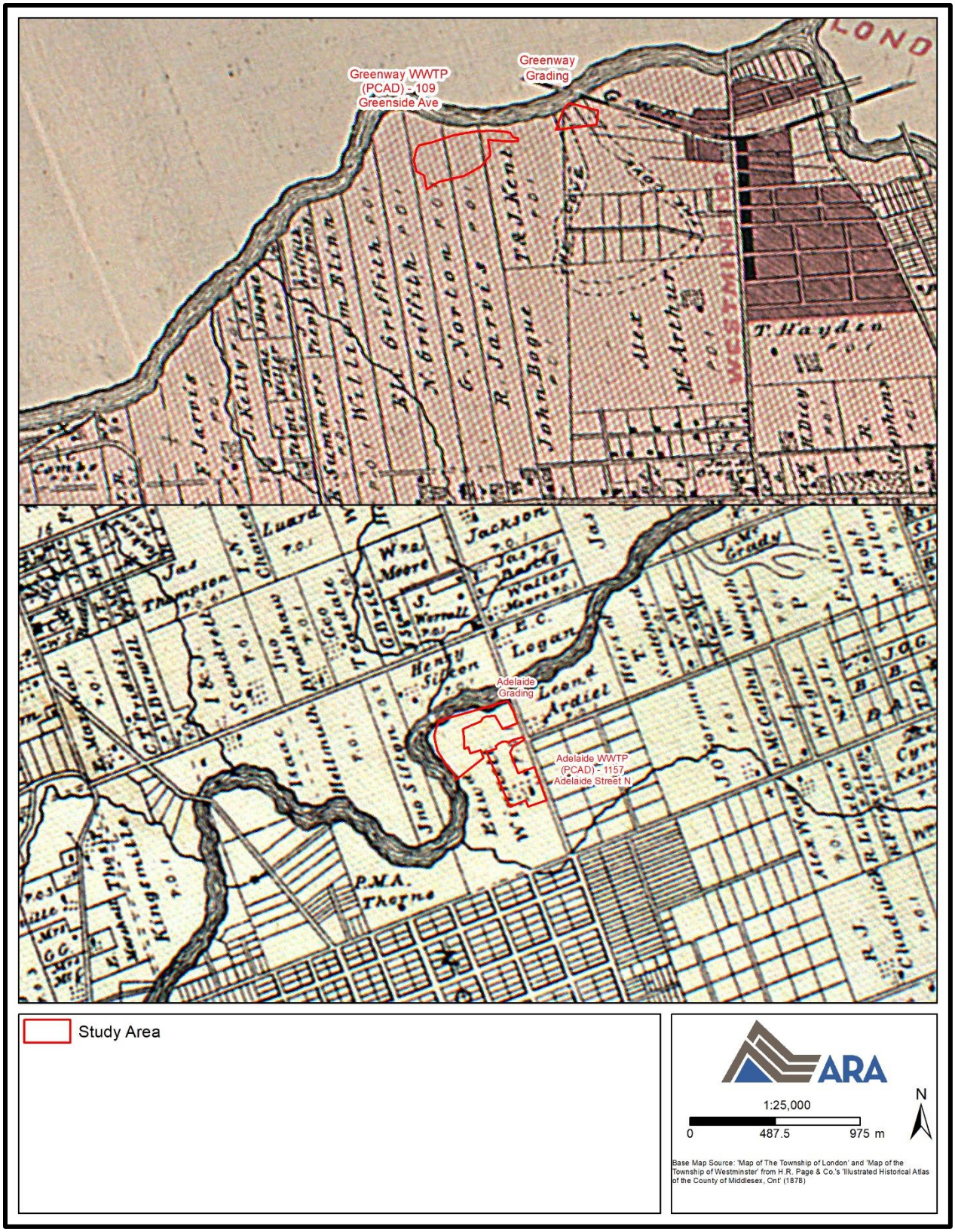
6.0 MAPS



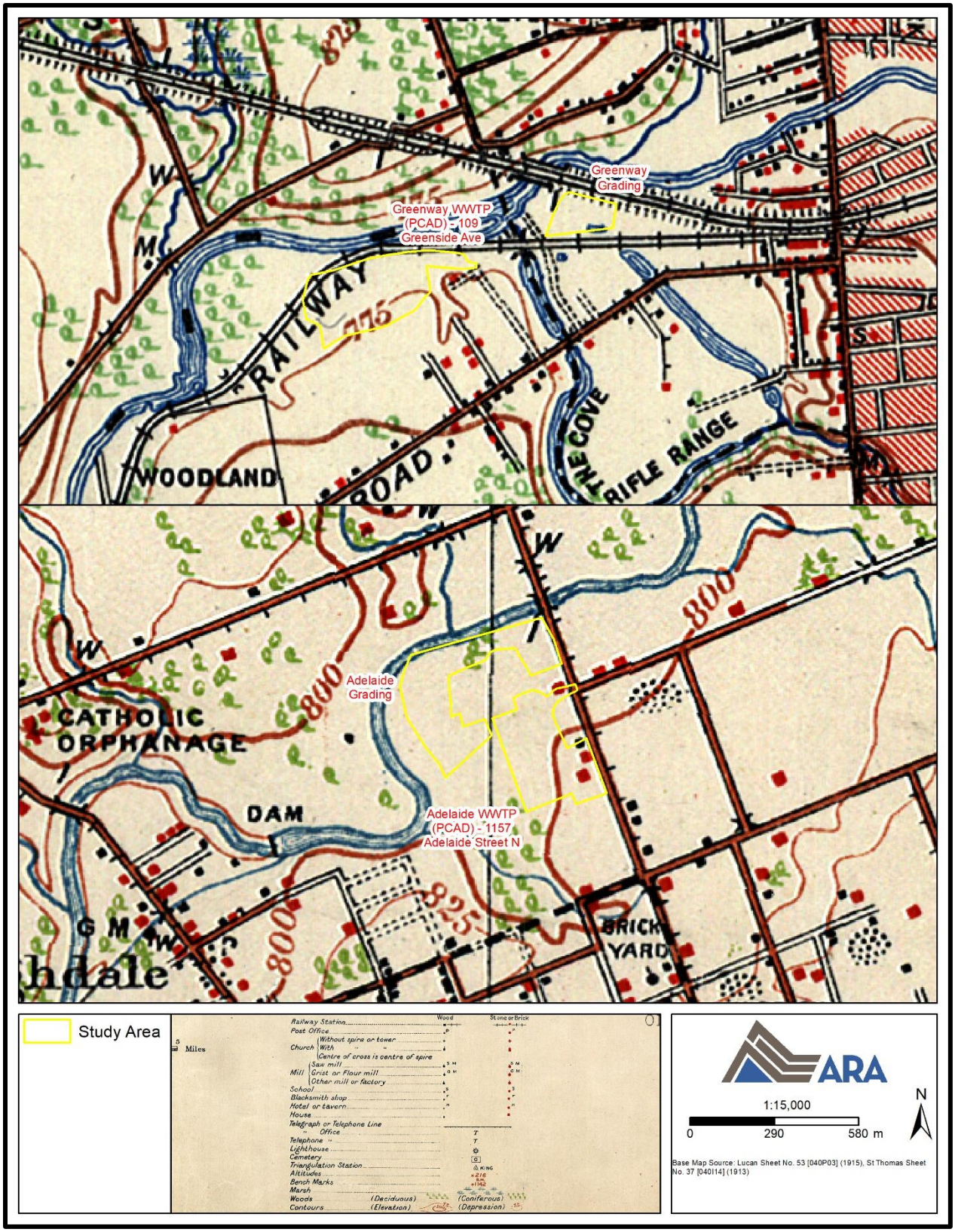
Map 1: Location of the Study Area
(Produced under licence using ArcGIS® software by Esri, © Esri)



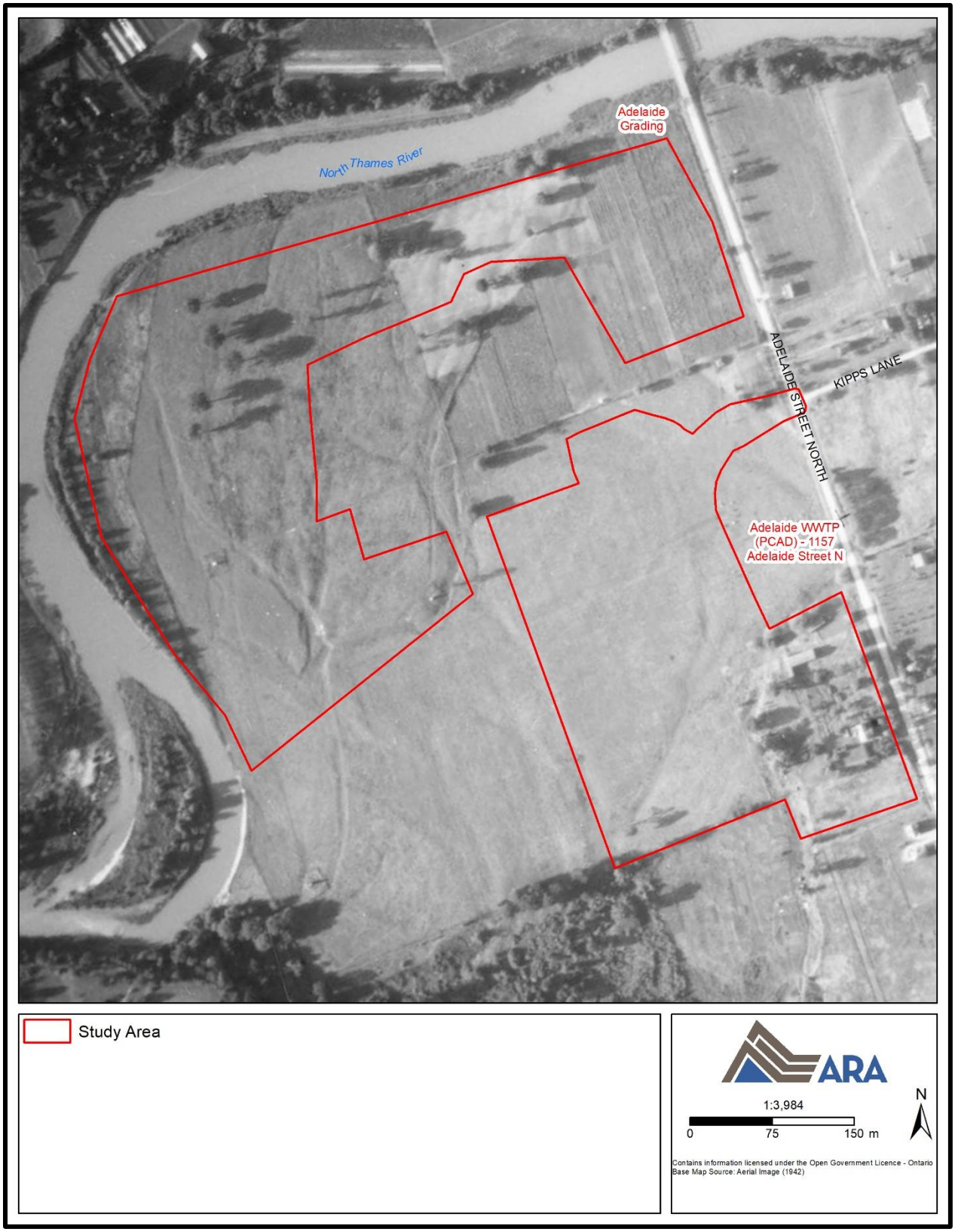
Map 2: *Tremaines' Map of the County of Middlesex, Canada West* (1862)
(Produced under licence using ArcGIS® software by Esri, © Esri; OHCMP 2019)



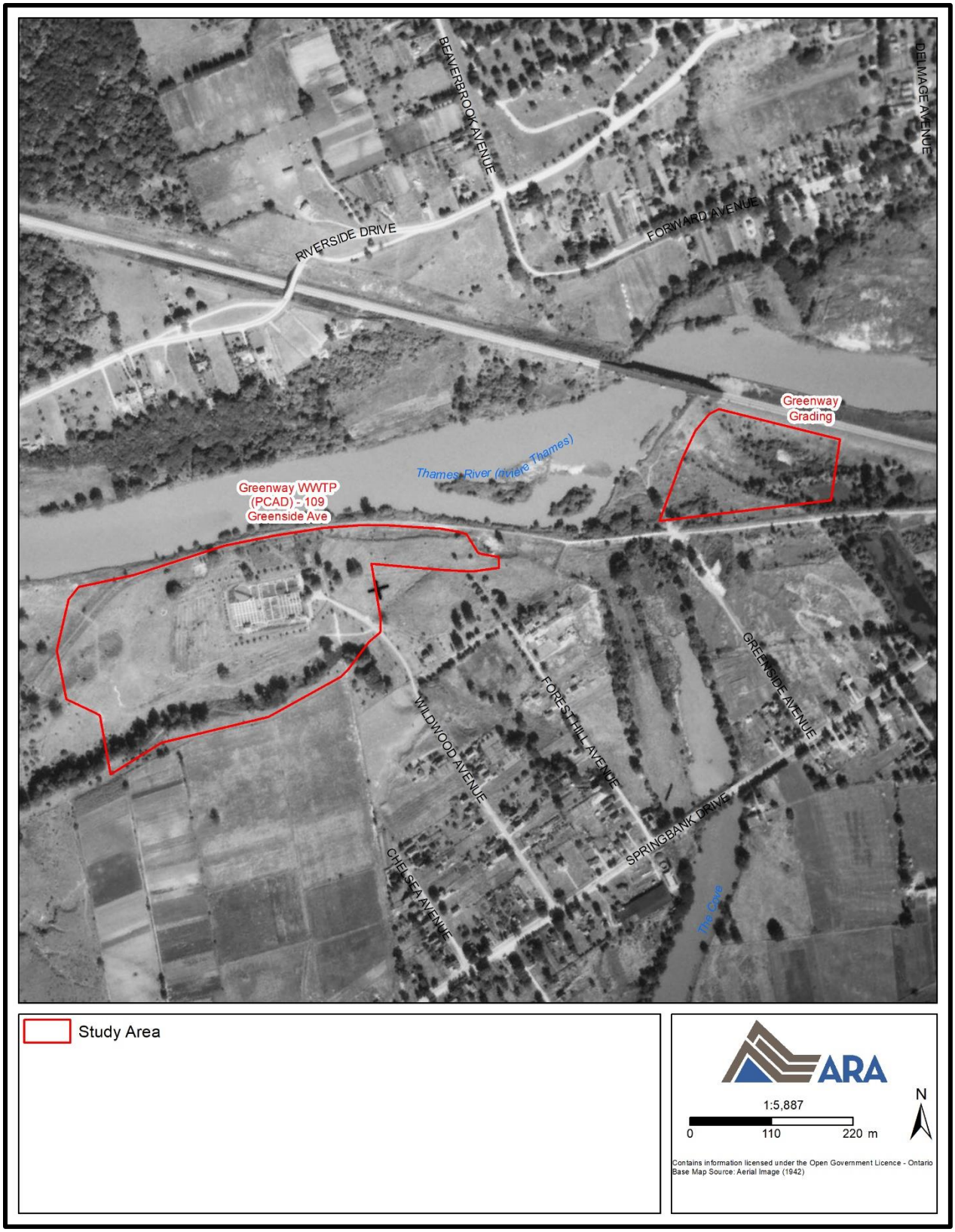
Map 3: *Illustrated Historical Atlas of the County of Middlesex, Ont.* (1878)
(Produced under licence using ArcGIS® software by Esri, © Esri; McGill University 2001)



Map 4: Topographic Maps (1913 and 1915)
(Produced under licence using ArcGIS® software by Esri, © Esri, OCUL 2021)



Map 5: Aerial Image (1942) – Adelaide Parcels
(Produced under licence using ArcGIS® software by Esri, © Esri; WU 2021)



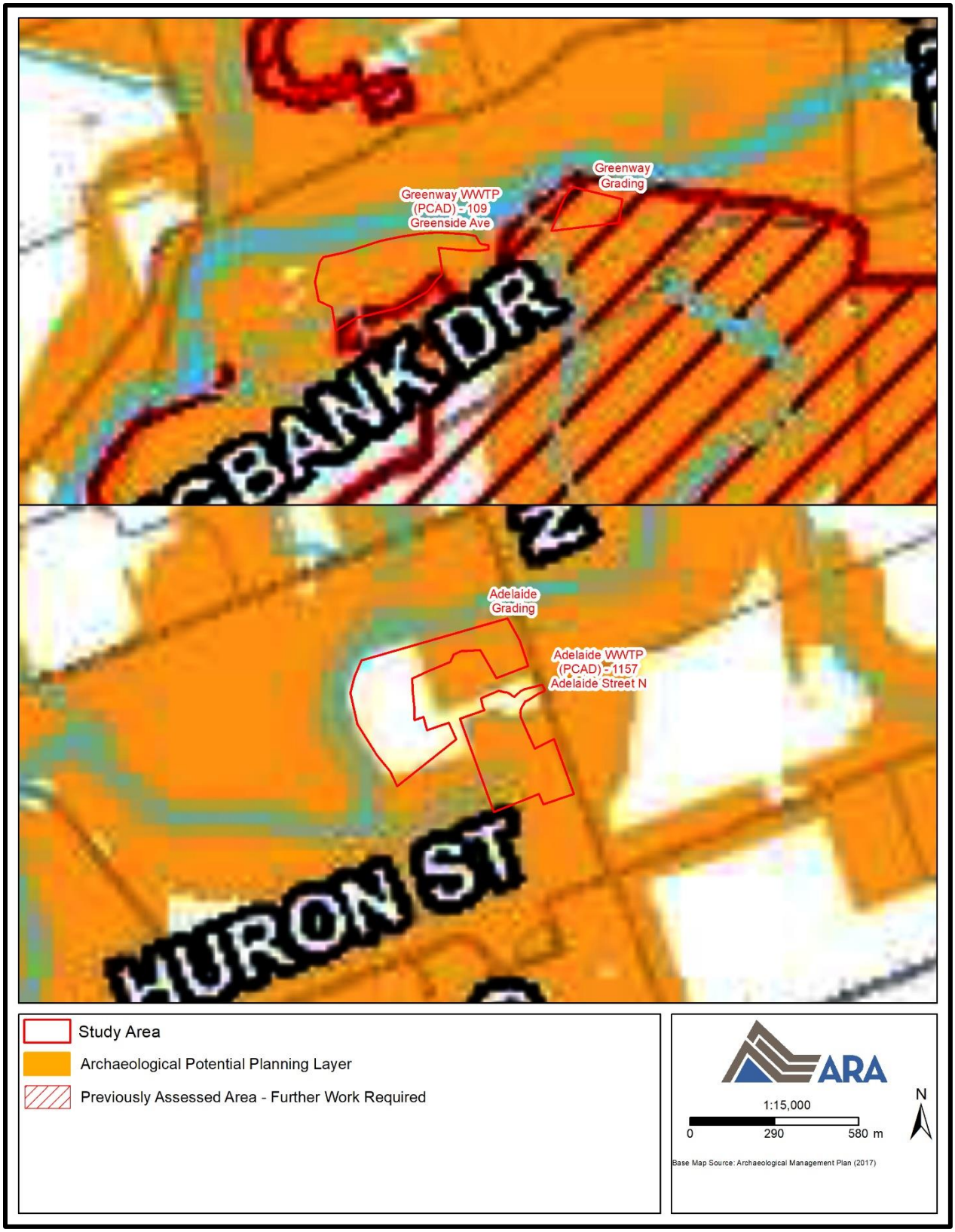
Map 6: Aerial Image (1942) – Greenway Parcels
(Produced under licence using ArcGIS® software by Esri, © Esri; Western University 2021)



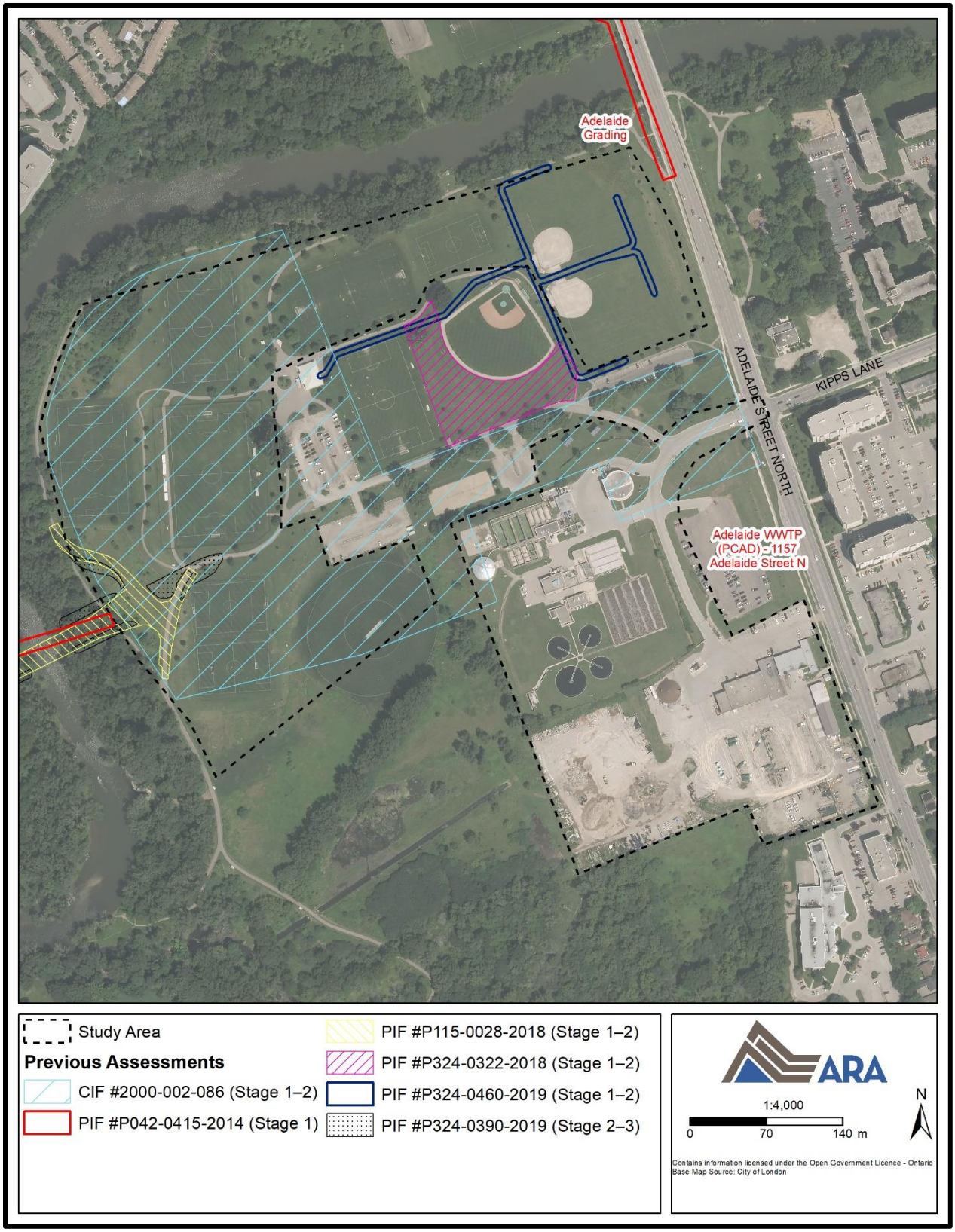
Map 7: Aerial Image (1967) – Adelaide Parcels
(Produced under licence using ArcGIS® software by Esri, © Esri; WU 2021)



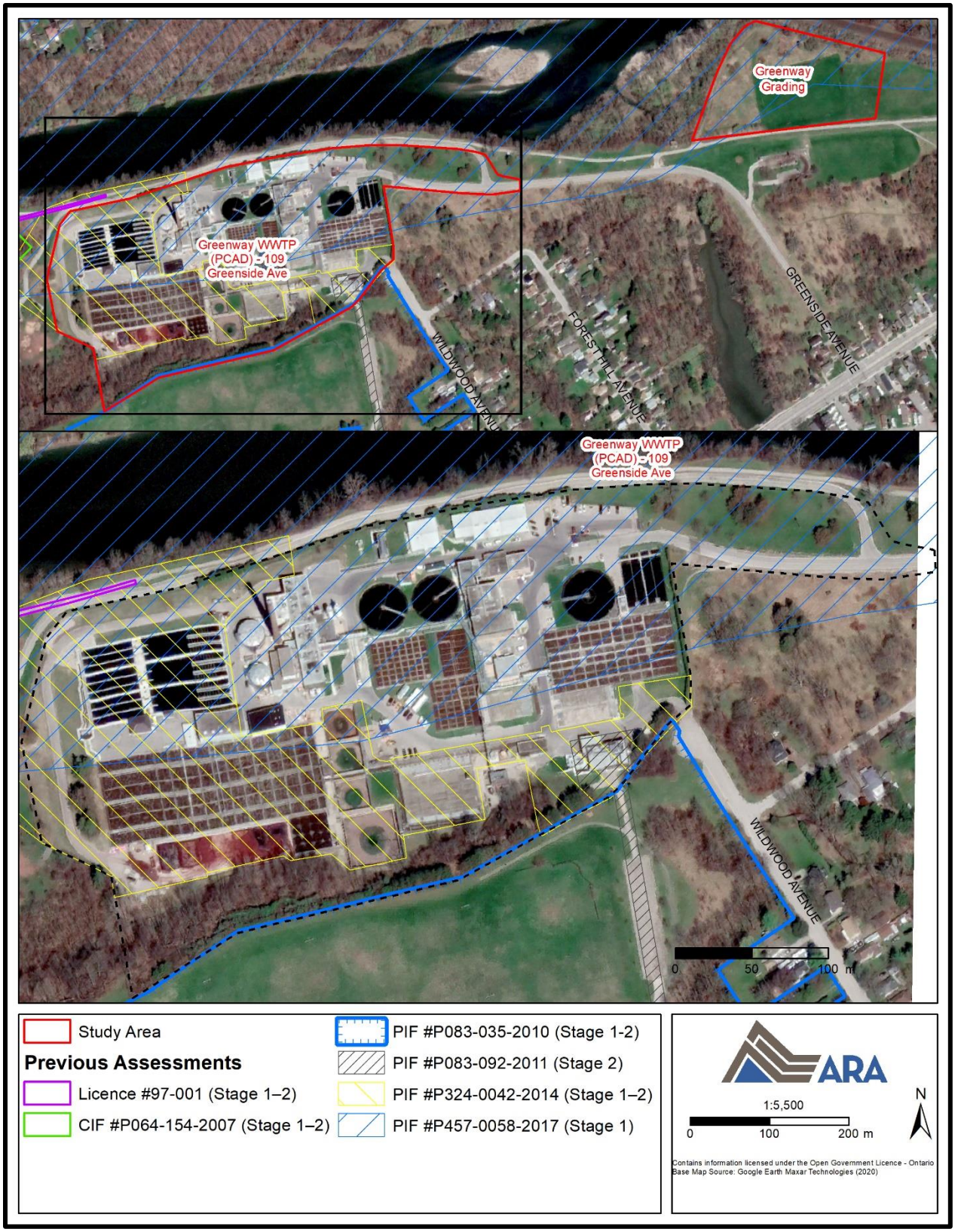
Map 8: Aerial Image (1967) – Greenway Parcels
(Produced under licence using ArcGIS® software by Esri, © Esri; WU 2021)



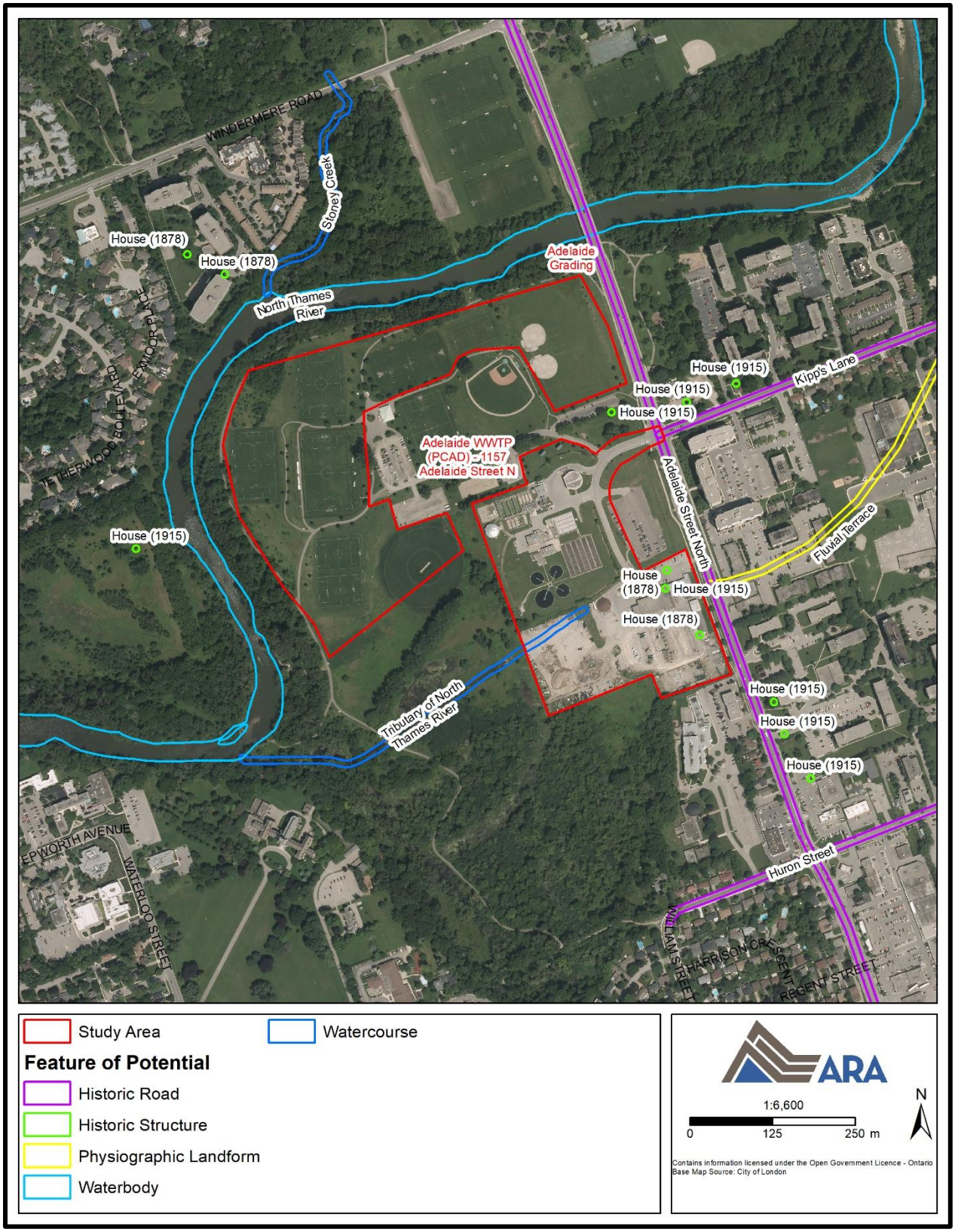
Map 9: City of London's *Archaeological Management Plan*
(Produced under licence using ArcGIS® software by Esri, © Esri; City of London 2017)



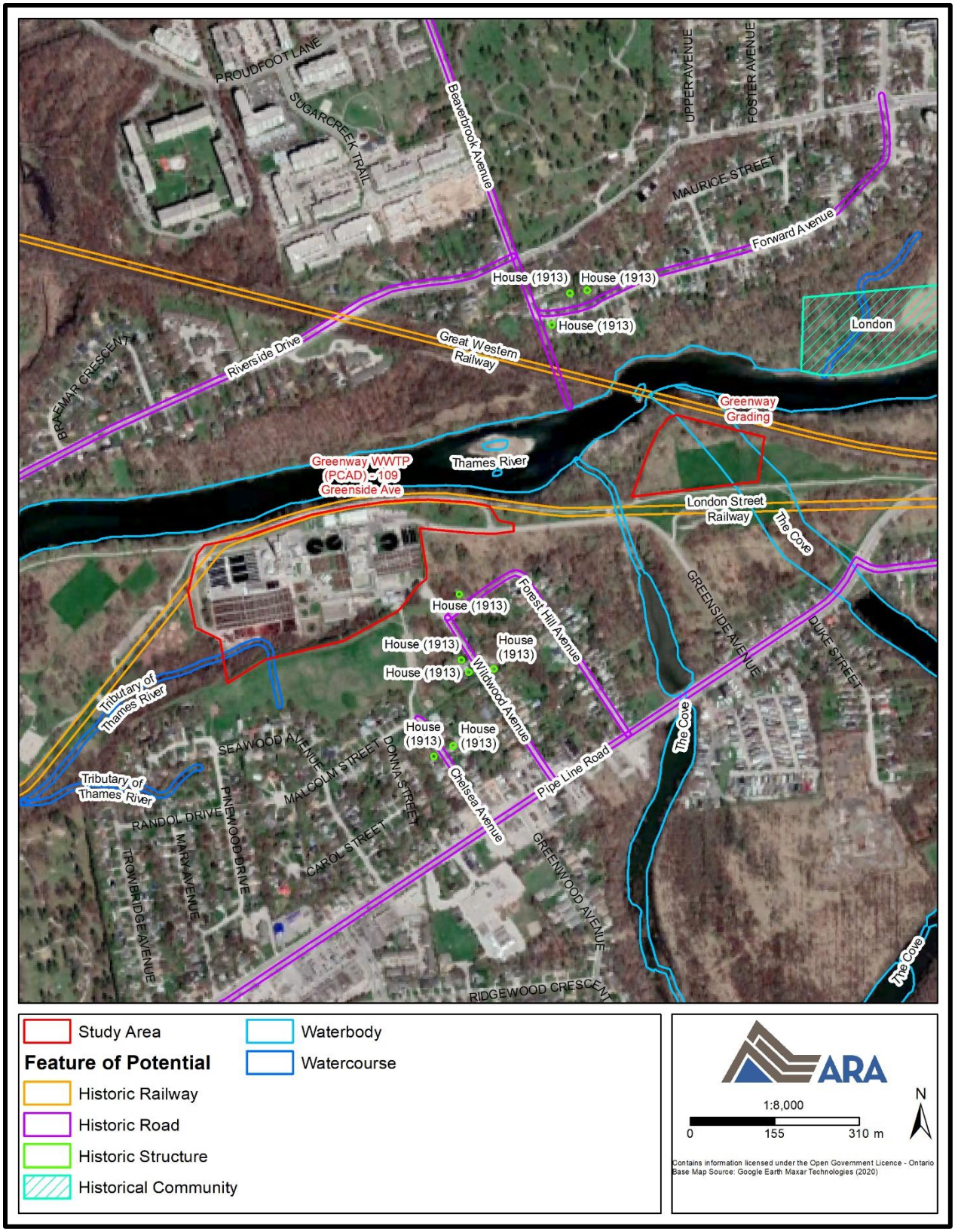
Map 10: Previous Assessments– Adelaide Parcels (Stage 1–3)
(Produced under licence using ArcGIS® software by Esri, © Esri)



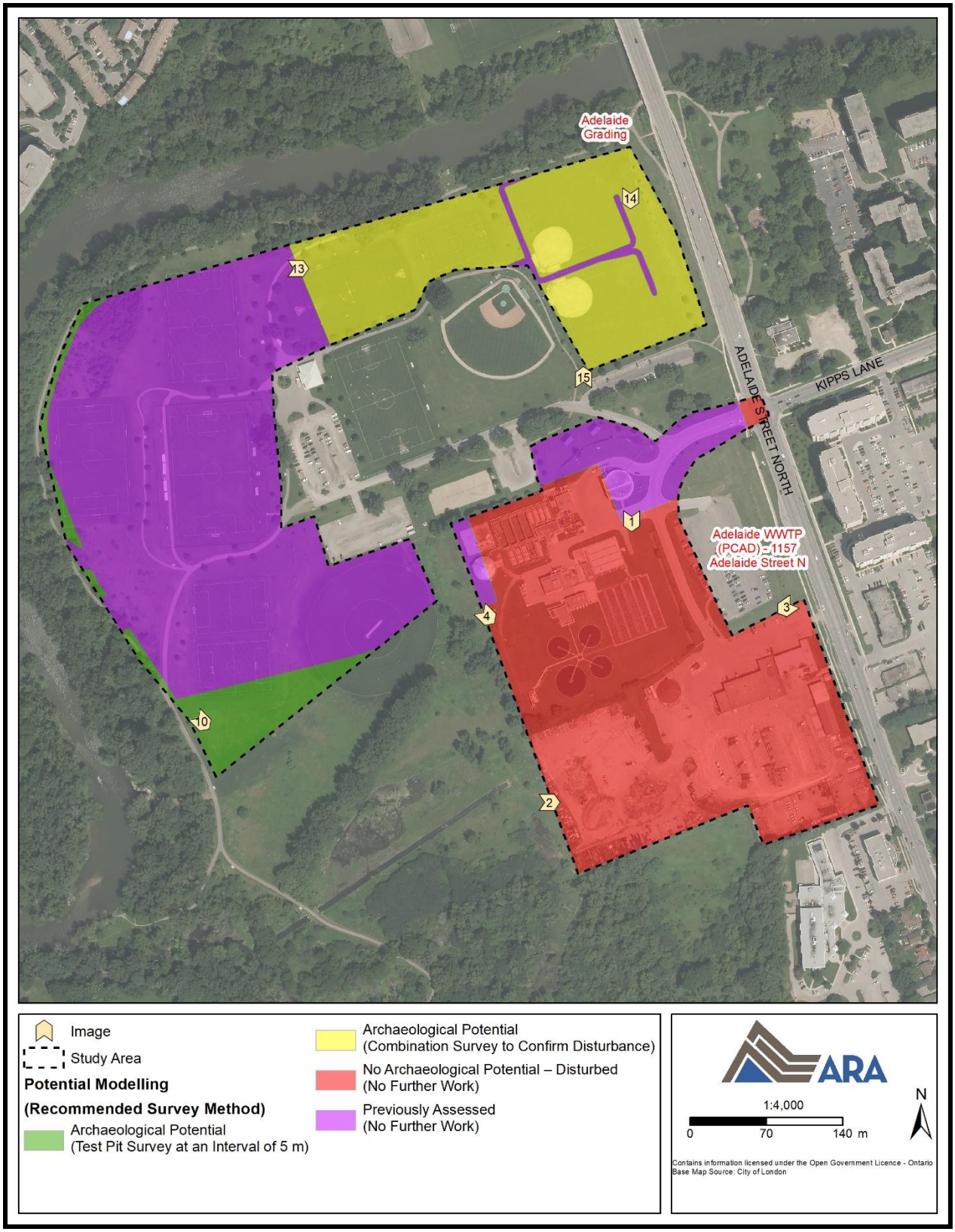
Map 11: Previous Assessments– Greenway Parcels (Stage 1–2)
(Produced under licence using ArcGIS® software by Esri, © Esri)



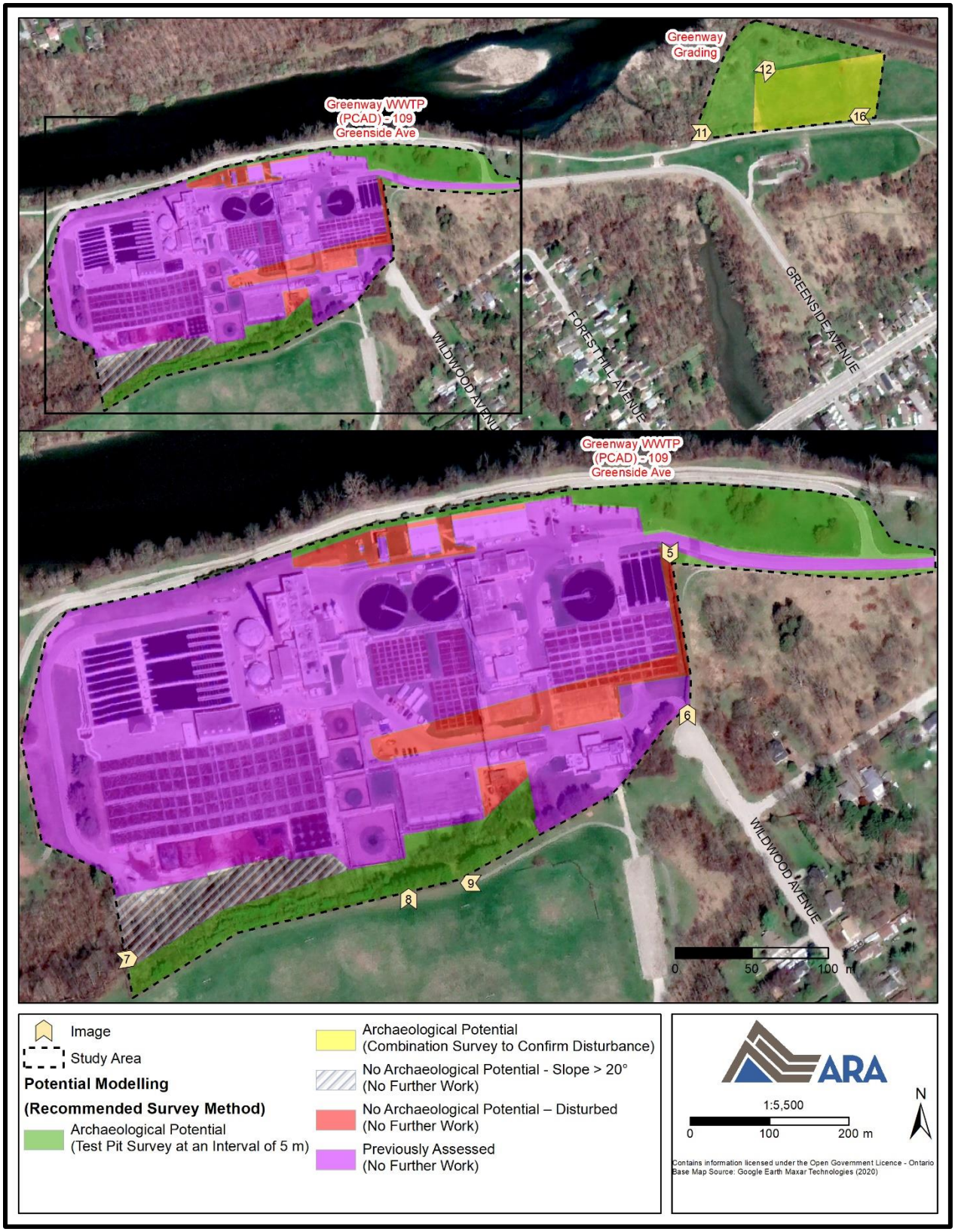
Map 12: Features of Potential – Adelaide Parcels
(Produced under licence using ArcGIS® software by Esri, © Esri)



Map 13: Features of Potential – Greenway Parcels
(Produced under licence using ArcGIS® software by Esri, © Esri)



Map 14: Potential Modelling and Recommendations – Adelaide Parcels
(Produced under licence using ArcGIS® software by Esri, © Esri)



Map 15: Potential Modelling and Recommendations – Greenway Parcels
(Produced under licence using ArcGIS® software by Esri, © Esri)

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ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

DRAFT

Stage 1 Archaeological Assessment
Greenway and Adelaide Wastewater Treatment Plants
Climate Change Resiliency Project
Municipal Class Environmental Assessment
City of London
Part of Lots 32–34, Concession B Broken Front
Geographic Township of Westminster
Part of Lot 13, Concession 3
Geographic Township of London
Former Middlesex County, Ontario

Prepared for
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650 Woodlawn Road West, Suite 7B
Guelph, ON N1K 1B8
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Licensed under
M. Maika
MHSTCI Licence #P1021
PIF #P1021-0009-2021
ARA File #2021-0007

12/04/2022

Supplementary Documentation

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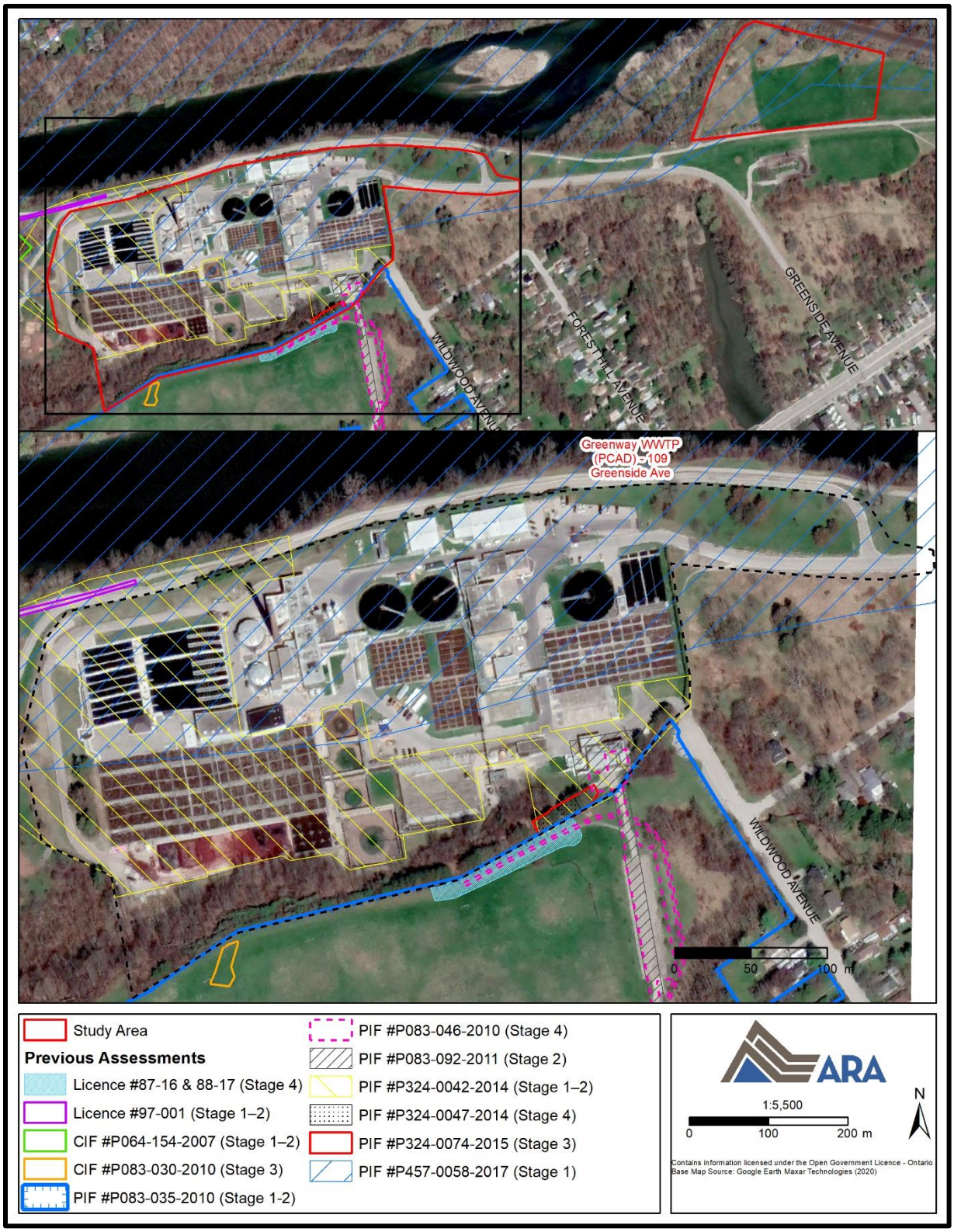
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1.0 SUPPLEMENTARY DOCUMENTATION

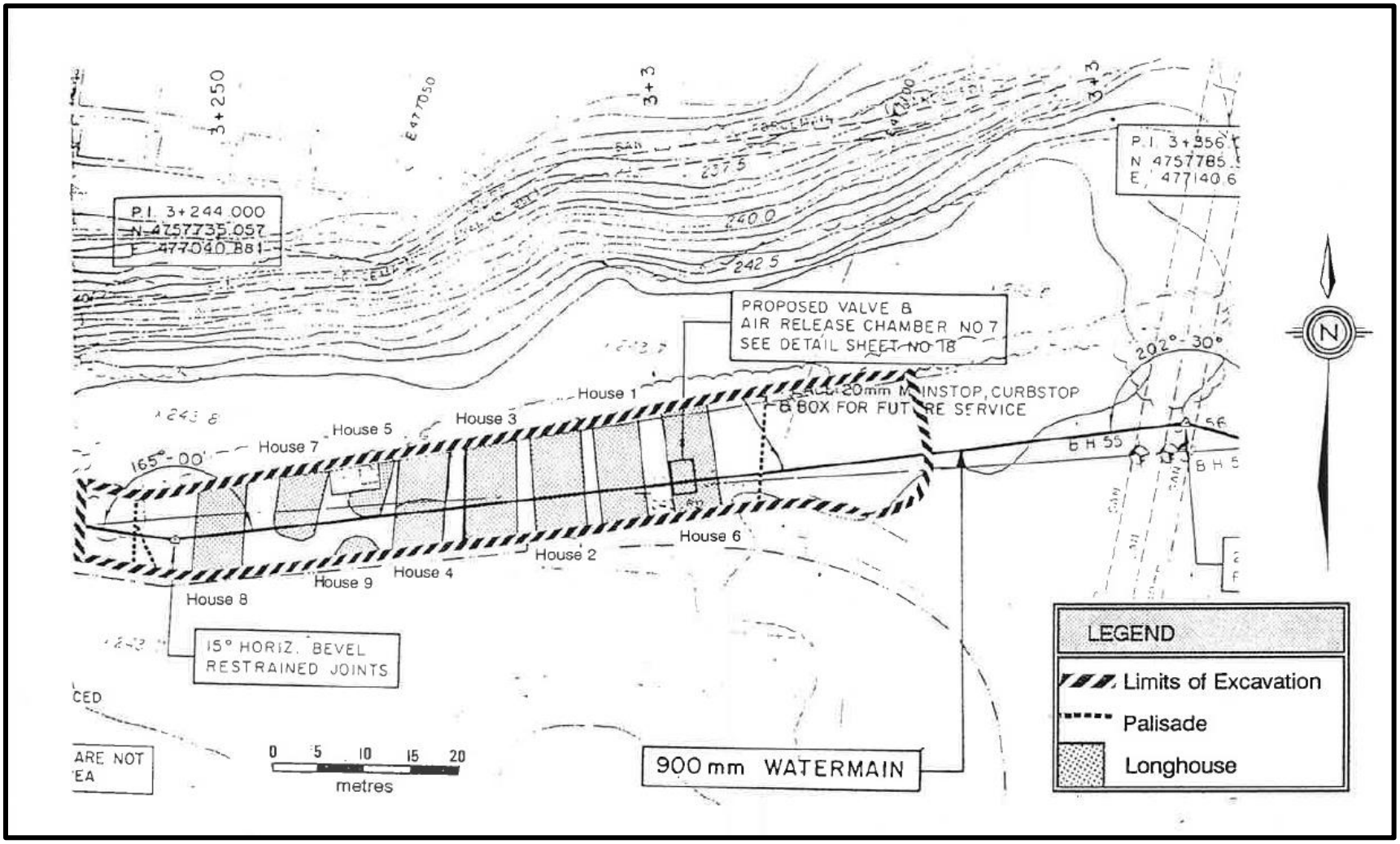
1.1 Detailed Site Location Information

In keeping with Section 7.6.1 of the 2011 *Standards and Guidelines for Consultant Archaeologists*, detailed site location information was not included within the project report. The previous assessments conducted within 50 m of the study area appear in SD Map 1, and a selection of past excavation results associated with the Norton site (AfHh-86) have been reproduced in SD Map 2–SD Map 5. The previously identified archaeological sites falling within 300 m of the Greenway parcels are shown in SD Map 6.

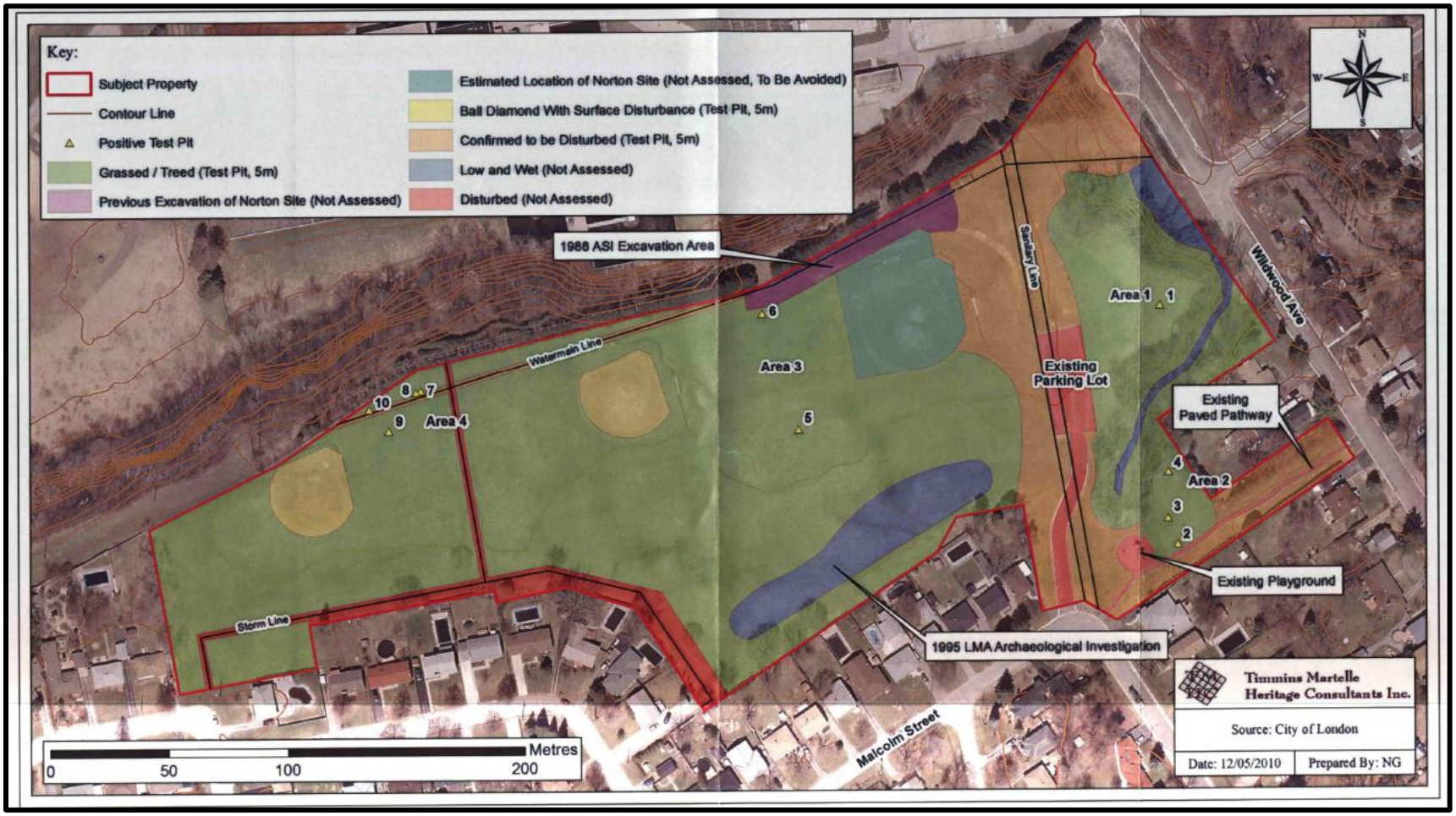
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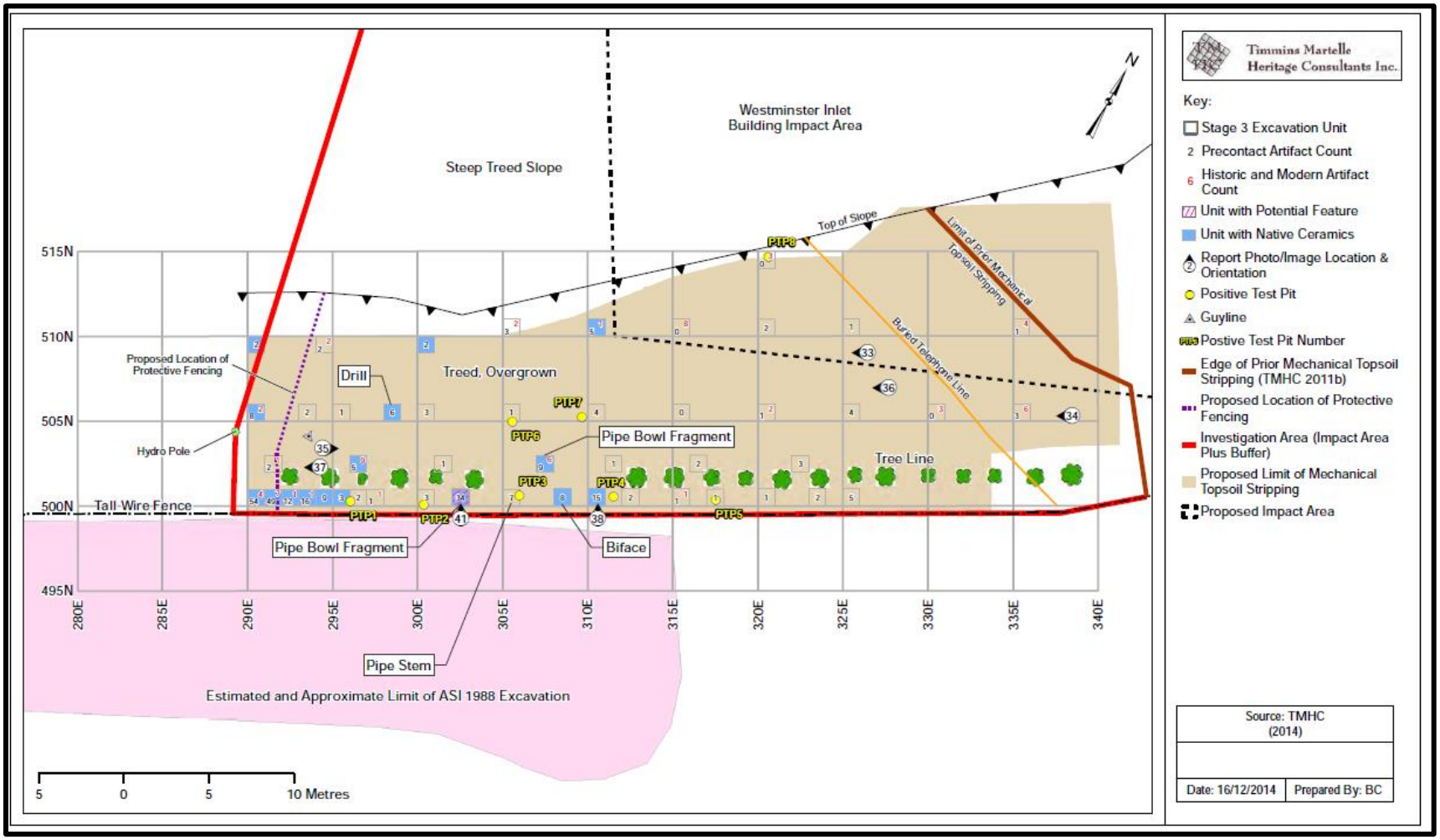
SD Map 1: Previous Assessments – Greenway Parcels (Stage 1–4)
(Produced under licence using ArcGIS® software by Esri, © Esri)



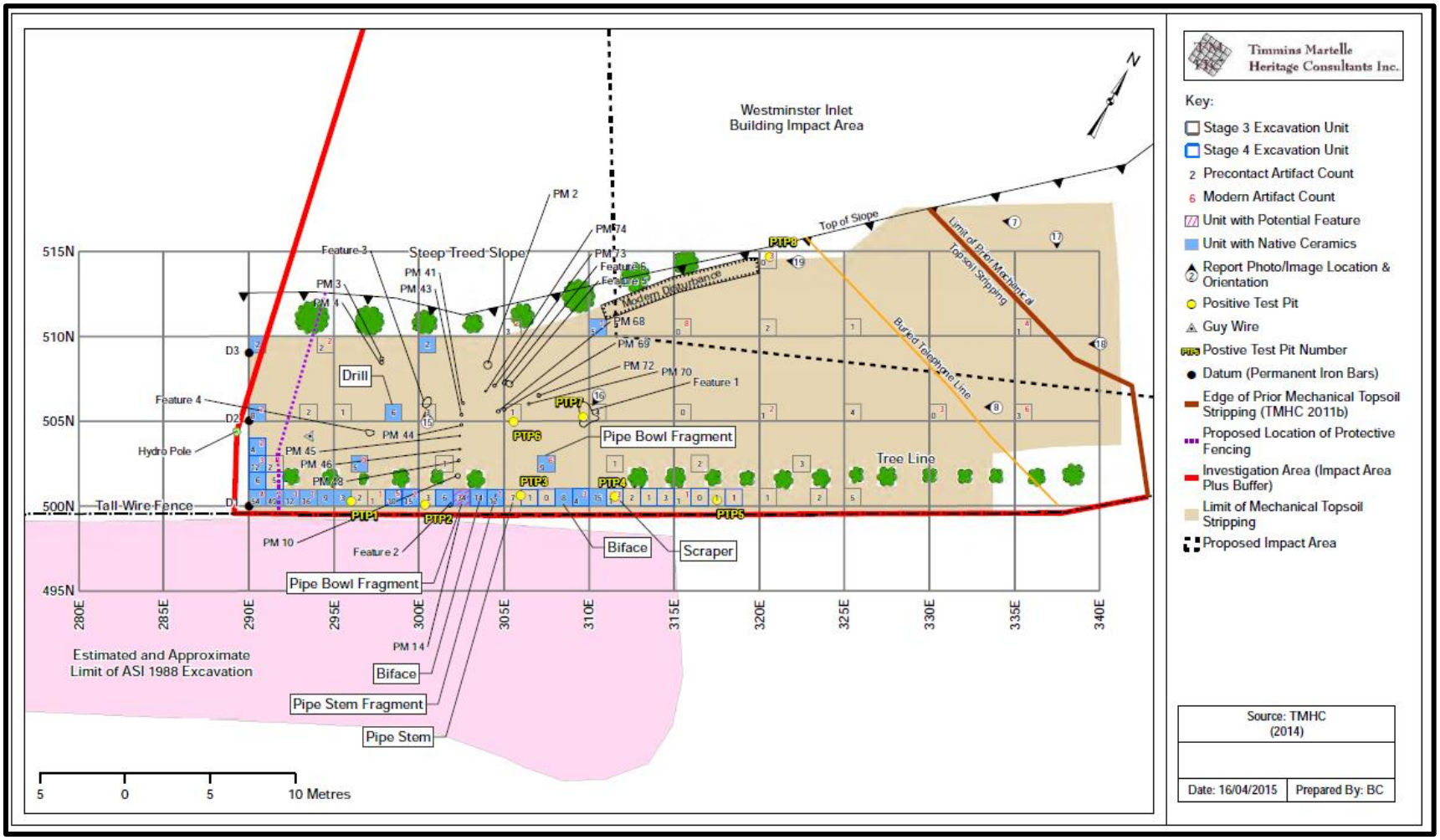
SD Map 2: Norton Site – 1988 Investigation
(Produced under licence using ArcGIS® software by Esri, © Esri; ASI 1992:Figure 3)



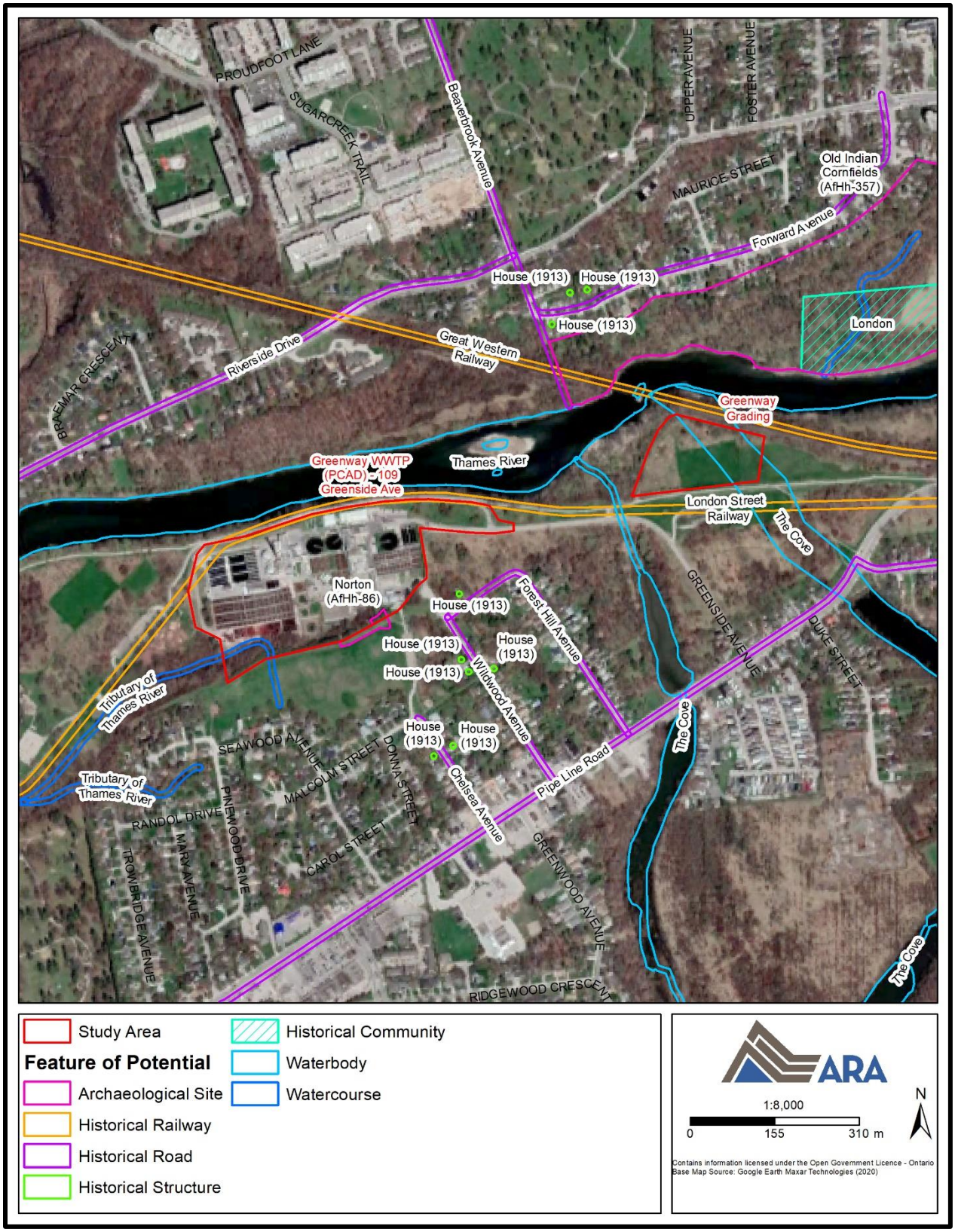
SD Map 3: Norton Site – 2010 Investigation
(Produced under licence using ArcGIS® software by Esri, © Esri; TMHC 2010a:Figure 27)



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(Produced under licence using ArcGIS® software by Esri, © Esri; TMHC 2015a:Map 16)



SD Map 5: Norton Site – 2014 Investigation (Stage 4)
(Produced under licence using ArcGIS® software by Esri, © Esri; TMHC 2015b:Map 14)



SD Map 6: Features of Potential with Site Information – Greenway Parcels
(Produced under licence using ArcGIS® software by Esri, © Esri)

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2015b *Stage 4 Archaeological Assessment, Norton Site (AfHh-86), Proposed Improvements, Greenway Pollution Control Plant, Part of Lots 33 & 34, Concession B, Geographic Township of Westminster, City of London, Middlesex County, Ontario*. PIF #P324-0047-2014. TMHC.

Appendix E
Consultation Report (Matrix 2022)

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

Class Environmental Assessment for the Adelaide Wastewater Treatment Plant Climate Change Resiliency

Consultation Report

Prepared for:
City of London

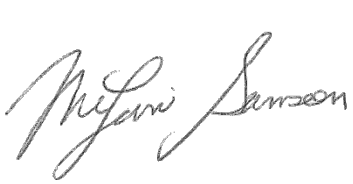
Prepared by:
Matrix Solutions Inc.

Version 1.0
May 2022
Guelph, Ontario

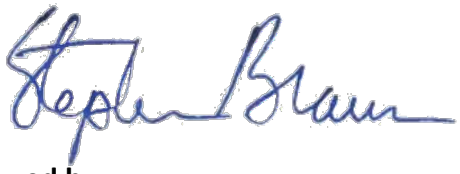
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Class Environmental Assessment for the Adelaide Wastewater Treatment Plant Climate Change Resiliency Consultation Report

Prepared for the City of London, May 2022



Melani-Ivy Samson, M.A.Sc., E.I.T.
Water Resources EIT



reviewed by
Stephen Braun, P.Eng.
Senior Water Resources Engineer

Disclaimer

Matrix Solutions Inc. certifies that this report is accurate and complete and accords with the information available during the project. Information obtained during the project or provided by third parties is believed to be accurate but is not guaranteed. Matrix Solutions Inc. has exercised reasonable skill, care, and diligence in assessing the information obtained during the preparation of this report.

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Version Control

Version	Date	Issue Type	Filename	Description
V0.1	18-Apr-2022	Draft	32667-531 Adelaide Consultation Report 2022-04-18 draft V0.1.docx	Issued to client for review
V0.2	29-Apr-2022	Draft revised	32667-531 Adelaide Consultation Report 2022-04-29 draft V0.2.docx	Reissued to client for review
V1.0	13-May-2022	Final	32667-531 Adelaide Consultation Report 2022-05-13 final V1.0.docx	Issued to client

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1 Introduction

The City of London (the City) has undertaken a Schedule B Municipal Class Environmental Assessment (EA) to develop mitigation approaches to provide climate change resiliency to the Adelaide Wastewater Treatment Plant (WWTP) located along the Thames River in London, Ontario (Figure 1). Consultation during the decision-making process is a key feature of the Municipal Class EA process (see Section 1.2). Those consulted throughout the process include Indigenous Communities; relevant agencies; and stakeholders, which include landowners within 500 m of the project location (Figure 1).

1.1 Project Overview

As part of the EA process, the project was anchored on the following problem, opportunity, and summary statements. These statements were provided early in the project for public consideration.

1.1.1 Problem Statement

In April 2019, the City declared a climate emergency to deepen its commitment to protecting its economy, ecosystems, and communities from climate change through adaptation and mitigation initiatives. The Adelaide WWTP, located along the Thames River at 1201 Adelaide Street North, is inundated during severe floods (e.g., 1:250-year event). As part of these climate change resiliency initiatives, the City has an interest in providing flood protection and climate resiliency at this critical WWTP infrastructure and reducing the environmental impacts of flooding.

1.1.2 Opportunity Statement

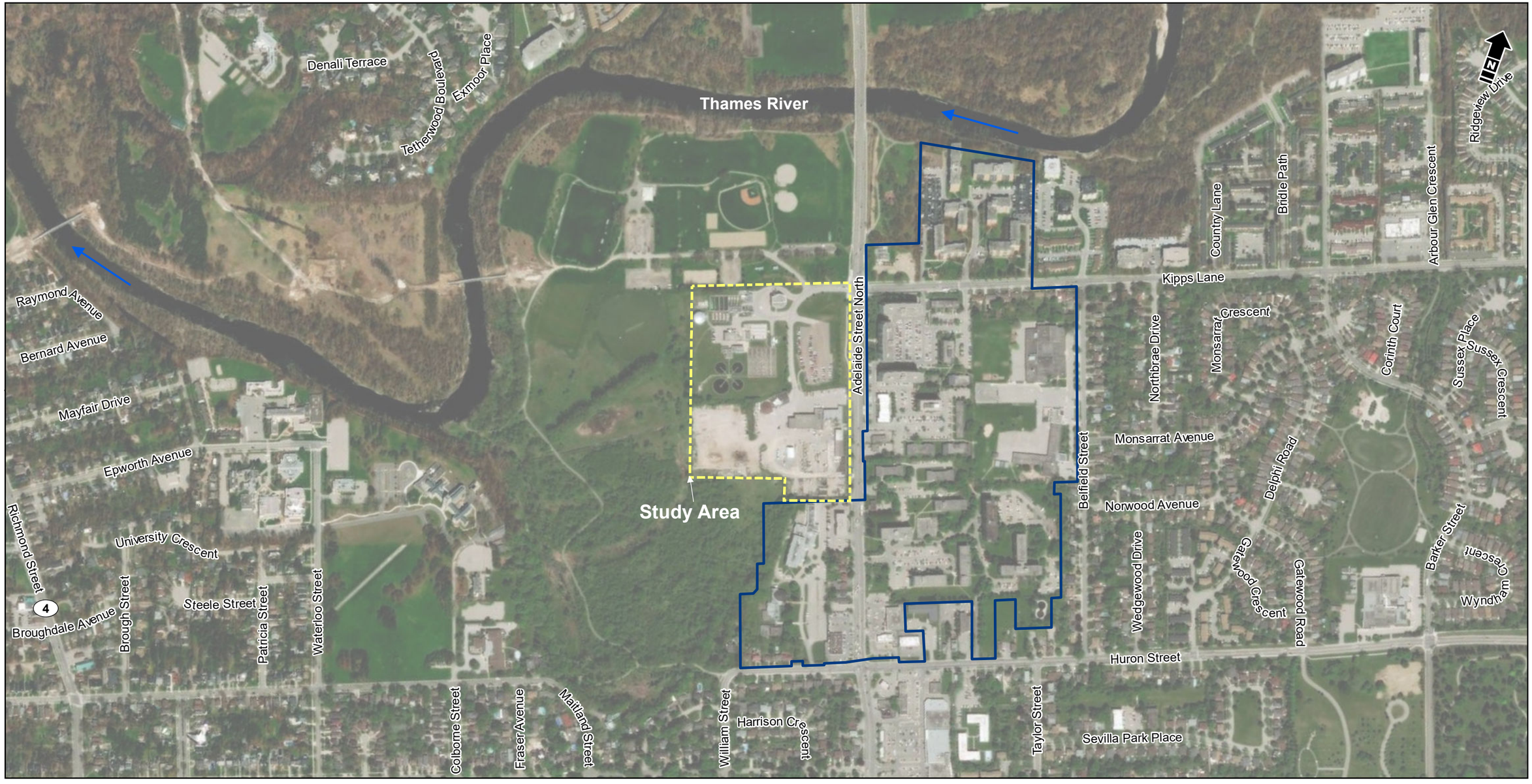
The Schedule B Municipal Class EA will seek to identify a preferred flood protection approach to improve asset resilience, enhance treatment capabilities, and improve plant safety. Potential approaches to protect these critical infrastructure assets and reduce the environmental impacts of flooding approaches will, to the extent possible, minimize impacts to land ownership, land use conditions, and existing infrastructure.

The City secured federal funding through the Disaster Mitigation and Adaptation Fund for this project, as well as for climate change resiliency improvements at the Greenway WWTP.

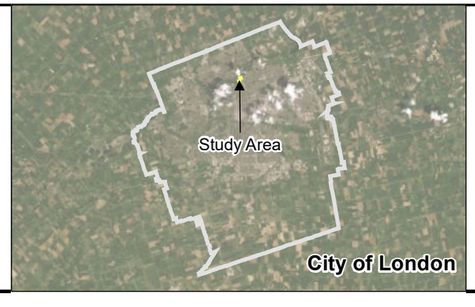
The EA will be coordinated with the long-term planning underway for the City's WWTPs. This coordination will ensure that resiliency opportunities identified in the EA will serve the City well into the future.

1.1.3 Summary Statement

The Adelaide WWTP is vulnerable to severe flooding. The EA will seek to identify a preferred flood protection approach to improve asset resilience, enhance treatment capabilities, and improve plant safety. An acceptable flood protection solution will, to the extent possible, minimize impacts to land ownership, land use conditions, and existing infrastructure.



Adelaide WWTP Study Area
Mail Out Area
Flow Direction



Notes:
(1) This figure is meant to be read with the attached Consultation Report, Climate Change Resiliency Class EA for the Adelaide WWTP (April 2022) and is subject to the same limitations and conditions stated in the report.

(2) The study area extends south beyond the current boundaries of the Adelaide WWTP to encompass potential future expansion.

1:7,000 metres
75 0 75 150
NAD 1983 UTM Zone 17N

Reference: Contains information licensed under the Open Government Licence – Ontario. Imagery (2020) Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community.

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

City of London
Class Environmental Assessment for the Adelaide Wastewater Treatment Plant Climate Resiliency

Adelaide Study Area

Date:	Project:	Submitter:	Reviewer:
May 2022	32667	M. Samson	S. Braun

Disclaimer: The information contained herein may be compiled from numerous third party materials that are subject to periodic change without prior notification. While every effort has been made by Matrix Solutions Inc. to ensure the accuracy of the information presented at the time of publication, Matrix Solutions Inc. assumes no liability for any errors, omissions, or inaccuracies in the third party material.

Figure 1

I:\City of London\32667\Figures And Tables\EA\2022\Consultation\Mail Out Area\Figure-1-Adelaide_Study_Area.mxd - Tabloid_L - 09-May-22, 11:29 AM - sylam - TID004

1.2 Municipal Class Environmental Assessment

The *Class Environmental Assessment for the Adelaide Wastewater Treatment Plant Climate Change Resiliency* follows the Municipal Class EA process outlined by the *Municipal Class Environmental Assessment Manual* (MEA 2015), under the Ontario *Environmental Assessment Act*, Revised Statutes of Ontario (R.S.O.) 1990, Chapter E.18, as amended, and includes amendments through the *COVID-19 Economic Recovery Act, 2020*. This process (Figure 2) allows for strategic planning of multiple integrated systems that impact the environment (defined as the natural, social, cultural, built, and economic environments). The consultation process for this project complies with the *Code of Practice for Consultation in Ontario's Environmental Assessment Process* (MOE 2014).

For this project, the Municipal Class EA process has been carried out under the Terms of Reference established in the Municipal Class EA document, prepared by the Ontario Municipal Engineers Association in October 2000 (as amended in 2007, 2011, and 2015). Figure 2 illustrates the Municipal Class EA Process and the phases are defined as follows in the EA manual (MEA 2015):

"Phase 1 Identify the problem (deficiency) or opportunity

Phase 2 Identify alternative solutions to address the problem or opportunity by taking into consideration the existing environment, and establish the preferred solution taking into account public and review agency input. At this point, determine the appropriate Schedule for the undertaking and document decisions in a Project File for Schedule B projects, or proceed through the following Phases for Schedule C projects.

Phase 3 Examine alternative methods of implementing the preferred solution, based upon the existing environment, public and review agency input, anticipated environmental effects and methods of minimizing negative effects and maximizing positive effects.

Phase 4 Document, in an Environmental Study Report a summary of the rationale, and the planning, design and consultation process of the project as established through the above Phases, and make such documentation available for scrutiny by review agencies and the public.

Phase 5 Complete contract drawings and documents, and proceed to construction and operation; monitor construction for adherence to environmental provisions and commitments. Where special conditions dictate, also monitor the operation of the completed facilities."

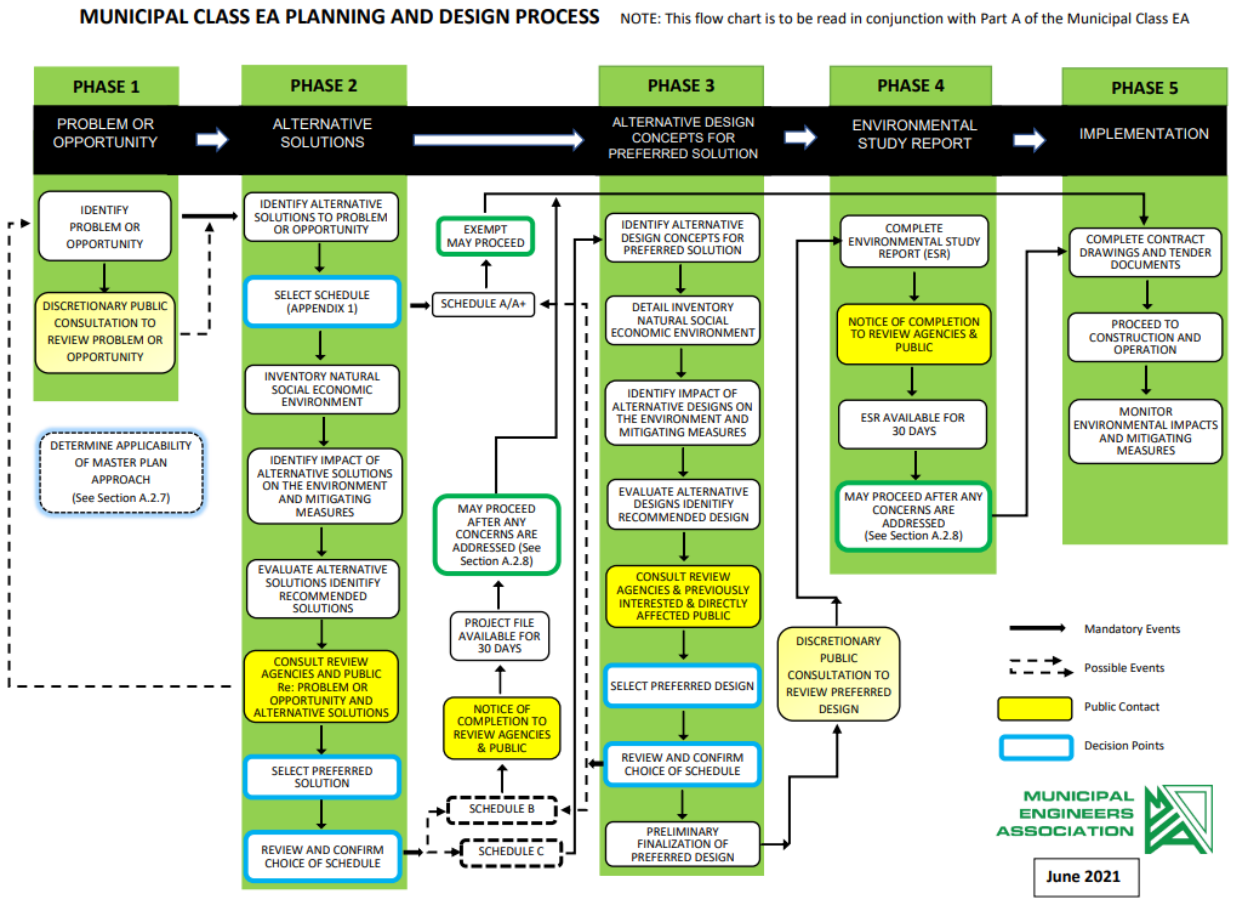


Figure 2 Municipal Class Environmental Assessment Process (MEA 2015)

There are several classifications or schedules associated with municipal infrastructure projects defined as follows in the EA manual (MEA 2015):

- **"Schedule A** (Phases 1 and 5)
  - generally includes normal or emergency operational and maintenance activities
  - the environmental effects of these activities are usually minimal and, therefore, these projects are pre-approved

- **Schedule A+** (Phases 1 and 5)
    - in 2007, MEA introduced Schedule A+. These projects are pre-approved, however the public is to be advised prior to project implementation. The manner in which the public is advised is to be determined by the proponent. Schedule A+ is discussed in Section A.1.2.2.
- **Schedule B** (Phases 1, 2, and 5)
    - generally includes improvements and minor expansions to existing facilities
    - there is the potential for some adverse environmental impacts and therefore the proponent is required to proceed through a screening process including consultation with those who may be affected
- **Schedule C** (Phases 1 through 5)
    - generally includes the construction of new facilities and major expansions to existing facilities
    - these projects proceed through the environmental assessment planning process outlined in the Class EA"

A project that is carried out following an approved Municipal Class EA process will comply with Section 16 (formerly known as Part II) of the *Environmental Assessment Act*. However, if during the project planning and consultation process there are agency or public concerns that cannot be resolved, the concerned party may request that the project comply with Section 16 of the *Environmental Assessment Act* and undertake a higher level of assessment known as a "Section 16 Order."

Amendments to the Section 16 Order have been implemented to focus on issues relating to Aboriginal and treaty rights. The updated guidelines (MECP 2021) indicate that a Section 16(6) Order can be requested to the Minister if the requestor has outstanding concerns that a project going through a Class EA process may have a potential adverse impact on constitutionally protected Aboriginal and treaty rights and it is believed that an Order may prevent, mitigate, or remedy this impact.

A Section 16 Order should try to be resolved with the project proponent first and should not be requested with the intent to solely delay or stop the planning and implementation of a Class EA project. If the issue cannot be resolved, a Section 16 Order request must be submitted to both

the Ontario Ministry of the Environment, Conservation and Parks (MECP) and the Director of Environmental Assessment Branch via mail, email, fax, or hand delivery after the proponent has issued a Notice of Completion. The proponent should also be sent a copy of the request. MECP will review the request, consider evaluation criteria, consult with other technical staff, and make a recommendation to the Minister. The Minister can request an individual Class EA for the project or apply further conditions to the Class EA that may entail further study, monitoring, and/or consultation.

1.3 Resources

To manage EAs during the pandemic, Matrix Solutions Inc. has managed consultation virtually in accordance with the Ontario *Environmental Assessment Act*, as amended, with the *COVID-19 Economic Recovery Act, 2020*. Matrix ensured any interested parties were provided notices, in paper and email, with instructions to sign up to the virtual events through the *Get Involved* page described below. Throughout the project, Matrix has adhered to public health recommendations, and meetings were held online in a format that was comfortable to stakeholders, whether through email, phone call, or virtual meeting.

Get Involved is the City's online engagement site that allows residents to contribute ideas and feedback on plans, projects, and services. The Adelaide WWTP Climate Change Resiliency EA project webpage was activated on April 2, 2021. The project webpage was continuously updated throughout the project and a link to the site provided in all notices distributed. Notices, Public information Centre (PIC) materials, and feedback forms were posted to the webpage for public review and comment. These materials are attached in the appendices.

1.4 Contact List

An important part of the Municipal Class EA process is to consult with interested parties to gather information they may have and obtain their input on alternative solutions and design concepts for the preferred solution. As mentioned, the contact list for this project comprised Indigenous Communities and relevant agencies and stakeholders. The contact list (Appendix A) has been maintained and updated throughout the project based on communication with these individuals/organizations.

Stakeholders comprised landowners and occupants within 500 m of the project's defined study area. The following subsections describe of the other interested parties and level of engagement.

1.4.1 Indigenous Communities

Appropriate and considerate engagement with Indigenous Communities was a priority for this project. The MECP also emphasized the importance of consultation and provided the project team with *A Proponent's Introduction to the Delegation of Procedural Aspects of Consultation with Aboriginal Communities* to follow throughout the project.

The City sent out individual letters with each notice to the following Indigenous Communities:

- Aamjiwnaang First Nation
- Caldwell First Nation
- Chippewas of the Thames First Nation
- Delaware Nation at Moraviantown
- Kettle and Stoney Point First Nation
- Munsee Delaware Nation
- Oneida Nation of the Thames
- Walpole Island First Nation

1.4.2 Agencies

The following agencies were provided the notices and requested to provide feedback or information that may be relevant to the project:

- Indigenous Services Canada
- Environment and Climate Change Canada
- Infrastructure Canada
- Ministry of the Environment, Conservation and Parks (MECP)
- Ontario Ministry of Northern Development, Mines, Natural Resources and Forestry (MNDMNRF)
- Ontario Ministry of Transportation
- Ontario Ministry of Agriculture, Food and Rural Affairs
- Upper Thames River Conservation Authority (UTRCA)
- Hydro One
- London Hydro
- London District Energy
- Enbridge Gas/Union Gas
- Canadian Pacific Railway
- London Transit

- London Environment Network
- Environmental and Ecological Planning Advisory Committee (EEPAC)

2 Consultation

Early in the project, the project team developed a consultation plan to develop a framework for engagement and consultation with Indigenous Communities, agencies, and stakeholders.
The Schedule B Municipal Class EA process has four mandatory points of contact: the Notice of Commencement, PIC No. 1, PIC No. 2, and the Notice of Completion. These points of contact are summarized in Table 1 and the details of the consultation are described in the following subsections.

Table 1 Summary of Points of Contact for Class EA Process

Point of Contact	Distribution	Purpose
Notice of Commencement	• distributed by email to contact persons for each organization/group identified on the project contact list • published on the City of London website • published in the *Londoner* on June 10, 2021	• introduce the project and problem/opportunity statements to the public and interested parties. • receive and address initial project comments and concerns from interested stakeholders
PIC No. 1	• conducted the live PIC on October 6, 2021 through Zoom and a signup sheet was posted on the *Get Involved* website • provided an online questionnaire for attendees to fill out and comment • a notice for the PIC was distributed: ▪ email was sent to the contact list ▪ published on the City of London website ▪ published in the *Londoner* on September 23, 2021	• introduce preliminary details of the project to the public and interested persons • present alternative solutions and evaluation criteria for feedback • provide opportunity for interested parties to identify any concerns and/or information that will support the Municipal Class EA process.
PIC No. 2	• conducted the live PIC on March 9, 2022 through Zoom and a signup sheet was posted on the *Get Involved* website • provided an online questionnaire for attendees to fill out and comment • a notice for the PIC was distributed: ▪ email was sent to the contact list ▪ published on the City of London website ▪ published in the *Londoner* on February 24, 2022	• present conceptual designs and a detailed evaluation of the alternative solutions • provide opportunity for interested parties to identify any concerns and/or information that will support the Municipal Class EA process

Point of Contact	Distribution	Purpose
Notice of Completion	• distributed by email to contact persons for each organization/group identified on the project contact list. • published on the City of London website • published in the *Londoner* on May 19, 2022	• highlight the end of the project and the location of the Project File summarizing the project's process and findings • receive and address project comments and concerns from interested stakeholders

PIC - Public Information Centre
EA - environmental assessment

2.1 Notice of Commencement

A Notice of Commencement (Appendix B) was distributed to the project contact list. The notice was distributed to approximately surrounding property owners and interested persons (Figure 1). Indigenous Communities, agencies, and organizations who may have been interested in the project received the notice along with an accompanying letter.

Additionally, the MECP were consulted as per the Class EA process to formally initiate the process. In response, MECP provided a *Response to Notice of Commencement* dated June 22, 2021 to explicitly indicate investigative requirements and due diligence with respect to policy, the environment, and consultation.

2.2 Public Information Centre

Two separate PICs were hosted by the project team throughout the project to fulfill the requirements of two mandatory points of contact to acquire feedback at crucial decision-making points of the project:

- introduction and presentation of the preliminary alternative solutions
- evaluation of the alternative solutions and identification of the preferred solution

The PICs were held virtually with a set agenda and presentation. City staff and the consulting team presented and were available for questions and comments. The project's *Get Involved* page was linked and key contact information on behalf of the City and project consultant were provided. After viewing the presentation and discussing questions or concerns with the project team during the PICs, public comments were captured through online survey participation and direct correspondence with the project team. A compiled list of public comments for the project is available in Appendix C.

2.2.1 Public Information Centre No. 1

PIC No. 1 was held on Wednesday, October 6, 2021. The event was hosted virtually from 6:30 p.m. to 7:30 p.m. Participants were invited to register for the PIC through the *Get Involved* project webpage. After the PIC, a virtual recording of the meeting and a copy of the slideshow presentation were made available to the public on the City's *Get Involved* page. PIC No. 1 slides are available in Appendix C.

In total, 5 individuals attended the PIC No. 1. In general, comments received supported the approach by the City and the criteria to be used for the evaluation of alternatives. Table 2 summarizes comments/questions received with respect to PIC No. 1.

Table 2 Responses to Public Information Centre No. 1

Comments/Questions	Response
How does 1:250-year flow event compare to the 1:100-year flow event?	The 250-year flow event is based on statistical analysis of river flows. A 250-year flow has a 0.4% chance in any given year. A 100-year flow has a 1% chance in any given year.
How recent is the rainfall data?	Flows were provided to project team from the UTRCA as the current regulatory flows and is related to dam operations and rainfall.
Nearby property owners seeking clarification on flood depths pre- and post-preferred alternative solutions.	Flood depths and flood risk figure from Matrix models presented during PIC No. 1 and shared with interested persons.

UTRCA - Upper Thames Region Conservation Authority

2.2.2 Public Information Centre No. 2

PIC No. 2 was held on Wednesday, March 9, 2022. The event was hosted virtually from 3:00 p.m. to 4:00 p.m. Participants were invited to register for the PIC through the *Get Involved* project webpage. After the PIC, a virtual recording of the meeting and a copy of the slideshow presentation were made available to the public on the City's *Get Involved* page. PIC No. 2 slides are available in Appendix C.

In total, 11 individuals attended the PIC No. 2. In general, comments received supported the approach by the City and the preferred solution. Table 3 summarizes comments/questions received with respect to PIC No. 2.

Table 3 Responses to Public Information Centre No. 2

Comments/Questions	Response
Positive feedback about the mitigation efforts addressing bypasses. Expression of no concern over a marsh that is typically full of phragmites.	The environmental impact study prepared by Matrix supports the opinion of the nearby marsh.

2.3 Notice of Completion

A Notice of Completion (Appendix B) was distributed to the project contact list and published on the in the *Londoner* on May 19, 2022.Indigenous Communities, agencies, and organizations who may have been interested in the project, received the notice along with an accompanying letter. The Notice of Completion advertised the final EA document and indicated that the public would have a minimum 30-day period to review and comment on the document.

3 Feedback

3.1 Indigenous Community Consultation

Relevant feedback and consultation with Indigenous Communities is summarized in the following subsections. A full summary of correspondence with Indigenous Communities is provided in Appendix D.

3.1.1 Caldwell First Nation

Email and phone correspondence between Caldwell First Nation and the City affirmed interest in continued and future communications (e.g., workshop and one-on-one meetings). Matrix provided information to the Caldwell First Nation through their online Consultation Tool that specifies details of the project that may or may not impact issues.

A brief description of the main areas of concern covered in the Consultation Tool is described below:

- **Project Location:** indication of project location to determine site overlap and any potential impacts to air, water, or land that could impact the land of interest
- **Project Impact Assessment:** verification of the approvals the project has or will undertake and the agencies that have been consulted, as well as provision of EA material
- **Economic Impacts:** survey and description of potential economic impacts the project may have on the Caldwell First Nations
- **Archaeological and Sacred Sites:** description of the archaeology study conducted and plans for future study
- **Species at Risk:** description of the environmental impact study and anticipated construction overlap with species listed in Ontario's *Endangered Species Act*, the *Species at Risk Act*, or in the Schedule of the *Migratory Birds Convention Act*
- **Waterways:** verification of potential waterway impact from the project using mapping and a verification of the approval process
- **Culture and Language:** survey and description of potential culture and language benefits the project may have on the Caldwell First Nations

- **Human Health:** description of potential impact the project has on human health, such as a list of pollutants

The project area is located within the Upper Thames River watershed. The Upper Thames River watershed overlaps the Caldwell First Nations lands that are concentrated in southern Ontario along the shores of Lake Erie. The WWTP releases treated wastewater effluent into the Thames River in accordance with the MECP's Environmental Compliance Approval (ECA) for the WWTP. Implementation of a flood protection and climate resiliency solution is anticipated to reduce the environmental impacts of flooding by allowing the WWTP to be more fully operational during flood conditions. Improving treatment capabilities during severe floods supports the protection of the surrounding environment, including the City's commitment to the Lake Erie Domestic Action Plan by reducing phosphorus discharge to the Thames River. Therefore, it can be confirmed that there are little to no impacts to the Caldwell First Nations.

3.1.2 Chippewas of Kettle and Stoney Point First Nation

The City conducted a virtual meeting with the Chippewas of Kettle and Stoney Point First Nation virtually on March 23, 2022. Representatives from the City met with staff from IBA Braiding, the firm retained by the Chippewas of Kettle and Stoney Point First Nation as consultation advisors. The City discussed the need for providing flood protection to the Adelaide WWTP using material from PIC No. 2 and described the preferred solution that was identified at PIC No. 2. The City provided the archaeological reports and environmental impact study to IBA Braiding, as requested, for review. No concerns with the project or the approach to consultation were raised at the meeting.

3.2 Agency Consultation

Relevant agency feedback received is summarized in the following subsections. A full list of agency contacts and full summary of correspondence is provided in Appendix D.

3.2.1 Ontario Ministry of the Environment, Conservation and Parks

The MECP provided a letter on June 22, 2021 entitled *Response to Notice of Commencement* detailing the requirements of the EA and resources to address these requirements. The major topics covered in the letter included:

- **Planning and Policy:** assure compliance to various municipal and provincial policies, such as the *Provincial Policy Statement, 2020*

- **Source Water Protection:** verification of vulnerable areas, such as Wellhead Protection Areas

- **Climate Change:** consideration of the MECP's climate change guide titled *Considering Climate Change in the Environmental Assessment Process*
- **Air Quality, Dust, and Noise:** review and description of any potential impacts to air quality, dust, and noise during and post construction
- **Ecosystem Protection and Restoration:** review and consideration for key natural heritage and hydrologic features
- **Species at Risk:** verification of any project impact to species at risk
- **Surface Water:** demonstration of no negative impacts on the natural features or ecological functions of any watercourse
- **Groundwater:** explanation for any impacts to groundwater takings or changes to drainage patterns
- **Excess Materials Management:** confirmation of excess soil management in accordance to a new regulation under the *Environmental Protection Act*, titled *On-Site and Excess Soil Management*
- **Contaminated Sites:** verification of any current or historical waste disposal sites as well as underground storage tanks
- **Servicing, Utilities, and Facilities:** identification of any servicing infrastructure, above or underground utilities, and facilities that may need compliance to an Environmental Compliance Approval (ECA)
- **Mitigation and Monitoring:** description of a plan for mitigation and post-construction monitoring
- **Consultation:** description of consultation efforts and how raised concerns have been addressed
- **Class EA Process:** documentation of the planning process

The main Project File for this EA contains an investigative summary for each of the components listed above. As a whole, the flood protection improvements that were explored as part of this EA can be reasonably managed in coordination with the relevant agencies at detailed design and during the construction phase to ensure compliance with the listed regulations.

3.2.2 Ontario Ministry of Northern Development, Mines, Natural Resources and Forestry

The MNDMNRF provided information to guide the project team in identifying and assessing natural features and resources, as required by applicable policies and legislation, and the project team engaged with the MNDMNRF for advice, as needed. It was confirmed that *Petroleum Wells, Lakes and Rivers Improvement Act* and *the Public Lands Act* are not currently applicable to the project due to scope. Natural heritage features (NHFs), including species and/or habitats protected under the *Endangered Species Act*, have been assessed through the environmental impact study process. Generally, it is anticipated that impacts to NHFs can be avoided through mitigation measures as stipulated. Several outstanding issues relating to NHFs have been identified, to be carried through to the detailed design phase of the project.

3.2.3 Ontario Ministry of Transportation

No comments or concerns with the proposal, as it is outside of the MTO Permit Control Area and has no impact on the provincial highway system.

3.2.4 Upper Thames and Region Conservation Authority

The project team had significant communication and interaction with the UTRCA regarding flood mitigation alternative solutions, including UTRCA attendance at workshops held specifically to discuss technical details of flood plain hydraulics. Floodplain storage calculations associated with the different alternatives were also discussed. Consultation with UTRCA is located in Appendix D in the form of meeting minutes (May, July, and December 2021), as well as email correspondence related to floodplain storage discussions.

3.3 Stakeholder Consultation

In addition to comments received during the PICs, comments were received by the project team via email and phone. Refer to Section 2.2 and Appendix D for a summary of the comments received.

4 References

Municipal Engineers Association (MEA). 2015. *Municipal Class Environmental Assessment Manual*. October 2000, as amended in 2015. Approved by Order-in-Council no. 1923/2000. 2015. https://www.municipalclassea.ca/manual/page1.html

Ontario Ministry of the Environment, Conservation and Parks (MECP). 2021. *Class Environmental Assessments: Section 16 Order*. Envrionmental Assessment Act. Queen's Printer for Ontario. Pulbished March 20, 2014. Updated October 7, 2021. October 2021. https://www.ontario.ca/page/class-environmental-assessments-section-16-order

Ontario Ministry of the Environment (MOE). 2014. *Code of Practice for Consultation in Ontario's Environmental Assessment Process*. Environmental Assessment Act, RSO 1990, chapter E.18. January 2014. http://www.ontario.ca/environmentalassessments

Appendix A
Contact List

Please note that the presented contact list reflects the latest projects contacts, considering situations such as staff turnover.

Contact List

ORGANIZATION	NAME OF PERSON	EMAIL/PHONE	ADDRESS
Conservation Authority			
Upper Thames Conservation Authority	Jenna Allain, Manager, Environmental Planning & Regulations	allainj@thamesriver.on.ca	Upper Thames Conservation Authority 1424 Clarke Road London, ON N5V 5B9
	Imtiaz Shah, Senior Environmental Engineer	shahi@thamesriver.on.ca	
	John Campbell, Senior Information Management Analyst	campbellj@thamesriver.on.ca	
	Chris Tasker, Manager, Water & Information Management	taskerc@thamesriver.on.ca	
	David Charles, Supervisor, Water and Erosion Control Structures	charlesd@thamesriver.on.ca	
	Mark Shifflett, Senior Water Resources Engineer	shifflettm@thamesriver.on.ca	
	Mark Helsten, Senior Water Resources Engineer	helstenm@thamesriver.on.ca	
	Brad Glasman, Manger, Conservation Services	glasmanb@thamesriver.on.ca	
	Jennifer Howley, Manager, Conservation Areas	howleyj@thamesriver.on.ca	
	Brent Verscheure, Manager, Lands & Facilities	verscheureb@thamesriver.on.ca	
	Stephanie Schreiner, Water Control Structures Engineer	schreiners@thamesriver.on.ca	
	Jessica Schnaithmann, Land Use Regulations Officer	schnaithmannj@thamesriver.on.ca	

Please note that the presented contact list reflects the latest projects contacts, considering situations such as staff turnover.

Contact List

ORGANIZATION	NAME OF PERSON	EMAIL/PHONE	ADDRESS
First Nation Communities			
Walpole Island First Nation	Chief Charles Sampson	charles.sampson@wifn.org	Walpole Island First Nation 117 Tahgahoning Road, R.R. #3 Walpole Island, ON N8A 4K9
	Alicia Blackeagle	alicia.blackeagle@wifn.org	
	Dean Jacobs, Consultation Manager	dean.jacobs@wifn.org	
	Janet MacBeth, Project Review Coordinator	janet.macbeth@wifn.org	
Oneida Nation of the Thames	Brandon Doxtator, Environment and Consultation Coordinator	environment@oneida.on.ca	Oneida Nation of the Thames 2212 Elm Avenue Southwold, ON N0L 2G0
	Chief Adrian Chrisjohn	adrian.chrisjohn@oneida.on.ca	
	Cherilyn Hill	cherilyn.hill@oneida.on.ca	
	Angie George, Political Office Assistant	ccounciltemp@oneida.on.ca	
	Holly Elijah, Political Reception/Finance	holly.elijah@oneida.on.ca	
Munsee Delaware Nation	Chief Mark Peters	chief.peters@munsee.ca	Munsee Delaware Nation 289 Jubilee Road, R.R. #1 Muncey, ON N0L 1Y0
	Carol Antone, Executive Assistant	carol@munsee.ca	
	Stacey Philips, Consultation Coordinator	consultation@munsee.ca	
	Reception	reception@munsee.ca	
Kettle and Stoney Point FN	Chief Jason Henry	jason.henry@kettlepoint.org	Kettle and Sony Point First Nation 6247 Indian Lane Kettle and Stony Point, ON
	Valerie George, Consultation Officer	valerie.george@kettlepoint.org	
	Yvette Boutcher	fdesk@kettlepoint.org	
Delaware Nation at Moraviantown	Chief Denise Stonefish	denise.stonefish@delawarenation.on.ca	Delaware Nation at Moraviantown 14760 School House Line, R.R. #3 Thamesville, ON N0P 2K0
Chippewas of the Thames First Nation	Chief Jacqueline French	jfrench@cottfn.com	Chippewas of the Thames First Nation 320 Chippewa Road Muncey, ON N0L 1Y0
	Fallon Burch, Consultation Coordinator	fburch@cottfn.com	
		consultation@cottfn.com	

Please note that the presented contact list reflects the latest projects contacts, considering situations such as staff turnover.

Contact List

ORGANIZATION	NAME OF PERSON	EMAIL/PHONE	ADDRESS
Caldwell First Nation	Chief Mary Duckworth	ChiefMaryDuckworth@caldwellfirstnation.ca (519-358-6922)	Caldwell First Nation 14 Orange Street Leamington, ON N8H 1P5
	Nikki van Oirschot, Director of Operations	nikki@caldwellfirstnation.ca	
	Brianna Sands, Environmental & Consultation Coordinator	ecc@caldwellfirstnation.ca	
	Michelle McCormack, Consultation Coordinator Assistant	consultation.assistant@caldwellfirstnation.ca	
Aamjiwnaang First Nation	Chief Chris Plain	chief.plain@aamjiwnaang.ca	Aamjiwnaang First Nation 978 Tashmoo Avenue Sarnia, ON N7T 7H5
	Sharilyn Johnston, Environment Coordinator	sjohnston@aamjiwnaang.ca	
Indigenous Services Canada		aadnc.cau-uca.aandc@canada.ca	
Government Bodies/ Environmental Networks			
London Environment Network	Skylar Franke, Executive Director	skylar@londonenvironment.net	944 Western Counties Road London, ON N6C 6A8
Environment Canada	Michael Goffin, Regional Director General, Ontario Region	michael.goffin@canada.ca	
Ministry of Environment, Conservation and Parks	Rob Wrigley, Manager, MECP London District Office	rob.wrigley@ontario.ca	Ministry of Environment, Conservation and Parks - London District 33 Exeter Road London, ON N6E 1L3
	Mark Smith, Water Compliance Supervisor, London District Office	mark.smith@ontario.ca	
	Mark Badali, Environmental Assessment Coordinator - Southwest Region	mark.badali1@ontario.ca	
	EA Coordinator email box	eanotification.swregion@ontario.ca	

Please note that the presented contact list reflects the latest projects contacts, considering situations such as staff turnover.

Contact List

ORGANIZATION	NAME OF PERSON	EMAIL/PHONE	ADDRESS
Ministry of Natural Resources and Forestry	Ian Thornton, Resource Operations Supervisor, Guelph District	ian.thornton@ontario.ca	Ministry of Natural Resources and Forestry - Guelph District Office Ontario Government Building 1 Stone Road West Guelph, ON
	Jennifer Harvard, Land and Waters Technical Specialist, Guelph District Office	jennifer.harvard@ontario.ca	
	Aylmer District Office	519-773-9241	Ministry of Natural Resources and Forestry - Aylmer District Office 615 John Street North Aylmer, ON N5H 2S8
	General Planning	MNRF.Ayl.Planners@ontario.ca	
Ministry of Transportation	Paul Santos, Senior Project Manager, Corridor Management Section	paul.santos@ontario.ca	Ministry of Transportation - Western Region 659 Exeter Road London, ON N6E 1L3
	Ryan Mentley	ryan.mentley@ontario.ca	
	Jessica Pegelo	Jessica.Pegelo@ontario.ca	
Ministry of Agriculture, Food and Rural Affairs	Drew Crinklaw, Rural Planner, SW Ontario	drew.crinklaw@ontario.ca	Ministry of Agriculture, Food and Rural Afairs - Southwest Region 667 Exeter Road London, ON N6E 1LE
Infrastructure Canada	Anne Salley, Program Officer, Disaster Mitigation and Adaptation Fund	anne.salley@infc.gc.ca	180 Kent Street Ottawa, ON K1P 5P5
	Amélie Rousseau	Amelie.Rousseau@infc.gc.ca	

Please note that the presented contact list reflects the latest projects contacts, considering situations such as staff turnover.

Contact List

ORGANIZATION	NAME OF PERSON	EMAIL/PHONE	ADDRESS
City of London			
City of London Staff	Kelly Scherr, Deputy City Manager, Environment and Infrastructure	kscherr@london.ca	
	Scott Mathers, Director Water, Wastewater and Stormwater	smathers@london.ca	
	Jay Standford	jstandfor@london.ca	
	Jennie Dann, Director, Construction and Major Projects	jdann@london.ca	
	Doug MacRae, Director, Road and Transportation	dmacrae@London.ca	
	Andrew MacPherson, Division Manager, Parks Planning and Operations	AMACPHER@London.ca	
	David O'Brien, Division Manager, Corporate Services and Chief Human Resources Officer	dobrien@london.ca	
	Jeff Bruin	jbruin@london.ca	
	Stephanie Wilson	stwilson@london.ca	
	Michael Losee, Division Manager, Solid Waste Management	mlosee@london.ca	
	Michael Schulthess, City Clerk	mschulth@London.ca 519.661.CITY(2489) x 5396	
	Ashley Rammeloo, Sewer Engineering Division Manager	arammelo@London.ca	
	Shawna Chambers, Stormwater Engineering, Division Manager	schambers@london.ca	
	Rick Pedlow, Sewer Operations, Division Manager	rpedlow@london.ca	
	Greg Barrett, Director City Planning and City Planner	GBarrett@London.ca	
	Michael Fabro, City Planning, Manager Sustainability and Resiliency	mfabro@london.ca	

Please note that the presented contact list reflects the latest projects contacts, considering situations such as staff turnover.

Contact List

ORGANIZATION	NAME OF PERSON	EMAIL/PHONE	ADDRESS
	Kirby Oudekerk, Division Manager, Wastewater Treatment Operations	koudeker@london.ca	
	Ryan Craven, Community Neightbourhood Groups Representative	rcraven@london.ca	
	Patrick Donnelly, Manager, Watershed Programs, Environmental Programs	pdonnell@london.ca	
	Val Morgado, Manager - Planning, Energy & Assets, Facilities Division	vmorgado@london.ca	
Councillors	Councillor Michael van Holst - Ward 1	mvanholst@london.ca	
	Councillor Shawn Lewis - Ward 2	slewis@london.ca	
	Councillor Mohamed Salih - Ward 3	msalih@london.ca	
	Councillor Jesse Helmer - Ward 4	jhelmer@london.ca	
	Councillor Maureen Cassidy - Ward 5	mcassidy@london.ca	
	Councillor Mariam Hamour - Ward 6	mhamou@london.ca	
	Councillor Josh Morgan - Ward 7	joshmorgan@london.ca	
	Councillor Steve Lehman - Ward 8	slehman@london.ca	
	Councillor Anna Hopkins - Ward 9	ahopkins@london.ca	
	Councillor Paul Van Meerbergen - Ward 10	pvanmeerbergen@london.ca	
	Councillor Stephen Turner - Ward 11	sturner@london.ca	
	Councillor Elizabeth Peloza - Ward 12	epeloza@london.ca	
	Councillor John Fyfe-Millar - Ward 13	jfmillar@london.ca	
	Councillor Steven Hillier - Ward 14	shillier@london.ca	
Environmental and Ecological Planning Advisory Committee (EEPAC)	Heather Lysynski, EEPAC Committee Clerk	hlysynsk@london.ca	
	Sandy Levin, EEPAC Committee Chair	s.levin@sympatico.ca	

Please note that the presented contact list reflects the latest projects contacts, considering situations such as staff turnover.

Contact List

ORGANIZATION	NAME OF PERSON	EMAIL/PHONE	ADDRESS
Neighbourhood Groups			
Northridge	Brett Soutter, Co-President Northridge Community Association (NCA)	northridgecommunityassociation@gmail.com	
	Lisa Wedlake, Co-President, Northridge Community Association (NCA)	northridgecommunityassociation@gmail.com	
Kipps Lane	Northeast London Community Engagement (NELCE)	nelce@lihc.on.ca	
	Councillor Mo Salih (noted above)	msalih@london.ca	
	Councillor Jesse Helmer (noted above)	jhelmer@london.ca	
School Boards			
Thames Valley District School Board	General line	planning@tvdsb.ca 519-452-2000	1250 Dundas Street London, ON N5W 5P2
	Carlos Henriquez, Manager, Capital Projects	519-452-2000 x 21027	
Other			
London Hydro	Rod Doyle, Distribution Engineer	doyler@londonhydro.com	PO Box 2700 London, ON N6A 4H6
	Jamie MacPherson, Engineering Technologist	macpherj@londonhydro.com	
London Transit	Katie Burns, Manager of Planning Services	kburns@londontransit.ca	450 Highbury Avenue North London, ON N5W 5L2
London District Energy	Tim Walach, Plant Manager	tim.walach@enwave.com	301 Colborne Street London, ON N6B 2S8
Enbridge Gas/Union Gas	Darryl Arnold, Manager, Operations	(519) 667-4100	109 Commissioners Road West London, ON N6A 4P1
	Rob Elliott, Construction Project Manager	rob.elliott@enbridge.com	
	Jake Van Ryn, Construction Projects Manager	jake.vanryn@enbridge.com	
	Steven Jelich, Director, Southwest Region Operations	(519) 667-4109 x 5154109	

Please note that the presented contact list reflects the latest projects contacts, considering situations such as staff turnover.

Contact List

ORGANIZATION	NAME OF PERSON	EMAIL/PHONE	ADDRESS
Bell Canada	Cary Hitchen, Project Coordinator	cary.hitchen@bell.ca	Access Network Facilities 725 Colborne Street, Floor 3 London, ON N6A 2Z6
	Diego Tobias Engiennering	PUCC.circulations.GT@bell.ca	
	Bell Canada Municipal Operations Centre	bell.moc@telecon.ca	
Rogers Communications	Jerry LaCount, System Planner	jerry.lacount@rci.rogers.com	800 York Street London, ON N5W 2S9
	Planning Coordinators	SWOGR.permits@rci.rogers.com	
	Rogers Municipal Operations Centre	rogers.moc@telecon.ca	
Telus Communications	Frederic Sua, Design Specialist, Access Engineering	frederic.sua@telus.com	Telus Communications Inc. Engineering Operations & Implementation East 25 York Street - 22nd Floor Toronto, ON M5J 2V5
Start Communications	Bill Shewfelt, Fibre Projects Manager	bshewfelt@start.ca	148 York Street London, ON N6A 1A9
Zayo (formerly Allstream)	PUCC Mark-Up Contact	utility.circulations@zayo.com	50 Worcester Road Etobicoke, ON M9W 5X2
Execulink Telecom	Jeff Soetemans	jeff.soetemans@execulink.com	1127 Ridgeway Road P.O. Box 33 Woodstock, ON N4V 1E3
	Quinten Wilson	quinten.wilson@execulink.com	
London Health Science Centre	Derek Lall, Director	derek.lall@lhsc.on.ca	Facilities Management 800 Comissioners Road East Room F3-103 MU Bldg London, ON N6A 5W9

Please note that the presented contact list reflects the latest projects contacts, considering situations such as staff turnover.

Contact List

ORGANIZATION	NAME OF PERSON	EMAIL/PHONE	ADDRESS
Canadian National Railway		Permits.GLD@cn.ca proximity@cn.ca	4 Welding Way P.O. Box 1000 Concord, ON L4K 1B9
Canadian Pacific Railway	Jack Carello, Manager, Utilities, Engineering Services	jack_carello@cpr.ca	1290 Central Parkway West Suite 800 Mississauga, ON L5C 4R3
Imperial Oil - Sarnia Products Pipeline	Hallie Maccuaig, Surface Land Agent Brenda Robinson, Administrator	hallie.maccuaig@esso.ca brenda.robinson@esso.ca	100 Concession 5 East Waterdown, ON L8B 1K5
Sun-Canada Pipeline Co. Ltd.	Wendy Sutherland, Field Support Coordinator Technologist	wsutherland@Sun-Canadian.com	Box 470 Waterdown, ON N5H 3J6
Epcore Natural Gas Ltd. Partnership LP	Darryl Adams, Operations	dadams2@epcor.com	39 Beech Street East Aylmer, ON N5H 3J6
Middlesex London Health Unit		health@mlhu.on.ca	355 Wellington Street London, ON N6A 3N7

Appendix B
Project Notices

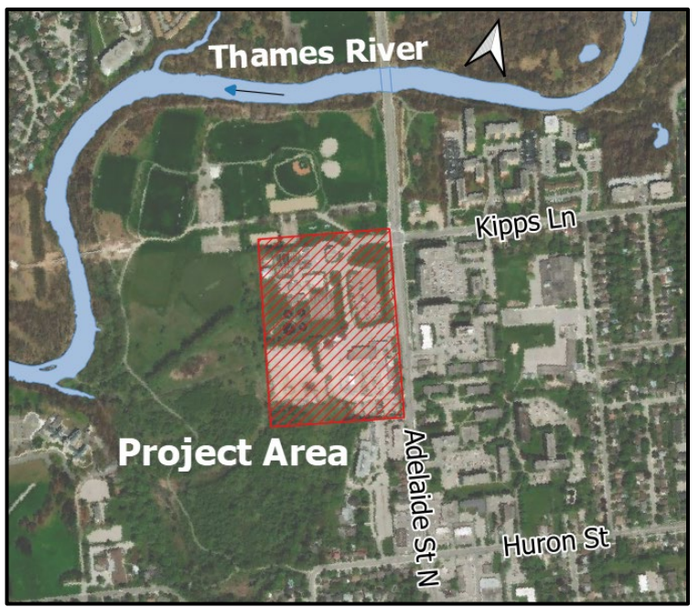
Notice of Study Commencement:
Adelaide Wastewater Treatment Plant Climate Change Resiliency Class Environmental Assessment

Date: May 26, 2021

The City of London (City) is undertaking a Schedule B Municipal Class Environmental Assessment (EA) to identify the preferred solution for flood protection and climate change resiliency at the Adelaide Wastewater Treatment Plant.

Background

In April 2019, the City declared a climate emergency to deepen its commitment to protecting its economy, ecosystems, and communities from climate change through adaptation and mitigation initiatives.



The City secured federal funding through the Disaster Mitigation and Adaptation Fund for this project, as well as for climate change resiliency improvements at the Greenway Wastewater Treatment Plant.

This project will seek to identify a preferred flood protection approach to improve asset resilience, enhance treatment capabilities, and improve plant safety. Potential approaches include a flood barrier, an effluent pumping station, and other upgrades to protect these critical infrastructure assets and reduce the environmental impacts of flooding.

Project Page

For the most up-to-date project information, please visit the Project Page:

london.ca/projects/adelaide-wastewater-treatment-plant-climate-change-resiliency-environmental-assessment

Public Information Centre

The first of two public information centres (PIC) will be held online in September 2021 to present the key opportunities, challenges, and constraints of the project. To receive notification of this PIC and other important project updates, please contact either the City or Consultant Project Manager:

City Project Manager:

Marcy McKillop, P.Eng.
Environmental Services Engineer
Wastewater Treatment Operations
(519) 661-2489 ext. 4976
mmckillop@london.ca

Consultant Project Manager:

Stephen Braun, P.Eng.
Senior Water Resources Engineer
Matrix Solutions Inc.
(289) 323-0975
sbraun@matrix-solutions.com

Your Input is Important

The City wants to hear from you! This EA would not be complete if it did not consider the needs of the City's residents, neighbours and stakeholders. If you would like to ask a question, make a comment, or add your name to the contact list, please contact the City Project Manager.

This document is available in accessible formats, including electronic formats, large-print formats, and/or audio formats. Please contact the City Project Manager to submit your request.

Municipal Class Environmental Assessment Process

This project is being undertaken in accordance with the Municipal Class EA process (MEA, 2000 as amended in 2007, 2011, and 2015). Results will be documented in an EA, which will be submitted to the Ministry of Environment, Conservation and Parks for review. At that time, the public, Indigenous communities, and other interested persons will be informed when and where the EA can be reviewed.

For details on this process, please refer to the Municipal Class EA website (www.municipalclassea.ca) or contact the City Project Manager.

Thank you in advance for your participation and contribution to the planning process that will impact your life in the City of London in a meaningful way. We look forward to working with you towards building a more sustainable and resilient city.

Sincerely,



Marcy McKillop, P.Eng.
Environmental Services Engineer, Wastewater Treatment Operations Division

Copied: Kelly Scherr, Deputy City Manager, Environment and Infrastructure; Scott Mathers, Director Water, Wastewater and Stormwater; all City Councillors

Please note that comments received will be maintained for reference throughout the project and will become part of the public record*. Under the Municipal Freedom of Information and Protection of Privacy Act and the Environmental Assessment Act, any personal information such as name, address, and telephone number included in a submission will become part of the public record unless the comments specifically requests that such personal details not be included in the public record.*

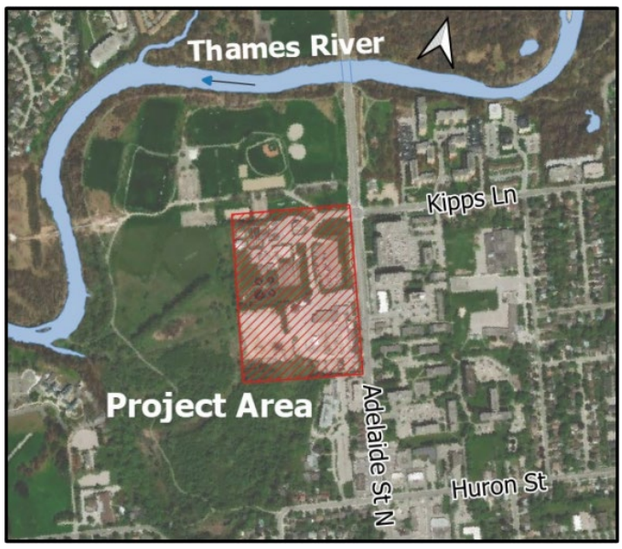
Notice of Public Information Centre (PIC) No.1:
Adelaide Wastewater Treatment Plant Climate Change Resiliency Class Environmental Assessment

PIC Date: Wednesday, October 6, 2021 – 6:30 pm to 7:30 pm (virtual)

The City of London (the City) is undertaking a Schedule B Municipal Class Environmental Assessment (EA) to identify the preferred solution for flood protection and climate change resiliency at the Adelaide Wastewater Treatment Plant.

Background

In April 2019, the City declared a climate emergency to deepen its commitment to protecting its economy, ecosystems, and communities from climate change through adaptation and mitigation initiatives.



The City secured federal funding through the Disaster Mitigation and Adaptation Fund for this project, as well as for climate change resiliency improvements at the Greenway Wastewater Treatment Plant.

This project seeks to identify a preferred flood protection approach to improve asset resilience, enhance treatment capabilities, and improve plant safety. Potential approaches include a flood barrier, an effluent pumping station, and other upgrades to protect these critical infrastructure assets and reduce the environmental impacts of flooding.

PIC Event Details

To register for this virtual PIC, please visit the project's Get Involved page or click here to register via Zoom. The PIC will present some of the key opportunities, challenges, and constraints of the project. Additionally, the PIC will provide opportunity for the public and interested parties to offer input and identify any concerns or local information to support the Class EA process. Following the event, a recording of the PIC presentation will be made available on the Get Involved page.

Project Page

For the most up-to-date information, including project updates, please visit the Project Page.

Your input is important

The City wants to hear from you. This Class EA would be incomplete if it does not consider the needs of the City's residents, neighbours, and stakeholders. If you would like to ask a question, make a comment, or add your name to the contact list, please visit the Get Involved Page or contact either the City or Consultant Project Manager:

City Project Manager:

Marcy McKillop, P.Eng.
Environmental Services Engineer
Wastewater Treatment Operations
(519) 661-2489 ext. 4976
mmckillop@london.ca

Consultant Project Manager:

Stephen Braun, P.Eng.
Senior Water Resources Engineer
Matrix Solutions Inc.
(289) 323-0975
sbraun@matrix-solutions.com

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Municipal Class Environmental Assessment Process

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For details on this process, please refer to the Municipal Class Environmental Assessment website or contact the City Project Manager.

Thank you in advance for your participation and contribution to the planning process that will impact your life in the City of London in a meaningful way. We look forward to working with you towards building a more sustainable and resilient city.

Sincerely,



Marcy McKillop, P.Eng.
Environmental Services Engineer, Wastewater Treatment Operations Division

Copied: Kelly Scherr, Deputy City Manager, Environment and Infrastructure; Scott Mathers, Director Water, Wastewater and Stormwater; all City Councillors

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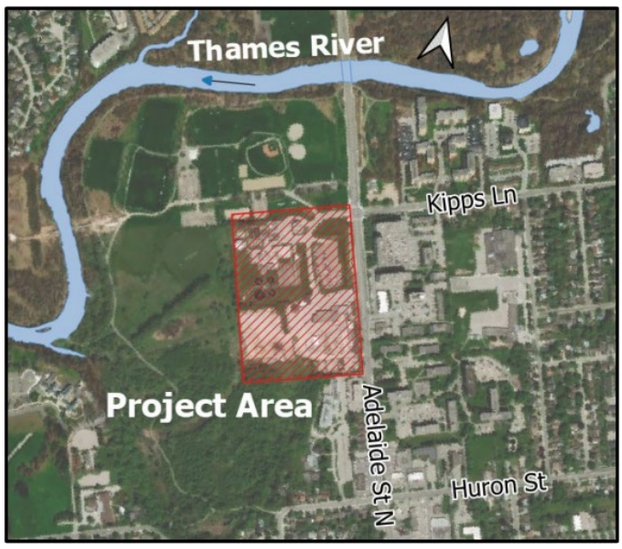
Notice of Public Information Centre (PIC) No. 2:
Adelaide Wastewater Treatment Plant Climate Change Resiliency Class Environmental Assessment

PIC Date: Wednesday, March 9, 2022 – 3:00 p.m. to 4:00 p.m. (virtual)

The City of London (the City) is undertaking a Schedule B Municipal Class Environmental Assessment (EA) to identify the preferred solution for flood protection and climate change resiliency at the Adelaide Wastewater Treatment Plant (WTTP).

Background

In April 2019, the City declared a climate emergency to deepen its commitment to protecting its economy, ecosystems, and communities from climate change through adaptation and mitigation initiatives.



The City secured federal funding through the Disaster Mitigation and Adaptation Fund for this project at the Adelaide WWTP, as well as for climate change resiliency improvements at the Greenway WWTP.

This project has sought to identify a preferred flood protection approach to improve asset resilience, enhance treatment capabilities, and improve plant safety. The approaches first outlined at PIC No. 1 have been evaluated, including a flood barrier, an effluent pumping station, and other upgrades to protect critical infrastructure assets and reduce the environmental impacts of flooding. PIC No. 2 will outline the preferred solution, including integration of public and agency comments to date.

At the end of the study, a project report documenting the entire study process will be available for public review.

PIC Event Details

To register for this virtual PIC, please visit the project's Get Involved page or click here to register via Zoom. The PIC will present some of the key opportunities, challenges, and constraints of the project. Additionally, the PIC will provide opportunity for the public and interested parties to offer input and identify any concerns or local information to support the Class EA process. Following the event, a recording of the PIC presentation will be made available on the Get Involved page.

Project Page

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City Project Manager:

Marcy McKillop, P.Eng.
Environmental Services Engineer
Wastewater Treatment Operations
(519) 661-2489 ext. 4976
mmckillop@london.ca

Consultant Project Manager:

Stephen Braun, P.Eng.
Senior Water Resources Engineer
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(289) 323-0975
sbraun@matrix-solutions.com

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Municipal Class Environmental Assessment Process

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Sincerely,



Marcy McKillop, P.Eng.
Environmental Services Engineer, Wastewater Treatment Operations Division

Copied: Kelly Scherr, Deputy City Manager, Environment and Infrastructure; Scott Mathers, Director Water, Wastewater and Stormwater; all City Councillors

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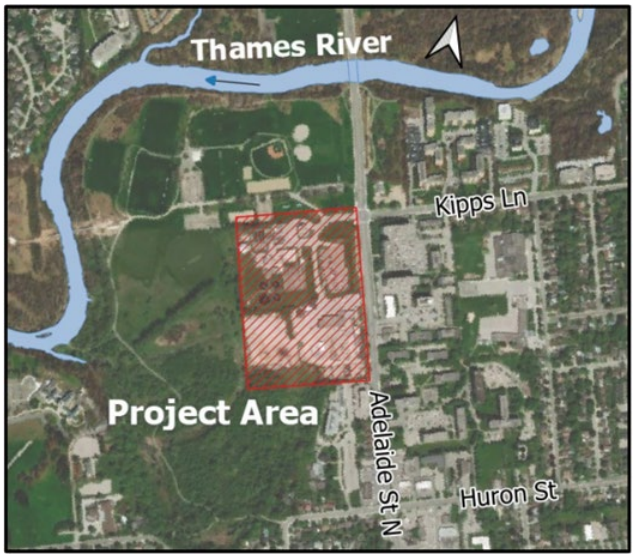
City of London
Notice of Completion

Adelaide Wastewater Treatment Plant
Climate Change Resiliency Class Environmental Assessment

PUBLIC NOTICE **May 2022**

Project

The City of London is concluding the Adelaide Wastewater Treatment Plant Climate Change Resiliency Class Environmental Assessment (EA). In April 2019, the City of London declared a climate emergency to deepen its commitment to protecting its economy, ecosystems, and communities from climate change. The purpose of this Class EA is to evaluate potential flood mitigation alternatives for improved climate change resiliency at the existing Adelaide Wastewater Treatment Plant, located at 1201 Adelaide Street North.



Process

The Class EA study was undertaken in accordance with the Ontario *Environmental Assessment Act* and has covered all necessary phases of Schedule 'B' of the Municipal Class EA Process. The Schedule 'B' process includes the definition of a problem or opportunity as well as the identification and evaluation of potential alternative solutions. At this time, a Project File Report has been completed to conclude the Schedule 'B' Municipal Class EA process to recommend the preferred solution for the Adelaide Wastewater Treatment Plant. The Project File Report will be available online for review at https://getinvolved.london.ca/adelaide-climate-change.

Interested persons may provide written comments to our project team by June 29, 2022. All comments and concerns should be sent directly to Kirby Oudekerk at the City of London or to Stephen Braun at Matrix Solutions Inc.

In addition, a request may be made to the Ontario Ministry of the Environment, Conservation and Parks for an order requiring a higher level of study (i.e., requiring an individual/comprehensive EA approval before being able to proceed) or that conditions be imposed (e.g., require further studies), only on the grounds that the requested order may prevent, mitigate, or remedy adverse impacts on constitutionally protected Aboriginal and treaty rights. Requests on other grounds will not be considered. Requests should include the requester contact information and full name.

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

The request should be sent in writing or by email to:

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

and

Director, Environmental Assessment Branch
Ministry of Environment, Conservation and Parks
135 St. Clair Ave. W, 1st Floor
Toronto ON M4V 1P5
EABDirector@ontario.ca

Requests should also be copied to Marcy McKillop and/or Stephen Braun by mail or by e-mail. Please visit the Ministry's website for more information on requests for orders under section 16 of the *Environmental Assessment Act* at https://www.ontario.ca/page/class-environmentalassessments-part-ii-order.

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

Your feedback is important to us

To provide comments, obtain alternate formats, request additional information, or if you have any issues accessing the document for review, please contact a member of the project team below:

Kirby Oudekerk, MPA, P.Eng.
Division Manager
Wastewater Treatment Operations
City of London
109 Greenside Avenue
London, ON N6J 2X5

(519) 661-2489 ext. 6232
koudeker@london.ca

Stephen Braun, P.Eng.
Senior Water Resources Engineer
Matrix Solutions Inc.
3001-6865 Century Ave.
Mississauga, ON L5N 7K2

(289) 323-0975
sbraun@matrix-solutions.com

Under the *Municipal Freedom of Information and Protection of Privacy Act* and the *Environmental Assessment Act*, unless otherwise stated in the submission, any personal information such as name, address, telephone number, and property location included in a submission will become part of the public record files for this matter and may be released, if requested, to any person.

The following pages contain sample letters sent to each Indigenous Community for each notification.

300 Dufferin Avenue
P.O. Box 5035
London, ON
N6A 4L9

February 23, 2022

Aamjiwnaang First Nation
978 Tashmoo Avenue
Sarnia, ON
N7T 7H5

Attention Chief Chris Plain,

Re: City of London – Schedule B Municipal Class Environmental Assessment for Adelaide Wastewater Treatment Plant Climate Change Resiliency – Notice of Public Information Centre No. 2

Please find attached a Notice of Public Information Centre (PIC) No. 2 for the Municipal Class Environmental Assessment (EA) to study flood protection and climate resiliency for the Adelaide Wastewater Treatment Plant (WWTP). The City of London (City) is undertaking this project in accordance with the requirements of the *Environmental Assessment Act*. A similar EA is being undertaken at the Greenway WWTP.

The Adelaide WWTP is highly vulnerable to severe flooding of the Thames River. This project will seek to identify a preferred flood protection approach to improve asset resilience, enhance treatment capabilities, and improve plant safety. The PIC will present the preliminary preferred solution for site flood protection.

We recognize and acknowledge that the watersheds of southwestern Ontario have been home to the Attawandaron, Anishininaabeg, Haudenosaunne, and Lunaapeewak peoples for millennia. We understand our duty and responsibility for providing full, accurate, and up-to-date information about this project.

The PIC will provide opportunity for the public and interested parties to offer input and identify any concerns or local information to support the EA process. We are committed to working with your community to facilitate your participation in the EA. In addition to the PIC, the City welcomes the opportunity for shared dialogue through a virtual workshop and/or through an individual meeting. Please feel free to contact me to further discuss and coordinate.

In accordance with pandemic protocols, we have elected to send this letter and attached notice via email only. If you would like a hard copy of this letter and notice, please

The Corporation of the City of London
Office 519-661-CITY (2489) x 4976
Fax 519-661-0199
mmckillo@london.ca
www.london.ca

contact me and I will arrange to have it mailed to you. Please feel free to call or email me using the contact details below if you have any questions or require additional information.

Sincerely,



Marcy McKillop, P.Eng.
Wastewater Treatment Operations
City of London

Encl.

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300 Dufferin Avenue
P.O. Box 5035
London, ON
N6A 4L9

February 23, 2022

Caldwell First Nation
14 Orange Street
Leamington, ON
N8H 1P5

Attention Chief Mary Duckworth,

Re: City of London – Schedule B Municipal Class Environmental Assessment for Adelaide Wastewater Treatment Plant Climate Change Resiliency – Notice of Public Information Centre No. 2

Please find attached a Notice of Public Information Centre (PIC) No. 2 for the Municipal Class Environmental Assessment (EA) to study flood protection and climate resiliency for the Adelaide Wastewater Treatment Plant (WWTP). The City of London (City) is undertaking this project in accordance with the requirements of the *Environmental Assessment Act*. A similar EA is being undertaken at the Greenway WWTP.

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The PIC will provide opportunity for the public and interested parties to offer input and identify any concerns or local information to support the EA process. We are committed to working with your community to facilitate your participation in the EA. In addition to the PIC, the City welcomes the opportunity for shared dialogue through a virtual workshop and/or through an individual meeting. Please feel free to contact me to further discuss and coordinate.

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Wastewater Treatment Operations
City of London

Encl.

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300 Dufferin Avenue
P.O. Box 5035
London, ON
N6A 4L9

February 23, 2022

Chippewas of the Thames First Nation
320 Chippewa Road
Muncey, ON
N0L 1Y0

Attention Chief Jacqueline French,

Re: City of London – Schedule B Municipal Class Environmental Assessment for Adelaide Wastewater Treatment Plant Climate Change Resiliency – Notice of Public Information Centre No. 2

Please find attached a Notice of Public Information Centre (PIC) No. 2 for the Municipal Class Environmental Assessment (EA) to study flood protection and climate resiliency for the Adelaide Wastewater Treatment Plant (WWTP). The City of London (City) is undertaking this project in accordance with the requirements of the *Environmental Assessment Act*. A similar EA is being undertaken at the Greenway WWTP.

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Wastewater Treatment Operations
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300 Dufferin Avenue
P.O. Box 5035
London, ON
N6A 4L9

February 23, 2022

Delaware Nation at Moraviantown
14760 School House Line, R. R. # 3
Thamesville, ON
N09 2K0

Attention Chief Denise Stonefish,

Re: City of London – Schedule B Municipal Class Environmental Assessment for Adelaide Wastewater Treatment Plant Climate Change Resiliency – Notice of Public Information Centre No. 2

Please find attached a Notice of Public Information Centre (PIC) No. 2 for the Municipal Class Environmental Assessment (EA) to study flood protection and climate resiliency for the Adelaide Wastewater Treatment Plant (WWTP). The City of London (City) is undertaking this project in accordance with the requirements of the *Environmental Assessment Act*. A similar EA is being undertaken at the Greenway WWTP.

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Wastewater Treatment Operations
City of London

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300 Dufferin Avenue
P.O. Box 5035
London, ON
N6A 4L9

February 23, 2022

Kettle and Stony Point First Nation
6247 Indian Lane
Kettle and Stony Point, ON
N0N 1J1

Attention Chief Jason Henry,

Re: City of London – Schedule B Municipal Class Environmental Assessment for Adelaide Wastewater Treatment Plant Climate Change Resiliency – Notice of Public Information Centre No. 2

Please find attached a Notice of Public Information Centre (PIC) No. 2 for the Municipal Class Environmental Assessment (EA) to study flood protection and climate resiliency for the Adelaide Wastewater Treatment Plant (WWTP). The City of London (City) is undertaking this project in accordance with the requirements of the *Environmental Assessment Act*. A similar EA is being undertaken at the Greenway WWTP.

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Wastewater Treatment Operations
City of London

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300 Dufferin Avenue
P.O. Box 5035
London, ON
N6A 4L9

February 23, 2022

Munsee Delaware Nation
289 Jubilee Road, R. R. # 1
Muncey, ON
N0L 1Y0

Attention Chief Mark Peters,

Re: City of London – Schedule B Municipal Class Environmental Assessment for Adelaide Wastewater Treatment Plant Climate Change Resiliency – Notice of Public Information Centre No. 2

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Wastewater Treatment Operations
City of London

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300 Dufferin Avenue
P.O. Box 5035
London, ON
N6A 4L9

February 23, 2022

Oneida Nation of the Thames
2212 Elm Avenue
Southwold, ON
N0L 2G0

Attention Chief Adrian Chrisjohn,

Re: City of London – Schedule B Municipal Class Environmental Assessment for Adelaide Wastewater Treatment Plant Climate Change Resiliency – Notice of Public Information Centre No. 2

Please find attached a Notice of Public Information Centre (PIC) No. 2 for the Municipal Class Environmental Assessment (EA) to study flood protection and climate resiliency for the Adelaide Wastewater Treatment Plant (WWTP). The City of London (City) is undertaking this project in accordance with the requirements of the *Environmental Assessment Act*. A similar EA is being undertaken at the Greenway WWTP.

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Marcy McKillop, P.Eng.
Wastewater Treatment Operations
City of London

Encl.

The Corporation of the City of London
Office 519-661-CITY (2489) x 4976
Fax 519-661-0199
mmckillo@london.ca
www.london.ca

300 Dufferin Avenue
P.O. Box 5035
London, ON
N6A 4L9

February 23, 2022

Walpole Island First Nation
117 Tahgahoning Road, R. R. # 3
Walpole Island, ON
N8A 4K9

Attention Chief Charles Sampson,

Re: City of London – Schedule B Municipal Class Environmental Assessment for Adelaide Wastewater Treatment Plant Climate Change Resiliency – Notice of Public Information Centre No. 2

Please find attached a Notice of Public Information Centre (PIC) No. 2 for the Municipal Class Environmental Assessment (EA) to study flood protection and climate resiliency for the Adelaide Wastewater Treatment Plant (WWTP). The City of London (City) is undertaking this project in accordance with the requirements of the *Environmental Assessment Act*. A similar EA is being undertaken at the Greenway WWTP.

The Adelaide WWTP is highly vulnerable to severe flooding of the Thames River. This project will seek to identify a preferred flood protection approach to improve asset resilience, enhance treatment capabilities, and improve plant safety. The PIC will present the preliminary preferred solution for site flood protection.

We recognize and acknowledge that the watersheds of southwestern Ontario have been home to the Attawandaron, Anishininaabeg, Haudenosaunne, and Lunaapeewak peoples for millennia. We understand our duty and responsibility for providing full, accurate, and up-to-date information about this project.

The PIC will provide opportunity for the public and interested parties to offer input and identify any concerns or local information to support the EA process. We are committed to working with your community to facilitate your participation in the EA. In addition to the PIC, the City welcomes the opportunity for shared dialogue through a virtual workshop and/or through an individual meeting. Please feel free to contact me to further discuss and coordinate.

In accordance with pandemic protocols, we have elected to send this letter and attached notice via email only. If you would like a hard copy of this letter and notice, please contact me and I will arrange to have it mailed to you. Please feel free to call or email

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me using the contact details below if you have any questions or require additional information.

Sincerely,



Marcy McKillop, P.Eng.
Wastewater Treatment Operations
City of London

Encl.

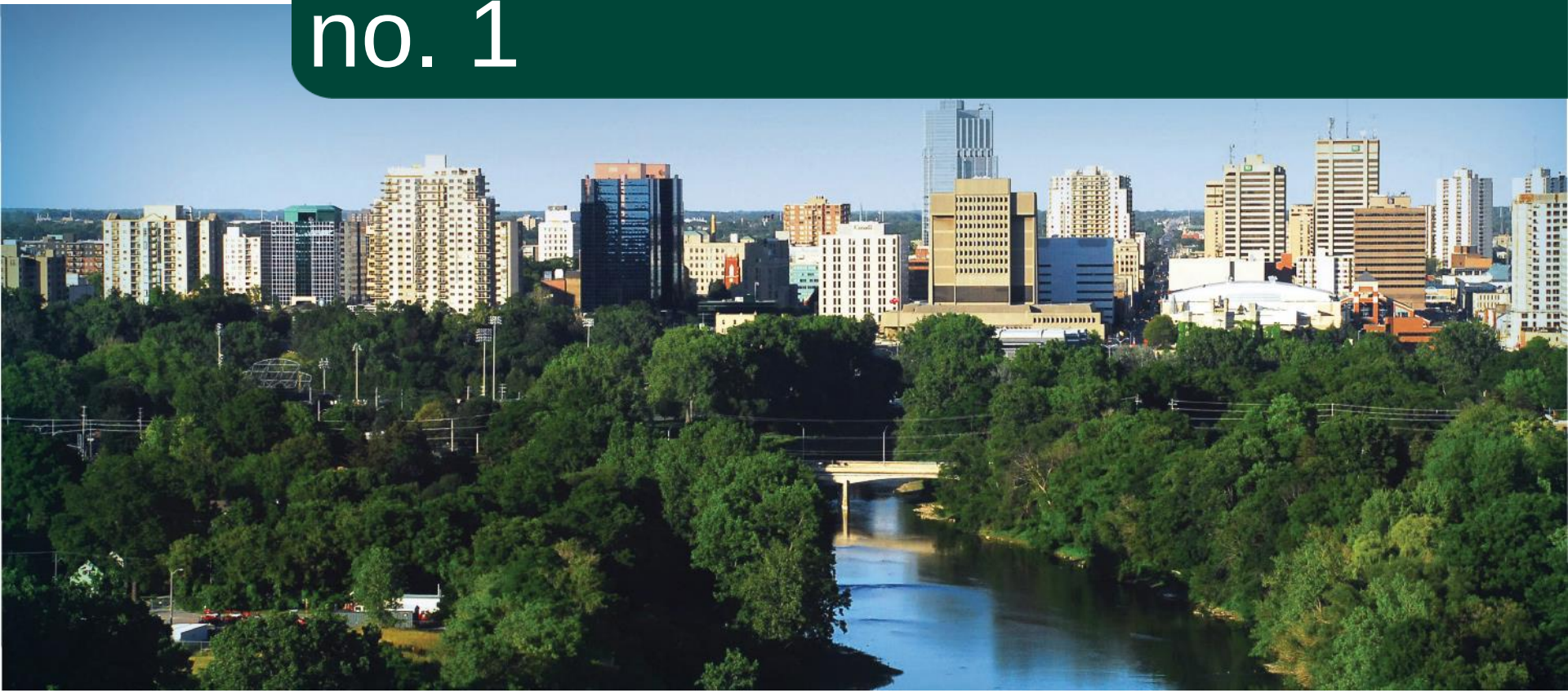
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Appendix C
Public Information Centre Materials

London
CANADA

Government of Canada | Gouvernement du Canada

Public information centre no. 1



Class Environmental Assessment for Adelaide Wastewater Treatment Plant Climate Change Resiliency

Schedule B Municipal Class Environmental Assessment

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

PRIME STRATEGY & PLANNING
innovative planning for sustainable communities

CIMA+

Contact information

If you would like to provide comment or complete the project questionnaire, please see the

Get Involved Page

https://getinvolved.london.ca/adelaide-climate-change

If you would like to be included on the project mailing list, please contact:

mmckillop@london.ca

or

sbraun@matrix-solutions.com

Thank you for participating!

Contact information:

Marcy McKillop, P.Eng.

Project Manager

City of London

mmckillop@london.ca

Phone: 519.661.CITY(2489) x 4976

Stephen Braun, P.Eng.

Consultant Project Manager

Matrix Solutions Inc.

sbraun@matrix-solutions.com

Phone: 289.323.0975

Overview

Agenda

1. Project overview
2. Problem and opportunity statement
3. Existing flood risks
4. Hydraulic analysis
5. Alternative solutions
6. Preliminary impact assessment
7. Next steps
8. Questions

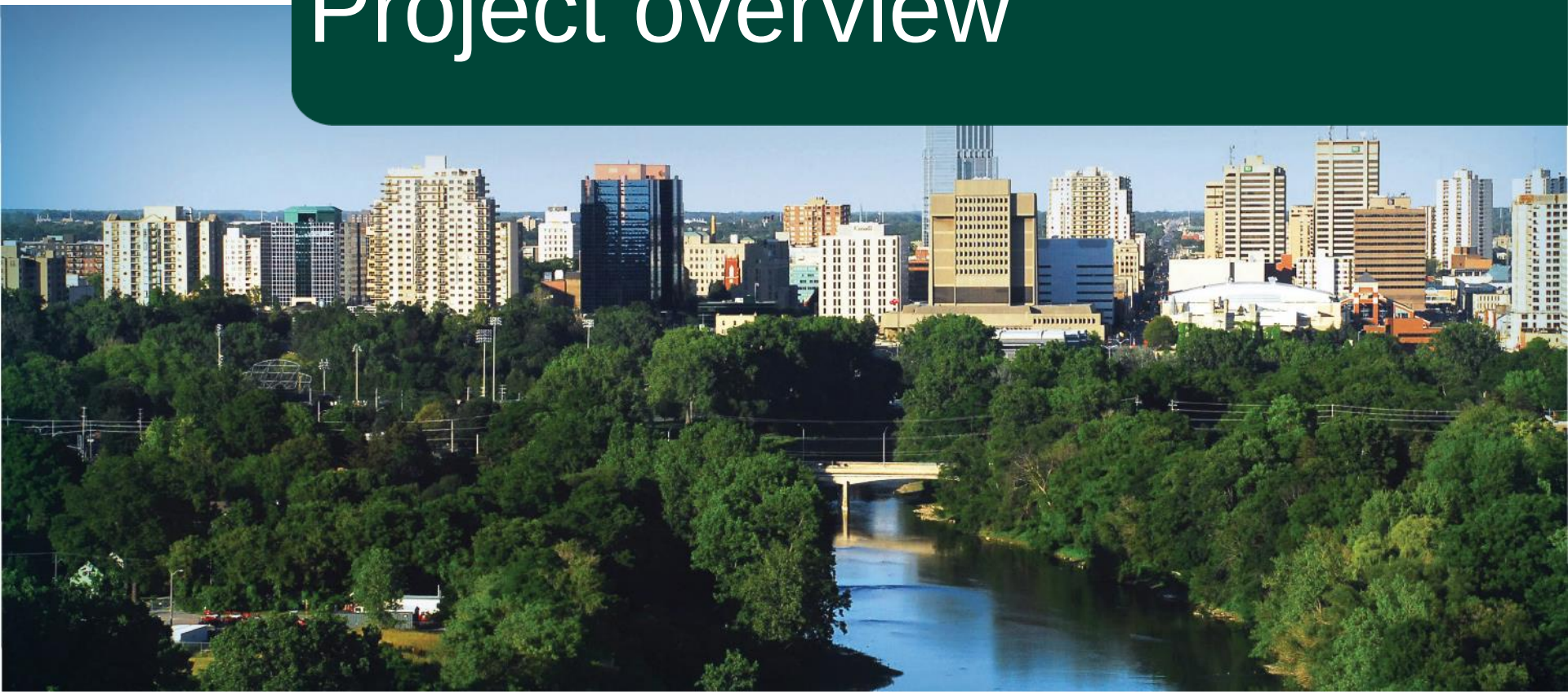
Public information centre no. 1

- Introduce the public to the project.
- Present alternative solutions and evaluation criteria for input.
- Provide opportunity for interested parties to identify any concerns or information that will support the Municipal Class Environmental Assessment process.

Public information centre no. 2 (early 2022)

- Present conceptual designs and a detailed evaluation of the alternative solutions.
- Provide opportunity for interested parties to identify any concerns or information that will support the environmental assessment.

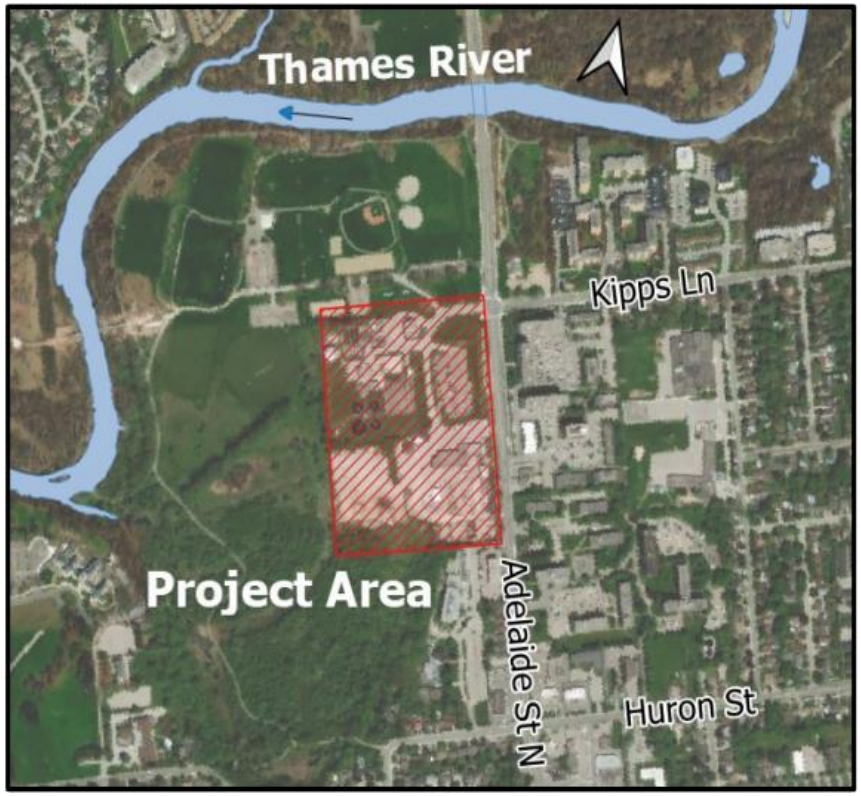
Project overview



Study area

Adelaide Wastewater Treatment Plant

1157 Adelaide Street North



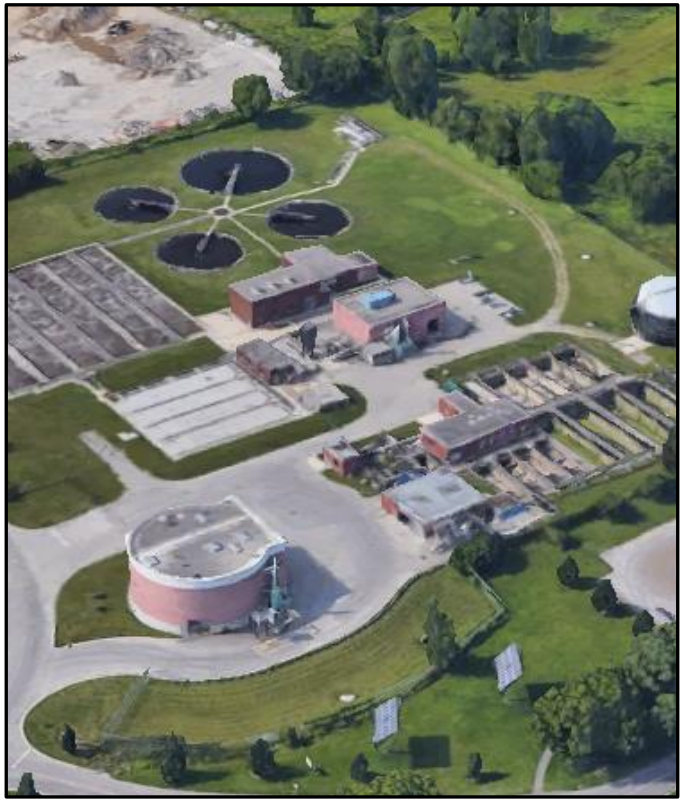


Image Source: Google Earth

Background

- In April 2019, the City of London declared a climate emergency to deepen its commitment to protecting its economy, ecosystems, and communities from climate change through adaptation and mitigation initiatives.
- The City of London, like other communities, is experiencing more frequent and intense flooding as a result of climate change.
- This environmental assessment will seek to identify a preferred flood protection approach to improve plant asset resilience, enhance treatment capabilities, and improve plant safety.



Image Source: City of London

Municipal class environmental assessment

Schedule B

Phase 1 — Problem or opportunity

- Identify problem or opportunity

Phase 2 — Alternative solutions

- Technical studies to provide inventory of the environment and to identify opportunities and constraints
- Identify alternative solutions to address the problem or opportunity
- PIC No. 1 **(current step)**
- Identify impacts and mitigation measure for alternative solutions
- Evaluate alternative solutions
- PIC No. 2 **(early 2022)**
- Identify a preferred alternative solution

Future phase — Implementation

(Anticipated 2022-2024)

- Develop a detailed design of the preferred alternative solution
- Complete contract drawings and tender documents
- Proceed to construction and operation
- Monitor for environmental provisions and commitments

Problem statement

In April 2019, the City declared a climate emergency to deepen its commitment to protecting its economy, ecosystems, and communities from climate change through adaptation and mitigation initiatives. The Adelaide Wastewater Treatment Plant, located along the Thames River at 1157 Adelaide Street North, is inundated during severe floods (e.g., 1:250-year event). As part of these climate change resiliency initiatives, the City of London has an interest in providing flood protection and climate resiliency at this critical wastewater treatment plant infrastructure and reducing the environmental impacts of flooding.

Opportunity statement

The Schedule B Municipal Class Environmental Assessment will seek to identify a preferred flood protection approach to improve asset resilience, enhance treatment capabilities, and improve plant safety. Potential approaches to protect these critical infrastructure assets and reduce the environmental impacts of flooding approaches will, to the extent possible, minimize impacts to land ownership, land use conditions, and existing infrastructure.

The City secured federal funding through the Disaster Mitigation and Adaptation Fund for this project, as well as for climate change resiliency improvements at the Greenway Wastewater Treatment Plant.

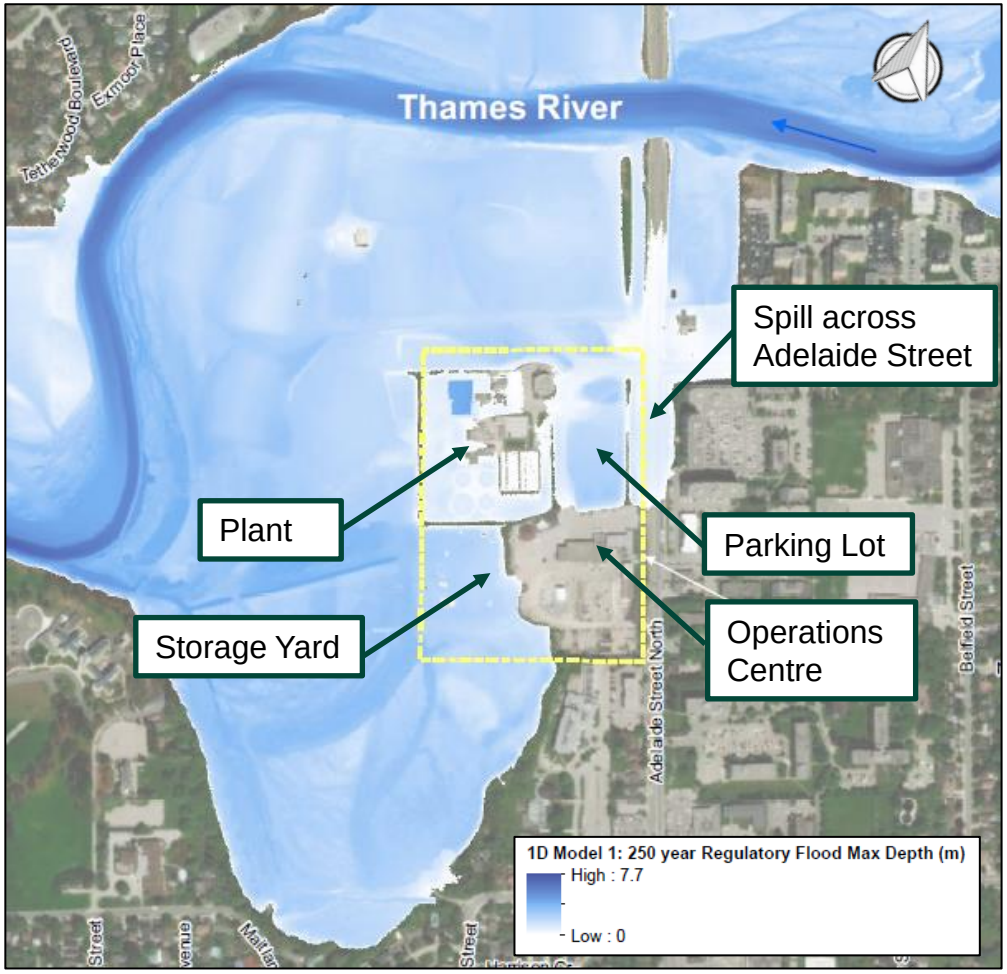
The environmental assessment will be coordinated with the long-term planning underway for the City's wastewater treatment plants. This coordination will ensure that resiliency opportunities identified in the environmental assessment will serve the City well into the future.

Summary statement

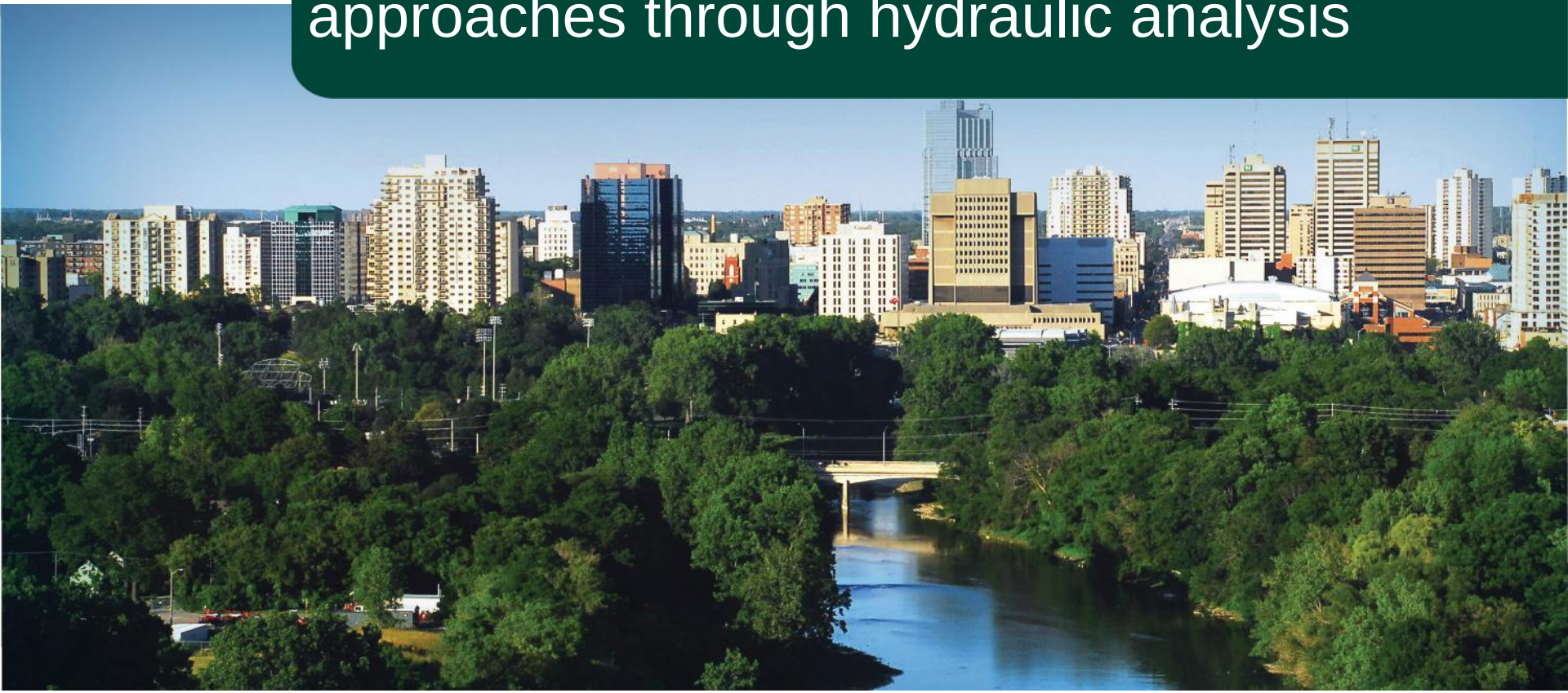
The Adelaide Wastewater Treatment Plant is vulnerable to severe flooding. The environmental assessment will seek to identify a preferred flood protection approach to improve asset resilience, enhance treatment capabilities, and improve plant safety. An acceptable flood protection solution will, to the extent possible, minimize impacts to land ownership, land use conditions, and existing infrastructure.

Existing flood risk

- Flooding spills across Adelaide Street
- 1:250-year regulatory event of 1,000 m^3/s
- Typical flood depths are between 0.2 m and 0.8 m at the plant



Screening of a long-list of flood mitigation approaches through hydraulic analysis



This screening demonstrates which mitigation approaches are not practical or not feasible to meet project requirements.

The conclusions of the screening form the basis of the alternative solutions being assessed and evaluated in the environmental assessment.

Summary

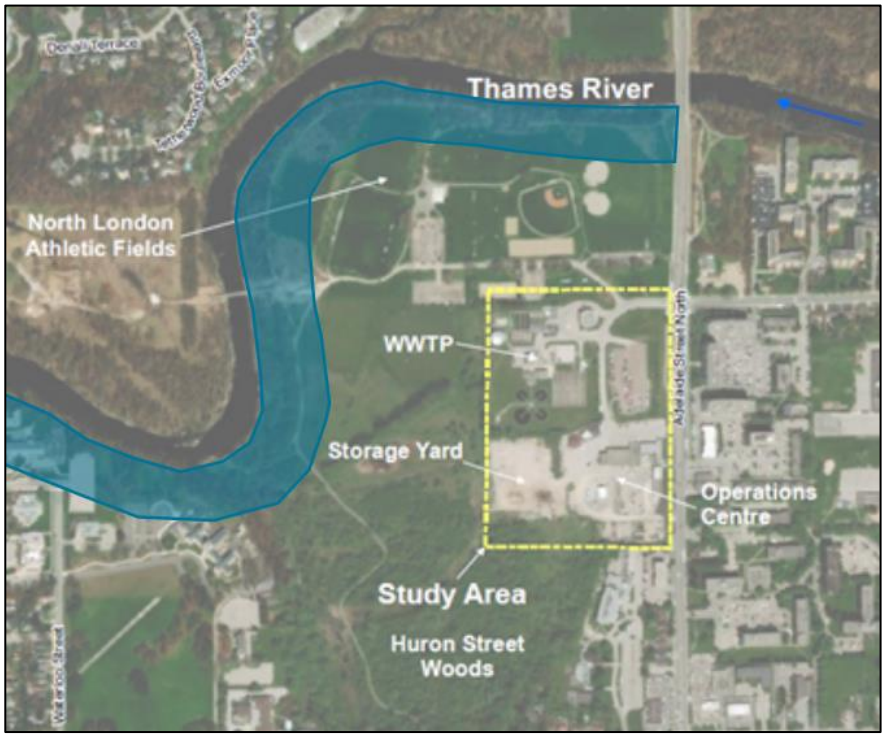
Long-list of flood mitigation approaches	Screening outcome
Channel conveyance	
Channel widening	not recommended
Channel lowering	not recommended
Floodplain improvement	not recommended
Bridge replacement	not recommended
Diversions	
Local flow diversion	not recommended
Storage	
Online storage	not recommended
Operational measures	
Process upgrades and operational modifications	not recommended
Site-level flood protection	
Floodwall/berm/dyke	**recommended**

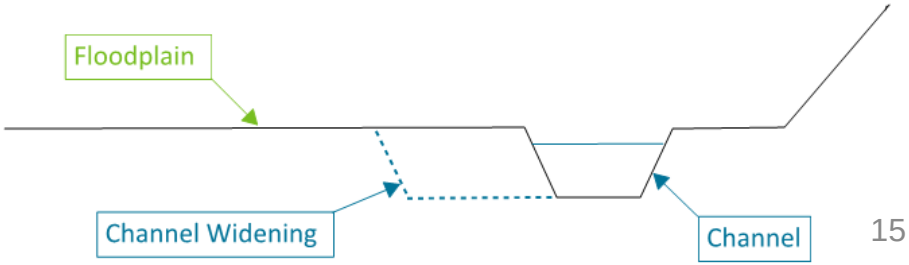
Screened-out flood mitigation approaches



Channel widening and flow diversion

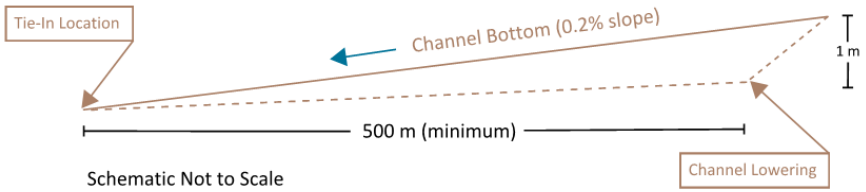
- Not Recommended
- Existing channel capacity is 250 m^3/s.
- Channel widening would need to provide an additional 500 m^3/s of capacity to mitigate flooding at the plant.
- As a result, approximately 100 m of widening is needed requiring significant disturbance.
- Similarly, a flow diversion channel would also need to be approximately 100 m wide to mitigate flooding.

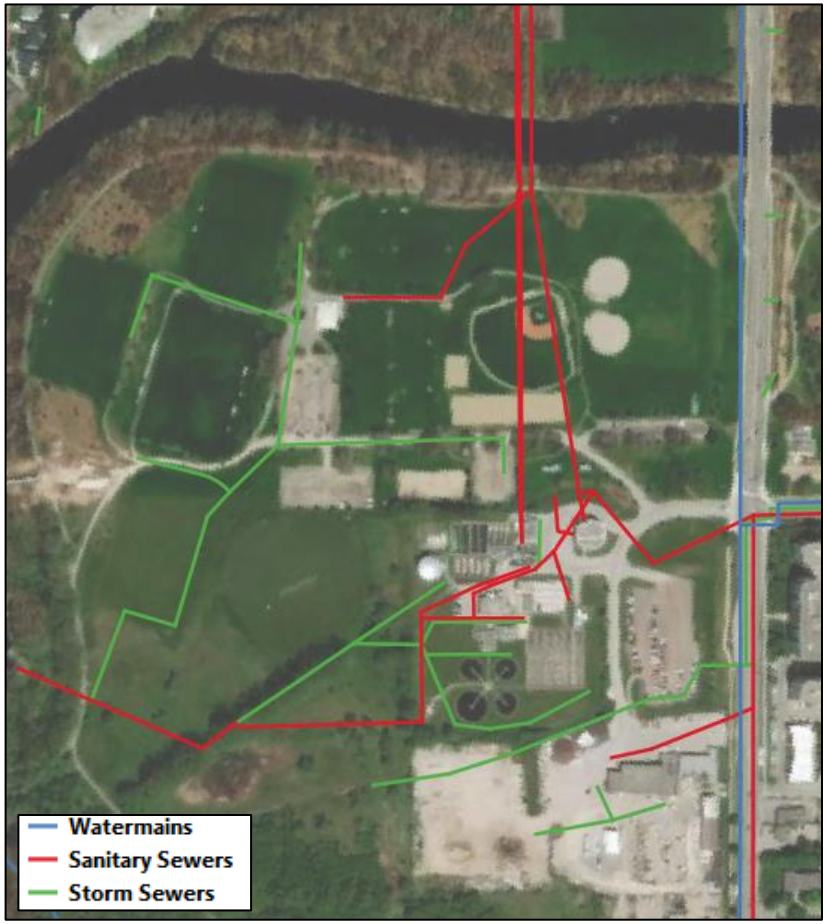




Channel lowering

- Not Recommended
- The Thames River has an existing slope of approx. 0.2% at the study area. This shallow slope limits the opportunity for lowering.
- For example, at least 500 m of downstream disturbance is required to lower the channel by 1 m.
- Infrastructure crossing below the Thames River further constrains lowering opportunity.





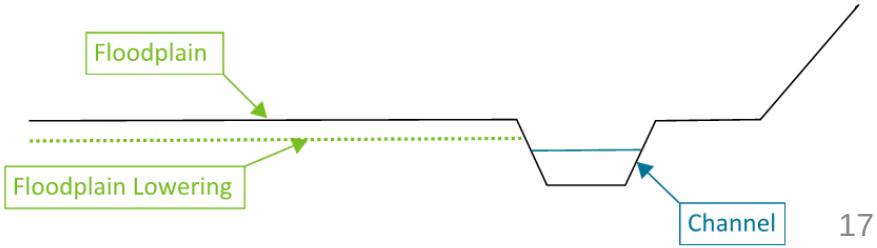
Infrastructure Constraints (data source: City of London)

Floodplain Improvements

- Not Recommended
- Evaluated lowering existing floodplain around the plant to improve conveyance.
- Floodplain lowering would need to provide an additional 500 m^3/s of capacity to mitigate flooding at the plant.
- Lowing the floodplain 1 m across its typical 250 m width would not provide the required conveyance.



Flood Lowering Area

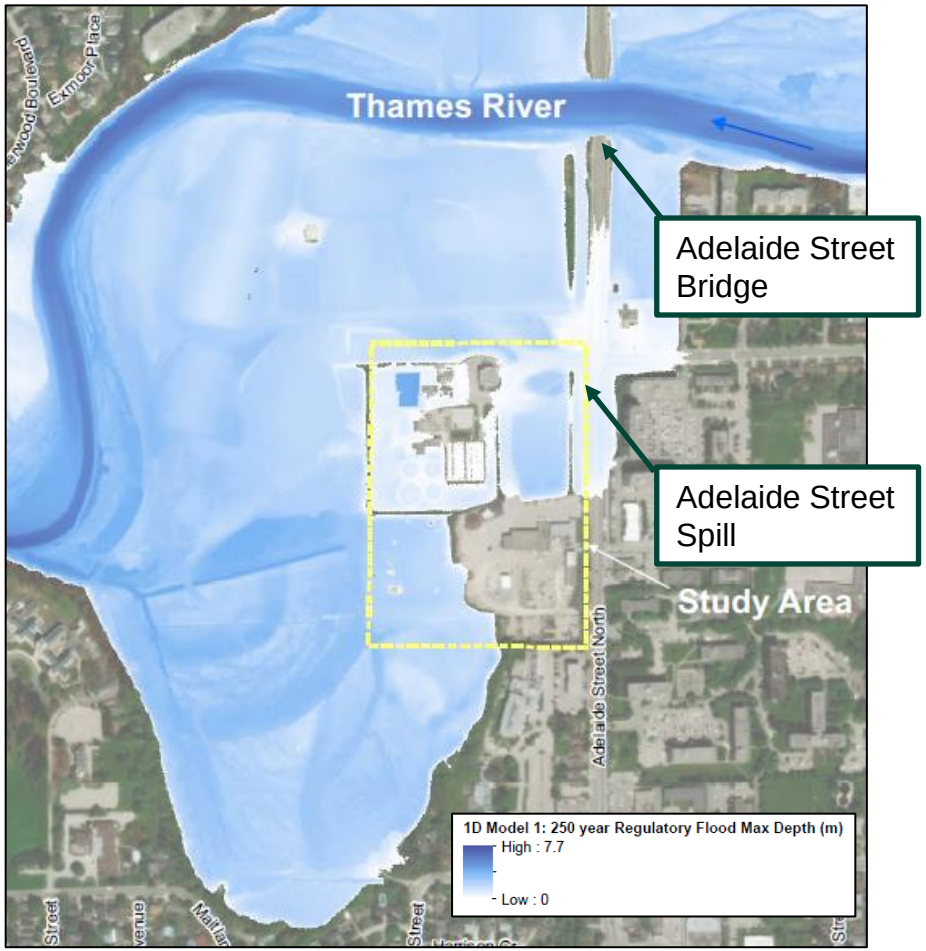


Bridge replacement

- Not Recommended
- Assessed whether replacing the bridge to improve hydraulic capacity could help eliminate the spill across Adelaide Street North.
- Analysis demonstrated that only minor upstream water level improvements would result from a bridge replacement, which would not eliminate the spill.



Adelaide Street Bridge (Image Source: Google Earth)



Online flood storage

- Not Recommended
- The Fanshawe Dam upstream of the study area regulates Thames River flows.
- Assessed the feasibility of further regulating flows at the plant to mitigate flooding by providing additional storage.
- Significant online storage would be need d to reduce the 1:250-year flow at the study area from 1000 m^3/s to 500 m^3/s to mitigate flooding at the plant.



Fanshawe Dam (Image Source: London Tourism 2021)



(Image Source: ESRI Satellite)

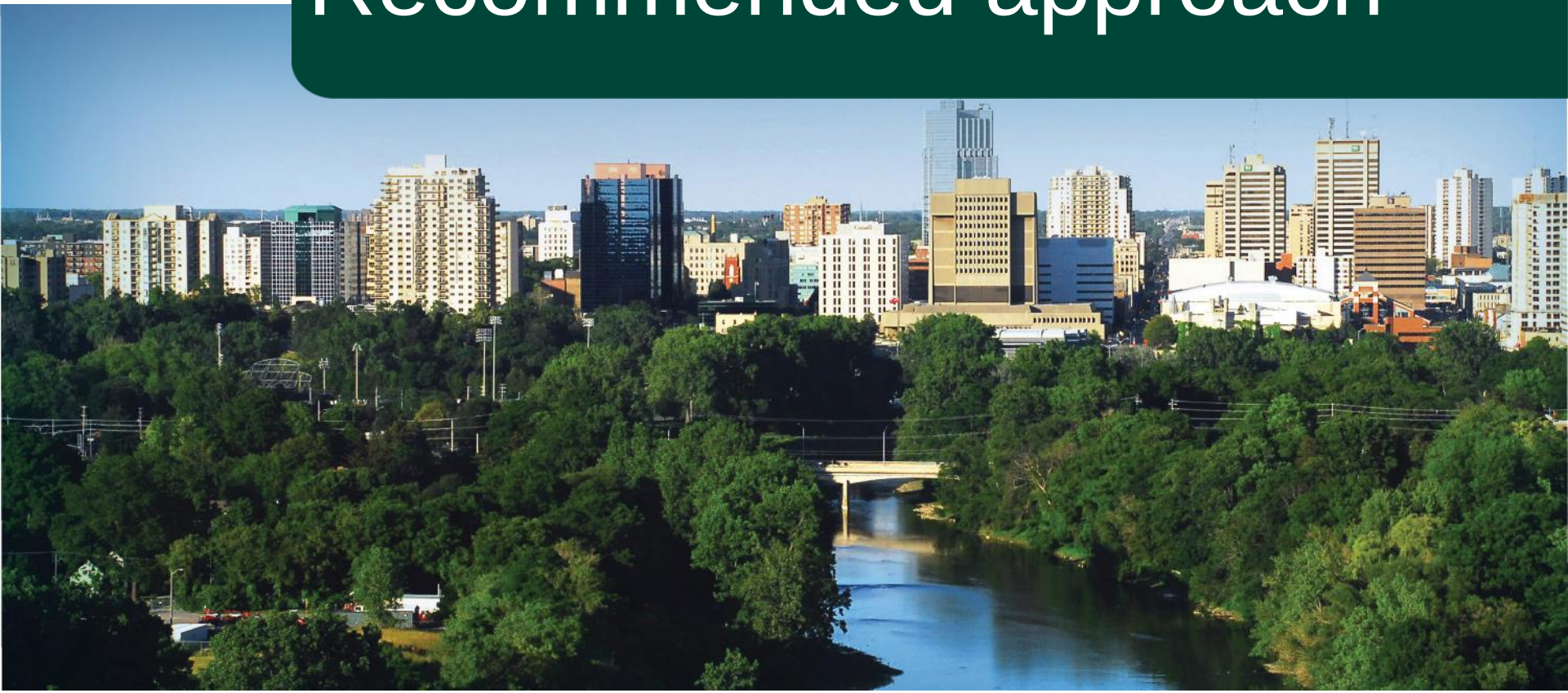
Process upgrades and operational modifications

- Not Recommended
- Significant costs
- Long-term timeframe for implementation
- Would not fully achieve objectives of the study



(Image Source: City of London)

Recommended approach



Site-level flood protection

- Recommended
- Examples of site-level flood protection include floodwalls and berms.
- Site-level flood protection restricts available floodplain (unlike the other approaches that were screened).
- This restriction introduces the potential for upstream flood impacts (i.e., backwater).
- Hydraulic analysis indicated no or negligible upstream flood impacts resulting from site-level flood protection.

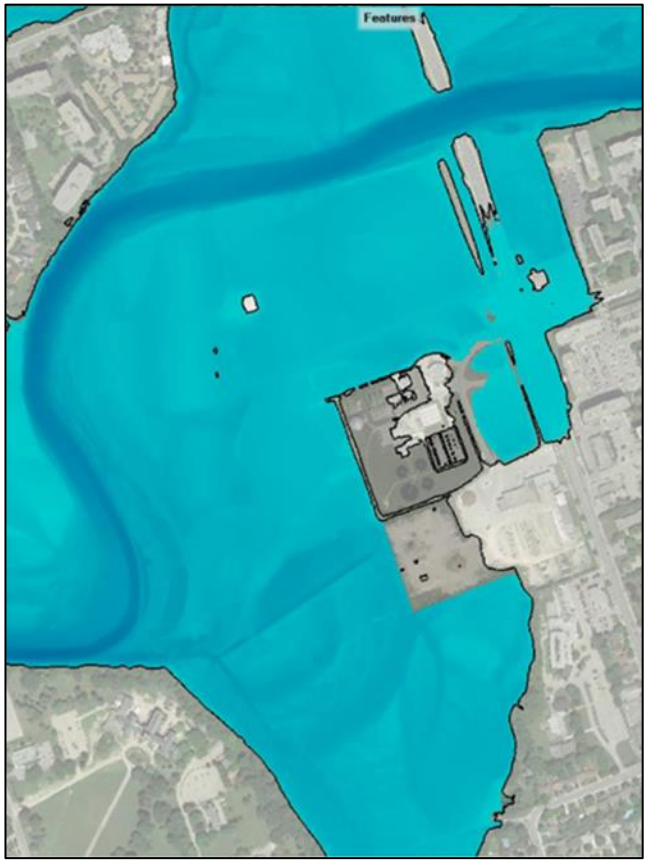


1:250-year flooding with site-level flood protection conceptually represented in hydraulic analysis

Site-level flood protection – continued

Compared to the other flood protection approaches that were screened:

- more readily constructable
- less environmental impacts
- less land-use impacts
- Implementing site-level protection results in minor floodplain storage loss.
- Options for offsetting (i.e., mitigating) floodplain storage loss will be considered in the environmental assessment.



1:250-year flooding with site-level flood protection conceptually represented in hydraulic analysis

Examples of site-level flood protection



Earthen berm/barrier at the Vauxhall Wastewater Treatment Plant (City of London)



Floodwall at the Vauxhall Wastewater Treatment Plant (City of London)

Examples of site-level flood protection



Construction of the West London Dyke (Image source: Upper Thames River Conservation Authority)

Conceptual alternative solutions



Visualization of 1:250-year flood conditions with site-level flood protection provided at the plant.

Conceptual alternative solutions



Conceptual alternative solutions

Option 1 – berm with raised entrance way

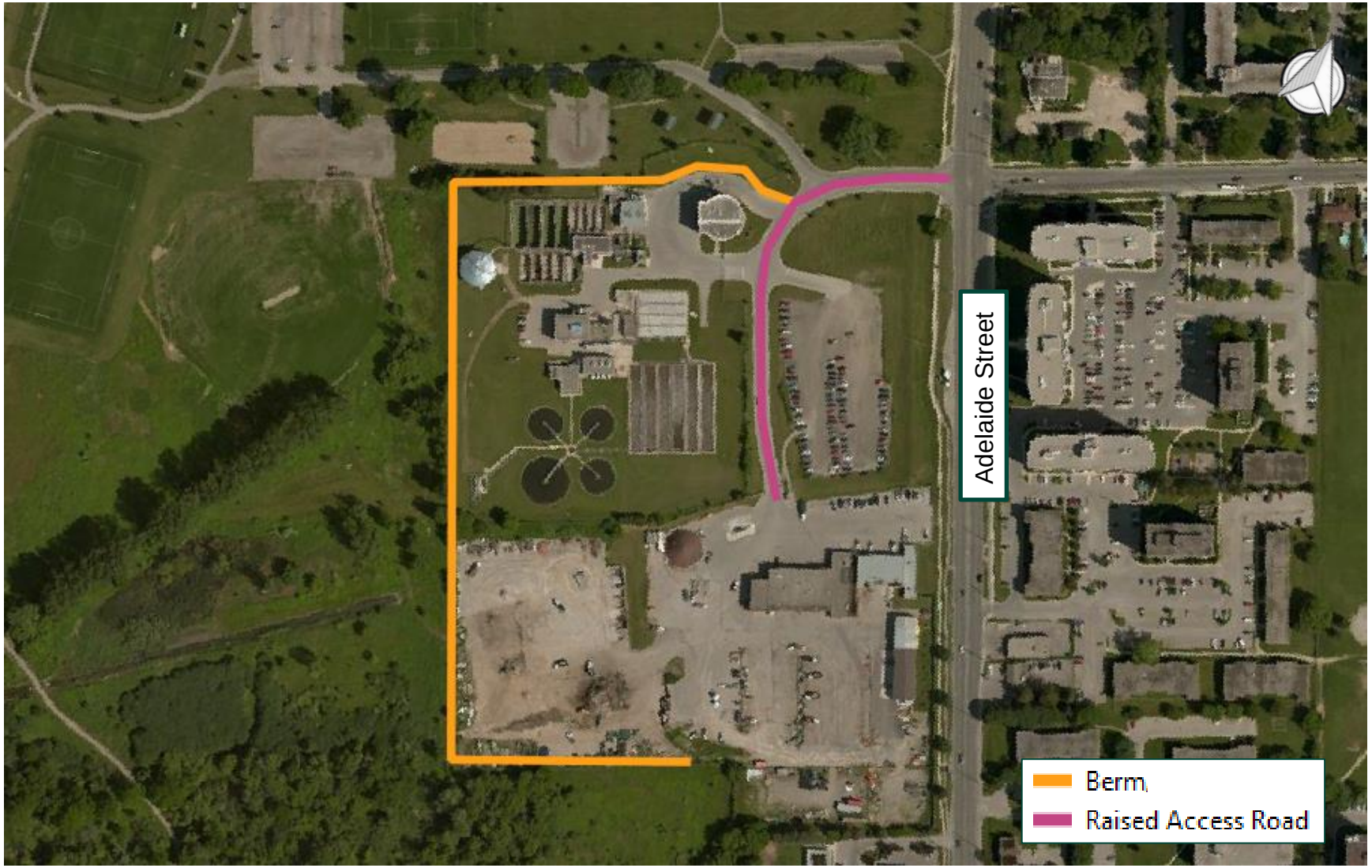
Option 2 – berm with a temporary measure at entrance way in response flood forecasts

Option 3 – berm extended to provide protection at the parking lot

Option 4 – do nothing

A pumping station is anticipated to be incorporated into these conceptual alternative solutions (Options 1 to 3). This pumping station will be designed to allow treated water to be discharged into the Thames River when water levels are too high for gravity drainage. As a result, the plant would be able to fully function during flooding, reducing the environmental impacts of flood events.

Option 1 – berm with raised entrance way



Option 2 – berm with a temporary measure at entrance way in response to flood forecasts



Option 3 – berm with parking lot protection



Preliminary impact assessment



Environmental impact study

- Ecological land classification and botanical inventory
- Breeding bird surveys
- Bat habitat surveys
- Species at risk screening
- Identified areas of constraints, areas of avoidance, and mitigation measures.
- The environmental assessment will identify any requirements for additional studies in future phases of the project (e.g., design).



Image Source: Google Earth

Stage 1 archaeology assessment

- Wastewater treatment plant site identified as having “no archaeological potential” or “previously assessed”.
- Areas surrounding the plant have “archaeological potential”.
- The environmental assessment will identify any requirements for additional studies in future phases of the project if disturbance is required in areas of “archaeological potential”.

(Archaeological Research Associates 2021)



Area of Archaeological Potential near the plant (ARA 2021)

Evaluation criteria

Technical	Economic	Environment	Social
• Level of flood protection • Construction approaches • Climate change resiliency • Wastewater treatment plant operations	• Capital costs • Operational and maintenance costs	• Ecology • Archaeology	• Policy Considerations • Public Input • Public land-use the (e.g., recreational) • Public safety

Next steps



Next steps

Next Steps in the environmental assessment process include:

1. Incorporate input from the public, First Nation communities, and other project stakeholders
2. Develop conceptual designs for the alternative solutions
3. Assess and evaluate the alternative solutions
4. Public information centre no. 2 (early 2022)
5. Identify a preferred solution

Reminder

- Visit the City's Get Involved page for project updates.

  https://getinvolved.london.ca/adelaide-climate-change

- To sign up for the mailing list and/or to provide comments, please complete the project comment form from the website above and email mmckillop@london.ca or sbraun@matrix-solutions.com

- If possible, please provide input before **October 15, 2021**

London CANADA

Government of Canada / Gouvernement du Canada

Public Information Centre No. 2



Class Environmental Assessment for the Adelaide Wastewater Treatment Plant Climate Change Resiliency

Schedule B Municipal Class Environmental Assessment

Matrix Solutions Inc. ENVIRONMENT & ENGINEERING

PRIME STRATEGY & PLANNING innovative planning for sustainable communities

CIMA+

Contact Information

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Get Involved Page

https://getinvolved.london.ca/adelaide-climate-change

Project contacts:

mmckillop@london.ca

or

sbraun@matrix-solutions.com

Thank you for participating!

Contact information:

Marcy McKillop, P.Eng.

Project Manager

City of London

mmckillop@london.ca

Phone: 519.661.CITY(2489) x 4976

Stephen Braun, P.Eng.

Consultant Project Manager

Matrix Solutions Inc.

sbraun@matrix-solutions.com

Phone: 289.323.0975

Land Acknowledgement

We acknowledge that we are gathered today on the traditional lands of the Anishinaabek, Haudenosaunee, Lūnaapéewak, and Attawandaron.

We acknowledge all the treaties that are specific to this area: the Two Row Wampum Belt Treaty of the Haudenosaunee Confederacy/Silver Covenant Chain; the Beaver Hunting Grounds of the Haudenosaunee NANFAN Treaty of 1701; the McKee Treaty of 1790, the London Township Treaty of 1796, the Huron Tract Treaty of 1827 with the Anishinaabeg, and the Dish with One Spoon Covenant Wampum of the Anishnaabek and Haudenosaunee.

This land continues to be home to diverse Indigenous peoples (First Nations, Metis, and Inuit) whom we recognize as contemporary stewards of the land and vital contributors to society. We hold all that is in the natural world in our highest esteem and give honour to the wonderment of all things within Creation. We bring our minds together as one to share good words, thoughts, feelings, and sincerely send them out to each other and to all parts of creation. We are grateful for the natural gifts in our world and we encourage everyone to be faithful to the natural laws of Creation.

The three Indigenous Nations that are neighbours to London are the Chippewas of the Thames First Nation; Oneida Nation of the Thames; and the Munsee-Delaware Nation who all continue to live as sovereign Nations with individual and unique languages, cultures, and customs.

This land acknowledgment is a first step towards reconciliation. It is the work of all citizens to take steps towards decolonizing practices and bringing our awareness into action. We encourage everyone to be informed about the traditional lands, Treaties, history, and cultures of the Indigenous people local to their region.

Overview

Agenda

1. Project Overview
2. Public Information Centre No. 1 Summary
3. Alternative Solutions
4. Impact Assessment
5. Evaluation of Alternative Solutions
6. Next Steps
7. Questions

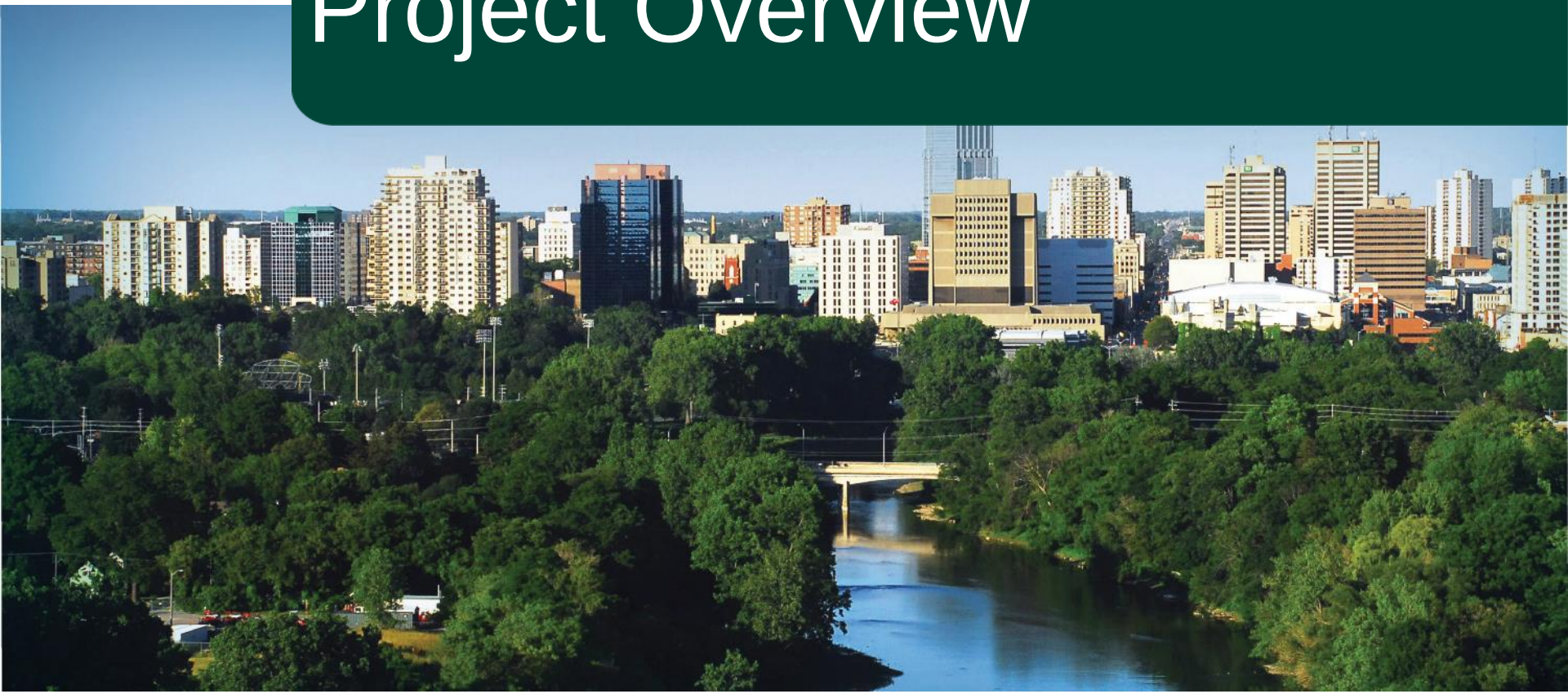
Public Information Centre No. 1 (late 2021)

- Introduced the public to the project.
- Presented alternative solutions and evaluation criteria for input.
- Provided opportunity for interested parties to identify any concerns or information that will support the Municipal Class Environmental Assessment process.

Public Information Centre No. 2

- Present alternative solutions and a detailed evaluation of them.
- Provide opportunity for interested parties to identify any concerns or information that will support the Municipal Class Environmental Assessment process.

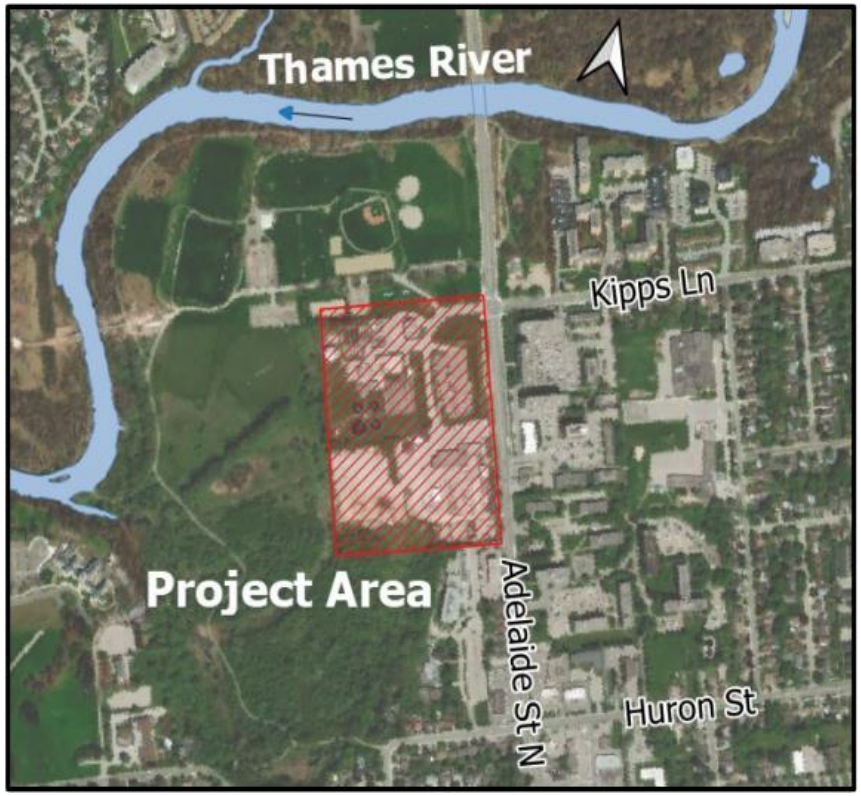
Project Overview



Study Area

Adelaide Wastewater Treatment Plant

1201 Adelaide Street North



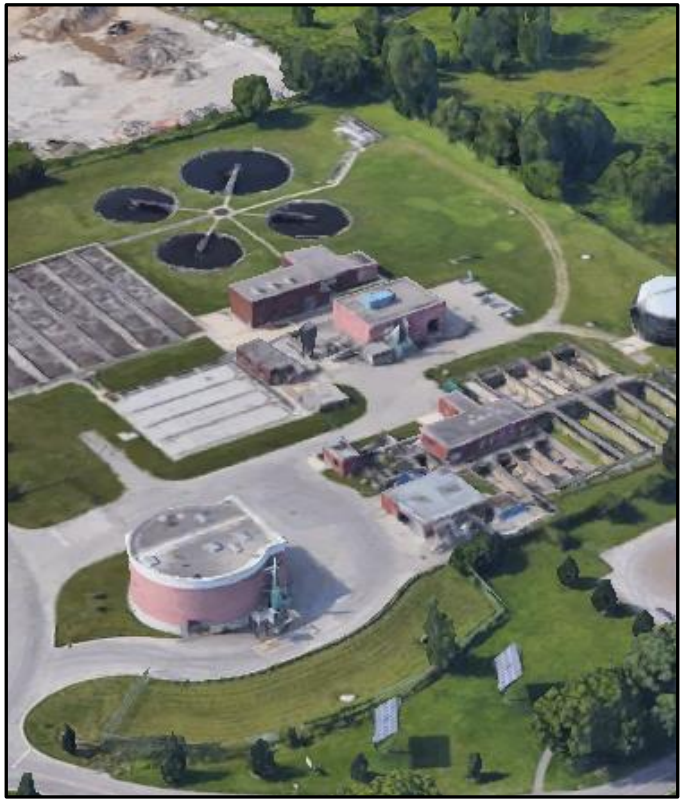


Image Source: Google Earth

Climate Change Resiliency

- In April 2019, the City of London declared a climate emergency to deepen its commitment to protecting its economy, ecosystems, and communities from climate change through adaptation and mitigation initiatives.
- The City of London, like other communities, is experiencing more frequent and intense flooding as a result of climate change.
- This environmental assessment will seek to identify a preliminary preferred flood protection approach to improve plant asset resilience, enhance treatment capabilities, and improve plant safety.



Image Source: City of London

Municipal Class Environmental Assessment

Schedule B

Phase 1 — Problem or opportunity

- Identify problem or opportunity

Phase 2 — Alternative solutions

- Technical studies to provide inventory of the environment and to identify opportunities and constraints
- Identify alternative solutions to address the problem or opportunity
- PIC No. 1
- Identify impacts and mitigation measure for alternative solutions
- Evaluate alternative solutions
- PIC No. 2 **(current step)**
- Identify a preferred alternative solution

Future phase — Implementation

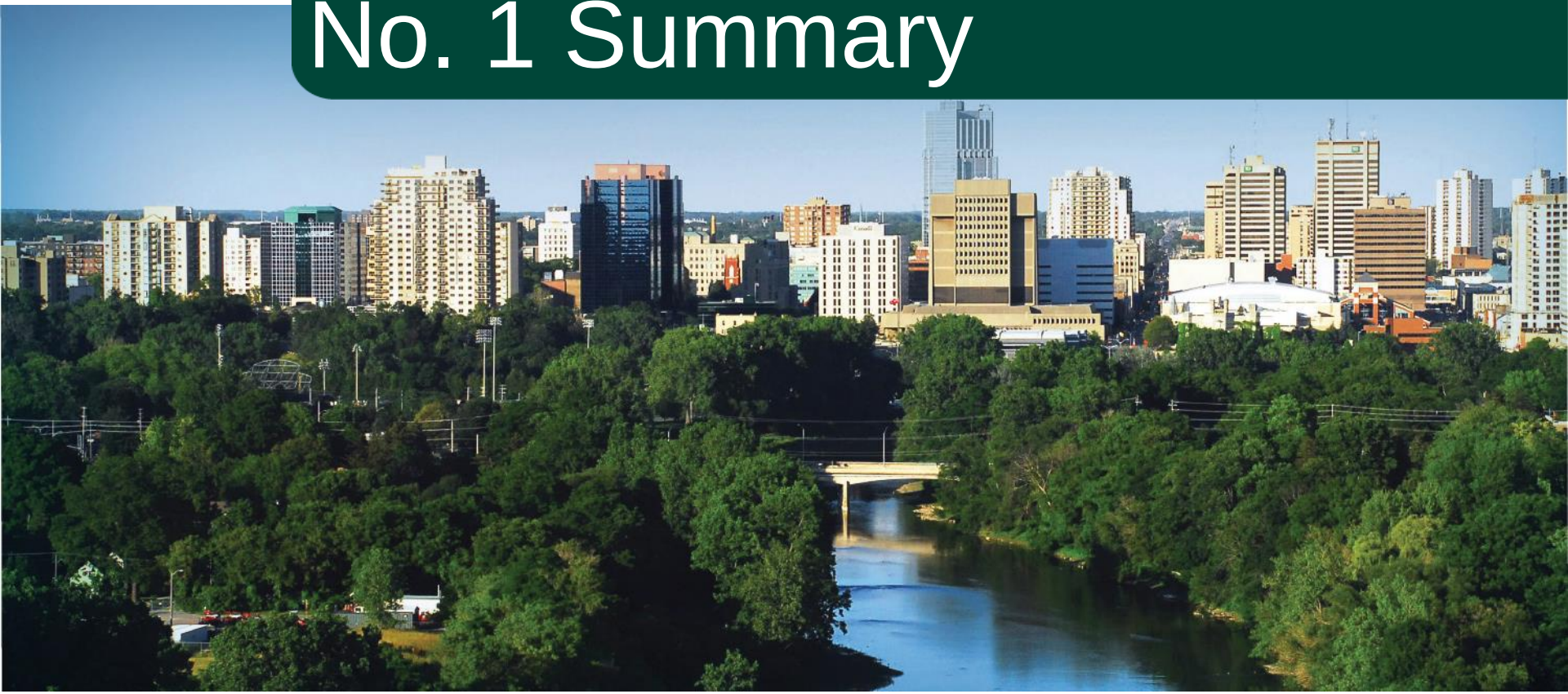
(Anticipated 2022-2024)

- Develop a detailed design of the preferred alternative solution
- Complete contract drawings and tender documents
- Proceed to construction and operation
- Monitor for environmental provisions and commitments

Consultation

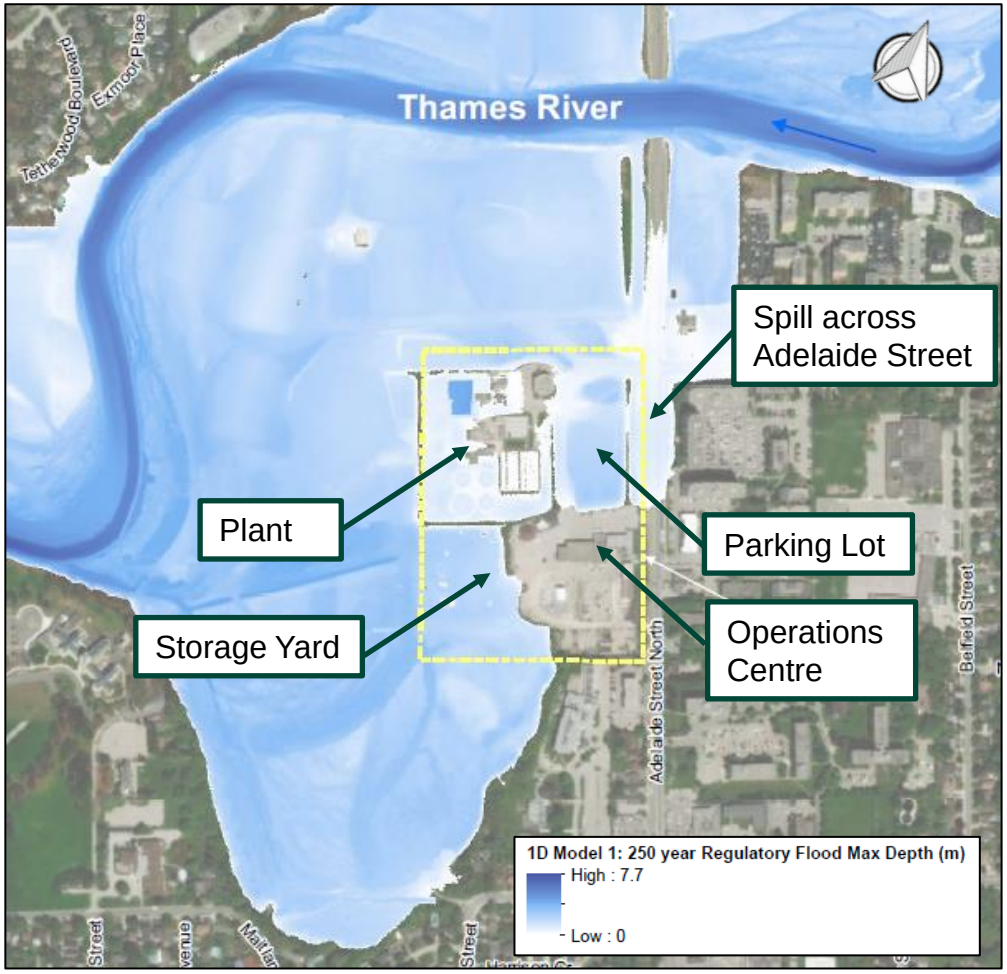
- Consultation is an essential part of the Municipal Environmental Assessment process. We want to ensure that anyone with an interest in the study has the opportunity to provide input as the study proceeds.
- We are engaging the following stakeholders to provide the opportunity to express concerns and preferences:
  - Indigenous community
  - Residents and businesses
  - Government agencies and regulators
- Engagement will provide an opportunity to gather input for consideration in the assessment of preliminary alternative solutions.

Public Information Centre No. 1 Summary



Existing Flood Risk

- Flooding spills across Adelaide Street
- 1:250-year regulatory event of 1,000 m^3/s
- Typical flood depths are between 0.2 m and 0.8 m at the plant



Summary

Long-list of flood mitigation approaches	Screening outcome
Site-level flood protection	
Floodwall/berm/dyke	**recommended**
Channel conveyance	
Channel widening	not recommended
Channel lowering	not recommended
Floodplain improvement	not recommended
Bridge replacement	not recommended
Diversions	
Local flow diversion	not recommended
Storage	
Online storage	not recommended
Operational measures	
Process upgrades and operational modifications	not recommended

Examples of Site-Level Flood Protection



Earthen berm/barrier at the Vauxhall Wastewater Treatment Plant (City of London)



Floodwall at the Vauxhall Wastewater Treatment Plant (City of London)

Alternative Solutions



Alternative Solutions – Site-Level Flood Protection

Option 1 berm with raised entrance way

Option 2 berm with a temporary measure at entrance way in response to flood forecasts

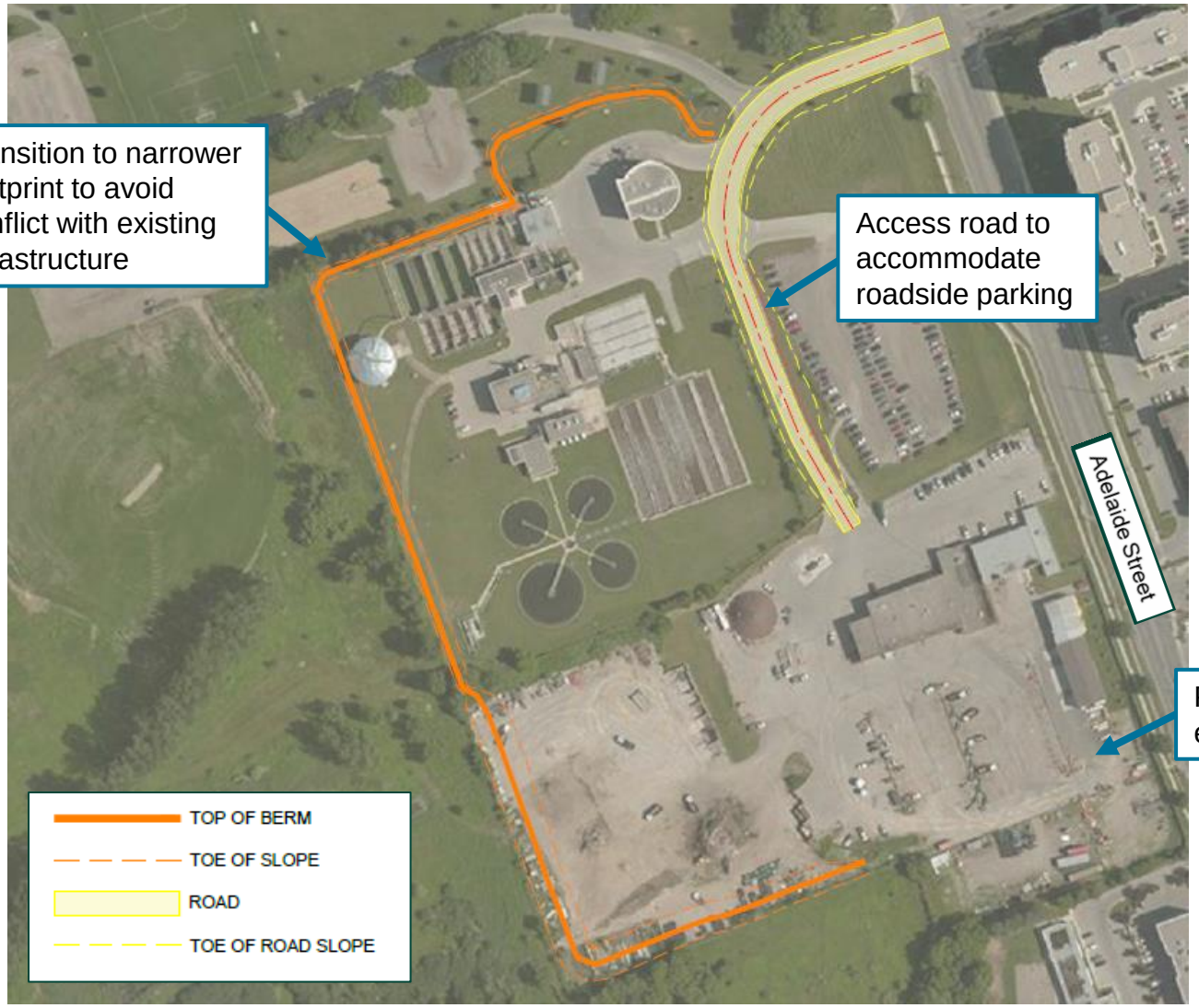
Option 3 berm extended to provide protection at the parking lot

Option 4 do nothing

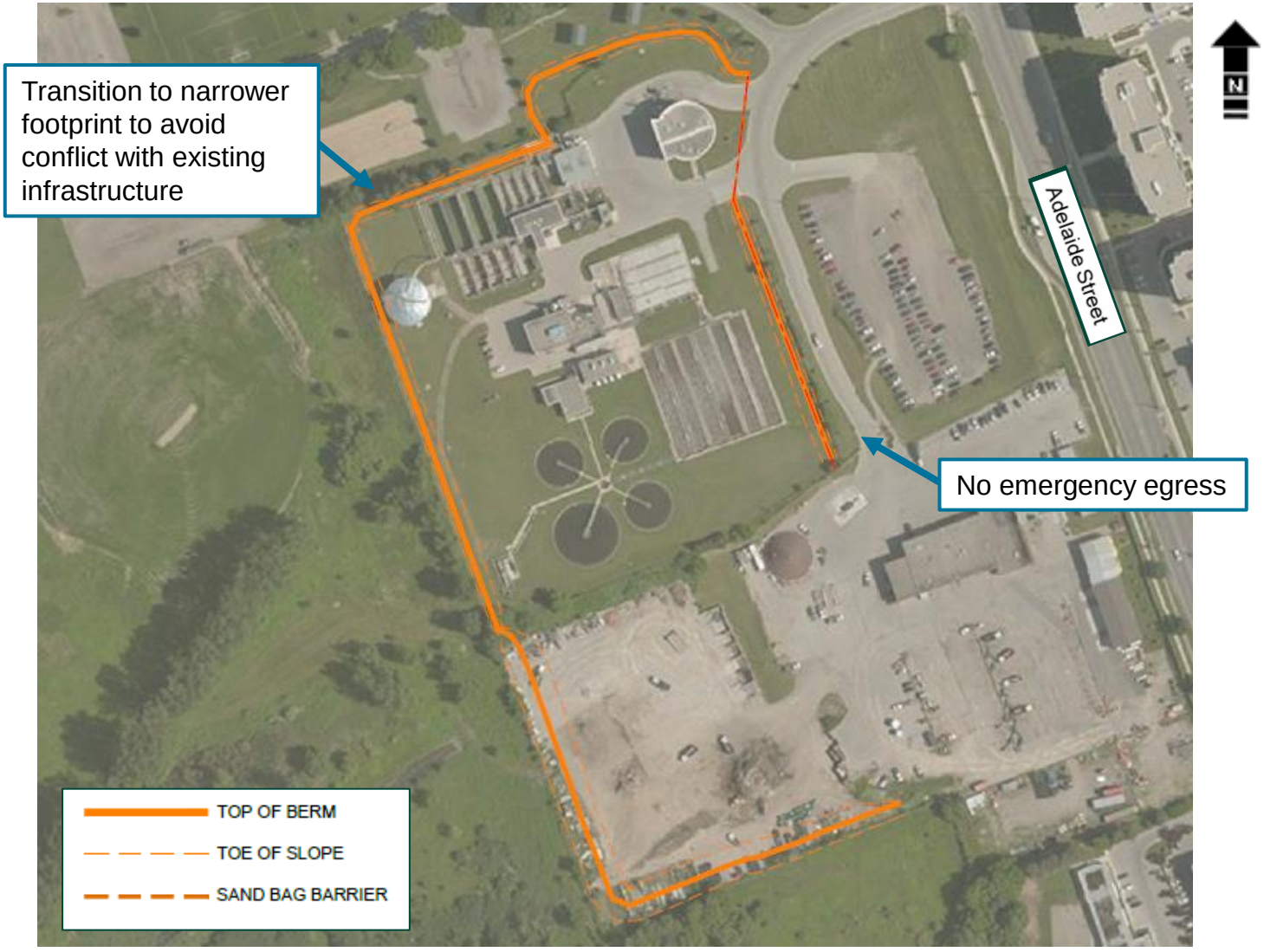
Note: A pumping station is incorporated into all three of these alternative solutions (Options 1 to 3). A new effluent pump station is needed to lift treated water into the Thames River when river levels are too high for gravity drainage. This allows the treatment process to continue during rare flooding events, thereby reducing environmental impacts.

The pumping station itself also has alternative solutions for implementation at the site.

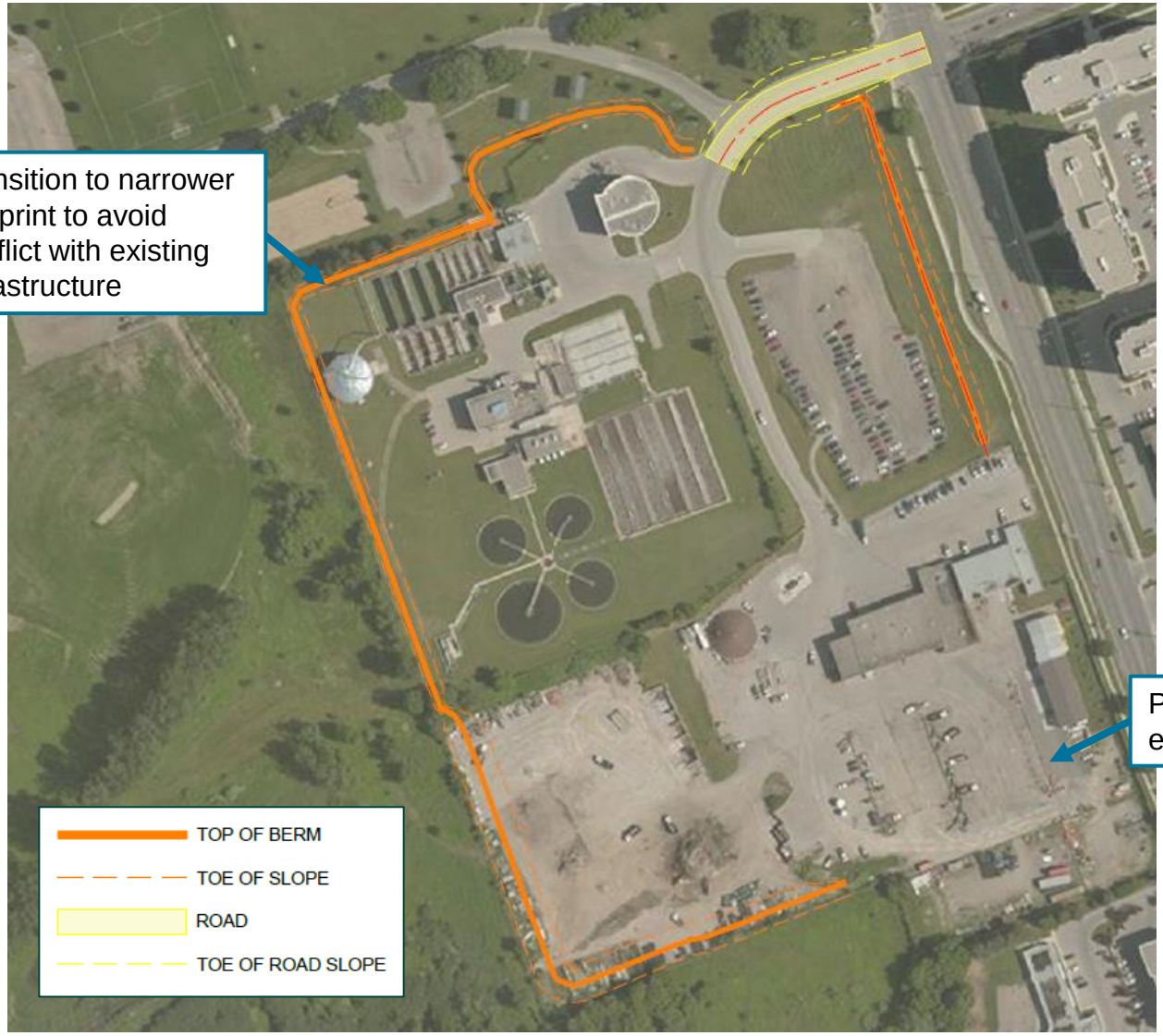
Option 1: Berm with Raised Entrance Way



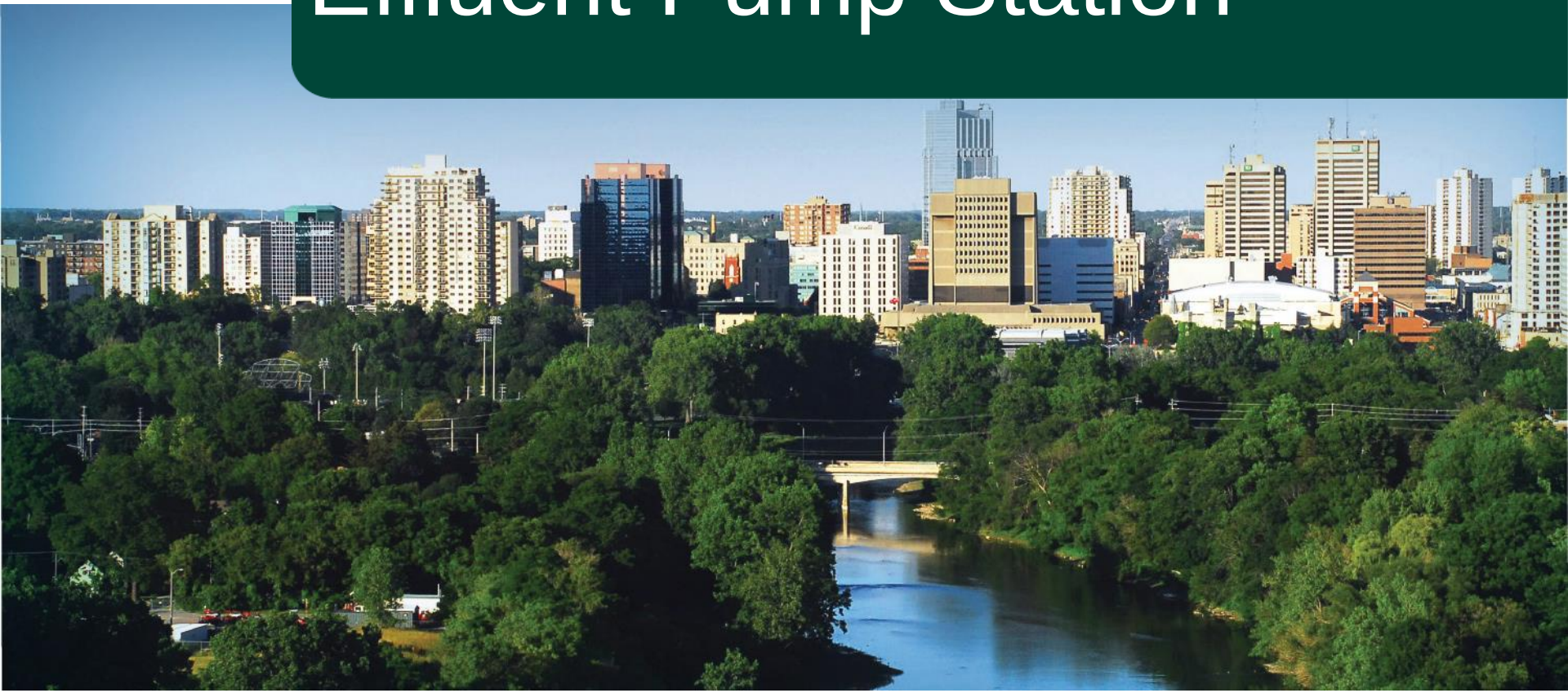
Option 2: Berm with a Temporary Measure at Entrance Way in Response to Flood Forecasts



Option 3: Berm Extended to Provide Protection at the Parking Lot



Effluent Pump Station



Effluent Pump Station

- All flood protection options require an effluent pump station.
- At this WWTP, treated water, stormwater, and emergency bypasses leave the site at different locations.
- The existing raw sewage pump station has a peak capacity of 204 MLD, whereas the existing WWTP peak treatment capacity is 105 MLD.
- Effluent pump station size, location, and the potential use of equalization storage to minimize emergency bypass will be evaluated.



Source Image: Google Earth

Alternative Solutions – Effluent Pump Station

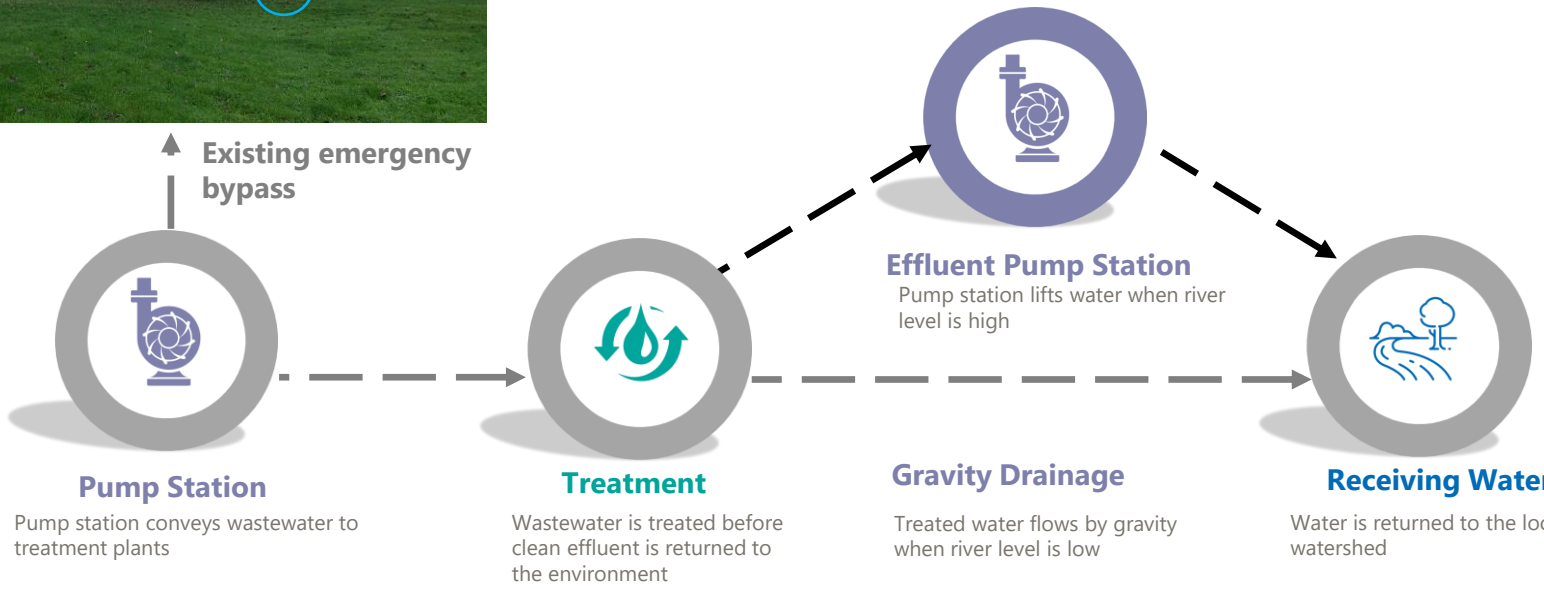
All alternative solutions include an effluent pump station with a minimum capacity of 105 MLD, and compatibility with future plant expansion.

Option P1	maintain existing emergency bypass
Option P2	build pipeline directly from existing pump station to river
Option P3	build pipeline directly from pump station to larger effluent pump station
Option P4a	build equalization storage tank to the north
Option P4b	build equalization storage tank to the south

Option P1 – Maintain Existing Emergency Bypass

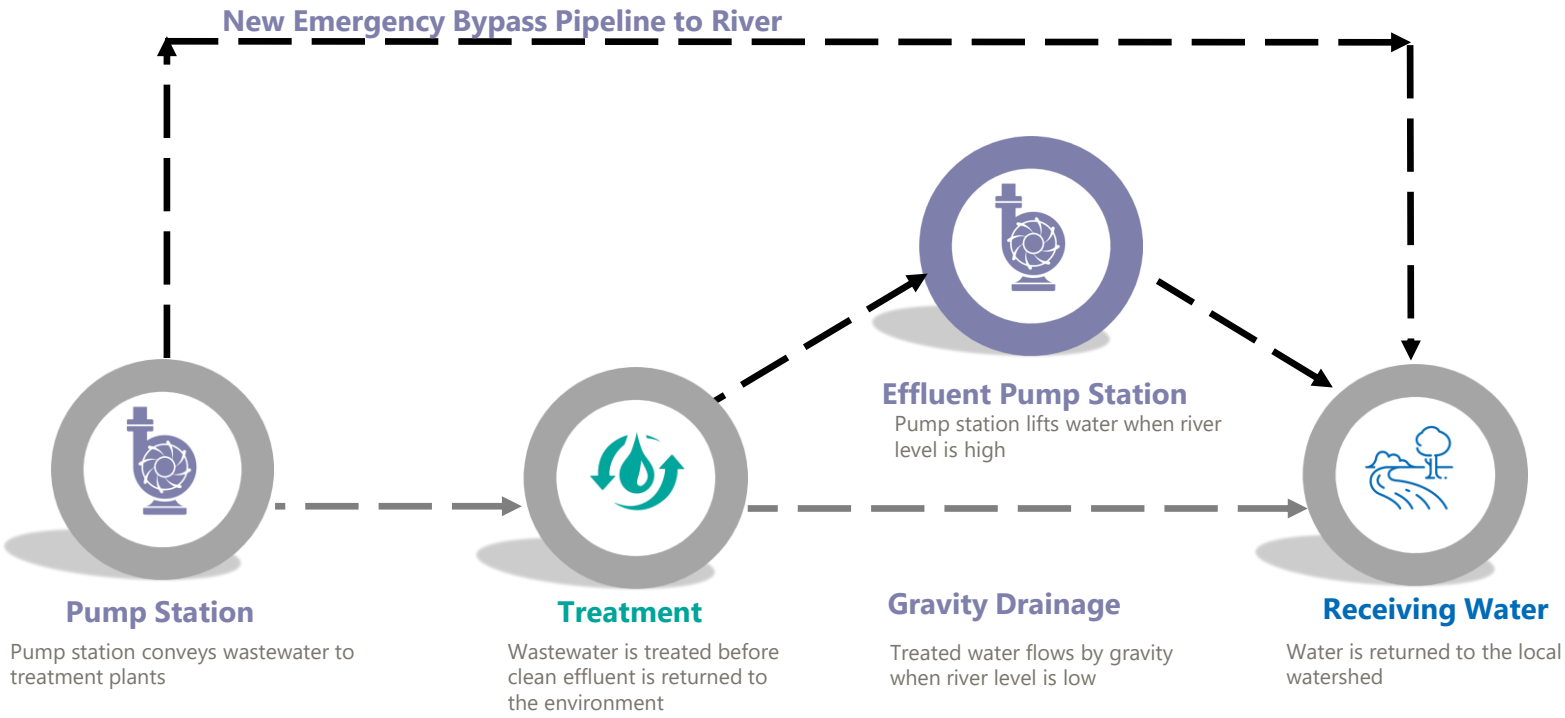
- Maintain existing emergency bypass
- New effluent pump station is needed to direct treated water into the Thames River when river levels are too high for gravity drainage
- Excess flows are bypassed to surface drainage system toward the river





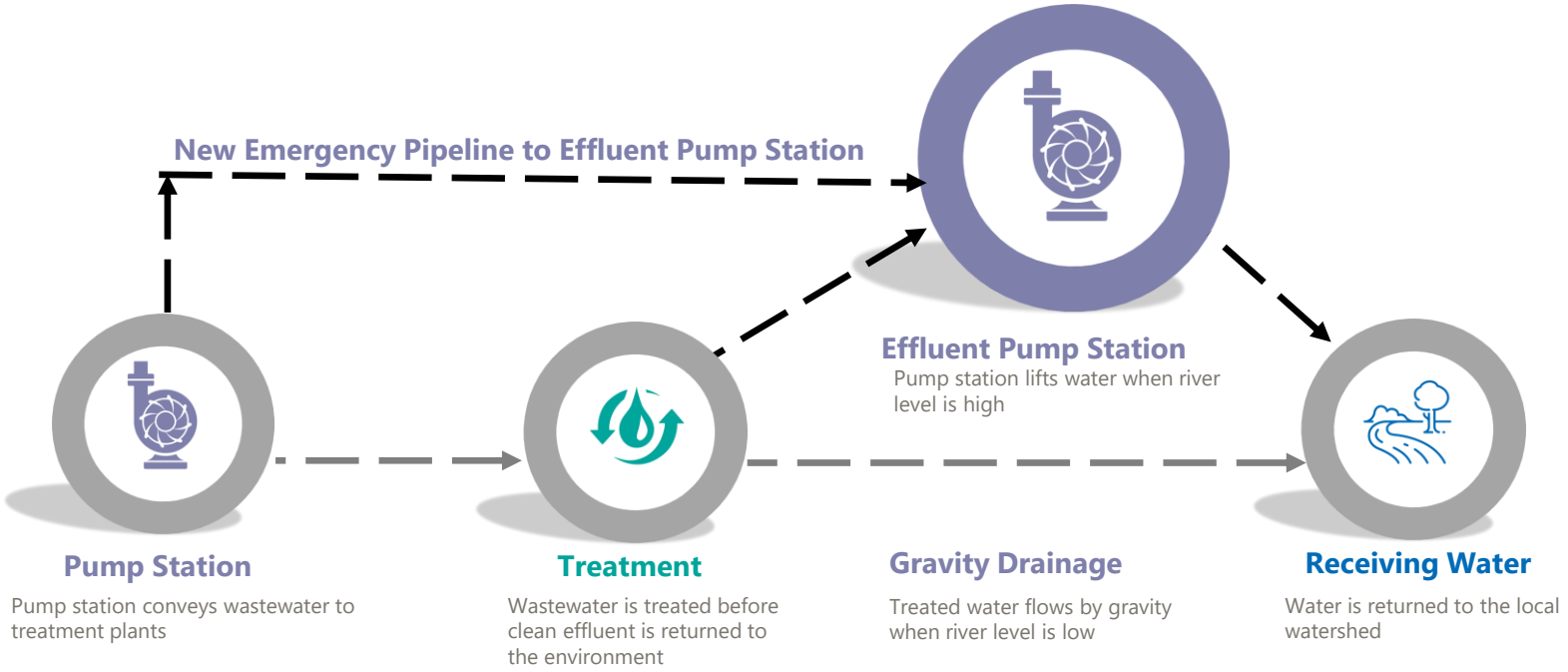
Option P2 – Build Pipeline Directly from Pump Station to River

- Build new pipe for emergency bypass to river using exiting outfall
- New effluent pump station is needed to direct treated water into the Thames River when river levels are too high for gravity drainage



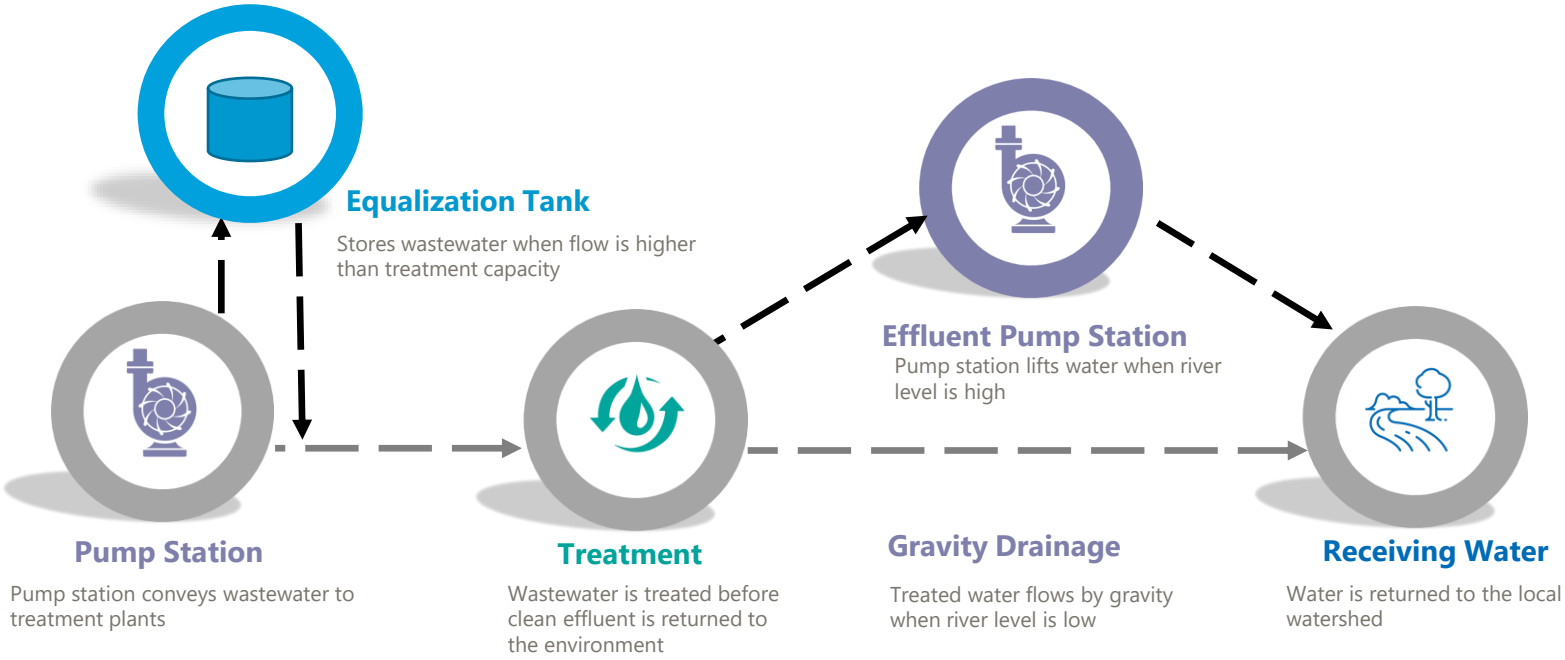
Option P3 – Build Pipeline Directly from Pump Station to Larger Effluent Pump Station

- Build new pipeline for emergency bypass to larger effluent pump station which in turn uses the existing outfall
- New larger pump station is needed to direct treated water into the Thames River when river levels are too high for gravity drainage



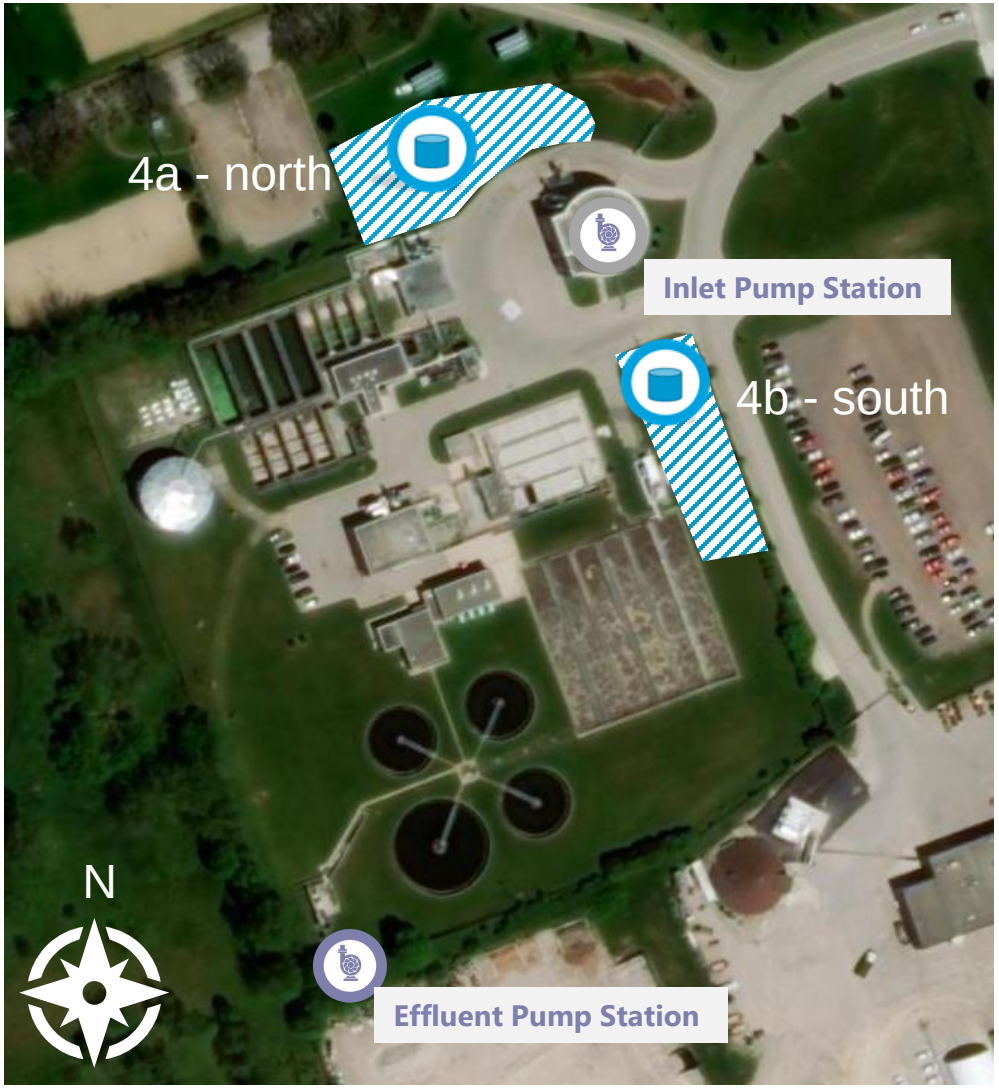
Option P4 – Build Equalization Storage

- Equalization storage to capture wastewater when peak flow is higher than treatment capacity
- New pump station is needed to direct treated water into the Thames River when river levels are too high for gravity drainage



Option P4 – Build Equalization Storage Tank

- Locations of equalization storage must be close to the existing inlet pump station
- Hatched lines show potential areas to be considered for each option with final location determined during detailed design
- Options to allow for approximately 6000 m^3 of storage



Source Image: City of London ArcGIS

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Impact Assessment



Floodplain Impact Assessment

- Previous hydraulic work presented in PIC No. 1 indicates that protection of the WWTP from river flooding (e.g., with berms) will not raise upstream flood levels.
- Any flood storage volume displaced due to proposed flood protection improvements should ideally be minimized to reduce impacts. The potential for downstream flow impacts is not, however, likely significant for any of the alternative solutions assessed. Flood storage is preserved as a general rule to ensure cumulative impacts are not experienced when they add up at a larger scale.

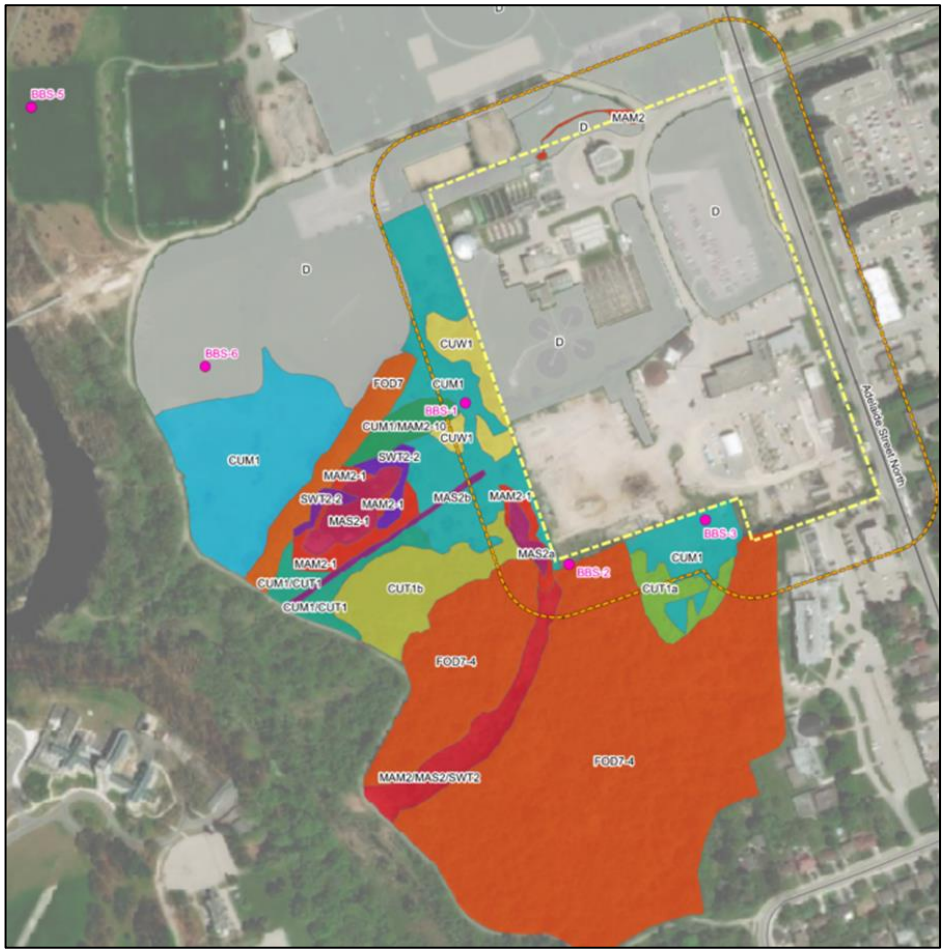
Environmental Impact Study

Key Natural Heritage Features

- Significant Woodlands (southern forest area)
- Wetlands (patches to the west and south)
- Fish and Fish Habitat (Western Drainage Outfall Channel)
- Candidate Significant Wildlife Habitat
- Potential Species at Risk

This study was completed in accordance with the City's guidelines for the preparation and review of Environmental Impact Studies.

Environmental Impact Study



- Breeding Bird Survey Point

ELC Code | Description

- CUM1 | CUM1 - Mineral Cultural Meadow
- CUM1 | Mineral Cultural Meadow
- CUM1/CUT1 | Mineral Cultural Meadow/Mineral Cultural Thicket
- CUM1/MAM2-10 | Mineral Cultural Meadow/Forb Mineral Meadow Marsh
- CUT1a | Mineral Cultural Thicket
- CUT1b | European Buckthorn Cultural Thicket
- CUW1 | Mineral Cultural Woodland
- D | Open/Disturbed
- FOD7 | FOD7 - Fresh-Moist Cottonwood Lowland Deciduous Forest
- FOD7-4 | Fresh-Moist Black Walnut Lowland Deciduous Forest
- MAM2 | Infiltration Channel Meadow Marsh
- MAM2-1 | Reed-canary Grass Mineral Meadow Marsh
- MAM2/MAS2/SWT2 | Mineral Meadow Marsh/Mineral Shallow Marsh/Mineral Thicket Swamp
- MAS2-1 | Cattail Mineral Shallow Marsh
- MAS2a | Phragmites Mineral Thallow Marsh
- MAS2b | Forb Mineral Shallow Marsh
- SWT2-2 | SWT2-2 - Willow Mineral Thicket Swamp
- SWT2-2 | Willow Mineral Thicket Swamp

Natural Heritage Features (Matrix 2022)

Environmental Impact Study

Impacts

- Direct Habitat Impacts
  Direct impact limited to meadow marsh drainage feature north of existing entryway – all other works within fence line of treatment plant
- Potential indirect impacts
  - Construction impacts offsite
  - Spills, erosion, and sedimentation
  - Damages to edge trees
  - Changes to moisture regime
  - Changes to structure and composition of vegetation communities (introduction of invasive species)
  - Habitat disturbance
  - Injury or incidental loss of wildlife



Grounds near the WWTP (ARA 2021)

Environmental Impact Study

Mitigation Strategies

- Respecting vegetation removal timing windows
- Following Construction Best Management Practices
- Isolating construction areas and inputting strategies to avoid incidental take
- Preventing terrestrial disturbances through identifying setbacks and restricting construction activity areas
- Developing an erosion and sediment control plan
- Preparing invasive species management strategy, where required

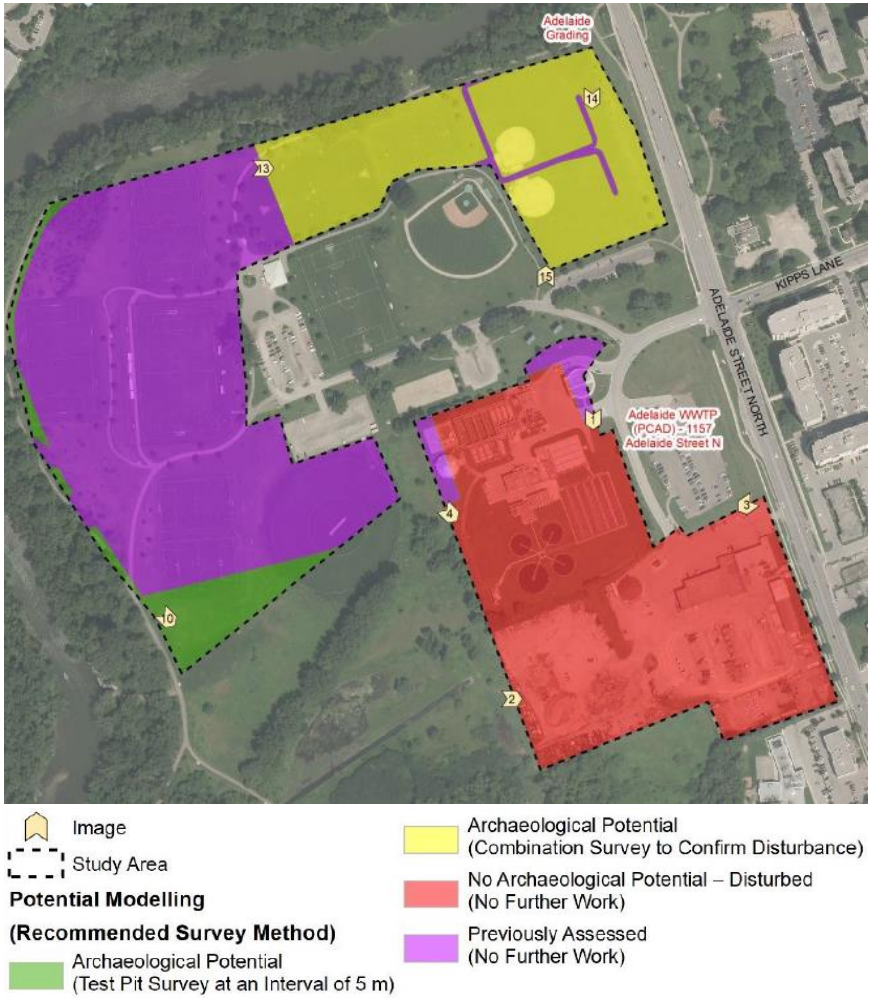


Grounds near the WWTP (ARA 2021)

Stage 1 Archaeology Assessment

- A few areas of archaeological potential in the surrounding fields (e.g., a fluvial terrace and three historical roadways).
- Lands within the WWTP either offer no archeological potential due to disturbance or have been previously assessed.
- In future phases, additional studies will be necessary if disturbance is required in areas of "archaeological potential" or outside areas.

(Archaeological Research Associates 2021)



Area of Archaeological Potential near the plant (ARA 2021)

Evaluation of Site-Level Alternative Solutions



Evaluation Criteria – Site-Level Flood Control Measures*

Technical	Economic	Environment	Social
• Level of flood protection • Construction approaches • Climate change resiliency • Wastewater treatment plant operations	• Capital costs • Pump station costs were considered separately	• Ecology • Archaeology	• Policy considerations • Public input • Public land-use the (e.g., recreational) • Public safety

* Site-level flood control measures are distinct from pump station alternatives being evaluated (see later slides in this presentation). All site-level measures have also been determined to be compatible with the pump station alternatives evaluated.

Option 1: Berm with Raised Entrance Way

Technical	Economic	Environment	Social
• Robust, passive flood protection • Minor conflicts with existing infrastructure • 52,000 m^3 flood storage loss	• $3.1M • 650 m of earthen berm • 280 m raised entry road	• Minimal direct impacts • Moderate indirect impact potential without mitigation • No archaeology conflicts expected	• Natural berm maintains park aesthetic • Passive protection of critical infrastructure • Emergency ingress/egress maintained



Option 2: Berm with a Temporary Measure at Entrance Way in Response to Flood Forecasts

Technical	Economic	Environment	Social
• Reliance on temporary measures for flood protection • Minor conflicts with existing infrastructure • 52,000 m^3 flood storage loss	• $2.3M • 775 m of earthen berm • Does not account for temporary measures (materials, training, etc.)	• Minimal direct impacts • Moderate indirect impact potential without mitigation • No archaeology conflicts expected	• Natural berm maintains park aesthetic • Temporary measures increase flood risk to critical infrastructure • Emergency ingress/egress not maintained



Option 3: Berm Extended to Provide Protection at the Parking Lot

Technical	Economic	Environment	Social
• Robust, passive flood protection • Minor conflicts with existing infrastructure • 74,000 m^3 flood storage loss	• $2.9M • 826 m of earthen berm • 106 m raised entry road	• Minimal direct impacts • Moderate indirect impact potential without mitigation • No archaeology conflicts expected	• Natural berm maintains park aesthetic • Passive protection of critical infrastructure • Emergency ingress/egress maintained



Impact Evaluation – Site-Level Flood Protection

Berm Options	Technical	Economic	Environment	Social
Option 1 – berm with raised entrance way	High Feasible & practical Fully passive	High $3.1M	Low Minimal direct impact & indirect impacts	Low Minimal disturbance High safety
Option 2 – temporary measure at entrance way	Low-Medium Not practical Not fully passive Long-term reliability issue	High $2.3M	Low Minimal direct impact & indirect impacts	High Ingress/egress is not maintained Temporary measures a safety risk
Option 3 – extended to provide protection at the parking lot	Medium-High Feasible & practical Additional flood storage loss	High $2.9M	Low Minimal direct impact & indirect impacts	Low Minimal disturbance High safety
Option 4 – do nothing	Low No resiliency provided	High Potential flood damage costs	Medium No direct impacts, Flood risk not addressed	High Safety and equipment concern continues

Preliminary Preferred Solution – Site-Level Flood Protection

- **Option 1**, raised entrance way, is the preliminary preferred solution as it is a feasible and practical flood protection strategy. Although slightly more expensive, there are less floodplain storage impacts.

- **Option 2**, temporary measure at entrance way, does not maintain emergency ingress or egress, and the reliance on temporary measures introduces potential risk for both flood protection integrity and human safety.

- **Option 3**, extended to provide protection at the parking lot, is viable, however, a larger flood storage area is affected (>50%).

- **Option 4**, do nothing, does not address flood protection of the WWTP, address climate resiliency, or provide any meaningful alternative to maintaining critical infrastructure during a regulatory flood event.

Preliminary Preferred Solution (Option 1) – Design Considerations

- Consider stormwater management strategies, including external areas, to address accumulation of precipitation and runoff within the WWTP.
- Apply localized transition between berms and vertical treatment to best suit environmental and physical constraints. Sheet-pile floodwall may be used in areas where WWTP infrastructure does not accommodate the footprint of an earthen berm.
- Any improvements to site roadway entrances must consider turning radii of large vehicles that enter the site.



Evaluation of Effluent Pump Station Alternative Solutions

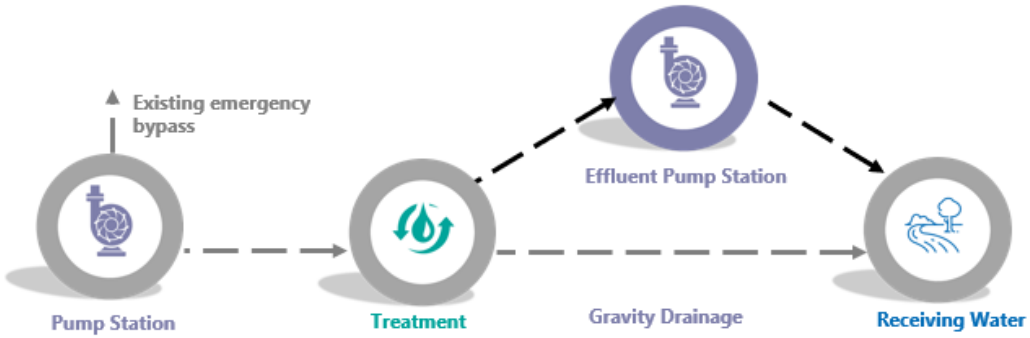


Evaluation Criteria

Technical	Economic	Environment	Social
• Level of flood protection • Construction approaches • Climate change resiliency • Wastewater treatment plant operations	• Capital costs • Operational and maintenance costs	• Ecology • Archaeology • Water quality	• Policy Considerations • Public Input • Public land-use the (e.g., recreational) • Public safety

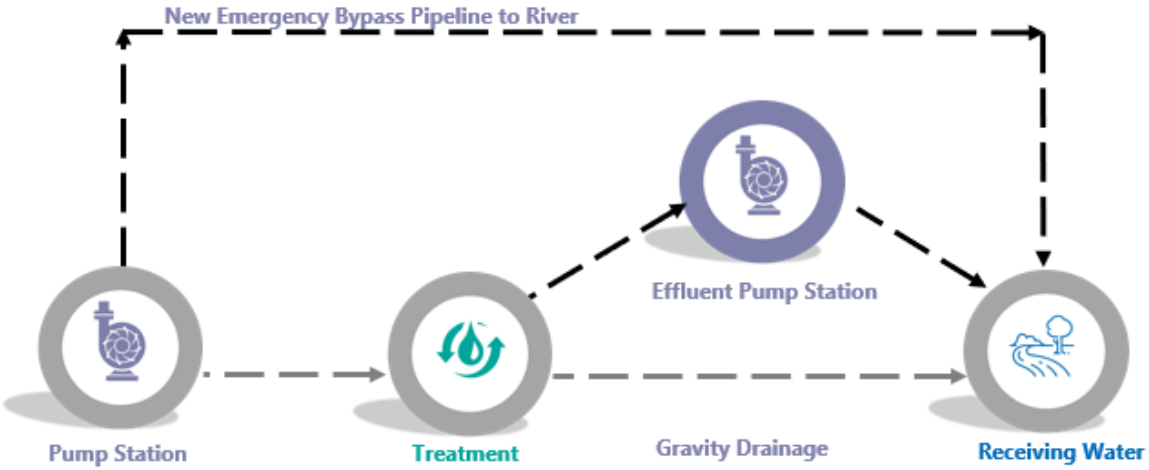
Option P1: Maintain Existing Emergency Bypass

Technical	Economic	Environment	Social
• Pumped bypass provided using existing raw sewage pump station	• $5M • 105 MLD Effluent Pump station	• Emergency bypass is directed to open space drainage • Direct environmental impact when emergency bypass occurs	• Protect of critical infrastructure • Emergency discharge in space with public access



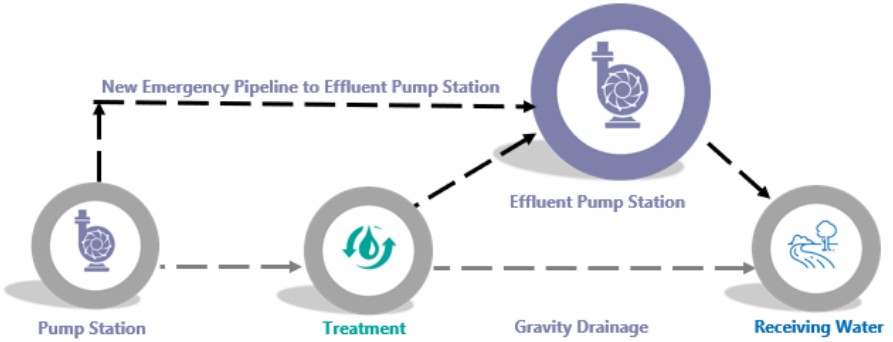
Option P2: Build Pipeline Directly from Existing Pump Station to River

Technical	Economic	Environment	Social
• Installation of new pipeline to river using existing outfall	• $6M • 105 MLD Effluent Pump Station • Pipeline to existing outfall	• Emergency bypass is directed into river • Construction impacts environmental space	• Protects of critical infrastructure • Pipeline construction disrupts use of public space



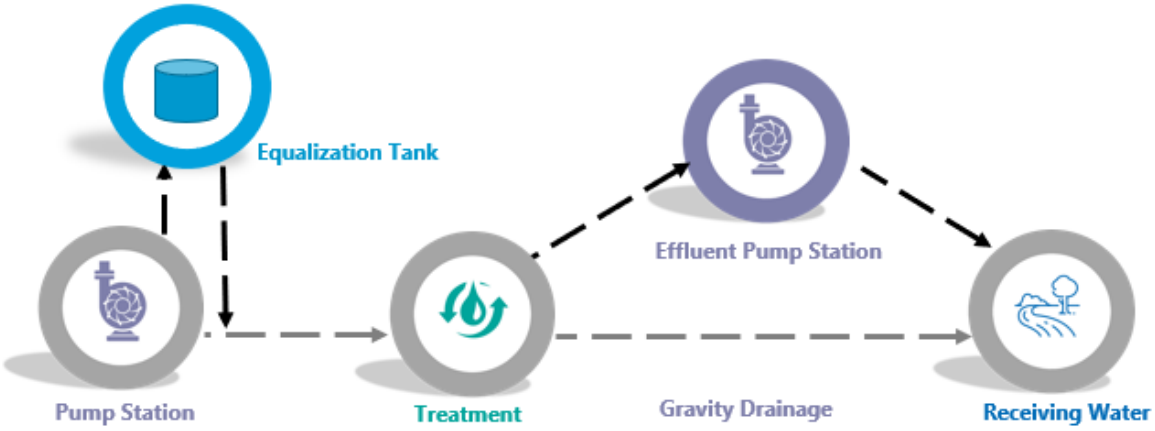
Option P3: Build Pipeline Directly from Pump Station to Larger Effluent Pump Station

Technical	Economic	Environment	Social
• Complex construction • Deeper and larger effluent pump station to lift water and emergency bypass when river is high	• $14M • 204 MLD Effluent Pump Station Emergency pipeline to effluent pump station • Pipe to PS • Larger Pipeline to existing outfall	• Emergency bypass is directed into river • Impacts mostly limited to existing treatment plant area	• Protects critical infrastructure



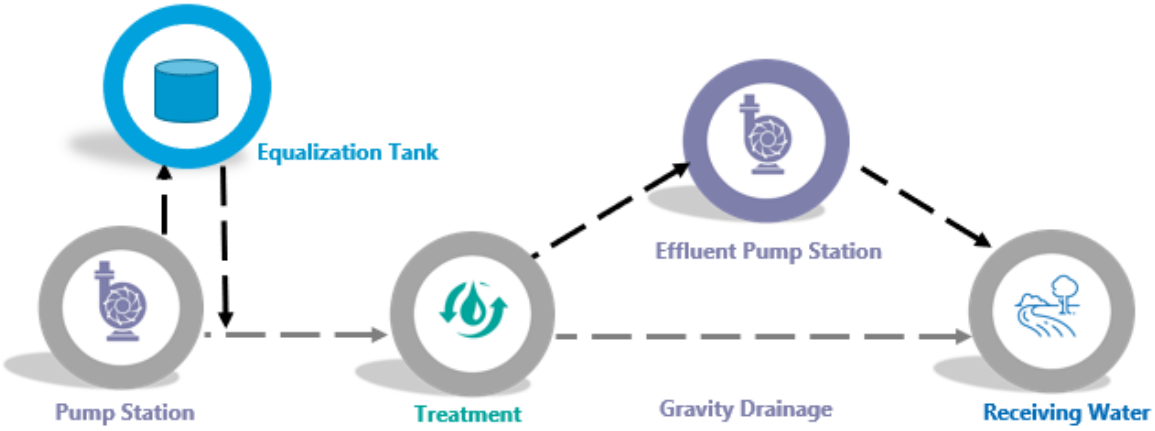
Option P4a: Build Equalization Storage to the North

Technical	Economic	Environment	Social
• Improved resiliency and operational flexibility to manage peak flows	• $10.5M • 105 MLD Effluent Pump Station • Equalization tank • Piping	• Improved protection from bypass • Some local impacts on existing park (turf) areas, including small meadow marsh	• Protects of critical infrastructure • Improved protection of public space and recreational land use • New tank visible to public, adjacent to park area



Option P4b: Build Equalization Storage to the South

Technical	Economic	Environment	Social
• Improved resiliency and operational flexibility to manage peak flows • Location may conflict with future WWTP expansion	• $10.5M • 105 MLD Effluent Pump Station • Equalization tank • Piping	• Improved protection from bypass • Impacts mostly limited to existing site boundary	• Improved protection of public space and recreational land use • New tank visible to public, within WWTP

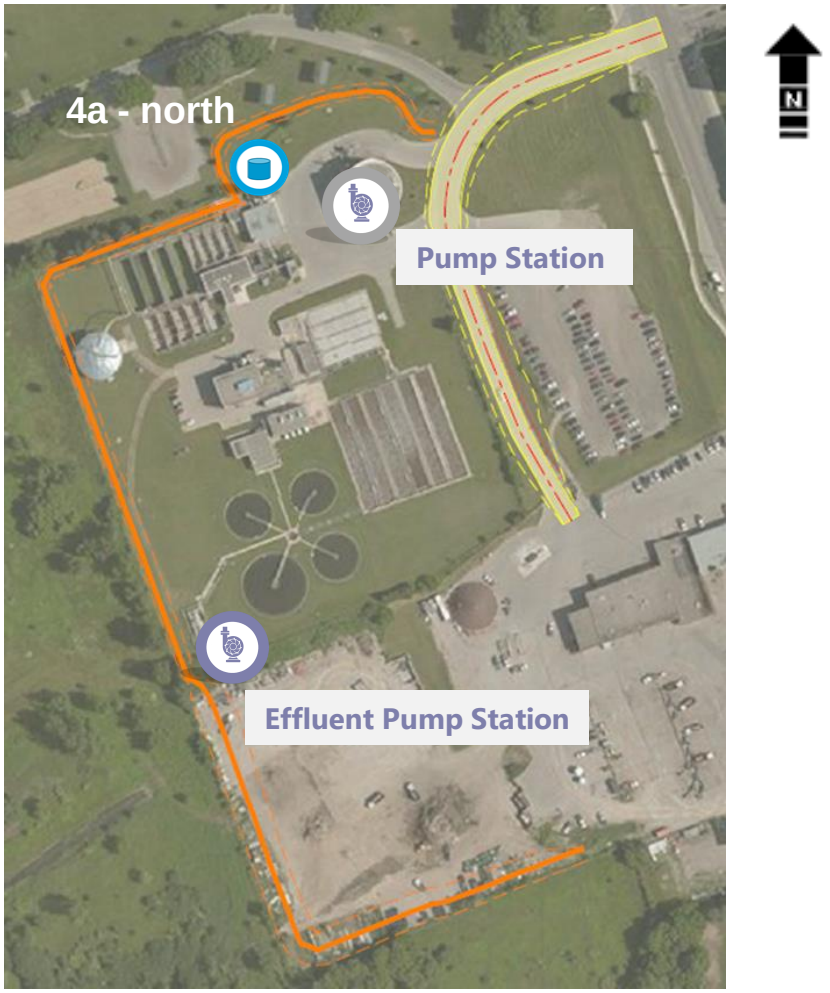


Impact Evaluation – Effluent Pump Station

PS Options	Technical	Economic	Environment	Social
Option P1 – maintain existing emergency bypass	Medium Uses existing infrastructure	Low $5M	High Direct environmental impact when emergency bypass occurs	High Emergency sewage discharge in space with public access
Option P2 – build pipeline directly from pump station to river	Medium	Medium - Low $6M	Medium Minimal direct impact & indirect impacts	Medium Construction impacts use of public space
Option P3 – build pipeline directly from pump station to larger effluent pump station	Low Most complex construction	High $14M	Medium Minimal direct impact & indirect impacts	Medium
Option P4a – Build equalization storage to the north	High Improved resiliency and operator flexibility	Medium - High $10.5M	Low Improved protection of the environment from bypass	Low - Medium Improved protection of the public space. New tank visible to public, adjacent to park
Option P4b – Build equalization storage to the south	Medium Improved resiliency and operational flexibility. Location may conflict with future WWTP expansion	Medium - High $10.5M	Low Improved protection of the environment from bypass	Low - Medium Improved protection of the public space. New tank visible to public within WWTP.

Integrated Preliminary Preferred Solution

- The integrated preliminary preferred solution is a berm with raised entrance road (Option 1) with equalization storage and an effluent pump station (Option P4a).
- Further details for the preliminary preferred solution will be explored in subsequent preliminary and detailed design.
- Environmental mitigation strategies recommended in the Environmental Impact Study, including the small meadow marsh located near the new equalization storage, will be addressed in future design.



Next Steps



Next Steps

Next Steps in the environmental assessment process include:

1. Incorporate input from the public, First Nations, agencies, and stakeholders

2. Confirm preliminary preferred solution

3. Distribute Notice of Completion

4. Finalize EA project report and make available for 30-day review period

Reminder

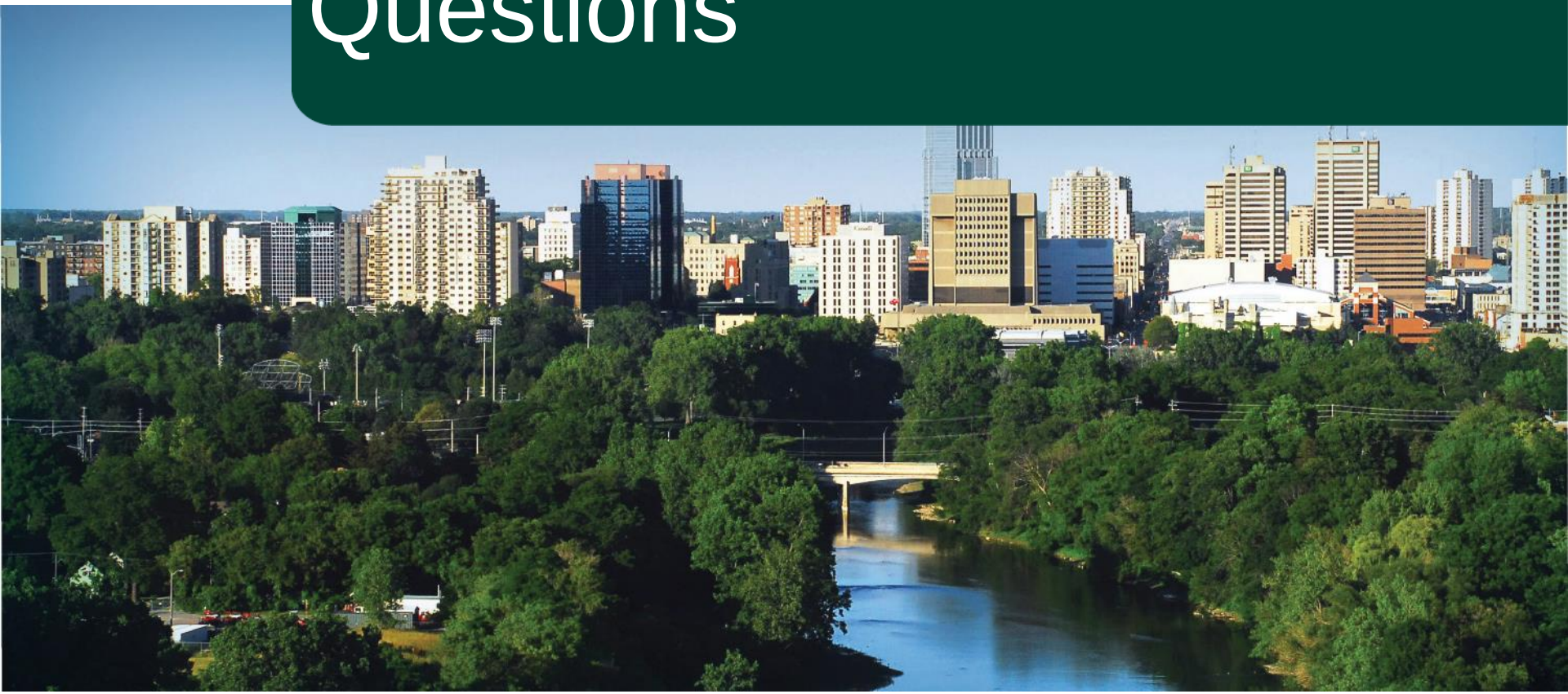
- Please complete the project survey/questionnaire, available on the *Get Involved* webpage (listed below) and email mmckillop@london.ca and sbraun@matrix-solutions.com.

  https://getinvolved.london.ca/greenway-climate-change

- If possible, please provide input related to the Public Information Centre No. 2 by **March 25, 2022.**

London
CANADA

Questions



Appendix D
Feedback

Melani-Ivy Samson

From: MNRF Ayl Planners (MNRF) <MNRF.Ayl.Planners@ontario.ca>
Sent: Friday, June 4, 2021 11:33 AM
To: McKillop, Marcy; Steve Braun
Cc: 'lisa@primestrategyplanning.com'; Andrew Doherty
Subject: [External] RE: Adelaide WWTP Climate Change Resiliency EA - Notice of Commencement
Attachments: image001.wmz; Adelaide WWTP Climate Change Resiliency EA Notice of Commencement_2June2021.pdf; NHGuide_MNRF_2019-04-01.pdf

Ministry of Natural Resources and Forestry

Ministère des Richesses naturelles et des Forêts

Ontario

615 John Street North
Aylmer, ON N5H 2S8
Tel: 519-773-9241
Fax: 519-773-9014

615, rue John Nord
Aylmer ON N5H 2S8
Tél: 519-773-9241
Téléc: 519-773-9014

June 4, 2021

Marcy McKillop, P.Eng.
Environmental Services Engineer
Wastewater Treatment Operations
(519) 661-2489 ext. 4976
mmckillop@london.ca

Stephen Braun, P.Eng.
Senior Water Resources Engineer
Matrix Solutions Inc.
(289) 323-0975
sbraun@matrix-solutions.com

Subject: Adelaide WWTP Climate Change Resiliency EA - Notice of Commencement

The Ministry of Natural Resources and Forestry (MNRF) received the notice for the Adelaide WWTP project. Thank you for circulating this information to our office, however, please note that we have not completed a screening of natural heritage or other resource values for the project at this time. Please also note 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.

This response provides information to guide you in identifying and assessing natural features and resources as required by applicable policies and legislation, and engaging with the MNRF for advice as needed.

Natural Heritage & Endangered Species Act

In order to provide the most efficient service possible, the attached Natural Heritage Information Request Guide has been developed to assist you with accessing natural heritage data and values from convenient online sources.

It remains the proponent's responsibility to complete a preliminary screening for each project, to obtain available information from multiple sources, to conduct any necessary field studies, and to consider any potential environmental impacts that may result from an activity. We wish to emphasize the need for the proponents of development activities to complete screenings prior to contacting the Ministry or other agencies for more detailed technical information and advice.

The Ministry continues to work on updating data housed by Land Information Ontario and the Natural Heritage Information Centre, and ensuring this information is accessible through online resources. Species at risk data is regularly being updated. To ensure access to reliable and up to date information, please contact the Ministry of the Environment, Conservation and Parks at SAROntario@ontario.ca.

Petroleum Wells & Oil, Gas and Salt Resource Act

There may be petroleum wells within the proposed project area. Please consult the Ontario Oil, Gas and Salt Resources Library website (www.ogsrlibrary.com) for the best known data on any wells recorded by MNRF. Please reference the 'Definitions and Terminology Guide' listed in the publications on the Library website in order to better understand the well information available. Any oil and gas wells in your project area are regulated by the *Oil, Gas and Salt Resource Act*, and the supporting regulations and operating standards. If any unanticipated wells are encountered during development of the project, or if the proponent has questions regarding petroleum operations, the proponent should contact the Petroleum Operations Section at POSRecords@ontario.ca or 519-873-4634.

Public Lands Act & Lakes and Rivers Improvement Act

Some projects may be subject to the provisions of the *Public Lands Act* or the *Lakes and Rivers Improvement Act*. Please review the information on MNRF's web pages provided below regarding when an approval is required or not. Please note that many of the authorizations issued under the *Lakes and Rivers Improvement Act* are administered by the local Conservation Authority.

- For more information about the *Public Lands Act*: https://www.ontario.ca/page/crown-land-work-permits
- For more information about the *Lakes and Rivers Improvement Act*: https://www.ontario.ca/document/lakes-and-rivers-improvement-act-administrative-guide

After reviewing the information provided, if you have not identified any of MNRF's interests stated above, there is no need to circulate any subsequent notices to our office.

If you have any questions or concerns, please feel free to contact me.

Sincerely,
Karina

Karina Černiavskaja, District Planner
Ministry of Natural Resources and Forestry
Email: MNRF.Ayl.Planners@ontario.ca

Ontario

As part of providing accessible customer service, please let me know if you have any accommodation needs or require communication supports or alternate formats.

From: Andrew Doherty <adoherty@matrix-solutions.com>
Sent: June-02-21 5:21 PM
To: Andrew Doherty <adoherty@matrix-solutions.com>
Cc: McKillop, Marcy <mmckillop@london.ca>; Steve Braun <sbraun@matrix-solutions.com>; 'lisa@primestrategyplanning.com' <lisa@primestrategyplanning.com>
Subject: Adelaide WWTP Climate Change Resiliency EA - Notice of Commencement

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Hello,

This email is to notify you of the Adelaide Wastewater Treatment Plant Climate Change Resiliency Municipal Class Environmental Assessment (EA) on behalf of the City of London.

The attached Notice of Commencement provides information about this project. A Public Information Centre will be held online this fall to provide additional information about the project and provide an opportunity for interested parties to offer input and identify any concerns or location information supporting the EA process.

If you have any questions or concerns about this project, please contact me or the Project Managers (contact information attached).

If you wish to be removed from the distribution list for this study, let me know.

Thank you,

Andrew Doherty, P.Eng.
Water Resources Engineer

MATRIX SOLUTIONS INC.
Environment & Engineering
7B-650 Woodlawn Rd W, Guelph ON N1K 1B8
D 226.314.1924 **C** 519.820.0443
T 519.772.3777 **F** 226.314.1908
www.matrix-solutions.com

Matrix Solutions Inc. ENVIRONMENT & ENGINEERING

2019 CANADA'S GREENEST EMPLOYERS

CHIPPEWAS OF THE THAMES FIRST NATION

June 18, 2021

VIA EMAIL

Marcy McKillop
Environmental Services Engineer,
Wastewater Treatment Operations Division
City of London

RE: Adelaide Wastewater Treatment Plant Climate Change Resiliency, Schedule 'B' Municipal Class Environmental Assessment, City of London

Dear: Marcy,

We have reviewed information concerning the aforementioned project. The proposed project is located within the London Township Treaty area to which Chippewas of the Thames First Nation (COTTFN) is a signatory. The project also falls within the Big Bear Creek Additions to Reserve (ATR) land selection area, as well as COTTFN's Traditional Territory.

After reviewing the project information, we have identified moderate level of concerns with the information that you have presented to us at this time. I kindly request that we receive regular project updates and the opportunity to review the completed studies. All future notifications can be sent via email to consultation@cottfn.com. If the Archaeology Assessment proceeds to a Stage 2, I ask that we notified with the invitation to actively participate by providing an Archaeology Field Liaison on behalf of this First Nation.

We look forward to continuing this open line of communication. To implement meaningful consultation, COTTFN has developed its own protocol - a document and a process that will guide positive working relationships. We would be happy to meet with you to review COTTFN's Consultation Protocol.

As per *'Appendix D'* of the Wiindmaagewin attached is invoice 0127. Please do not hesitate to contact me if you need further clarification of this letter.

Sincerely,

Fallon Burch
Consultation Coordinator
Chippewa of the Thames First Nation
consultation@cottfn.com

Stephan Braun, Senior Water Resources Engineer, Matrix Solutions Inc.

320 Chippewa Road, Muncey, ON, N0L 1Y0
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Ministry of the Environment, Conservation and Parks

Environmental Assessment Branch

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June 22, 2021

Marcy McKillop
Environmental Services Engineer
City of London

Re: **Adelaide Wastewater Treatment Plant Climate Change Resiliency**
City of London
Municipal Class EA
Response to Notice of Commencement

Dear Marcy McKillop,

This letter is in response to the Notice of Commencement for the above noted project. The Ministry of the Environment, Conservation and Parks (MECP) acknowledges that the City of London (proponent) has indicated that the study is following the approved environmental planning process for a Schedule B project under the Municipal Class Environmental Assessment (Class EA).

The **updated (February 2021)** attached "Areas of Interest" document provides guidance regarding the ministry's interests with respect to the Class EA process. Please address all areas of interest in the EA documentation at an appropriate level for the EA study. Proponents who address all the applicable areas of interest can minimize potential delays to the project schedule. **Further information is provided at the end of the Areas of Interest document relating to recent changes to the Environmental Assessment Act through Bill 197, Covid-19 Economic Recovery Act 2020.**

The Crown has a legal duty to consult Aboriginal communities when it has knowledge, real or constructive, of the existence or potential existence of an Aboriginal or treaty right and

contemplates conduct that may adversely impact that right. Before authorizing this project, the Crown must ensure that its duty to consult has been fulfilled, where such a duty is triggered. Although the duty to consult with Aboriginal peoples is a duty of the Crown, the Crown may delegate procedural aspects of this duty to project proponents while retaining oversight of the consultation process.

The proposed project may have the potential to affect Aboriginal or treaty rights protected under Section 35 of Canada's *Constitution Act* 1982. Where the Crown's duty to consult is triggered in relation to the proposed project**, the MECP is delegating the procedural aspects of rights-based consultation to the proponent through this letter.** The Crown intends to rely on the delegated consultation process in discharging its duty to consult and maintains the right to participate in the consultation process as it sees fit.

Based on information provided to date and the Crown`s preliminary assessment the proponent is required to consult with the following communities who have been identified as potentially affected by the proposed project:

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

Steps that the proponent may need to take in relation to Aboriginal consultation for the proposed project are outlined in the "Code of Practice for Consultation in Ontario's Environmental Assessment Process". Additional information related to Ontario's Environmental Assessment Act is available online at: www.ontario.ca/environmentalassessments.

Please also refer to the attached document "A Proponent's Introduction to the Delegation of Procedural Aspects of consultation with Aboriginal Communities" for further information, including the MECP's expectations for EA report documentation related to consultation with communities.

The proponent must contact the Director of Environmental Assessment Branch (EABDirector@ontario.ca) under the following circumstances subsequent to initial discussions with the communities identified by MECP:

- Aboriginal or treaty rights impacts are identified to you by the communities
- You have reason to believe that your proposed project may adversely affect an Aboriginal or treaty right

- Consultation with Indigenous communities or other stakeholders has reached an impasse
- A Part II Order request is expected on the basis of impacts to Aboriginal or treaty rights

The MECP will then assess the extent of any Crown duty to consult for the circumstances and will consider whether additional steps should be taken, including what role you will be asked to play should additional steps and activities be required.

A draft copy of the report should be sent directly to me prior to the filing of the final report, allowing a minimum of 30 days for the ministry's technical reviewers to provide comments.

Please also ensure a copy of the final notice is sent to the ministry's Southwest Region EA notification email account (eanotification.swregion@ontario.ca) after the draft report is reviewed and finalized.

Should you or any members of your project team have any questions regarding the material above, please contact me at mark.badali1@ontario.ca.

Yours truly,



Mark Badali
Regional Environmental Assessment Coordinator – Southwest Region

Cc: Rob Wrigley, Manager, London District Office, MECP
Mark Smith, Water Compliance Supervisor, London District Office, MECP
Stephen Braun, Senior Water Resources Engineer, Matrix Solutions Inc.
Andrew Doherty, Water Resources Engineer, Matrix Solutions Inc.

Encl. Areas of Interest
A Proponent's Introduction to the Delegation of Procedural Aspects of Consultation with Aboriginal Communities

AREAS OF INTEREST (v. February 2021)

It is suggested that you check off each section after you have considered / addressed it.

☐ **Planning and Policy**

- Projects located in MECP Central Region are subject to **A Place to Grow: Growth Plan for the Greater Golden Horseshoe (2020).** Parts of the study area may also be subject to the Oak Ridges Moraine Conservation Plan (2017), Niagara Escarpment Plan (2017), Greenbelt Plan (2017) or Lake Simcoe Protection Plan (2014). Applicable plans and the applicable policies should be identified in the report, and the proponent should describe how the proposed project adheres to the relevant policies in these plans.

- The **Provincial Policy Statement (2020)** contains policies that protect Ontario's natural heritage and water resources. Applicable policies should be referenced in the report, and the proponent should describe how the proposed project is consistent with these policies.

- In addition to the provincial planning and policy level, the report should also discuss the planning context at the municipal and federal levels, as appropriate.

☐ **Source Water Protection**

The *Clean Water Act*, 2006 (CWA) aims to protect existing and future sources of drinking water. To achieve this, several types of vulnerable areas have been delineated around surface water intakes and wellheads for every municipal residential drinking water system that is located in a source protection area. These vulnerable areas are known as a Wellhead Protection Areas (WHPAs) and surface water Intake Protection Zones (IPZs). Other vulnerable areas that have been delineated under the CWA include Highly Vulnerable Aquifers (HVAs), Significant Groundwater Recharge Areas (SGRAs), Event-based modelling areas (EBAs), and Issues Contributing Areas (ICAs). Source protection plans have been developed that include policies to address existing and future risks to sources of municipal drinking water within these vulnerable areas.

Projects that are subject to the Environmental Assessment Act that fall under a Class EA, or one of the Regulations, have the potential to impact sources of drinking water if they occur in designated vulnerable areas or in the vicinity of other at-risk drinking water systems (i.e. systems that are not municipal residential systems). MEA Class EA projects may include activities that, if located in a vulnerable area, could be a threat to sources of drinking water (i.e. have the potential to adversely affect the quality or quantity of drinking water sources) and the activity could therefore be subject to policies in a source protection plan. Where an activity poses a risk to drinking water, policies in the local source protection plan may impact how or where that activity is undertaken. Policies may prohibit certain activities, or they may require risk management measures for these activities. Municipal Official Plans, planning decisions,

Class EA projects (where the project includes an activity that is a threat to drinking water) and prescribed instruments must conform with policies that address significant risks to drinking water and must have regard for policies that address moderate or low risks.

- In October 2015, the MEA Parent Class EA document was amended to include reference to the Clean Water Act (Section A.2.10.6) and indicates that proponents undertaking a Municipal Class EA project must identify early in their process whether a project is or could potentially be occurring with a vulnerable area. **Given this requirement, please include a section in the report on source water protection.**

    - The proponent should identify the source protection area and should clearly document how the proximity of the project to sources of drinking water (municipal or other) and any delineated vulnerable areas was considered and assessed. Specifically, the report should discuss whether or not the project is located in a vulnerable area and provide applicable details about the area.

    - If located in a vulnerable area, proponents should document whether any project activities are prescribed drinking water threats and thus pose a risk to drinking water (this should be consulted on with the appropriate Source Protection Authority). Where an activity poses a risk to drinking water, the proponent must document and discuss in the report how the project adheres to or has regard to applicable policies in the local source protection plan. This section should then be used to inform and be reflected in other sections of the report, such as the identification of net positive/negative effects of alternatives, mitigation measures, evaluation of alternatives etc.

- While most source protection plans focused on including policies for significant drinking water threats in the WHPAs and IPZs it should be noted that even though source protection plan policies may not apply in HVAs, these are areas where aquifers are sensitive and at risk to impacts and within these areas, activities may impact the quality of sources of drinking water for systems other than municipal residential systems.

- In order to determine if this project is occurring within a vulnerable area, proponents can use this mapping tool: http://www.applications.ene.gov.on.ca/swp/en/index.php. Note that various layers (including WHPAs, WHPA-Q1 and WHPA-Q2, IPZs, HVAs, SGRAs, EBAs, ICAs) can be turned on through the “Map Legend” bar on the left. The mapping tool will also provide a link to the appropriate source protection plan in order to identify what policies may be applicable in the vulnerable area.

- For further information on the maps or source protection plan policies which may relate to their project, proponents must contact the appropriate source protection authority. **Please consult with the local source protection authority to discuss potential impacts on drinking water. Please document the results of that consultation within the report and include all communication documents/correspondence.**

More Information

For more information on the *Clean Water Act*, source protection areas and plans, including specific information on the vulnerable areas and drinking water threats, please refer to Conservation Ontario's website where you will also find links to the local source protection plan/assessment report.

A list of the prescribed drinking water threats can be found in section 1.1 of Ontario Regulation 287/07 made under the *Clean Water Act*. In addition to prescribed drinking water threats, some source protection plans may include policies to address additional "local" threat activities, as approved by the MECP.

- **Climate Change**

The document "Considering Climate Change in the Environmental Assessment Process" (Guide) is now a part of the Environmental Assessment program's Guides and Codes of Practice. The Guide sets out the MECP's expectation for considering climate change in the preparation, execution and documentation of environmental assessment studies and processes. The guide provides examples, approaches, resources, and references to assist proponents with consideration of climate change in EA. Proponents should review this Guide in detail.

- **The MECP expects proponents of Class EA projects to:**

    1. Consider during the assessment of alternative solutions and alternative designs, the following:
        a. the project's expected production of greenhouse gas emissions and impacts on carbon sinks (climate change mitigation); and
        b. resilience or vulnerability of the undertaking to changing climatic conditions (climate change adaptation).
    2. Include a discrete section in the report detailing how climate change was considered in the EA.

How climate change is considered can be qualitative or quantitative in nature and should be scaled to the project's level of environmental effect. In all instances, both a project's impacts on climate change (mitigation) and impacts of climate change on a project (adaptation) should be considered.

- The MECP has also prepared another guide to support provincial land use planning direction related to the completion of energy and emission plans. The "Community Emissions Reduction Planning: A Guide for Municipalities" document is designed to educate stakeholders on the municipal opportunities to reduce energy and greenhouse gas emissions, and to provide guidance on methods and techniques to incorporate consideration of energy and greenhouse gas emissions into municipal activities of all types. We encourage you to review the Guide for information.

Air Quality, Dust and Noise

- If there are sensitive receptors in the surrounding area of this project, a quantitative air quality/odour impact assessment will be useful to evaluate alternatives, determine impacts and identify appropriate mitigation measures. The scope of the assessment can be determined based on the potential effects of the proposed alternatives, and typically includes source and receptor characterization and a quantification of local air quality impacts on the sensitive receptors and the environment in the study area. The assessment will compare to all applicable standards or guidelines for all contaminants of concern. **Please contact this office for further consultation on the level of Air Quality Impact Assessment required for this project if not already advised.**

- If a quantitative Air Quality Impact Assessment is not required for the project, the MECP expects that the report contain a qualitative assessment which includes:

    - A discussion of local air quality including existing activities/sources that significantly impact local air quality and how the project may impact existing conditions;
    - A discussion of the nearby sensitive receptors and the project's potential air quality impacts on present and future sensitive receptors;
    - A discussion of local air quality impacts that could arise from this project during both construction and operation; and
    - A discussion of potential mitigation measures.

- As a common practice, "air quality" should be used an evaluation criterion for all road projects.

- Dust and noise control measures should be addressed and included in the construction plans to ensure that nearby residential and other sensitive land uses within the study area are not adversely affected during construction activities.

- The MECP recommends that non-chloride dust-suppressants be applied. For a comprehensive list of fugitive dust prevention and control measures that could be applied, refer to *Cheminfo Services Inc. Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities* report prepared for Environment Canada. March 2005.

- The report should consider the potential impacts of increased noise levels during the operation of the completed project. The proponent should explore all potential measures to mitigate significant noise impacts during the assessment of alternatives.

Ecosystem Protection and Restoration

- Any impacts to ecosystem form and function must be avoided where possible. The report should describe any proposed mitigation measures and how project planning will protect and enhance the local ecosystem.

- Natural heritage and hydrologic features should be identified and described in detail to assess potential impacts and to develop appropriate mitigation measures. The following sensitive environmental features may be located within or adjacent to the study area:
  - Key Natural Heritage Features: Habitat of endangered species and threatened species, fish habitat, wetlands, areas of natural and scientific interest (ANSIs), significant valleylands, significant woodlands; significant wildlife habitat (including habitat of special concern species); sand barrens, savannahs, and tallgrass prairies; and alvars.
  - Key Hydrologic Features: Permanent streams, intermittent streams, inland lakes and their littoral zones, seepage areas and springs, and wetlands.
  - Other natural heritage features and areas such as: vegetation communities, rare species of flora or fauna, Environmentally Sensitive Areas, Environmentally Sensitive Policy Areas, federal and provincial parks and conservation reserves, Greenland systems etc.

We recommend consulting with the Ministry of Natural Resources and Forestry (MNRF), Fisheries and Oceans Canada (DFO) and your local conservation authority to determine if special measures or additional studies will be necessary to preserve and protect these sensitive features. In addition, you may consider the provisions of the Rouge Park Management Plan if applicable.

Species at Risk

- The Ministry of the Environment, Conservation and Parks has now assumed responsibility of Ontario's Species at Risk program. Information, standards, guidelines, reference materials and technical resources to assist you are found at https://www.ontario.ca/page/species-risk.

- The Client's Guide to Preliminary Screening for Species at Risk (Draft May 2019) has been attached to the covering email for your reference and use. Please review this document for next steps.

- For any questions related to subsequent permit requirements, please contact SAROntario@ontario.ca.

Surface Water

- The report must include enough information to demonstrate that there will be no negative impacts on the natural features or ecological functions of any watercourses within the study area. Measures should be included in the planning and design process to ensure that any impacts to watercourses from construction or operational activities (e.g. spills, erosion, pollution) are mitigated as part of the proposed undertaking.

- Additional stormwater runoff from new pavement can impact receiving watercourses and flood conditions. Quality and quantity control measures to treat stormwater runoff should be considered for all new impervious areas and, where possible, existing surfaces. The ministry's Stormwater Management Planning and Design Manual (2003) should be referenced in the report and utilized when designing stormwater control methods. **A Stormwater Management Plan should be prepared as part of the Class EA process** that includes:

    - Strategies to address potential water quantity and erosion impacts related to stormwater draining into streams or other sensitive environmental features, and to ensure that adequate (enhanced) water quality is maintained
    - Watershed information, drainage conditions, and other relevant background information
    - Future drainage conditions, stormwater management options, information on erosion and sediment control during construction, and other details of the proposed works
    - Information on maintenance and monitoring commitments.

- Ontario Regulation 60/08 under the *Ontario Water Resources Act* (OWRA) applies to the Lake Simcoe Basin, which encompasses Lake Simcoe and the lands from which surface water drains into Lake Simcoe. If the proposed sewage treatment plant is listed in Table 1 of the regulation, the report should describe how the proposed project and its mitigation measures are consistent with the requirements of this regulation and the OWRA.

- Any potential approval requirements for surface water taking or discharge should be identified in the report. A Permit to Take Water (PTTW) under the OWRA will be required for any water takings that exceed 50,000 L/day, except for certain water taking activities that have been prescribed by the Water Taking EASR Regulation – *O. Reg. 63/16*. These prescribed water-taking activities require registration in the EASR instead of a PTTW. Please review the Water Taking User Guide for EASR for more information. Additionally, an Environmental Compliance Approval under the OWRA is required for municipal stormwater management works.

Groundwater

- The status of, and potential impacts to any well water supplies should be addressed. If the project involves groundwater takings or changes to drainage patterns, the quantity and quality of groundwater may be affected due to drawdown effects or the redirection of existing contamination flows. In addition, project activities may infringe on existing wells such that they must be reconstructed or sealed and abandoned. Appropriate information to define existing groundwater conditions should be included in the report.

- If the potential construction or decommissioning of water wells is identified as an issue, the report should refer to Ontario Regulation 903, Wells, under the OWRA.

- Potential impacts to groundwater-dependent natural features should be addressed. Any changes to groundwater flow or quality from groundwater taking may interfere with the ecological processes of streams, wetlands or other surficial features. In addition, discharging contaminated or high volumes of groundwater to these features may have direct impacts on their function. Any potential effects should be identified, and appropriate mitigation measures should be recommended. The level of detail required will be dependent on the significance of the potential impacts.

- Any potential approval requirements for groundwater taking or discharge should be identified in the report. A Permit to Take Water (PTTW) under the OWRA will be required for any water takings that exceed 50,000 L/day, with the exception of certain water taking activities that have been prescribed by the Water Taking EASR Regulation – *O. Reg. 63/16*. These prescribed water-taking activities require registration in the EASR instead of a PTTW. Please review the Water Taking User Guide for EASR for more information.

- Consultation with the railroad authorities is necessary wherever there is a plan to use construction dewatering in the vicinity of railroad lines or where the zone of influence of the construction dewatering potentially intercepts railroad lines.

Excess Materials Management

- In December 2019, MECP released a new regulation under the Environmental Protection Act, titled "On-Site and Excess Soil Management" (O. Reg. 406/19) to support improved management of excess construction soil. This regulation is a key step to support proper management of excess soils, ensuring valuable resources don't go to waste and to provide clear rules on managing and reusing excess soil. New risk-based standards referenced by this regulation help to facilitate local beneficial reuse which in turn will reduce greenhouse gas emissions from soil transportation, while ensuring strong protection of human health and the environment. The new regulation is being phased in over time, with the first phase

in effect on January 1, 2021. For more information, please visit https://www.ontario.ca/page/handling-excess-soil.

- The report should reference that activities involving the management of excess soil should be completed in accordance with O. Reg. 406/19 and the MECP's current guidance document titled "Management of Excess Soil – A Guide for Best Management Practices" (2014).

- All waste generated during construction must be disposed of in accordance with ministry requirements

Contaminated Sites

- Any current or historical waste disposal sites should be identified in the report. The status of these sites should be determined to confirm whether approval pursuant to Section 46 of the EPA may be required for land uses on former disposal sites. We recommend referring to the MECP's D-4 guideline for land use considerations near landfills and dumps.
  - Resources available may include regional/local municipal official plans and data; provincial data on large landfill sites and small landfill sites; Environmental Compliance Approval information for waste disposal sites on Access Environment.

- Other known contaminated sites (local, provincial, federal) in the study area should also be identified in the report (Note – information on federal contaminated sites is found on the Government of Canada's website).

- The location of any underground storage tanks should be investigated in the report. Measures should be identified to ensure the integrity of these tanks and to ensure an appropriate response in the event of a spill. The ministry's Spills Action Centre must be contacted in such an event.

- Since the removal or movement of soils may be required, appropriate tests to determine contaminant levels from previous land uses or dumping should be undertaken. If the soils are contaminated, you must determine how and where they are to be disposed of, consistent with *Part XV.1 of the Environmental Protection Act* (EPA) and Ontario Regulation 153/04, Records of Site Condition, which details the new requirements related to site assessment and clean up. Please contact the appropriate MECP District Office for further consultation if contaminated sites are present.

Servicing, Utilities and Facilities

- The report should identify any above or underground utilities in the study area such as transmission lines, telephone/internet, oil/gas etc. The owners should be consulted to discuss impacts to this infrastructure, including potential spills.

- The report should identify any servicing infrastructure in the study area such as wastewater, water, stormwater that may potentially be impacted by the project.

- Any facility that releases emissions to the atmosphere, discharges contaminants to ground or surface water, provides potable water supplies, or stores, transports or disposes of waste must have an Environmental Compliance Approval (ECA) before it can operate lawfully. Please consult with MECP's Environmental Permissions Branch to determine whether a new or amended ECA will be required for any proposed infrastructure.

- We recommend referring to the ministry's environmental land use planning guides to ensure that any potential land use conflicts are considered when planning for any infrastructure or facilities related to wastewater, pipelines, landfills or industrial uses.

Mitigation and Monitoring

- Contractors must be made aware of all environmental considerations so that all environmental standards and commitments for both construction and operation are met. Mitigation measures should be clearly referenced in the report and regularly monitored during the construction stage of the project. In addition, we encourage proponents to conduct post-construction monitoring to ensure all mitigation measures have been effective and are functioning properly.

- Design and construction reports and plans should be based on a best management approach that centres on the prevention of impacts, protection of the existing environment, and opportunities for rehabilitation and enhancement of any impacted areas.

- The proponent's construction and post-construction monitoring plans must be documented in the report, as outlined in Section A.2.5 and A.4.1 of the MEA Class EA parent document.

Consultation

- The report must demonstrate how the consultation provisions of the Class EA have been fulfilled, including documentation of all stakeholder consultation efforts undertaken during the planning process. This includes a discussion in the report that identifies concerns that were raised and **describes how they have been addressed by the proponent** throughout

the planning process. The report should also include copies of comments submitted on the project by interested stakeholders, and the proponent's responses to these comments (as directed by the Class EA to include full documentation).

- Please include the full stakeholder distribution/consultation list in the documentation.

Class EA Process

- If this project is a Master Plan: there are several different approaches that can be used to conduct a Master Plan, examples of which are outlined in Appendix 4 of the Class EA. **The Master Plan should clearly indicate the selected approach for conducting the plan**, by identifying whether the levels of assessment, consultation and documentation are sufficient to fulfill the requirements for Schedule B or C projects. Please note that any Schedule B or C projects identified in the plan would be subject to Part II Order Requests under the Environmental Assessment Act, although the plan itself would not be. **Please include a description of the approach being undertaken (use Appendix 4 as a reference).**

- If this project is a Master Plan: Any identified projects should also include information on the MCEA schedule associated with the project.

- The report should provide clear and complete documentation of the planning process in order to allow for transparency in decision-making.

- The Class EA requires the consideration of the effects of each alternative on all aspects of the environment (including planning, natural, social, cultural, economic, technical). The report should include a level of detail (e.g. hydrogeological investigations, terrestrial and aquatic assessments, cultural heritage assessments) such that all potential impacts can be identified, and appropriate mitigation measures can be developed. Any supporting studies conducted during the Class EA process should be referenced and included as part of the report.

- Please include in the report a list of all subsequent permits or approvals that may be required for the implementation of the preferred alternative, including but not limited to, MECP's PTTW, EASR Registrations and ECAs, conservation authority permits, species at risk permits, MTO permits and approvals under the *Impact Assessment Act*, 2019.

- Ministry guidelines and other information related to the issues above are available at http://www.ontario.ca/environment-and-energy/environment-and-energy. We encourage you to review all the available guides and to reference any relevant information in the report.

Amendments to the EAA through the Covid-19 Economic Recovery Act, 2020
Once the EA Report is finalized, the proponent must issue a Notice of Completion providing a minimum 30-day period during which documentation may be reviewed and comment and input can be submitted to the proponent. The Notice of Completion must be sent to the appropriate MECP Regional Office email address (for projects in MECP Southwest Region, the email is eanotification.swregion@ontario.ca).

The public has the ability to request a higher level of assessment on a project if they are concerned about potential adverse impacts to constitutionally protected Aboriginal and treaty rights. In addition, the Minister may issue an order on his or her own initiative within a specified time period. The Director (of the Environmental Assessment Branch) will issue a Notice of Proposed Order to the proponent if the Minister is considering an order for the project within 30 days after the conclusion of the comment period on the Notice of Completion. At this time, the Director may request additional information from the proponent. Once the requested information has been received, the Minister will have 30 days within which to make a decision or impose conditions on your project.

Therefore, the proponent cannot proceed with the project until at least 30 days after the end of the comment period provided for in the Notice of Completion. Further, the proponent may not proceed after this time if:

- a Part II Order request has been submitted to the ministry regarding potential adverse impacts to constitutionally protected Aboriginal and treaty rights, or
- the Director has issued a Notice of Proposed order regarding the project.

Please ensure that the Notice of Completion advises that outstanding concerns are to be directed to the proponent for a response, and that in the event there are outstanding concerns regarding potential adverse impacts to constitutionally protected Aboriginal and treaty rights, Part II Order requests on those matters should be addressed in writing to:

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

and

Director, Environmental Assessment Branch
Ministry of Environment, Conservation and Parks
135 St. Clair Ave. W, 1st Floor
Toronto ON, M4V 1P5
EABDirector@ontario.ca

A PROPONENT'S INTRODUCTION TO THE DELEGATION OF PROCEDURAL ASPECTS OF CONSULTATION WITH ABORIGINAL COMMUNITIES

DEFINITIONS

The following definitions are specific to this document and may not apply in other contexts:

Aboriginal communities – the First Nation or Métis communities identified by the Crown for the purpose of consultation.

Consultation – the Crown's legal obligation to consult when the Crown has knowledge of an established or asserted Aboriginal or treaty right and contemplates conduct that might adversely impact that right. This is the type of consultation required pursuant to s. 35 of the *Constitution Act, 1982*. Note that this definition does not include consultation with Aboriginal communities for other reasons, such as regulatory requirements.

Crown – the Ontario Crown, acting through a particular ministry or ministries.

Procedural aspects of consultation – those portions of consultation related to the process of consultation, such as notifying an Aboriginal community about a project, providing information about the potential impacts of a project, responding to concerns raised by an Aboriginal community and proposing changes to the project to avoid negative impacts.

Proponent – the person or entity that wants to undertake a project and requires an Ontario Crown decision or approval for the project.

I. PURPOSE

The Crown has a legal duty to consult Aboriginal communities when it has knowledge of an existing or asserted Aboriginal or treaty right and contemplates conduct that may adversely impact that right. In outlining a framework for the duty to consult, the Supreme Court of Canada has stated that the Crown may delegate procedural aspects of consultation to third parties. This document provides general information about the Ontario Crown's approach to delegation of the procedural aspects of consultation to proponents.

This document is not intended to instruct a proponent about an individual project, and it does not constitute legal advice.

II. WHY IS IT NECESSARY TO CONSULT WITH ABORIGINAL COMMUNITIES?

The objective of the modern law of Aboriginal and treaty rights is the *reconciliation* of Aboriginal peoples and non-Aboriginal peoples and their respective rights, claims and interests. Consultation is an important component of the reconciliation process.

The Crown has a legal duty to consult Aboriginal communities when it has knowledge of an existing or asserted Aboriginal or treaty right and contemplates conduct that might adversely impact that right. For example, the Crown's duty to consult is triggered when it considers

issuing a permit, authorization or approval for a project which has the potential to adversely impact an Aboriginal right, such as the right to hunt, fish, or trap in a particular area.

The scope of consultation required in particular circumstances ranges across a spectrum depending on both the nature of the asserted or established right and the seriousness of the potential adverse impacts on that right.

Depending on the particular circumstances, the Crown may also need to take steps to accommodate the potentially impacted Aboriginal or treaty right. For example, the Crown may be required to avoid or minimize the potential adverse impacts of the project.

III. THE CROWN'S ROLE AND RESPONSIBILITIES IN THE DELEGATED CONSULTATION PROCESS

The Crown has the responsibility for ensuring that the duty to consult, and accommodate where appropriate, is met. However, the Crown may delegate the procedural aspects of consultation to a proponent.

There are different ways in which the Crown may delegate the procedural aspects of consultation to a proponent, including through a letter, a memorandum of understanding, legislation, regulation, policy and codes of practice.

If the Crown decides to delegate procedural aspects of consultation, the Crown will generally:

- Ensure that the delegation of procedural aspects of consultation and the responsibilities of the proponent are clearly communicated to the proponent;
- Identify which Aboriginal communities must be consulted;
- Provide contact information for the Aboriginal communities;
- Revise, as necessary, the list of Aboriginal communities to be consulted as new information becomes available and is assessed by the Crown;
- Assess the scope of consultation owed to the Aboriginal communities;
- Maintain appropriate oversight of the actions taken by the proponent in fulfilling the procedural aspects of consultation;
- Assess the adequacy of consultation that is undertaken and any accommodation that may be required;
- Provide a contact within any responsible ministry in case issues arise that require direction from the Crown; and
- Participate in the consultation process as necessary and as determined by the Crown.

IV. THE PROPONENT'S ROLE AND RESPONSIBILITIES IN THE DELEGATED CONSULTATION PROCESS

Where aspects of the consultation process have been delegated to a proponent, the Crown, in meeting its duty to consult, will rely on the proponent's consultation activities and documentation of those activities. The consultation process informs the Crown's decision of whether or not to approve a proposed project or activity.

A proponent's role and responsibilities will vary depending on a variety of factors including the extent of consultation required in the circumstance and the procedural aspects of consultation the Crown has delegated to it. Proponents are often in a better position than the Crown to discuss a project and its potential impacts with Aboriginal communities and to determine ways to avoid or minimize the adverse impacts of a project.

A proponent can raise issues or questions with the Crown at any time during the consultation process. If issues or concerns arise during the consultation that cannot be addressed by the proponent, the proponent should contact the Crown.

a) What might a proponent be required to do in carrying out the procedural aspects of consultation?

Where the Crown delegates procedural aspects of consultation, it is often the proponent's responsibility to provide notice of the proposed project to the identified Aboriginal communities. The notice should indicate that the Crown has delegated the procedural aspects of consultation to the proponent and should include the following information:

- a description of the proposed project or activity;
- mapping;
- proposed timelines;
- details regarding anticipated environmental and other impacts;
- details regarding opportunities to comment; and
- any changes to the proposed project that have been made for seasonal conditions or other factors, where relevant.

Proponents should provide enough information and time to allow Aboriginal communities to provide meaningful feedback regarding the potential impacts of the project. Depending on the nature of consultation required for a project, a proponent also may be required to:

- provide the Crown with copies of any consultation plans prepared and an opportunity to review and comment;
- ensure that any necessary follow-up discussions with Aboriginal communities take place in a timely manner, including to confirm receipt of information, share and update information and to address questions or concerns that may arise;

- as appropriate, discuss with Aboriginal communities potential mitigation measures and/or changes to the project in response to concerns raised by Aboriginal communities;
- use language that is accessible and not overly technical, and translate material into Aboriginal languages where requested or appropriate;
- bear the reasonable costs associated with the consultation process such as, but not limited to, meeting hall rental, meal costs, document translation(s), or to address technical & capacity issues;
- provide the Crown with all the details about potential impacts on established or asserted Aboriginal or treaty rights, how these concerns have been considered and addressed by the proponent and the Aboriginal communities and any steps taken to mitigate the potential impacts;
- provide the Crown with complete and accurate documentation from these meetings and communications; and
- notify the Crown immediately if an Aboriginal community not identified by the Crown approaches the proponent seeking consultation opportunities.

b) What documentation and reporting does the Crown need from the proponent?

Proponents should keep records of all communications with the Aboriginal communities involved in the consultation process and any information provided to these Aboriginal communities.

As the Crown is required to assess the adequacy of consultation, it needs documentation to satisfy itself that the proponent has fulfilled the procedural aspects of consultation delegated to it. The documentation required would typically include:

- the date of meetings, the agendas, any materials distributed, those in attendance and copies of any minutes prepared;
- the description of the proposed project that was shared at the meeting;
- any and all concerns or other feedback provided by the communities;
- any information that was shared by a community in relation to its asserted or established Aboriginal or treaty rights and any potential adverse impacts of the proposed activity, approval or disposition on such rights;
- any proposed project changes or mitigation measures that were discussed, and feedback from Aboriginal communities about the proposed changes and measures;
- any commitments made by the proponent in response to any concerns raised, and feedback from Aboriginal communities on those commitments;
- copies of correspondence to or from Aboriginal communities, and any materials distributed electronically or by mail;

- information regarding any financial assistance provided by the proponent to enable participation by Aboriginal communities in the consultation;
- periodic consultation progress reports or copies of meeting notes if requested by the Crown;
- a summary of how the delegated aspects of consultation were carried out and the results; and
- a summary of issues raised by the Aboriginal communities, how the issues were addressed and any outstanding issues.

In certain circumstances, the Crown may share and discuss the proponent's consultation record with an Aboriginal community to ensure that it is an accurate reflection of the consultation process.

c) Will the Crown require a proponent to provide information about its commercial arrangements with Aboriginal communities?

The Crown may require a proponent to share information about aspects of commercial arrangements between the proponent and Aboriginal communities where the arrangements:

- include elements that are directed at mitigating or otherwise addressing impacts of the project;
- include securing an Aboriginal community's support for the project; or
- may potentially affect the obligations of the Crown to the Aboriginal communities.

The proponent should make every reasonable effort to exempt the Crown from confidentiality provisions in commercial arrangements with Aboriginal communities to the extent necessary to allow this information to be shared with the Crown.

The Crown cannot guarantee that information shared with the Crown will remain confidential. Confidential commercial information should not be provided to the Crown as part of the consultation record if it is not relevant to the duty to consult or otherwise required to be submitted to the Crown as part of the regulatory process.

V. WHAT ARE THE ROLES AND RESPONSIBILITIES OF ABORIGINAL COMMUNITIES' IN THE CONSULTATION PROCESS?

Like the Crown, Aboriginal communities are expected to engage in consultation in good faith. This includes:

- responding to the consultation notice;
- engaging in the proposed consultation process;
- providing relevant documentation;

- clearly articulating the potential impacts of the proposed project on Aboriginal or treaty rights; and
- discussing ways to mitigates any adverse impacts.

Some Aboriginal communities have developed tools, such as consultation protocols, policies or processes that provide guidance on how they would prefer to be consulted. Although not legally binding, proponents are encouraged to respect these community processes where it is reasonable to do so. Please note that there is no obligation for a proponent to pay a fee to an Aboriginal community in order to enter into a consultation process.

To ensure that the Crown is aware of existing community consultation protocols, proponents should contact the relevant Crown ministry when presented with a consultation protocol by an Aboriginal community or anyone purporting to be a representative of an Aboriginal community.

VI. WHAT IF MORE THAN ONE PROVINCIAL CROWN MINISTRY IS INVOLVED IN APPROVING A PROPONENT'S PROJECT?

Depending on the project and the required permits or approvals, one or more ministries may delegate procedural aspects of the Crown's duty to consult to the proponent. The proponent may contact individual ministries for guidance related to the delegation of procedural aspects of consultation for ministry-specific permits/approvals required for the project in question. Proponents are encouraged to seek input from all involved Crown ministries sooner rather than later.

Hydro One Networks Inc
483 Bay St
Toronto, ON

October 06, 2021

Re: Adelaide Wastewater Treatment Plant Climate Change Resiliency Class EA

Attention:
Marcy McKillop, P.Eng.
Environmental Services Engineer
Wastewater Treatment Operations

Thank you for sending us notification regarding (Adelaide Wastewater Treatment Plant Climate Change Resiliency Class EA). In our preliminary assessment, we confirm there are no existing Hydro One Transmission assets in the subject area. Please be advised that this is only a preliminary assessment based on current information.

If plans for the undertaking change or the study area expands beyond that shown, please contact Hydro One to assess impacts of existing or future planned electricity infrastructure.

Any future communications are sent to Secondarylanduse@hydroone.com.

Be advised that any changes to lot grading and/or drainage within proximity to Hydro One transmission corridor lands must be controlled and directed away from the transmission corridor.

Sent on behalf of,

Secondary Land Use
Asset Optimization
Strategy & Integrated Planning
Hydro One Networks Inc.

Melani-Ivy Samson

From: McKillop, Marcy <mmckillop@london.ca>
Sent: Friday, October 22, 2021 5:13 PM
To: Andrew Doherty
Subject: FW: [EXTERNAL] what about a levy

Hi Andrew,

I had a ½ hr phone call with [redacted] this afternoon regarding the Greenway and Adelaide Class EAs. I provided an general overview of these Class EAs and spoke to some of the information presented as part of the first PIC.

Please add my email below to the consultation record for each Class EA.

Thanks and have a great weekend,

-Marcy

From: McKillop, Marcy
Sent: Friday, October 22, 2021 5:10 PM
To: [redacted]
Subject: RE: [EXTERNAL] what about a levy

Hi [redacted]

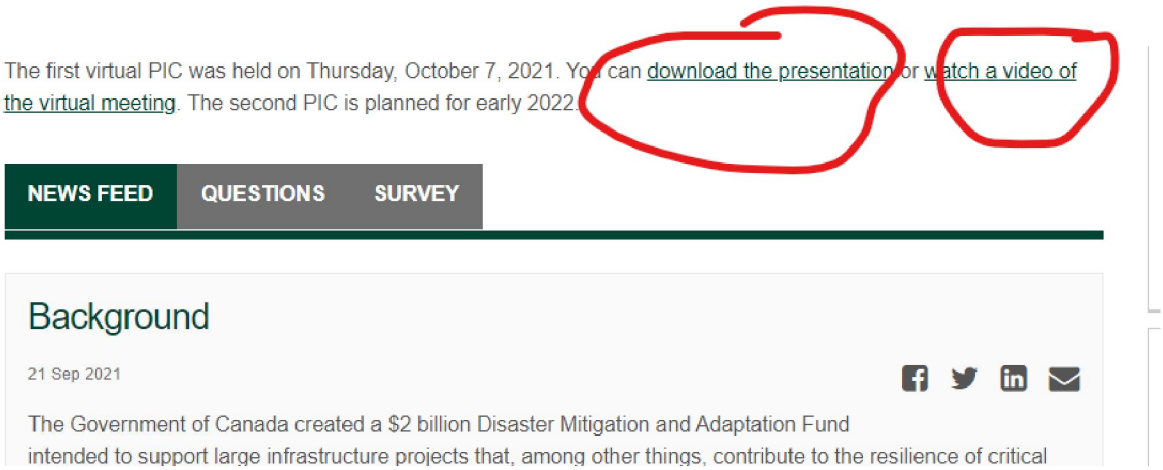
I'm glad we were able to connect this afternoon.

As a follow-up to our phone call, here are the relevant websites that I mentioned:

Greenway Wastewater Treatment Plant Climate Change Resiliency Class Environment Assessment: Get Involved Webpage: https://getinvolved.london.ca/greenway-climate-change

Adelaide Wastewater Treatment Plant Climate Change Resiliency Class Environment Assessment: Get Involved Webpage: https://getinvolved.london.ca/adelaide-climate-change

Please note that for both the Greenway and Adelaide projects, you can view the October 6 and 7 public information centre materials about half-way down the webpage:



Wastewater Treatment Operations Master Plan – provides a long-term plan for the City's wastewater treatment plants and pumping stations to address growth, asset renewal, environmental protection and climate change mitigation
Get Involved Webpage: https://getinvolved.london.ca/wastewater-master-plan

Let me know if you would like to further discuss any of these projects. Feel free to call me again.

Take care,

-Marcy

From: [redacted]
Sent: Thursday, October 21, 2021 6:04 PM
To: McKillop, Marcy <mmckillop@london.ca>
Subject: Re: [EXTERNAL] what about a levy

will do.

On 21/10/2021 5:42 p.m., McKillop, Marcy wrote:

> Thanks [redacted]
>
> The best time to reach me tomorrow is between 1 pm and 3 pm. Feel free to call my cell number.

Marcy McKillop, P.Eng.
Environmental Services Engineer
Wastewater Treatment Operations
City of London

109 Greenside Avenue
London, ON N6J 2X5
P: 519.661.CITY(2489) x 4976 | Cell: 226.688.8176 | Fax: 519.661.0199

mmckillop@london.ca | www.london.ca

As part of our ongoing efforts to stop the spread of COVID-19, the City of London has made changes to many City services. Visit our website for the latest information about City services and COVID-19.

From: [redacted]
Sent: Thursday, October 21, 2021 5:11 PM
To: McKillop, Marcy <mmckillop@london.ca>
Subject: Re: [EXTERNAL] what about a levy

will do..tomorrow, friday works for me.

On 20/10/2021 8:30 p.m., McKillop, Marcy wrote:

> Hi [redacted]
>
> I'm working a mix of remotely at home, and also in the office. A good time to reach me is tomorrow between 1:30 pm and 3 pm. Please call my office extension, and leave me a message including your contact information, including your phone number. I'll then call you back on my cell phone.
>
> Take care,
>
> -Marcy

From: [redacted]
Sent: Wednesday, October 20, 2021 6:20 PM
To: McKillop, Marcy <mmckillop@london.ca>
Subject: Re: [EXTERNAL] what about a levy

we have been busy..I WILL phone you or leave a message..what would be appropriate time to phone

On 20/10/2021 3:12 p.m., McKillop, Marcy wrote:

> Hi [redacted]
>
> You might be interested in reviewing the Public Information Centre materials for both the Greenway Wastewater Treatment Plant Climate Change Resiliency Class Environmental Assessment, as well as the Adelaide Wastewater Treatment Plant Climate Change Resiliency

Class Environmental Assessment. These public information centres were held virtually on October 6 and 7, 2021.

A copy of the presentation materials is available as a pdf file, as well as a recording of the meeting/webinar, are available here:

https://getinvolved.london.ca/greenway-climate-change

and

https://getinvolved.london.ca/adelaide-climate-change

Each presentation includes a figure and simulation to illustrate flooding extent from the regulatory (1:250 year) event, as well as the proposed alternatives for site flood protection.

Again, I'd be happy to speak with you about these projects. Feel free to propose a date and time that works for you, along with your phone number.

Best regards,

Marcy McKillop, P.Eng.
Environmental Services Engineer
Wastewater Treatment Operations
City of London

109 Greenside Avenue
London, ON N6J 2X5
P: 519.661.CITY(2489) x 4976 | Cell: 226.688.8176 | Fax: 519.661.0199
mmckillop@london.ca | www.london.ca

As part of our ongoing efforts to stop the spread of COVID-19, the City of London has made changes to many City services. Visit our website for the latest information about City services and COVID-19.

From: [redacted]
Sent: Sunday, October 17, 2021 5:32 PM
To: McKillop, Marcy <mmckillop@london.ca>
Subject: Re: [EXTERNAL] what about a levy

I googled the Adelaide plant and its a small river passing teh north part where all the play areas are, but how far does the water,,as in rain that we have had in the last month,

Overflow of river is 1/4 Mile, come to the plant. Unlike Greenway, where there is a ridge or driveway, with doggie on south side..play areas for humans on the north side.

On 15/10/2021 5:04 p.m., [redacted]

> I will drive to the Adelaide Plant and take a look before we talk. Both are near the Thames River.
>
> I need to get semi educated on this plan the city is about to spend our money on.
>
> On 15/10/2021 3:38 p.m., McKillop, Marcy wrote:
>
> > Good afternoon [redacted]
> >
> > Thank you for your email. I'd be happy to speak with you regarding proposed flood protection strategies for the Greenway Wastewater Treatment Plant and/or the Adelaide Wastewater Treatment Plant.
> >
> > Let me know if there is a preferred day and time, and the best number to reach you at.
> >
> > Best regards,

Marcy McKillop, P.Eng.
Environmental Services Engineer
Wastewater Treatment Operations
City of London

109 Greenside Avenue
London, ON N6J 2X5
P: 519.661.CITY(2489) x 4976 | Cell: 226.688.8176 | Fax: 519.661.0199
mmckillop@london.ca | www.london.ca

As part of our ongoing efforts to stop the spread of COVID-19, the City of London changes to many City services. Visit our website for the latest information about C and COVID-19.

-----Original Message-----
From: [redacted]

[redacted]
Sent: Thursday, October 14, 2021 8:39 PM
To: McKillop, Marcy <mmckillop@london.ca>
Subject: [EXTERNAL] what about a levy

has thought been given to building a levy or wall on the inside of the Plant, next to the hedge.

It does not have to be high..

I noted over the years, the only place that becomes flooded is Greenway & Harris park.

But I wonder about what the drainage pipe that I used to see draining into the Thames.

I noted also teh yard stick protruding near the drain pipe..or used to.
Since the growth of trees at the river side has hidden both

Melani-Ivy Samson

From: McKillop, Marcy <mmckillop@london.ca>
Sent: Friday, October 15, 2021 1:27 PM
To: Andrew Doherty
Subject: [External] FW: Greenway Wastewater Treatment Plant & Adelaide WWTP

FYI

Please save with the comments/responses received….

From: Matthew Ilkiw <MIlkiw@aecon.com>
Sent: Friday, October 15, 2021 1:21 PM
To: McKillop, Marcy <mmckillop@london.ca>
Subject: [EXTERNAL] Greenway Wastewater Treatment Plant & Adelaide WWTP

Hello Marcy,

I hope all is well with you.
My name is Matthew Ilkiw and I am the Coordinator of Strategic Business Development for our Industrial Team at Aecon Group Inc. (www.aecon.com).
I wanted to reach out to you regarding London's future water treatment plant & wastewater treatment plant endeavors. We are very interested in connecting with you to discuss how Aecon could possibly support the development of this project.
Please let me know if there is any information (size, value, start dates) with regards to any construction scope / GC prequal or if you could pass this information on to a suitable contact.
Let me know at your earliest convenience – have a great weekend.

Thank you.

Best regards,

Matthew Ilkiw, BURPL
Business Development Coordinator,
Aecon Industrial
Mobile: 437 324 3825
Email: milkiw@aecon.com

AECON GROUP INC.
20 Carlson Ct,
Etobicoke ON M9W 7K6
aecon.com
https://www.aecon.com/

Survey Responses

24 February 2020 - 25 April 2022

Public Information Centre (PIC) No. 1 Public Comments Questionnaire

Get Involved London

Project: Greenway Wastewater Treatment Plant Climate Change Resiliency

BANG THE TABLE engagementHQ

VISITORS					
4					
CONTRIBUTORS			RESPONSES		
1			1		
1 Registered	0 Unverified	0 Anonymous	1 Registered	0 Unverified	0 Anonymous

Respondent No: 1
Login: [redacted]
Email: [redacted]

Responded At: Mar 07, 2022 22:52:52 pm
Last Seen: Mar 08, 2022 05:50:59 am
IP Address: [redacted]

Q1.	**My interest in this project is: (Please check all that apply)**	General Interest Nearby Residential Property
Q2.	**Is the presentation on the EA project clear? Such as:Where we are in the processEA criteriaAlternatives**	Yes
Q3.	**Are the Problem and Opportunity statements clear?**	Yes
Q4.	**Do you feel the consultation team should further consider something particular to your local area?**	No
Q5.	**Are there additional criteria that you feel should be considered in the process?**	No
Q6.	**Do you have any comments or concerns about the conceptual alternative solutions presented for the project area?**	No
Q7.	**Based on the presentation, do you feel there is anything further you would like to share?**	**Yes (please specify)** I am wondering if odor issue can be improved.

Melani-Ivy Samson

From: McKillop, Marcy <mmckillop@london.ca>
Sent: Thursday, March 10, 2022 11:05 AM
To: Steve Braun
Cc: Oudekerk, Kirby; Murray, Kyle John Stuart; Peter De Carvalho; Melani-Ivy Samson
Subject: FW: [EXTERNAL] Adelaide

FYI

[redacted] provided the forwarded email in response to yesterday's Adelaide PIC

From: [redacted]
Sent: Thursday, March 10, 2022 10:33 AM
To: McKillop, Marcy <mmckillop@london.ca>
Subject: [EXTERNAL] Adelaide

Nice to hear that the climate change adaptation also has the benefit of reducing by passes. No worries about that little marsh - it is full of phragmites

Cheers

Melani-Ivy Samson

From: Baskaran, Narendran <Narendran.Baskaran@Telecon.ca>
Sent: Wednesday, March 16, 2022 10:02 AM
To: Melani-Ivy Samson
Subject: [External] G221828_Adelaide St N
Attachments: G221828_Adelaide St N.dwg; G221828_Adelaide St N_Rogers Markup Response Letter.pdf

Hi,

Please find attached completed markup request.

Narendran Baskaran

CAD, Engineering - Central Canada
CAO, Ingénierie - Centre du Canada

T 905-569-2882 ext 1501
7777 Weston Rd, Woodbridge (Ontario) L4L 0G9

telecon

telecon.ca

From: Melani-Ivy Samson <msamson@matrix-solutions.com>
Sent: Wednesday, February 23, 2022 3:49 PM
Cc: Steve Braun <sbraun@matrix-solutions.com>; McKillop, Marcy <mmckillop@london.ca>; Lisa Prime <lisa@primestrategyplanning.com>; Peter De Carvalho <pdecarvalho@matrix-solutions.com>
Subject: Adelaide WWTP Climate Change Resiliency EA - Notice of Public Information Centre No. 2

Hello,

On behalf of the City of London, this email is to notify you of the upcoming virtual Public Information Centre (PIC) for the Adelaide Wastewater Treatment Plant Climate Change Resiliency Class Environmental Assessment (EA). The attached notice provides additional information about this event.

The virtual PIC will be held on **Wednesday, March 9, 2022 from 3:00 pm to 4:00 pm.** Please visit the City's Get Involved page to register for this event. A recorded video presentation will be made available following the PIC on the Get Involved page.

If you have any questions or concerns about this project, please don't hesitate to get in touch with the Project Managers (contact information attached).

If you wish to be removed from the distribution list for this study, please let me know.

Thank you,

Melani-Ivy Samson, M.A.Sc., EIT
Water Resources EIT

MATRIX SOLUTIONS INC.

Environment & Engineering
7B, 650 Woodlawn Rd. W, Guelph, ON N1K 1B8
D 226.314.1916 **C** 514.402.8082
T 519.772.3777 **F** 226.314.1908
24-Hour Emergency Spill Response 1.877.774.5525
www.matrix-solutions.com

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

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MEETING MINUTES

MEETING TIME:	Wednesday, May 5, 2021 1:00 - 2:00 pm		
LOCATION:	Online		
PROJECT:	32667 – 531 Class EAs for Greenway and Adelaide WWTPs Climate Change Resiliency		
SUBJECT:	Project Introduction Workshop		
ATTENDEES:	**City of London:** • Marcy McKillop	**Upper Thames River Conservation Authority:** • Brent Verscheure • Stephanie Schreiner • Mark Shifflett	**Matrix Solutions Inc:** • Steve Braun • Andrew Doherty
MINUTES BY:	A. Doherty		
REVIEWED BY:	S. Braun		

The agenda items included:

- Introduction
- Schedule B Environmental Assessment (EA) Process
- Conceptual Flood Mitigation
- Conceptual Effluent Pumping
- Discussion: Challenges, Opportunities, and Risks
- Communication Plan
- Schedule and Next Steps

The presentation is attached to these minutes.

Introduction

Introductions were made by Matrix, the City of London, and the Upper Thames River Conservation Authority (UTRCA).

B. Verscheure noted that he would be the primary UTRCA contact for the EAs.

A. Doherty provided an overview of the Municipal Class EAs being undertaken for the Adelaide and Greenway WWTPs to provide flood mitigation for climate change resiliency.

Schedule B EA Process

A. Doherty discussed that a separate Schedule B Municipal Class EA will be completed for each WWTP and presented the following summary of key steps in the EA process:

- Technical studies to identify opportunities and constraints
- Hydraulic screening to evaluate a long-list of alternatives
- Confirm short-list of alternative solutions
- 10% conceptual design of alternative solutions
- Evaluation and selection of a preferred alternative solution

A. Doherty discussed that the technical studies included a stage 1 archaeology study and a natural heritage study. Matrix, UTRCA (B. Verscheure), and the City met online on May 4, 2021 to review Matrix's ecology scope for the natural heritage study.

Screening of a Long-list of Alternatives through Hydraulic Analysis

A. Doherty presented the following long-list of flood mitigation alternatives that will be screened through hydraulic analysis:

- Channel Conveyance Improvements: lowering and/or widening
- Structural Conveyance Improvements: bridge replacement (i.e. at the end of design lifecycle)
- Flood Containment: flood protection landforms, berms/dykes, floodwalls
- Flood Diversion: local or upstream
- Regional Flood Control: online or offline
- Policy Measures: flood-proofing, land acquisition
- Do Nothing

B. Verscheure highlighted that the ecology scope (previously discussed with UTRCA on May 4, 2021) was confined to the limits of the WWTPs (i.e. it does not include an assessment of the Thames River). In contrast, the limits of several long-list options extend beyond the WTTPs.

It was discussed that the ecology work was scoped based on the expectation that flood mitigation would be contained to the WWTP properties. For example, S. Braun highlighted that improving Thames River conveyance was not expected to be a feasible or acceptable flood mitigation approach. It was noted that hydraulic analysis and screening were being completed to determine technical feasibility as well as to confirm and demonstrate options that are not practical.

Developing a Short-List of Alternatives for Conceptual Design

A. Doherty discussed that the results of the hydraulic analysis and screening would form the basis of identifying a short-list of alternatives that will be developed to conceptual (10%) design and evaluated in the EA process. A. Doherty presented the following considerations for developing the short-list of alternatives based on the screening results.

- Technical feasibility (hydraulic modelling)
- Economic feasibility
- Results of technical studies
- Flood plain impacts
- Level of protection
- Combination of approaches
- Rationale for short-list alternatives

M. Shifflett confirmed that upstream (i.e. backwater) and downstream (i.e. storage loss/balance) flood plain impacts are important project considerations from UTRCA's perspective.

Conceptual Design

A. Doherty briefly discussed the conceptual design scope, which is summarized as follows:

- preparing conceptual design figures
- confirming the hydraulics
- defining and coordinating requirements for effluent pumping
- incorporating climate change resiliency in the design criteria (e.g. freeboard)
- estimating costs

M. McKillop noted that City undertook a similar climate resiliency initiative at the Vauxhall WWTP. M. McKillop recommended that the Vauxhall project be considered a reference point for technical considerations for the Adelaide and Greenway EAs.

Evaluation of Preferred Solution

A. Doherty discussed that the alternative conceptual solutions would be evaluated to identify a preferred solution. The following typical evaluation criteria were presented, noting that the criteria would likely be developed as the EA progresses:

- **Technical:** Level of protection, construction approaches, climate change resiliency, WWTP operations
- **Economic**: Capital costs, O&M costs
- **Environment:** Ecology, archaeology
- **Social:** Policy considerations, public input, property, property/public space impacts, public safety

Conceptual Effluent Pump Station

A. Doherty briefly discussed that an effluent pumping station was anticipated as part of a flood mitigation solution and that CIMA+ (not present at the meeting) would lead its conceptual design.

Communication

A. Doherty highlighted the envisioned communication and consultation plans with the UTRCA during the EAs, including project workshops, meeting documentation, and reports and deliverables provided to UTRCA for review and comment.

Schedule

A. Doherty presented a project schedule and next steps, including background review and technical studies, hydraulic screening of the long-list of options, stakeholder engagement planning, and issuing commencement notices. The next project workshop is scheduled for July 2021, and project completion is scheduled for March 2022.

Discussion: Challenges, Opportunities, and Risks

M. Shifflett discussed that a spill occurs across Adelaide Street near the Adelaide WWTP during the regulatory flood event (i.e., 1:250 year event). UTRCA recommended a 2-dimensional (2D) modelling approach for hydraulic analysis of the Adelaide WWTP based on this spill occurring.

M. Shifflett noted that UTRCA was updating their 2D model of the Thames River at the Adelaide WWTP area, including incorporating relief culverts at Adelaide Street and structures within the flood plain. M. Shifflett noted that UTRCA might need to review technical details of the 2D model with Matrix's hydraulic modelling lead if required once the model was ready to be shared. S. Braun confirmed that K. Hofbauer, who has worked with M. Shifflett on previous projects, was the hydraulic modelling lead.

Matrix confirmed that both 1D and 2D models at Adelaide would be used in the hydraulic analysis. In addition, Matrix confirmed that a 1D modelling approach would be used for hydraulic analysis at the Greenway WWTP.

Post-Meeting Note: The hydraulic analysis and high-level screening of flood mitigation approaches at the Adeliade WWTP used both the 1D and 2D models provided by UTRCA. For Greenway, the 1D model provided by UTRCA was used.

B. Verscheure confirmed that UTRCA would share their 1D and 2D models with Matrix as soon as possible.

ACTION ITEMS

Action Required	Person Responsible	Action Due Date
UTRCA to share 1D hydraulic models (Adelaide and Greenway) and 2D model (Adelaide) with Matrix	B. Verscheure	Complete

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

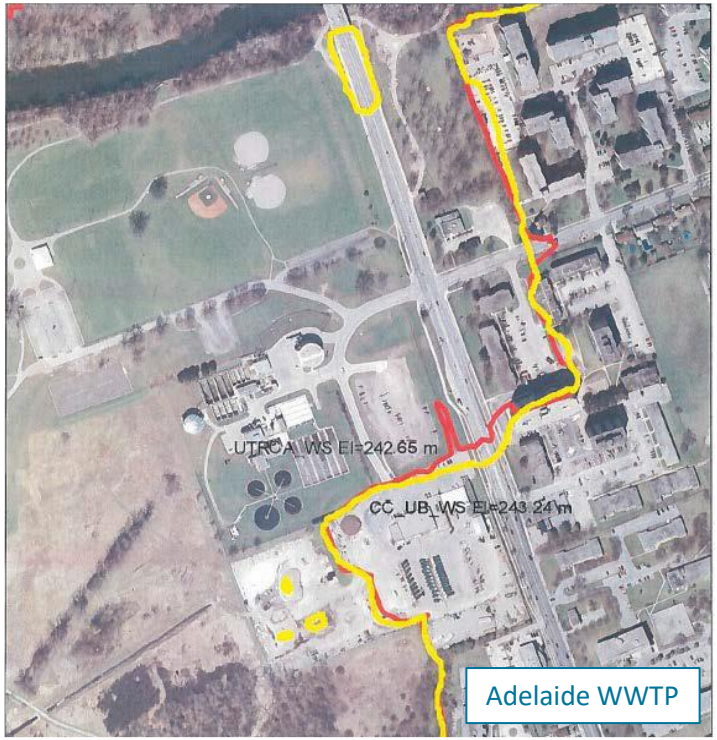
Class EAs for Greenway & Adelaide WWTP Climate Change Resiliency

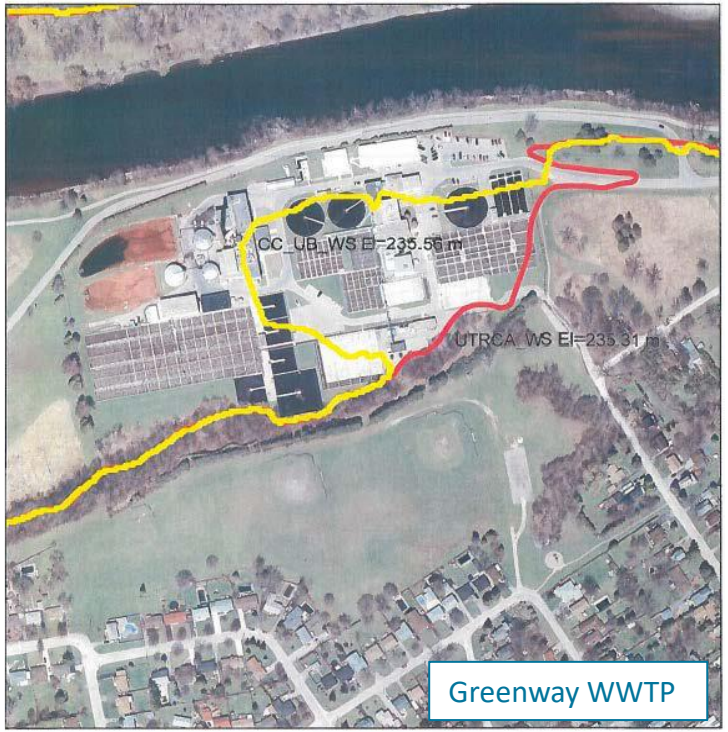
UTRCA Project Startup Meeting –May 5, 2021

Agenda

1. Introductions
2. Schedule B EA Process
3. Conceptual Flood Mitigation
4. Conceptual Effluent Pumping
5. Discussion: Challenges, Opportunities, and Risks
6. Communication
7. Schedule and Next Steps

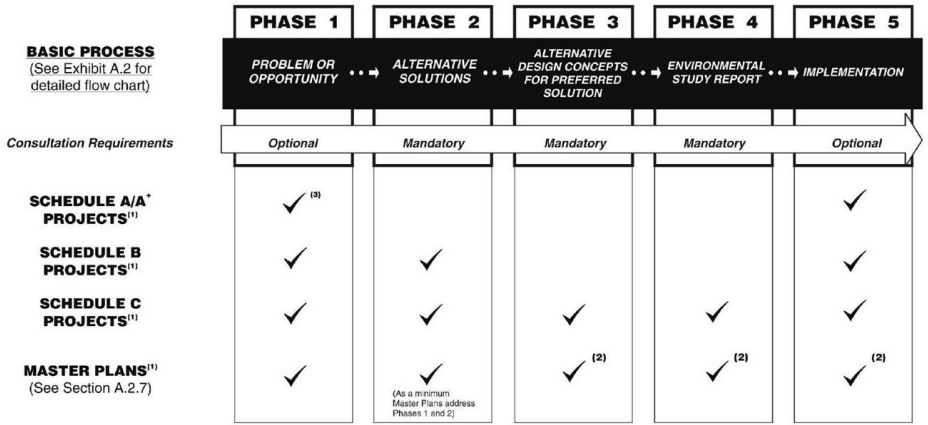
Introduction





Schedule B Class EA

EXHIBIT A. 1 KEY FEATURES OF THE MCEA



NOTES:

✓ Actions required during relevant phase

(1) Schedule A, A+, B and C projects and Master Plans can also be integrated with the requirements of the Planning Act (See Section A.2.9)

(2) Complete Phases 3 and 4 for any Schedule C projects included in the Master Plan prior to implementation

(3) For Schedule A+ projects, public to be advised. See Section A.1.2.2.

Conceptual Flood Mitigation

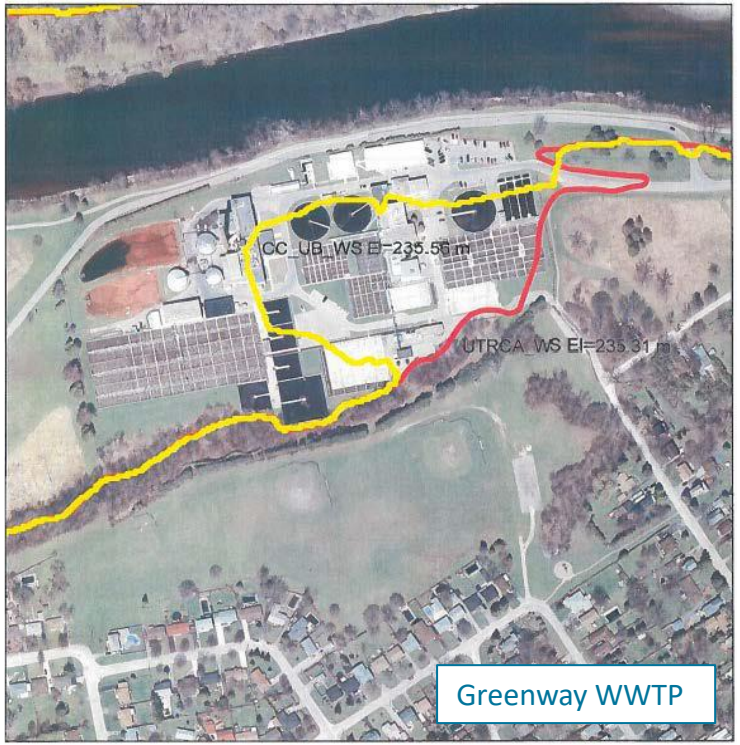


Screening of Long-list of Alternatives through Hydraulic Analysis

- **Channel Conveyance Improvements**: lowering and/or widening
- **Structural Conveyance Improvements**: bridge replacement (i.e. at end of lifecycle)
- **Flood Containment:** flood protection landforms, berm/dyke floodwall
- **Flood Diversion:** local or upstream
- **Regional Flood Control:** online or offline
- **Policy Measures:** flood-proofing, land acquisition, etc.
- Do Nothing

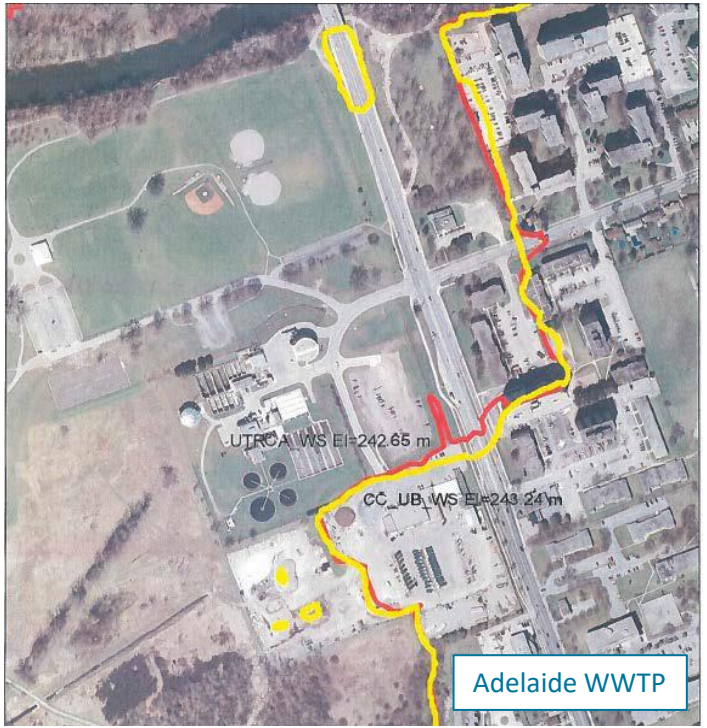
Developing a Short-list of Alternatives for Conceptual Design

- Technical feasibility (hydraulic modelling),
- Economic feasibility,
- Results of technical studies
- Floodplain impacts
- Level of protection
- Combination of approaches
- Sound rationale for short-list alternatives
- Demonstrate which options are not practical and not feasible to meet project requirements



Conceptual Design

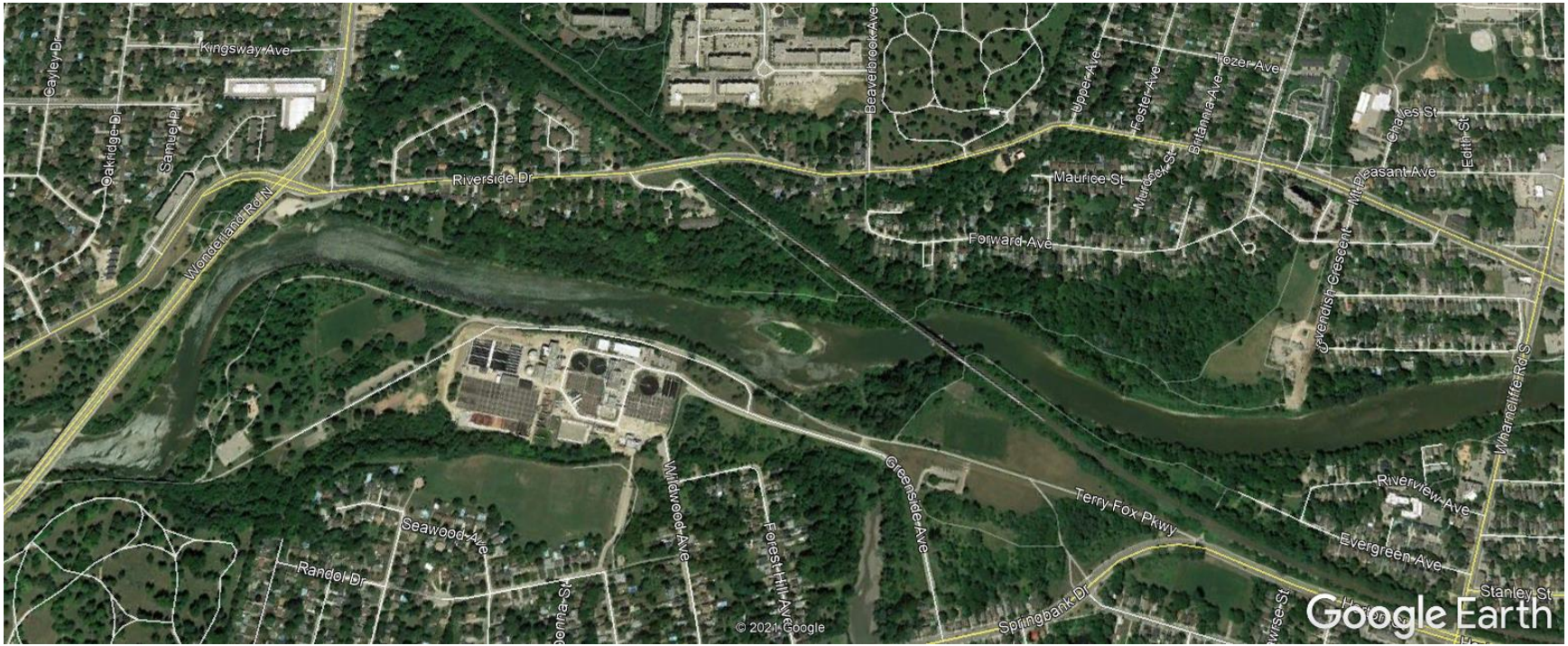
- preparing conceptual design figures
- confirming the hydraulics
- defining and coordinating requirements for effluent pumping
- incorporating climate change resiliency in the design criteria (e.g. freeboard)
- estimating costs



Adelaide WWTP



Greenway WWTP



Evaluation of Preferred Solution

Technical

a. Level of Protection
b. Construction Approaches
c. Climate Change Resiliency
d. WWTP operations

Economic

a. Capital Costs
b. O&M Costs

Environment

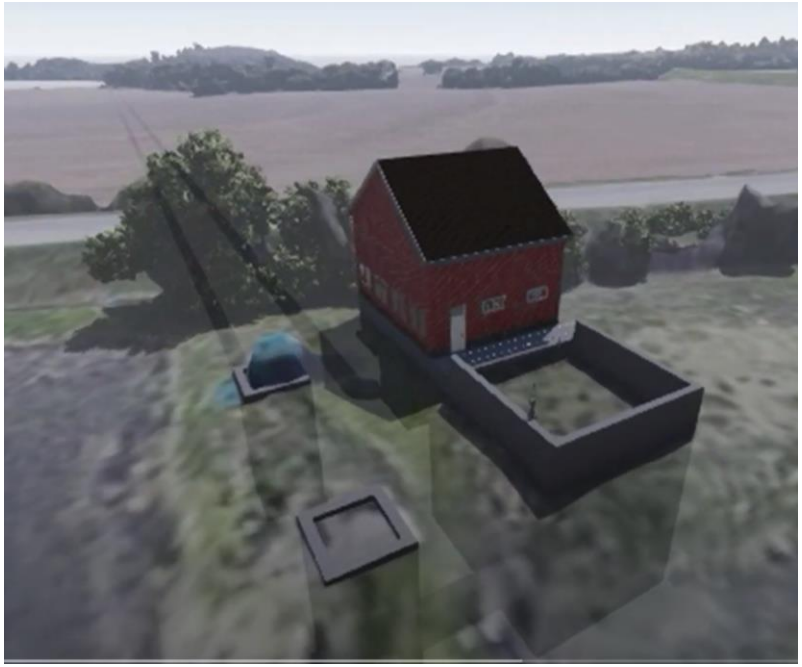
a. Ecology
b. Archaeology

Social

a. Policy Considerations
b. Public Input
c. Property/Public Space Impacts
d. Public Safety

Conceptual Effluent Pump Station

- CIMA+ is providing support with effluent pump station components
- Assumed that future high river levels will require an effluent pump station (base scope)
- Important to meet with wastewater operations to develop and refine effluent pumping alternatives before presenting to external stakeholders





Discussion: Challenges, Opportunities, and Risk

Communication

- UTRCA project contact
- Project workshops
- Meeting documentation
- Deliverable review and comment
- PICs

Workshops

- Workshop No.1
  - Project start-up
- Workshop No.2
  - short list of alternatives
- Workshop No. 3
  - Conceptual designs, evaluation criteria
- Workshop No. 4
  - Study outcomes, preferred solutions

Schedule

- **Late May 2021**: Notice of Commencement
- **July 2021**: Workshop No.2
- **September 2021**: PIC No. 1a and 1b
- **December2021**: Workshop No.3
  - short list of alternatives
- **January 2022**: PIC No. 2a and 2b
- **March 2022**: Workshop No. 3
  - Conceptual designs, evaluation criteria
- **March 2022**: EA Project File

Next Steps

- Background review and technical studies
- Hydraulic screening of high-level options
- Stakeholder engagement plan
- Public Notice

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MEETING MINUTES

MEETING TIME:	Thursday, July 22, 2021 10:00 - 11:15 am		
LOCATION:	Online		
PROJECT:	32667 - Class EAs for Greenway & Adelaide WWTP Climate Change Resiliency		
SUBJECT:	Mid-Project Workshop		
ATTENDEES:	**City of London:** • Marcy McKillop • Kirby Oudekerk	**Upper Thames River Conservation Authority** • Mahmoud Pejam • Stephanie Schreiner • Mark Shifflett • Brent Verscheure	**Matrix Solutions Inc:** • Sam Bellamy • Stephen Braun • Andrew Doherty • Karen Hofbauer • Melani-Ivy Samson
MINUTES BY:	M. Samson		
REVIEWED BY:	K. Hofbauer		

The agenda items included:

- Introduction
- Screened-Out Flood Mitigation Approaches
- Site-Level Flood Protection
- Hydraulic Modelling
    - Greenway (1d)
    - Adelaide (2d)
- Upstream Flood Impacts
- Floodplain Storage
- Alternative Solutions
- Natural Heritage Study
- Next Steps

The presentation slides are attached to these minutes.

1 MEETING MINUTES

Introduction

Introductions were made by Matrix Solutions Inc. (Matrix), the City of London (the City), and Upper Thames River Conservation Authority (UTRCA).

A. Doherty provided an overview of the Environmental Assessment (EA) process applicable for both wastewater treatment plants (WWTPs), which consists of technical studies, hydraulic screening, short-list of alternative solutions, 10% conceptual design of alternative solutions, and evaluation and selection of the preliminary preferred alternative solution.

At this stage in the project, the draft hydraulic screening memos have been completed and were sent to both the City and UTRCA for review. Matrix has finalized the memos based on the provided feedback from the City and UTRCA. Currently, technical studies for stage 1 archaeology investigation and ecology are underway, and these results will inform next steps for conceptual design.

A. Doherty discussed the existing conditions for both WWTPs. At the Adelaide WWTP, there is a key spill into the site from across Adelaide Street (east of the site) just upstream of the bridge and the 1:250 year event flow in the channel at this location is 1,000 m^3/s. The Greenway WWTP lies immediately adjacent to the river and the 1:250 year event flow in the channel at this location is 1,900 m^3/s.

Screened-Out Flood Mitigation Approaches

A. Doherty reviewed the high-level alternative solutions with the team. The screened-out options included conveyance improvements, structural conveyance improvements, local flood diversion, Regional flood control, and operation measures. The hydraulic screening demonstrated that the site-level flood protection was the preferred option to evaluate to 10% conceptual design phase. And as part of the standard EA process, the “do nothing” alternative will also be carried forward.

A. Doherty described each of the screened-out options.

- Channel conveyance improvements (including floodplain improvements) at both locations would require significant widening and lowering to mitigate flooding. In theory, a channel approximately triple the size of the existing river would provide enough conveyance to mitigate flooding at both locations. Construction costs and sediment transfer are other issues which would stem from channel conveyance improvements.

- Structural conveyance improvements (i.e., bridge replacements) will not have a significant impact on flood mitigation for either of the WWTPs. Adelaide Street bridge and Wonderland Road bridge have minor backwater impacts (approximately 10-20 cm). B. Verscheure asked when Wonderland Road bridge is slated to be replaced and M. McKillop followed up after the meeting indicating it is currently anticipated for 2050.

- Local Flood Diversion (i.e., diversion channel/conduit) was screened out because it would require a size that is roughly 2-3 times larger than the current Thames River (similar to channel widening).

- Regional Flood Control was screened out because significant storage requirements would be required at Fanshawe Dam to reduce flows by at least half the current flow at either river reaches.

- Operational Measures (i.e., equipment upgrades and operational procedures in response to flood forecast) were screened out due to significant costs of upgrades and long-term timeframe to uphold.

Site-Level Flood Protection (including Upstream Impacts)

A. Doherty reviewed site-level flood protection as the preferred flood mitigation approach for both WWTPs.

At the Greenway WWTP, A. Doherty showed the flooding improvements from implementing a floodwall or berm along Terry Fox Parkway. K. Hofbauer commented that upstream backwater impacts from this approach is minor and there are no impacts to the Coves, just east of the WWTP. S. Bellamy added that there is little to no difference between flooding extents with the addition of a floodwall or berm for the WWTP.

Under existing conditions at the Adelaide WWTP, A. Doherty noted that the operations centre does not flood under the 1:250-year, the WWTP is partly flooded, and the storage yard is mostly flooded. A. Doherty showed flooding improvements at this WWTP with a floodwall or berm wrapping along the access road and storage yard to the south. K. Oudekerk noted that the storage yard was added to the scope as for potential future plant expansion to the WWTP in the next 20 years. The modelling demonstrated little to no upstream impacts; the urban area to the east of the WWTP is not a key flow path and thus the addition of the berm will have negligible impacts to the upstream area.

Hydraulic Modelling

To assess the effectiveness of the site-level flood protection, Matrix used the 1D model for the Greenway WWTP and the 2D model for the Adelaide WWTP, both provided by UTRCA. K. Hofbauer asked M. Shifflett about the modelling approach (i.e., using the 2D model for the Adelaide site) for this project. Matrix compared both diffusive wave and shallow water equations (SWE; full momentum) in the 2D model, and would like to proceed with the SWE. M. Shifflett indicated that the UTRCA's key assessments are based on the 1D models and Matrix may revise the 2D model as needed to best replicate the 1D model.

Floodplain Storage

A. Doherty reviewed the storage loss at both WWTPs. At the Greenway WWTP, there is a storage loss of approximately 35,000 m^3 if a floodwall or berm is implemented. Along the river reach (downstream of the Coves to upstream of Wonderland Road bridge), approximately 2.5% of floodplain (excluding Mud Creek) is lost. Similarly, the Adelaide WWTP has a storage loss of 52,000 m^3 if a floodwall or berm is implemented.

The storage loss represents a 4% floodplain loss for the river reach encompassing the WWTP (upstream of Adelaide Street bridge to approximately King's University College). In response to a question by B. Verscheure, A. Doherty clarified the storage loss was roughly 20,000 m^3 for the WWTP and 30,000 m^3 for the storage lot (WWTP expansion site).

S. Braun acknowledged that taking away floodplain storage is never the intention. In this case, the project is working towards building resilience towards a public work. While we recognize the potential cumulative effect of floodplain losses, Matrix would like to look at the effect here; however, floodplain storage loss is likely acceptable under these terms. S. Braun asked UTRCA for their thoughts and comments on Matrix's interpretation of the conditions. B. Verscheure indicated that UTRCA prefers that opportunities to offset the loss of floodplain storage be explored as part of the Class EA, including a consideration of adjacent park land to offset a portion of this volume loss.

K. Hofbauer suggested that Matrix could run the 2D model (with the hydrograph) to verify the downstream impacts. M. Shifflett stated that UTRCA is more focused on the volume calculation rather than modelling effects. B. Verscheure would like to explore any opportunity to provide volume storage as this is a condition UTRCA sets for all projects. M. Shifflett added that even if the one-to-one volume balance cannot be achieved, a best effort is required. UTRCA would like to be provided the reasons and investigation details behind it.

S. Braun discussed a "spectrum" of volume solutions; the first few storage offset may be easily placed, but the last bit (i.e., full volume replacement) may be more difficult. S. Bellamy added that this storage loss investigation may be difficult to pinpoint without the completion of an Environmental Impact Study or natural heritage study. S. Braun also indicated that subsurface water levels are unknown and depth of cuts cannot be properly assessed without this information. UTRCA indicated that the Adelaide site can be probed further for opportunities for volume offset; however, the Greenway site will have limited opportunities.

Alternative Solutions

A. Doherty first reviewed the possible alternatives for site-level flood protection at the Greenway WWTP that will be developed to 10% conceptual design in the next stage of the study. K. Hofbauer indicated that a floodwall (concrete, green wall, etc.) could be constructed between the Terry Fox Parkway and the WWTP, and the separation wall can be extended to the entrance of the WWTP. Alternatively, the Terry Fox Parkway could be raised atop a berm; however, it may not be the best solution when considering aesthetics as trail walkers may be peering into the WWTP from this height. M. McKillop indicated that the City would prefer a floodwall for this area. K. Hofbauer added that this flood mitigation approach will continue to facilitate safe egress to the WWTP from the east. B. Verscheure inquired about the topography from Terry Fox Parkway to the Thames River and K. Oudekerk confirmed there is a steep drop. K. Oudekerk also added that a raised berm for Terry Fox Parkway may conflict with regulations within the Accessibility for Ontarians with Disabilities Act.

K. Hofbauer reviewed the alternatives for site-level flood protection at the Adelaide WWTP that will be developed to 10% conceptual design. The access road from Adelaide Street could be raised to act as a

berm to protect the WWTP, and the existing berm south of the site (currently providing low effectiveness) would be extended to wrap around the storage yard. Safe egress through the operations centre is clear due to the higher elevation of this portion of the site and K. Oudekerk indicated that the WWTP could be connected to Adelaide Street further south. K. Oudekerk suggested another option of running a floodwall or berm along the east side of the parking lot; however, K. Oudekerk acknowledged that this would require further floodplain storage offset.

M. Shifflett mentioned that a standard freeboard of 0.6 m was provided for dykes to account for climate change, though it is unclear if this includes a safety factor. It was noted that freeboard criteria has not been reviewed in years and may warrant further investigation, though there are a few references. K. Hofbauer commented that 0.6 m freeboard is similar to the 0.5 m sometimes used elsewhere.

Natural Heritage

A. Doherty provided an update on the natural heritage study progress thus far. In April (representing leaf-off season), bat surveys were conducted at both sites. Bat habitat was found and Matrix will carefully indicate the appropriate construction windows and protocols (i.e., use of bat boxes and bat houses). In June, breeding bird surveys were conducted. Plant inventory and wildlife habitat are projected to be assessed in August.

Next Steps

A. Doherty reviewed the project schedule with the team. Matrix will move to conceptual design of the site-level flood protection for both the Adelaide and Greenway WWTPs. At this stage, floodplain storage will be reviewed and potential sites will be identified. The findings of the natural heritage study and the stage 1 archaeology will be discussed at Joint Workshop No. 3 in early December. A. Doherty mentioned that the next deliverable will be the online Public Information Centre No. 1a (Adelaide WWTP) and 1b (Greenway WWTP) projected for mid-September, which will review the contents of this meeting for the public.

2 ACTION ITEMS

Summary	Action Required	Person Responsible	Action Due Date
UTRCA inquired about the projected timeframe for the Wonderland Road bridge replacement.	Provide approximate timeframe for bridge replacement.	M. McKillop	Complete
Provide updated hydraulic memos with mention of storage loss investigation.	Provide updated hydraulic memos.	Matrix	Complete

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Class EAs for Greenway & Adelaide WWTP Climate Change Resiliency

Workshop No. 2 – July 22, 2021

Agenda

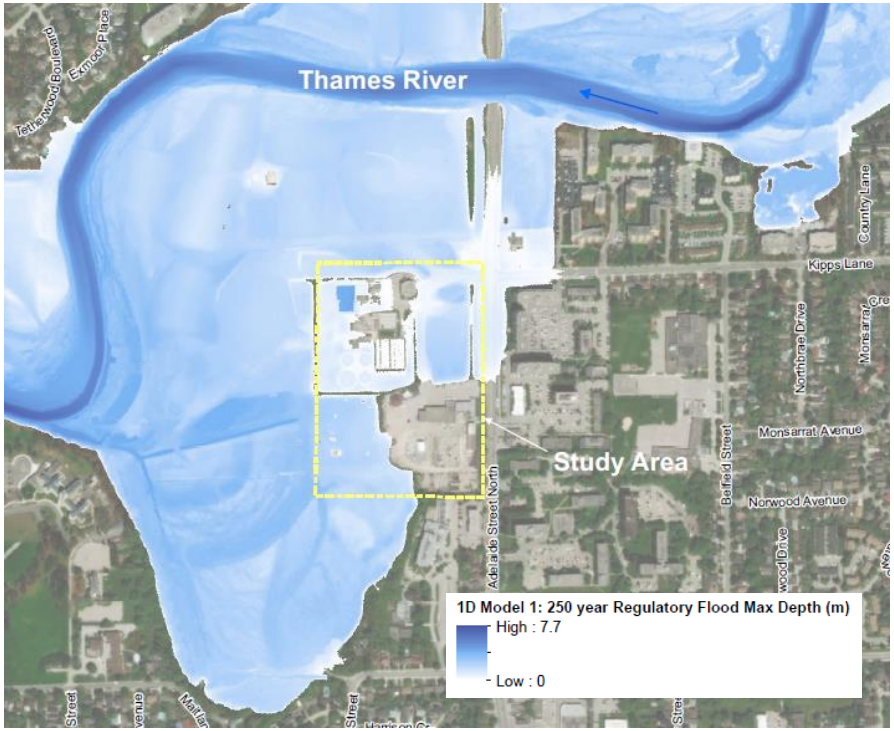
1. Introduction
2. Screened-Out Flood Mitigation Approaches
3. Site-Level Flood Protection
4. Hydraulic Modelling
    a. Greenway (1d)
    b. Adelaide (2d)
5. Upstream Flood Impacts
6. Floodplain Storage
7. Alternative Solutions
8. Natural Heritage Study
9. Next Steps

Conceptual Flood Mitigation



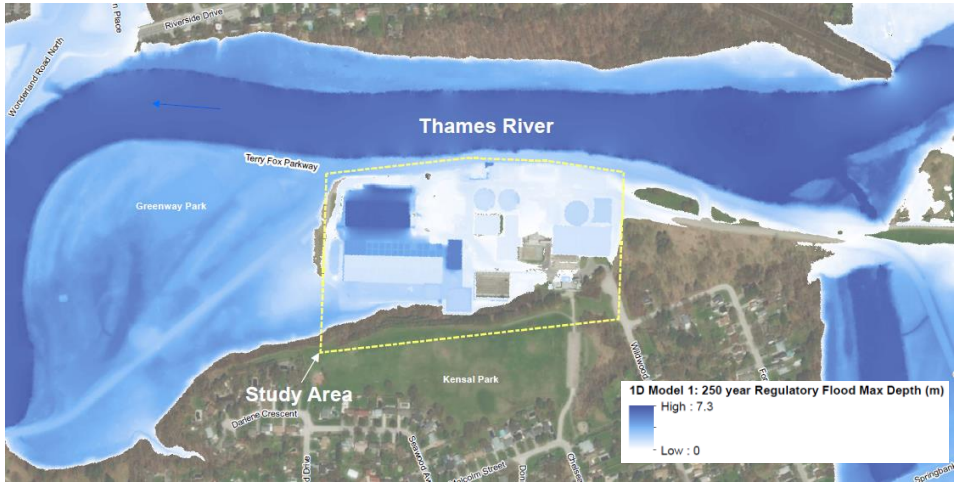
Existing Conditions – Adelaide

- Spill across Adelaide Street
- 1:250 year regulatory event of 1,000 m^3/s



Existing Conditions – Greenway

- WWTP occupies most of the floodplain width
- 1:250 year event of 1,900 m^3/s



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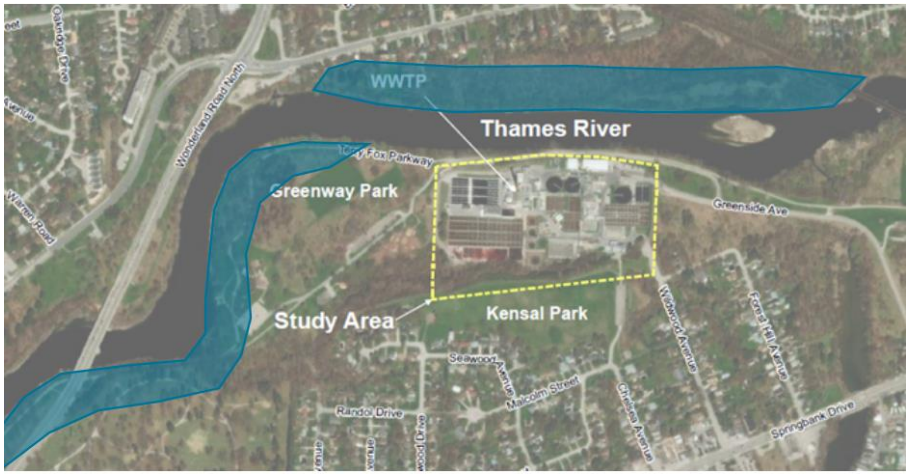
Screened-Out Flood Mitigation Approaches

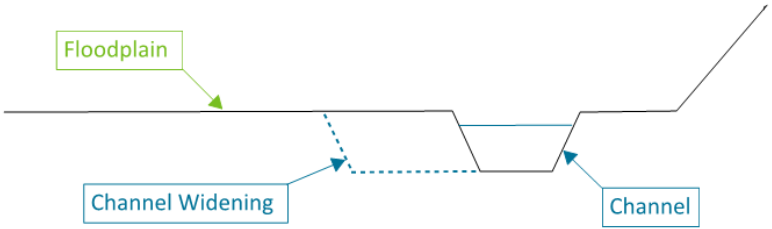
High-Level Alternative Solutions

- **Conveyance Improvements:** lowering, widening, floodplain improvements
- **Structural Conveyance Improvements:** bridge replacement, raised road profile
- **Local Flood Diversion:**
- **Regional Flood Control:** Fanshawe Dam storage
- **Operation Measures:** flood-proofing, equipment upgrades
- **Site-Level Flood Protection:** floodwall, berm/dyke
- Do Nothing

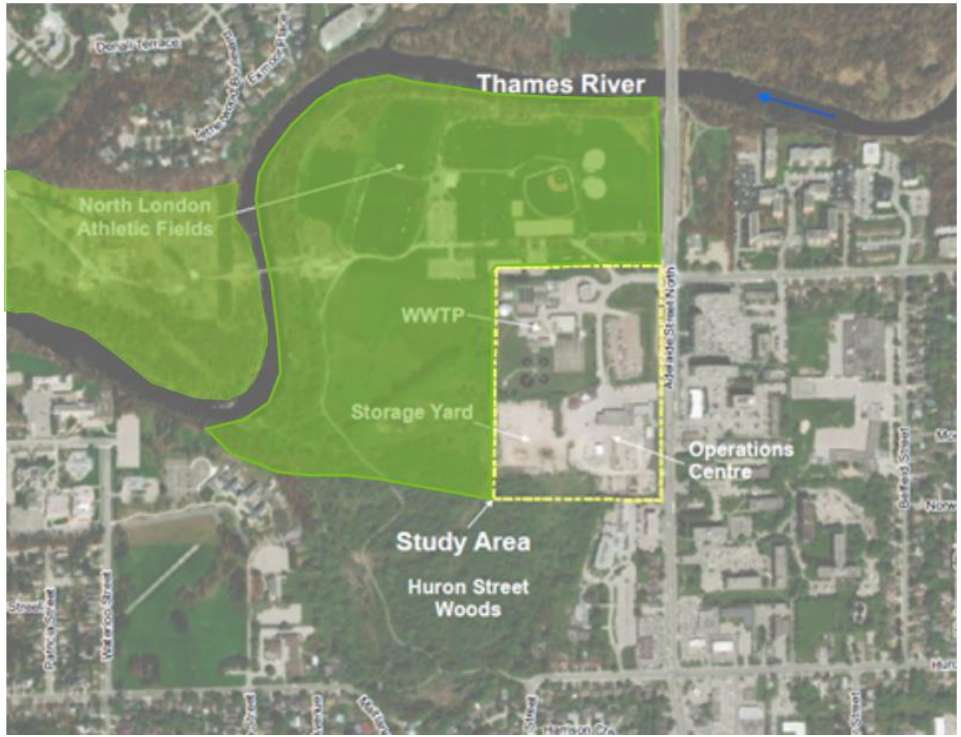
Channel Conveyance Improvements



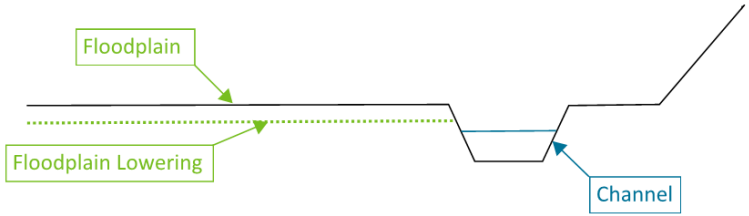




Channel Conveyance Improvements







High-Level Alternative Solutions

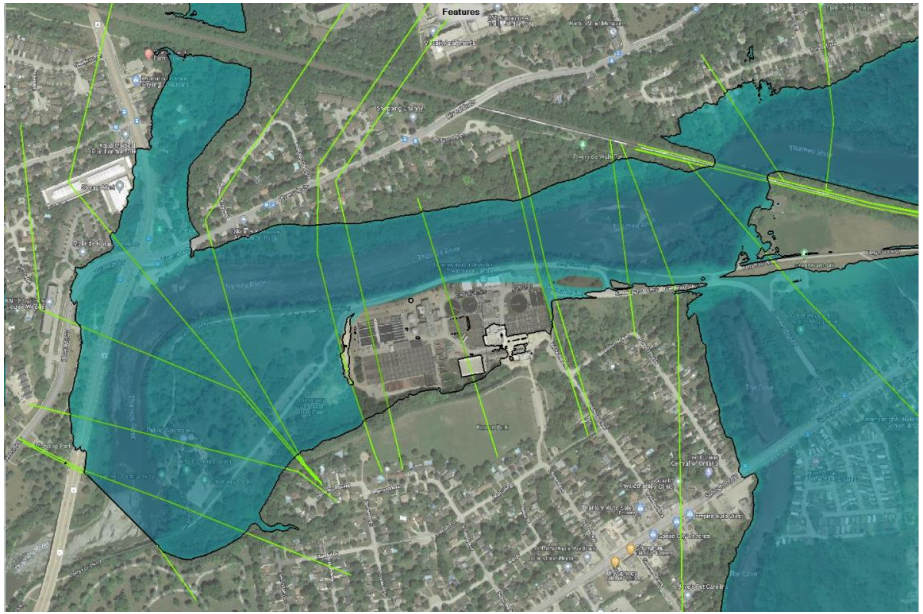
- **Structural Conveyance Improvements**: existing bridges at Adelaide Street and Wonderland Road do not have a significant impact on flooding at the WWTPS
- **Local Flood Diversion:** diversion channel/conduit would need to be roughly 2-3 times larger than the river (similar to channel widening)
- **Regional Flood Control:** significant storage requirements at Fanshawe Dam
- **Operational Measures:** significant costs, long-term timeframe

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Site-Level Flood Protection

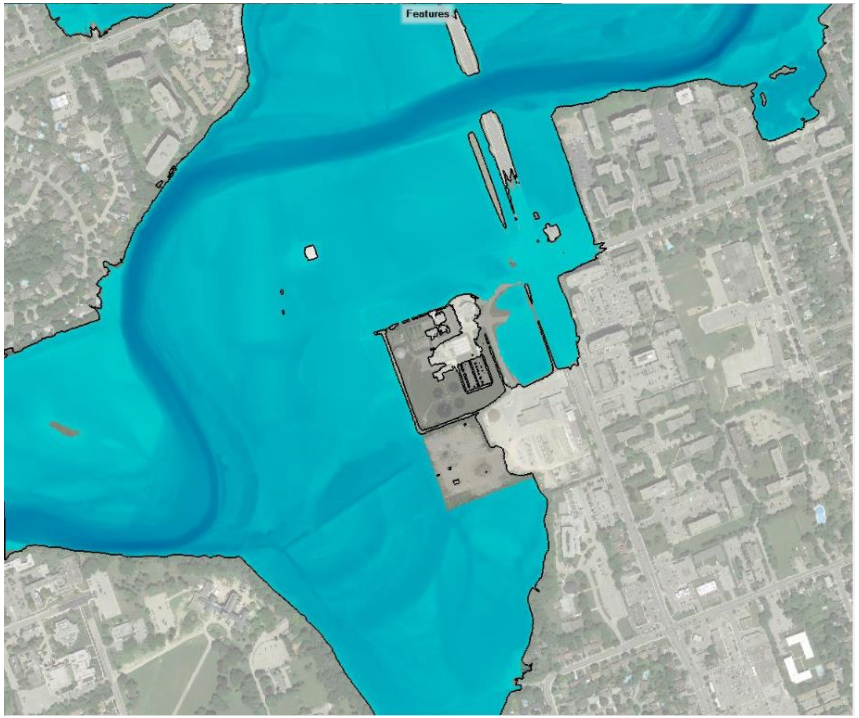
Hydraulic Modelling – Greenway

- Represented berm in 1D HEC-RAS model
- Modelling indicated no upstream flood impacts



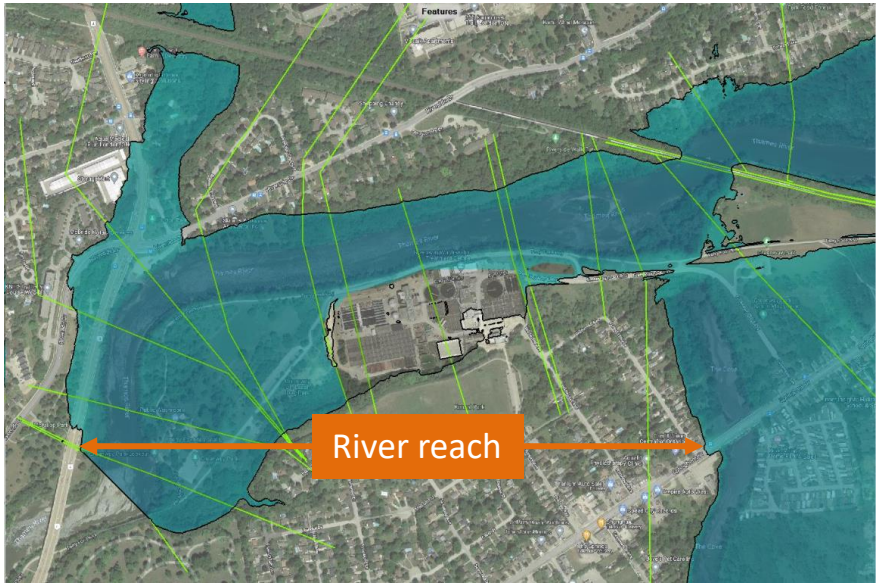
Hydraulic Modelling – Adelaide

- Represented berm in 2D HEC-RAS model
- Modelling indicated no upstream flood impacts



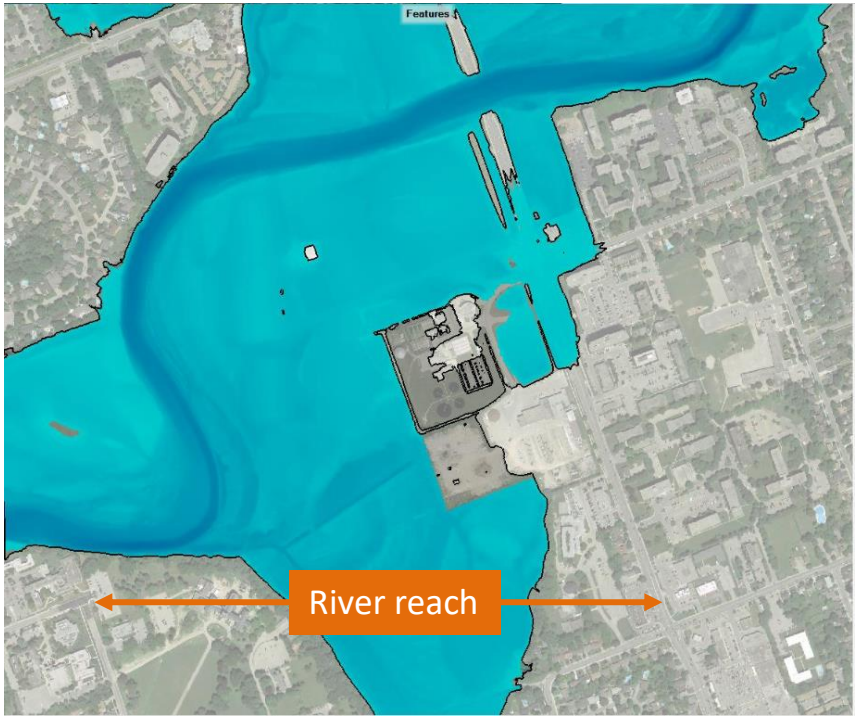
Storage Loss – Greenway

- Approximately 35,000 m^3 of storage loss
- 1,900 m^3/s 1:250 year flood event
- Existing floodplain storage approximately 1.4 million m^3 (river reach encompassing WWTP; excluding Mud Creek; 2.5% loss)
- Fanshawe Dam Regulated Flow



Storage Loss – Adelaide

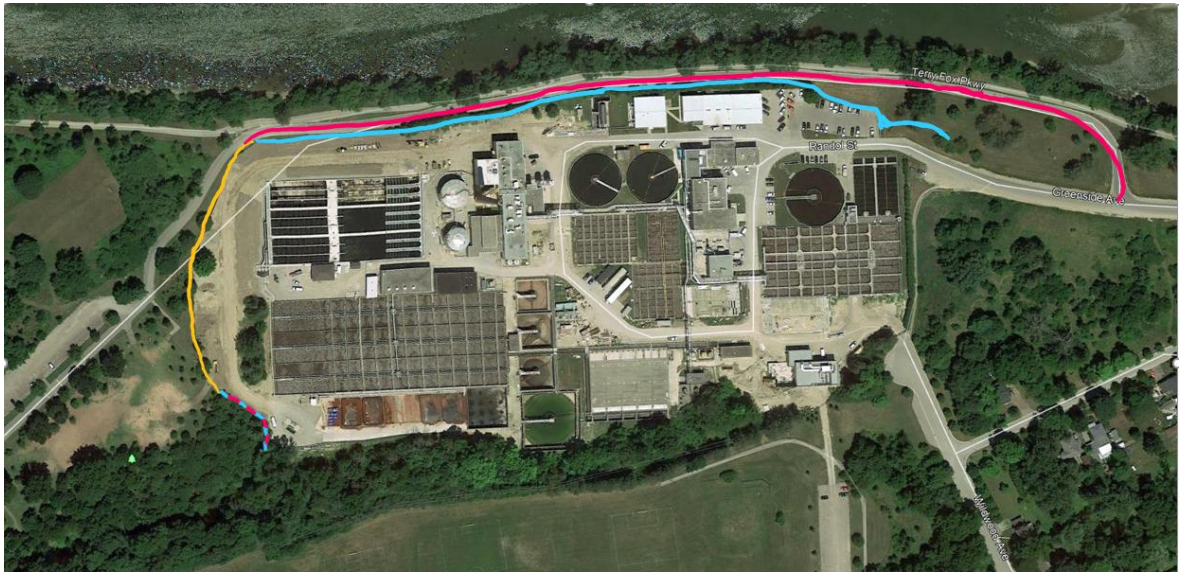
- Approximately 52,000 m^3 of storage loss at the study area
- 1,000 m^3/s 1:250 year flood event
- Existing floodplain storage 1.2 million m^3 (river reach encompassing WWTP; 4% loss)
- Fanshawe Dam Regulated Flow





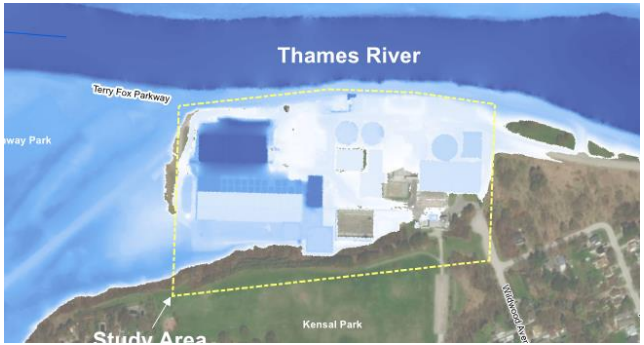
Alternative Solutions

Alternative Solutions – Greenway

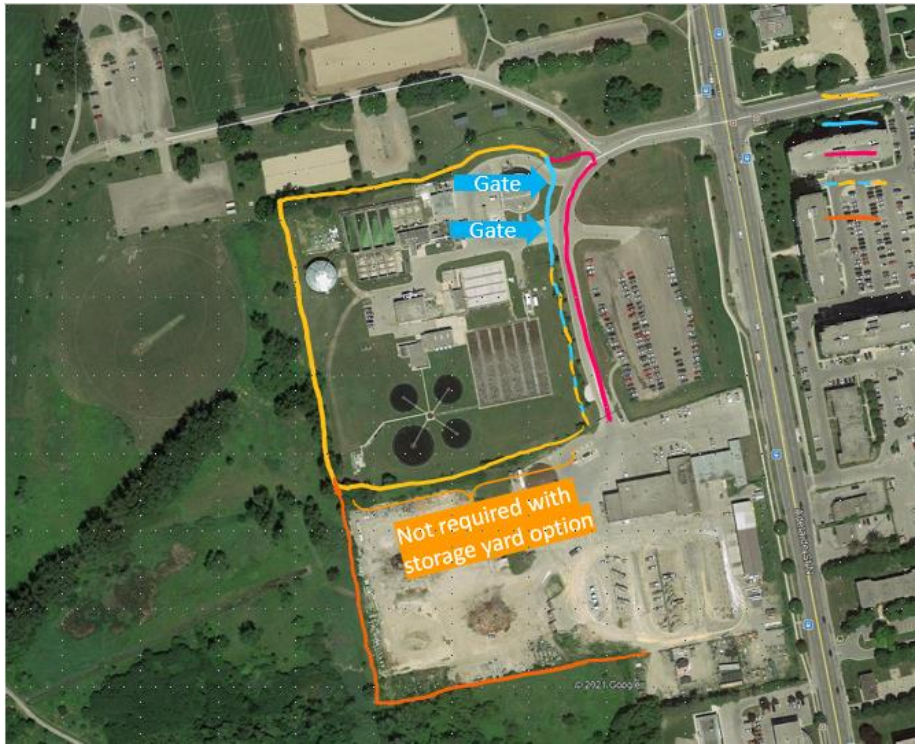


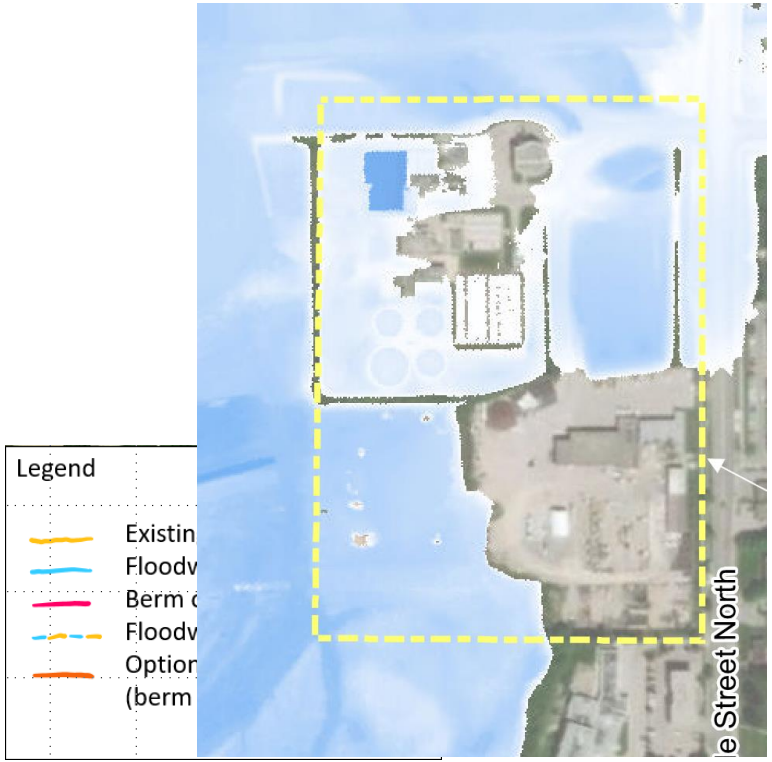
Legend

- Existing Berm
- Floodwall Alternative
- Berm on Terry Fox Pkwy Alternative
- Floodwall or Berm



Alternative Solutions – Adelaide





Greenway WWTP



Adelaide WWTP



Natural Heritage Assessment

- April (leaf-off): Bat Habitat Survey
- June: Breeding Bird Survey
- Planned for August: Plant inventory, wildlife habitat

Next Steps

Tasks	Anticipated Timing
Project Initiation	
Startup Workshop	March 30, 2021
Notice of Commencement (two notices)	Late May 2021
Workshops	
Joint Workshop No. 1 (startup)	April 23, 2021
Joint Workshop No. 2	Mid July 2021
Joint Workshop No. 3	Mid December 2021
Joint Workshop No. 4	Early March 2022
Public Information Centres	
PIC No. 1a (Adelaide) and 1b (Greenway)	Mid September 2021
PIC No. 2a (Adelaide) and 2b (Greenway)	Early January 2022
Reporting Deliverables	
Hydraulic Screening	Late July 2021
Environmental Impact Report	Early October 2021
Conceptual Design Brief	Mid November 2021
EA Project File (two reports; draft for City and UTRCA)	Early February 2022
Final EA Project File	March 2022

MEETING MINUTES

MEETING TIME:	Thursday, December 16, 2021 1:00 – 2:30 pm
LOCATION:	Online
PROJECT:	32667 - Class EAs for Greenway & Adelaide WWTP Climate Change Resiliency
SUBJECT:	Project Workshop #3 – Option Summary and Flood Storage Loss Offsetting
ATTENDEES:	**City of London:** • Marcy McKillop • Kirby Oudekerk **Upper Thames River Conservation Authority** • Stephanie Schreiner • Brent Verscheure **Matrix Solutions Inc:** • Stephen Braun • Andrew Doherty • Karen Hofbauer • Peter De Carvalho
MINUTES BY:	P. De Carvalho

The agenda items included:

- Flood Protection and Storage Offsetting
  - Adelaide
  - Greenway
- Adelaide WWTP Flood Protection
  - Review Options
  - Discussion: Preferred Approach at Adelaide
- Greenway WWTP Flood Protection
  - Review Options
  - Stormwater Management
  - Discussion: Preferred Approach at Greenway
- Next Steps

The presentation slides are attached to these minutes.

1 MEETING MINUTES

Introduction

Introductions were made by Matrix Solutions Inc. (Matrix), the City of London (the City), and Upper Thames River Conservation Authority (UTRCA).

Flood Protection - Adelaide

A. Doherty summarized the flood mitigation options for Adelaide and discussed potential issues relating to feasibility.

- Option 1 – Berm with raised entrance way
- Option 2 – Berm with a temporary measure at entrance way in response to flood forecasts
- Option 3 – Berm extending to provide protection of eastern parking lot

It was noted that anticipated footprint of flood mitigation measures (earthen berm) overlaps with some existing fixtures within the wastewater treatment plant (WWTP) for all three options. It was discussed that impacts can be avoided through transition between berm and floodwall, or through the use of retaining gabion (similar to the strategy employed at Vauxhall WWTP). All three options also raise the potential for stormwater accumulation within the southern storage yard. The potential for a temporary ponded retention area within the yard was discussed. Additionally, the eventual location of equalization tank may need to factor in potentially incorporating tank footprint with flood protection measures.

No technical issues specific to Option 1 were noted. Potential challenges with the remaining two options were discussed. Option 2, which does not propose any improvements to the entry road, is the only option that does not have an obvious route for emergency ingress/egress during a 250-year event. Providing flood protection to the eastern parking lot in Option 3 would represent the removal of additional floodplain storage (approximately 22,000 m^3). Discussion points towards Option 1 as the preferred solution.

Additional technical challenges were discussed. Integration of raised access road (approximately 1-2 m higher than existing profile) and the existing plant entrance must consider large vehicle access. Turning radius of larger sludge trucks must be factored into any modifications to the existing access road. It was also noted that the parking lot drains through a catch basin and outlets through the outfall channel to the west. Existing stormwater infrastructure within the works yard should be considered in terms of maintaining integrity of flood protection. Flap system or connection removal may be required to ensure flood flows don't bubble into protected sections of the WWTP.

Flood Storage Offsetting - Adelaide

A. Doherty discussed the offsetting of storage loss at Adelaide. Three offsetting strategies were explored.

- Grading a wide depression adjacent to existing sports fields
- Widening the existing stormwater outfall channel west of the storage yard into a linear SWM feature (SWM1a)
- Widening the existing stormwater outfall channel southward to include a large section of exotic European Buckthorn thicket (SWM1b)

Benefits of the grading option include avoiding impacts to existing recreational facilities and adjacent natural heritage features. This option represents an approximate storage volume offset of 5,300 m^3. The

SWM1a option would provide the opportunity to incorporate water quality improvements and bioengineering into the feature. Widening the linear feature represents an approximate storage volume offset of 4,700 m^3. SWM1b expands the widened feature south into an existing thicket of invasive European Buckthorn. The combined approximate storage volume offset of SM1a and SWM1b is 16,000 m^3.

B. Verscheure discusses that flood modelling confirms impacts to upstream and downstream flood levels resulting from proposed flood protection options is essentially negligible, and questions whether storage loss offsetting is worthwhile. The offsetting strategies presented are to be discussed internally with UTRCA staff.

Flood Protection - Greenway

A. Doherty summarized the flood protection options for Greenway and discussed potential issues relating to feasibility.

- Option 1 – Floodwall with augmentation of existing western berm
- Option 2 – Berm
- Option 3 – Combined berm and floodwall

A local low point exists at the ditch adjacent to the intersection east of the Greenway WWTP entrance. This low point has potential to short-circuit flood protection. It is proposed to raise the low point to the 1:250 year level plus freeboard, and raise the adjacent intersection accordingly for all three options.

All options must also consider emergency ingress/egress. It is anticipated that overland precipitation within a local sub-catchment of approximately 9 ha may direct flows to the northern end of Wildwood Avenue and impede access to and from the WWTP.

Finally, a municipal stormwater outfall was noted extending from the southern ridge. The potential to reroute this SWM outfall through modified open conveyance or a bend with use of a flap-gate to discharge outside flood protection areas was discussed.

Option 1 and 3 were found to be similar in terms of technical performance and viability. Option 2 poses technical challenges due to the lack of space to accommodate a berm footprint on the northern side of the WWTP. A berm in this area would potentially impact the nearby Thames River shoreline, the existing multi-use trail, and existing access road. Discussion points towards Option 1 or 3 as the preferred solution.

Flood Storage Offsetting – Greenway

A. Doherty discussed the offsetting of storage loss at Greenway. Two areas were assessed for feasibility. An area to the east adjacent to the existing rail bridge was deemed to be too high. Excavation would need to remove between 0.5-1 m of overburden before any flood volume offsetting would be achieved. A second area to the west adjacent to the existing sports fields was found to be too low. Excavation in this area may also impact groundwater and potentially destabilize the bank of the nearby Thames River.

General Considerations

B. Verscheure inquired about potential impacts to natural heritage. It was noted that the flood protection measures are to be contained within the existing footprint of each respective WWTP. The Environmental Impact Study (EIS) for these sites is being reviewed by the City and will be submitted to UTRCA once internal review is completed. The presence of sensitive natural heritage features, as well as the potential for indirect effects, are to be factored into the assessment of preferred option for each site.

S. Braun discussed that geotechnical considerations must be assessed for flood protection options. Berm design and areas where existing berms are to be augmented should be assessed by a qualified geotechnical professional. The use of floodwalls, especially near existing slopes and shorelines, should be assessed to ensure that these fixtures will not compromise the geotechnical integrity of the local area.

Next Steps

A. Doherty reviewed the project schedule with the team. Matrix will formally evaluate options and build off talking points from this workshop. A design brief with the formal evaluation is to be submitted to the City for review and additional input. Additionally, Matrix will prepare and schedule for PIC#2 to be held early in 2022.

2 ACTION ITEMS

Summary	Action Required	Person Responsible	Action Due Date
Evaluate feasibility of road improvements for Adelaide regarding access for larger transport vehicles.	Consult TAC manual, evaluate feasibility	P. De Carvalho	January 31, 2022
Complete formal evaluation of options and design brief for review and input by the City.	Complete Evaluation and Design Brief	P. De Carvalho	January 31, 2022
UTRCA to discuss flood storage offsetting internally, and to provide comments to City.	Discuss flood storage, provide comments	UTRCA	To facilitate PIC preparation, feedback would be appreciated by January 31, 2022

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

Class EAs for Greenway & Adelaide WWTP Climate Change Resiliency

Workshop No. 3

Agenda

1. Adelaide WWTP Flood Protection
   a. Option 1 – Berm with Raised Entrance Way
   b. Option 2 – Berm with a Temporary Measure at Entrance Way in Response to Flood Forecasts
   c. Option 3 – Berm Extended to Provide Protection at the Parking Lot
2. Discussion: Adelaide Preferred Approach
3. Adelaide Storage Loss Offsetting
4. Greenway WWTP Flood Protection
   1. Option 1 – Combination of floodwall and berm
   2. Option 2 – Berm
   3. Option 3 – Combination of floodwall and berm
5. Discussion: Greenway Preferred Approach
6. Greenway Stormwater Management
7. Greenway Storage Loss Offsetting
8. Next Steps



Adelaide WWTP Flood Protection

Adelaide Flood Mitigation Options

Option 1 – Berm with Raised Entrance Way

Option 2 – Berm with a Temporary Measure at Entrance Way in Response to Flood Forecasts

Option 3 – Berm Extended to Provide Protection at the Parking Lot

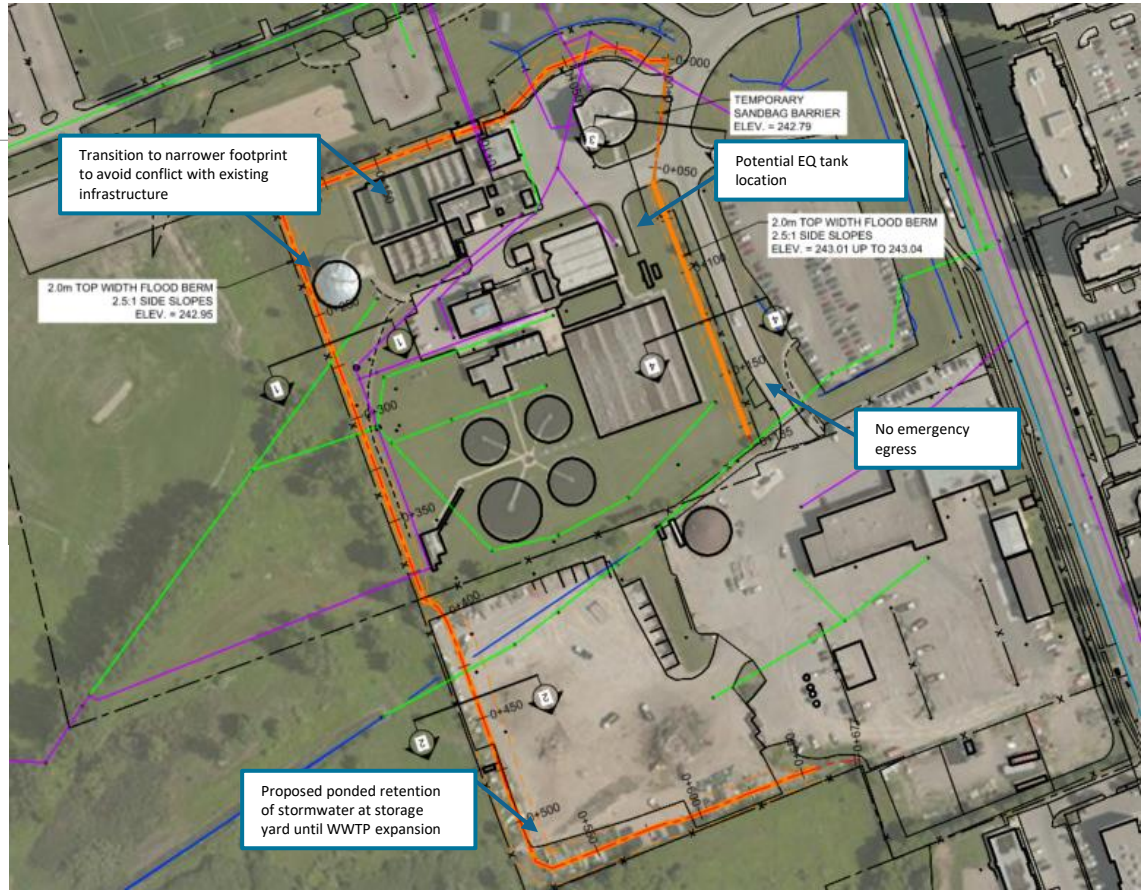
Adelaide Option 1

- Berm with Raised Entrance Way



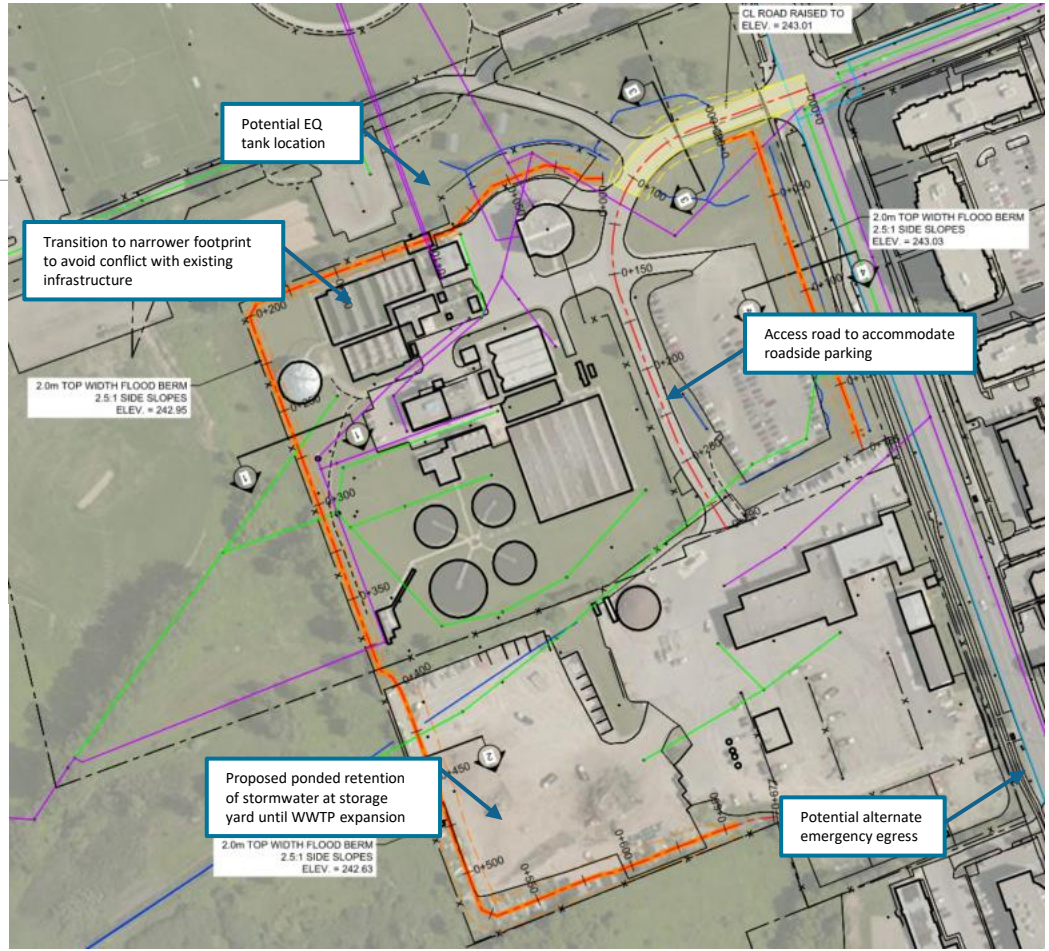
Adelaide Option 2

- Berm with a Temporary Measure at Entrance Way in Response to Flood Forecasts



Adelaide Option 3

- Berm Extended to Provide Protection at the Parking Lot





Discussion: Adelaide Preferred Approach

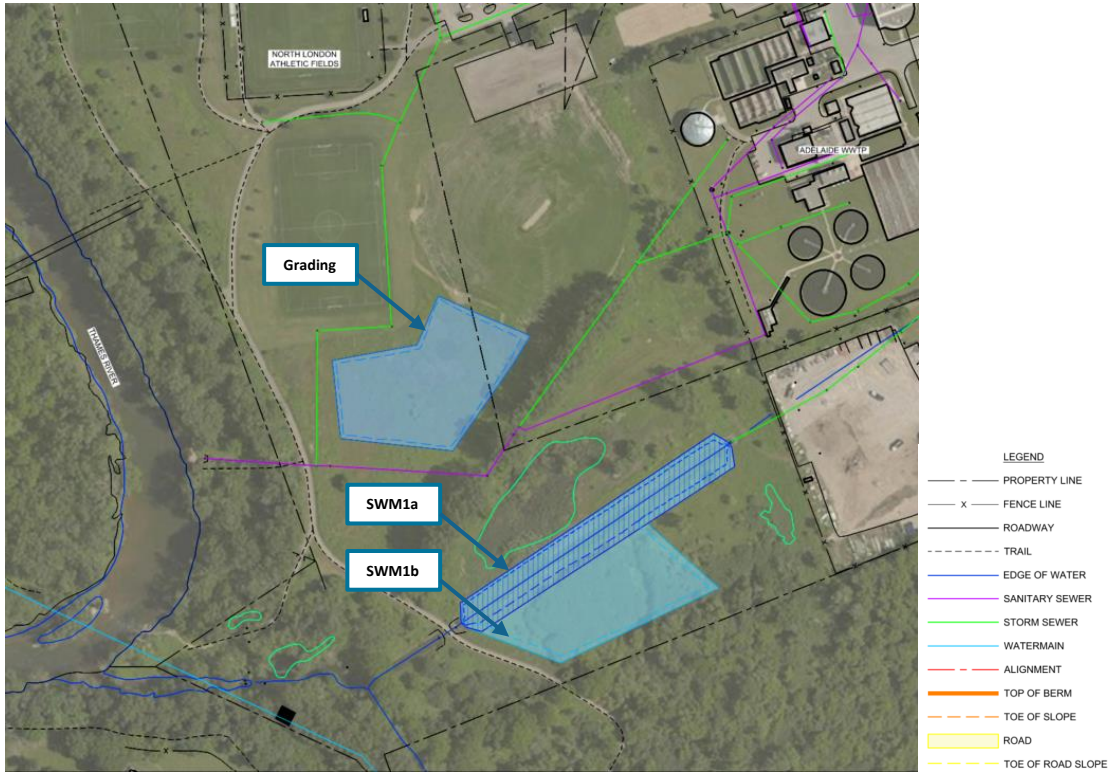
Adelaide Discussion

- Significant loss of floodplain storage by protection parking lot (22,000 m^3)
- Emergency egress
- Technical robustness of temporary measure versus elevated entrance way
- Cost of temporary measure versus elevated entrance way



Adelaide Storage Loss Offsetting – High-level Evaluation of Available Concepts

Adelaide Storage Loss Offsetting



Adelaide Storage Loss Offsetting - Grading

- Graded depression in floodplain
- Avoids impacts to recreational facilities
- Conceptual offsetting volume = 5,300 m^3
- Assumed bottom elevation equal to top-of-bank from adjacent Thames River (Appx. 238.7 m)



Adelaide Storage Loss Offsetting - SWM1a

- Widen existing outfall channel
- Opportunity to incorporate SWM and water-quality improvements into offsetting
- Conceptual offsetting volume = 4,700 m^3
- Assumed bottom elevation of existing channel maintained (237.6 m)



Adelaide Storage Loss Offsetting - SWM1b

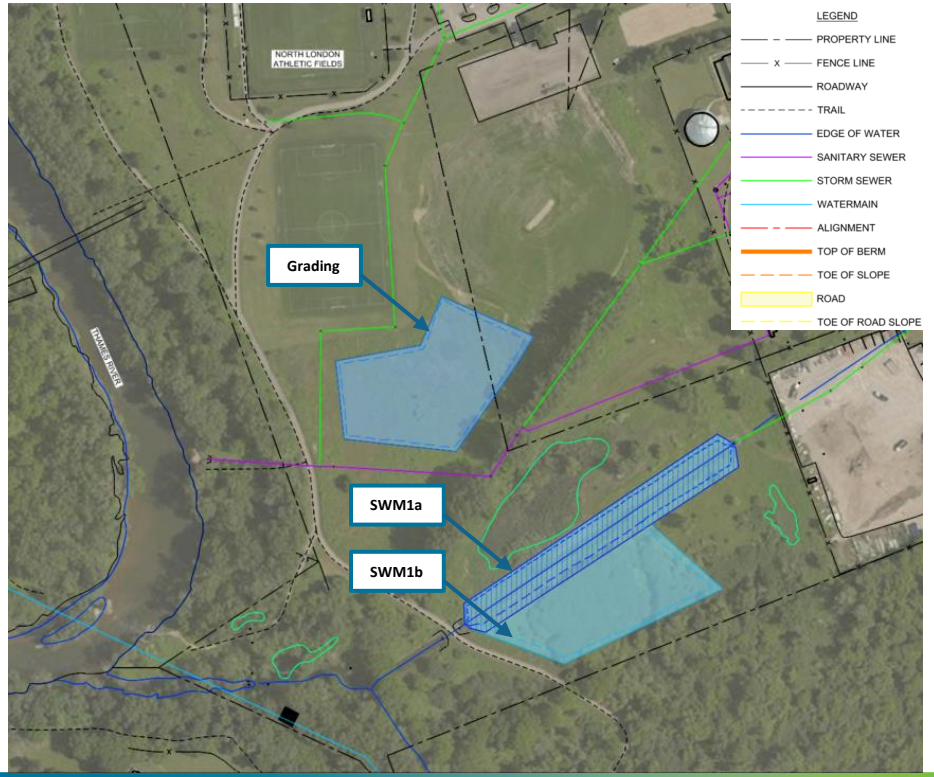
- Widen existing outfall channel and grade into floodplain
  - Impacted floodplain areas dominated by European Buckthorn monocultural thicket (invasive species)
- Opportunity to incorporate SWM and water-quality improvements into offsetting
- Conceptual offsetting volume = 16,000 m^3
- Assumed bottom elevation of existing channel maintained (237.6 m)



Adelaide Flood Storage Analysis

Available Concepts	Additional Storage
Grading	5,300 m^3
SWM1a	4,700 m^3
SWM1b	16,000 m^3
Total	21,300 m^3

- Site-level Flood Storage Loss:
  - Adelaide Options 1, 2 – 52,000 m^3
  - Adelaide Option 3 – 74,000 m^3





Greenway WWTP Flood Protection

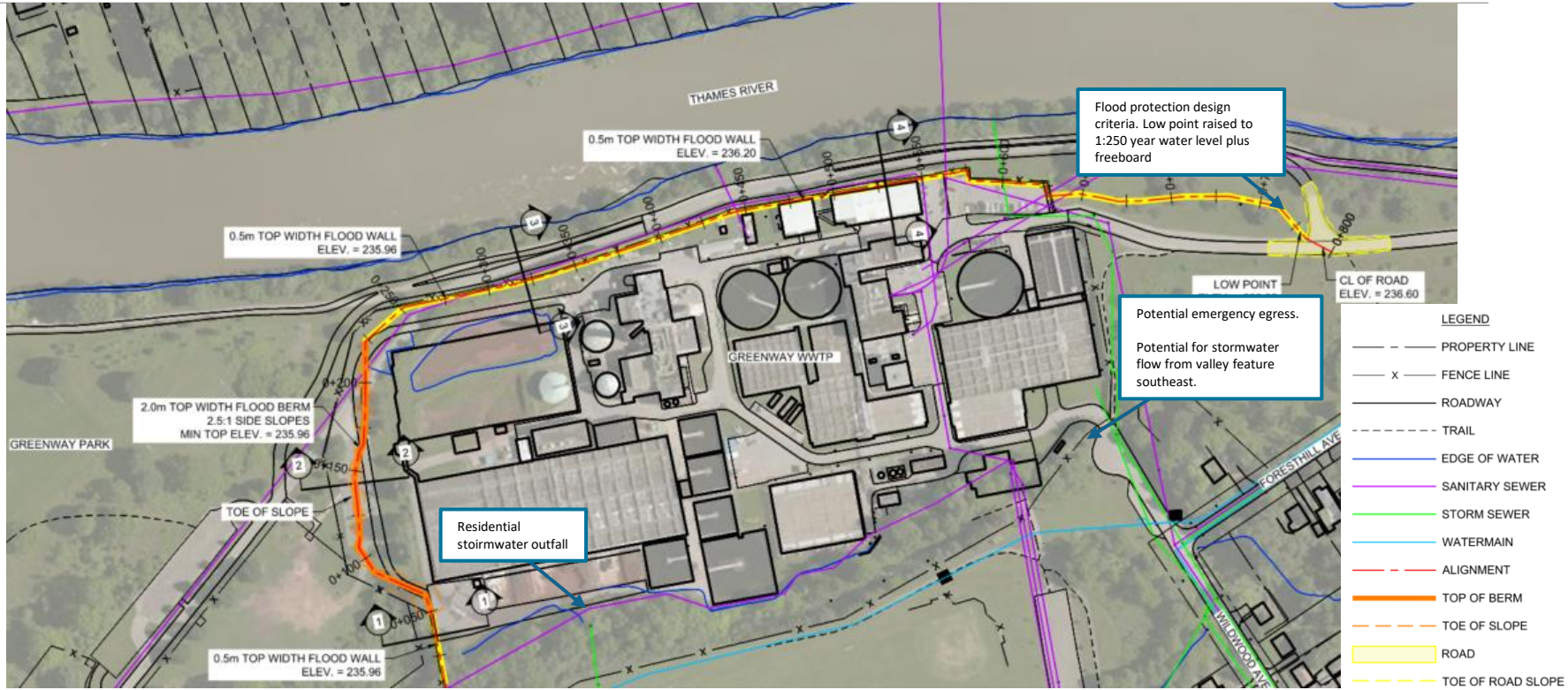
Greenway Flood Mitigation Options

Option 1 – Combination of floodwall and berm

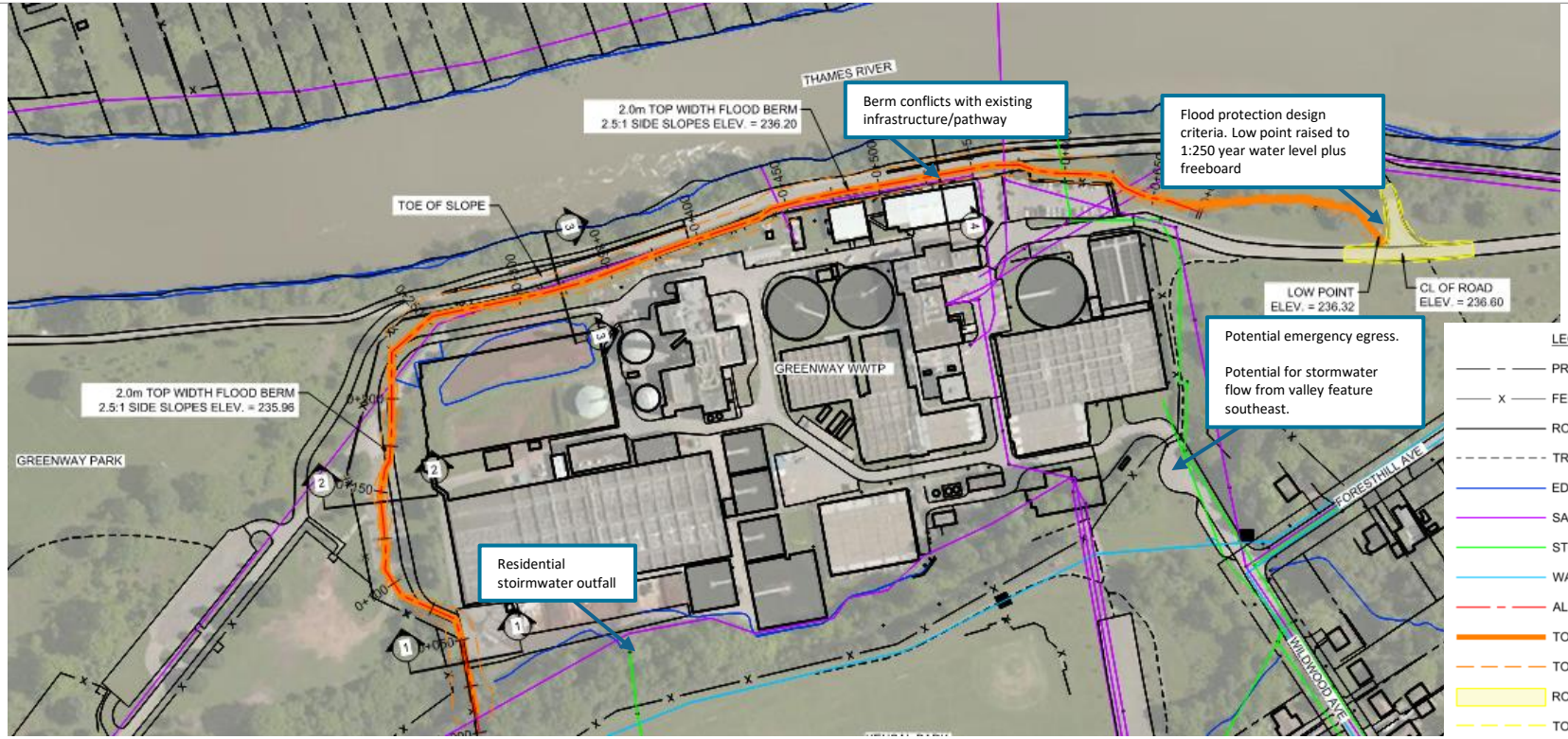
Option 2 – Berm

Option 3 – Combination of floodwall and berm

Greenway Option 1



Greenway Option 2



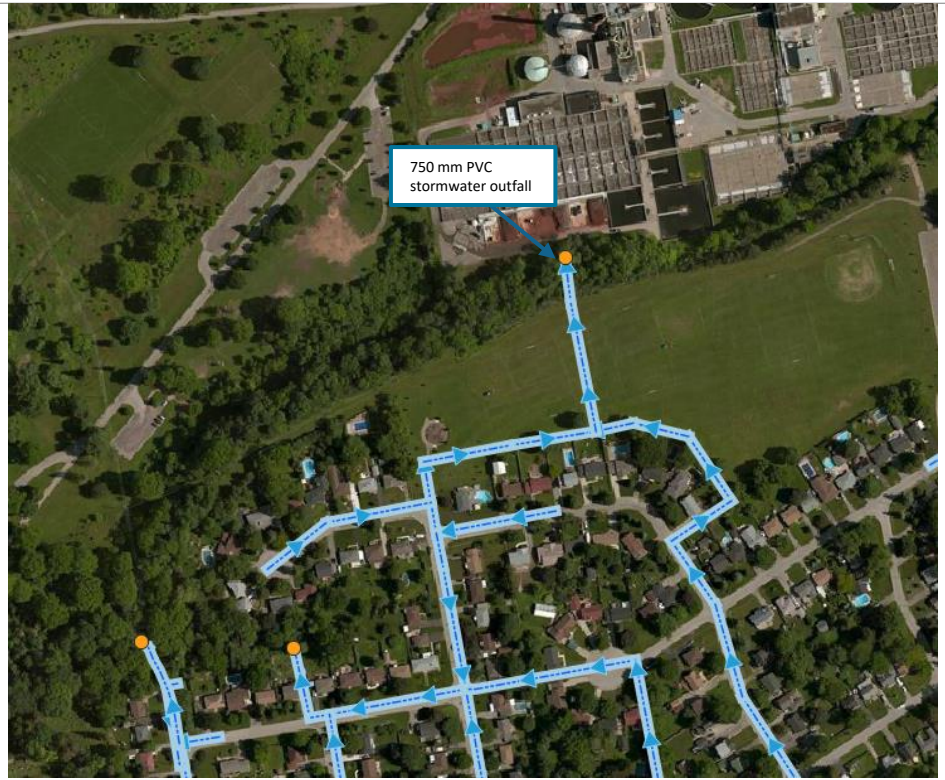
Greenway Option 3



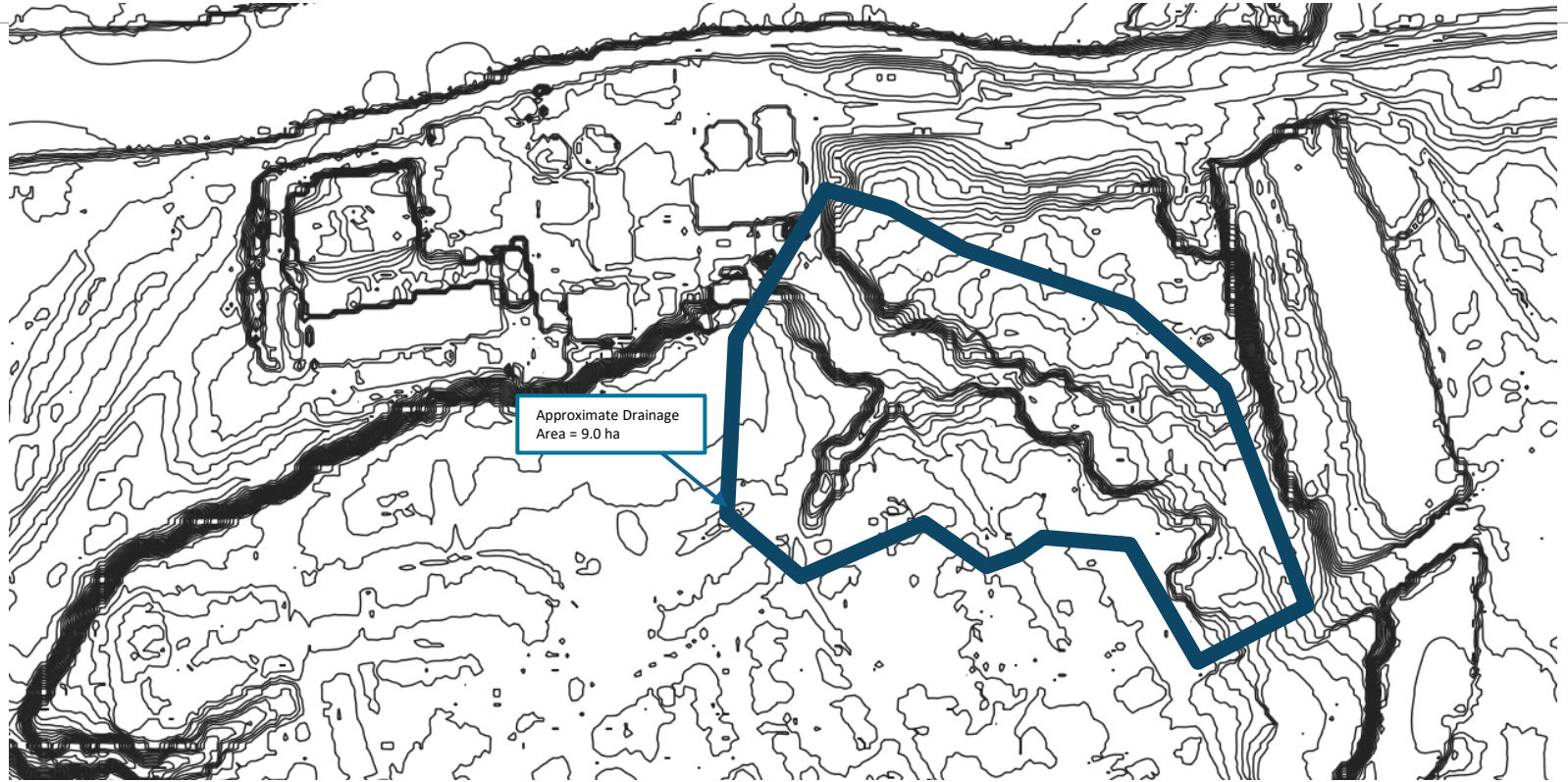


Greenway Stormwater Management

Greenway Stormwater Outfall Location



Greenway Stormwater Drainage Catchment





Discussion: Greenway Preferred Approach

Greenway Discussion

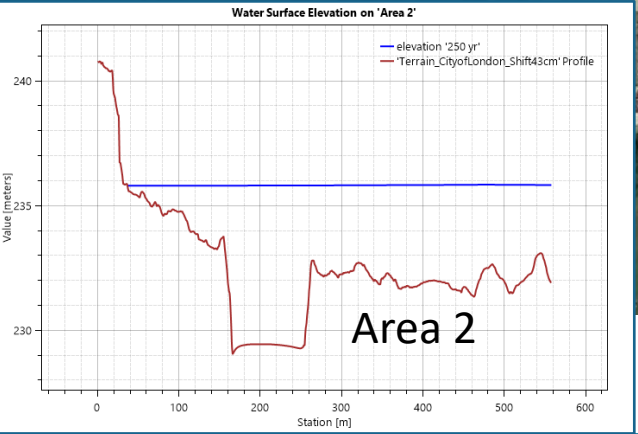
- Stormwater considerations required for each of the alternative solutions
- Modifications to intersection near entrance of WWTP required for each of the alternative solutions
- Available area along northside of WWTP too constrained for required footprint of berm



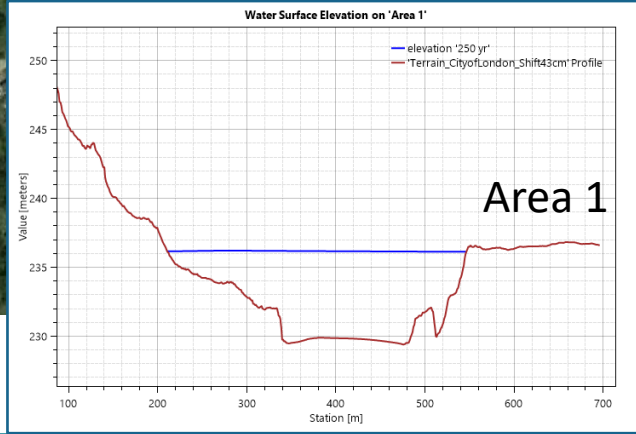
Greenway Storage Loss Offsetting – High-level Evaluation of Available Concepts

Greenway Storage Loss Offsetting



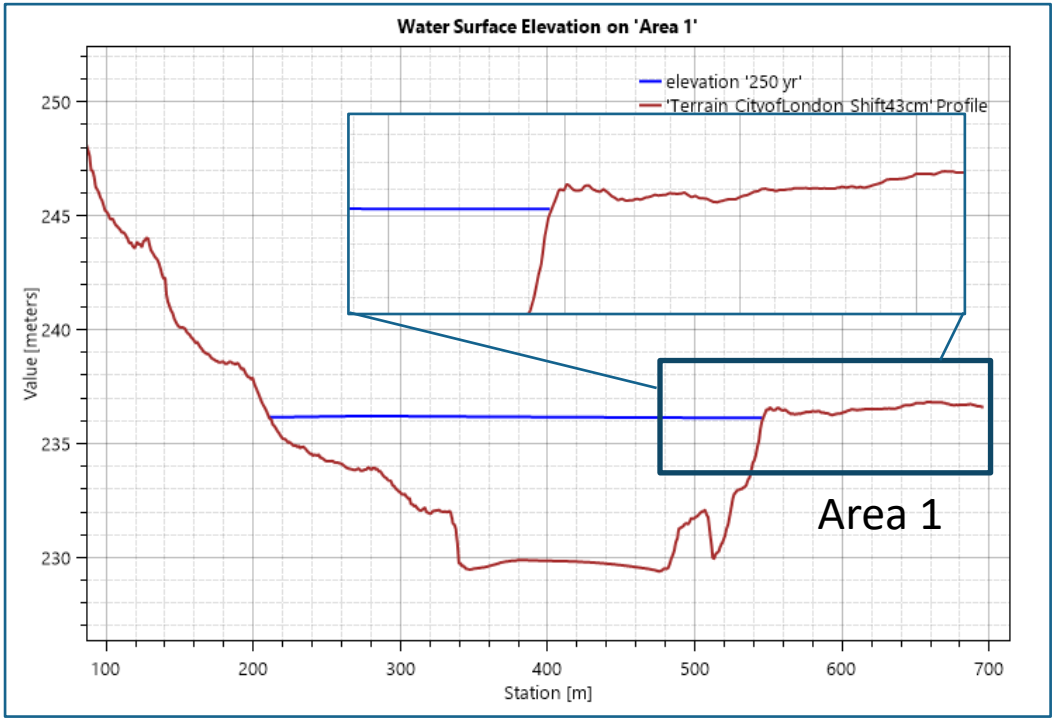


Site-level Flood Storage Loss:
52,000 m^3



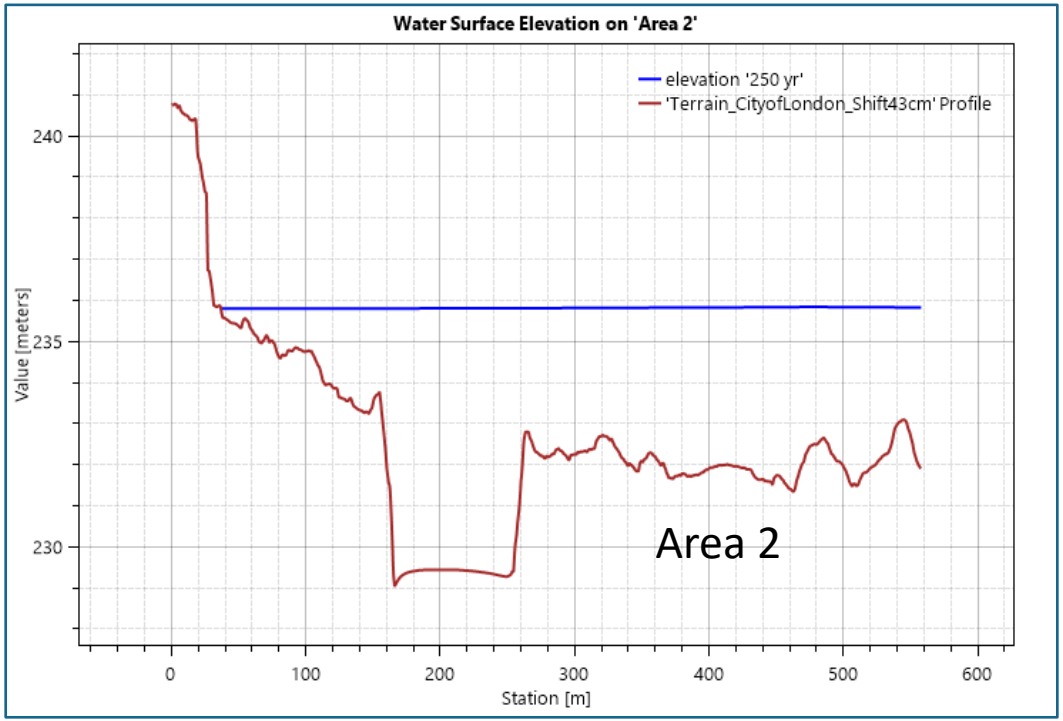
Greenway Storage Loss Offsetting – Area 1

- Existing ground above regulatory flood level



Greenway Storage Loss Offsetting – Area 2

- Existing floodplain low relative to the adjacent Thames River





Next Steps

Next Steps

- Finalized evaluation of options
- Finalize concept designs and design brief
- Confirm date for PIC #2

Melani-Ivy Samson

From: Steve Braun
Sent: Monday, May 9, 2022 1:25 PM
To: Melani-Ivy Samson
Subject: FW: [EXTERNAL] Re: Fwd: FW: Greenway/Adelaide WWTP EA - Workshop #3 Meeting Minutes - Revised
Attachments: 32667-522 Workshop 3 - v1.0.pdf

From: McKillop, Marcy <mmckillop@london.ca>
Sent: February 9, 2022 1:07 PM
To: Jessica Schnaithmann <schnaithmannj@thamesriver.on.ca>
Cc: Brent Verscheure <VerscheureB@thamesriver.on.ca>; Karen Hofbauer <khofbauer@matrix-solutions.com>; Oudekerk, Kirby <koudeker@london.ca>; Steve Braun <sbraun@matrix-solutions.com>; Peter De Carvalho <pdecarvalho@matrix-solutions.com>; Chambers, Shawna <schamber@London.ca>
Subject: RE: [EXTERNAL] Re: Fwd: FW: Greenway/Adelaide WWTP EA - Workshop #3 Meeting Minutes - Revised

Hi Jessica,

Thank you for your email and responses regarding floodplain offsetting. Reponses have been provided embedded below **in green**.

These emails can be included in the communication record and project file for the Greenway and Adelaide Wastewater Treatment Plant Climate Change Resiliency Class Environmental Assessments (EAs).

Best regards,

Marcy McKillop, P.Eng.
Environmental Services Engineer
Wastewater Treatment Operations
City of London

109 Greenside Avenue
London, ON N6J 2X5
P: 519.661.CITY(2489) x 4976 | Cell: 226.688.8176 | Fax: 519.661.0199

mmckillop@london.ca | www.london.ca

As part of our ongoing efforts to stop the spread of COVID-19, the City of London has made changes to many City services. Visit our website for the latest information about City services and COVID-19.

From: Jessica Schnaithmann <schnaithmannj@thamesriver.on.ca>
Sent: Wednesday, February 2, 2022 11:11 AM
To: McKillop, Marcy <mmckillop@london.ca>
Cc: Brent Verscheure <VerscheureB@thamesriver.on.ca>; khofbauer@matrix-solutions.com; Oudekerk, Kirby <koudeker@london.ca>; sbraun@matrix-solutions.com
Subject: [EXTERNAL] Re: Fwd: FW: Greenway/Adelaide WWTP EA - Workshop #3 Meeting Minutes - Revised

Hi Marcy,

UTRCA Staff have reviewed and discussed internally - my apologies for the delay. We appreciate that the options for flood storage offsetting were investigated. Note that a Conservation Authorities Section 28 permit application will be required for the proposed works.

Please consider the following feedback/input regarding the flood storage offsetting:

1. The UTRCA is supportive of the flood storage offsetting identified as 1a and 1b at the Adelaide location provided that the City ecologist has reviewed and is supportive. The opportunity to incorporate naturalization and ecological features in the design of the channel was discussed and the UTRCA recommends that this be reviewed and incorporated in the design;

   Alternatives SWM1a and SWM1b were presented as potential concepts for flood storage offsetting. The flood storage volume displaced, due to implementation of the proposed Adelaide Wastewater Treatment Plant flood protection improvements, has been determined by the City's consultant to be negligible in terms of the potential downstream hydrologic impact (i.e. effects to downstream flows). The potential upstream hydraulic impacts from the proposed works were also determined by the City's consultant (through hydraulic modelling) to be negligible. Accordingly the Adelaide Climate Change Resiliency Class EA, similarly to the Greenway Class EA, will recommend that flood storage offsetting concepts not be implemented at either site. Options for floodplain storage offsetting were evaluated but were determined to be insufficient to provide for all lost storage volume. The potential costs for the offsetting concepts, including potential ecological impacts, make their implementation less compelling. Given the special context of the existing WTTPs in the flood plain, the potential for "cumulative effects" of floodplain storage loss from other municipal projects like this one should not pose a significant risk.

2. The UTRCA has concerns with grading a wide depression adjacent to the existing sports fields at the Adelaide location and would be unlikely to support this without an outlet. We request further information indicating how this area would drain. The UTRCA would likely be more supportive if there were a connection/outlet incorporated into the design;
   These comments are noted/acknowledged. Grading was presented as a concept only. Similarly to the response provided above, the City has no plans to further consider this grading concept as part of the flood protection site improvements for the current Adelaide Wastewater Treatment Plant Climate Change Resiliency Class Environmental Assessment. The City's Parks Division has no immediate or short-term plans to modify the existing sports fields surrounding the Adelaide Wastewater Treatment Plant site.

3. The UTRCA is in agreement that there are no options for flood offsetting within the Greenway location.
   Agreed/noted

Please let me know if you have any questions or concerns.

Thank you,

Jessica

UPPER THAMES RIVER
CONSERVATION AUTHORITY

Jessica Schnaithmann
Land Use Regulations Officer
1424 Clarke Rd, London, ON N5V 5B9
Tel: 519-451-2800 Ext. 307
Email:schnaithmannj@thamesriver.on.ca
Web:www.thamesriver.on.ca

All UTRCA offices and buildings are closed to the public to help protect the public and staff from COVID-19. I am working remotely during this time and will be monitoring all messages and emails. We apologize for any inconvenience this may cause.

>>> "McKillop, Marcy" <mmckillop@london.ca> 1/17/2022 4:19 PM >>>

Hi Brent,

As a follow-up to my v-mail message and the attached meeting minutes, I just wanted to request feedback/input from UTRCA regarding the flood storage offsetting considered by the end of January. This will allow us to maintain our schedule for these Class EAs and proceed with our second PIC.

Feel free to contact me by phone if you would like to discuss further.

Best regards,

Marcy McKillop, P.Eng.
Environmental Services Engineer
Wastewater Treatment Operations
City of London

109 Greenside Avenue
London, ON N6J 2X5
P: 519.661.CITY(2489) x 4976 | Cell: 226.688.8176 | Fax: 519.661.0199
mmckillop@london.ca | www.london.ca

As part of our ongoing efforts to stop the spread of COVID-19, the City of London has made changes to many City services. Visit our website for the latest information about City services and COVID-19.

From: Peter De Carvalho <pdecarvalho@matrix-solutions.com>
Sent: Monday, January 17, 2022 3:25 PM

To: McKillop, Marcy <mmckillop@london.ca>; schnaithmannj@thamesriver.on.ca; Oudekerk, Kirby <koudeker@london.ca>
Cc: Brent Verscheure <verscheureb@thamesriver.on.ca>; Steve Braun <sbraun@matrix-solutions.com>; Karen Hofbauer <khofbauer@matrix-solutions.com>
Subject: [EXTERNAL] RE: Greenway/Adelaide WWTP EA - Workshop #3 Meeting Minutes - Revised

Good afternoon,

Please note that the minutes I sent out last week have been revised as attached (attendee list has been corrected, and an additional action item for UTRCA has been noted in the summary table).

Don't hesitate to let me know if you have any questions or concerns.

All the best,

Peter

Peter De Carvalho, M.Eng., EIT.
Restoration Specialist

MATRIX SOLUTIONS INC.
Environment & Engineering
650 Woodlawn Rd W Unit 7B, Guelph, ON N1K 1B8
D 226.314.1926 **C** 226.332.4392
www.matrix-solutions.com

2019 Canada's Greenest Employers

From: Peter De Carvalho
Sent: January 13, 2022 10:07 AM
To: McKillop, Marcy <mmckillop@london.ca>; schnaithmannj@thamesriver.on.ca; koudeker@london.ca; shifflettm@thamesriver.on.ca
Cc: Brent Verscheure <verscheureb@thamesriver.on.ca>; Steve Braun <sbraun@matrix-solutions.com>; Karen Hofbauer <khofbauer@matrix-solutions.com>
Subject: Greenway/Adelaide WWTP EA - Workshop #3 Meeting Minutes

Good morning,

Apologies for the delay, but please find attached the meeting minutes and presentation slides for last month's Workshop #3.

All the best,

Peter

Peter De Carvalho, M.Eng., EIT.
Restoration Specialist

MATRIX SOLUTIONS INC.
Environment & Engineering
650 Woodlawn Rd W Unit 7B, Guelph, ON N1K 1B8

D 226.314.1926 **C** 226.332.4392
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Appendix F
Cost Estimates

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Adelaide WWTP Flood Protection Cost Estimate
Option 1 - Berm with Raised Entrance Way

Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Item Price
1.0	**Removals**				
1.1	Remove and dispose of existing asphalt roadway	m^2	2,000	$4	$8,000
2.0	**Berm Construction**				
2.1	Site Preparation	m^2	6,500	$50	$325,000
2.2	Earthworks (base)	m^3	6,857	$50	$342,850
2.3	Hydrostatic Basing/Geotechnical/Clay Core/Cut-off Wall	m	650	$750	$487,500
2.6	Landscaping/Soft Area Restoration	m^2	6,500	$10	$65,000
2.4	Minor Items	EA	1	$183,053	$183,053
			per metre cost	$2,159	
3.0	**Road Construction**				
3.1	Earthworks	m^3	4,636	$50	$231,800
3.2	Road Construction	m	280	$1,500	$420,000
3.4	Landscaping and Illumination	EA	1	$50,000	$50,000
3.3	Minor Items	EA	1	$105,270	$105,270
			per metre cost	$2,882	
4.0	**Provisional Costs - EQ Tank and Flood Protection**				
4.1	EQ Tank Placement and Flood Protection Considerations	EA	1	$150,000	$150,000
				Subtotal	**$2,368,500**
				Contingency (20%)	**$473,700**
				Engineering (10%)	**$236,850**
				TOTAL	**$3,080,000**
5.0	**Operational Costs**				
5.1	Maintenance for berm	year	1	$1,000	*recurring*

Comments: - Actual costs may differ from the cost shown in this estimate
- Totals have been rounded up to the nearest thousand dollars
- All prices are in 2021 Canadian Dollars

Matrix Solutions Inc. - Project 183831-32667-531

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

Adelaide WWTP Flood Protection Cost Estimate
Option 2 - Berm with Temporary Measures

Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Item Price
1.0	**Removals**				
1.1	Site Preparation	m^2	7,500	$50	$375,000
1.2	Earthworks (base)	m^3	7,377	$50	$368,850
1.3	Hydrostatic Basing/Geotechnical/Clay Core/Cut-off Wall	m	775	$750	$581,250
1.5	Landscaping/Soft Area Restoration	m^2	7,500	$10	$75,000
1.4	Minor Items	EA	1	$210,015	$210,015
			per metre cost	$2,078	
4.0	**Provisional Costs - EQ Tank and Flood Protection**				
4.1	EQ Tank Placement and Flood Protection Considerations	EA	1	$150,000	$150,000
				Subtotal	**$1,760,200**
				Contingency (20%)	**$352,040**
				Engineering (10%)	**$176,020**
				TOTAL	**$2,289,000**
5.0	**Operational Costs**				
5.1	Maintenance for berm	year	1	$1,000	*recurring*
5.2	Maintenance and upkeep of temporary works	year	1	$3,000	*recurring*
Comments: -	Actual costs may differ from the cost shown in this estimate				
-	Totals have been rounded up to the nearest thousand dollars				
-	All prices are in 2021 Canadian Dollars		**Matrix Solutions Inc. - Project 183831-32667-531**		

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

Adelaide WWTP Flood Protection Cost Estimate
Option 3 - Berm Extended to Provide Protection at the Parking Lot

Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Item Price
1.0	**Removals**				
1.1	Remove and dispose of existing asphalt roadway	m^2	2,000	$4	$8,000
2.0	**Berm Construction**				
2.1	Site Preparation	m^2	8,300	$50	$415,000
2.2	Earthworks (base)	m^3	8,057	$50	$402,850
2.3	Hydrostatic Basing/Geotechnical/Clay Core/Cut-off Wall	m	826	$750	$619,500
2.6	Landscaping/Soft Area Restoration	m^2	8,300	$10	$83,000
2.4	Minor Items	EA	1	$228,053	$228,053
			per metre cost	$2,117	
3.0	**Road Construction**				
3.1	Earthworks	m^3	1,308	$50	$65,400
3.2	Road Construction	m	106	$1,500	$159,000
3.4	Landscaping and Illumination	EA	1	$50,000	$50,000
3.3	Minor Items	EA	1	$41,160	$41,160
			per metre cost	$2,977	
4.0	**Provisional Costs - EQ Tank and Flood Protection**				
4.1	EQ Tank Placement and Flood Protection Considerations	EA	1	$150,000	$150,000
				Subtotal	**$2,222,000**
				Contingency (20%)	**$444,400**
				Engineering (10%)	**$222,200**
				TOTAL	**$2,889,000**
5.0	**Operational Costs**				
5.1	Maintenance for berm	year	1	$1,000	*recurring*
Comments:	- Actual costs may differ from the cost shown in this estimate				
	- Totals have been rounded up to the nearest thousand dollars				
	- All prices are in 2021 Canadian Dollars		**Matrix Solutions Inc. - Project 183831-32667-531**		