Pontiac Pumping Station Capacity Upgrades – Schedule 'C' Municipal Class Environmental Assessment

Environmental Study Report

February 8, 2023

Prepared for:
City of Windsor

Prepared by:
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Project Number:
165620249

PONTIAC PUMPING STATION CAPACITY UPGRADES – SCHEDULE 'C' MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT

Executive Summary
February 8, 2023

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EXECUTIVE SUMMARY

The City of Windsor (City), like many other municipalities, has experienced an increase in significant storm events in recent years. Basement, coastal, and surface flooding has occurred across the City, particularly in the Riverside area. In response, the City undertook a comprehensive study in the Spring of 2018. This study looked to understand the causes of the widespread flooding; identify areas and locations in which severe flooding occurs, evaluate high-level alternative solutions to address this flooding, complete high-level designs and cost estimates; and provide an implementation strategy and timing for the proposed solutions. This comprehensive study was adopted by the City as the Sewer & Coastal Flood Protection Master Plan (SMP) in July of 2020.

The SMP identified the need for expansion of the Pontiac drainage area and hydraulic capacity upgrades at the Pontiac Pumping Station. The Pontiac Pumping Station, which is located on the site of the Little River Pollution Control Plant (LRPCP), is a stormwater pumping station that services the Pontiac drainage area and acts as an emergency bypass for the LRPCP in the case of a severe storm event. The SMP identified the need for a new wet well structure to house three (3) new stormwater pumps, which will increase the level of service in the expanded Pontiac drainage area and provide capability for a controlled bypass of the LRPCP in the case of a severe storm event.

The purpose of this study is to identify, evaluate, and report on the alternative design concepts for the Pontiac Pumping Station upgrades. This evaluation will include the conceptual design of the proposed Pontiac Pumping Station upgrades including the site layout and pumping technology. The project objective is to identify the recommended pumping station design to meet flood mitigation objectives in the Pontiac drainage area. This Environmental Assessment report is the documentation of the Class Environmental Assessment (Class EA) process outlined by the Municipal Engineers Association (MEA) for the Pontiac Pumping Station upgrades.

This report comprises **Sections 1 to 10** inclusive and **Appendices A to C** inclusive. A brief description of each section follows.

SECTION 1: INTRODUCTION

This section provides background information and a description of the Class EA process. The Class EA process is comprised of five phases.

- Phase 1 includes identification of the problem or opportunity and discretionary public consultation.

- Phase 2 includes identification and evaluation of alternative solutions to the problem, identification of environmental impacts of the alternative solutions, consultation with the public and review agencies, selection of the preferred solution and determination of the project schedule. Projects are classified as Schedule A, B, or C depending on their complexity and potential for environmental impact.

- Phase 3 includes identification and evaluation of alternative design concepts, identification of environmental impacts and mitigating measures with respect to the design concepts, further consultation with the public and review agencies, and selection of the preferred design.

- Phase 4 includes the completion of the ESR and placing it on the public record, notification to the public and review agencies of completion of the Class EA and a 30-day review period providing the opportunity to request the Minister to require a proponent to comply with Part II of the EA Act (which addresses individual EAs) before proceeding with the project. The Minister determines whether this is necessary.

- Phase 5 includes the implementation of the recommended design.

The SMP was prepared in accordance with Phases 1 and 2 of the Class EA process and identified this project as Schedule C. This Class EA has been carried out in accordance with Phases 3 and 4.

SECTION 2: STUDY AREA CONDITIONS

Projects identified through this Class EA process must be evaluated based on the potential impact on the existing environmental conditions of the study area. This section provides a general description of the existing natural, social, and economic environmental conditions in the study area.

SECTION 3: PROBLEM STATEMENT

This section provides an overview of the existing stormwater pumping station and nearby wastewater treatment facility, identifies the problem statement, and establishes the project objective.

SECTION 4: DESIGN SOLUTION FOR PONTIAC PUMPING STATION AS OUTLINED IN THE SMP

This section presents the details of the work undertaken under Phase 2 of the Class EA process, which was completed as a part of the SMP study. Phase 2 involves the identification and evaluation of various conceptual alternatives with the objective of determining alternative solutions which best address the identified problems and needs based on the potential impact to the natural, social, and economic environments.

SECTION 5: DESIGN CONCEPTS AND RECOMMENDATIONS FOR PONTIAC PUMPING STATION

This section presents the details of the work undertaken to support Phase 3 of the Class EA process, which was completed as a part of this study. In this section of the ESR, alternative design concepts are presented and evaluated leading to the selection of the recommended design, which satisfies the overall preferred solution identified under Phase 2. The evaluation of alternative designs includes consideration of potential environmental, social, and economic impacts and recognizes the need to design the facilities in such a way that they will be as unobtrusive as possible and blend in with existing and proposed uses in the Little River Pollution Control Plant.

SECTION 6: ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

This section identifies the environmental impacts of the preferred solution and describes the recommended mitigation measures.

SECTION 7: PROPERTY REQUIREMENTS

This section includes any property and easement requirements for the proposed upgrades and a brief description of typical process for the property acquisition.

SECTION 8: CONSULTATION

This section includes documentation of consultation with the public, review agencies and Indigenous communities that occurred during Phases 2 and 3 of the process. In order to complete Phase 4 of the Class EA process, this report will be made available for review and comment by the above-mentioned parties as a part of the consultation process.

SECTION 9: OPINION OF PROBABLE COST

This section summarizes the opinion of probable cost for the recommended solution and anticipated phasing. The estimated total capital cost for this project is approximately $8,200,000.00 (in 2022 dollars).

SECTION 10: SUMMARY

This section summarizes recommendations that are made with respect to this study.

1.0 INTRODUCTION

1.1 BACKGROUND

1.1.1 General

The City of Windsor (City) has experienced an increase in significant storm events in recent years as well as record-high water levels in Lake St. Clair and the Detroit River. These hydrological factors have resulted in significant basement, coastal, and surface level flooding throughout the city and surrounding municipalities. Coastal zones and low-lying areas, which includes Riverside and a majority of East Windsor, are at considerable risk for flood events that can negatively impact the community and cause damage to municipal infrastructure, residential / commercial properties, and local transportation networks.

The Intergovernmental Panel on Climate Change (IPCC) noted that it is increasingly clear climate change has influenced several variables, including precipitation and snowmelt, which may contribute to localized flooding. Climate change and more specifically anthropogenic influence has contributed to the intensification of extreme precipitation events worldwide. In North America, the likeliness of heavy precipitation events is set to increase in the future resulting in more frequent, intense, and unpredictable precipitation events. The Windsor Climate Change Adaptation Plan (2020) outlines the local data regarding climate change and projects that an increase in severe precipitation events is to be expected in the future. In addition, high water levels in Lake St. Clair and the Detroit River are putting a strain on the municipal storm sewer systems and poses a risk to property owners in coastal and low-lying areas.

To address widespread basement and surface level flooding during extreme storm events, the City carried out a comprehensive study known as the SMP. The SMP study identified the Pontiac stormwater drainage area and LRPCP sanitary collection area as areas of concern. These areas are at high risk for basement and surface level flooding during a significant storm event because the Pontiac Pumping Station does not have adequate capacity to remove water from the stormwater system or sanitary system (in the case of a bypass event at the LRPCP). Further, the SMP identified that the hydraulic grade line (HGL) in the stormwater collection system did not meet the recommended level of service for a 1 in 100-year storm event. These findings are consistent with observed and reported data during severe storm events. Failure to have adequate infrastructure in place will negatively impact the community and may cause damage to infrastructure, properties, and local transportation networks. The LRPCP will be expanded in the future to provide wastewater treatment capacity for anticipated development throughout East Windsor and Tecumseh. However, to reduce the risk of backups and provide flood relief, the SMP recommended an expansion of the Pontiac drainage area and capacity upgrades at the Pontiac Pumping Station.

The Pontiac Pumping Station, which is located on the site of the LRPCP, is a stormwater pumping station that services the Pontiac drainage area and acts as an emergency bypass for the LRPCP

in the case of a severe storm event. The SMP identified the need for a new wet well structure to house three (3) 1.25 m^3/s pumps to lower the HGL in the stormwater collection system and increase capacity to provide a 1:100-year storm level of service for the extended Pontiac drainage area. The upgrades completed as a part of this project will increase the level of service in the expanded Pontiac drainage area and provide capability for a controlled bypass of the LRPCP in the case of a severe storm event.

The Pontiac Pumping Station generally services the East Riverside area and is bounded by Tecumseh Road East in the south, the Detroit River in the north, Lauzon Road on the west and Chateau Avenue on the east. The existing infrastructure in the Pontiac drainage area consists of separate sanitary and stormwater collection systems as well as two (2) stormwater management ponds. The existing stormwater infrastructure and boundaries of the Pontiac drainage area are shown in **Figure 1.1** of **Appendix A**. The proposed upgrades to the Pontiac Pumping Station will modify the service areas for the Pontiac drainage area and the nearby East Marsh drainage area. This will include redirecting a portion of the East Marsh drainage area to the Pontiac Pumping Station. The following sections of storm collection system will be redirected from the East Marsh Pumping Station to the Pontiac Pumping Station:

- Riverside Drive East between Bertha Avenue and Adelaide Avenue;
- Adelaide Avenue between Riverside Drive East and Wyandotte Street East;
- Clover Street between Riverside Drive East and Wyandotte Street East;
- Elinor Street between Riverside Drive East and Wyandotte Street East;
- Florence Avenue between Riverside Drive East and Wyandotte Street East;
- Menard Street and John Street between Elinor Street and Florence Avenue;

The proposed drainage area and modifications identified in the SMP study are shown in **Figure 1.2** of **Appendix A.**

1.1.2 Sewer & Coastal Flood Protection Master Plan (SMP)

To address widespread basement and surface level flooding issues during extreme storm events, the City carried out a comprehensive study known as the Sewer & Coastal Flood Protection Master Plan (SMP). The SMP study was initiated in the Spring of 2018 and was completed in July of 2020. The purpose of the SMP study was to understand the causes of flooding; identify locations of basement, surface, and coastal flooding; evaluate alternative solutions; complete high-level design and cost estimates for proposed infrastructure improvements; and provide an implementation strategy for the recommended solutions. The SMP report can be accessed through the following weblink: Sewer and Coastal Flood Protection Master Plan (citywindsor.ca).

The SMP study was carried out under the direction of a Technical Advisory Committee (TAC) that included representatives from the Essex Regional Conservation Authority (ERCA), the City of Windsor, Aquafor Beech Ltd. (Aquafor), and Dillion Consulting Ltd (Dillion). The engineering and planning team assembled to complete the study included Dillion as lead consulting firm, partnered with Aquafor and AMG Environmental Inc.

The SMP Study was carried out in general accordance with the Municipal Engineer's Association Municipal Class EA Master Plan Process, an approved process under the provincial *Environmental Assessment Act*. It included a planning and design process and public open house consultation sessions to provide information on the study findings and solicit input on preferred control options.

As a part of the SMP, the City considered shorter-term and longer-term solutions. Shorter-term solutions were defined as those which can be implemented relatively quickly (ex. 0 to 10 years) and do not need significant capital investment. These include measures to reduce the quantity of precipitation and lake water getting into the sewer system through municipal policies, subsidy programs, and collaborative improvements. Municipal policies include mandatory use of sewage ejector pumps, mandatory downspout disconnection, stormwater surcharges and green infrastructure credits, sanitary rain catchers and maintenance hole sealing, infrastructure maintenance and assessment, design standards, and sewer network backflow prevention devices.

Longer-term solutions were defined as those which will require a longer period of time to implement (ex. greater than 10 years) and may involve a significant capital investment. These include measures to improve the sewer systems by increasing downstream outlet capacity through increased treatment capacity or enlarging outlets to receiving water bodies, source control and private property measures, coastal protection through overland flood barriers and backflow prevention, and improving sewer system conveyance and storage capacity through enlarging sewer pipes and storage facilities.

Longer-term solutions identified in the East Windsor Area, near the Pontiac Pumping Station, include the following improvements:

- Construct 40 km of new storm sewers in East Windsor;
- Improve existing sewer pipes by upgrading from 300 mm diameter circular pipes to 4200 mm x 1800 mm box culverts in certain regions of East Windsor;
- Design and install five (5) underground stormwater storage facilities at the following locations with the corresponding storage volumes:
    - Brumpton Park → 4,725 m^3
    - Wyandotte Street East at Watson Avenue → 7,000 m^3

  - 8380 Wyandotte Street East → 5,000 m^3
  - Meadowbrook Park → 5,000 m^3
  - Roseville Garden Park → 31,625 m^3

- Design and construct a new stormwater surcharge storage pond in the Little River Golf course with a storage volume of 20,000 m^3;
- Design and construct a new stormwater pumping station at the following locations with the corresponding pumping capacity:
  - St. Rose Pumping Station in St. Rose Park with a firm pumping capacity of 13.5 m^3/s
- Upgrades and modifications to existing stormwater pumping stations:
  - St. Paul Pumping Station capacity upgrades such that the total firm pumping capacity is 18.2 m^3/s
  - Ford Pumping Station pump replacement such that the total firm pumping capacity is 0.5 m^3/s
  - Pontiac Pumping Station capacity upgrade such that the new pumping station provides an additional firm pumping capacity of 2.5 m^3/s (Overflow at the LRPCP)
  - East Marsh Pumping Station pump replacement such that the total firm pumping capacity 1.7 m^3/s
- Upgrade Lakeview Pumping Station to increase pump rate to 0.65 m^3/s. Improve the outlet pipe to Detroit River by replacing the existing 300 mm diameter outlet pipe with a 600 mm diameter outlet pipe;
- Construct 2.7 km of landform barriers and improve the existing landform barrier along Riverside Drive to meet the flood protection elevation of 176.50 m;
- Install backflow prevention measures for sewers crossing the proposed landform barrier;
- Design and install local storm sewers adjacent to the landform barrier ranging in size from 450 mm to 525 mm in diameter; and
- Provide emergency infill areas where temporary flood protection measures are required to provide continuous barrier.

The Class EA for the proposed Pontiac Pumping Station capacity upgrades started in February of 2022. The City of Windsor has initiated this Class EA for the Pontiac Pumping Station capacity upgrades as the next step in implementing the SMP.

1.1.3 The Windsor Climate Change Adaptation Plan

The City of Windsor has a long-standing commitment to both Climate Change Mitigation and Adaptation Planning. This corporate environmental commitment was made through the development of an Environmental Master Plan in 2007 which was further developed through the Climate Change Adaptation Plan in 2020. The Windsor Climate Change Adaptation Plan was developed by the City of Windsor and ICLEI Canada Project Staff working closely with a Community Task Force and various City of Windsor departments.

In the Windsor Climate Change Adaptation Plan, the City determined that average precipitation values are expected to increase in the future, particularly in the seasons of winter and spring. The summer months may see a slight decrease in precipitation coupled with increasingly warm seasonal temperatures. In terms of extreme precipitation, the intensity and frequency of events is expected to increase in the future corresponding to 25% increase in 10-year storm events and 40% increase in 100-year storm events. For example, the City of Windsor has already experienced two 100-year storms between 2018 and 2020. On average more rain is expected to fall (in terms of mm/hr) during these periods of extreme precipitation. The water levels in Lake Erie and Lake St. Clair have been above average values since 2013. In 2019, the Detroit River reached a high-water level of 176.08 metres. In the near climate future water levels are expected to continue to be high. In the distant climate future, the water levels are projected to decrease in the Great Lakes partially due to warmer temperatures and changing precipitation patterns.

The City will continue to prepare for the climate future by creating a more climate resilient city. The City will continue to minimize climate change risks to the community through the advancement of sustainable policies, infrastructure investment, and public education. Forward thinking and proactive actions will benefit the community health, environment, and economy. The climate change mitigation and planning objectives for the City of Windsor include:

1. Integrate Climate Change Thinking and Response
2. Protect Public Health and Safety
3. Reduce Risk to Buildings and Property
4. Strengthen Infrastructure Resilience
5. Protect Biodiversity and Enhance Ecosystem Functions
6. Reduce Community Service Disruptions

7. Build Community Resilience

The Class EA for the proposed Pontiac Pumping Station upgrades will improve capacity and provide flood relief to the extended Pontiac drainage area. This project will address the City's climate change adaptation plan objectives by strengthening the infrastructure resilience, reducing risk to buildings and property, and protecting public health and safety.

1.1.4 Disaster Mitigation and Adaptation Fund

Communities throughout Canada are actively experiencing the negative impacts of climate change, including significant weather events and natural disasters. In 2018, the Government of Canada launched the Disaster Mitigation and Adaptation Fund (DMAF) to assist communities with flooding issues, capacity concerns and improve overall community resilience. This project is one of the many that will benefit from Federal Government Funding to make necessary capacity upgrades. The DMAF involves a series of projects, including studies, environmental assessments, road works, sewer works, stormwater management works, and pumping station works to address areas in the City prone to flooding, drainage complications and overall storm sewer capacity issues. These projects seek to reduce future flooding risks in the City of Windsor.

1.1.5 Purpose of Report

This is an Environmental Study Report (ESR) for the Pontiac Pumping Station capacity upgrades. This ESR presents the completed planning and decision-making process for the recommended design of the proposed upgrades to the Pontiac Pumping Station. This ESR includes a general introduction, review of existing conditions, problem statement, presentation of design solution identified in the SMP, identification and evaluation of alternative design concepts, and recommendations.

Alternative design approaches are presented and evaluated leading to the selection of a preferred design for proposed upgrades to the Pontiac Pumping Station and outlet structure. The decision-making process is based upon minimizing undesirable impacts on the natural, social, and economic environments and the ESR presents the rationale for decisions made. Where impacts on the environment are unavoidable, proposed mitigating measures are presented for consideration to minimize those impacts.

1.2 CLASS ENVIRONMENTAL ASSESSMENT PROCESS

1.2.1 General

The Ontario *Environmental Assessment Act* (the Act) aims to protect, conserve, and properly manage the natural, social, cultural, built, and economic environments as undertakings are planned and implemented in Ontario. The Act recognized that certain undertakings occur frequently, are small in scale, and have a generally predictable range of effects; or have minor environmental significance with the inclusion of a process to approve class environmental

assessments as the process to ensure proper planning and engagement on such projects. Under the Act, many municipal stormwater, wastewater, water, roads, and transit projects proceed through the approved Municipal Engineers Association (MEA) Municipal Class EA process (Class EA). The work undertaken in preparation of this study report follows the planning and design process of the Municipal Class EA, October 2000, as amended in 2007, 2011 and 2015.

This report also serves as a statement for public use in the decision-making process under the Act. Municipal staff and consultants can use the Class EA process in planning, design, and construction of projects to ensure that the requirements of the Act are met. As part of the Class EA procedure, the proponent is required to state how the project is to proceed and gain approval under the Act. There are four approval mechanisms available to the proponent under the Class EA process:

- **Schedule A and Schedule A+** projects are limited in scale, have minimal adverse environmental affects, and include several normal or emergency municipal maintenance and operational objectives. Projects listed in these schedules are now exempt from the Act
- **Schedule B** projects generally include improvements and minor expansions to existing facilities. In these cases, there is a 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** projects generally include 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 and require preparation of an Environmental Study Report to document the planning process.

The preferred solution has multiple activities identified under multiple Class EA schedules. Therefore, this project is being completed under the Municipal Class EA as a **Schedule C** activity, which is the highest identified schedule. Upon completion of Phase 1, Phase 2, Phase 3 and Phase 4 for Schedule C projects, the Owner may proceed directly to Phase 5 and implement the preferred solution.

1.2.2 Phases in Municipal Class EA Process

Figure 1.3 in **Appendix A** illustrates the steps followed in the planning and design of projects covered by the Municipal Class EA. The Class EA for municipal projects follows a five-phase planning process that can be summarized as follows:

Phase 1 – Identification of the problem

Phase 2 – Identification of alternative solutions to the problem, consultation with review agencies and the public, selection of the preferred solution, and identification of the project as a Schedule A, A+, B or C activity.

Phase 3 – Identification of alternative design concepts (technical alternatives) for the preferred solution, evaluation of the alternative designs and their impacts on the environment, consultation with review agencies and the public and selection of the preferred design.

Phase 4 – Preparation of an Environmental Study Report to document the planning, design and consultation process for the project. The ESR is placed on the public registry for scrutiny by review agencies and the public.

Phase 5 – Final design, construction and commissioning of the selected technical alternative. Monitoring of construction for adherence to environmental provisions and commitments.

1.3 PROJECT SCHEDULE

Phase 1 and 2 of the Municipal Class EA process, problem identification and evaluation of alternative design solutions, were completed as a part of the SMP. Phase 3 and 4 of the Municipal Class EA process, evaluation of alternative design concepts and preparation of an Environmental Study Report, were completed as a part of this study. Phase 5 of the Municipal Class EA process, project implementation, is anticipated to commence in Spring 2023. **Table 1.1** outlines the project schedule thus far and the anticipated schedule for implementation.

Table 1.1: Project Schedule for the Pontiac Pumping Station Capacity Upgrades

Phase of Class EA Process	Project Component	Completion Date
Phase 1 & 2	Sewer & Coastal Flood Protection Master Plan	July 2020
Phase 3	Project Initiation – Notice of Study Commencement	March 2022
Phase 3	Review of Background Information	May 2022
Phase 3	Evaluation of Alternative Design Concepts	June 2022
Phase 3	Public Information Center	July 2022
Phase 4	Draft Environmental Study Report	August 2022
Phase 4	Council Presentation & Resolution	January 2023
Phase 4	Notice of Completion	February 2023
Phase 5	Project Implementation	Anticipated to Start in Spring 2023; Completion by the end of the year 2025

2.0 STUDY AREA CONDITIONS

The following sections provide an overview of background information and a description of existing conditions within the study area as a basis for comparison. Alternative design solutions and concepts must be evaluated based on their potential impact to existing natural environment, social, and economic factors.

2.1 GENERAL DESCRIPTION OF THE STUDY AREA

The City of Windsor is located in Southwestern Ontario on the south shore of the Detroit River and Lake St. Clair directly across from the City of Detroit, Michigan. The population of Windsor is approximately 230,000 with a total land area of approximately 145.3 square kilometers (12,063 hectares). Settlement in the Windsor area dates to the 1700's with a population of 200 being reported in 1836 and 2,500 in 1892. Development generally started along the riverfront and progressed southernly away from the river as the population increased. More recently, the Canadian Census Program shows the population of the City increased from 217,188 in 2016 to 229,660 in 2021. The Windsor Census Metropolitan Area (which includes the Towns of Amherstburg, LaSalle, Lakeshore, and Tecumseh) is the 14th largest metropolitan area in Canada.

The riverfront area of the City extends from Lake St. Clair approximately 22.5 km downstream to the west limit of the City. The long-term average discharge of the Detroit River is 5,200 m^3/s with mid-channel surface currents of 1 to 1.2 m/s at the Ambassador Bridge. Flow travel time along the riverfront study area from Lake St. Clair to the western City limit is approximately 8 to 9 hours. There are numerous existing uses of the Detroit River as described in the "Detroit River Remedial Action Plan, Stage 1" dated 1991.

- The river is heavily used for commercial navigation as part of the Great Lakes-St. Lawrence Seaway system with Detroit being the busiest port on the Great Lakes.
- The river is used as a source of cooling water supply for several industries.
- There are five municipal drinking water intakes in the river including the City of Windsor intake and the Town of Amherstburg intake in the lower reaches of the river near Lake Erie.
- The river supports over sixty species of resident and migratory fish with an associated strong sport fishery.
- The river provides habitat for many resident and migratory birds.
- The Detroit River is an important recreational resource used for activities such as swimming, water skiing, jet skiing, scuba diving, fishing, boating, waterfowl viewing and waterfowl hunting.

- The two bathing beaches on the Canadian shore are located upstream of the study area (Sand Point Beach and Stop 26).
- The river serves as a receiving water for municipal and industrial discharges.
- There are extensive park areas in the City of Windsor bordering on the river.

Riverside, Ontario is a neighbourhood located in the eastern section of the City of Windsor. The Riverside area is characterised by its waterfront road, Riverside Drive, which follows the southern shoreline of the Detroit River. The neighbourhood of Riverside extends generally from Westminster Boulevard to the Windsor/Tecumseh town borderline. The Pontiac drainage area, which is the focus of this study, is located in the Riverside neighbourhood of the City of Windsor. The drainage area considered in the study is shown in **Figure 1.2** of **Appendix A** and is generally described as the lands lying between Tecumseh Road East and the Detroit River extending from Lauzon Road on the west and Chateau Avenue on the east. The topography of the land in the study area is relatively low lying and flat with a fall of 2 to 2.5 metres per kilometre from the south limit of the study area to the river.

2.2 LAND USE

The study area for this project is the Pontiac drainage area as shown in **Figure 1.2** of **Appendix A**. The Pontiac drainage area is located on the east end of Windsor, otherwise known as East Riverside. The study area is mostly composed of residential dwellings and parkland with some small areas with industrial and commercial establishments. All the developed lands within this area are serviced with separate sanitary sewers and storm sewers.

2.3 EXISTING FACILITIES AND INFRASTRUCTURE

2.3.1 Existing Pontiac Pumping Station

The Pontiac Pumping Station is adjacent to the Little River Pollution Control Plant which is located at 9400 Little River Road. The Pontiac Pumping Station is primarily a stormwater pumping station that services the Pontiac drainage area and acts as an emergency bypass for the LRPCP in the case of a severe storm event. The stormwater from the drainage area flows by gravity to the stormwater inlet chamber and further to the Pontiac Pumping Station where it is lifted and discharged to the Little River. The station receives water from a 1950 mm diameter storm sewer incoming from the LRPCP bypass chamber.

The Pontiac Pumping Station generally services the East Riverside area and is bounded by Tecumseh Road East in the south, the Detroit River in the north, Lauzon Road on the west and Chateau Avenue on the east. The existing infrastructure in the Pontiac drainage area consists of separate sanitary and stormwater collection systems as well as two (2) stormwater management ponds. The existing stormwater infrastructure and boundaries of the Pontiac drainage area are shown in **Figure 1.1** of **Appendix A**.

The Pontiac Pumping Station was constructed in 1977 and has been in operation since then. The station has a firm capacity of 4812 L/s and a total capacity of 6935 L/s. It is equipped with four (4) screw pumps, three at 2123 L/s (each) and one at 566 L/s. The pumps are electrically driven. The station is equipped with a 1320 HP diesel driven generator that provides power in an emergency when the normal electrical feed is interrupted. There are several subsystems required to keep the generator functioning, including a fuel oil feed system, a cooling water feed system, an air start system and an oil lubrication system. There are also several ancillary systems within the building that are required to support the pumping operation.

Pontiac Pumping Station is primarily a stormwater pumping station which provides flood relief to the Pontiac drainage area. In a severe storm event, where the capacity of the LRPCP is exceeded, the Pontiac Pumping Station acts as an emergency bypass for wet weather flows to prevent basement flooding. However, the existing pumping station does not have the hydraulic capacity to meet the required level of service and reduce the risk of basement flooding. The SMP identified that the HGL in the LRPCP stormwater collection system did not meet the recommended level of service for a 1 in 100-year storm event. This results in increased risk of basement and surface flooding in the Pontiac drainage area, which is consistent with observed and reported data during severe storm events. Failure to have adequate infrastructure in place will negatively impact the community and may cause damage to infrastructure, properties, and local transportation networks. To reduce the risk of backups and provide flood relief, the SMP recommended an expansion of the Pontiac drainage area and capacity upgrades at the Pontiac Pumping Station.

2.3.2 Little River Pollution Control Plant

The LRPCP, is located on a 16.2-hectare (40 acres) site at the intersection of Little River Road and Little River Access Drive at 9400 Little River Road. The plant treats sanitary and industrial wastewater from the portion of the City of Windsor east of Pillette Road, and the nearby Town of Tecumseh. The LRPCP receives wastewater from the 1200mm diameter Little River Sanitary Trunk Sewer, servicing the south-eastern section of the City of Windsor. It also receives wastewater from the 1500mm diameter Windsor-Tecumseh Sanitary Sewer, presently servicing East Windsor and the Town of Tecumseh. LRPCP receives wastewater from the 900mm diameter Edgar Avenue – Riverside Sandwich East Trunk Interceptor Sewer. An oval 940 x 990mm combined trunk sewer from Wyandotte Street, and a 690mm diameter Clairview Avenue sanitary interceptor sewer serve the areas West of LRPCP to Pillette Road and Westminster Boulevard and North of Little River Boulevard to Detroit River.

The LRPCP was originally constructed in 1965 and has undergone several expansions, most recently the upgrades completed in 1993. The original plant began its operation in 1966 as a primary treatment plant with a rated capacity of 18,000 m^3/d. In 1974, it was upgraded and expanded to 36,000 m^3/d providing secondary treatment using the activated sludge process and phosphorous removal. The plant was expanded again in the early 90's to a rated capacity of 73,000 m^3/d. The major unit operations at the LRPCP include fine bar screening, raw wastewater pumping station, grit removal, primary clarifiers, aeration tanks (activated sludge process), final

clarifiers (activated sludge process), UV disinfection and sludge dewatering by centrifuges. In the case of a significant wet weather event where the capacity of the LRPCP is exceeded, the Pontiac Pumping Station acts as an emergency bypass for wet weather flows to prevent basement flooding.

2.4 NATURAL ENVIRONMENT

2.4.1 Climate

The climate in Essex County is classified as modified humid continental, which has hot and humid summers with mild winters and adequate precipitation. In comparison with the other areas in the Province, Essex County's southerly latitude and proximity to the lower Great Lakes provides for warmer summer and winter temperatures with a longer growing season. Because the area is also on one of the major continental storm tracks, it experiences wide variations in day-to-day weather including severe summer thunderstorms. The normal minimum and maximum temperatures are -9^0 C and +28 ^{0}C respectively and the mean daily temperature is above 6 ^{0}C, which tends to increase temperatures in surface waters.

2.4.2 Geology and Physiography

The City of Windsor is located in the physiographic region of Southwestern Ontario known as the St. Clair Clay Plains. As the name suggests the area is covered with extensive clay plains. The topography of the area is extremely flat with elevations ranging from 175 to 204 meters above sea level.

Most of the bedrock under the region is sedimentary limestone of the Devonian age which has a high calcium and magnesium content. The bedrock in the majority of Essex County is covered by glacial drift with a thickness ranging from 3 m to 45 m from west to east. The parent soil material is a heavy ground moraine and lacustrine deposition containing a considerable amount of limestone, appreciable amounts of shale and some igneous rock.

2.4.3 Soils and Subsurface Conditions

Soils within the County of Essex were formed from heavy ground moraine which has been altered by glacial lake wave action and lacustrine deposition. The majority of the area is part of a smooth clay plain and the predominant soil types are Perth and Brookston clays and their associated clay loams. Developed from dolomitic limestone intermixed with shale, the imperfectly drained member is the Perth clays and the poorly drained member is the Brookston clays.

The clay deposits found in the majority of the Windsor area consist of a stiff silty clay to clayey silt deposited without significant stratification and possessing a distinctively till-like structure with a small fraction of sand and gravel sized particles distributed randomly throughout. In the west end of Windsor, this till-like deposit is overlain by a lacustrine deposit of soft to firm, layered silty clay. This deposit was laid down in the glacial lakes in front of the ice sheet during their retreat in the

post glacial period, when the level of Lake Erie was considerably higher than it is at present. These layered strata, of varying thicknesses and strengths, are known to exist up to 30 meters in total depth.

Geotechnical investigations at this site were carried out by Golder Associates for the City of Windsor. To evaluate the site conditions, historical geological and geotechnical information in the site were reviewed. There are six (6) geotechnical reports in Golder's records for lands at or adjacent to the Pontiac Pumping Station site. The borehole investigations on the site determined the general subsurface conditions on site consist of existing fill, topsoil, and pavement structures underlain by extensive deposits of native silty clay to sandy silty clay.

Further there are three (3) soil layers on the site: (i) topsoil, (ii) sandy silty clay fill, (iii) native sandy silty clay. The depth and thickness of the three soil layers is anticipated to vary slightly throughout the site. At the borehole locations the subsurface conditions consisted of surficial topsoil of approximately 150 to 240 mm in thickness underlain by sandy silty clay fill of approximately 0.8 m to 1.3 m in thickness. Beneath the sandy silty clay fill was an extensive deposit of native sandy silty clay. Borehole investigations were terminated in this soil layer after exploring the stratum for depths ranging from about 11.7 m to 14.4 m. During the borehole investigations no seepage into the open boreholes was observed and boreholes were dry upon completion of drilling. No obvious staining or odours indicative of potentially significant chemical impacts were observed in the soil samples for the boreholes. It should be noted that groundwater conditions vary dependent on precipitation, site grading, and other factors; therefore, some groundwater seepage should be anticipated during construction. Inflows may be controlled by pumping with filtered sumps and are anticipated to be sufficiently low such that a Permit to Take Water (PTTW) should not be required.

2.4.4 Natural Vegetation

The County lies completely within the Niagara section of the Deciduous Forest Region of Ontario. Favourable soil and climatic conditions have allowed for the extension of many species of Carolinian and Prairie flora which makes the region unique in Canada.

The study area within the LRPCP consists mainly of walking paths, paved parking lots and green space around the facilities and infrastructure. Stantec completed a site investigation on April 13th, 2022, to document existing natural heritage conditions in the Study Area. Surveys included Ecological Land Classification (ELC) of vegetation communities, a species at risk (SAR) habitat assessment of terrestrial features, and a fish habitat assessment of the shoreline. The natural heritage features that were identified through the background review were confirmed during the field surveying. The natural heritage impact assessment report is included in **Appendix C**.

Potential impacts associated with the construction of the proposed building and connecting infrastructure include soil compaction, siltation of adjacent natural communities, vegetation disturbance, spills of deleterious substances into the Little River, noise disturbance and encounters with wildlife. The impacts are considered short term, localized to the construction area during

construction activities, and will be mitigated through the application of appropriate construction techniques and mitigation measures. Climbing prairie rose is a species of conservation concern (SOCC) that may be present within the impacted thicket community. A site visit to look for this species is recommended prior to vegetation removal. If the species is present, relocation may be needed.

2.4.5 Terrestrial Animal Life

The study area within the LRPCP consists mainly of walking paths, paved parking lots and green space around the facilities and infrastructure which are not anticipated to support a wide diversity of terrestrial animal life. Impacts from construction of the proposed building and connecting infrastructure will primarily be limited to anthropogenic habitats that do not support wildlife. Construction of the outlet sewer may result in a small, short-term impact to terrestrial communities.

Eight (8) SAR have the potential to be present in the Study Area: Barn Swallow, Chimney Swift, bat SAR (4 different species), Butler's Gartersnake and Eastern Foxsnake. Of these, Butler's Gartersnake and Eastern Foxsnake are the only SAR that have potential to be present within the work zone. Mitigation measures for SAR snakes are discussed in **Section 6**. No permanent impacts to breeding birds, reptiles or other wildlife species, is expected as a result of the construction of the proposed building and connecting infrastructure provided mitigation measures recommended in **Section 6** are implemented.

2.4.6 Marine Life

The Study Area includes the Little River and the embayment connecting the Little River and the Pumping Station, which serves as the outlet for the proposed pumping station and supports a limited variety of marine and aquatic species. As many as 8 species of fish have been documented in the Little River. Installation of the Pontiac Pumping Station will result in a short-term impact to fish habitat as a result of the temporary isolation and dewatering of the work area. No permanent impacts to fish and fish habitat are expected as a result of the installation of the Pontiac Pumping Station provided mitigation and contingency measures are followed.

2.5 CULTURAL, SOCIAL AND ECONOMIC ENVIRONMENT

2.5.1 Study Area

The study area, within the boundaries of the Pontiac drainage area, can be described as a residential community. The study area contains a mixture of residential, parkland, and commercial/industrial developments.

Air quality in the area is poor which has been partially attributed to heavy industry on the American side of the Detroit River. Noise levels are typical of City settings.

The study area is well served with a good road system and a full range of utilities including electrical power, water, natural gas and telephone.

2.5.2 Official Plan

The City of Windsor has an Official Plan and zoning by-laws that regulate and control development and planning policies in the service area. These documents are revised from time to time as necessary to take into account physical and social changes affecting the City.

Based on the Official Plan and zoning by-laws, the study area consists of mainly three zones. The area north of Riverside Drive East is zoned Waterfront Residential, the central part of the study area between Riverdale Avenue and Clover Avenue is mostly Open Space and the remainder of the area is zoned as Residential. The study area does not include any of the City's designated special policy areas.

2.5.3 Provincial Policy Statement

The Provincial Policy Statement (PPS) is a consolidated statement of the government's policies on land use planning. The PPS was issued in 2020 under the *Planning Act* and as such all decisions affecting planning matters shall be consistent with the Provincial Policy Statement. The PPS has policies across five themes: increasing housing supply and mix, protecting the environment and public safety, reducing barriers and costs, supporting rural, northern, and Indigenous communities, and supporting certainty and economic growth. The PPS is a key consideration for identifying land-use planning objectives and evaluating alternative design concepts in **Section 5.0** of this ESR.

In combination with Municipal Official Plans, the PPS outlines a framework for comprehensive planning that allows Ontario to sustain strong communities, a clean and healthy environment, and economic growth. The key approach for implementing the PPS is through Municipal Official Plans which identify provincial interests and present appropriate land use designations and policies for the local community. It is important that Municipal Official Plans are kept up to date with the PPS to protect provincial interests and ensure that development takes place in suitable areas. This proposed project is consistent with the City of Windsor's Official Plan.

2.5.4 Archaeological

Windsor is an area rich in cultural heritage resources and diversified cultural traditions. **Figure 2.1** of **Appendix A**, which is adapted from Figure 4: 'Archaeological Potential' of the City of Windsor Archaeological Master Plan, shows land containing archaeological resources or areas of archaeological potential within the City of Windsor. There are eighteen (18) registered archeological sites within the Windsor city limits and five (5) additional registered sites in the immediate environs of the City. In addition, there are several dozen unregistered archeological finds. Registered sites in Windsor include five (5) Native sites, nine (9) Euro-Canadian sites and four (4) sites with both cultural components. A majority of the registered and unregistered

archeological sites within the City of Windsor are located in the Central and West end particularly in the Old Sandwich Town region.

In accordance with the Checklist for Determining Archaeological Potential from the Ministry of Tourism and Culture, a Stage 1 Archaeological Assessment is to be conducted for lands impacted by this project. If the Stage 1 Archaeological Assessment concludes that these areas have moderate to high potential for the discovery of Indigenous or Euro-Canadian resources, a further Stage will be conducted to determine if any archaeological resources are on the property using either pedestrian survey or test pit survey.

A Stage 1 Archaeological Assessment was undertaken by Fisher Archaeological Consulting (FAC) for the study area. The Stage 1 Archaeological Assessment consists of a review of geographic, land use, and historical information for the property and the relevant surrounding area, a property visit to inspect its current condition and contacting MTCS to find out whether there are any known archaeological sites on or near the property. Its purpose is to identify areas of archaeological potential and further archaeological assessment (e.g. Stage 2-4) as necessary.

The Stage 1 Archaeological Assessment indicated that there was one registered archaeological site within a one-kilometer radius of the study area and there were no previous archaeological reports for work within fifty meters of the study area. The Pontiac Pumping Station study area is located between Little River and the 'Old' Little River. The historic NTS map from 1912 shows some channelization of the 'Old' Little River. The archaeological potential for Indigenous and Euro-Canadian sites is high based on the study area's proximity to this watercourse. Although the archaeological potential is high, there have been obvious disturbances to parts of the study area during the construction of the existing pumping station. Due to the potential for discovery of Aboriginal or Euro-Canadian resources, FAC recommended that the small portion of the study area indicated as having high archaeological potential undergo a Stage 2 Archaeological Assessment by a test pit survey at five metre intervals.

The Stage 2 Archaeological Assessment to determine if any archaeological resources are on the property using test pit survey was carried out by Stantec on May 19th, 2022. No archaeological resources were identified during the Stage 2 Archaeological Assessment at the site. Therefore, no further land-based archaeological assessment of the study area is required. The archaeological assessment carried out as a part of this study is included in **Appendix C**.

2.5.5 Built Heritage and Cultural Heritage Landscapes

The heritage resources around the proposed work area were identified based on the Windsor Municipal Heritage Register provided by the City of Windsor. The City of Windsor's Planning and Building Services Department was also consulted to determine the location and details of Built Heritage and Cultural Heritage Landscapes.

Figure 2.2 of **Appendix A** is an aerial plan showing the built heritage and cultural heritage landscapes around the potential proposed work area. As shown, there are no built heritage resources and/or cultural heritage landscapes in proximity to the location of proposed work area.

The Ministry of Tourism, Culture and Sport (MTCS)'s "Screening for Impacts to Built Heritage and Cultural Heritage Landscapes" checklist was completed for this project. The completed checklist is included in **Appendix C**. The checklist indicated that there are buildings or structures aged 40 years or more on or adjacent to the properties impacted by the proposed work. In response, a Heritage Overview Memorandum (memo) was prepared to address this matter. The preparation of the Heritage Overview included a review of relevant online materials and consultation with the City of Windsor, Ontario Heritage Trust, and Ministry of Citizenship and Multiculturalism. Review of historic mapping indicated no potential for 19th century structures in the study area. The building/structures identified in the MTCS Checklist were evaluated and determined to have no design, physical, historic, associative, or contextual value. Thus, the Heritage Overview concluded that no protected heritage resources or "cultural heritage values or interests" (CHVI) were identified within the study area. Given the findings of the Heritage Overview, no additional heritage studies are recommended. The Heritage Memo is included in **Appendix C**.

3.0 PROBLEM STATEMENT

3.1 PROBLEM IDENTIFICATION

The City of Windsor has experienced several significant storm events in recent years that have resulted in widespread basement, coastal, and surface level flooding. Through the comprehensive SMP study the Pontiac stormwater drainage area and LRPCP collection area were identified as areas of concern. These areas are at high risk for basement and surface level flooding during a significant storm event because the Pontiac Pumping Station does not have adequate capacity to remove water from the stormwater system or sanitary system (in the case of a bypass event at the LRPCP). Further, the SMP identified that the HGL in the stormwater collection system upstream of the LRPCP did not meet the recommended level of service for a 1 in 100-year storm event.

In addition, the Riverside area between Ford Boulevard and the east City limits (which includes the Pontiac drainage area) was identified as a coastal flood risk area. A coastal flood risk area is defined as those areas that are at risk of flooding due to overtopping of the existing shoreline from unusually high lake/river level conditions or storm surges. During the SMP study, it was confirmed that basement and surface level flooding was observed throughout the drainage area during storm events.

Failure to have adequate infrastructure in place will negatively impact the community and may cause damage to infrastructure, properties, and local transportation networks. The LRPCP will be expanded in the future to provide wastewater treatment capacity for anticipated development throughout East Windsor and Tecumseh. However, to reduce the risk of backups and provide flood relief, the SMP recommended an expansion of the Pontiac drainage area and capacity upgrades at the Pontiac Pumping Station. This design solution will reduce the HGL within the storm sewer system, allow LRPCP emergency bypass to minimize sanitary sewer surcharge during severe storm events, mitigate the risk of basement flooding, and provide flood resiliency for the 1 in 100-year storm event.

3.2 PROJECT OBJECTIVE

The City of Windsor, with funding from the Federal Government's Disaster Mitigation and Adaptation Fund, has initiated this Class EA for the design of the new Pontiac Pumping Station as recommended in the Sewer & Coastal Flood Protection Master Plan. The purpose of this EA study will be to investigate and report on the design and site layout alternatives for the Pontiac Pumping Station capacity upgrades to reduce the risk of flooding in the Pontiac drainage area during major storm events.

4.0 DESIGN SOLUTION FOR THE PROPOSED UPGRADES TO PONTIAC PUMPING STATION AS OUTLINED IN THE SMP

This section presents an overview of the work undertaken for Phase 2 of the Class EA process. Phase 2 involves the identification and evaluation of various design solutions with the objective of determining which alternative best addresses the problem statement. Phase 2 for this project was completed as a part of the SMP, which can be accessed through the following weblink:

Sewer and Coastal Flood Protection Master Plan (citywindsor.ca)

In order to reduce the risk of flooding in the Pontiac drainage area, the SMP determined the following actions are required:

1. Redirect a portion of the East Marsh drainage area to the Pontiac drainage area to reduce the risk of inland coastal flooding. Improving the effectiveness of the Ganatchio Trail berm to provide inland drainage preventing coastal flood waters from entering the storm sewer system and reducing the risk of flooding in the Pontiac and East Marsh drainage areas;

2. Upgrade sewers along Cedarview Avenue, Riverside Drive, North Neighbourhood, and South Neighbourhood as well as provide off-line underground storage in Brumpton Park; and

3. Upgrade the hydraulic capacity of the Pontiac Pumping Station to effectively release stormwater to the Little River and reduce the HGL within the stormwater system to meet the appropriate level of service. This would be accomplished by redirecting flow from the existing stormwater inlet chamber to a new wet well structure proposed to be located south of the existing Pontiac Pumping Station. The wet well structure is to house three (3) 1.25 m^3/s (each) pumps.

4.1 PROPOSED DRAINAGE AREA

The Pontiac Pumping Station generally services the East Riverside area and is bounded by Tecumseh Road East in the south, the Detroit River in the north, Lauzon Road on the west and Chateau Avenue on the east. The existing infrastructure in the Pontiac drainage area consists of separate sanitary and stormwater collection systems as well as two (2) stormwater management ponds. The existing stormwater infrastructure and boundaries of the Pontiac drainage area are shown in **Figure 1.1** of **Appendix A**. The proposed Pontiac Pumping Station project will modify the service areas for the Pontiac drainage area and the nearby East Marsh drainage area to reduce the risk of inland coastal flooding. The following sections of storm collection system will be redirected from the East Marsh Pumping Station to the Pontiac Pumping Station:

- Riverside Drive East between Bertha Avenue and Adelaide Avenue;

- Adelaide Avenue between Riverside Drive East and Wyandotte Street East;
- Clover Street between Riverside Drive East and Wyandotte Street East;
- Elinor Street between Riverside Drive East and Wyandotte Street East;
- Florence Avenue between Riverside Drive East and Wyandotte Street East;
- Menard Street and John Street between Elinor Street and Florence Avenue;

The Ganatchio Trail berm provides inland drainage preventing coastal flood waters from entering the storm sewer system and reduces flooding risk in the Pontiac and East Marsh drainage areas. However, the identified sections of storm sewers, which are currently directed to the East Marsh Pumping Station, are located inland (to the south) of the existing berm. In the event of a severe storm event, coastal flooding, pump failure, or other event where stormwater is not able to be effectively released at the East Marsh Pumping Station, these storm sewers may surcharge and cause inland flooding south of the Ganatchio Trail berm. Redirecting these storm sewers to the Pontiac drainage area would eliminate this pathway for inland flooding and improve the effectiveness of the Ganatchio Trail berm significantly reducing the risk to infrastructure. The proposed drainage area and modifications identified in the SMP study are shown in **Figure 1.2** of **Appendix A.**

4.2 PROPOSED PUMPING STATION CAPACITY

As outlined in the SMP, the Pontiac Pumping Station is proposed to be designed to provide the following level of service:

- Major System (Overland Drainage):
    - Provide service for the 1 in 100-year event and maintain the storm sewer HGL such that surface flooding is less than 0.30 m deep within the municipal right-of-way.
    - Ensure emergency access is available via main roadways and reduce the risk of property damage.
- Minor System (Underground Sewers):
    - Provide service for the 1 in 5-year event and maintain the storm sewer HGL at least 0.3 m below the ground level based on the available outlet receiving capacity.
    - No surface flooding in the case of a minor rainfall event.

The level of service provided by the Pontiac Pumping Station was established in the SMP study based on input from the Technical Advisory Committee, Essex Regional Conservation Authority,

emergency services providers, internal departments at the City of Windsor, the public, and the Ministry of Environment, Conservation and Parks (MECP). In addition, the following documents were referenced to determine the level of service: Windsor and Essex Regional design guidelines, applicable City of Windsor Master Plan studies, and applicable Municipal Master Plan studies from likewise Municipalities (i.e., Toronto, London, and Hamilton). In addition to the recommendations for the pumping station level of service, the MECP recommends the use of Low Impact Development (LID) features such as infiltration trenches or bioswales to attenuate and infiltrate stormwater throughout the drainage area.

Due to the physical characteristics of the existing pumping station improving the hydraulic capacity through pump replacement or addition is not plausible. In the SMP study, the existing water levels in the Pontiac Pumping Station and the corresponding pumping capacities were evaluated. The sanitary trunk sewer immediately upstream of the LRPCP is connected to the Pontiac Pumping Station through an emergency bypass sewer which is only utilized during severe storm events. The overflow elevation of the emergency bypass sewer is 173.38 m and emergency bypass events are controlled by a sluice gate which opens when the water level in the LRPCP wet well reaches an elevation of 170.69 m. The filling point or water level elevation at which the screw pump is operating at its full capacity and maximum efficiency is 170.99 m. Therefore, when an emergency bypass event occurs the screw pumps are not operating at their full capacity and the existing pumping station is not able to lower the water level in the inlet chamber to facilitate an overflow.

In the SMP study (see Section 6.3 of Appendix F of the SMP), the overflow rate at the LRPCP was estimated to be approximately 2.5 m^3/s. Therefore, the firm capacity of the proposed Pontiac Pumping Station based on the desired level of service was determined to be 2.5 m^3/s. The proposed improvements will include expanding the existing pumping station by adding a new wet well structure to house the three (3) pumps. These pumps will operate in a two duty and one standby configuration with each pump having a capacity of 1.25 m^3/s. The functional design of the pumping station and specific site features are to be determined throughout this Schedule C Class Environmental Assessment and refined based on further stakeholder input.

5.0 DESIGN CONCEPTS AND RECOMMENDATIONS FOR PROPOSED UPGRADES TO PONTIAC PUMPING STATION

5.1 PUMPING STATION TECHNOLOGIES

In this section of the report, alternative designs which would satisfy the recommended solution are identified and evaluated leading to the selection of a preferred design for this application. The recommended design will include an evaluation of the following alternative pumping technologies:

- Centrifugal Flow Pump
- Axial Flow Pump
- Mixed Flow Pump
- Archimedean Screw Pump

The evaluation of alternative designs includes consideration of potential environmental, social and economic impacts and recognizes the need to design the facilities in such a way that maximizes performance and efficiency, reduces footprint a the LRPCP, and reduces operation and maintenance requirements.

5.1.1 Centrifugal Flow Pump

The Hydraulic Institute Standards (HIS) defines a centrifugal pump as a kinetic machine that converts mechanical energy into hydraulic energy through centrifugal activity. As fluid enters the pump it is directed to the center of a rotating impeller. The rotational movement of the impeller creates centrifugal force accelerating the fluid radially outward into the diffuser (volute chamber), from which the fluid exits with higher energy than when it entered. Centrifugal pumps are typically non-clog close-coupled pumps. Pumps which are designed for all electrical components to be watertight and submerged below the surface of the water are otherwise known as submersible centrifugal pumps. These pumps may be removed from the wet well for inspection and repair. This type of pump is typically used for raw sewage and other solids bearing fluids.

Centrifugal flow pumps can be used for high head – low flow applications or can be designed to meet a wide range of head and flow requirements making them functional for a variety of applications. Centrifugal pumps can be arranged in a variety of configurations including coupled so that the discharge from one pump feeds the intake of subsequent pumps, thereby increasing the delivery head. In this way it is possible to design centrifugal pumping systems which can meet head requirements in the of hundreds of metres. Centrifugal pumps are also able to operate a higher speed than the other types of pumps especially when higher pressures are required.

However, matching the pump operating speeds with the application is crucial to maximizing pump efficiency, as high operating speeds usually require more power and need to be controlled to avoid losses. Centrifugal pumps tend to be less tolerant of solid material entering the stream and while they can be designed to be tolerant of solid material, it is usually at considerable expense to efficiency.

5.1.2 Axial Flow Pump

The Hydraulic Institute Standards (HIS) defines an axial flow pump as a kinetic machine that converts mechanical energy into hydraulic energy. For axial flow pumps the fluid enters the pump cavity parallel to a central rotating impeller. The rotational movement of the impeller creates a force accelerating the fluid axially outward as a result the fluid exits with higher energy than when it entered. A similar analogy to an axial flow pump is a boat motor or propeller which pushes the water in a single direction to create movement or thrust. Of the various pump types, axial flow pumps are considered to have the highest efficiency; however, the use of this pump type is limited due to inability to use in high head applications.

Axial flow pumps are high-capacity pumps that are typically used for low head - high flow applications such as stormwater pumping stations. These pumps can be mounted at any angle, although in stormwater applications they tend to be almost universally mounted in the vertical orientation. Typically, axial flow pumps are driven by means of a vertical shaft attached to an external motor which is mounted on the top of the pumping chamber structure. Axial flow pumps tend to be more tolerant of solid material entering the stream; however, large debris should be screened as the propellers may bend or break if they strike a relatively large or hard object. In addition, as with centrifugal pumps, fibrous materials may wrap themselves around the propellers causing maintenance and operational impacts.

5.1.3 Mixed Flow Pump

Mixed flow pumps are high-capacity pumps that are typically used for high flow – medium head applications. The mixed flow pump impellers are designed uniquely such that the vanes sweep backwards and the pump functions as a compromise between axial flow pumps and centrifugal pumps. In mixed flow pumps the flow is directed radially and axially along the shaft centerline. As a result, mixed-flow pumps are able operate at higher head than axial-flow pumps while delivering higher flow rates than centrifugal-flow pumps. Like axial-flow pumps, mixed-flow pumps can be mounted at any angle; however, they are typically mounted in a vertical orientation in stormwater applications. Mixed flow pumps are commonly used for the following applications: transferring water from rivers to canals, flash mixers, filter-to-waste, or intermediate pumping stations.

5.1.4 Archimedean Screw Pump

An Archimedean screw pump is a type of positive-displacement pump which provide lift by carrying fluids in the spaces between the screw threads. Screw pumps utilize the Archimedes

principle of a rotating shaft to displace the fluid axially as the screws rotate. An inclined screw pump has a continuous spiral vane attached to a central shaft, mounted in a trough or pipe. When the screw is rotated, the spiral vane scoops water from the free water surface at the entrance of the pump and discharges it at a higher elevation. It is a continuous propeller pump and flows are axial, with no centrifugal action. The primary advantage of an inclined screw pump is that it is a natural variable flow pump which operates at a constant speed. As the free water surface at the suction rises, the submergence of the inlet increases, and the pump is able to scoop more liquid.

The Archimedes screw pump is usually large capacity low head, non-clogging and therefore advantageous in raw sewage and wastewater applications. As a result of the pumping mechanism, screw pumps can provide constant flow rates and pressures and have a relatively high tolerance for solids entering the flow stream. Screw pumps are commonly used in applications where low heads are required (i.e., less than 10 meters). The main disadvantage of screw pumps is the difficulty to increase the pumping head without considerable physical modifications to the structure, whereas this is easy with other types of pumps. Also, since the design is dependent upon minimal leakage from between the flights and the channel, any wear over time significantly reduces efficiency.

5.1.5 Evaluation of Alternative Pump Technologies

Four alternatives, which include the centrifugal flow pumps, axial flow pumps, mixed-flow and screw pumps were evaluated based on the following evaluation criteria:

- Performance or Effectiveness
- Space Required
- Capital and Construction Cost
- Operation & Maintenance
- General Concerns

Each pump technology was reviewed and summarized in **Table 5.1.**

Table 5.1: Evaluation of Alternative Pump Technologies

Evaluation Criteria	Centrifugal - Flow Pump	Axial - Flow Pump	Mixed - Flow Pump	Screw Pump
Performance & Effectiveness	•Lower efficiency, shorter lifetimes	•Very efficient in high flow, low head applications	•Efficient in high flow, low head applications	•Wide range of flow, Difficult to increase head
Space Required	•Low space requirements	•Low space requirements	•Low space requirements	•Relatively high space requirements
Capital / Construction Cost	•Relatively low to medium	•Relatively low to medium	•Relatively low to medium	•Relatively high equipment and construction cost
O&M Requirements	•Low to medium O&M requirements	•Low O&M requirements	•Low to medium O&M requirements	•Medium O&M requirements
General Concerns	•Loss of efficiency should solids enter the flow	•Performance is very dependent upon providing good inlet flow, Loss of efficiency should solids enter the flow	•Performance is very dependent upon providing good inlet flow, Loss of efficiency should solids enter the flow	•Difficult to modify, Requires enclosing

Based on a detailed review of the four alternative pump technologies, the axial flow type of pump was identified as the preferred alternative for the new pumps to be installed as part of the proposed upgrades to the Pontiac Pumping Station. This is due to the pump's high efficiency in high flow – low head applications, relatively low space requirement, and relatively low capital cost. These benefits are of particular importance for this application as reducing the size of the pumps and pumping station will minimize the space utilized at the LRPCP site. This will result in more space for future expansions of the UV disinfection facilities as well as improved access for vehicles to the northwest side of the site and minimal structural impact for the proposed expansion of the administration building.

The simple and proven operation of this axial flow pump technology makes this the preferred alternative for this project. The typical concerns associated with axial flow pumps are the loss of efficiency caused by solids entering the wet well and the need to provide adequate inlet flow

conditions. In the final design of the Pontiac Pumping Station these issues will be addressed by implementing a bar screen at the pumping station inlet to minimize solids entering the pumping chamber and configuring the wet well to reduce the turbulent flow conditions.

5.2 PUMPING STATION SITE LAYOUT

In this section of the report, alternative design concepts for the site layout are identified and evaluated leading to the selection of a recommended design for this application. The evaluation of alternative layouts included consideration of potential environmental, social, technical, and economic impacts. However, due to the isolated location of the study area and the nature of this application, the social, natural environmental, and economic impacts are anticipated to be similar regardless of the layout chosen for the site. As a basis for comparison, it is assumed that all of the site layout alternatives will: be able to meet flood mitigation objectives; provide an enhanced level of service for the Pontiac drainage area; and have comparable capital, operations, and maintenance cost/requirements.

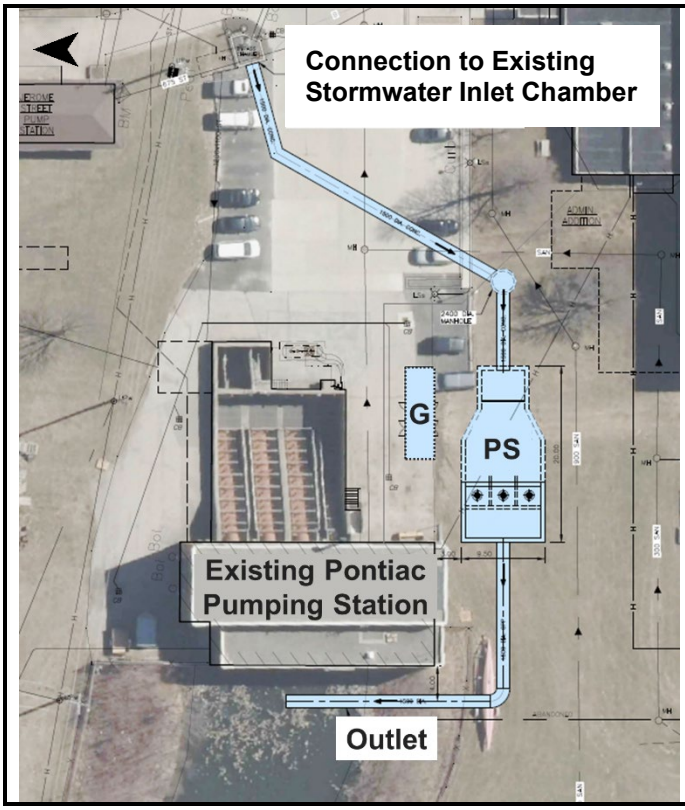
5.2.1 Alternative No. 1

Site Layout Alternative No. 1 features the new wet well structure and generator to the south of the existing Pontiac Pumping Station with a designated outlet to the Little River embayment. This layout will include the construction of a new storm sewer from the existing bypass chamber, extending southwest to the southern edge of the parking lot, and connecting to a new manhole just north of the administration building expansion. The new storm sewer will then continue west and connect to the wet well structure. The proposed outlet sewer will exit the pumping station heading west and will turn 90-degrees to the north where it will outlet directly into the Little River embayment.

This layout would avoid existing underground sanitary sewer lines and therefore would not require the relocation of any existing utilities resulting in relatively easy construction. However, the construction of the new outlet to the Little River embayment would require in-water construction work and additional considerations under the Fisheries Act and Species at Risk Act. These requirements would result increase the complexity of construction.

Site Layout Alternative No. 1 will include all above grade structures close to the existing Pontiac Pumping Station which will minimize the space utilized at the LRPCP site. This layout will not hinder the future expansion of the administration building, UV disinfection facilities or existing parking area in front of the administration building.

See **Figure 5.1A** below and in greater detail in Figure **5.1B** of **Appendix A.**



PS = New Pumping Station

G = Generator

Note: The preliminary layout presented in this figure are for display purpose and may be subject to change during the implementation phase (detailed design). For example, the exact location of the proposed pumping station or generator may be shifted ± 1.0 meters north or south and east or west.

Figure 5.1A: Site Layout Alternative No. 1

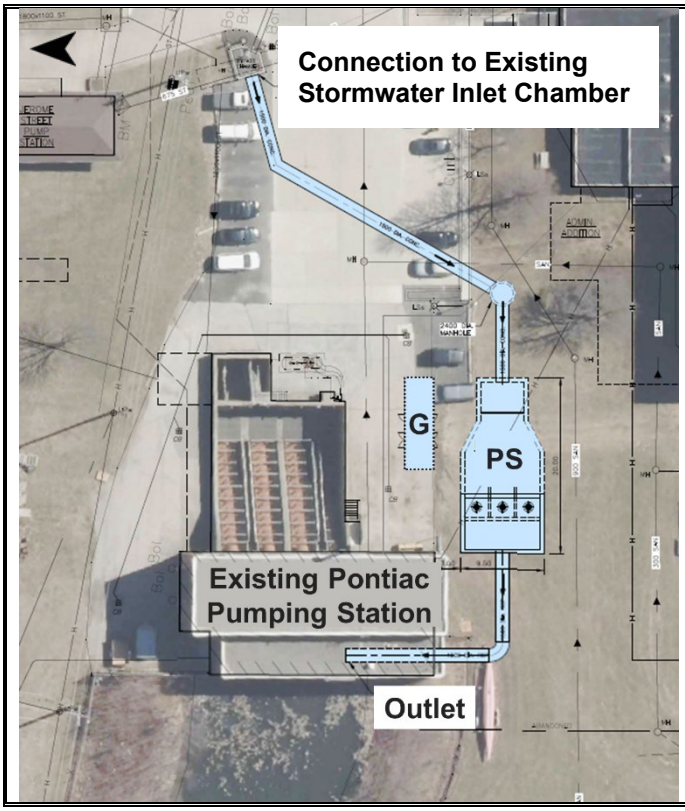
5.2.2 Alternative No. 2

Site Layout Alternative No. 2 features the new wet well structure and generator to the south of the existing Pontiac Pumping Station with an outlet the existing Pontiac Pumping Station discharge chamber. This layout will include the construction of a new storm sewer from the existing bypass chamber, extending southwest to the southern edge of the parking lot, and connecting to a new manhole just north of the administration building expansion. The new storm sewer will then continue west and connect to the wet well structure. The proposed outlet sewer will exit the pumping station heading west and will turn 90-degrees to the north where it will outlet directly into the existing Pontiac Pumping Station discharge chamber.

This layout would avoid existing underground sanitary sewer lines and therefore would not require the relocation of any existing utilities resulting in relatively easy construction. The construction of the new outlet to existing Pontiac Pumping Station discharge chamber would require modifications to the existing structures. However, it would negate the requirements for in-water construction work or additional considerations under the Fisheries Act and Species at Risk Act, which would typically increase the complexity of construction.

Site Layout Alternative No. 2 will include all above grade structures close to the existing Pontiac Pumping Station which will minimize the space utilized at the LRPCP site. This will result in more space for future expansions of the administration building or UV disinfection facilities as well as improved access for vehicles to the northwest side of the site.

See **Figure 5.2A** below and in greater detail in Figure **5.2B** of **Appendix A.**



PS = New Pumping Station

G = Generator

Note: The preliminary layout presented in this figure are for display purpose and may be subject to change during the implementation phase (detailed design). For example, the exact location of the proposed pumping station or generator may be shifted ± 1.0 meters north or south and east or west.

Figure 5.2A: Site Layout Alternative No. 2

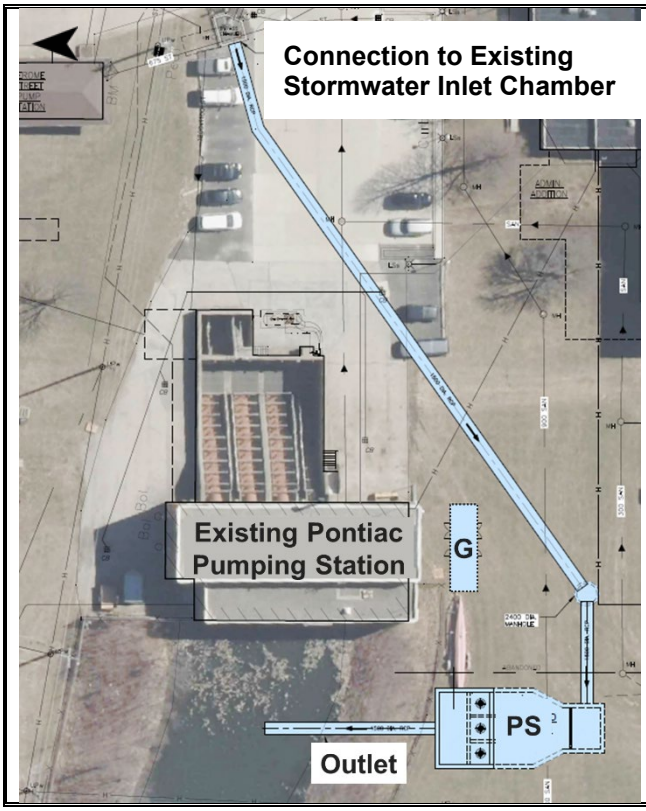
5.2.3 Alternative No. 3

Site Layout Alternative No. 3 features the new wet well structure and generator to the south and southwest of the existing Pontiac Pumping Station with a designated outlet to the Little River embayment. This layout will include the construction of a new storm sewer from the existing bypass chamber, extending southwest and connecting to a new manhole west of the administration building. The new storm sewer will then continue west and connect to the wet well structure. The proposed outlet sewer will exit the pumping station heading north where it will outlet directly into the Little River embayment.

This layout would intersect with existing underground sanitary sewer lines and therefore would result in more complex construction requirements. In addition, the construction of the new outlet to the Little River embayment would require in-water construction work and additional considerations under the Fisheries Act and Species at Risk Act. These requirements would further increase the complexity of construction.

Site Layout Alternative No. 3 will include above grade structures at a greater distance from the existing Pontiac Pumping Station which will require additional space at the LRPCP site. This will result in less functional space for future expansions of the administration building or UV disinfection facilities as well as limited access for vehicles to the northwest side of the site.

See **Figure 5.3A** below and in greater detail in Figure **5.3B** of **Appendix A.**



PS = New Pumping Station

G = Generator

Note: The preliminary layout presented in this figure are for display purpose and may be subject to change during the implementation phase (detailed design). For example, the exact location of the proposed pumping station or generator may be shifted ± 1.0 meters north or south and east or west.

Figure 5.3A: Site Layout Alternative No. 3

5.2.4 Evaluation of Alternative Site Layouts

Three site layout alternatives were evaluated based on the following evaluation criteria:

- Ease of Construction
- Space Requirements
- Work In-Water
- Technical Suitability
- General Concerns

Each site layout alternative was reviewed and summarized in **Table 5.4**.

Table 5.2: Evaluation of Alternative Site Layouts

Evaluation Criteria	Alternative No.1	Alternative No. 2	Alternative No. 3
Ease of Construction	Moderately complex construction due to: • Requirements and additional considerations for in-water construction work related to constructing the outlet to the Little River Embayment • No relocations of existing sanitary sewers or utilities required	Moderately complex construction due to: • Requirements for modifications to existing Pontiac Pumping Station to accommodate new outlet piping • No relocations of existing sanitary sewers or utilities required • No requirements for in-water work	Most complex construction due to: • Requirements and additional considerations for in-water construction work related to constructing the outlet to the Little River Embayment • Requires relocation of existing sanitary sewer
Space Requirements	• Low space requirements • Close to existing PS	• Low space requirements • Close to existing PS	• High space requirements • Limits access to west side of site
Work in-Water	Required	Not required	Required
Technical Suitability	• All site layout alternatives will be able to meet flood mitigation objectives and provide an enhanced level of service for the Pontiac drainage area • Comparable O & M requirements with access to generator and pumping chambers		
General Concerns	The social, natural environmental, and economic impacts of the proposed pumping station are anticipated to be similar for each site layout alternative.		

5.3 OVERVIEW OF RECOMMENDED DESIGN

Section 5.1 and **Section 5.2** identified, evaluated, and reported on the pumping technology and site layout to determine the recommended pumping station design. The recommended design meets the requirements outlined in the SMP to reduce the risk of flooding in the Pontiac drainage area.

The design concepts that form the overall recommended design are summarized in **Table 5.3**. Exact locations of new wet well structure, standby power generator, and sewer routing are to be further reviewed during the detailed design. Also, in the detailed design phase, replacing the existing Pontiac Pumping Station generator with a new generator to power the existing and new pumping station should be considered. The existing generator requires significant maintenance costs, and it has already exceeded the service life.

Table 5.3: Summary of Recommended Design

Design Concept	Recommendation
Pump Technology	Axial Flow Pump Benefits Include: • Low space requirements • High efficiency in high-flow low-head applications • Relatively low to medium capital cost • Relatively low operations and maintenance cost
Site Layout	Site Layout Alternative No. 2 as shown in **Figure 5.2A**. Benefits Include: • Moderately complex construction • No utility relocations • No work in-water permitting required • Meets flood mitigation objectives

5.4 IMPACT ON EXISTING AND FUTURE OPERATION OF THE LITTLE RIVER POLLUTION CONTROL PLANT

The LRPCP was originally constructed in 1965 and has undergone multiple expansions since this date. The treatment process was originally designed to facilitate gravity flow through the plant based on the predicted high-water level in the Detroit River. However, the current predicted high-water level in the Detroit River, based on climate change studies, is significantly higher than that used in the original design of the plant. As a result of this increase, it is unlikely that gravity flow through the existing plant will be possible during peak flow events and high-water level conditions. Pumping of effluent during these periods will be required to maintain operation of the treatment process, reduce backups in the sewer system, and minimize sewage bypasses.

Upgrading of the Pontiac Pumping station could potentially impact future operation of the LRPCP if there is any interference between the area needed for the Pontiac Pumping Station upgrades and the provision of effluent pumping facilities for the LRPCP.

It is recommended that an analysis of the need for effluent pumping from the LRPCP be undertaken using the current predicted ultimate water level in the Detroit River. If the need is confirmed, a planning level study should be done to determine approximate sizing and location for the effluent pumping facilities and to identify any potential areas of conflict between the two undertakings. If the need for effluent pumping is confirmed there may well be an opportunity during final design to achieve some synergy and cost savings in the structures and equipment needed for the two projects.

6.0 ENVIRONMENTAL IMPACTS AND MITIGATING MEASURES

6.1 OVERVIEW

Table 6.1 provides a summary of potential environmental impacts and proposed mitigating measures for the preferred design. In general, the preferred design will have a limited effect on the environment and that effect will be mostly due to construction activities. Other than the environmental effects listed in **Table 6.1**, it is anticipated that the preferred work will not have a significant effect on the natural environment such as wildlife, vegetation, or the habitat characteristics of any particular species. The main impact that the alternatives for the proposed work will have on the socio-economic environment is the disruption that residents may experience during the construction. However, this inconvenience and disruption will only be temporary and should not significantly impact the environment.

With respect to other socio-economic impacts, it is anticipated that the preferred servicing alternative will not have any serious impact on existing land uses, cultural activities, heritage resources or any other community program except to the extent that it will permit the ongoing implementation of development and other activities as envisioned in planning documents which have positive impacts on the socio-economic environment.

Table 6.1: Environmental Effects and Mitigating Measures

OPERATION	*EFFECT*	*MITIGATING MEASURES*
Cutting, digging, or trimming ground covers, shrubs and trees	Reduced terrestrial wildlife habitat quality (i.e., diversity, area, function) and increased fragmentation of habitat.	➢ This is not a concern as there is no significant existing terrestrial wildlife habitat in the proposed area of construction
	Loss of unique or otherwise valued vegetation features	➢ There are no known unique vegetation features in the area that may be disturbed by construction activities. ➢ Where possible, existing vegetation features will be restored to a preconstruction condition.
Trenching / tunnelling for sewers, excavation and construction for new wet well structure and	Soil erosion and sediment transport to adjacent water bodies causing sedimentation and turbidity of adjacent water bodies and drainage ditches	➢ Use of erosion control measures (i.e., sediment traps, silt fences, etc.) ➢ Collect contaminated runoff ➢ Restore vegetation growth quickly ➢ Stage construction activities to minimize potential of adverse impacts

OPERATION	*EFFECT*	*MITIGATING MEASURES*
generator foundation.	Reduced water quality and clarity due to increased erosion and sedimentation, and transport of debris.	➢ Apply wet weather restrictions to construction activity. ➢ Comply with any local regulations, policies and guidelines that stipulate a minimum acceptable buffer width (the allowable distance from a water body). Maximum buffer widths are desirable. ➢ If possible, direct surface drainage away from working areas and areas of exposed soils. To the maximum extent possible, promote overland sheet flow to well vegetated areas. ➢ Install and maintain silt curtains, sedimentation ponds, check dams, cofferdams or drainage swales, and silt fences around soil storage sites and elsewhere, as required.
	Loss of vegetation and topsoil and mixing topsoil and subsoil	➢ Restore site by replacing topsoil and reinstate vegetation to prevent erosion
	Removal and/or disturbance of trees and ground flora	➢ Avoid treed areas where possible ➢ Employ tree protection measures ➢ Replace trees and provide site landscaping
	Temporary disruption of pedestrian and vehicle traffic	➢ Provide and maintain detours ➢ Provide for safe alternate routes ➢ Select alternate routes to minimize inconvenience
	Temporary disruption and inconvenience during construction to adjacent properties, buildings and inhabitants	➢ Notify public agencies and neighbouring owners of construction activities ➢ Prepare program for reporting and resolving problems ➢ Ensure access is provided for emergency vehicles and personnel ➢ Apply noise and vibration control measures ➢ Apply dust control measures ➢ Control emissions from construction equipment and vehicles ➢ Use silencers to reduce noise ➢ Require compliance with municipal noise by-laws
	Possible need to remove petroleum contaminated excavated material.	➢ Sample material. ➢ Handle and dispose of contaminated material in an acceptable manner
	Decreased ambient air quality due to dust and other particulate matter.	➢ Avoid site preparation or construction during windy and prolonged dry periods. ➢ Cover and contain fine particulate materials during transportation to and from the site. ➢ Instruct workers and equipment operators on dust control methods. ➢ Spray water to minimize dust off paved areas or exposed soils. ➢ Stabilize high traffic areas with a clean gravel surface layer or other suitable cover material. ➢ Cover or otherwise stabilize construction materials, debris and excavated soils against wind erosion.

OPERATION	*EFFECT*	*MITIGATING MEASURES*
	Disturbance to microscopic organisms in the soil.	➢ Limit the size of stockpiles to avoid anaerobic conditions. ➢ Protect stockpiled soils from exposure to and sterilization by solar radiation (or stockpile in an uncovered shaded area).
	Reduced soil capability through compaction and rutting, and mixing of topsoil and layers below.	➢ Avoid working during wet conditions and/or confine operation to paved or gravel surfaces. ➢ Whenever possible, strip and store topsoil separately from the layers below and return to excavation in sequence.
	Industrial disruption of field/facility access.	➢ All driveways, roadways and field access will be restored to pre-construction condition ➢ Staging of construction and advance notice to property owners prior to disruption of construction to minimize inconvenience
	Disruption surface drainage systems.	➢ Provide for temporary drainage systems until final restoration is accomplished. ➢ Avoid disturbing drainage systems during critical periods. ➢ All existing culverts, tiles and drainage systems to be restored to pre-construction conditions following construction.
	Reduced water quality of nearby surface waters having value as wildlife habitat.	➢ Use sediment control techniques for stockpiled materials to minimize degradation of water quality. ➢ An emergency spill kit will be kept on site during construction activities. ➢ Service equipment shall be washed, refuelled and/or a minimum of 30 m from watercourses to reduce the risk of deleterious substances entering the watercourse. ➢ Construction machinery shall be cleaned prior to entering the site to reduce the potential for establishment of invasive species, such as Phragmites
	Modifications or removal of aquatic habitat.	➢ Stage construction to minimize potential for adverse impacts.
	Residential impacts.	➢ Construction noise and dust impacts will be controlled through noise by-laws and dust control measures in contract specification. ➢ Inconvenience due to temporary loss of property access will be minimized through proper communication and advance notice of disruption. ➢ Pedestrian safety will be maintained through excavation barricades and construction fencing

OPERATION	*EFFECT*	*MITIGATING MEASURES*
	Traffic disruption.	➢ It is not expected that there will be any significant traffic disruptions during the construction of the proposed work. ➢ Emergency services will be advised of work in advance and access to the site will be maintained during construction.
	Visual aesthetics.	➢ The design will adhere to the current visual aesthetics that the surrounding infrastructure currently maintains.
	Recreation.	➢ Maintain access to recreational sites during construction. ➢ Locate water and wastewater infrastructure components to minimize impact. ➢ Construction and tree protection fencing shall be installed prior to the start of construction, after layout, and shall be reviewed by an engineer.
	Archaeological and heritage resources.	➢ Assess archaeological significance in areas undisturbed by previous activities. Complete Stage 1 & 2 Land Archaeological Assessment if required and follow mitigative measures outlined in cooperation with the MTCS. ➢ The MTCS's "Screening for Impacts to Build Heritage and Cultural Heritage Landscapes" checklist was reviewed. Proposed work is located away from any built heritage and cultural heritage landscapes, and thus is not expected to impact heritage resources in the area.
Use of construction equipment	Contamination of surface waters, drains and public roadways from spills, leaks or equipment refuelling.	➢ Use containment facilities ➢ Inspect equipment regularly for fuel and oil leaks ➢ Clean equipment before it travels off site
	Decreased air quality due to vehicular emissions causing increased concentrations of chemical pollutants.	➢ Minimize operation and idling of vehicles and gas-powered equipment, particularly during local smog advisories. ➢ Use well-maintained equipment and machinery within operating specifications.
	Disruption to wildlife migration and movement patterns, breeding, nesting or hibernation.	➢ There are no known areas containing sensitive vegetation and wildlife. ➢ There are no known areas where migratory birds are breeding.
	Introduction of non-native vegetation, including opportunistic species.	➢ Clean heavy machinery and equipment prior to transporting to new location.

OPERATION	*EFFECT*	*MITIGATING MEASURES*
	Loss of unique or otherwise valued vegetation features	➢ Avoid or minimize trampling vegetation with equipment. ➢ Minimize physical damage to vegetation by avoiding push-outs and avoiding the placement of splash onto living vegetation.
	Reduced water quality and clarity due to increased erosion and sedimentation, and transport of debris.	➢ Operate heavy machinery on the shore above the normal water level. ➢ Where possible, conduct activities in the dry, above the actual water level and above any expected rises in water level that may occur during a rainfall or snowmelt event.
	Reduced water quality due to inputs of contaminants from surface runoff during construction and operation.	➢ Refuel equipment off slopes and well away from water bodies. ➢ Securely contain and store all oils, lubricants, fuels and chemicals. If necessary, use impermeable pads or berms.

6.2 NATURAL ENVIRONMENT IMPACTS AND MITIGATING MEASURES

6.2.1 Aquatic and Terrestrial Habitat

The proposed work area may contain natural features that may support habitat of endangered species and threatened species. As per Section 2.1.7 of the Provincial Policy Statement (PPS 2020) – "Development and site alteration shall not be permitted in habitat of endangered species and threatened species, except in accordance with provincial and federal requirements." All issues related to the provincial Endangered Species Act and its regulations shall be addressed prior to the construction of the proposed work. If the proponent believes that their proposed activities are going to have an impact on Species at Risk or are uncertain about the impacts, they should contact SAROntario@ontario.ca to undergo a formal review under the ESA. It is the responsibility of the proponent to ensure that Species at Risk are not killed, harmed, or harassed, and that their habitat is not damaged or destroyed through the proposed activities to be carried out on the site.

Stantec completed a site investigation on April 13th, 2022, to document existing natural heritage conditions in the Study Area. Surveys included Ecological Land Classification (ELC) of vegetation communities, a species at risk (SAR) habitat assessment of terrestrial features, and a fish habitat assessment of the shoreline. The natural heritage features that were identified through the background review were confirmed during the field surveying. Potential impacts associated with the construction of the proposed building and connecting infrastructure include soil compaction, siltation of adjacent natural communities, vegetation disturbance, spills of deleterious substances into the Little River, noise disturbance and encounters with wildlife. The impacts are considered short term, localized to the construction area during construction activities, and will be mitigated

through the application of appropriate construction techniques and mitigation measures. The natural heritage impact assessment report is included in **Appendix C**.

Eight (8) SAR have the potential to be present in the general study area and include the Barn Swallow, Chimney Swift, bat SAR (4 different species), Butler's Gartersnake, and Eastern Foxsnake. Of these, Butler's Gartersnake and Eastern Foxsnake are the only SAR that have potential to be present within the work zone. Mitigation measures for these SAR snakes are discussed in **Section 6.2.2**. Climbing prairie rose is a species of conservation concern that may be present within the impacted thicket community. A site visit to look for this species is recommended prior to vegetation removal. If the species is present, relocation may be needed. Impacts from construction of the proposed building and connecting infrastructure will primarily be limited to anthropogenic habitats that do not support wildlife. No permanent impacts to breeding birds, reptiles or other wildlife species, is expected as a result of the construction of the proposed building and connecting infrastructure provided mitigation measures recommended are implemented.

6.2.2 Butler's Gartersnake and Eastern Foxsnake Mitigation

The sensitive periods of the year for Butler's Gartersnake and Eastern Foxsnake include hibernation and breeding. The breeding and birthing period for this species is between late May and September while the hibernation period for the species is approximately November 1 – March 31, but individuals may emerge earlier during warm spring weather.

If work is to be completed between April 1 and October 31 (i.e., during the active period for the species) the following mitigation is recommended:

- All persons entering the site should be provided training about Butler's Gartersnake and Eastern Foxsnake and proper steps to take upon encountering these species.

- If Crayfish burrows, ant hills, small mammal burrows or other potential hibernacula features are observed, they should not be impacted during a time of year when they may be in use by hibernating snakes (i.e., October 1 to April 30).

- Vegetation brushing or removal that is required to facilitate the Activity must be limited to the smallest extent possible, ideally under guidance of a qualified biologist, and while air temperatures are above 10 °C, when snakes are more active and able to flee.

- To reduce interaction with Butler's Gartersnake and Eastern Foxsnake, sediment fencing is recommended along the border of the Work Zone to reduce interactions of snakes on site. Installation of sediment fencing will occur before April 1 or after October 31 (i.e., outside of snake active season) to define Work Zones and restrict the movement of snakes into the working area. If the installation of fencing occurs during the active season, it is recommended that the area be searched by a Qualified Biologist for the presence of snakes prior to installation of fencing. Fencing materials with plastic mesh will not be used due to risk of entanglement of snakes or other wildlife. Further specifications for reptile

exclusion fencing should follow Best Practices Technical Note – Reptile and Amphibian Exclusion Fencing and Best Management Practices for Mitigating the Effects of Road Mortality on Amphibian and Reptile Species at Risk in Ontario. As per the recommendations fencing should be buried to a depth of 10-20 cm and a height of 200 cm. The exclusion fencing is to be maintained around the work area for the duration of the active season and checked daily to identify any repairs that may be needed. Fencing should be repaired immediately if it is found to be deficient.

- A thorough visual search of the Work Zone by construction contractors is recommended before work commences each day. Visual searches should include inspection of machinery and equipment, prior to starting equipment, particularly during the peak reptile activity period from April 1 to October 31.

- In the unlikely event that a Butler's Gartersnake or Eastern Foxsnake enters the work area and is in immediate danger, a 30 m buffer should be placed on the work area and construction activities should cease until the snake has vacated the work area on its own accord before recommencing construction activity. If the reptile does not vacate the area within a reasonable time, a qualified individual may be used to relocate the reptile to a safe location away from the Work Zone.

6.2.3 Protection of Migratory Birds

The Migratory Birds Convention Act, 1995 (MBCA) provides legal protection of migratory birds and their active nests in Canada. The loss of migratory bird nests, eggs and/or nestlings due to tree cutting or other vegetation clearing can be avoided by limiting clearing of vegetation to outside of the general nesting period for migratory birds in this region (C2) as identified by Environment and Climate Change Canada (ECCC) (i.e., between April 1 and August 31). If work must be performed within this window, a survey for active nests or breeding activity should be conducted by a qualified biologist before work commences and additional mitigation measures (e.g., implementation of avoidance distances during construction) implemented, if required.

6.2.4 Protection of Fish and Fish Habitat

In addition to the measures identified in **Sections 6.1.1**, the following specific measures are recommended to protect fish and fish habitat:

• Avoid in-water work during the restricted activity period for spring spawning fish species in the MNRF's Southern Region (i.e., no in-water work March 15 to July 15).

• The contractor should monitor the five-day weather forecast daily to anticipate weather conditions and should be prepared to leave the site in a stable and secure condition should water levels rise.

• Prior to instream construction activity, fish should be rescued from the isolated work areas by implementing a fish removal and relocation plan.

• During dewatering of the in-water work areas the dewatering pump inlet should be covered with filter fabric or clear stone. The outlet should discharge to a sediment bag or trap. Discharge from the bag should be released to a relatively flat vegetated location or if vegetated location is not available, a flow dissipating structure should be provided.

• Water from dewatering and unwatering operations should be directed to a sediment control measure and/or a vegetated discharge are 30 m away from the waterbodies or as far as practical form the top of bank of any waterbody, prior to discharge to the natural environment. No dewatering shall be sent directly to a sewer. These control measures shall be monitored for effectiveness and maintained or revised to meet the objective of reducing the risk of the entry of sediment into the watercourse.

• All water intakes used to dewater area(s) that may contain fish should be screened to reduce the risk of the impingement and entrainment of fish as per DFO's Interim Code of Practice: End-of-Pipe Fish Protection Screens for Small Water Intakes in Freshwater.

6.2.5 Floodplain Hazard Management

The proposed work site is under the jurisdiction of the Essex Region Conservation Authority. The preferred route and location of this project was reviewed in accordance with ERCA's floodplain mapping of this area, and it has been determined that the western limits fall within the Limit of Regulated Area. The proposed excavations, construction of structures, drain crossings, and placement and grading of fill, within the regulated area will require permits from the ERCA under Ontario Regulation 158/06, (Development, Interference with Wetlands and Alteration to Shorelines and Watercourse Regulations - Section 28 of the Conservation Authorities Act).

In the final design phase, an application of flood proofing measures must be submitted to the ERCA for review and approval. The permit application shall meet the following requirements:

- Specific "Best Management Practices" regarding erosion control measures, sedimentation, and the removal of vegetation, which is provided in the MECP Stormwater Management Planning and Design Manual (2003).

- The Windsor-Essex Region Stormwater Management Standards Manual (2018), https://essexregionconservation.ca/wp-content/uploads/2018/12/WE-Region-SWM-Standards-Manual.pdf.

- Water quality measures shall be considered to ensure no adverse impact on the downstream watercourse. Surface water monitoring program is to be implemented to verify no adverse impact on the downstream watercourse.

- Items listed in **Table 6.1** "Environmental Effect and Mitigation Measures" described in this ESR Report.

6.2.6 Erosion and Sediment Control

Appropriate erosion and sediment controls should be employed during all phases of construction to reduce erosion and sediment transport into the Little River to the extent possible. Mitigation measures to reduce the risk of negative effects on fish, fish habitat and water quality in the Little River are listed below:

- Silt fence will be installed around the perimeter of the work area
- Materials requiring stockpiling (fill, topsoil, etc.) will be stabilized and kept outside of the floodplain
- All disturbed areas are to be restored with erosion protection/vegetative cover following disturbance
- Erosion and sediment control materials (silt fence, strawbales, clear stone) are to be kept on site for emergencies and repairs
- Erosion and sediment controls should be monitored and maintained, as required. Controls are to be removed only after the soils of the construction area have been stabilized and adequately protected until cover is re-established
- Conditions of the anticipated ERCA permit under Ontario Regulation (O. Reg.) 171/06 should be followed during these activities.

6.2.7 Excess Soil Materials and Waste

In 2019, the MECP introduced O. Reg. 406/19 entitled 'On-Site and Excess Soil Management' under the *Environmental Protection Act* to support improved management of excess construction soil. The purpose of the new regulation to ensure the proper steps are taken to manage excess soils, prevent valuable resources from going to waste, and to offer a clear set of rules on how to manage and reuse excess soil. This regulation will also reduce soil management costs, while protecting human health and the environment.

Any construction activities carried out in the process of this project involving the management of excess soil should be completed in accordance with O. Reg. 406/19 and the ministry's guidance document titled "Management of Excess Soil – A Guide for Best Management Practices" (2014). All waste generated during the course of construction must be disposed of in accordance with the ministry's requirements.

6.2.8 Source Water Protection

6.2.8.1 Source Water Protect

For the protection of local municipal drinking water sources, the Essex Region Source Protection Plan (SPP), which has been established under the Clean Water Act, 2006 (Ontario Regulation 287/07), came into effect on October 1, 2015.

The Clean Water Act (2006) refers to four types of Vulnerable Areas, which include:

- Intake Protection Zones
- Wellhead Protection Areas
- Highly Vulnerable Aquifers
- Significant Groundwater Recharge Areas

The types of Vulnerable Areas are addressed further below in relation to this project location.

6.2.8.2 Intake Protection Zones (IPZs)

There are two municipal Water Treatment Plants (WTPs) in the region, the A. H. Weeks (Windsor) and Amherstburg WTPs, having their intakes in the Detroit River (refer to Map 3 of the Essex Region Source Protection Plan). Intake Protection Zones are areas of land and water, where run-off from streams or drainage systems, in conjunction with currents in lakes and rivers, could directly impact the source water at the municipal drinking water intakes.

An Intake Protection Zone can be described as a defined area surrounding a surface water body intake. The size and shape of each zone in an IPZ represents either a set distance around the intake pipe, or the length of time it would take water and contaminants to reach the intake:

- IPZ-1 is the area closest to the intake pipe and is a set distance which extends one kilometre upstream and 120 metres onto the shore.
- IPZ-2 includes the on and offshore areas where flowing water and any pollution would reach the intake pipe within two hours.
- IPZ-3 is an area where contaminants could reach the intake pipe during and after a large storm.

According to Approved Source Protection Plan for Essex region source protection area, the Detroit River in the study area is characterized to be an Intake Protection Zone 3 (IPZ-3). Refer to Map 10 of the Essex Region Source Protection Plan)

The purpose of this EA study is to investigate and report on alternative means of controlling basement and surface flooding in the Pontiac storm water drainage area. The proposed pumping station upgrades for the collection of wet weather flow will have a negligible impact on the source of drinking water quality.

6.2.8.3 Wellhead Protection Areas

Wellhead Protection Areas are not applicable in the Essex Region, as no municipal drinking water systems are supplied by groundwater.

6.2.8.4 Highly Vulnerable Aquifers (HVAs)

Highly Vulnerable Aquifers (HVAs) are defined as aquifers on which external sources have or are likely to have a significant adverse impact, and include the land above the aquifer.

In the ERSPA these HVAs are generally located in the sandy soil areas in the southern part of the region, including most of Pelee Island (refer to Map 4 of the Essex Region Source Protection Plan). There are no HVAs located in or close to the proposed work area.

6.2.8.5 Significant Groundwater Recharge Areas

Significant Groundwater Recharge Areas (SGRAs) are defined as per Regulation 287/07 as areas within which it is desirable to regulate or monitor drinking water threats that may affect the recharge of an aquifer. Groundwater recharge occurs where rain or snowmelt percolates into the ground and flows to an aquifer. The greatest recharge usually occurs in areas which have loose or permeable soil such as sand or gravel that allows the water to seep easily into the aquifer.

Most of the SGRAs in the ERSPA are located in the sandy soil areas of the southern part of the Essex Region, in the Harrow area, parts of Leamington and Kingsville, and limited parts of the Turkey Creek and Pelee Island subwatersheds (refer to Map 5 of the Essex Region Source Protection Plan). There are no HVAs located in the northern part of the Essex Region including City of Windsor area.

6.2.8.6 Overall Vulnerability Assessment Summary

Project activities in vulnerable areas need to be assessed to determine the risk they pose. The Clean Water Act requires that significant threats be managed to reduce the threat to a point where it is no longer significant. Action may be taken to address low and moderate threats at the discretion of the Source Protection Committee. Table 6.2 provides a summary of threats to vulnerable areas and the subsequent actions to be taken, relating to this project.

Table 6.2: Summary of Threats to Vulnerable Areas

Vulnerable Area	Threat Potential	Action Taken
Intake Protection Zone	Low	None
Wellhead Protection Areas	Not applicable	None

Highly Vulnerable Aquifer	Not applicable	None
Significant Ground Water Recharge Areas	Not applicable	None

6.2.9 Permits to Take Water

At the site location, the Little River water surface is approximately 2 meters below the site grade while the ground water table is about 12.5 m to 14.1 m below, indicating that the native silty clay soil has low permeability and ground water control will not be a big issue during construction. It is anticipated that any groundwater inflows from excavating within this stratum during construction can be managed by pumping from properly filtered sumps located within the excavation. The use of these dewatering systems will require the acquisition of MECP approvals. The relevant MECP approvals are discussed further in **Section 6.4.2.2**.

6.2.10 Climate Change

Climate encompasses all aspects of weather, including: temperature, precipitation, air pressure, humidity, wind speeds, and cloudiness. Weather and climate are not static processes and variability is often normal. Weather, for example, changes on a daily and sometimes hourly basis. Weather can also change on a monthly basis, through the changing of seasons. When climate changes on a global scale, it is referred to as Climate Change.

Since the beginning of the industrial revolution in the 18th century, excessive emission of greenhouse gases, like carbon dioxide and methane, have been released through human activities, causing an increased percentage of solar radiation to be trapped in our atmosphere. In recent decades the effect of this on climate has become clearer. As more energy is retained within the atmosphere, a general increasing trend in global temperatures has occurred.

Regardless of the cause, the average temperature in Windsor has increased by almost 1°C since 1940. As air temperatures increases, so does the capacity of the air to hold more water leading to more intense rainfall events. The Environment Canada weather station located at Windsor Airport has been monitoring and recording weather data since 1941. Since this time, an increasing trend in annual precipitation has been documented.

The effects of climate change are expected to include an increase in the number and severity of storms, leading to increased precipitation. Since 1970, there has been increasing evidence of heavier short duration (24 hours or less) rain events in southern Ontario.

Climate changes related to increasing rainfall in the region have a significant impact on municipal sewer systems. The City of Windsor recently experienced a significant rainfall event that inundated and overwhelmed the area's sanitary and storm sewer system/facilities. In the last decade alone,

this region has experienced six (6) significant storm events that have surpassed current 1:100 year regulatory standards, and have resulted in urban flooding issues and sewer backups that have impacted hundreds of homes and businesses in the region. As such, historical data regarding the likelihood of major flooding events must be reconsidered. It is important that the proposed work for storm and coastal flooding control continues to operate effectively in the future. A solution needs to be identified to provide resiliency to the impacts of climate change.

The City's own Climate Change Adaptation Policy notes that focus needs to be directed towards climate change impacts such as: operating/maintenance demands to deal with climate extremes, flooding to basements, roads and infrastructure, and operation demands during severe storms. **Table 6.3**, which is obtained from City of Windsor Climate Change Adaption Plan (September 2012), summarizes the average trends in the amount of annual maximum rain events.

Table 6.3: Summary of the Observed and Projected Increases in Rainfall Over Time in Windsor

	Observed trends 1970 – 2000	Projected trends to 2050 (High Emissions)
30 Minute Extremes	• 5% increase per decade • 4.5% increase per decade to 1996	• 5% increase per decade
Daily Extremes	• 7% per decade (May, June, July) • 5% increase per decade (over the year) to 1996	• 3% per decade over the year (20 year return period) • 2.5 to 6% increase per decade (rainfall with probability <5 %)
Annual Rainfall	• 1% to 3% increase per decade	• 1% increase per decade

In conjunction with the regional municipalities including City of Windsor, the ERCA has developed a set of regional stormwater management guidelines that take into account adjustments for the impacts of Climate Change. The recommendations from this guidance document have also been considered and endorsed in the Storm and Coastal Flooding Master Plan.

The proposed work for storm and coastal flooding control, which was coordinated with the above studies, was recommended based on current standards with a conservative design method that provides a safety margin for extreme rainfall events above and beyond the average year design storms. The proposed facility is designed to handle an additional flow of 2.5 m^3/s, which is the estimated additional flow predicted during the 100-year storm event.

As there is an increase in the number and intensity of storm events affecting the region, climate change needs to be considered in the evaluation of alternative solutions, and the opportunity for flooding protection is considered where feasible.

6.3 SOCIO-ECONOMIC IMPACTS AND MITIGATING MEASURES

6.3.1 Built Heritage Resources and Cultural Heritage Landscapes

Figure 2.2 of **Appendix A** is an aerial plan showing the heritage resources around the proposed work areas. As shown in the aerial plan, there are no built heritage resources and/or cultural heritage landscapes in proximity to the locations of proposed work areas.

The vibration limits set for the project will ensure that all buildings, including those with heritage features, are protected. Monitoring during construction will ensure that vibration is kept below the established limit.

6.3.2 Archaeological Resources

The Stage 1 Archaeological Assessment for the proposed upgrades of the Pontiac Pumping Station site, which is situated within the Little River Treatment Plant was completed in 2020. The Stage 1 Archaeological Assessment was completed by Fisher Archaeological Consulting and determined that the area retained potential for the identification of archaeological resources. The Stage 1 Archaeological Assessment consisted of a review of geographic, land use, and historical information for the property and the relevant surrounding area, a property visit to inspect its current condition and contacting MTCS to find out whether there are any known archaeological sites on or near the property. Its purpose is to identify areas of archaeological potential and further archaeological assessment (e.g. Stage 2-4) as necessary.

The Stage 1 Archaeological Assessment indicated that there was one registered archaeological site within a one-kilometer radius of the study area and there were no previous archaeological reports for work within fifty meters of the study area. The Pontiac Pumping Station study area is located between Little River and the 'Old' Little River. The historic NTS map from 1912 shows some channelization of the 'Old' Little River. The archaeological potential for Indigenous and Euro-Canadian sites is high based on the study area's proximity to this watercourse. Although the archaeological potential is high, there have been obvious disturbances to parts of the study area during the construction of the existing pumping station. Due to the potential for discovery of Aboriginal or Euro-Canadian resources, it was recommended that the small portion of the study area indicated as having high archaeological potential undergo a Stage 2 Archaeological Assessment by a test pit survey at five metre intervals.

The Stage 2 Archaeological Assessment to determine if any archaeological resources are on the property using test pit survey was carried out by Stantec on May 19th, 2022. No archaeological resources were identified during the Stage 2 Archaeological Assessment at the site. Therefore, no

further land-based archaeological assessment of the study area is required. The archaeological assessment carried out as a part of this study is included in **Appendix C**.

As stated in the Stage 2 Archaeological Assessment report, if previously undocumented archaeological resources are discovered during construction, there may be a new archaeological site and therefore subject to Section 48(1) of the Ontario Heritage Act (Government of Ontario 1990c). 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 (Government of Ontario 1990c).

The Funeral, Burial and Cremation Services Act, 2002, S.O. 2002, c.33 (Government of Ontario 2002) requires that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the Ministry of Government and Consumer Services.

6.3.3 Community

6.3.3.1 Disruption of Traffic

It is not expected that there will be any significant traffic disruptions during the construction of the proposed work. If there are any traffic disruptions during the construction of the proposed facility and outfall, all emergency services will be notified of detours prior to commencement of construction. Mitigating measures are to provide and maintain detours, provide safe alternate routes, and select alternate routes to minimize inconvenience, if applicable.

6.3.3.2 Proximity to Arterial Roadway

The EC Row Expressway and Highway 401 are major arterial roadways that provide direct access to the Windsor Communities and neighboring areas. It is not expected that there will be any significant traffic disruptions during the construction of the proposed work.

6.4 PERMITTING CONSIDERATIONS

6.4.1 Essex Region Conservation Authority

The proposed pumping station is located in the Essex Region Conservation Authority regulated area related to the Detroit River and its associated floodplain. As such, development in the ERCA regulated area is subject to the policies of O. Reg. 158/06 under the Conservation Authorities Act.

6.4.2 Ministry of the Environment, Conservation and Parks

6.4.2.1 Endangered Species Act

During the Natural Heritage Impact Assessment field studies eight (8) species are risk were identified to have the potential to be present in the study area. This includes the Barn Swallow, Chimney Swift, Eastern Foxsnake, Butler's Gartersnake, and four (4) different species of bat. Based on this, development in the area is subject to the policies of the *Endangered Species Act*, (2007). It was further determined that there is a low likelihood of occurrence within the Work Zone as the area is heavily disturbed. Avoidance of the migratory bird nesting season (April 1 - August 31) and active reptile season (April 1 and October 31) is recommended. If this is not possible, then bird nesting surveys must be completed in advance of construction as well as the erection of proper exclusionary fencing for reptiles form the Work Zone. With the implementation of this mitigation, no authorizations are anticipated under the ESA.

6.4.2.2 Environmental Protection Act and Ontario Water Resource Act

The use of these dewatering systems will require the acquisition of a PTTW from the MECP. Any water extraction over 50,000 L/day will require MECP approval under the *Environmental Protection Act* and *Ontario Water Resource Act*. However, certain water taking activities that have been prescribed by the Water Taking Regulation O. Reg. 63/16, such as some construction dewatering, may require Environmental Activity and Sector Registry (EASR) registration instead of a PTTW. Regardless, a PTTW is required if the water-taking exceeds 400,000 L/day.

6.4.2.3 Environmental Compliance Approval

There is no ECA for the existing Pontiac Pumping Station. There is an ongoing discussion with MECP regarding a "Corporate ECA" for all the City of Windsor pumping stations including the Disaster Mitigation and Adaptation Fund (DMAF) upgrades.

6.4.3 Fisheries and Oceans Canada

Fisheries Act and *Species at Risk Act* (SARA) - Under the fish and fish habitat protection provisions of the Fisheries Act, works, undertaking or activity of a project must incorporate measures to avoid causing the death of fish and the harmful alteration, disruption, or destruction (HADD) of fish habitat. To assist proponents with determining if their project will comply with the fish and fish habitat provisions, DFO provides measures to protect fish and fish habitat (DFO 2021b) as well as several standards and codes of practice (DFO 2021c). If it is determined that a project cannot implement the measures to protect fish and fish habitat and if there are no applicable standards and codes of practice, then it is recommended that the proponent request a review of the project by DFO. If DFO determines that a project will result in the death of fish and/or HADD of fish habitat an Authorization under the Fisheries Act may be required.

Based on the presence of fish habitat in the Study Area, the proposed activities, and DFO's current guidelines, Stantec recommends that a DFO Request for Review form be completed and submitted to DFO for review of the project under the Fisheries Act. DFO also reviews projects under the federal SARA. A SARA permit may be required by DFO for potential handling of Aquatic SAR during in water construction activities.

6.4.4 City of Windsor – Building Permit

The proposed pumping station is located within the City of Windsor and as such would require a building permit prior to construction. Building permits ensure that construction within our municipality meet the standards set out in the Ontario Building Code. In addition, this permitting process ensures all zoning requirements, fire and structural safety standards, and other building standards are met.

7.0 PROPERTY REQUIREMENTS

There does not appear to be any property and easement requirements for the proposed upgrades to Pontiac Pumping Station.

If there is any property or easements is required, the City will acquire property and easement at fair market value, which basically means that it is sold at the price that other real estate is selling for in that area. The City may obtain the services of an accredited appraiser to assist in establishing the fair Market value and related compensation for any 'land' required for the Project.

Below is a brief description of typical process for the property acquisition:

a) Identify and contact effected property owners
b) Procure the services of qualified appraiser
c) Present Letter of Offer to property owner
d) Negotiate agreement with property owner
e) Obtain appropriate Municipal approval for acquisition of property
f) Present an Agreement of Purchase and Sale to property owner
g) Conduct any required survey work and due diligence for the property
h) Close on the property acquisition

The City will pay for all costs of acquiring the property and easements for its purposes, including the cost of the appraisal of the property, compensation related to the land, survey costs, and reasonable closing fees.

8.0 CONSULTATION

The Municipal Class Environmental Assessment process provides a minimum of three points of contact for a Schedule C undertaking where members of the public, review agencies and Indigenous communities have the opportunity to review the project findings and submit comments for consideration in development of the project. The following sections summarize the approach that has been taken with respect to participation during this project.

8.1 PUBLIC PARTICIPATION

A notice of commencement was originally published in the March 5th, 2022, edition of the Windsor Star and on the City of Windsor's Webpage advising of the initiation of this Class EA undertaking and inviting public input. A copy of the notice is contained in **Appendix B**.

In addition to this discretionary point of contact, there are two points for mandatory public contact during the Class EA process, namely:

- Phase 3: Public Consultation and Information Centre
- Phase 4: Notice of Completion

A public open house was held on July 13th, 2022, to provide information regarding this undertaking and to invite input and comment from interested persons. A copy of the open house notice as published in the Windsor Star on July 2nd, 2022 is included in **Appendix B** together with a list of persons who attended the open house and a copy of the material that was given to all attendees.

8.2 REVIEW AGENCIES

The Class EA provides for the involvement in the project by the MECP's various branches as well as other provincial and federal ministries and outside agencies. The list of Review Agencies varies depending upon the scope of the project, its location and the potential environmental impacts.

Emails were sent out to review agencies the week of March 7th 2022, advising of the initiation of this project. Copies of the letter, notice of project commencement and the list of review agencies are contained in **Appendix B**.

The Notice of Public Information Centre was distributed to review agencies and mandatory contacts July 4th, 2022. A copy of the email, the notice and the distribution list is included in **Appendix B**.

The Notice of the Draft Environmental Study Report was distributed to review agencies and mandatory contacts by email on August 30th, 2022. The email included a link to the project webpage on the City of Windsor's website where a PDF file of the draft ESR could be viewed.

8.3 RESPONSE FROM PUBLIC AND REVIEW AGENCIES

8.3.1 Notice of Project Initiation

The notice of initiation of the project did not generate any public response. The following responses (copies included in **Appendix B**) were received from review agencies and mandatory contacts.

- Ministry of the Environment, Conservation and Parks (MECP) – provided acknowledgement of Notice of Project Initiation on March 30, 2022.

- Ministry of Northern Development, Mines, Natural Resources and Forestry (MNDNRF)– advised in an email dated March 18, 2022, that the Class EA should identify and address potential impacts to natural heritage including species at risk or other resource values.

- Ministry of Tourism Culture and Sport (MTCS) – advised in an email dated April 20, 2022, that Little River is in an area of High Archaeological Potential and works proposed would have to be subject to City of Windsor adopted Archaeological Management Plan (WAMP). MTCS then advised in an email dated May 11, 2022, that they recommend the Environmental Study Report clearly articulates the existing conditions and that there are no impacts to the existing storm water pumping station which is over 40 years old.

- Ministry of Transportation – advised in an email dated April 8, 2022, that the site (Little River Pollution Control Plant) does not fall within the MTO Permit Control Area (PCA), and as such, MTO permits are not required. MTO would have concerns with any work that could potentially impact the highway or falls within the PCA.

- Windsor Police - advised in an email dated March 15, 2022, that any alternative design concepts/solutions developed for the proposed Pontiac Pumping Station Capacity Upgrades capture appropriate target hardening (physical access control and related security) measures to ensure an outcome that functions with less risk. They want to continue to be informed with project updates as they develop.

- Enwin Utilities – advised in an email dated March 11, 2022, that they would like to stay informed on the progress of the project.

- TELUS – advised in an email dated March 14, 2022, that they have no underground infrastructure in the area of the proposed work.

8.3.2 Public Open House

A total of one (1) person attended the Open House held on July 13th, 2022. No one expressed any objection to the proposed undertaking. Email comments (copies included in **Appendix B**) were received from the following review agencies and mandatory contacts.

- ERCA - advised in a letter dated August 3rd, 2022, that

    - The study area is regulated, by the Conservation Authority, under Section 28 of the Conservation Authorities Act. In addition, there is very little by way of natural heritage that, should be affected by the works proposed for the new pumping station in the study area

    - For the new pumping station, early consultation with the ERCA, at the detailed design stage, is encouraged to obtain feedback on the recommended / preferred design. This is to ensure environmental impacts are avoided and to discuss the specific permitting requirements for this project,

- Hydro One - advised in an email dated July 6th, 2022, that

    - "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."

- Windsor Police Service – advised in an email dated July 5th, 2022, that

    - This project is not anticipated to carry any significant impact to public safety in a way that is overtly discernible.

    - The primary issue, while low in overall risk probability, is to ensure the property is established and maintained in a way that optimizes physical security. This is because of the high importance associated with this asset, when required. In this regard, failure of its functioning should unlawful access be gained, would be detrimental. Criminal access that leads to possible acts of sabotage needs to be prevented. In saying this, extra care should be given to solidifying good access control measures into the site, plus implementing important target hardening features.

    - It is also important that uninhibited access by all emergency responders (Police, Fire, and EMS) be achieved as an outcome from the final design, when it is constructed and made operational.

No feedback forms were received in response to the information provided at the Public Open House.

A copy of the display material, which was presented at the open house is included in **Appendix B**.

8.3.3 Notice of Draft Environmental Study Report

The notice of draft ESR was sent by email to review agencies and the public on August 30th, 2022. A copy of the email and list of recipients can be found in **Appendix B**. The email included a link to the City's website where the Draft ESR could be found on the project's page.

- The MECP provided comments via email on October 5th, 2022, see **Appendix B**.
- The MTCS provided comments via email on September 30th, 2022, see **Appendix B**.
- Transport Canada advised in an email on September 15th, 2022 that,
    - Transport Canada does not require receipt of all individual or Class EA related notifications. We are requesting project proponents self-assess if their project:
        1. Will interact with a federal property and/or waterway by reviewing the Directory of Federal Real Property, available at at www.tbs-sct.gc.ca/dfrp-rbif/; **and**
        2. Will require approval and/or authorization under any Acts administered by Transport Canada available at http://www.tc.gc.ca/eng/acts-regulations/menu.htm.

    Projects that will occur on federal property prior to exercising a power, performing a function or duty in relation to that project, will be subject to a determination of the likelihood of significant adverse environmental effects, per Section 82 of the *Impact Assessment Act, 2019*. A self-assessment was done to ensure the project does not interact with federal property and/or waterway and does not require approval or authorization under any Acts administered by Transport Canada.

8.4 INDIGENOUS CONSULTATION

Consultation with Indigenous communities is ongoing in accordance with the Municipal Class EA Indigenous Consultation requirements. As part of this Environmental Assessment, communications with Indigenous agencies and communities are being undertaken in parallel with the other stakeholder communications and consultations. This report will be sent to the Indigenous groups and organizations to solicit their interest or non-interest in the study.

The communities contacted as a part of this EA study include:

- Aamjiwnaang First Nation
- Caldwell First Nation
- Walpole Island First Nation (Bkejwanong Territory)
- Chippewas of the Thames First Nation

- Chippewas of Kettle & Stony Point First Nation
- Oneida Nation of the Thames (ONYOTA'A:KA)
- Métis Nation of Ontario
- Moravian of the Thames (Delaware Nation)

Notices were sent to the following Indigenous groups and organizations at study commencement and public open house to solicit their interest or non-interest in the study.

Following the project Notice of Commencement, a consultation response was received from Chippewas of the Thames First Nation (COTTFN), stating that the proposed project is located within the McKee Treaty Area (1790) to which Chippewas of the Thames First Nation (COTTFN) is a signatory. It is also located within the Big Bear Creek Additions to Reserve (ATR) land selection area, as well as COTTFN's Traditional Territory. COTTFN requested to have a First Nation Field Liaison present for the Stage 2 Archaeological Assessment. COTTFN was notified of the assessment and a COTTFN Field Liaison was on site May 19th, 2022, when the assessment was completed.

Documentation of consultation with Indigenous communities during the Environmental Assessment Process is in **Appendix B**.

9.0 OPINION OF PROBABLE COST

This section discusses an opinion of probable cost for the preferred solution. The opinion of probable cost is an estimate of the future contract price for the engineering and construction work, which is not yet fully defined and may be subject to changes in scope, design, and market conditions.

9.1 LEVEL OF ACCURACY

Opinions of probable cost are typically provided throughout various stages of a project's life cycle. There are a number of classifications for estimates that identify typical minimum and maximum probable costs or levels of accuracy. These classifications vary widely by industry but all are based on the fact that the level of accuracy is directly proportional to the level of detail available at each stage of the project.

The level of accuracy increases as the project moves through the various stages from planning to preliminary design to final design. A wide range of accuracy would be expected at the planning stage of a project development because a number of details would be unknown. As the project moves closer to completion of final design, the estimate would become more accurate due to the increased level of detail available and the reduced number of unknowns.

Table 9.1 includes a summary of typical estimate classifications used throughout a project's development including a description of the project stage and range of accuracy. The opinions of probable cost in this study are estimated at the study stage (Class 2) and the corresponding level of accuracy could range from –15% to +30% from the opinion presented in the report.

Table 9.1: Classification of Cost Estimates

Class	Description	Level of Accuracy	Stage of Project Lifecycle
1	Conceptual Estimate	+50% to -30%	Screening of alternatives.
2	Study Estimate	+30% to -15%	Treatment system master plans.
3	Preliminary Estimate	+25% to -10%	Pre-design report.
4	Detailed Estimate	+15% to -5%	Completed plans and specifications.
5	Tender Estimate	+10% to -3%	This is the actual tender price and it can vary depending on the amount of contingency allowance consumed.

9.2 OPINION OF PROBABLE COST FOR PREFERRED SOLUTION

A capital budget estimate (in 2022 dollars) is summarized in **Table 9.2**. In addition to the level of accuracy discussed, the opinion of probable cost was prepared taking into consideration the following factors.

- All estimates are in 2022 dollars.
- It is assumed that the Contractor will have unrestricted access to the site and will complete the work during normal working hours from 7:00 am to 6:00 pm Monday to Friday. There is no allowance for premium time included.
- Labour costs are based on union labour rates for the Windsor area.
- An allowance is included for mobilization and demobilization and the Contractor's overhead and profit.
- Equipment costs are based on vendor supplied price quotations and historical pricing of similar equipment.
- Bulk material and equipment rental costs used are typical for the Windsor area.
- The estimate does not include the cost of application or permit fees.
- Allowances for engineering and contingency allowances (approximately 15% and 30%, respectively) are included in the estimate.
- No allowance is included for interim financing costs or legal costs.
- No allowance is included for escalation beyond the date of this report.
- A factor that could impact the estimate is the possible presence of archaeological resources in the construction area. However, the potential for these resources has been identified to be low and therefore no allowance is included in the estimate.

Table 9.2: Opinion of Probable Capital Cost for Preferred Solution

Item	Description	Probable Cost
1	Pumping Station and Outlet Structure	$5,500,000
Sub-total Construction Cost		**$5,500,000**
	Contingency Allowance (30%)	$1,650,000
	Engineering Allowance (15%)	$1,050,000
TOTAL CAPITAL COST (excluding taxes)		**$8,200,000**

The 2020 SMP study estimated the cost of the proposed upgrades to be $5.1 million. The opinion of probable cost is $8,200,000 as of Phase 4 of this Class EA.

The causes of the cost increase are primarily a result of

- Unprecedented price increases for materials and equipment over the last 3 years, mostly due to continued unprecedented supply chain issues affecting the construction industry, increased demand in construction, COVID-19 lockdowns, and home improvements, increased new housing sales, new infrastructure stimulus announcement of $6 Trillion by US and forthcoming Canadian Infrastructure spending, etc.
- Shortage of skilled labour within the local Union halls

10.0 SUMMARY

10.1 RECOMMENDATIONS

The preferred design is indicated in the **Figure 5.2A** and recommended design concepts are summarized in the **Table 5.3**. The recommended design meets the requirements outlined in the SMP to reduce the risk of flooding in the Pontiac drainage area in the case of severe storm events. Construction of the proposed infrastructure will positively impact the community and work to decrease the risk of damage to municipal infrastructure, local transportation networks, and residential properties due to flooding.

When capital budget funding becomes available, it is recommended that the following work described in the ESR proceed to Phase 5 with final design and construction:

- Upgrade the hydraulic capacity of the Pontiac Pumping Station to effectively release stormwater to the Little River and reduce the HGL within the stormwater system to meet the appropriate level of service. The wet well structure is to house three (3) pumps, two duty and one standby, each rated 1.25 m^3/s. Exact number and configuration of pumps is to be further reviewed in the detailed design phase.

- Upgrade existing Pontiac Pumping Station inlet chamber to divert flow from the inlet chamber to a new wet well structure that is to be located south of the existing Pontiac Pumping Station.

- New 1500 mm diversion sewer from existing inlet chamber to new wet well structure.

- New 1500 mm connection sewer from the new wet well structure to the outlet of existing Pontiac Pumping Station

10.2 PERMITS & APPROVALS

Table 10-1 shows the permit and approval requirements for the preferred design. The permit requirements are based on past experience with similar projects and may change at the discretion of the regulatory authorities. The applications shall be prepared upon completion of the detailed design drawings and specifications.

Table 10-1: Permit requirements for implementing the preferred design

Regulatory Authority or Owner	Permit
Ministry of Environment Conservation and Parks (MECP)	ECA for Pontiac Pumping Station Upgrades
Essex Region Conservation Authority (ERCA)	ERCA permit for Pontiac Pumping Station Upgrades
Ministry of Natural Resources and Forestry (MNR)/Fisheries and Oceans Canada (DFO)	Endangered Species Act permit or authorization
Building Permit	Building Permit for Pontiac Pumping Station Upgrades

APPENDICES

APPENDIX A: FIGURES

Figure 1.1: Existing Storm Sewer System in the Pontiac Drainage Area

Figure 1.2: Proposed Pontiac Drainage Area Improvements

Figure 1.3: Municipal Class EA Planning and Design Process

Figure 2.1: Archaeological Potential in the City of Windsor Area

Figure 2.2: Aerial Plan of Windsor's Cultural Heritage Sites

Figure 5.1B: Site Layout Alternative No. 1

Figure 5.2B: Site Layout Alternative No. 2

Figure 5.3B: Site Layout Alternative No. 3

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Legend

- Existing Pontiac Drainage Area
- East Marsh Drainage Area
- SWM Ponds
- Ganatchio Trail Berm
- Existing Storm Sewers
- Storm Pump Stations

East Marsh Pump Station

Pontiac Pump Station

North Neighbourhood SWM Pond

Aspen Lake SWM Pond

0 370 740 metres

1:6,163 (At original document size of 22x34)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N

Project Location
East Windsor

165620249 REVA
Prepared by HLR on 2022-08-05

Client/Project
Pontiac Pump Station Capacity Upgrades "Schedule C" Class EA

Figure No.
Figure 1.1

Title
Existing Storm Sewer System in the Pontiac Drainage Area

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C:\Users\hhindi\Stantec\OneDrive - Stantec\Desktop\GIS Files (updated)\Figure 1.1.mxd Revised: 2022-08-05 By: hhindi

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Legend

- Proposed Pontiac Drainage Area
- Amended East Marsh Drainage Area
- Ganatchio Trail Berm
- Existing Storm Sewers
- Storm Sewer Improvements
- SWM Ponds
- Storm Pump Stations

RE-DIRECTION OF STORM FLOWS FROM EAST MARSH PS DRAINAGE AREA TO PONTIAC PS DRAINAGE AREA

East Marsh Pump Station

Pontiac Pump Station

North Neighbourhood SWM Pond

Aspen Lake SWM Pond

0 500 1,000 metres

1:8,225 (At original document size of 22x34)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N

Project Location
East Windsor

165620249 REVA
Prepared by HLR on 2022-08-22

Client/Project
Pontiac Pump Station Capacity Upgrades "Schedule C" Class EA

Figure No.
Figure 1.2

Title
Proposed Drainage Area Improvements

V:\01656\active\165620249\planning\report\ESR\Appendices\Appendix A Figures\GIS Files (updated)\Figure 1.2.mxd Revised: 2022-08-22 By: hmfdisbacher

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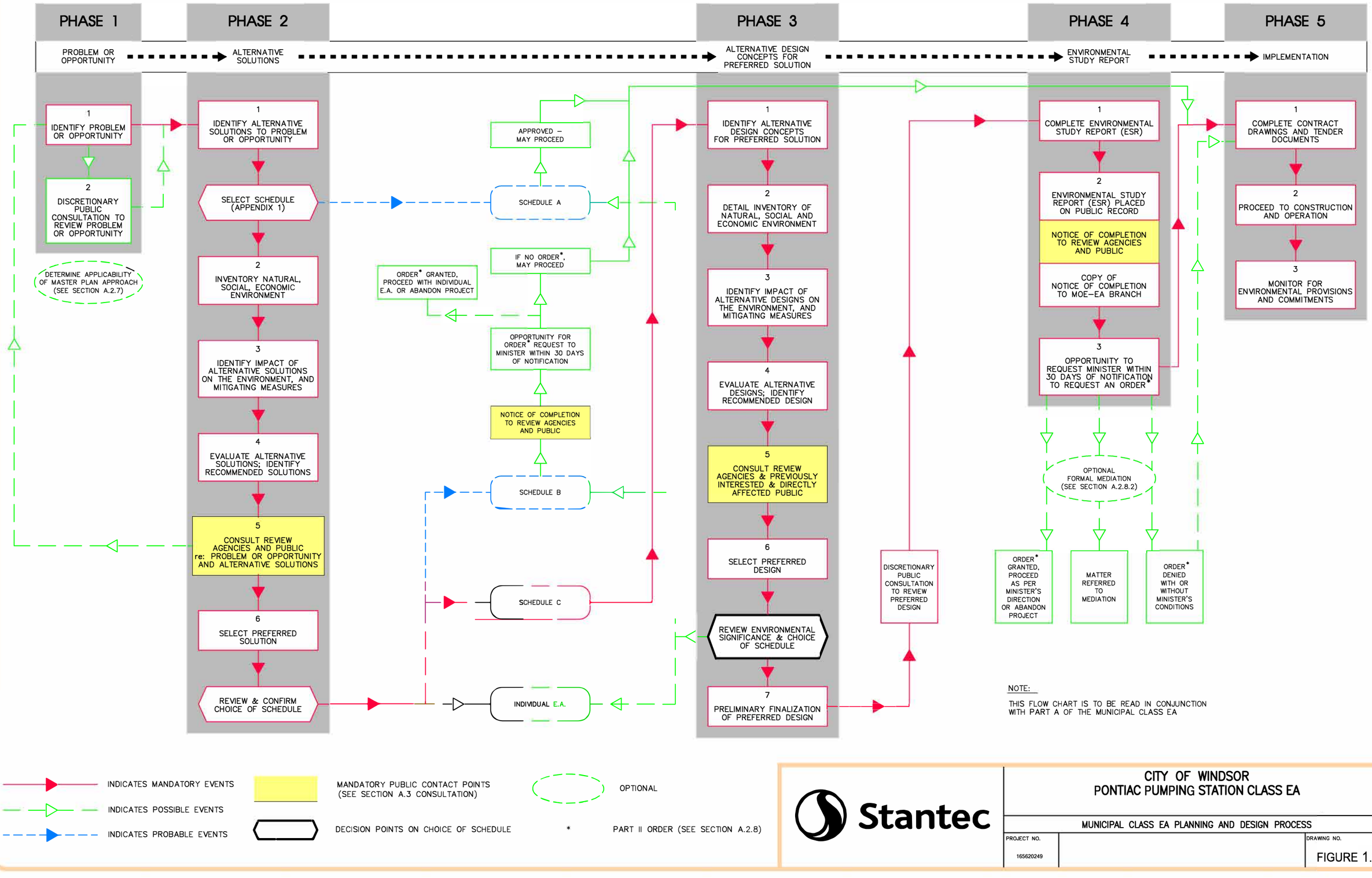

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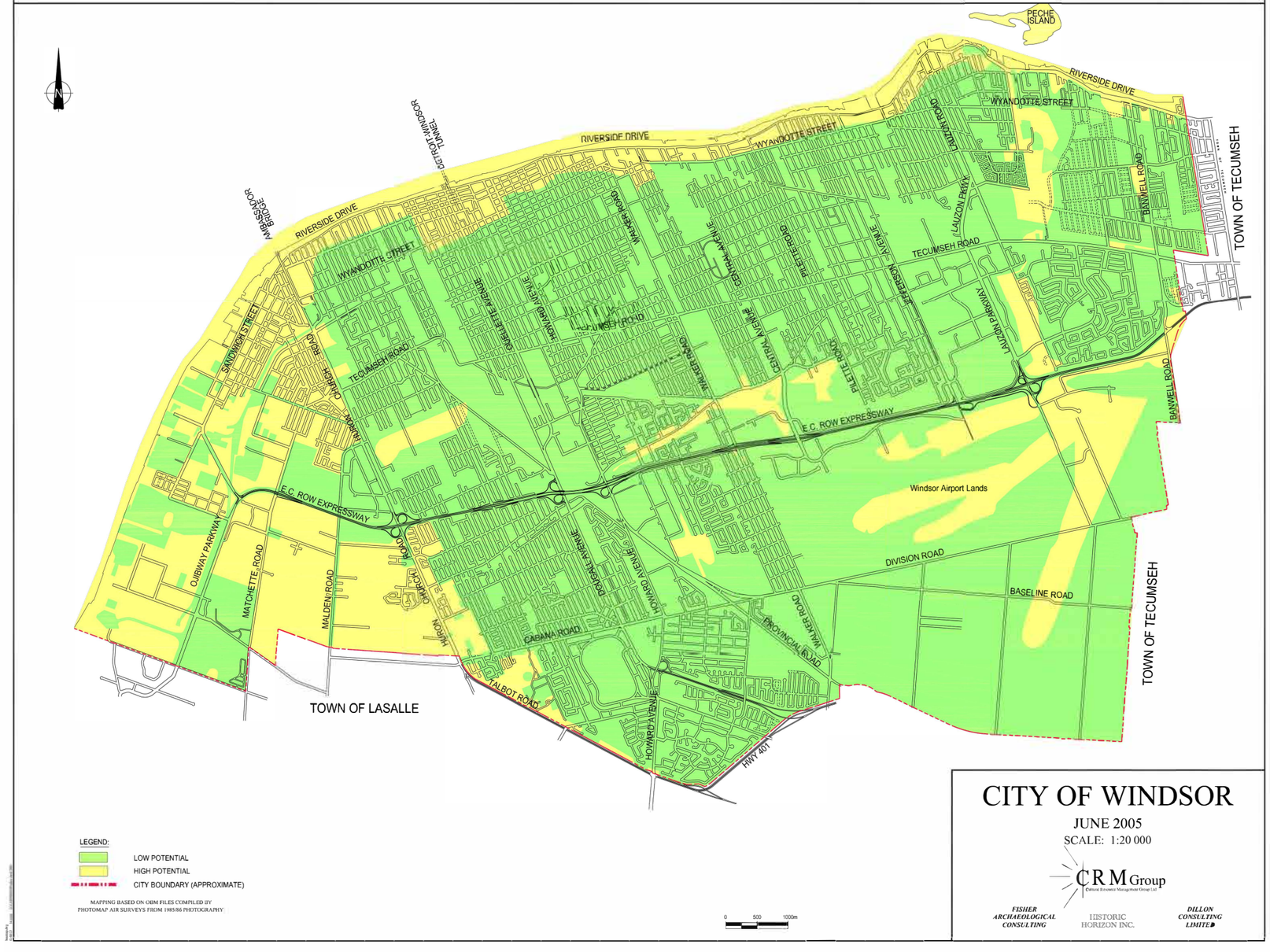
CITY OF WINDSOR
PONTIAC PUMPING STATION CLASS EA

MUNICIPAL CLASS EA PLANNING AND DESIGN PROCESS

PROJECT NO. 165620249

DRAWING NO. FIGURE 1.3

WINDSOR ARCHAEOLOGICAL MASTER PLAN: FIGURE 4.0 - ARCHAEOLOGICAL POTENTIAL



CITY OF WINDSOR

JUNE 2005

SCALE: 1:20 000

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CITY OF WINDSOR
PONTIAC PUMPING STATION CLASS EA

ARCHAEOLOGICAL POTENTIAL IN THE CITY OF WINDSOR AREA

PROJECT NO. 165620249

DRAWING NO. FIGURE 2.1

Albert J. Lothian House

House

Pelee Passage Lighthouse

Monarch Liqueurs / W.L. Webster Mfg. Ltd.

Guido Fantin House

East Marsh Pump Station

Pontiac Pump Station

North Neighbourhood SWM Pond

Hydro Sub-Station No.61

Little River

BRUMPTON PARK

CLAIRVIEW

DIEPPE

GENEVIEVE

BETTY

CARLING

CEDARVIEW

DORMAR

LORI

MENARD

ISACK

CHRISTOPHER

LAFORTE

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ALAN

WYANDOTTE

MENARD

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EDGAR

MATTHEW BRADY

ADAMS

GATESIDE

HEATHFIELD

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ENFIELD

ST PAUL

EASTLAWN

BELLE ISLE VIEW

TRANBY

FOXHILL

EAST MOOR

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BLENCARN

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MOUNTBATTEN

MARTINIQUE

VANDERBILT

SAND POINT

KOTEH

BREEZEWOOD

MENARD

PAULINA

RIVERSIDE

FLORENCE

JOHN M

CLAIRVIEW

ADELAIDE

CLOVER

ELINOR

WYANDOTTE

BEVERLY GLEN

FLORENCE

PEABODY

COPELAND

THUNDERBAY

IVANHILL

CLOVER

FREDERICA

PEARSON

LUBLIN

ICEWATER

NIGHTFALL

BRIDALFALLS

PEPPERVINE

MAGNOL

LITTLE RIVER

MANCROFT

VENETIAN

KATELLA

LUXURY

Little River Acres Park

Riverdale Park

Little River Corridor Park

St Paul Grove Park

Cedarview Park

Brookfield Park

Shumsky Shores Park

Sandwich Park

Riverside Park

Little River Park

Big Valu Mart

FRESHCO

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Legend

- Proposed Pontiac Drainage Area
- Amended East Marsh Drainage Area
- Storm Sewer Improvements
- SWM Ponds
- Heritage Sites
- Underground Storage
- Storm Pump Stations

0 270 540 metres

1:4,495 (At original document size of 22x34)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N

Project Location
East Windsor

165620249 REVA
Prepared by HLR on 2022-08-05

Client/Project
Pontiac Pump Station Capacity Upgrades "Schedule C" Class EA

Figure No.
Figure 2.2

Title
Aerial Plan of Windsor's Cultural Heritage Sites

C:\Users\hlindlasbacher\OneDrive - Stantec\Desktop\GIS Files (updated)\Figure 2.2.mxd Revised: 2022-08-05 By: hlindlasbacher

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AERIAL PLAN

SCALE: 1:250

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File Name: 165620249_SW-101_option	Q.K. Dwn.	J.L. Chkd.	J.L. Dsgn.	2021.09.14 YY.MM.DD

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Client/Project

CORPORATION OF THE CITY OF WINDSOR
LITTLE RIVER POLLUTION CONTROL PLANT

PONTIAC PUMPING STATION UPGRADE
NEW PUMPING STATION

City of Windsor, Ontario

Title

SITE LAYOUT ALTERNATIVE No. 1

Project No.	Scale
165620249	AS SHOWN
Revision Sheet	Drawing No.

FIGURE 5.1B

AERIAL PLAN

SCALE: 1:250

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File Name: 165620249_SW-101_option	Q.K. Dwn.	J.L. Chkd.	J.L. Dsgn. 2021.09.14 YY.MM.DD

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Client/Project

CORPORATION OF THE CITY OF WINDSOR
LITTLE RIVER POLLUTION CONTROL PLANT

PONTIAC PUMPING STATION UPGRADE
NEW PUMPING STATION

City of Windsor, Ontario

Title

SITE LAYOUT ALTERNATIVE No. 2

Project No.	Scale
165620249	AS SHOWN
Revision Sheet	Drawing No.

FIGURE 5.2B

AERIAL PLAN
SCALE: 1:250

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Issued	By	Appd.	YY.MM.DD
File Name: 165620249_SW-101_option	Q.K. Dwn.	J.L. Chkd.	J.L. Dsgn.	2021.09.14 YY.MM.DD

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Client/Project
CORPORATION OF THE CITY OF WINDSOR
LITTLE RIVER POLLUTION CONTROL PLANT

PONTIAC PUMPING STATION UPGRADE
NEW PUMPING STATION

City of Windsor, Ontario

Title
SITE LAYOUT ALTERNATIVE No. 3

Project No.	Scale
165620249	AS SHOWN
Revision Sheet	Drawing No.

FIGURE 5.3B

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APPENDIX B: CONSULTATION

1. Notice of Study Commencement
2. Public Information Centre
3. Notice of Draft Environmental Study Report
4. Email Packages to Review Agencies
5. Response from Review Agencies – Notice of Project Commencement
6. Response from Review Agencies – Public Open House
7. Response from Review Agencies – Notice of Draft ESR
8. Indigenous Consultation

APPENDIX B

Notice of Study Commencement

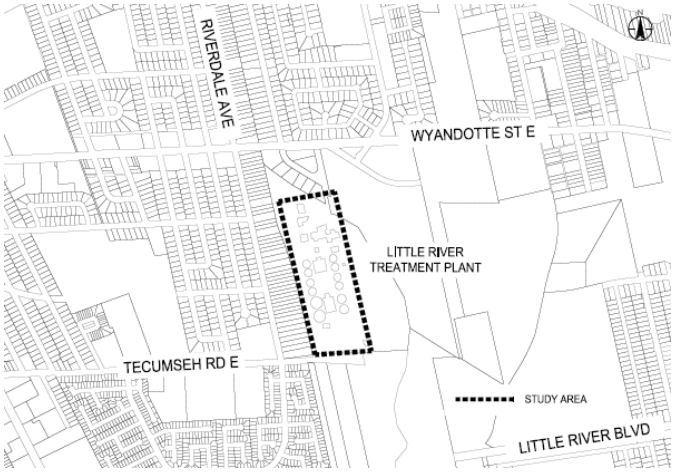
1. Notice of Study Commencement
2. Notice of Study Commencement – Windsor Star Advertisement

PONTIAC PUMPING STATION UPGRADES
MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT

NOTICE OF STUDY COMMENCEMENT

The City of Windsor is undertaking a Schedule C Municipal Class Environmental Assessment (Class EA) to increase capacity of existing Pontiac Pumping Station at the Littler River Pollution Control Plant. This study will satisfy Phases 3 and 4 of the Class EA process which will involve the evaluation of alternative design concepts for the proposed Pontiac Pumping Station Capacity Upgrades. An Environmental Study Report will be prepared to document the activities and recommendations from the Class EA process.

The City of Windsor endorsed its first comprehensive Sewer and Coastal Flood Protection Master Plan (SMP) in 2020. The SMP was completed in accordance with Phases 1 and 2 of the Municipal Class Environmental Assessment process. The SMP identified specific improvement projects that can be undertaken by the city to improve efficiency and reduce the risk of flooding caused by severe storm events. It is outlined in the SMP that the capacity upgrades of Pontiac Pumping Station within the Little River Pollution Control Plant (refer to key map) are required to discharge excess water during major storm events in the expanded Pontiac drainage area.



This Notice of Study Commencement continues the public consultation process for this project. The public is invited to submit questions or wish to be added to the study mailing list. During the course of the Class EA as the study work is nearing completion, the public will be invited to a Public Information Centre (PIC) to review the findings of the study and to submit any further comments and concerns.

If you have any questions or if you wish to be added to the study mailing list, please contact:

Chandana Walgama, P.Eng.
Pollution Control Project Engineer, City of Windsor
4155 Ojibway Parkway
Windsor, ON N9C 4A5
519-253-7111 x 3274
cwalgama@citywindsor.ca

Jian Li, Ph.D., P. Eng.
Project Manager, Stantec Consulting
2555 Ouellette Avenue, Suite 100
Windsor, Ontario N8X 1L9
519-966-2250 x 240
jian.li@stantec.com

Personal information submitted is collected, maintained, and disclosed under the authority of the *Environmental Assessment Act and the Municipal Freedom of Information and Protection of Privacy Act* for transparency and consultation purposes. 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.

CLASSIFIEDS

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Public Notices

THE CITY OF WINDSOR

PONTIAC PUMPING STATION UPGRADES
CLASS ENVIRONMENTAL ASSESSMENT

NOTICE OF STUDY COMMENCEMENT

The City of Windsor is undertaking the Class EA process to increase capacity of existing Pontiac Pumping Station at the Littler River Pollution Control Plant. The new pumping station is determined in the Sewer and Coastal Flood Protection Master Plan to improve efficiency and reduce the risk of flooding caused by severe storm events. The capacity upgrades of Pontiac Pumping Station are required to discharge excess water during major storm events in the expanded Pontiac drainage area

All content and instructions on how to submit questions or wish to be added to the study mailing list will be available on the City of Windsor's project webpage, https://www.citywindsor.ca/residents/Construction/Environmental-Assessments-Master-Plans/Pages/Pontiac-Pumping-Station-Upgrades-at-the-LIttle-River-Pollution-Control-Plant-Environmental-Assessment.aspx

Legal & Tender Notices

WINDSOR ESSEX
CHC
COMMUNITY HOUSING CORPORATION
945 McDougall, Windsor, ON N9A 1L9

NNRFPps 22-02 – Grass Cutting

Services will be required for CHC at various locations in Windsor and Essex County, Ontario.

One mandatory "virtual" Pre-Bid Information Meeting will be held **March 10, 2022**, from 10:00 a.m. – 12:00 p.m.

Meeting invitations will be sent to registered proponents only. Deadline for registration is **March 9, 2022** up to and including 3:30 p.m. EST. To register and view the RFP documents, visit the "Corporate-Create a Contractor Account" and "Access Your Contractor Account" sections at www.wechc.com. Attendance for the entire duration of the meeting is mandatory.

The deadline for submissions (Closing Date) shall be 11:00:00 a.m. Eastern Standard Time, **March 23, 2022** at 945 McDougall St., Windsor, ON.

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Birthdays

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Thérèse St Pierre (nee Barrette)

Wishing you a Happy 90th Birthday!! May God continue to Bless you mom (9), mémé (24) and grand-mémé (60)!!

Birthday

Tommaso Rossi

90 Years Young on March 3rd! Buon Compleanno to the best husband, dad and nonno anyone could ever ask for. His love of pasta, wine and espresso is only outshined by his love for family. Happy Birthday Wishes from Angela, Rita, Chris, Pat, Lori, Thomas, Lucas, Luna & Vita.

Tommi Lewis

With Love from Mel

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311 WINDSOR CITY SERVICES www.citywindsor.ca #workwindsor

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Application will be accepted up to and including **Friday April 1st, 2022**

FP NEWSLETTERS financialpost.com/newsletters

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If losing keys, phones or other items is a common occurrence, there are strategies that may help with your memory. *GETTY IMAGES/ISTOCKPHOTO*

A trip down memory drain

Simple tips and tricks may help alleviate stress around keeping track of your things

ANGELA HAUPT

Sasha Bradford doesn't have time to lose things. She's a working mom with lots of hobbies, and when she misplaces her keys or important papers she becomes frustrated and irritable.

"It impacts me greatly," said Bradford, 34, a Washington-based federal contracting officer who blogs about mental health. Bradford has attention-deficit/hyperactivity disorder, which makes her prone to put things places and not remember where she puts them, she said.

She has learned to adapt, in part by writing down where she has stored valuables, such as expensive jewelry, and setting micro goals.

For example, "every time I travel, I typically forget or lose something. So now I think of one thing that's really important to remember (to bring home) and I focus on that." Bradford also coaches herself not to panic when an item goes astray by focusing on breathing and affirmations.

Her internal angst is probably familiar to anyone whose phone is MIA a dozen times a day, or who can't find the TV remote until 10 minutes after the best show of the night began.

"It's a very common occurrence and certainly very annoying," said Daniel Schacter, a professor of psychology and director of the Schacter Memory Lab at Harvard University.

"Most of the time, losing things results from what I call absent-mindedness. That's a breakdown at the interface of attention and memory, where we're focused on something other than the object we're going to lose, be it the TV remote or a phone or glasses," he said. "We're thinking about something else, and then we never really encode the information into memory about where we've put the object because we have other concerns occupying our attention."

That's not necessarily a bad thing, he said; we could be busy pondering something productive, such as a work task or what to make for dinner.

Or there could be another innocuous factor at play.

"It might be that I mindfully put something down somewhere — maybe it's a book I'm reading — and I know I won't be able to get back to it for a few days," he said. "And then I can't remember where I put it."

This is a normal example of "transience," or the decreasing accessibility of memory over time.

Schacter, the author of The Seven Sins of Memory: How the Mind Forgets and Remembers, has tried to train himself to keep track of where he puts his reading glasses and car keys, to the point that he only sets them down in certain places and would notice if he strayed from that routine.

Sometimes, when we're operating on autopilot and not truly focused on our surroundings, even the best of intentions might not suffice, Schacter said. But for the most part, he said he thinks people can overcome the tendency to misplace things.

It's possible, however, that something more serious than absent-mindedness is going on.

Misplacing and losing items is one sign of ADHD, which is characterized by traits such as inattention and impulsivity.

If you have the condition, you've probably struggled with wayward objects throughout your entire life, said Stephanie Moulton Sarkis, a psychotherapist based in Tampa who specializes in ADHD.

Many people ask Gregory Jicha, director of clinical trials at the University of Kentucky's Sanders-Brown Center on Aging, whether they should be worried about misplacing things. Often, it's simply a normal part of aging.

"The brain does change over time," he said. For example, imagine you run into someone and can't surface their name and hours later it pops into your mind. "That's the slowing associated with normal aging."

One way to be more mindful in the moment is to verbalize the item's location, said Mareen Dennis, an assistant professor of psychiatry at the University of Kentucky College of Medicine.

"You'd say, 'OK, I'm setting my mouse to the right of my computer right now.' And saying that either internally in your mind or out loud makes you focus your attention on where you put it," heightening the odds that you'll remember its location later.

You could make up a quick rhyme, Dennis suggested: "My keys are by the door for when I leaves." Or select a catchy song and sub in your own lyrics. "I've got a few people that use the tune Head, Shoulders, Knees and Toes," Dennis said. "That one works really well."

Spending time coming up with a song or rhyme is a useful way to keep your objects' location top of mind.

Ever leave a store and wander around the parking lot for 10 minutes because you can't locate your car?

Take a picture of your parking spot, especially if you're at an airport and won't be returning to it for a few days, suggested Susan Whitbourne, a professor emeritus of psychological and brain sciences at the University of Massachusetts at Amherst.

Make your belongings stand out: Dennis recommends designating a personal "brand colour" that you love, such as bright purple. Attach your keys to a purple key ring and select a purple phone case, "so that when you're scanning, you're always looking for your favourite colour."

There are lots of gadgets designed to keep track of things: You can attach an Apple AirTag to products you often misplace, for example, and an app will guide you to their location, Sarkis said.

There are also fobs you can put in your wallet or purse that will ring like a phone when you press a button on either another fob or an app on your phone.

Dennis coaches her patients with ADHD to make a "home for everything."

That might mean placing a basket inside your front door where you drop your keys and wallet immediately upon entering your home, or designating one drawer as the scissors drawer.

If you're in a situation where you've misplaced something, "take a deep breath, and give your brain a minute or two," Jicha said. "(The location) will come, in the vast majority of cases."

Be kind to yourself. It's certainly understandable if you're frustrated with your tendency to misplace things. But if you keep beating yourself up about it, it could "become a self-fulfilling prophecy, and you start to think you can't control your memory, that you're losing it, that there's something wrong with you, and you get anxious about that," Whitbourne said.

The Washington Post

APPENDIX B

Public Information Centre

1. Notice of Public Information Centre
2. Notice of PIC – Windsor Star Advertisement
3. PIC Sign in Sheet
4. PIC Feedback Form
5. PIC Presentation

PONTIAC PUMPING STATION UPGRADES
MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT

NOTICE OF PUBLIC INFORMATION CENTRE

The City of Windsor is undertaking a Schedule 'C' Municipal Class Environmental Assessment (Class EA) for the proposed Pontiac Pumping Station Upgrades. This study will satisfy Phases 3 and 4 of the Class EA process which will involve the evaluation of design concept alternatives for the proposed Pontiac Pumping Station. An Environmental Study Report will be prepared to document the activities and recommendations from the Class EA process.

The City of Windsor endorsed its first comprehensive Sewer and Coastal Flood Protection Master Plan (SMP) in 2020. The SMP was completed in accordance with Phases 1 and 2 of the Municipal Class Environmental Assessment process. It is outlined in the SMP that the capacity upgrades of Pontiac Pumping Station are required mitigate basement flooding and improve flood resiliency for severe storm events in the Pontiac Drainage Area.

The City is hosting a Public Information Centre (PIC) to present the evaluation of design concept alternatives for the Pontiac Pumping Station. Consultation is an integral part of the EA process and members of the public, agencies, and other interested persons are invited to participate in the upcoming PIC.

PUBLIC INFORMATION CENTRE
Wednesday July 13th, 2022
3:00 p.m. – 7:00 p.m.
WFCU Centre, St. Clair Room
8787 McHugh Street, Windsor, ON

Information regarding this Environmental Assessment can be found on the City's project website:https://www.citywindsor.ca/residents/Construction/Environmental-Assessments-Master-Plans/Pages/Pontiac-Pumping-Station-Upgrades-at-the-LIttle-River-Pollution-Control-Plant-Environmental-Assessment.aspx

Following the PIC, comments are welcomed and will be received until August 3rd, 2022.

For further information, please contact:

Chandana Walgama, P.Eng.
Pollution Control Project Engineer, City of Windsor
4155 Ojibway Parkway
Windsor, ON N9C 4A5
519-253-7111 x 3274
cwalgama@citywindsor.ca

Jian Li, Ph.D., P. Eng.
Project Manager, Stantec Consulting
2555 Ouellette Avenue, Suite 100
Windsor, Ontario N8X 1L9
519-966-2250 x 240
jian.li@stantec.com

Personal information submitted is collected, maintained, and disclosed under the authority of the *Environmental Assessment Act and the Municipal Freedom of Information and Protection of Privacy Act* for transparency and consultation purposes. 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.

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Public Notices

THE CITY OF WINDSOR ONTARIO, CANADA

NOTICE

PONTIAC PUMPING STATION UPGRADES CLASS ENVIRONMENTAL ASSESSMENT

NOTICE OF PUBLIC INFORMATION CENTRE

The City of Windsor is undertaking a Schedule 'C' Municipal Class Environmental Assessment for the proposed Pontiac Pumping Station Upgrades. This study will satisfy Phases 3 and 4 of the Class EA process.

The City is hosting a Public Information Centre (PIC) to present the evaluation of design concept alternatives for the Pontiac Pumping Station and receive input from interested residents and stakeholders. The PIC will be held on Wednesday July 13th, 2022 (3:00 to 7:00 pm) at the WFCU Centre, St. Clair Room, 8787 McHugh Street, Windsor, ON.

Additional details regarding the PIC are available on the City of Windsor's project webpage: https://www.citywindsor.ca/residents/Construction/Environmental-Assessments-Master-Plans/Pages/Pontiac-Pumping-Station-Upgrades-at-the-LIttle-River-Pollution-Control-Plant-Environmental-Assessment.aspx

THE CITY OF WINDSOR ONTARIO, CANADA

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Proponents must attend two mandatory site meetings: Wednesday, July 6, 2022 (8:00am to 4:00PM) and Thursday, July 7, 2022 (9:00am to 3:00pm).

Meeting invitations will be sent to registered proponents only. Deadline for registration is **Tuesday July 5, 2022** up to and including 3:30 p.m. EST. To register and view the RFP documents, visit the "Corporate-Create a Contractor Account" and "Access Your Contractor Account" sections at www.wechc.com. Attendance for the entire duration of the meeting is mandatory.

The deadline for submissions (Closing Date) shall be 11:00:00 a.m. Eastern Standard Time, **Wednesday July 27, 2022** at 945 McDougall St., Windsor, ON.

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Anniversary

Antoinette & Ernest Pecaski

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Love Deanna, Trevor, Anthony, Dana, Cadence, Caleb and Quinn

Birthdays

Happy Birthday

Happy 18th Birthday Sebastien

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CITY OF WINDSOR
CLASS ENVIRONMENTAL ASSESSMENT
PONTIAC PUMPING STATION UPGRADES
PUBLIC INFORMATION CENTRE
WFCU Centre
July 13th, 2022 – 3:00 p.m. to 7:00 p.m.
SIGN-IN SHEET

No.	Name (Please Print)	Address	Telephone Number
1	CHRIS MANZON	937 JARVIS AVE	519 7350054
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10			
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12			

PUBLIC INFORMATION CENTRE
COMMENT FORM

PONTIAC PUMPING STATION UPGRADES

To address widespread flooding issues during extreme storm events, the City of Windsor completed a comprehensive study known as the Sewer & Coastal Flood Protection Master Plan (SMP). The SMP identified the need for capacity upgrades at the Pontiac Pumping Station within the Little River Pollution Control Plant to service the Pontiac Drainage Area. The City is undertaking the Municipal Class Environmental Assessment (EA) process to develop a long-term solution to mitigate basement flooding and improve flood resiliency for severe storm events. This Class EA study will determine the overall design concept of the proposed Pontiac pumping station.

THANK YOU

Thank you for your interest in this project and attendance at this public information centre. Copies of the Public Information Centre material are available on the project website below:

https://www.citywindsor.ca/residents/Construction/Environmental-Assessments-Master-Plans/Pages/Pontiac-Pumping-Station-Upgrades-at-the-LIttle-River-Pollution-Control-Plant-Environmental-Assessment.aspx

Please return your completed comment form on or before August 3rd, 2022, to:

Hannah Rindlisbacher, E.I.T.
Stantec Consulting Ltd.
Environmental Engineer in Training
Mobile: 226-268-3033
hannah.rindlisbacher@stantec.com

Attention: Hannah Rindlisbacher
Stantec Consulting Ltd.
2555 Ouellette Avenue, Unit 100
Windsor ON
N8X 1L9

Stantec

PONTIAC PUMPING STATION UPGRADES
MUNICIPAL CLASS ENVIORNMENTAL ASSESSMENT
PUBLIC INFORMATION CENTRE – COMMENT FORM

Please provide your comments or concerns on the presented material for the Pontiac Pumping Station:

NAME _____

EMAIL ADDRESS _____

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Personal information submitted is collected, maintained, and disclosed under the authority of the *Environmental Assessment Act and the Municipal Freedom of Information and Protection of Privacy Act* for transparency and consultation purposes. 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.

City of Windsor

PONTIAC PUMPING STATION UPGRADES

PUBLIC INFORMATION CENTER

WELCOME

Municipal Class Environmental Assessment (Class EA)

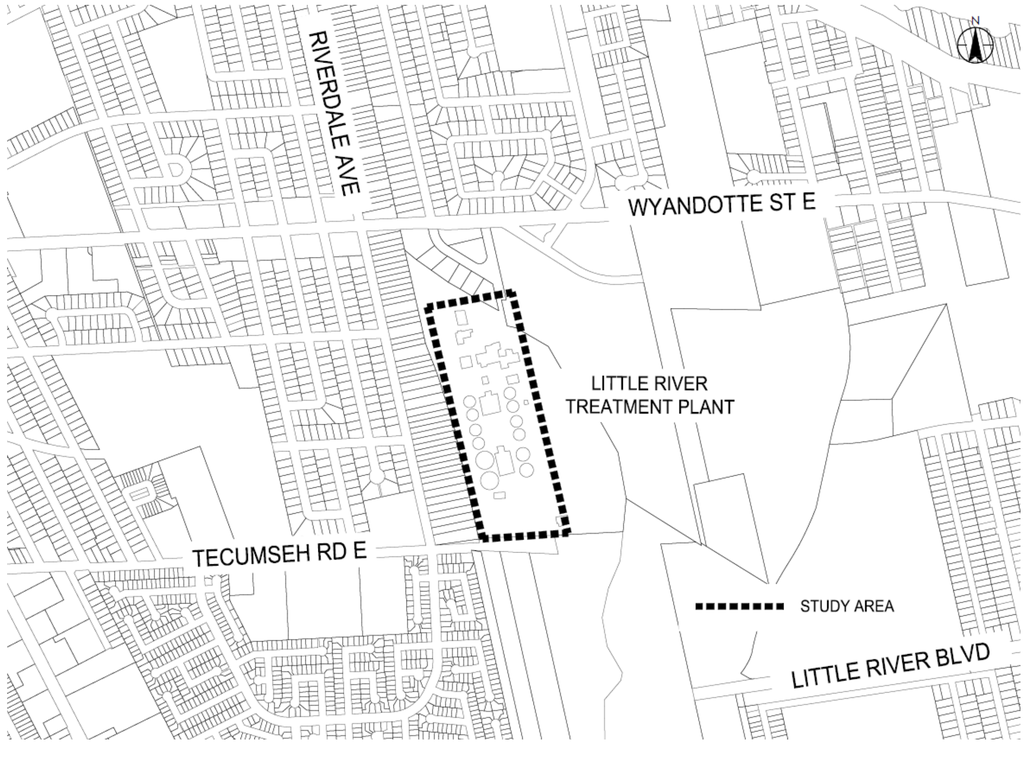
July 13th, 2022

Study Overview

The purpose of this study is to determine the preferred layout and design for the Pontiac Pumping Station.

The purpose of this Public Information Center (PIC) is to:

- Present an evaluation of alternative design concepts for the Pontiac Pumping Station
- Obtain public feedback on the preferred design concepts for the proposed Pontiac Pumping Station



Background
Flooding in the City of Windsor

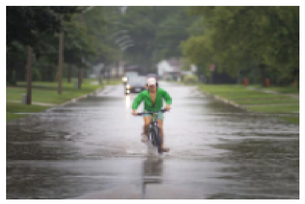
The City of Windsor has experienced several significant storm events in recent years that have resulted in widespread flooding.

WINDSOR STAR

Rainfall 'deluge' triggers flooding, road closures

With widespread reports of flooding and roads being under water, the city on Friday was urging residents to stay off...

July 16, 2021 **Local News**



WINDSOR STAR

Residents, municipalities deal with flooding aftermath

Craig Weir spent his weekend tearing apart the soggy remains of a sewage-soaked basement that took months to finish but only hours t...

with Video

July 20, 2021 **Local News**

To address these issues the City carried out the Sewer & Coastal Flood Protection Master Plan (SMP). The purpose of this study was to:

- Understand the causes of flooding
- Identify locations of basement, surface, and coastal flooding
- Evaluate alternative solutions
- Complete high-level design and cost estimates for proposed improvements
- Provide an implementation strategy for the recommended solutions

Background
Problem Statement

The SMP identified:

- The Pontiac Pumping Station at the Little River Pollution Control Plant (LRPCP) does not have the hydraulic capacity to service wet weather flows during severe storm events
- This results in an increased risk of basement and surface flooding in the Pontiac drainage area, which is consistent with observed and reported data during severe storm events
- Failure to have adequate infrastructure in place will negatively impact the community and may cause damage to infrastructure, properties, and local transportation networks

Background
The Pontiac Drainage Area

LEGEND

PONTIAC DRAINAGE AREA

Stantec

CITY OF WINDSOR

PONTIAC DRAINAGE AREA

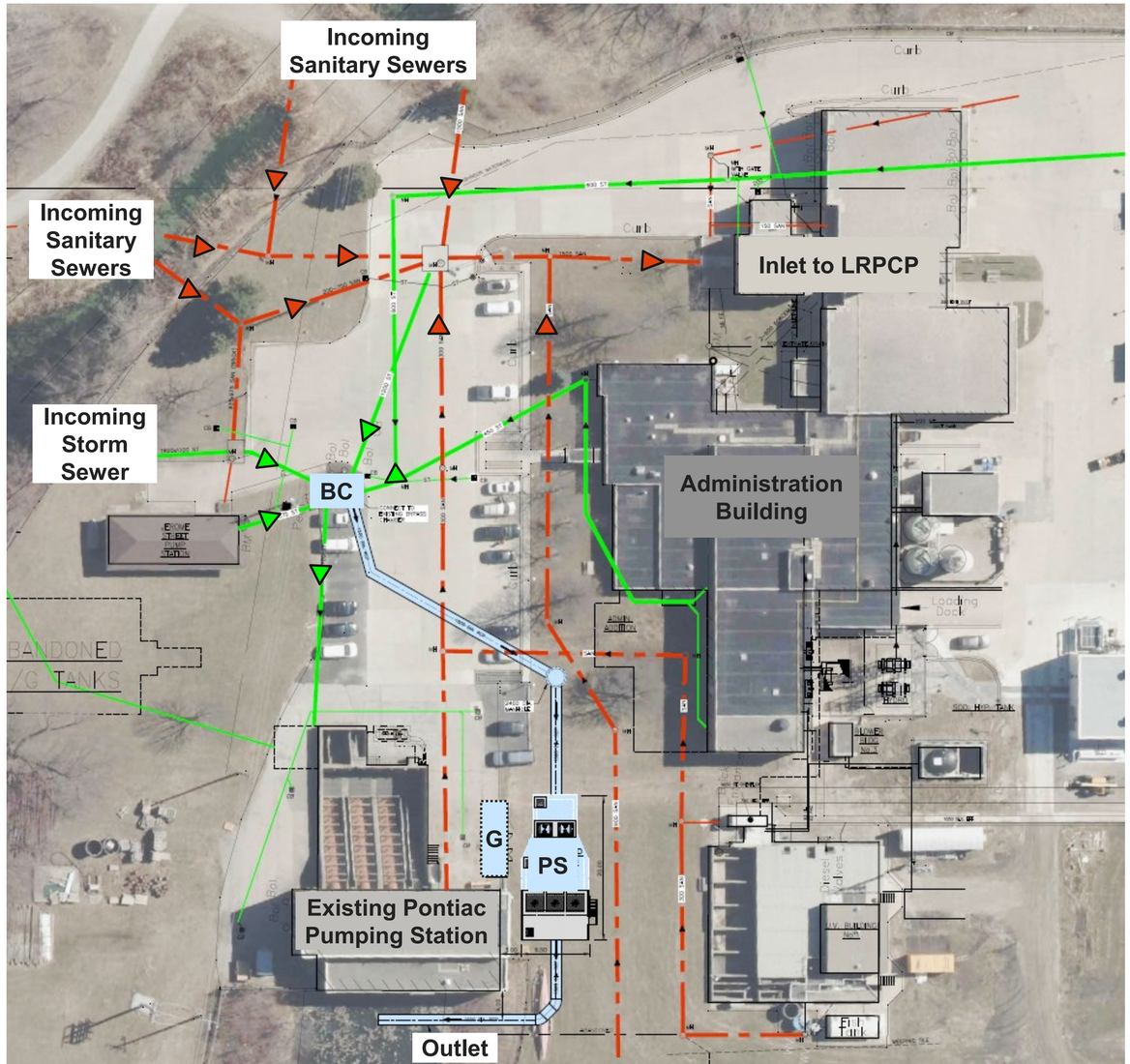
PROJECT NO. 160422249

1:15,000 0 150 450 750m

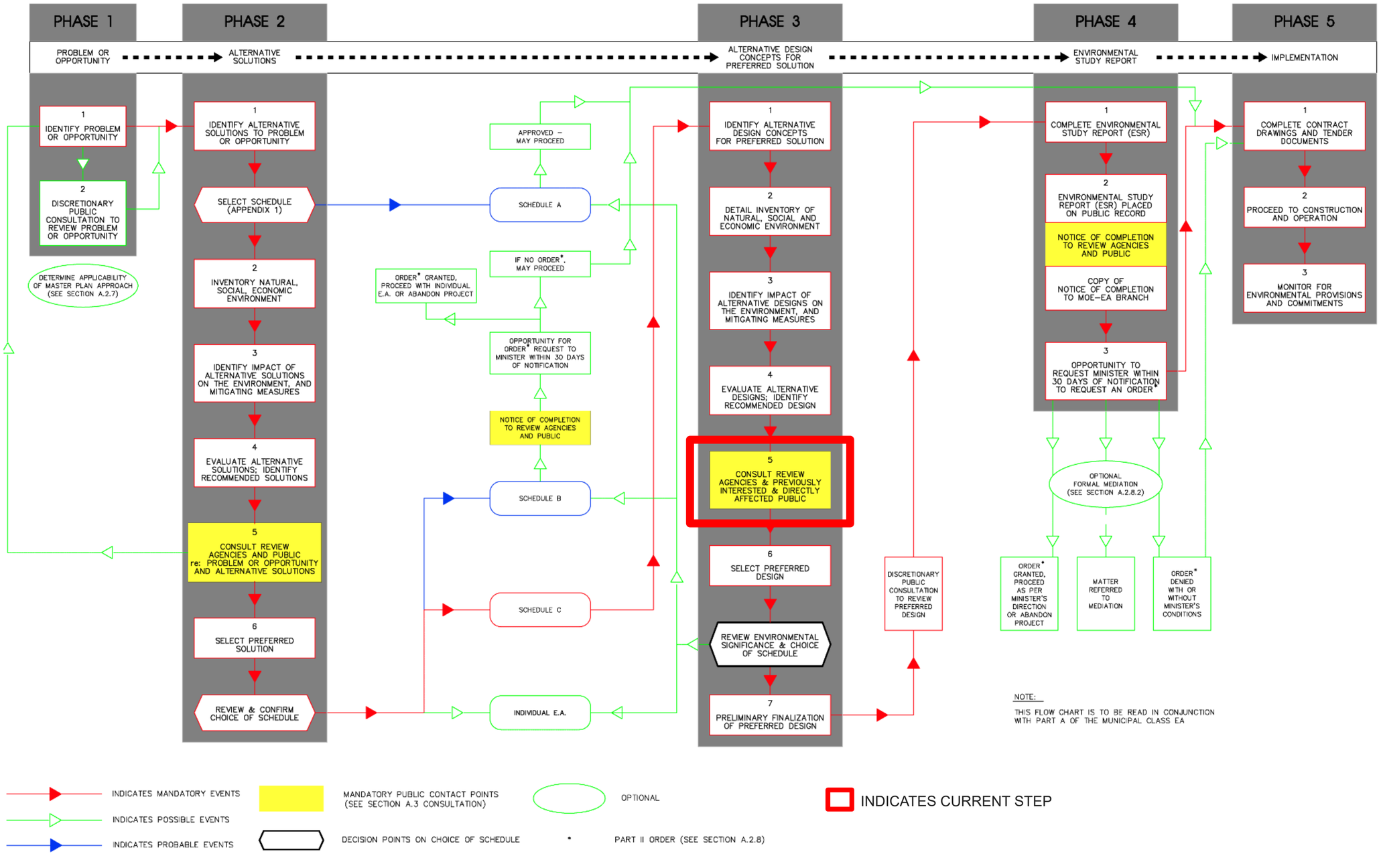
DRAWING NO. FIGURE 1.1

Background
The Pontiac Pumping Station

- Pontiac Pumping Station is primarily a stormwater pumping station which provides flood relief to the Pontiac drainage area
- In a severe storm event, where the capacity of the LRPCP is exceeded, the Pontiac Pumping Station acts as an emergency bypass for wet weather flows to prevent basement flooding
- However, the existing pumping station does not have the hydraulic capacity to meet the required level of service and reduce the risk of basement flooding



Background
Overview of the Class EA Process



Background
Key Features of the Class EA Process

The project is being conducted in accordance with the Class EA requirements for 'Schedule C Projects':

Municipal Class EA Phases	
Phase 1 – Review and identify problem or opportunity	SMP
Phase 2 – Alternative solutions to problem	SMP
Phase 3 – Alternative design concepts for the preferred solution	This EA Study
Phase 4 – Environmental Study Report	This EA Study
Phase 5 – Implementation of the preferred design	Future Work

Background
Phase 1 and 2 of the Class EA – Completed

Phase 1 and 2 of the Class EA process were completed as a part of the SMP.

The SMP identified the following objectives for the Pontiac drainage area:

- Provide an enhanced level of service to mitigate the risk of basement and surface level flooding during severe storm events
- Improve flood resiliency for the Pontiac drainage area in the case of the 1 in 100-year storm event

To meet these objectives the following solution was identified:

- **Increase the hydraulic capacity of the existing Pontiac Pumping Station**
- **Expand the existing pumping station by adding a new wet well structure to house three (3) 1.25 m^3/s pumps**

Background

Phase 1 and 2 of the Class EA – Completed

	Design Basis Flows		
	Existing Capacity	**Additional Capacity**	**Upgraded Capacity**
Firm Capacity (m^3/s)	**4.8** 3 large pumps – 2.12 m^3/s 1 small pump – 0.57 m^3/s	**2.5** 3 new pumps– 1.25 m^3/s	**7.3**
Total Capacity (m^3/s)	**6.9** 3 large pumps – 2.12 m^3/s 1 small pump – 0.57 m^3/s	**3.75** 3 new pumps – 1.25 m^3/s	**10.7**

Background
Phase 3 and 4 of the Class EA – Ongoing

Phase 3 of the Class EA process for this study will include:

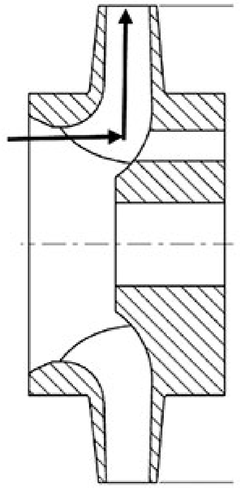
- Evaluation and selection of the recommended design for the proposed Pontiac Pumping Station
- **This open house is being held to obtain comments and public input on the preferred design concepts**

Phase 4 of the Class EA process for this study will include:

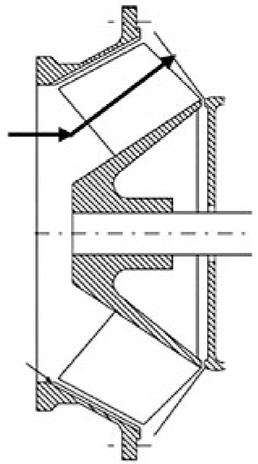
- Preparation and submission of an Environmental Study Report

Design Alternatives
Pumping Technology

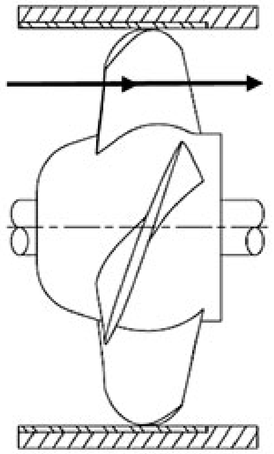
The four most common pump types for flood control applications:



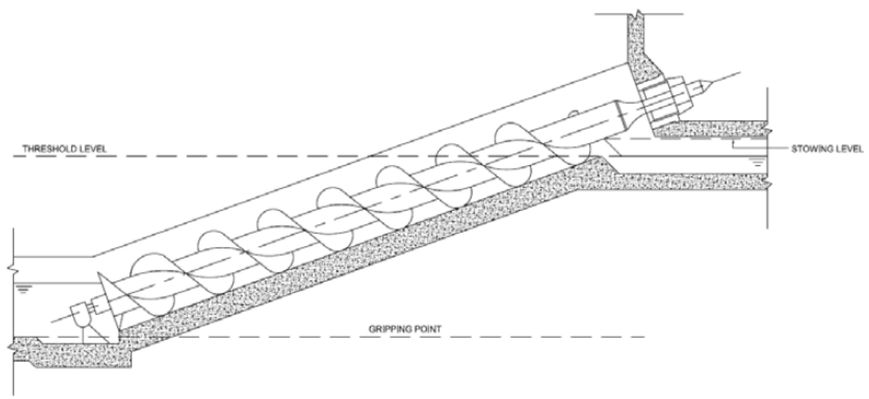
Centrifugal Flow



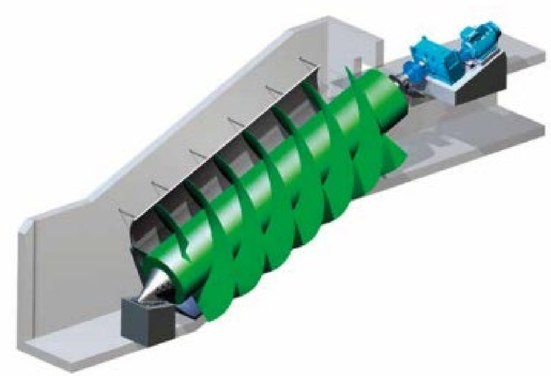
Mixed Flow



Axial Flow



Screw



Design Alternatives
Pumping Technology

Centrifugal Flow Pumps	• Centrifugal flow pumps are used to meet a wide range of head and flow requirements.
Axial Flow Pumps	• Axial-flow pumps are high-capacity pumps that are typically used for low head, high flow applications such as stormwater pumping stations.
Mixed Flow Pumps	• The mixed- flow type has impellers with vanes which are shaped such that the pump functions as a compromise between axial flow pumps and centrifugal pumps. Mixed-flow pumps are able operate at higher head than axial-flow pumps while delivering higher flow rates than centrifugal-flow pumps.
Screw Pumps	• Screw pumps are positive displacement pumps based on the Archimedes principle of a rotating shaft. Screw pumps can provide constant flow rates and pressures and have a relatively high tolerance for solids entering the flow stream. • Commonly used when low heads are required (less than ten meters).

Design Alternatives

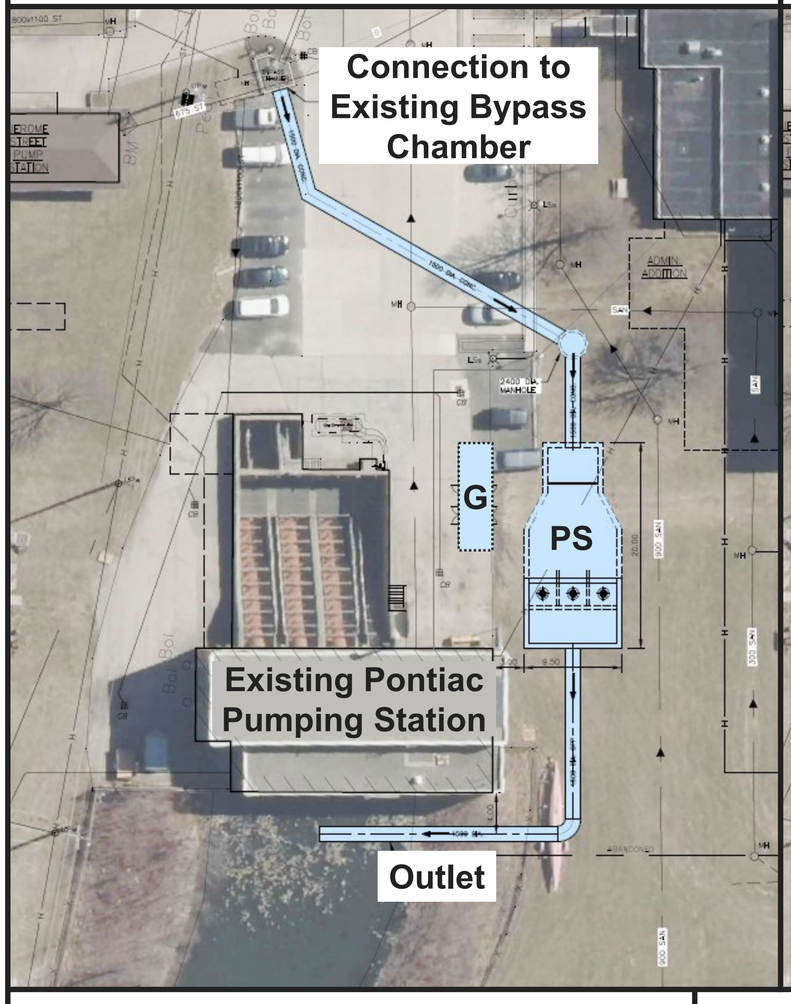
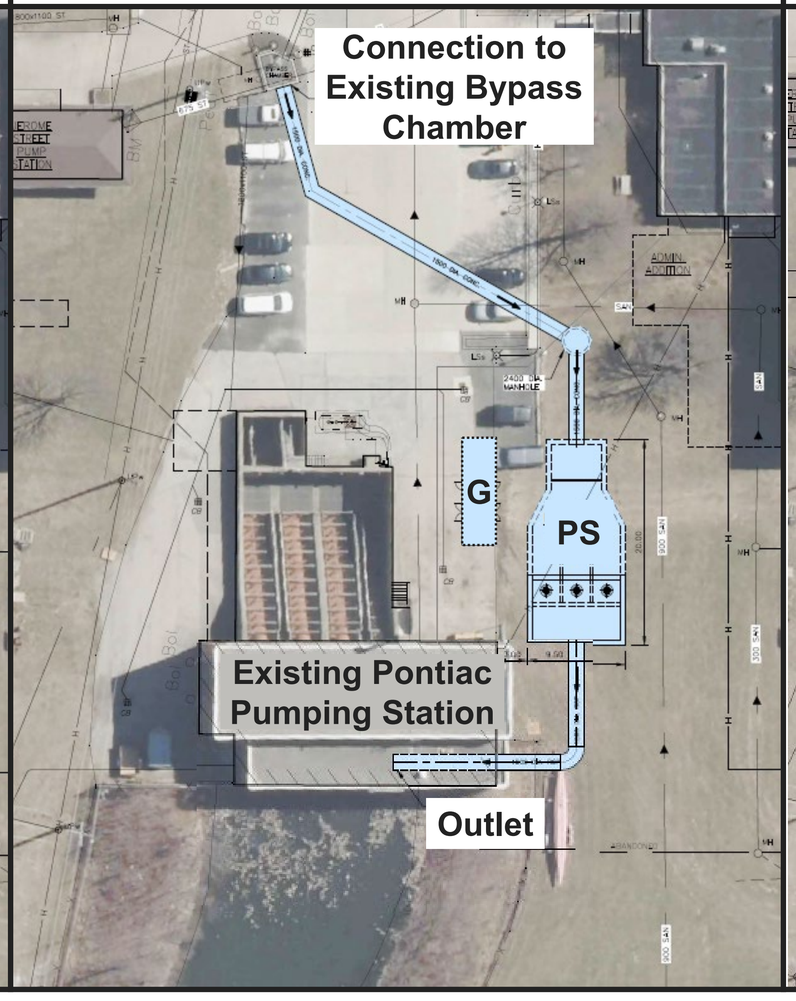
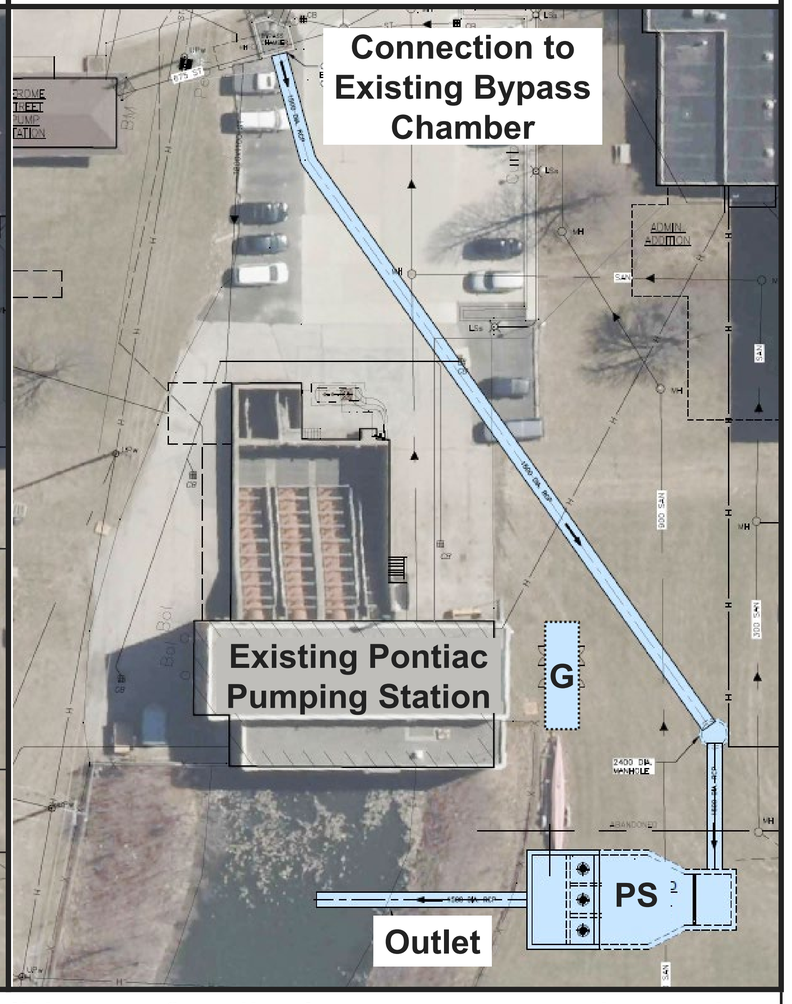
Pumping Technology

Criteria	Centrifugal- Flow Pump	Axial-Flow Pump	Mixed-Flow Pump	Screw Pump
Performance & Effectiveness	• Lower efficiency, shorter lifetimes	• Very efficient in high flow, low head applications	• Efficient in high flow, low head applications.	• Wide range of flow, Difficult to increase head.
Space Required	• Low space requirements	• Low space requirements	• Low space requirements	• Relatively high space requirements.
Capital/ Construction Cost	• Relatively low to medium	• Relatively low to medium	• Relatively low to medium	• Relatively low to medium
O&M Requirements	• Low to medium O&M requirements	• Low O&M requirements	• Low to medium O&M requirements	• Medium O&M requirements
General Concerns	• Loss of efficiency should solids enter the flow.	• Performance is very dependent upon providing good inlet flow, Loss of efficiency should solids enter the flow	• Performance is very dependent upon providing good inlet flow, Loss of efficiency should solids enter the flow	• Difficult to modify, Requires enclosing.

Axial – Flow Pump is recommended based on the high efficiency, low space requirements, and low O&M requirements

Design Alternatives

Site Layout

Alternative No. 1	Alternative No. 2	Alternative No. 3
		

PS = New Pumping Station G = Generator	Note: Preliminary layouts presented on this slide are for display purpose and may be subject to change during the detailed design phase. In the detailed design phase, a flow monitor will be included to ensure accurate reporting of bypass events.

Design Alternatives

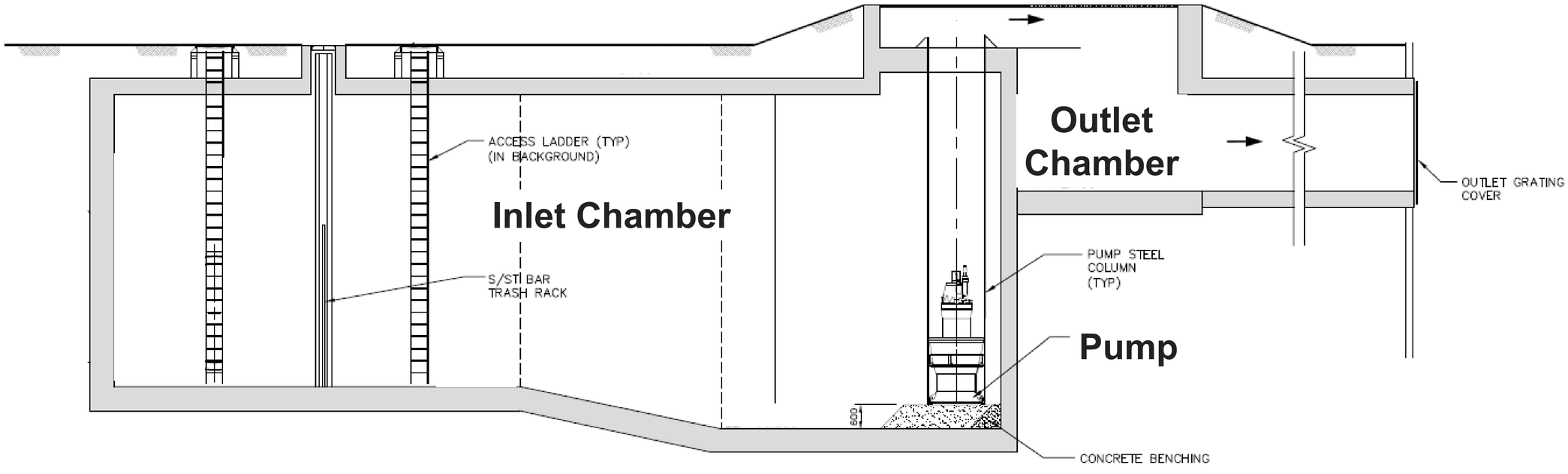
Site Layout

	Alternative No. 1	Alternative No. 2	Alternative No. 3
Ease of Construction	• **Moderately complex** • No utility relocations • Requires in-water construction work	• **Moderately complex** • Requires modifications to the existing PS • No utility relocations • No in-water work	• **Most complex** • Requires relocation of existing sanitary sewer • Requires in-water construction work
Space Requirements	• **Low space requirements** • Close existing PS	• **Low space requirements** • Close existing PS	• **High space requirements** • Limits access over the grass to the disinfection chambers
Work in-Water Permitting	• **Required**	• **Not required**	• **Required**
Technical Suitability	• Both site layout alternatives will be able to meet flood mitigation objectives and provide an enhanced level of service for the Pontiac drainage area • Comparable O & M requirements with access to generator and pumping chambers		
General Concerns	The social, natural environmental, and economic impacts of the proposed pumping station is anticipated to be similar for each site layout alternative.		

Layout Alternative No. 2 is recommended based on the ease of construction, work in-water permitting, and low space requirements.

Summary of Selected Design
Preliminary Hydraulic Profile

This figure shows the conceptual sectional view of the proposed pumping station:



Note: Preliminary design presented on this slide is for display purpose and may be subject to change during the detailed design phase.

Summary of Selected Design
Opinion of Probable Cost

Item	
Pumping Station and Outlet Structure	$5,500,000
Contingency Allowance	$1,500,000
Engineering Allowance	$950,000
Total Capital Cost:	**$7,950,000**

Note: The opinion of probable cost presented on this slide is an approximation and may be subject to change in the implementation phase (detailed design).

Next Steps

Project Component	Date
Environmental Study Report	Summer 2022
Council Presentation	Fall 2022
Notice of Completion	Winter 2022

Thank You

Please visit the City of Windsor's project website to submit a feedback form.

Pontiac Pumping Station Upgrades at the Little River Pollution Control Plant - Environmental Assessment (citywindsor.ca)

APPENDIX B

Notice of Draft Environmental Study Report

1. Draft ESR on City of Windsor's Website

⚠ Update on City of Windsor Operations in Light of the Coronavirus (COVID-19)

Pontiac Pumping Station Upgrades at the Little River Pollution Control Plant - Schedule C Municipal Class Environmental Assessment

The City of Windsor is undertaking a Schedule C Municipal Class Environmental Assessment (Class EA) to increase the capacity of the existing Pontiac Pumping Station at the Little River Pollution Control Plant. This study will satisfy phases 3 and 4 of the Class EA process, which will involve the evaluation of alternative design concepts for the proposed Pontiac Pumping Station Capacity Upgrades. An Environmental Study Report will be prepared to document the activities and recommendations from the Class EA process.

The City of Windsor endorsed its first comprehensive Sewer and Coastal Flood Protection Master Plan (SMP) in 2020. The SMP was completed in accordance with phases 1 and 2 of the Municipal Class Environmental Assessment process. The SMP identified specific improvement projects that can be undertaken by the City to improve efficiency and reduce the risk of flooding caused by severe storm events. It is outlined in the SMP that the capacity upgrades of Pontiac Pumping Station within the Little River Pollution Control Plant (refer to key map) are required to discharge excess water during major storm events in the expanded Pontiac drainage area. In 2018, the Government of Canada launched the Disaster Mitigation and Adaptation Fund (DMAF) to assist communities with flooding issues and capacity concerns. This project is one of the many that will benefit from federal government funding to make necessary capacity upgrades.

Draft Environmental Study Report

The City has completed a Draft of the Environmental Study Report (ESR) to present the evaluation of alternative design concepts for the Pontiac Pumping Station Upgrades and is inviting area residents and interested persons to provide feedback.

Comments will be received until September 23rd, 2022. Based on the comments received through this public consultation process, the ESR will be finalized and placed on public record.

Resources:

- Draft Environmental Study Report
- Appendix A
- Appendix B
- Appendix C

Project Documents:

- Notice of Commencement

Public Information Centre (PIC)

The City is hosting a public information centre (PIC) to present the evaluation of design concept alternatives for the Pontiac Pumping Station and is inviting interested persons to participate in the PIC and provide feedback. The PIC will be held on Wednesday, July 13, 2022, (3:00 to 7:00 p.m.) at the WFCU Centre, St. Clair Room, 8787 McHugh Street, Windsor, Ontario. Following the PIC, comments are invited and will be received until August 3rd, 2022.

Public Information Centre Resources:

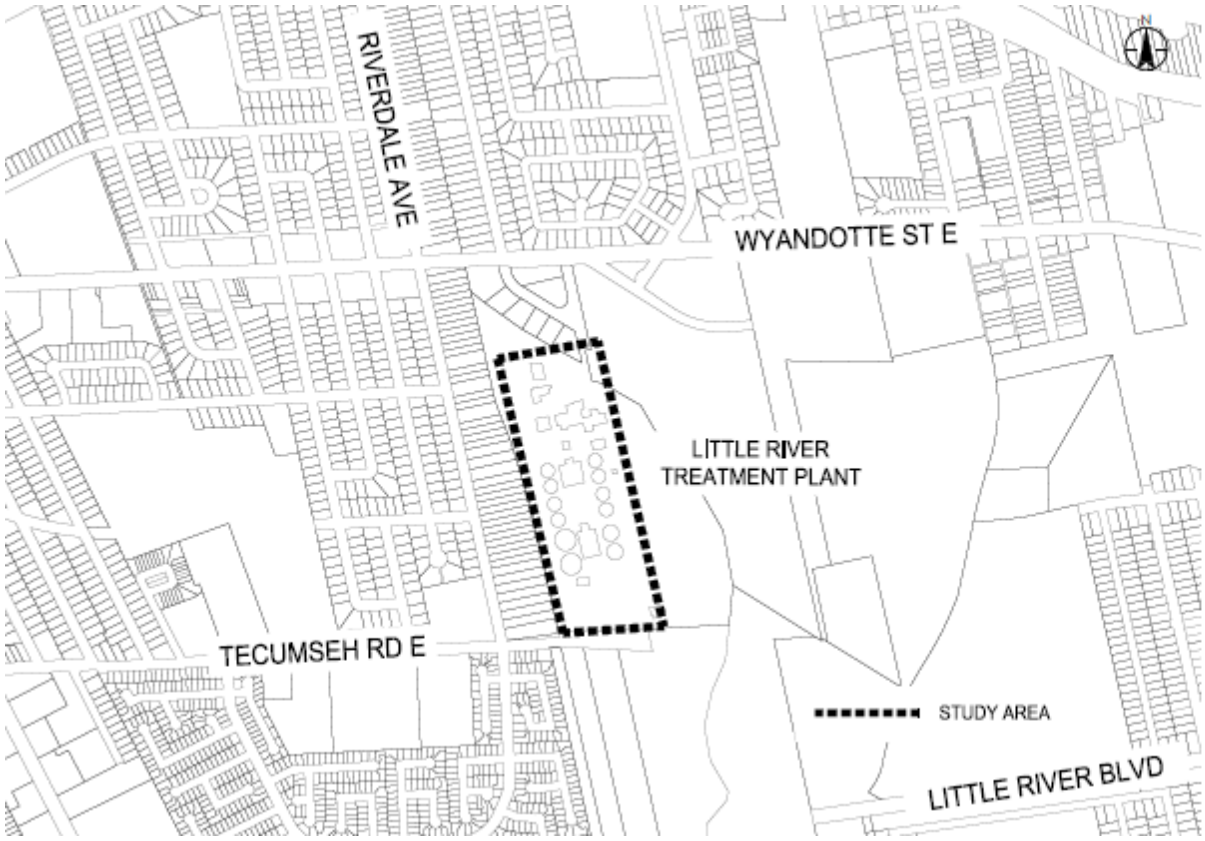
- Notice of Public Information Centre
- Presentation for PIC
- PIC Feedback Form

Learn more about the Sewer and Coastal Flood Protection Master Plan.

If you are interested in participating and/or would like to be added to our mailing list, please contact a member of the study team below:

Chandana Walgama, P. Eng.
Pollution Control Project Engineer,
City of Windsor
4155 Ojibway Parkway
Windsor, Ontario, N9C 4A5
519-253-7111 ext. 3274
cwalgama@citywindsor.ca

Jian Li, Ph.D., P. Eng.
Stantec Consulting, Project Manager
2555 Ouellette Avenue, Suite 100
Windsor, Ontario, N8X 1L9
519-966-2250 ext. 240
jian.li@stantec.com



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For Residents
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APPENDIX B

Email Packages to Review Agencies

1. Email Package – Notice of Commencement
2. Email Package – Notice of Public Information Centre
3. Email Package – Notice of Draft ESR
4. Contact List

From:	Rindlisbacher, Hannah
To:	
Subject:	165620249: Notice of Study Commencement - Class EA Pontiac Pumping Station Upgrades, City of Windsor, Ontario
Date:	Wednesday, March 9, 2022 4:47:00 PM
Attachments:	Notice of Study Commencement .pdf

[redacted]

To Whom it May Concern,

The City of Windsor is undertaking the Class Environmental Assessment (EA) process to develop a long-term solution to improve efficiency and reduce the risk of flooding caused by severe storm events in the expanded Pontiac drainage area. This study will satisfy Phases 3 and 4 of the Class EA process which will involve the evaluation of alternative design concepts for the proposed Pontiac Pumping Station Capacity Upgrades. A copy of the Notice of Study Commencement for the project is attached.

On behalf of the City of Windsor, we are inviting you to participate in this project and to assist us in identifying the environmental, social, and cultural values your community may have within the Project Area.

If you have any comments or concerns regarding this project and wish to provide input into the Study, please contact the undersigned below or one of the individuals named in the attached Notice of Commencement

Sincerely,

Hannah Rindlisbacher
BASc, Environmental Engineering Intern

Direct: 519 966-2250 ext 258
Mobile: 226 268-3033
hannah.rindlisbacher@stantec.com
Stantec
100-2555 Ouellette Avenue
Windsor ON N8X 1L9

The content of this email is the confidential property of Stantec and should not be copied, modified, retransmitted, or used for any purpose except with Stantec's written authorization. If you are not the intended recipient, please delete all copies and notify us immediately.

Please consider the environment before printing this email.

From:	Rindlisbacher, Hannah
To:	
Subject:	165620249: Notice of Public Information Centre - Class EA Pontiac Pumping Station Capacity Upgrades, City of Windsor, Ontario
Date:	Monday, July 4, 2022 5:13:00 PM
Attachments:	Public Open House Feedback Form - Final.pdf Notice of Public Information Centre - Final.pdf

To Whom it May Concern,

The City of Windsor is undertaking the Class Environmental Assessment (EA) process to develop a long-term solution to improve efficiency and reduce the risk of flooding caused by severe storm events in the Pontiac drainage area. This Class EA will involve evaluation of alternative design concepts for the proposed Pontiac Pumping Station capacity upgrades.

The City is hosting a Public Information Centre (PIC) to present the evaluation of alternative design concepts and receive input from interested residents and stakeholders. The PIC will be held on Wednesday July 13th, 2022 (3:00 to 7:00 pm) at the WFCU Centre, 8787 McHugh Street, Windsor, ON (Second Floor –St. Clair). A copy of the Notice of Public Information Centre for the project is attached and additional information regarding the project is available on the City Webpage: Pontiac Pumping Station Upgrades at the Little River Pollution Control Plant - Environmental Assessment (citywindsor.ca)

If you have any comments or concerns regarding this project, please contact the undersigned.

Sincerely,

Hannah Rindlisbacher B.A.Sc., E.I.T.
Environmental Engineer in Training

Direct: 519 966-2250 ext 258
Mobile: 226 268-3033
hannah.rindlisbacher@stantec.com

Stantec
100-2555 Ouellette Avenue
Windsor ON N8X 1L9

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Please consider the environment before printing this email.

From:	Rindlisbacher, Hannah
To:	
Subject:	165620249: Notice of Draft Environmental Study Report - Pontiac Pumping Station Capacity Upgrades, City of Windsor
Date:	Tuesday, August 30, 2022 4:59:00 PM
Attachments:	Aerial Plan - Proposed Pontiac PS Upgrades.pdf

To Whom it May Concern,

The City of Windsor endorsed its first comprehensive Sewer and Coastal Flood Protection Master Plan (SMP) in 2020. The SMP, which were prepared in accordance with Phases 1 and 2 of the Municipal Class Environmental Assessment (Class EA), identified the need for the capacity upgrades of Pontiac Storm Water Pumping Station within the Little River Pollution Control Plant to discharge excess water during major storm events in the expanded Pontiac drainage area.

To satisfy Phases 3 and 4 of the Class EA process, the City of Windsor initiated a Schedule C Class EA study to increase the capacity of the existing Pontiac Pumping Station. Alternative design concepts were evaluated to select the preferred solution that would improve efficiency and reduce the risk of flooding caused by severe storm events in the drainage area serviced by the Pontiac Pumping Station. A draft study report has been prepared which presents a number of possible alternative designs for the preferred solution. The merits and disadvantages of these alternatives are discussed with the decision-making process being structured to select the design that minimizes undesirable impacts on the natural, social and economic environments.
Through this evaluation process a recommended design has been identified and is provided for consideration as the preferred design. As shown in the attached aerial plan, the proposed design consists of the following main elements:

- New pumping station structure to house the three (3) new pumps, which will increase pumping capacity to provide a 1:100-year storm level of service for the extended Pontiac drainage area.
- New storm sewer to redirect flow from the existing stormwater inlet chamber to the new pumping station.
- New diesel generator to provide power in an emergency when the normal electrical feed is interrupted.

Your agency is invited to submit comments on the “Draft” Environmental Study Report. In an effort to conserve paper and reduce printing costs, the report is being distributed in electronic format as a PDF file on the City of Windsor website at the following link Pontiac Pumping Station Upgrades at the Little River Pollution Control Plant - Environmental Assessment (citywindsor.ca). If you would prefer, a hard copy of the draft report will be provided on request.

A public open house was held on July 13, 2022 to provide information on this project and to solicit public input. Copies of the Open House material are also available on the City of Windsor website above.

We would appreciate receiving any comments you care to offer on the draft report by Friday, September 30, 2022. Any comments or questions should be submitted to the following:

Chandana Walgama, P.Eng.
Pollution Control Project Engineer, City of Windsor
4155 Ojibway Parkway
Windsor, ON N9C 4A5
519-253-7111 x 3274
cwalgama@citywindsor.ca

Jian Li, Ph.D., P. Eng.
Project Manager, Stantec Consulting
2555 Ouellette Avenue, Suite 100
Windsor, Ontario N8X 1L9
519-966-2250 x 240
jian.li@stantec.com

Sincerely,

Hannah Rindlisbacher B.A.Sc., E.I.T.
Environmental Engineer in Training

Direct: 519 966-2250 ext 258
Mobile: 226 268-3033
hannah.rindlisbacher@stantec.com

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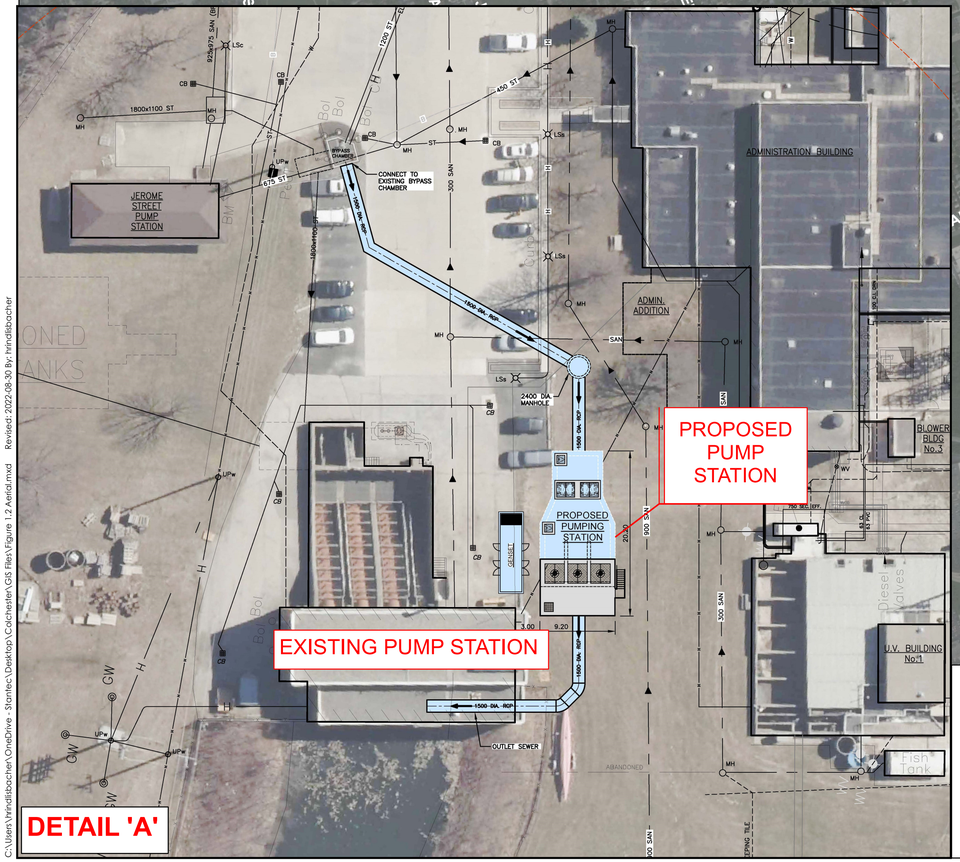

C:\Users\hhindlebacher\OneDrive - Stantec\Desktop\Colchester\GIS Files\Figure 1.2 Aerial.mxd Revised: 2022-08-30 By: hhindlebacher

THE CITY OF WINDSOR
ONTARIO, CANADA

Stantec

City of Windsor
Pontiac Pump Station Capacity Upgrades
"Schedule C" Class Environmental Assessment

Project No. 165620249

0 450 900 metres

Proposed Drainage Area Expansion

Proposed Pontiac Drainage Area

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.

Title	Surname	First Name	Organization	Department	Job Title	Address	City/Prov	Postal Code	Tel.	E-Mail	Notice of Commencement
Local Municipalities											
	Habiba	Sumaiya	County of Essex		Environmental Coordinator	360 Fairview Avenue West	Essex, Ontario	N8M 1Y6	519-776-6441 ex 1385	SHabiba@countyofessex.ca	3/7/2022
Mr.	Marra	Peter	Town of LaSalle		Deputy Chief Administrative Officer	5950 Malden Road	LaSalle, Ontario	N9H 1S4	519-969-7770	pmarra@lasalle.ca	3/7/2022
Mr.	Girard	Kevin	Town of Essex		Director of Infrastructure Services	33 Talbot Street South	Essex, Ontario	N8M 1A8	519-776-7336 ext 1119	kgirard@essex.ca	3/7/2022
Ms.	Giofu	Antonietta	Town of Amherstburg		Director of Engineering & Public Works	271 Sandwich Street South	Amherstburg, ON	N9V 2A5	519-736-0012	agiofu@amherstburg.ca	3/7/2022
Mr.	Bartnik	Phil	Town of Tecumseh		Director Public Works & Engineering Services	917 Lesperance Road	Tecumseh, ON	N8N 1W9	519-735-2184	pbartnik@tecumseh.ca	3/7/2022
Ms.	Kalbol	Krystal	Municipality of Lakeshore		Corporate Leader - Operations	419 Notre Dame Street	Belle River, ON	N0R 1A0	519-728-2488 x655	kkalbol@lakeshore.ca	3/7/2022
Ms.	Belleau	Shannon	Municipality of Leamington		Manager of Environmental Services	111 Erie St N	Leamington ON	N8H 279	519-326-5761 x1650	sbelleau@leamington.ca	3/7/2022
Mr.	Plancke	Andrew	Town of Kingsville		Director of Infrastructure and Engineering	2021 Division Rd North	Kingsville, ON	N9Y2Y9		aplancke@kingsville.ca	3/7/2022
Ms.	Tang	Kristina	City of Windsor	Planning & Building Services	Heritage Planner	350 City Hall Square West	Windsor, ON	N9A 6S1	519-255-6543 x 6179	ktang@citywindsor.ca	
Essex-Windsor Solid Waste Authority (EWSWA)											
Ms.	Bishop	Michelle	Essex-Windsor Solid Waste Authority		General Manager	360 Fairview Avenue West	Essex, Ontario	N8M 3G4	519-776-6441 ext. 1225	mbishop@ewswa.org	3/9/2022
	Marentette	Tom	Essex-Windsor Solid Waste Authority		Manager, Waste Disposal	360 Fairview Avenue West	Essex, Ontario	N8M 3G4	519-776-6441 ext. 1961	tommarentette@ewswa.org	3/9/2022
Conservation Authority											
(ERCA) Please send all Class EA study correspondence to the Planning inbox in the future, including Notices of Study Commencements, PICs, Completions, etc.						planning@erca.org					
Mr.	Bryant	James	Essex Region Conservation Authority		Director of Watershed Management Services					jbryant@erca.org	3/9/2022
Emergency Services											
	Krauter	Bruce	Essex-Windsor EMS	c/o Administrative Assistant, Office of the	Chief	360 Fairview Ave West	Essex, ON	N8M 1Y6	519-776-6441 x 2654	bkrauter@countyofessex.on.ca	3/10/2022
Mr.	Horrobin	Barry	Windsor Police Service	Police Headquarters	Director of Planning & Physical Resources	150 Goyeau Street, PO Box 60	Windsor, ON	N9A 6J5	519-255-6700 x4471	bhorrobin@police.windsor.on.ca	3/10/2022
Fire Chief	Laforet	Stephen	Windsor Fire and Rescue		Fire Chief	815 Goyeau Street	Windsor, ON	N9A 1H7	519-253-6573	slaforet@citywindsor.ca	3/10/2022
Mr.	Benoit	Josh	Central Ambulance Communications Centre			4510 Rhodes Drive, Suite 320	Windsor, ON	N8W 5K5	519-256-2373	josh.benoit@ontario.ca	3/10/2022
Interest Groups											
	Yeomans	Brian	Downtown Windsor Business Improvement Association		Chair				519-252-5723	byeomans39@gmail.com	3/10/2022
Mr.	Naidu	Rakesh	Windsor-Essex Regional Chamber of Commerce		President & CEO	2575 Ouellette Place	Windsor, ON	N8X 1L9	519-966-3696 x222	rnaidu@windsoressexchamber.org	3/10/2022
			Citizen Environmental Alliance							ceaadmin@cogeco.net	
	Frank	Butler	Citizen Environmental Alliance of Southwestern Ontario							flbutler12@gmail.com	3/10/2022
	Trish	Morris	International Joint Commission							commission@windsor.ijc.org	3/10/2022
	Trevor	Pitcher	Great Lakes Institute for Environmental Research							glierdir@uwindsor.ca	3/10/2022
			Windsor Essex County Environment Committee							emp@citywindsor.ca	3/10/2022
	Claire	Sanders	Detroit River Canadian Cleanup							sanders@detroitriver.ca	3/10/2022
	Dave	Munro	Detroit River Clean-up							dmunro@mnsi.net	3/10/2022
	Bosinger	Andrew	SYNAGRO		VP, Strategic Accounts & Partnerships	6326 Wilson Road	Ann Arbor, MI	48108	1-410-271-1020	ABosinger@SYNAGRO.com	3/10/2022

Title	Surname	First Name	Organization	Department	Job Title	Address	City/Prov	Postal Code	Tel.	E-Mail	Notice of Commencement
Provincial											
Mr.	Hagerty	Thom	Ontario Ministy of Agriculture, Food and Rural Affairs		Director of Environmental Management Branch	Ontario Government Bldg 5th Flr NW, 1 Stone Rd W	Guelph, ON	N1G 4Y2		thom.hagerty@ontario.ca	3/11/2022
Mr.	Carlow	Dan	Ontario Ministy of Agriculture, Food and Rural Affairs		Manager of Innovation, Engineering and Program Delivery, Western Region	581 Huron St,	Stratford, ON	N5A 5T8		dan.carlow@ontario.ca	3/11/2022
Mr.	Brunke	Richard	Ontario Ministy of Agriculture, Food and Rural Affairs		Nutrient Management Engineer	581 Huron St,	Stratford, ON	N5A 5T8		richard.brunke@ontario.ca	3/11/2022
	Badali	Mark	Ministry of the Environment, Conservation and Parks	Project Review Unit | Environmental Assessment Branch	Regional Environmental Planner (REP) – Southwest Region				(416) 457-2155	Mark.Badali1@ontario.ca	3/11/2022
			MECP Regional Email address							eanotification.swregion@ontario.ca	
Ms.	Barboza	Karla	Ministry of Heritage, Sport, Tourism and Culture Industries		Team Lead - Heritage	5th Flr, 400 University Ave	Toronto, ON	M7A 2R9	416-660-1027	karla.barboza@ontario.ca	3/11/2022
	Romeo	Laura	Ministry of Heritage, Sport, Tourism and Culture Industries		Heritage Planner	5th Flr, 400 University Ave	Toronto, ON	M7A 2R9	647-248-9147	Laura.Romeo@ontario.ca	3/11/2022
	Kwan	Helen	Ministry of Energy		Manager of Renewables Policy Unit	5th Flr, 77 Grenville St	Toronto, ON	M7A 2C1	416-697-5814	helen.l.kwan@ontario.ca	3/11/2022
	Allan	Fraser	Ministry of Energy		Manager of Renewable Facilitation and Analysis Unit	5th Flr, 77 Grenville St	Toronto, ON	M7A 2C1	437-993-1269	fraser.allan@ontario.ca	3/11/2022
	Cotnam	Erin	Ministry of Northern Development, Mines, Natural Resources and Forestry (NRF)		Municipal Planning Advisor, Land Use Planning and Strategic Issues Section	4th Flr S, 300 Water St,	Peterborough, ON	K9J 3C7	705-313-4719	erin.cotnam@ontario.ca	3/11/2022
	Holtby	Cara	Ministry of Northern Development, Mines, Natural Resources and Forestry (NRF)		Manager of Land Use Planning and Strategic Issues Section	4th Flr S, 300 Water St,	Peterborough, ON	K9J 3C7	705-749-8169	Cara.Holtby@ontario.ca	3/11/2022
	Wilson	Mitch	Ministry of Northern Development, Mines, Natural Resources and Forestry (NRF)	Aylmer District	District Manager	615 John Street North	Aylmer, ON	N5H 2S8	519-773-4710	mitch.wilson@ontario.ca	3/11/2022
	Kerr	Ian	Ministry of Municipal Affairs and Housing	Municipal Services Office - Western Ontario Region	Regional Director	659 Exeter Road, 2nd Floor	London, ON	N6E 1L3	519-873-4026	ian.kerr@ontario.ca	3/11/2022
	Boyd	Erick	Ministry of Municipal Affairs and Housing	Community Planning and Development	Manager	659 Exeter Road, 2nd Floor	London, ON	N6E 1L3	519-873-4025	erick.boyd@ontario.ca	3/11/2022
	Perry	Elizabeth	Ontario Ministry of Transportation	Transportation Infrastructure Management Division Design and Engineering Branch Engineering Program Delivery West	Head, Environmental	659 Exeter Road	London, ON	N6E 1L3	519-619-4086	elizabeth.perry@ontario.ca	3/11/2022
	Swim	Michael	Ontario Ministry of Transportation	Transportation Infrastructure Management Division Asset Management Branch Capital Planning and Program Office Capital Planning & Program Development (West)	Head, Capital Planning & Program Development (W)	Exeter Road Complex, 659 Exeter Rd	London, ON	N6E 1L3	519-619-1153	michael.swim@ontario.ca	3/11/2022
	Mentley	Ryan	Ontario Ministry of Transportation	Highway Corridor Management Section	Corridor Management Planner	659 Exeter Road	London, ON	N6E 1L3	(519) 878-4026	Ryan.Mentley@ontario.ca	3/11/2022
Federal											
Ms.	Knox	Louise	Environment Canada	Canadian Environmental Assessment Agency - Ontario Region	Regional Director	55 St Clair Ave East, 9th Floor	Toronto, ON	M4T 1M2		louise.knox@ontario.ca	3/11/2022
Mr.	Leonardelli	Sandro	Environment Canada, Ontario Region	Environmental Assessment Section	Head				416-739-5858	sandro.leonardelli@ec.gc.ca	3/11/2022
Ms.	Eddy	Sara	Fisheries and Oceans Canada - Central and Arctic Region	Fisheries Protection Program	Senior Fisheries Protection Biologist	867 Lakeshore Road, PO Box 5050	Burlington, ON	L7R 4A6	(905) 336-4535	Sara.Eddy@dfo-mpo.gc.ca	3/11/2022
Ms.	Shea	Suzanne	Transport Canada Marine	Navigable Water Protection Officer		100 Front Street South, 1st Floor	Sarnia, ON	N7T 2M4	519-383-1863	NPPONT-PPNONT@tc.gc.ca	3/11/2022
Mr.	Barry	Peter	Windsor Port Authority		Director	3190 Sandwich Street	Windsor, ON	N9C 1A6	519-258-5741 xt.211	pberry@portwindsor.com	3/11/2022
Mr.	Hatt	Chris	Windsor-Detroit Bridge Authority		Manager of Procurement	100 Ouellette Ave, Suite 400	Windsor, ON	N9A 6T3		chris.hatt@wdbridge.com	3/11/2022
Mr.	Winger	Darren	Ministry of Citizenship, Immigration & International Trade / Ministry of Tourism, Culture & Sport	Windsor Office	Regional Development Advisor	221 Mill Street	Windsor, ON	N9C 2R1		darren.winger@ontario.ca	3/11/2022

Title	Surname	First Name	Organization	Department	Job Title	Address	City/Prov	Postal Code	Tel.	E-Mail	Notice of Commencement
Utilities											
	Manzon	Chris	ENWIN Utilities	Windsor Utilities Commission	Director, Engineering (Water)	787 Ouellette Avenue, PO Box 1625 Stn A	Windsor, ON	N9A 5T7	519-566-3897	cmanzon@enwin.com	3/11/2022
	Ogg	Bruce	ENWIN Utilities	Water						bogg@enwin.com	3/11/2022
	General		ENWIN Utilities	HYDRO						tsd@enwin.com	3/11/2022
	Fuerth	Tyson	Bell Canada		Manager, Network Provisioning	1149 Goyeau Street, PO Box 1601	Windsor, ON	N9A 1H9	519-973-4711	tyson.fuerth@bell.ca	3/11/2022
	Markc	Rachel	Bell Canada							rachel.marks@bell.ca	3/11/2022
	Kovacs	Aaron	Bell Canada							aaron.kovacs@bell.ca	3/11/2022
	Team Email		TELUS							telusutilitymarkups@telecon.ca	3/11/2022
	Planning Support		ROGERS							planningsupport.team@rci.rogers.com	3/11/2022
	Jones	Mark	MNSI							mjones@mnsi.net	3/11/2022
	Hartleib	Dave	MNSI							hartleib@mnsi.net	3/11/2022
	Raymond	Frank	Cogeco Cable Services			2225 Dougall Avenue	Windsor, ON	N8X 5A7		raymond.frank@cogeco.com	3/11/2022
	Haggins	Daniel	Cogeco Cable Services							daniel.haggins@cogeco.com	3/11/2022
	Ceccacci	Will	Union Gas			50 Keil Drive North	Chatham, ON	N7M 5M1		wceccacci@uniongas.com	3/11/2022
	Anthony	Clavet	Essex Power							aclavet@essexpowerlines.ca	3/11/2022
	MacAulay	Norman	E.L.K Energy		Operations Manager					nmacaulay@elkenergy.com	3/11/2022
			Ontario Power Generation							Executivevp.lawanddevelopment@opg.com	
			Essex Terminal Railway Company			1601 Lincoln Road	Windsor, ON	N8Y 2J3	519-973-8222	info@etr.ca	3/11/2022
	Maga	Jessica	Hydro One		Manager-Government Relations					jessica.maga@hydroone.com	3/11/2022
	Sun	Susan	Hydro One							Susan.SUN@HydroOne.com	3/11/2022
			Hydro One	Secondary Land Use Department						Department.SecondaryLandUse@hydroone.com	
Ms.	Susan	Budden	Ontario Clean Water Agency	Southwest Regional Hub Office	Business Development Manager	450 Sunset Drive, Suite 370	St. Thomas ON	N5R 5V1	519-637-8334	sbudden@ocwa.com	3/11/2022

Title	Surname	First Name	Organization	Department	Job Title	Address	City/Prov	Postal Code	Tel.	E-Mail	Notice of Commencement
Indigenous Agencies											
	Mann	Molly	Ministry of Indigenous Affairs Assistant Deputy Minister's Office - Indigenous Relations and Programs Division Indigenous Relations Branch	Manager, Indigenous Relations Unit		Suite 400, 160 Bloor Street East	Toronto, ON	M7A 2E6		molly.mann@ontario.ca	3/7/2022
	Levecque	Heather	Ministry of Indigenous Affairs Assistant Deputy Minister's Office - Indigenous Relations and Programs Division Indigenous Relations Branch	Director, Indigenous Relations		Suite 400, 160 Bloor Street East	Toronto, ON	M7A 2E6	416-325-7032	heather.levecque@ontario.ca	3/7/2022
Ms.	Whiteye	Jennifer	Southern First Nations Secretariat		Executive Director	22361 Austin Line	Bothwell, ON	N0L 1Y0	519-692-5868 x242	jenwhiteye@sfns.on.ca	3/7/2022
First Nation Communities/Métis Groups											
Dr.	Jacobs	Dean	Walpole Island First Nation / Bkejwanong Territory		Heritage Centre Director	117 Tahgahoning Road,R.R. #3	Wallaceburg, ON	N8A 4K9	519-627-1475	dean.jacobs@wifn.org	3/7/2022
	MacBeth	Janet	Walpole Island First Nation / Bkejwanong Territory		Project Review Coordinator	117 Tahgahoning Road,R.R. #3	Wallaceburg, ON	N8A 4K9	519-627-1481	janet.macbeth@wifn.org	3/7/2022
	Ierullo	Julia	Caldwell First Nation		Consultation Coordinator	14 Orange Street	Leamington, ON	N8H 1P5		consultation@caldwellfirstnation.ca	CFN will now be asking Proponents
	Sands	Brianna	Caldwell First Nation		Environmental & Consultation Coordinator	14 Orange Street	Leamington, ON	N8H 1P5		ecc@caldwellfirstnation.ca	\\Cd1223-f01\01656\active\1
											\\Cd1223-
	Plain	Chris	Aamjiwnaang First Nation		Chief	978 Tashmoo Avenue	Sarnia, ON	N7T 7H5	519-336-8410	chief.plain@aamjiwnaang.ca	3/7/2022
	Rogers	Joanne	Aamjiwnaang First Nation		Councillor	978 Tashmoo Avenue	Sarnia, ON	N7T 7H5	519-336-8410	jrogers@aamjiwnaang.ca	3/7/2022
Ms.	O'Brien	Cathleen	Aamjiwnaang First Nation		Environmental Coordinator	978 Tashmoo Avenue	Sarnia, ON	N7T 7H5	519-336-8410	cobrien@aamjiwnaang.ca	3/7/2022
Ms.	Jackson	Courtney	Aamjiwnaang First Nation		Environment Worker	978 Tashmoo Avenue	Sarnia, ON	N7T 7H5	519-336-8410	cjackson@aamjiwnaang.ca	3/7/2022
	French	Jacqueline	Chippewas of the Thames First Nation		Chief	320 Chippewa Road	Muncey, ON	N0L 1Y0	519-289-5555	jfrench@cottfn.com	3/7/2022
	Riley	Kelly	Chippewas of the Thames First Nation		Director of Treaties, Lands & Environment	320 Chippewa Road	Muncey, ON	N0L 1Y0	519-289-5555 x 209	kriley@cottfn.com	3/7/2022
	Burch	Fallon	Chippewas of the Thames First Nation		Consultation Coordinator	320 Chippewa Road	Muncey, ON	N0L 1Y0	519-289-5555 x 213	fburch@cottfn.com	3/7/2022
	Submit request via NationsConnect.ca for Chippewas of the Thames First Nation										
	Henry	Jason	Chippewas of Kettle & Stony Point First Nation		Chief	6247 Indian Lane, RR#2	Forest, ON	N0N 1J1	519-786-2125	Jason.Henry@kettlepoint.org	3/7/2022
	George	Valerie	Chippewas of Kettle & Stony Point First Nation		Consultation Coordinator	6247 Indian Lane, RR#2	Forest, ON	N0N 1J1	519-786-2125	valerie.george@kettlepoint.org	3/7/2022
	Chrisjohn	Adrian	Onelda Nation of the Thames ONYOTA'A:KA		Chief	2212 Elm Avenue	Southwold, ON	N0L 2G0	519-318-4598	adrian.chrisjohn@oneida.on.ca	3/7/2022
	Hill	Cherilyn	Onelda Nation of the Thames ONYOTA'A:KA		Political Office Manager	2212 Elm Avenue	Southwold, ON	N0L 2G0	(519) 318-4593	cherilyn.hill@oneida.on.ca	3/7/2022
	Froh	Margaret	Métis Nation of Ontario		Director, Lands, Resources and Consultations	75 Sherbourne Street, Suite 311	Toronto, ON	M5A 2P9	416-977-9881	margaretF@metisnation.org	3/7/2022
			MNO Windsor-Essex Métis Council							consultations@metisnation.org	3/7/2022
	Anderson	Kathleen	Métis Nation of Ontario, Thames Bluewater Métis Council		President	183 Summerset Crescent	London, ON	N6K 3S5		tbwmc.president@gmail.com	3/7/2022
Ms.	Stonefish	Denise	Moravian of the Thames (Delaware Nation)		Chief	14760 School House Line, RR 3	Thamesville, ON	N0P 2K0	519-692-3936	denise.stonefish@delawarenation.on.ca	3/7/2022

APPENDIX B

Response from Review Agencies – Notice of Project Commencement

Ministry of the Environment, Conservation and Parks

Environmental Assessment Branch

1st Floor
135 St. Clair Avenue W
Toronto ON M4V 1P5
Tel.: 416 314-8001
Fax.: 416 314-8452

Ministère de l'Environnement, de la Protection de la nature et des Parcs

Direction des évaluations environnementales

Rez-de-chaussée
135, avenue St. Clair Ouest
Toronto ON M4V 1P5
Tél. : 416 314-8001
Téléc. : 416 314-8452

March 30, 2022

Chandana Walgama
Pollution Control Project Engineer
City of Windsor
cwalgama@citywindsor.ca

Re: **Pontiac Pumping Station Upgrades**
City of Windsor
Municipal Class EA
Response to Notice of Commencement

Dear Chandana Walgama,

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 Windsor (proponent) has indicated that the study is following the approved environmental planning process for a Schedule C 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

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 the 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 Planner – Southwest Region

Cc: Marcelina Wilson, Supervisor, Windsor Area Office, MECP
Marc Bechard, Water Compliance Supervisor, Sarnia District Office, MECP
Jian Li, Project Manager, Stantec Consulting

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.

From:	MNRF Ayl Planners (NDMNRF)
To:	cwalgama@citywindsor.ca; Li, Jian
Cc:	Rindlisbacher, Hannah
Subject:	RE: 165620249: Notice of Study Commencement - Class EA Pontiac Pumping Station Upgrades, City of Windsor, Ontario
Date:	Friday, March 18, 2022 10:46:42 AM
Attachments:	image001.wmz image002.png image003.png Notice of Study Commencement .pdf NHGuide_MNRF_2019-04-01.pdf

Ministry of Northern Development, Mines, Natural Resources and Forestry

Ministère du Développement du Nord, des Mines, des Richesses naturelles et des Forêts

March 18, 2022

Subject: 165620249: Notice of Study Commencement - Class EA Pontiac Pumping Station Upgrades, City of Windsor, Ontario

The Ministry of Northern Development, Mines, Natural Resources and Forestry (NDMNRF) received the notice for the Pontiac Pumping Station Upgrades 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 Ministry 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 NDMNRF. 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 NDMNRF'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 NDMNRF'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 Northern Development, Mines, Natural Resources and Forestry
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: Rindlisbacher, Hannah <Hannah.Rindlisbacher@stantec.com>
Sent: March 11, 2022 2:12 PM
To: Wilson, Mitch (NDMNRF) <mitch.wilson@ontario.ca>
Subject: 165620249: Notice of Study Commencement - Class EA Pontiac Pumping Station Upgrades, City of Windsor, Ontario

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[redacted] Mitch,

The City of Windsor is undertaking the Class Environmental Assessment (EA) process to develop a long-term solution to improve efficiency and reduce the risk of flooding caused by severe storm events in the expanded Pontiac drainage area. This study will satisfy Phases 3 and 4 of the Class EA process which will involve the evaluation of alternative design concepts for the proposed Pontiac Pumping Station Capacity Upgrades. A copy of the Notice of Study Commencement for the project is attached.

On behalf of the City of Windsor, we are inviting you to participate in this project and to assist us in identifying the environmental, social, and cultural values your community may have within the Project Area.

If you have any comments or concerns regarding this project and wish to provide input into the Study, please contact the undersigned below or one of the individuals named in the attached Notice of Commencement

Sincerely,

Hannah Rindlisbacher
BASc, Environmental Engineering Intern

Direct: 519 966-2250 ext 258
Mobile: 226 268-3033
hannah.rindlisbacher@stantec.com

Stantec
100-2555 Ouellette Avenue
Windsor ON N8X 1L9

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Ministry of Heritage, Sport, Tourism and Culture Industries

Programs and Services Branch
400 University Ave, 5th Flr
Toronto, ON M7A 2R9
Tel: 437.996.5218

Ministère des Industries du Patrimoine, du Sport, du Tourisme et de la Culture

Direction des programmes et des services
400, av. University, 5e étage
Toronto, ON M7A 2R9
Tél: 437.996.5218

Ontario

April 11, 2022 EMAIL ONLY

Jian Li
Project Manager
Stantec Consulting
2555 Ouellette Avenue, Suite 100
Windsor, Ontario N8X 1L9
jian.li@stantec.com

MHSTCI File	**:**	**0016185**
Proponent	**:**	**City of Windsor**
Subject	**:**	**Notice of Commencement – Schedule C MCEA**
Project	**:**	**Pontiac Pumping Station Upgrades**
Location	**:**	**Windsor, Ontario**

Dear Dr. Li:

Thank you for providing the Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI) with the Notice of Commencement for the above-referenced project. MHSTCI's interest in this Environmental Assessment (EA) project relates to its mandate of conserving Ontario's cultural heritage, which includes:

- archaeological resources, including land and marine;
- built heritage resources, including bridges and monuments; and
- cultural heritage landscapes.

Under the EA process, the proponent is required to determine a project's potential impact on known (previously recognized) and potential cultural heritage resources.

Project Summary
The City of Windsor is undertaking a Schedule C Municipal Class Environmental Assessment (Class EA) to increase capacity of existing Pontiac Pumping Station at the Littler River Pollution Control Plant. This study will satisfy Phases 3 and 4 of the Class EA process which will involve the evaluation of alternative design concepts for the proposed Pontiac Pumping Station Capacity Upgrades.

Identifying Cultural Heritage Resources
While some cultural heritage resources may have already been formally identified, others may be identified through screening and evaluation.

Archaeological Resources
MHSTCI understands that a Stage 1 Archaeological Assessment (AA) (under Project Information Number P-359-0117-2019 by Fisher Archaeological Consulting dated August, 2021) was completed as part of the City of Windsor Sewer Master Plan.

The Stage 1 AA identified the Pontiac Pumping Station study area as having low archaeological potential for majority of the area and no further archaeological work is required. However, the

Stage 1 AA also recommended that a small section of the study area indicated as retaining high potential and will require a Stage 2 AA.

Please note that archaeological concerns have not been addressed until reports have been entered into the Ontario Public Register of Archaeological Reports where those reports recommend that:

i. the archaeological assessment of the project area is complete and
ii. all archaeological sites identified by the assessment are either of no further cultural heritage value or interest (as per Section 48(3) of the Ontario Heritage Act) or that mitigation of impacts has been accomplished through an avoidance and protection strategy.

Built Heritage Resources and Cultural Heritage Landscapes

The MHSTCI *Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes* should be completed to help determine whether this EA project may impact built heritage resources and/or cultural heritage landscapes.

A Cultural Heritage Report: Existing Conditions and Preliminary Impact Assessment will be undertaken for the entire study area during the planning phase and will be summarized in the EA Report. This study will:

1. Describe the existing baseline cultural heritage conditions within the study area by identifying all known or potential built heritage resources and cultural heritage landscapes, including a historical summary of the study area. MHSTCI has developed screening criteria that may assist with this exercise: *Criteria for Evaluating for Potential Built Heritage Resources and Cultural Heritage Landscapes*.

2. Identify preliminary potential project-specific impacts on the known and potential built heritage resources and cultural heritage landscapes that have been identified. The report should include a description of the anticipated impact to each known or potential built heritage resource or cultural heritage landscape that has been identified.

3. Recommend measures to avoid or mitigate potential negative impacts to known or potential built heritage resources and cultural heritage landscapes. The proposed mitigation measures are to inform the next steps of project planning and design.

Given that this project covers a large study area, MHSTCI recommends that the Cultural Heritage Report is carried out so that step 1 described above is undertaken early in the planning process. Then, steps 2 and 3 can be undertaken once the preferred alternatives have been selected.

Cultural Heritage Reports will be undertaken by a qualified person who has expertise, recent experience, and knowledge relevant to the type of cultural heritage resources being considered and the nature of the activity being proposed.

Community input should be sought to identify locally recognized and potential cultural heritage resources. Sources include, but are not limited to, municipal heritage committees, historical societies and other local heritage organizations.

Cultural heritage resources are often of critical importance to Indigenous communities. Indigenous communities may have knowledge that can contribute to the identification of cultural heritage resources, and we suggest that any engagement with Indigenous communities

includes a discussion about known or potential cultural heritage resources that are of value to them.

Environmental Assessment Reporting
All technical cultural heritage studies and their recommendations are to be addressed and incorporated into EA projects. Please advise MHSTCI whether any technical cultural heritage studies will be completed for this EA project, and provide them to MHSTCI before issuing a Notice of Completion. If screening has identified no known or potential cultural heritage resources, or no impacts to these resources, please include the completed checklists and supporting documentation in the EA report or file.

Thank you for consulting MHSTCI on this project and please continue to do so throughout the EA process. If you have any questions or require clarification, please do not hesitate to contact me.

Sincerely,

Laura Romeo
Heritage Planner (A)
Heritage Planning Unit
laura.romeo@ontario.ca

Copied to: Chandana Walgama, Pollution Control Project Engineer, City of Windsor
Karla Barboza, Team Lead (A), Heritage Planning Unit, MHSTCI

It is the sole responsibility of proponents to ensure that any information and documentation submitted as part of their EA report or file is accurate. MHSTCI makes no representation or warranty as to the completeness, accuracy or quality of the any checklists, reports or supporting documentation submitted as part of the EA process, and in no way shall MHSTCI be liable for any harm, damages, costs, expenses, losses, claims or actions that may result if any checklists, reports or supporting documents are discovered to be inaccurate, incomplete, misleading or fraudulent.

Please notify MHSTCI (at archaeology@ontario.ca) if archaeological resources are impacted by EA project work. All activities impacting archaeological resources must cease immediately, and a licensed archaeologist is required to carry out an archaeological assessment in accordance with the Ontario Heritage Act and the Standards and Guidelines for Consultant Archaeologists.

If human remains are encountered, all activities must cease immediately, and the local police and coroner must be contacted. In situations where human remains are associated with archaeological resources, MHSTCI should also be notified (at archaeology@ontario.ca) to ensure that the site is not subject to unlicensed alterations which would be a contravention of the Ontario Heritage Act.

From: Tang, Kristina
To: Rindlisbacher, Hannah
Cc: Ed Valdez; Li, Jian
Subject: RE: 165620242 Notice of Study Commencement - Class EA Biosolids Management Study, City of Windsor, Ontario
Date: Wednesday, April 20, 2022 2:31:09 PM

Good Afternoon,

Little River is in an area of High Archaeological Potential while portions of the Lou Romano Water Reclamation Plant and the Windsor Biosolids Processing Facility are also in areas of high archaeological potential. Works proposed would have to be subject to the City of Windsor adopted Archaeological Management Plan (WAMP) and Official Plan policies concerning archaeology. https://www.citywindsor.ca/residents/planning/Plans-and-Community-Information/Know-Your-Community/Heritage-Planning/Windsor-Archaeological-Master-Plan/Pages/Windsor-Archaeological-Master-Plan.aspx

Please keep me in the loop as the project progresses and let me know if you have any questions.

Thank you!
KRISTINA TANG, MCIP, RPP
Heritage Planner
City of Windsor Planning & Building Services
Email: ktang@citywindsor.ca
Phone: 519-255-6543 X 6179

From: Rindlisbacher, Hannah <Hannah.Rindlisbacher@stantec.com>
Sent: Tuesday, April 19, 2022 4:18 PM
To: Tang, Kristina <ktang@citywindsor.ca>
Subject: 165620242 Notice of Study Commencement - Class EA Biosolids Management Study, City of Windsor, Ontario

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

[redacted] Kristina,

The City of Windsor is undertaking the Class Environmental Assessment (EA) process to develop a long-term biosolids management plan for the two municipal wastewater treatment plants. This Class EA will review and identify the opportunity of co-processing biosolids and source separated organics (SSO). The key elements of the study include identifying and evaluating options for processing biosolids and SSO that can generate renewable energy and reduce greenhouse gas emissions. A copy of the Notice of Study Commencement for the project is attached.

On behalf of the City of Windsor, we are inviting you to participate in this project and to assist us in identifying the environmental, social and cultural values your community may have within the Project Area. A reply by February 18, 2022, would be appreciated so that we may consider your comments early in this study stage.

If you have any comments or concerns regarding this project and wish to provide input into the Study, please

contact the undersigned below or one of the individuals named in the attached Notice of Commencement

Sincerely,

Hannah Rindlisbacher B.A.Sc., E.I.T.
Environmental Engineering Intern

Direct: 519 966-2250 ext 258
Mobile: 226 268-3033
hannah.rindlisbacher@stantec.com

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From: Romeo, Laura (MHSTCI)
To: Rindlisbacher, Hannah
Cc: Li, Jian; Barboza, Karla (MHSTCI)
Subject: RE: 165620249 Class EA Pontiac Pumping Station Capacity Upgrades MHSTCI Screening Criteria Form
Date: Wednesday, May 11, 2022 10:06:20 AM

Hi Hannah,

Thank you for providing a copy of the site plan with the existing and proposed new storm water pumping station. MHSTCI recommends that the Environmental Study Report clearly articulates the existing conditions and that there is no impacts to the existing storm water pumping station which is over 40 years old. Please do not hesitate to contact me should you have any questions or concerns.

Kind regards,
Laura

Laura Romeo | Heritage Planner (A)
Heritage, Tourism and Culture Division | Programs and Services Branch | Heritage Planning Unit
Ministry of Heritage, Sport, Tourism and Culture Industries
Laura.Romeo@ontario.ca

From: Rindlisbacher, Hannah <Hannah.Rindlisbacher@stantec.com>
Sent: May 6, 2022 8:51 AM
To: Romeo, Laura (MHSTCI) <Laura.Romeo@ontario.ca>
Cc: Li, Jian <jian.li@stantec.com>; Barboza, Karla (MHSTCI) <Karla.Barboza@ontario.ca>
Subject: RE: 165620249 Class EA Pontiac Pumping Station Capacity Upgrades MHSTCI Screening Criteria Form

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Good morning Laura,

Attached is a PDF copy of the site plan, which shows existing Pontiac Pumping Station (equipped with screw pumps) and proposed new storm water pumping station on the southside of existing pumping station. The existing and proposed pumping station are located at the existing Little River Pollution Control Plant site. The new pumping station is proposed to provide supplemental pumping for flooding prevention. Since the operation of existing pumping must be maintained, construction of new pumping station shall have no impact on the existing pumping station structure or other building structures nearby.

Hope this answer your questions.

Have a great weekend,

Hannah Rindlisbacher B.A.Sc., E.I.T.
Environmental Engineering Intern

Direct: 519 966-2250 ext 258

Mobile: 226 268-3033
hannah.rindlisbacher@stantec.com

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From: Romeo, Laura (MHSTCI) <Laura.Romeo@ontario.ca>
Sent: Thursday, April 28, 2022 9:12 AM
To: Rindlisbacher, Hannah <Hannah.Rindlisbacher@stantec.com>
Cc: Li, Jian <jian.li@stantec.com>; Barboza, Karla (MHSTCI) <Karla.Barboza@ontario.ca>
Subject: RE: 165620249 Class EA Pontiac Pumping Station Capacity Upgrades MHSTCI Screening Criteria Form

Hi Hannah,

Thank you for providing the completed checklist. Can you please provide additional details on the type of work and location of work that will occur within the Pontiac Pumping Station? Additional information on what the specific improvements are to the existing facility would be helpful in determining whether this project has the potential to impact properties of potential cultural heritage value.

Kind regards,
Laura

Laura Romeo | Heritage Planner (A)
Heritage, Tourism and Culture Division | Programs and Services Branch | Heritage Planning Unit
Ministry of Heritage, Sport, Tourism and Culture Industries
Laura.Romeo@ontario.ca

From: Rindlisbacher, Hannah <Hannah.Rindlisbacher@stantec.com>
Sent: April 25, 2022 8:48 AM
To: Romeo, Laura (MHSTCI) <Laura.Romeo@ontario.ca>
Cc: Li, Jian <jian.li@stantec.com>
Subject: 165620249 Class EA Pontiac Pumping Station Capacity Upgrades MHSTCI Screening Criteria Form

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sender.

Hi Laura,

Attached is the MHSTCI Screening Criteria Form for the Class EA Pontiac Pumping Station project. I would like to add for the answer to **Question 4D** on the form that although the property contains buildings which are 40 or more years old, none of them would be affected by this project and none of the properties are identified on the Windsor Municipal Heritage Register.

Thanks,

Hannah Rindlisbacher B.A.Sc., E.I.T.
Environmental Engineering Intern

Direct: 519 966-2250 ext 258
Mobile: 226 268-3033
hannah.rindlisbacher@stantec.com

Stantec
100-2555 Ouellette Avenue
Windsor ON N8X 1L9

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From:	Mentley, Ryan (MTO)
To:	Rindlisbacher, Hannah
Subject:	RE: 165620249: Notice of Study Commencement - Class EA Pontiac Pumping Station Upgrades, City of Windsor, Ontario
Date:	Friday, April 8, 2022 11:41:42 AM
Attachments:	Notice of Study Commencement .pdf

Hi Hannah,

Thank you for circulating the Ministry of Transportation (MTO) with the subject project and providing us an opportunity to comment. The site (Little River Pollution Control Plant) does not fall within the MTO Permit Control Area (PCA), and as such, MTO permits area not required.

MTO would have concerns with any work that could potentially impact the highway or falls within the PCA.

Please let me know if you have any questions.

Regards,

Ryan Mentley
Corridor Management Planner
Highway Corridor Management Section
Ministry of Transportation
659 Exeter Road, London ON, N6E 1L3
Tel: (519) 878-4026
Fax: (519) 873-4228
Ryan.Mentley@Ontario.ca

From: Rindlisbacher, Hannah <Hannah.Rindlisbacher@stantec.com>
Sent: March 11, 2022 2:45 PM
To: Mentley, Ryan (MTO) <Ryan.Mentley@ontario.ca>
Subject: 165620249: Notice of Study Commencement - Class EA Pontiac Pumping Station Upgrades, City of Windsor, Ontario

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[redacted] Ryan,

The City of Windsor is undertaking the Class Environmental Assessment (EA) process to develop a long-term solution to improve efficiency and reduce the risk of flooding caused by severe storm events in the expanded Pontiac drainage area. This study will satisfy Phases 3 and 4 of the Class EA process which will involve the evaluation of alternative design concepts for the proposed Pontiac Pumping Station Capacity Upgrades. A copy of the Notice of Study Commencement for the project is attached.

On behalf of the City of Windsor, we are inviting you to participate in this project and to assist us in identifying the environmental, social, and cultural values your community may have within the Project Area.

If you have any comments or concerns regarding this project and wish to provide input into the Study, please

contact the undersigned below or one of the individuals named in the attached Notice of Commencement

Sincerely,

Hannah Rindlisbacher
BASc, Environmental Engineering Intern

Direct: 519 966-2250 ext 258
Mobile: 226 268-3033
hannah.rindlisbacher@stantec.com

Stantec
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Windsor ON N8X 1L9

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From: Horrobin, Barry
To: Rindlisbacher, Hannah
Subject: Windsor Police comments: 165620249: Notice of Study Commencement - Class EA Pontiac Pumping Station Upgrades, City of Windsor, Ontario
Date: Tuesday, March 15, 2022 10:31:11 AM

Hannah:

Thank you for your recent email and invitation for the Windsor Police Service to comment on the project during this environmental assessment review stage. My only comment at this time is that any alternative design concepts/solutions developed for the proposed Pontiac Pumping Station Capacity Upgrades capture appropriate target hardening (physical access control and related security) measures to ensure an outcome that functions with less risk. Please keep my contact for your distribution list for this project so that I can stay on top of project updates as they develop.

Respectfully,

Barry Horrobin, B.A., M.A., CLEP, CMM-III
Director of Planning & Physical Resources
WINDSOR POLICE SERVICE

Advanced Certified Law Enforcement Planner

From: Rindlisbacher, Hannah <Hannah.Rindlisbacher@stantec.com>
Sent: Friday, March 11, 2022 9:51 AM
To: Horrobin, Barry <bhorrobin@windsorpolice.ca>
Subject: 165620249: Notice of Study Commencement - Class EA Pontiac Pumping Station Upgrades, City of Windsor, Ontario

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[redacted] Barry,

The City of Windsor is undertaking the Class Environmental Assessment (EA) process to develop a long-term solution to improve efficiency and reduce the risk of flooding caused by severe storm events in the expanded Pontiac drainage area. This study will satisfy Phases 3 and 4 of the Class EA process which will involve the evaluation of alternative design concepts for the proposed Pontiac Pumping Station Capacity Upgrades. A copy of the Notice of Study Commencement for the project is attached.

On behalf of the City of Windsor, we are inviting you to participate in this project and to assist us in identifying the environmental, social, and cultural values your community may have within the Project Area.

If you have any comments or concerns regarding this project and wish to provide input into the Study, please contact the undersigned below or one of the individuals named in the attached Notice of Commencement

Sincerely,

Hannah Rindlisbacher

BASc, Environmental Engineering Intern

Direct: 519 966-2250 ext 258
Mobile: 226 268-3033
hannah.rindlisbacher@stantec.com

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From:	Christopher Manzon
To:	Rindlisbacher, Hannah
Subject:	RE: [External] 165620249: Notice of Study Commencement - Class EA Pontiac Pumping Station Upgrades, City of Windsor, Ontario
Date:	Friday, March 11, 2022 4:07:28 PM
Attachments:	ATT00001.png ATT00002.png ATT00003.png

Hannah,

I am interested in the project and wish to remain on the mailing list.

Thanks

Chris

Christopher Manzon
Director Engineering (Water)
ENWIN Utilities Ltd.

P: (519) 251-7300 ext 295
C: (519) 566-3897

4545 Rhodes Drive | P.O. Box 1625 Station A | Windsor, Ontario | N8W 5T1

www.enwin.com twitter.com/ENWINUtilities youtube.com/ENWINUtilitiesLtd

We've moved! ENWIN and Windsor Utilities Commission business offices are now located at the utility's Operations Centre at 4545 Rhodes Drive.

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From: Rindlisbacher, Hannah <Hannah.Rindlisbacher@stantec.com>
Sent: March 11, 2022 3:55 PM
To: Christopher Manzon <cmanzon@enwin.com>
Subject: [External] 165620249: Notice of Study Commencement - Class EA Pontiac Pumping Station Upgrades, City of Windsor, Ontario

ATTENTION: This email originated from outside of ENWIN Utilities Ltd. Do not click links or open attachments unless you recognize the sender and know the content is safe.

[redacted] Chris,

The City of Windsor is undertaking the Class Environmental Assessment (EA) process to develop a long-term solution to improve efficiency and reduce the risk of flooding caused by severe storm events in the expanded Pontiac drainage area. This study will satisfy Phases 3 and 4 of the Class EA process which will involve the evaluation of alternative design concepts for the proposed Pontiac Pumping Station

Capacity Upgrades. A copy of the Notice of Study Commencement for the project is attached.

On behalf of the City of Windsor, we are inviting you to participate in this project and to assist us in identifying the environmental, social, and cultural values your community may have within the Project Area.

If you have any comments or concerns regarding this project and wish to provide input into the Study, please contact the undersigned below or one of the individuals named in the attached Notice of Commencement

Sincerely,

Hannah Rindlisbacher
BASc, Environmental Engineering Intern

Direct: 519 966-2250 ext 258
Mobile: 226 268-3033
hannah.rindlisbacher@stantec.com

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From:	Telus Utility Markups
To:	Rindlisbacher, Hannah
Subject:	RE: 165620249: Notice of Study Commencement - Class EA Pontiac Pumping Station Upgrades, City of Windsor, Ontario Telus 2022- 1586
Date:	Monday, March 14, 2022 2:41:32 PM

Hello,

TELUS has no underground infrastructure in the area of your proposed work.

Thank you,

Meghna Patel

Permit Coordinator
Coordinateur de permis

T (905) 569-2882 x1352
7777 Weston Road, Vaughan, ON L4L 0G9

telecon
design • build • connect

telecon.com

From: Rindlisbacher, Hannah <Hannah.Rindlisbacher@stantec.com>
Sent: Friday, March 11, 2022 4:59 PM
To: Telus Utility Markups <telusutilitymarkups@Telecon.ca>
Subject: 165620249: Notice of Study Commencement - Class EA Pontiac Pumping Station Upgrades, City of Windsor, Ontario

[redacted] TELUS,

The City of Windsor is undertaking the Class Environmental Assessment (EA) process to develop a long-term solution to improve efficiency and reduce the risk of flooding caused by severe storm events in the expanded Pontiac drainage area. This study will satisfy Phases 3 and 4 of the Class EA process which will involve the evaluation of alternative design concepts for the proposed Pontiac Pumping Station Capacity Upgrades. A copy of the Notice of Study Commencement for the project is attached.

On behalf of the City of Windsor, we are inviting you to participate in this project and to assist us in identifying the environmental, social, and cultural values your community may have within the Project Area.

If you have any comments or concerns regarding this project and wish to provide input into the Study, please contact the undersigned below or one of the individuals named in the attached Notice of Commencement

Sincerely,

Hannah Rindlisbacher
BASc, Environmental Engineering Intern

Direct: 519 966-2250 ext 258
Mobile: 226 268-3033
hannah.rindlisbacher@stantec.com

Stantec

100-2555 Ouellette Avenue
Windsor ON N8X 1L9

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APPENDIX B

Response from Review Agencies – Public Open House

From:	Kimberly Darroch
To:	Li, Jian; Rindlisbacher, Hannah
Subject:	NOTICE OF PUBLIC INFORMATION CENTRE: PONTIAC PUMPING STATION UPGRADES (Windsor) - July PIC
Date:	Wednesday, August 3, 2022 9:56:30 AM

Good morning:

The City of Windsor is undertaking a Schedule 'C' Municipal Class Environmental Assessment (Class EA) for the proposed Pontiac Pumping Station Upgrades.

This study will satisfy Phases 3 and 4 of the Class EA process, which will involve the evaluation of design concept alternatives for the proposed Pontiac Pumping Station *(Phase 3)*. An *Environmental Study Report (Phase 4)* will be prepared to document the activities and recommendations from the Class EA process.

The Pontiac Pumping Station is primarily a stormwater pumping station which provides flood relief to the Pontiac drainage area. In a severe storm event, where the capacity of the LRPCP is exceeded, the Pontiac Pumping Station acts as an emergency bypass for wet weather flows to prevent basement flooding. However, the existing pumping station does not have the hydraulic capacity to meet the required level of service and reduce the risk of basement flooding. It is the ERCA understanding that Phase 1 and 2 of the Class EA process was completed as a part of the *Sewer & Coastal Flood Protection Master Plan (SMP).* As a result of the findings of the SMP, Phase 3 of the Class EA process for this study includes an evaluation and selection of the recommended design and preferred layout for the proposed Pontiac Pumping Station.

The City, recently hosted, a Public Information Centre (PIC), on Wednesday July 13th, 2022, to present the evaluation of design concept alternatives for the Pontiac Pumping Station. This letter is in response to our receipt and review of the Public Information Centre (PIC) material, for the Pontiac Pumping Station.

Please be advised, that the study area is regulated, by the Conservation Authority, under Section 28 of the *Conservation Authorities Act*.

There is very little by way of natural heritage, which should be affected by the works proposed. All works appear to be located well away from any natural heritage features. Therefore, no negative impacts are anticipated.

The subject property may lie wholly or partially within the Event Based Area (EBA) and the Windsor's (A.H. Weeks) Drinking Water Intake Protection Zone 2 (IPZ 2) of the Essex Region Source Protection Plan, which came into effect October 1, 2015. The Source Protection Plan, was developed, to provide measures to protect Essex Region's municipal drinking water sources. Intake Protection Zones are areas of land and water, where run-off from streams or drainage systems, in conjunction with currents in lakes and rivers, could directly impact on the source water at the municipal drinking water intakes. As a result of these policies, new projects in these areas may require approval by the Essex Region Risk Management Official (RMO) to ensure that appropriate actions are taken to mitigate any potential drinking water threats. Should your proposal require the installation of fuel, the application or storage of agricultural source material (ASM), the application or storage of non- agricultural source material (NASM), or the application of pesticide on the site, please

contact the RMO to ensure the activity will not pose a significant risk to local sources of municipal drinking water. For any questions regarding Source Water Protection and the applicable source protection plan policies that may apply to the site, please contact the Essex Region Risk Management Official. The Essex Region's Risk Management Official can be reached by email at riskmanagement@erca.org.

The EBA is delineated, using the best available mapping of drains and other open watercourses. If the proposed project, is to include the creation, relocation or removal of drains and/or other open watercourses, which would alter the delineation of the EBA, the applicant will be required to notify the Source Protection Authority. Once the project is complete and these changes are finalized, Essex Region Source Protection staff may need to adjust the delineation of the EBA. Any changes to the EBA would need to be included in formal updates to the Source Protection Plan and Assessment Report using the provisions of the Clean Water Act (s.34 or s. 36) or its Regulations (s.51). O.Reg 287/07 S. 27(3) requires municipalities to notify the SPA and SPC of proposals to engage in an activity that may result in the creation of a new transport pathway or the modification of an existing transport pathway.

When site selection is confirmed, for the new pumping station upgrades, early consultation with the ERCA, at the detailed design stage, is encouraged, to obtain feedback on the recommended / preferred design, to ensure environmental impacts are avoided and to discuss the specific permitting requirements for this project, including other agency approvals. Please contact:

TIAN MARTIN, P.Eng. Water Resources Engineer,
Watershed Management Services
Essex Region Conservation Authority
360 Fairview Avenue West,
Suite 311
Essex, Ontario N8M 1Y6 P
519-776-5209 x 304 F. 519-776-8688
tmartin@erca.org www.essexregionconservation.ca

ERCA appreciates the opportunity to provide additional comments, at a later date. Please keep us on the mailing distribution list, for future updates, to the study, including the any additional open houses.

Please keep the following on the study distribution list:

planning@erca.org – Planning inbox
tmartin@erca.org – Tian Martin, P.Eng., Water Resources Engineer

If you have any questions or require any additional information, to facilitate the completion of this project, please do not hesitate to contract me directly.

Regards,

Team Lead, Planning Services, Watershed Management Services
Essex Region Conservation Authority
360 Fairview Avenue West, Suite 311 | Essex, Ontario | N8M 1Y6
P. 519-776-5209 x 347 | F. 519-776-8688
kdarroch@erca.org www.essexregionconservation.ca

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Follow us on Twitter: @essexregionca

**NOTE: In accordance with public health guidelines, our offices are closed to the public, but staff are working remotely to provide responses to inquiries and review applications as efficiently as possible. Your patience and understanding is greatly appreciated at this time. **

Hydro One Networks Inc.

483 Bay Street
8th Floor South Tower
Toronto, Ontario M5G 2P5

HydroOne.com

July 06, 2022

Re: PONTIAC PUMPING STATION UPGRADES

Attention:
Chandana Walgama, P.Eng.
Pollution Control Project Engineer
City of Windsor

Thank you for sending us notification regarding (PONTIAC PUMPING STATION UPGRADES). 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.

From:	Horrobin, Barry
To:	Rindlisbacher, Hannah
Cc:	cwalgama@citywindsor.ca; Li, Jian
Subject:	Windsor Police comments - Class EA Pontiac Pumping Station Capacity Upgrades, City of Windsor, Ontario
Date:	Tuesday, July 5, 2022 2:39:14 PM

Hannah:

Thank you for sending this notice for the Class EA to be undertaken for the Pontiac Pumping Station upgrades. This project is not anticipated to carry any significant impact to public safety in a way that is overtly discernible, however I would offer the following feedback at this stage of the process:

- The primary issue, while low in overall risk probability, is to ensure the property is established and maintained in a way that optimizes physical security. This is because of the high importance associated with this asset, when required. In this regard, failure of its functioning should unlawful access be gained, would be detrimental. Criminal access that leads to possible acts of sabotage needs to be prevented. In saying this, extra care should be given to solidifying good access control measures into the site, plus implementing important target hardening features such as, but not limited to:
  - High resolution CCTV recording of activity on and around the property, with a minimum image retention capability of 30 days.
  - Use of high security hardware to effectively fortify access into any building structures.
  - Installing a good quality security access system that can quickly detect the presence of illegal access by unauthorized individuals.
  - Excellent lighting to optimize natural surveillance capability and also facilitate more effective police response if called to the site. Minimum illumination levels would vary according to various parts of the site and would be provided if a final site plan was provided to Windsor Police for review (Recommended). In general, full cut off LED lighting is recommended that uses fixtures with a colour temperature of 4000 degrees Kelvin (4000K) and a corresponding minimum colour rendering index (CRI0 of 70. There may also be areas where motion-activated floodlighting is more appropriate – this can be confirmed during a site plan review.
- It is also important that uninhibited access by all emergency responders (Police, Fire, and EMS) be achieved as an outcome from the final design, when it is constructed and made operational.

I will be happy to comment further on this project as it progresses to later stages, most notably the point at which a finalized site plan of all works to be undertaken gets developed.

Respectfully,

Barry Horrobin, B.A., M.A., CLEP, CMM-III
Director of Planning & Physical Resources
WINDSOR POLICE SERVICE

IALEP
INTERNATIONAL ASSOCIATION OF LAW ENFORCEMENT PLANNERS

Advanced Certified Law Enforcement Planner

From: Rindlisbacher, Hannah <Hannah.Rindlisbacher@stantec.com>
Sent: Monday, July 4, 2022 2:01 PM
To: Horrobin, Barry <bhorrobin@windsorpolice.ca>
Subject: 165620249: Notice of Public Information Centre - Class EA Pontiac Pumping Station Capacity Upgrades, City of Windsor, Ontario

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Dear Barry,

The City of Windsor is undertaking the Class Environmental Assessment (EA) process to develop a long-term solution to improve efficiency and reduce the risk of flooding caused by severe storm events in the Pontiac drainage area. This Class EA will involve evaluation of alternative design concepts for the proposed Pontiac Pumping Station capacity upgrades.

The City is hosting a Public Information Centre (PIC) to present the evaluation of alternative design concepts and receive input from interested residents and stakeholders. The PIC will be held on Wednesday July 13th, 2022 (3:00 to 7:00 pm) at the WFCU Centre, 8787 McHugh Street, Windsor, ON (Second Floor –St. Clair). A copy of the Notice of Public Information Centre for the project is attached and additional information regarding the project is available on the City Webpage: Pontiac Pumping Station Upgrades at the Little River Pollution Control Plant - Environmental Assessment (citywindsor.ca)

If you have any comments or concerns regarding this project, please contact the undersigned.

Sincerely,

Hannah Rindlisbacher B.A.Sc., E.I.T.
Environmental Engineer in Training

Direct: 519 966-2250 ext 258
Mobile: 226 268-3033
hannah.rindlisbacher@stantec.com

Stantec
100-2555 Ouellette Avenue
Windsor ON N8X 1L9

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APPENDIX B

Response from Review Agencies – Notice of Draft ESR

Ministry of the Environment, Conservation and Parks

Environmental Assessment Branch

1st Floor
135 St. Clair Avenue W
Toronto ON M4V 1P5
Tel.: 416 314-8001
Fax.: 416 314-8452

Ministère de l'Environnement, de la Protection de la nature et des Parcs

Direction des évaluations environnementales

Rez-de-chaussée
135, avenue St. Clair Ouest
Toronto ON M4V 1P5
Tél. : 416 314-8001
Téléc. : 416 314-8452

Via E-mail Only

October 5, 2022

Chandana Walgama
Pollution Control Project Engineer
City of Windsor
cwalgama@citywindsor.ca

Re: Pontiac Pumping Station Capacity Upgrades
City of Windsor
Municipal Class Environmental Assessment – Schedule C
Project Review Unit Comments – Draft Environmental Study Report

Dear Chandana Walgama,

Thank you for providing the ministry with an opportunity to comment on the draft Environmental Study Report (ESR) for the above noted Class Environmental Assessment (EA) project. Our understanding is that in order to reduce the risk of flooding in the Pontiac drainage area during major storm events, and to implement the preferred alternative identified in the Sewer & Coastal Flood Protection Master Plan (SMP), the City of Windsor (the proponent) has determined that the preferred design alternative is to expand the existing Pontiac Pumping Station (PS) with axial flow pumps and a new wet well structure and generator to the south of the existing pumping station. The Ministry of the Environment, Conservation and Parks (ministry) provides the following comments for your consideration.

General

1) Several of the page number references in the Table of Contents of the draft ESR are displaying error messages. This should be corrected in the final ESR.
2) Section 7.0 and Appendix B of the draft ESR are currently titled "*Public Consultation*". Given that these sections include descriptions and records of consultation undertaken with review

agencies and Indigenous communities, it would be more appropriate for these sections to have a broader title such as "*Consultation*".

3) The ministry suggests the following underlined grammatical edit in Section 5.2.3 of the draft ESR, "*This layout would ~~avoid~~ intersect with existing underground sanitary sewer lines and therefore would result in more complex construction requirements.*"

4) The ministry suggests the following underlined and/or bolded grammatical edits in Section 6.4.3 of the draft ESR, "*DFO determines that a project will result in the death of fish and/or HADD ~~if~~ **of** fish habitat an Authorization under the Fisheries Act may be required*."

5) The ministry suggests the following underlined/bolded grammatical edit in Section 9.0 of the draft ESR, "The existing Pontiac Pumping Station is not able to effectively discharge wet weather flows during sever**e** storm events

Planning and Policy

6) A discussion of the provincial planning and policy context, particularly of the Provincial Policy Statement (PPS), 2020, is missing from the ESR. As noted in Section C.1.1 of the Municipal Class EA document (https://municipalclassea.ca/manual/page45.html), the PPS is a key consideration for identifying land-use planning objectives and evaluating alternative solutions in Phases 2 and 3 of the Class EA process. The ministry notes that the City of Windsor Official Plan, discussed in section 2.5.2 of the draft ESR, is expected to be kept up-to-date with the PPS in order to protect provincial interests, as per section 4.6 of the PPS, 2020 (www.ontario.ca/page/provincial-policy-statement-2020). Regardless, the ministry notes that policies of the PPS continue to apply even after adoption and approval of an official plan. The ministry recommends including a separate section in the ESR to discuss the PPS.

7) Section 6.2.1 of the draft ESR references the Provincial Policy Statement, 2014. Please note that any discussion of the PPS should be based on the changes that came into effect in 2020.

Project Timeline

8) A preliminary anticipated work schedule for the project should be included in the ESR, to best meet the ESR content requirements noted in section A.4.2.1 of the Municipal Class EA document (https://municipalclassea.ca/manual/page31.html).

Indigenous Consultation

9) The proponent should continue to engage with all communities that have been engaged with to date as the Class EA process proceeds.

10) The ministry notes that additional consultation with the identified communities may be required during the application processes for any subsequent Environmental Compliance Approvals (ECA)/ECA amendments and/or Permits to Take Water, if required.

Excess Materials and Waste

11) In December 2019, the ministry 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. The regulation is being phased in over time, with the first phase in effect on January 1, 2021. For more information, please visit www.ontario.ca/page/handling-excess-soil. The ESR should reference that activities involving the management of excess soil should be completed in accordance with O. Reg. 406/19 and the ministry'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.

Species at Risk

12) Further to discussion of potential authorization under the Endangered Species Act (ESA) in section 6.4.2 of the draft ESR, please note that if the proponent believes that their proposed activities are going to have an impact on Species at Risk or are uncertain about the impacts, they should contact SAROntario@ontario.ca to undergo a formal review under the ESA. It is the responsibility of the proponent to ensure that Species at Risk are not killed, harmed, or harassed, and that their habitat is not damaged or destroyed through the proposed activities to be carried out on the site.

Surface Water

13) Section 1.1.2 of the draft ESR indicates that solutions identified in the SMP included, "Upgrades and modifications to existing pumping stations", including St. Paul PS, Ford PS, and East Marsh PS, in addition to the Pontiac PS. Please clarify whether these three pumping stations are all also stormwater pumping stations.

14) The ministry notes that for the preferred alternative site layout, sewage from the collection system will be mixed with the stormwater going into the existing PS discharge chamber. This would be a combined sewer overflow. As such this may require a flow meter for reporting purposes, to be confirmed by MECP Environmental Permissions Branch.

15) Section 6.2.5 of the draft ESR states, "*Water quality measures shall be considered to ensure no adverse impact on the downstream watercourse. The new preferred outfall sewer will run parallel to the existing LRWRP outfall sewer that is located along Prospect Ave, and outletting to the Detroit River. Surface water monitoring program is to be implemented to verify no adverse impact on the downstream watercourse*."

    a. This is the first instance of the acronym LRWRP in the ESR. Acronyms in the body of the ESR should be defined at the first instance of their use.

    b. This paragraph seems to relate to work adjacent to the Lou Romano Water Reclamation Plant (LRWRP), instead of the Little River Pollution Control Plant. This paragraph should be removed or edited with information applicable to this project.

16) Section 6.2.8 of the draft ESR discusses dewatering requirements for the project and associated Permit to Take Water (PTTW) requirements.

    a. Please note that any water extraction over 50,000 L/day will require MECP approval(s) under the *Environmental Protection Act* and *Ontario Water Resource Act*. However, certain water taking activities that have been prescribed by the Water Taking

Regulation O. Reg. 63/16, such as some construction dewatering, may require Environmental Activity and Sector Registry (EASR) registration instead of a PTTW. Regardless, a PTTW is required if the water-taking exceeds 400,000 litres per day. The ministry recommends that potential EASR requirements be identified in the report. More information regarding the EASR and PTTW is available online at www.ontario.ca/page/water-taking-and-transfer-user-guide-clarifications-and-exemptions, and at www.ontario.ca/page/water-taking-user-guide-environmental-activity-and-sector-registry#:~:text=If%20the%20water%20takings%20are,a%20permit%20is%20not%20required.

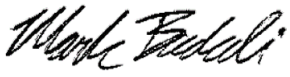
b. It may be pertinent to include some or all of these water-taking permit discussions in section 6.4 "Permitting Considerations" of the draft ESR, for the ease of readers who are interested in locating all permitting information for the project. At a minimum, section 6.4 could include a reference to the discussions in section 6.2.8.

17) Section 6.4 and any other relevant sections of the ESR should discuss the potential requirements for a new ECA or ECA amendment to implement the preferred solution. The proponent should consult further with MECP Environmental Permissions Branch regarding potential ECA requirements, subsequent to this Class EA process.

Thank you for circulating this draft ESR for the ministry's consideration. Please document the provision of the draft Report to the ministry as well as this Project Review Unit Comments letter in the final report, and please provide an accompanying response letter to support our review of the final report. A copy of the final Notice should be sent to the ministry's Southwest Region EA notification email account (eanotification.swregion@ontario.ca).

Should you or any members of your project team have any questions regarding the material above, please contact me at mark.badali1@ontario.ca.

Sincerely,



Mark Badali
Regional Environmental Planner
Project Review Unit, Environmental Assessment Branch
Ontario Ministry of the Environment, Conservation and Parks

cc Marcelina Wilson, Supervisor, Windsor Area Office, MECP
Marc Bechard, Water Compliance Supervisor, Sarnia District Office, MECP
Jian Li, Project Manager, Stantec Consulting
Hannah Rindlisbacher, Environmental Engineer in Training, Stantec Consulting

Stantec Consulting Ltd.
100-140 Ouellette Place, Windsor ON N8X 1L9

October 19, 2022
File: 165620249

Attention: Mr. Mark Badali, Regional Environmental Planner

Ministry of the Environment, Conservation and Parks
135 St. Clair Avenue W
Toronto ON, M4V 1P5

Dear Mr. Badali,

Reference: Class Environmental Assessment – Pontiac Pumping Station Capacity Upgrades, City of Windsor

Thank you for your prompt response to the August 22, 2022, Draft ESR for Pontiac Pumping Station Capacity Upgrades, City of Windsor. The following is in response to your comments on the draft ESR, which was received on October 5, 2022.

1. General

1.1 Page Number References

Noted. The page number references in the Table of Contents of the ESR will be corrected.

1.2 Section 7 - Consultation

Noted. The title of Section 7 and Appendix B of the ESR will be revised to “Consultation”.

1.3 Grammar

- The following underlined grammatical edit in Section 5.2.3 of the ESR will be made and included in the final ESR, “*This layout would ~~avoid~~ intersect with existing underground sanitary sewer lines and therefore would result in more complex construction requirements.”*
- The following underlined and/or bolded grammatical edits in Section 6.4.3 of the ESR will be made and included in the final ESR, “*DFO determines that a project will result in the death of fish and/or HADD ~~if~~ **of** fish habitat an Authorization under the Fisheries Act may be required*.”
- The following underlined/bolded grammatical edit in Section 9.0 of the ESR will be made and included in the final ESR, “*The existing Pontiac Pumping Station is not able to effectively discharge wet weather flows during severe storm events*.”

Reference: **Class Environmental Assessment – Pontiac Pumping Station Capacity Upgrades, City of Windsor**

2. Planning and Policy

- A discussion of the Provincial Policy Statement (PPS) 2020, which is presented below, will be included in Section 2.5.3 of the final ESR:

  "*The province of Ontario released an updated version of the Provincial Policy Statement (PPS) in 2020. The PPS, 2020 has new policies across five themes: increasing housing supply and mix, protecting the environment and public safety, reducing barriers and costs, supporting rural, northern, and Indigenous communities, and supporting certainty and economic growth. The PPS is a key consideration for identifying land-use planning objectives and evaluating alternative solutions in Phase 2 and 3 of the Class EA process.*

  The purpose of the PPS is to provide consistent standards across the province for issues regarding land and resource use. The PPS aims to improve the quality of life for all residents of Ontario by allowing appropriate development while protecting resources of provincial interest, public health and safety and the quality of the natural and built environment. Both provincial plans and municipal official plans layout a framework for comprehensive, integrated, planning that allows Ontario to sustain strong communities, a clean and healthy environment and economic growth, for the long term. The key approach for implementing the PPS are municipal official plans because they identify provincial interests and present appropriate land use designations and policies. It is important that municipal official plans are kept up to date with the PPS to protect provincial interests and ensure that development takes place only in suitable areas."

- The reference to the Provincial Policy Statement, 2014 in Section 6.2.1 will be corrected to reference the Provincial Policy Statement, 2020.

3. Project Timeline

The following preliminary anticipated work schedule for the project will be included in Section 3.3 of the final ESR to best meet the ESR content requirements noted in section A.4.2.1 of the Municipal Class EA document **(**A.4.2 SCHEDULE C ENVIRONMENTAL STUDY REPORT (municipalclassea.ca)):

Project Component	**Date**
Project Initiation – Notice of Study Commencement	March 2022
Review of Background Information and Problem Identification	May 2022
Evaluation of Alternative Design Concepts	June 2022

Public Information Center	July 2022
Environmental Study Report	August 2022
Council Presentation & Resolution	November 2022
Notice of Completion	November 2022
Phase 5 – Project Implementation	2023 –2025

4. Indigenous Consultation

- Consultation with First Nations is being implemented in accordance with the Municipal Class EA First Nations Consultation requirements. As part of this Class EA, communications with First Nations agencies and communities are being undertaken in parallel with the other stakeholder communications and consultations. Emails and submissions via consultation websites were sent to the First Nations groups and organizations at study commencement and public open house to solicit their interest or non-interest in the study. Engagement with First Nations communities will continue as the Class EA process proceeds.

- In the case that any subsequent Environmental Compliance Approvals (ECA)/ECA amendments and/or Permits to Take Water are required, additional consultation with the identified communities will be carried out.

- Follow-up reminders will be sent to other First Nations groups prior to the issuance of the Notice of Completion.

- Indigenous consultation efforts are documented in a Consultation Log and appended to this letter for review. The Consultation Log will be included in the final ESR.

5. Excess Materials and Waste

A reference to the new regulation under the Environmental Protection Act, titled On-Site and Excess Soil Management (O. Reg. 406/19) will be included in the ESR under section 6.2.10 Excess Materials and Waste.

“In 2019, the Ministry of Environment, Conservation and Parks 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. The regulation is being phased in over time, but the first phase was put into effect on January 1st, 2021. The purpose of the new regulation is to reduce soil management costs, while protecting human health and the environment.

This regulation is necessary to ensure the proper steps are taken to manage excess soils, prevent valuable resources from going to waste and to offer a clear set of rules on how to manage and reuse excess soil.

Any construction activities carried out in the process of this project involving the management of excess soil should be completed in accordance with O. Reg. 406/19 and the ministry's guidance document titled "Management of Excess Soil – A Guide for Best Management Practices" (2014). All waste generated during the course of construction must be disposed of in accordance with the ministry's requirements."

6. Species at Risk

A Natural Heritage Impact Assessment was completed for the study area which identified six (6) different species at risk. Additionally, thirteen (13) records of SAR that were documented or have the potential to occur in the study area were identified in the background review.

The mitigation measures discussed in Section 6 of the ESR will be implemented to prevent harm to any SAR.

7. Surface Water

7.1 Stormwater Pumping Stations

Section 1.1.2 of the ESR that indicates solutions identified in the SMP was revised to clarify that the St. Paul PS, Ford PS, and the East Marsh PS are all also stormwater pumping stations.

7.2 Flow Meter

For the preferred alternative site layout, excess wet weather flow from the sanitary sewer system will be mixed with the stormwater going into the existing PS discharge chamber which would be a combined sewer overflow. It is the city's intention to have a flow meter installed on the overflow pipe to the pumping station for reporting purposes to be confirmed by MECP Environmental Permissions Branch.

7.3 Paragraph Removed

The paragraph referring to the LRWRP in Section 6.2.5 of the report will be removed.

7.4 Permit to Take Water

It was noted that any water extraction over 50, 000 L/day will require MECP approval(s) under the *Environmental Protection Act* and *Ontario Water Resource Act*. However, certain water taking activities that have been prescribed by the Water Taking Regulation O. Reg. 63/16, such as some construction dewatering, may require Environmental Activity and Sector Registry (EASR) registration instead of a PTTW. Regardless, a PTTW is required if the water-

Reference: Class Environmental Assessment – Pontiac Pumping Station Capacity Upgrades, City of Windsor

taking exceeds 400,000 litres per day. The information regarding the required MECP approval(s) will be incorporated to the construction drawings and specifications which the contractor should apply.

We will include discussions in section 6.4 “Permitting Considerations” of the ESR regarding the Permit to Take Water for the ease of readers interested in locating all permitting information for the project. In Section 6.4 of the ESR we will include a reference to the discussions in Section 6.2.8.

7.5 Environmental Compliance Approval

It was noted that the proponent should consult further with the MECP Environmental Permissions Branch regarding potential ECA requirements, subsequent to this Class EA Process.

A new section regarding ECA application will be added to the ESR:

“There is currently no ECA available for the existing Pontiac Pumping Station. There is an ongoing discussion with MECP regarding a "Corporate ECA" for all the City of Windsor pumping stations including the Disaster Mitigation and Adaptation Fund (DMAF) upgrades.”

Respectfully yours,

Stantec Consulting Ltd.

Hannah Rindlisbacher B.A.Sc., E.I.T.
Environmental Engineer in Training
Phone: 519 966 2250 ext. 258
hannah.rindlisbacher@stantec.com

Jian Li Ph.D., P.Eng., PE
Project Manager
Phone: 519 966 2250 ext. 240
jian.li@stantec.com

c. Mr. Chandana Walgama, Pollution Control Project Engineer, City of Windsor

Ministry of Tourism, Culture and Sport

Programs and Services Branch
400 University Ave, 5th Flr
Toronto, ON M7A 2R9
Tel: 416-786-7553

Ministère du Tourisme, de la Culture et du Sport

Direction des programmes et des services
400, av. University, 5e étage
Toronto, ON M7A 2R9
Tél: 416-786-7553

Ontario

September 30, 2022 EMAIL ONLY

Chandana Walgama, P.Eng.
Pollution Control Project Engineer
City of Windsor
4155 Ojibway Parkway
Windsor, ON N9C 4A5
cwalgama@cityofwindsor.ca

MTCS File	**:**	**0016185**
Proponent	**:**	**City of Windsor**
Subject	**:**	**Municipal Class EA – Schedule C – Notice of Draft Environmental Study Report**
Project	**:**	**Pontiac Pumping Station Capacity Upgrades**
Location	**:**	**City of Windsor**

Dear Ms. Walgama:

Thank you for providing the Ministry of Tourism, Culture and Sport (MTCS) with the Notice of Draft Environmental Study Report (ESR) for the above-referenced project. MTCS's interest in this Environmental Assessment (EA) project relates to its mandate of conserving Ontario's cultural heritage, which includes:

- archaeological resources, including land and marine;
- built heritage resources, including bridges and monuments; and
- cultural heritage landscapes.

We have reviewed the draft ESR (dated August 22, 2022, prepared by Stantec) and offer the following comments.

Project Summary
The purpose of this project is to increase the capacity of the existing Pontiac Pumping Station, in order to improve efficiency and reduce the risk of flooding caused by severe storm events in the drainage area it services. The current study follows from the 2020 Sewer and Coastal Flood Protection Master Plan, which satisfied Phases 1 and 2 of the Municipal Class EA process.

Draft ESR Comments
It is unclear why a Cultural Heritage Evaluation Report (CHER) or similar technical study was not undertaken, given the affirmative answer to question 4.d. on the *Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes* checklist as provided in Appendix C. Section 2.5.4 of the draft ESR explains that "there are no built heritage resources and/or cultural heritage landscapes in proximity to the location of proposed work area" as shown in Figure 2.2 of Appendix A. The referenced figure in Appendix A includes a symbol for "Heritage Sites", which would appear to refer to previously identified heritage properties included on the City of Windsor's Municipal Heritage Register; this does not account

for the buildings or structures that are 40 or more years old, referred to in the Checklist, which are an indicator of potential previously unrecognized cultural heritage resources. Given the negative answer to question 3.a. of the Checklist, it is clear that the study area used for purposes of the Checklist is not so extensive as to include the cultural heritage resources marked on Figure 2.2. of Appendix A. If there are buildings or structures aged 40 years or more on or adjacent to the properties impacted by the proposed undertaking as indicated in the Checklist, a CHER should be carried out, unless a clear rationale to the contrary can be provided.

We acknowledge that the Stage 2 archaeological assessment report carried out by Stantec under PIF # P256-0715-2022 and provided in Appendix C, which recommends no further archaeological assessment, has been entered into the Ontario Public Register of Archaeological Reports.

In spite of the completion of archaeological assessment, Section 6.3.2 should include a commitment for the possibility of archaeological resources being unexpectedly encountered during construction. This commitment could be based on the last two paragraphs of Section 6 of the Stage 2 archaeological assessment report provided in Appendix C.

Finally, please note that this ministry's name has been reverted to the Ministry of Tourism, Culture and Sport (MTCS). The final version of the ESR could change references to MHSTCI accordingly.

Thank you for consulting MTCS on this project and please continue to do so throughout the EA process. If you have any questions or require clarification, please do not hesitate to contact me.

Sincerely,

Dan Minkin
Heritage Planner
Dan.Minkin@Ontario.ca

Copied to: Jian Li, Stantec

It is the sole responsibility of proponents to ensure that any information and documentation submitted as part of their EA report or file is accurate. MTCS makes no representation or warranty as to the completeness, accuracy or quality of the any checklists, reports or supporting documentation submitted as part of the EA process, and in no way shall MTCS be liable for any harm, damages, costs, expenses, losses, claims or actions that may result if any checklists, reports or supporting documents are discovered to be inaccurate, incomplete, misleading or fraudulent.

Please notify MTCS (at archaeology@ontario.ca) if archaeological resources are impacted by EA project work. All activities impacting archaeological resources must cease immediately, and a licensed archaeologist is required to carry out an archaeological assessment in accordance with the Ontario Heritage Act and the Standards and Guidelines for Consultant Archaeologists.

If human remains are encountered, all activities must cease immediately, and the local police and coroner must be contacted. In situations where human remains are associated with archaeological resources, MTCS should also be notified (at archaeology@ontario.ca) to ensure that the site is not subject to unlicensed alterations which would be a contravention of the Ontario Heritage Act.

Stantec Consulting Ltd.
100-140 Ouellette Place, Windsor ON N8X 1L9

October 26, 2022
File: 165620249

Attention: Mr. Dan Minkin, Heritage Planner

Ministry of Tourism, Culture and Sport
400 University Avenue, 5th Floor
Toronto ON, M7A 2R9

Dear Mr. Minkin,

Reference: Class Environmental Assessment – Pontiac Pumping Station Capacity Upgrades, City of Windsor

Thank you for your prompt response to the August 22, 2022, Draft ESR for Pontiac Pumping Station Capacity Upgrades, City of Windsor. The following is in response to your comments on the draft ESR, which was received on September 30, 2022.

Please see the attached Heritage Overview memo to address the answer to question 4D of the *Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes* checklist regarding the buildings or structures are that are 40 or more years old. The Heritage Overview memo concluded that with the appropriate regulatory bodies no protected heritage resources were identified within the Study Area and there is no potential for 19th century structures in the Study Area. One indicator of CHVI was identified according to the MCM Checklist for the Study Area, however, following further examination and discussion of the LRPCP property and the structures within the Study Area, there was no confirmed CHVI for the Study Area.

In Section 6.3.2 we will include a commitment for the possibility of archaeological resources being unexpectedly encountered during construction. The commitment will be based on the last two paragraphs of Section 6 of the Stage 2 archaeological assessment report provided in Appendix C.

The ministry's name will be corrected in the final version of the ESR to the Ministry of Tourism, Sport and Culture (MTCS).

Stantec Consulting Ltd.

Hannah Rindlisbacher B.A.Sc., E.I.T.
Environmental Engineer in Training
Phone: 519 966 2250 ext. 258
hannah.rindlisbacher@stantec.com

Jian Li Ph.D., P.Eng., PE
Project Manager
Phone: 519 966 2250 ext. 240
jian.li@stantec.com

c. Mr. Chandana Walgama, Pollution Control Project Engineer, City of Windsor

From:	ONT Environment / Environnement ONT
To:	Rindlisbacher, Hannah; cwalgama@citywindsor.ca; Li, Jian
Subject:	RE: 165620249: Notice of Draft Environmental Study Report - Pontiac Pumping Station Capacity Upgrades, City of Windsor
Date:	Thursday, September 15, 2022 7:40:06 PM
Attachments:	Aerial Plan - Proposed Pontiac PS Upgrades.pdf

UNCLASSIFIED / NON CLASSIFIÉ

Greetings,

Thank you for your correspondence.

Please note Transport Canada **does not** require receipt of all individual or Class EA related notifications. We are requesting project proponents self-assess if their project:

1. Will interact with a federal property and/or waterway by reviewing the Directory of Federal Real Property, available at at www.tbs-sct.gc.ca/dfrp-rbif/; **and**
2. Will require approval and/or authorization under any Acts administered by Transport Canada* available at http://www.tc.gc.ca/eng/acts-regulations/menu.htm.

Projects that will occur on federal property prior to exercising a power, performing a function or duty in relation to that project, will be subject to a determination of the likelihood of significant adverse environmental effects, per Section 82 of the *Impact Assessment Act, 2019*.

If the aforementioned does not apply, the Environmental Assessment program should not be included in any further correspondence and future notifications will not receive a response. If there is a role under the program, correspondence should be forwarded *electronically* to: EnviroOnt@tc.gc.ca with a **brief description of Transport Canada's expected role**.

*Below is a summary of the most common Acts that have applied to projects in an Environmental Assessment context:

- ***Canadian Navigable Waters Act (CNWA)*** – the Act applies primarily to works constructed or placed in, on, over, under, through, or across navigable waters set out under the Act. The Navigation Protection Program administers the CNWA through the review and authorization of works affecting navigable waters. Information about the Program, CNWA and approval process is available at: http://www.tc.gc.ca/eng/programs-621.html. Enquiries can be directed to NPPONT-PPNONT@tc.gc.ca or by calling (519) 383-1863.

- ***Railway Safety Act (RSA)*** – the Act provides the regulatory framework for railway safety, security, and some of the environmental impacts of railway operations in Canada. The Rail Safety Program develops and enforces regulations, rules, standards and procedures governing safe railway operations. Additional information about the Program is available at: https://www.tc.gc.ca/eng/railsafety/menu.htm. Enquiries can be directed to RailSafety@tc.gc.ca or by calling (613) 998-2985.

- ***Transportation of Dangerous Goods Act (TDGA)*** – the transportation of dangerous goods by air, marine, rail and road is regulated under the TDGA. Transport Canada, based on risks, develops safety standards and regulations, provides oversight and gives expert advice on dangerous goods to promote public safety. Additional information about the transportation of dangerous goods is available at: https://www.tc.gc.ca/eng/tdg/safety-menu.htm. Enquiries can be directed to TDG-TMDOntario@tc.gc.ca or by calling (416) 973-1868.

- ***Aeronautics Act*** – Transport Canada has sole jurisdiction over aeronautics, which includes aerodromes and all related buildings or services used for aviation purposes. Aviation safety in Canada is regulated under this Act and the Canadian Aviation Regulations (CARs). Elevated Structures, such as wind turbines and communication towers, would be examples of projects that must be assessed for lighting and marking requirements in accordance with the CARs. Transport Canada also has an interest in projects that have the potential to cause interference between wildlife and aviation activities. One example would be waste facilities, which may attract birds into commercial and recreational flight paths. The *Land Use In The Vicinity of Aerodromes* publication recommends guidelines for and uses in the vicinity of aerodromes, available at: https://www.tc.gc.ca/eng/civilaviation/publications/tp1247-menu-1418.htm. Enquires can be directed to tc.aviationservicesont-servicesaviationont.tc@tc.gc.ca or by calling 1 (800) 305-2059 / (416) 952-0230.

Please advise if additional information is needed.

Thank you,

Environmental Assessment Program, Ontario Region
Transport Canada / Government of Canada / 4900 Yonge St., Toronto, ON M2N 6A5
EnviroOnt@tc.gc.ca / Facsimile : (416) 952-0514 / TTY: 1-888-675-6863

Programme d'évaluation environnementale, Région de l'Ontario
Transports Canada / Gouvernement du Canada / 4900, rue Yonge, Toronto, ON, M2N 6A5
EnviroOnt@tc.gc.ca / télécopieur: (416) 952-0514

From: Rindlisbacher, Hannah <Hannah.Rindlisbacher@stantec.com>
Sent: Tuesday, August 30, 2022 3:48 PM
To: NPP ONT / PPN ONT <NPPONT-PPNONT@tc.gc.ca>
Subject: 165620249: Notice of Draft Environmental Study Report - Pontiac Pumping Station Capacity Upgrades, City of Windsor

Dear Suzanne,

The City of Windsor endorsed its first comprehensive Sewer and Coastal Flood Protection Master Plan (SMP) in 2020. The SMP, which were prepared in accordance with Phases 1 and 2 of the Municipal Class Environmental Assessment (Class EA), identified the need for the capacity upgrades of Pontiac

Storm Water Pumping Station within the Little River Pollution Control Plant to discharge excess water during major storm events in the expanded Pontiac drainage area.

To satisfy Phases 3 and 4 of the Class EA process, the City of Windsor initiated a Schedule C Class EA study to increase the capacity of the existing Pontiac Pumping Station. Alternative design concepts were evaluated to select the preferred solution that would improve efficiency and reduce the risk of flooding caused by severe storm events in the drainage area serviced by the Pontiac Pumping Station. A draft study report has been prepared which presents a number of possible alternative designs for the preferred solution. The merits and disadvantages of these alternatives are discussed with the decision-making process being structured to select the design that minimizes undesirable impacts on the natural, social and economic environments.
Through this evaluation process a recommended design has been identified and is provided for consideration as the preferred design. As shown in the attached aerial plan, the proposed design consists of the following main elements:

- New pumping station structure to house the three (3) new pumps, which will increase pumping capacity to provide a 1:100-year storm level of service for the extended Pontiac drainage area.
- New storm sewer to redirect flow from the existing stormwater inlet chamber to the new pumping station.
- New diesel generator to provide power in an emergency when the normal electrical feed is interrupted.

Your agency is invited to submit comments on the "Draft" Environmental Study Report. In an effort to conserve paper and reduce printing costs, the report is being distributed in electronic format as a PDF file on the City of Windsor website at the following link Pontiac Pumping Station Upgrades at the Little River Pollution Control Plant - Environmental Assessment (citywindsor.ca). If you would prefer, a hard copy of the draft report will be provided on request.

A public open house was held on July 13, 2022 to provide information on this project and to solicit public input. Copies of the Open House material are also available on the City of Windsor website above.

We would appreciate receiving any comments you care to offer on the draft report by Friday, September 30, 2022. Any comments or questions should be submitted to the following:

Chandana Walgama, P.Eng.
Pollution Control Project Engineer, City of Windsor
4155 Ojibway Parkway
Windsor, ON N9C 4A5
519-253-7111 x 3274
cwalgama@citywindsor.ca

Jian Li, Ph.D., P. Eng.
Project Manager, Stantec Consulting
2555 Ouellette Avenue, Suite 100
Windsor, Ontario N8X 1L9
519-966-2250 x 240
jian.li@stantec.com

Sincerely,

Hannah Rindlisbacher B.A.Sc., E.I.T.
Environmental Engineer in Training

Direct: 519 966-2250 ext 258
Mobile: 226 268-3033
hannah.rindlisbacher@stantec.com

Stantec
100-2555 Ouellette Avenue
Windsor ON N8X 1L9

APPENDIX B

Indigenous Consultation Log

Indigenous Consultation Log
Municipal Class Environmental Assessment
Pontiac Pumping Station Upgrades, City of Windsor

Contact Information	Date/Method of Communication	Correspondence Received and/or Project Information Distributed	Consultant Response
Ministry of Indigenous Affairs Molly Mann molly.mann@ontario.ca Manager, Indigenous Relations Unit Heather Levecque heather.levecque@ontario.ca Director, Indigenous Relations Unit Suite 400, 160 Bloor Street East Toronto, ON M7A 2E6	**Notice of Commencement** Date: March 7th, 2022 Method: Via Email	The Notice of Commencement was sent to Molly Mann and Heather Levecque, on March 7th, 2022, via Email	N/A
	1st Open House Date: July 5th, 2022 Method: Newspaper and Email	The Notice of 1st Open House was published in the Windsor Star on July 2nd, 2022. The Notice of Open House was sent to Molly Mann and Heather Levecque on July 5th, 2022, via Email. The 1st Open House was held on July 13th, 2022.	N/A
	Draft ESR Date: August 30th, 2022 Method: Email	An email, including access information to the electronic copy of draft ESR report, was mailed to individual Indigenous communities to solicit comments and inputs on August 30th, 2022.	N/A
	Notice of Completion Date: February 13th, 2023 Method: Email	A Notice of Completion, including access information to the electronic copy of final draft ESR report, was emailed to individual Indigenous communities to solicit comments and inputs on February 13th, 2023.	N/A
Southern First Nations Secretariat Ms. Jennifer Whiteye jenwhiteye@sfns.on.ca Executive Director 22361 Austin Line Bothwell, ON N0L 1Y0	**Notice of Commencement** Date: March 7th, 2022 Method: Via Email	The Notice of Commencement was sent to Jennifer Whiteye on August 15th, 2022, via Email.	N/A
	1st Open House Date: July 5th, 2022 Method: Newspaper and Email	The Notice of 1st Open House was published in the Windsor Star on July 2nd, 2022. The Notice of Open House was sent to Jennifer Whiteye on July 5th, 2022, via Email. The 1st Open House was held on July 13th, 2022.	N/A
	Draft ESR Date: August 30th, 2022 Method: Email	An email, including access information to the electronic copy of draft ESR report, was mailed to individual Indigenous communities to solicit comments and inputs on August 30th, 2022.	N/A
	Notice of Completion Date: February 13th, 2023 Method: Email	A Notice of Completion, including access information to the electronic copy of final draft ESR report, was emailed to individual Indigenous communities to solicit comments and inputs on February 13th, 2023.	N/A
Walpole Island First Nation / Bkejwanong Territory Dr. Dean Jacobs dean.jacobs@wifn.org Independent Consultant Janet MacBeth janet.macbeth@wifn.org Consultation Manager 117 Tahgahoning Road,R.R. #3 Wallaceburg, ON N8A 4K9	**Notice of Commencement** Date: March 7th, 2022 Method: Via Email	The Notice of Commencement was sent to Dr. Dean Jacobs and Janet MacBeth on March 7th, 2022, via Email.	N/A
	1st Open House Date: July 5th, 2022 Method: Newspaper and Email	The Notice of 1st Open House was published in the Windsor Star on July 2nd, 2022. The Notice of Open House was sent to Dr. Dean Jacobs and Janet MacBeth on July 5th, 2022, via Email. The 1st Open House was held on July 13th, 2022.	N/A
	Draft ESR Date: August 30th, 2022 Method: Email	An email, including access information to the electronic copy of draft ESR report, was mailed to individual Indigenous communities to solicit comments and inputs on August 30th, 2022.	N/A
	Notice of Completion Date: February 13th, 2023 Method: Email	A Notice of Completion, including access information to the electronic copy of final draft ESR report, was emailed to individual Indigenous communities to solicit comments and inputs on February 13th, 2023.	N/A
Métis Nation of Ontario, Thames Bluewater Métis Council	**Notice of Commencement** Date: March 7th, 2022 Method: Via Email	The Notice of Commencement was sent to Kathleen Anderson on March 7th, 2022 via Email.	N/A

Indigenous Consultation Log
Municipal Class Environmental Assessment
Pontiac Pumping Station Upgrades, City of Windsor

Contact Information	Date/Method of Communication	Correspondence Received and/or Project Information Distributed	Consultant Response
Kathleen Anderson tbwmc.president@gmail.com President 183 Summerset Crescent London, ON N6K 3S5	**1st Open House** Date: July 5th, 2022 Method: Newspaper and Email	The Notice of 1st Open House was published in the Windsor Star on July 2nd, 2022. The Notice of Open House was sent to Kathleen Anderson on July 5th, 2022, via Email. The 1st Open House was held on July 13th, 2022.	N/A
	Draft ESR Date: August 30th, 2022 Method: Email	An email, including access information to the electronic copy of draft ESR report, was mailed to individual Indigenous communities to solicit comments and inputs on August 30th, 2022.	N/A
	Notice of Completion Date: February 13th, 2023 Method: Email	A Notice of Completion, including access information to the electronic copy of final draft ESR report, was emailed to individual Indigenous communities to solicit comments and inputs on February 13th, 2023.	N/A
Caldwell First Nation Zack Hamm ecc2@caldwellfirstnation.ca Consultation Coordinator Michelle McCormack consultation@caldwellfirstnation.ca Consultation Coordinator 14 Orange Street Leamington, ON N8H 1P5	**Notice of Commencement** Date: March 7th, 2022 Method: Via Email and Online Consultation Tool	The Notice of Commencement was submitted online through the online consultation tool: www.consultwithcaldwell.ca on March 7th, 2022.	N/A
	1st Open House Date: July 5th, 2022 Method: In Person	Received an email from Zack Hamm on June 13, 2022, via email. Caldwell First Nation would like to engage in detailed consultation with the proponent. A meeting will be arranged to discuss their expectations.	Received email from Zack Hamm on June 13, 2022: Caldwell First Nation would like to engage in detailed consultation with the proponent. A 'Fieldwork Participation Agreement' and 'Technical Review Agreement' which outlined capacity funding was sent to the City on July 15, 2022. The City advised via email on October 11, 2022, that they would not be able to provide funding for the review of Class EA study materials for these municipal class environmental assessments.
	Draft ESR Date: August 30th, 2022. Method: Consultation Tool	An electronic copy of draft ESR report, was submitted to www.consultwithcaldwell.ca to solicit comments and inputs on August 30th, 2022.	Online Consultation Tool status: Awaiting response, as of November 2022
	Notice of Completion Date: February 13th, 2023 Method: Consultation Tool	A Notice of Completion, including access information to the electronic copy of final draft ESR report, was submitted to www.consultwithcaldwell.ca to solicit comments and inputs on February 13th, 2023.	N/A
Aamjiwnaang First Nation Chris Plain cplain@aamjiwnaang.ca Chief Joanne Rogers jrogers@aamjiwnaang.ca Councillor Cathleen O'Brien cobrien@aamjiwnaang.ca Environmental Coordinator Courtney Jackson cjackson@aamjiwnaang.ca	**Notice of Commencement** Date: March 7th, 2022 Method: Via Email	The Notice of Commencement was sent to Chief Chris Plain, Joanne Rogers, Cathleen O'Brien and Courtney Jackson on March 7th, 2022, via Email.	N/A
	1st Open House Date: July 5th, 2022 Method: Newspaper and Email	The Notice of 1st Open House was published in the Windsor Star on July 2nd, 2022. The Notice of Open House was sent to Chief Chris Plain, Joanne Rogers, Cathleen O'Brien and Courtney Jackson on July 5th, 2022, via Email. The 1st Open House was held on July 13th, 2022.	N/A
	Draft ESR Date: August 30th, 2022 Method: Email	An email, including access information to the electronic copy of draft ESR report, was mailed to individual Indigenous communities to solicit comments and inputs on August 30th, 2022.	N/A
	Notice of Completion Date: February 13th, 2023 Method: Email	A Notice of Completion, including access information to the electronic copy of final draft ESR report, was emailed to individual Indigenous communities to solicit comments and inputs on February 13th, 2023.	N/A

Indigenous Consultation Log
Municipal Class Environmental Assessment
Pontiac Pumping Station Upgrades, City of Windsor

Contact Information	Date/Method of Communication	Correspondence Received and/or Project Information Distributed	Consultant Response
Environment Worker 978 Tashmoo Avenue Sarnia, ON N7T 7H5			
Delaware Nation (Moravian of the Thames) Denise Stonefish denise.stonefish@delawarenation.on.ca Chief 14760 School House Line Thamesville, ON N0P 2K0	**Notice of Commencement** Date: March 7th, 2022 Method: via Email	The Notice of Commencement was sent to Denise Stonefish on March 7th, , 2022, via Email.	N/A
	1st Open House Date: July 5th, 2022 Method: Newspaper and Email	The Notice of 1st Open House was published in the Windsor Star on July 2nd, 2022. The Notice of Open House was sent to Denise Stonefish on July 5th, 2022, via Email. The 1st Open House was held on July 13th, 2022.	N/A
	Draft ESR Date: August 30th, 2022 Method: Email	An email, including access information to the electronic copy of draft ESR report, was mailed to individual Indigenous communities to solicit comments and inputs on August 30th, 2022. The email did not deliver to Denise Stonefish, Stantec submitted a request on Delaware Nation's website August 31st for an updated email address.	N/A
	Notice of Completion Date: February 13th, 2023 Method: Email	A Notice of Completion, including access information to the electronic copy of final draft ESR report, was emailed to individual Indigenous communities to solicit comments and inputs on February 13th, 2023.	N/A
Metis Nation of Ontario Margaret Froh margaretF@metisnation.org Director, Lands, Resources and Consultations 75 Sherbourne Street, Unit 311 Toronto ON M5A 2P9	**Notice of Commencement** Date: March 7th, 2022 Method: via Email	The Notice of Commencement was sent to Margaret Froh on March 7th, 2022, via Email.	N/A
	1st Open House Date: July 5th, 2022 Method: Newspaper and Email	The Notice of 1st Open House was published in the Windsor Star on July 2nd, 2022. The Notice of Open House was sent to Margaret Froh on July 5th, 2022, via Email. The 1st Open House was held on July 13th, 2022.	N/A
	Draft ESR Date: August 30th, 2022 Method: Email	An email, including access information to the electronic copy of draft ESR report, was mailed to individual Indigenous communities to solicit comments and inputs on August 30th, 2022.	N/A
	Notice of Completion Date: February 13th, 2023 Method: Email	A Notice of Completion, including access information to the electronic copy of final draft ESR report, was emailed to individual Indigenous communities to solicit comments and inputs on February 13th, 2023.	N/A
Chippewas of Kettle and Stony Point First Nation Emily Ferguson consultation@kettlepoint.org CKSPFN Consultation 6247 Indian Lane, R.R. #2 Forest, ON N0N 1J1	**Notice of Commencement** Date: March 7th, 2022 Method: via Email	The Notice of Commencement was sent to Jason Henry on March 7th, 2022, via Email.	N/A
	1st Open House Date: July 5th, 2022 Method: Newspaper and Email	The Notice of 1st Open House was published in the Windsor Star on July 2nd, 2022. The Notice of Open House was sent to Jason Henry on July 5th, 2022, via Email. The 1st Open House was held on July 13th, 2022.	Contact list was updated to Emily Ferguson as only contact.
	Draft ESR Date: August 30th, 2022 Method: Email	An email, including access information to the electronic copy of draft ESR report, was mailed to individual Indigenous communities to solicit comments and inputs on August 30th, 2022.	N/A
	Notice of Completion Date: February 13th, 2023 Method: Email	A Notice of Completion, including access information to the electronic copy of final draft ESR report, was emailed to individual Indigenous communities to solicit comments and inputs on February 13th, 2023.	N/A

Indigenous Consultation Log
Municipal Class Environmental Assessment
Pontiac Pumping Station Upgrades, City of Windsor

Contact Information	Date/Method of Communication	Correspondence Received and/or Project Information Distributed	Consultant Response
Chippewas of the Thames First Nation Jacqueline French jfrench@cottfn.com Chief Kelly Riley kriley@cottfn.com Director of Treaties, Lands & Environment Fallon Burch fburch@cottfn.com Consultation Coordinator 320 Chippewa Road Muncey, ON N0L 1Y0	**Notice of Commencement** Date: March 7th, 2022 Method: via Email	The Notice of Commencement was sent to Chief Jacqueline French, Kelly Riley and Fallon Burch March 7th, 2022, via Email. The Notice of Commencement was submitted to NationsConnect.ca on March 14th, 2022. (see consultant response to the right)	Response from Fallon Burch: The Chippewas of the Thames First Nation has transitioned to using NationsConnect as our preferred method to receive consultation and engagement requests. Requests sent over email are not considered submitted and will not be reviewed. To register for NationsConnect, and submit your request, please visit NationsConnect.ca.
	1st Open House Date: July 5th, 2022 Method: Newspaper and NationsConnect.ca	The Notice of 1st Open House was published in the Windsor Star on July 2nd, 2022. The Notice of Open House was submitted to Chippewas of the Thames First Nation via NationsConnect.ca on July 5th, 2022, via Email. The 1st Open House was held on July 13th, 2022.	N/A
	Draft ESR Date: August 30th, 2022 Method: Consultation website	An electronic copy of draft ESR report, was submitted to www.nationsconnect.ca to solicit comments and inputs on August 30th, 2022.	Response from Fallon Burch September 28th, 2022: Based on our review of the draft ESR report, we have identified no concerns or recommendations. We are satisfied with the mitigation measures put in place to ensure minimal impacts to species as well as the surrounding area. We ask that if there are any substantive changes to the proposed project that you keep us notified with the opportunity to review and provide comments if necessary. The City responded October 3rd, 2022 that they do not pay any third-party for the review of documents during a public consultation phase of an environmental assessment. The City had a Field Liaison Agreement with COTTFN and payment was provided for the field work for this project, but they will not pay for the review of public documents. As part of the EA process the Public's comments and concerns are always welcome.
	Notice of Completion Date: February 13th, 2023 Method: Email	A Notice of Completion, including access information to the electronic copy of final draft ESR report, was submitted to www.nationsconnect.ca to solicit comments and inputs on February 13th, 2023.	N/A
Oneida Nation of the Thames ONYOTA'A:KA Adrian Chrisjohn adrian.chrisjohn@oneida.on.ca Chief Cherilyn Hill cherilyn.hill@oneida.on.ca Political Office Manager 2212 Elm Avenue Southwold, ON N0L 2G0	**Notice of Commencement** Date: March 7th, 2022 Method: via Email	The Notice of Commencement was sent to Chief Adrian Chrisjohn and Cherilyn Hill on March 7th, 2022, via Email.	N/A
	1st Open House Date: July 5th, 2022 Method: Newspaper and Email	The Notice of 1st Open House was published in the Windsor Star on July 2nd, 2022. The Notice of Open House was sent to Adrian Chrisjohn and Cherilyn Hill on July 5th, 2022, via Email. The 1st Open House was held on July 13th, 2022.	N/A
	Draft ESR Date: August 30th, 2022 Method: Email	An email, including access information to the electronic copy of draft ESR report, was mailed to individual Indigenous communities to solicit comments and inputs on August 30th, 2022.	N/A
	Notice of Completion Date: February 13th, 2023 Method: Email	A Notice of Completion, including access information to the electronic copy of final draft ESR report, was emailed to individual Indigenous communities to solicit comments and inputs on February 13th, 2023.	N/A

From: Fallon Burch
To: Rindlisbacher, Hannah
Cc: Jennifer Mills; Rochelle Smith
Subject: RE: 165620249: Notice of Study Commencement - Class EA Pontiac Pumping Station Upgrades, City of Windsor, Ontario
Date: Monday, March 7, 2022 4:15:29 PM
Attachments: image001.png
image002.png
NationsConnect User Guide.pdf

Good afternoon,

The Chippewas of the Thames First Nation has transitioned to using NationsConnect as our preferred method to receive consultation and engagement requests. Requests sent over email are not considered submitted and will not be reviewed.

To register for NationsConnect, and submit your request, please visit NationsConnect.ca.

You will need a spatial file in .kml, .kmz, or .zip shapefile formats to submit your request. Once your project has been submitted, you can attach additional files or send updated communication through the Conversations feature on NationsConnect.

If you have any questions about NationsConnect or require technical assistance in any way, please reach out to support@kwusen.ca.

Regards,

Fallon

Fallon Burch
Consultation Coordinator, Chippewas of the Thames First Nation
320 Chippewa Rd Muncey, ON N0L 1Y0 | 519-289-5555 |
www.cottfn.com/consultation

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From: Rindlisbacher, Hannah <Hannah.Rindlisbacher@stantec.com>
Sent: March 7, 2022 3:38 PM

To: Fallon Burch <fburch@cottfn.com>
Subject: 165620249: Notice of Study Commencement - Class EA Pontiac Pumping Station Upgrades, City of Windsor, Ontario

> You don't often get email from hannah.rindlisbacher@stantec.com. Learn why this is important

[redacted] Fallon,

The City of Windsor is undertaking the Class Environmental Assessment (EA) process to develop a long-term solution to improve efficiency and reduce the risk of flooding caused by severe storm events in the expanded Pontiac drainage area. This study will satisfy Phases 3 and 4 of the Class EA process which will involve the evaluation of alternative design concepts for the proposed Pontiac Pumping Station Capacity Upgrades. A copy of the Notice of Study Commencement for the project is attached.

On behalf of the City of Windsor, we are inviting you to participate in this project and to assist us in identifying the environmental, social, and cultural values your community may have within the Project Area.

If you have any comments or concerns regarding this project and wish to provide input into the Study, please contact the undersigned below or one of the individuals named in the attached Notice of Commencement

Sincerely,

Hannah Rindlisbacher
BASc, Environmental Engineering Intern

Direct: 519 966-2250 ext 258
Mobile: 226 268-3033
hannah.rindlisbacher@stantec.com

Stantec
100-2555 Ouellette Avenue
Windsor ON N8X 1L9

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Deshkan Ziibiing
Chippewas of the Thames
First Nation

320 Chippewa Road
Muncey, ON, N0L 1Y0
Tel: 519-289-5555
Fax: 519-289-2230
info@cottfn.com

September 28, 2022

Chandana Walgama
Pollution Control Project Engineer
City of Windsor
4155 Ojibway Parkway
Windsor, ON N9C 4A5

RE: Pontiac Pumping Station Upgrades, Draft Environmental Study Report (ESR) Review

Dear Chandana,

Thank you for the opportunity to review the draft environmental study report for the Pontiac Pumping Station Upgrades.

Based on our review of the draft ESR report, we have identified no concerns or recommendations. We are satisfied with the mitigation measures put in place to ensure minimal impacts to species as well as the surrounding area. We ask that if there are any substantive changes to the proposed project that you keep us notified with the opportunity to review and provide comments if necessary.

We look forward to keeping this open line of communication. As per *'Appendix D'* of the Wiindmaagewin attached is invoice 0389.

If you have any questions, please feel free to contact me.

Sincerely,

Fallon Burch
Chippewa of the Thames First Nation
Consultation Coordinator
(519) 289-5555 Ext. 251
fburch@cottfn.com

From:	Cherilyn Hill
To:	Rindlisbacher, Hannah
Cc:	Brandon Doxtator; Pamela Tobin; Chief Todd Cornelius
Subject:	RE: 165620249: Notice of Draft Environmental Study Report - Pontiac Pumping Station Capacity Upgrades, City of Windsor
Date:	Wednesday, August 31, 2022 9:47:25 AM

Good Morning Hannah:

Thank-you for the information. I have forwarded to our Environment and Consultation Coordinator Brandon Doxtator as well as our Chief Todd Cornelius and CEO, Pam Tobin for follow up. I have cc'd them on this email for future reference.

Best Regards,

Cherilyn Hill
Oneida Nation of The Thames
2210 Elm Ave Southwold, ON N0L 2G0
Phone: 519-652-6161 ext. 804

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From: Rindlisbacher, Hannah <Hannah.Rindlisbacher@stantec.com>
Sent: August 30, 2022 4:58 PM
To: Cherilyn Hill <cherilyn.hill@oneida.on.ca>
Subject: 165620249: Notice of Draft Environmental Study Report - Pontiac Pumping Station Capacity Upgrades, City of Windsor

CAUTION: This email originated from outside of the Oneida Nation Of The Thames Organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Dear Cherilyn,

The City of Windsor endorsed its first comprehensive Sewer and Coastal Flood Protection Master Plan (SMP) in 2020. The SMP, which were prepared in accordance with Phases 1 and 2 of the Municipal

Class Environmental Assessment (Class EA), identified the need for the capacity upgrades of Pontiac Storm Water Pumping Station within the Little River Pollution Control Plant to discharge excess water during major storm events in the expanded Pontiac drainage area.

To satisfy Phases 3 and 4 of the Class EA process, the City of Windsor initiated a Schedule C Class EA study to increase the capacity of the existing Pontiac Pumping Station. Alternative design concepts were evaluated to select the preferred solution that would improve efficiency and reduce the risk of flooding caused by severe storm events in the drainage area serviced by the Pontiac Pumping Station. A draft study report has been prepared which presents a number of possible alternative designs for the preferred solution. The merits and disadvantages of these alternatives are discussed with the decision-making process being structured to select the design that minimizes undesirable impacts on the natural, social and economic environments.
Through this evaluation process a recommended design has been identified and is provided for consideration as the preferred design. As shown in the attached aerial plan, the proposed design consists of the following main elements:

- New pumping station structure to house the three (3) new pumps, which will increase pumping capacity to provide a 1:100-year storm level of service for the extended Pontiac drainage area.
- New storm sewer to redirect flow from the existing stormwater inlet chamber to the new pumping station.
- New diesel generator to provide power in an emergency when the normal electrical feed is interrupted.

Your agency is invited to submit comments on the “Draft” Environmental Study Report. In an effort to conserve paper and reduce printing costs, the report is being distributed in electronic format as a PDF file on the City of Windsor website at the following link Pontiac Pumping Station Upgrades at the Little River Pollution Control Plant - Environmental Assessment (citywindsor.ca). If you would prefer, a hard copy of the draft report will be provided on request.

A public open house was held on July 13, 2022 to provide information on this project and to solicit public input. Copies of the Open House material are also available on the City of Windsor website above.

We would appreciate receiving any comments you care to offer on the draft report by Friday, September 30, 2022. Any comments or questions should be submitted to the following:

Chandana Walgama, P.Eng.
Pollution Control Project Engineer, City of Windsor
4155 Ojibway Parkway
Windsor, ON N9C 4A5
519-253-7111 x 3274
cwalgama@citywindsor.ca

Jian Li, Ph.D., P. Eng.
Project Manager, Stantec Consulting
2555 Ouellette Avenue, Suite 100
Windsor, Ontario N8X 1L9
519-966-2250 x 240
jian.li@stantec.com

Sincerely,

Hannah Rindlisbacher B.A.Sc., E.I.T.
Environmental Engineer in Training

Direct: 519 966-2250 ext 258
Mobile: 226 268-3033
hannah.rindlisbacher@stantec.com

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100-2555 Ouellette Avenue
Windsor ON N8X 1L9

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APPENDIX C: FIELD INVESTIGATIONS

1. Geotechnical Assessment and Preliminary Geotechnical Exploration Report
2. Preliminary Soil Characterization Report
3. Stage 2 Archaeological Assessment Report
4. Ministry of Tourism, Culture and Sport Letter Affirming Entry of 'Stage 2 Archaeological Assessment Report' into the Ontario Public Register
5. Natural Heritage Impact Assessment Report
6. Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes – Checklist
7. Heritage Overview Memo

APPENDIX C

Geotechnical Assessment and Preliminary Geotechnical Exploration Report

REPORT

Geotechnical Assessment and Preliminary Geotechnical Exploration and Testing Program

Class Environmental Assessment Study, Proposed Pontiac Pump Station Improvements, Little River Pollution Control Plant, City of Windsor, Ontario

Submitted to:

Mr. Jian Li, Ph.D., P.Eng., PE

Stantec Consulting Ltd.
2555 Ouellette Avenue, Suite 100
Windsor, Ontario N8X 1L9

Submitted by:

Golder Associates Ltd.
1825 Provincial Road, Windsor, Ontario, N8W 5V7, Canada

+1 519 250 3733

21507944-R01-Rev0

June 9, 2022

Distribution List

1 E-Copy: WSP Golder

1 E-Copy: Stantec Consulting Ltd.

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TABLES

Table 1: Summary of Peak and Remoulded Undrained Shear Strengths
Table 2: Estimate Soil Parameter Values for Excavation Support Systems
Table 3: Undrained Shear Strength and Corresponding Maximum Stable Depth of Trench Excavations

Important Information and Limitations on this Report
Method of Soil Classification
Abbreviations and Terms Used on Records of Boreholes and Test Pits
List of Symbols
Record of Boreholes

FIGURES

Figure 1: Location Plan – Current (2022) Exploration

Figure 2: Location Plan – Previous Explorations

Figure 3: Grain Size Distribution – sandy SILTY CLAY

Figure 4: Plasticity Chart

APPENDICES

APPENDIX A
Records of Previous Boreholes

1.0 INTRODUCTION

This report presents the results of the geotechnical assessment and preliminary geotechnical exploration and testing program carried out to support the Class Environmental Assessment (EA) for the proposed Pontiac pump station improvements at the Little River Pollution Control Plant (9400 Little River Road) in the City of Windsor, Ontario (referred to hereinafter as "the Site"). The location of the Site is shown on the Key Plan, Figure 1.

Based on the project information provided by Stantec Consulting Ltd. ("Stantec"), it is understood that a new wet well is proposed to be constructed at the northwest corner of the Little River Pollution Control Plant to accommodate capacity issues related to the existing Pontiac pump station. As currently envisaged, the new wet well will measure 9.5 metres by 16.5 metres in plan and will extend to a depth of approximately 10.6 metres below grade. The wet well will house three new pumps, each having a flow capacity of 1.2 cubic metres per second. In addition, an outlet from the new wet well structure to the Little River Drain, adjacent to the existing Pontiac pump station, will be constructed as part of the proposed improvement works. At this time, the current requested scope of work is required for the Class EA study of the new pump station infrastructure and not for detailed design.

The purpose of the geotechnical assessment was to evaluate the subsurface soil and groundwater conditions based on available mapping (topographic, surficial soil, and bedrock geological mapping) and borehole data from previous geotechnical work in the general area of the Site to outline the general geotechnical conditions and delineate areas of geotechnical opportunities/constraints for the project. The purpose of the preliminary geotechnical exploration and testing program was to supplement the available geotechnical data and provide preliminary recommendations for the geotechnical design aspects of the proposed works.

Confirmation of authorization to proceed with the assessment and exploration, in accordance with our December 13, 2021, proposal (Proposal No. CX21507944), was provided by Mr. Jian Li, Ph.D., P.Eng., P.E., on behalf of Stantec on March 17, 2022.

This report should be read in conjunction with the attached document "Important Information and Limitations of This Report", which comprises an integral component hereof. The reader's attention is specifically drawn to this material, as it is essential for the proper use and interpretation of the information presented and discussed herein.

2.0 GEOTECHNICAL ASSESSMENT METHODOLOGY

To evaluate the subsurface conditions in the vicinity of the Site, existing geological and geotechnical information in the area of the Site, readily available from our files, was compiled and reviewed. The information consisted of topographical mapping, aerial mapping, soil and bedrock mapping, geological data, and geotechnical data from previous explorations carried out adjacent to the Site. The relevant previous exploration reports are identified as follows:

- Golder Project No. 031-140318 titled 'Geotechnical Investigation, Wyandotte Street Extension, Glendale Drive to Florence Avenue, Windsor, Ontario' dated February 16, 2004;
- Golder Project No. 031-140333 titled 'Geotechnical Investigation, Proposed Bridge Over Little River, Wyandotte Street East Extension, City of Windsor, Ontario' dated February 27, 2004;
- Golder Project No. 06-1140-029 titled 'Geotechnical Investigation, Sanitary Servicing of Annexed Lands and Town of Tecumseh Lands, Phase 1B, Windsor, Ontario" dated April 27, 2006;

- Golder Project No. 09-1140-W091A titled ‘Geotechnical Investigation, Sandwich South Trunk Sanitary Sewer, McHugh Street to Peppervine Street, Windsor, Ontario’ dated September 2009;
- Golder Project No. 09-1140-W091B titled ‘Geotechnical Investigation, Sandwich South Trunk Sanitary Sewer, Peppervine Street to Little River Pollution Control Plant, Windsor, Ontario’ dated October 2009; and
- Golder Project No. 20148676-R01 titled ‘Geotechnical Exploration, Little River Pollution Control Plant Gate 1 Entrance, 9400 Little River Road, Windsor, Ontario’ dated September 2020.

The subsurface conditions encountered in the relevant previous boreholes are shown in detail on the attached Record of Borehole sheets in Appendix A. The approximate locations of the previous boreholes are shown on Figure 2.

3.0 SITE DESCRIPTION

3.1 General

The Pontiac pump station is located at the Little River Pollution Control Plant in the City of Windsor, Ontario. The Little River Pollution Control Plant is bounded by Wyandotte Street East to the north, Little River Road to the south, the Little River Drain to the west, and the Little River Corridor (a naturalized path linking the Ganatchio Trail to Tecumseh Road) to the east. The Site is relatively flat and land use is primarily residential, with various parklands also located within the Little River Corridor.

Aerial photography between 2000 and 2021 was reviewed via the County of Essex MapViewer digital mapping online resource. These aerial photographs were reviewed in order to develop a history of the development of the Site and surrounding properties. Based on the available photographs, the surrounding land use has remained relatively unchanged since 2000, apart from the extension of Wyandotte Street West to the north, which can be seen from 2008 onward.

3.2 Site Geology

3.2.1 Overburden Soils

The Project Area is located in the physiographic region of Southwestern Ontario known as the St. Clair Clay Plains. Within this region, Essex County and the southwestern part of Kent County are normally discussed as a sub-region known as the Essex Clay Plain. The clay plain was deposited during the retreat of ice sheets (late Pleistocene Era) when a series of glacial lakes inundated the area. In general, the ice sheets deposited materials with a glacial-till-like gradation in the Essex County area. Depending on the locations of the glacial ice sheets and depths of water in the ice-contact glacial lakes, the materials may have been directly deposited at the contact between the ice sheet and the bedrock or, as the lake levels rose, and the ice sheets retreated and floated, the soil and rock debris within and at the base of the ice were deposited through the lake water (glaciolacustrine depositional environment). The term “glacial till”, in its common usage, often indicates a very dense or hard composition resulting from consolidation and densification under the weight of the ice sheet and the mineral soil particles typically have a distribution of grain sizes ranging from cobbles to clay. In many areas of Essex County, however, the majority of the soils described as “glacial till” were deposited through water and have a soft to firm consistency below an upper “crust” that has since become stiff to hard through weathering and desiccation. At

this site, these materials have generally been described as sandy silty clay of low to intermediate plasticity, with a trace of gravel.

The quaternary geology mapping from the Ontario Department of Mines Preliminary Geological Map No. 3253 titled “Quaternary Geology, Essex County Area (West Half), Southern Ontario” dated 1994 indicates that the predominant soil types are Pleistocene deposits consisting of glaciolacustrine silty clay and clayey silt till.

3.2.2 Bedrock

The bedrock underlying the Site is reported to consist of Middle Devonian limestone of the Hamilton Group Formation. Based on the bedrock depth mapping from the Ontario Ministry of Northern Development and Mines Map No. P.3255 titled “Drift Thickness, Essex County Area (West Half)”, dated 1994, the Site lies between the 46 metre and 53 metre bedrock depth contours. Bedrock was cored in one borehole (identified as borehole BH-4) advanced as part of Golder Project No. 031-140333. Borehole BH-4 was located some 300 metres northwest of the Site and encountered grey limestone bedrock at about elevation 139 metres (about 38 metres below the ground surface).

4.0 PRELIMINARY EXPLORATION PROCEDURES

The field work for the preliminary geotechnical exploration and testing program was carried out on April 14, 2022, at which time two (2) boreholes, designated as boreholes (BH)-101 and BH-102, were advanced to depths of about 15.9 and 12.8 metres below the existing ground surface, respectively. The approximate locations of the boreholes are shown on the Location Plan, Figure 1. As shown, borehole BH-101 was advanced with the proposed footprint of the wet well and borehole BH-102 was advanced at the location of the proposed sewer outlet to the Little River Drain.

The boreholes were advanced using a truck-mounted drilling rig supplied and operated by a specialist drilling contractor licensed by the Ministry of the Environment, Conservation and Parks (MECP[1]). The field work was supervised by a qualified member of our geotechnical engineering staff who located the boreholes in the field, obtained underground utility clearances, directed the drilling and sampling operations, logged the boreholes, and cared for the soil samples obtained. During the drilling of the boreholes, soil sampling was carried out at selected intervals of depth using standard 35-millimetre inside diameter split-spoon sampling equipment in accordance with the Standard Penetration Test (SPT) procedures outlined in ASTM International standard D1586: ‘Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils’. The SPTs were conducted using an automatic hammer. The SPT N values[2] presented on the Record of Borehole sheets and discussed herein are the values measured directly in the field and are unfactored. Field vane shear strength testing was carried out in the softer cohesive deposits, in accordance with ASTM International standard D2573: ‘Standard Test Method for Field Vane Shear Test in Cohesive Soil’ to evaluate peak and remoulded undrained shear strengths.

The soil samples were classified in the field, placed in individually labelled 1-litre sealable plastic bags and transported to our Windsor office for further examination and laboratory testing. The boreholes were monitored

[1] Formerly Ministry of Environment and Climate Change (MOECC), formerly Ministry of Environment (MOE).

[2] The SPT N value is defined as the number of blows required by a 63.5-kilogram hammer dropped from a height of 760 millimetres to drive a split spoon sampler a distance of 300 millimetres into the soil after having first penetrated 150 millimetres.

for groundwater seepage during drilling. Following drilling, the boreholes were backfilled in accordance with the requirements of the Revised Regulations of Ontario (R.R.O.) 1990, Ontario Regulation (O.Reg.) 903, as amended, of the Ontario Water Resources Act.

The soil stratigraphy and groundwater conditions encountered in the boreholes, as well as the results of field and laboratory testing, are shown in detail on the Record of Borehole sheets and Figures 3 and 4 following the text of this report. The ground surface elevations at the borehole locations were surveyed by Golder staff using an established local benchmark defined as *"manhole number 6S2249, located at approximate Universal Transverse Mercator (UTM) coordinates 4688342 metres north and 341216 metres east."* The local benchmark was assigned an arbitrary elevation of 100.0 metres. Based on the elevation survey, the ground surface elevations at the borehole locations ranged from about elevation 100.0 metres to 100.1 metres.

5.0 SUBSURFACE CONDITIONS

5.1 General

The subsurface conditions encountered in the boreholes advanced at the Site, together with the results of in situ and geotechnical laboratory testing, are shown on the attached Record of Borehole sheets and Figures 3 and 4 following the text of this report. Records of previous boreholes advanced in the area of the Site are shown in Appendix A, and their locations are shown on Figure 2. The following paragraphs have been simplified in terms of major soil strata for the purposes of geotechnical design. The soil boundaries indicated have been inferred from non-continuous samples and observations of sampling and drilling resistance and typically represent transitions from one soil type to another rather than exact planes of geological change. Further, the subsurface conditions will vary between and beyond the borehole locations.

5.2 Previous Borehole Data

Geotechnical data from 50 boreholes advanced near the Site were retrieved from our files. The soil stratigraphy, groundwater conditions, and results of field and laboratory testing are shown on the previous Record of Borehole sheets in Appendix A. The approximate locations of the previous boreholes are shown on Figure 2. In general, the subsurface conditions in the vicinity of the Site consist of existing fill, topsoil, and pavement structures underlain by extensive deposits of native silty clay to sandy silty clay. Seams and layers of fine sands, silty sands and / or sandy silts are present within the silty clay stratum.

5.3 Current (2022) Preliminary Exploration – Soil Conditions

5.3.1 Topsoil

Topsoil was encountered at the ground surface in both boreholes and was measured to be about 150 to 240 millimetres thick. The noted thicknesses are specific to the borehole locations and variations in the topsoil thickness should be anticipated in other areas of the Site. Samples of the topsoil had water contents ranging from about 18 to 39 per cent. Materials designated as topsoil in this report were classified based solely on visual and textural evidence. Testing of organic content or for other soil nutrients was not carried out. Accordingly, materials

classified as topsoil herein cannot necessarily be relied upon for support and growth of landscaping vegetation without supplemental soil fertility analyses.

5.3.2 Sandy Silty Clay Fill

Beneath the topsoil, boreholes BH-101 and BH-102 encountered a layer of sandy silty clay fill with organics. The sandy silty clay fill with organics had a brown to dark grey colouration and was about 1.3 metres thick in borehole BH-101 and about 0.8 metres thick in borehole BH-102. The sandy silty clay fill with organics had water contents ranging from about 12 to 21 per cent.

5.3.3 Native Sandy Silty Clay

Beneath the sandy silty clay fill with organics, boreholes BH-101 and BH-102 encountered, and were terminated in, an extensive deposit of native sandy silty clay after exploring the stratum for depths of about 14.4 metres and 11.7 metres, respectively. The native sandy silty clay generally had a mottled brown and grey, brown, and grey colouration. The upper 0.7 metres of native sandy silty clay in borehole BH-102 had a dark grey colouration and contained organic matter. Measured SPT N values obtained in the native sandy silty clay ranged from 1 to 17 blows per 0.3 metres, indicating a very soft to very stiff consistency. Samples of the native sandy silty clay had water contents ranging from about 12 to 23 per cent.

Grain size distribution analyses and Atterberg limits testing were carried out on two samples of the native sandy silty clay, the results of which are shown on Figure 3 and Figure 4, respectively. The results of the Atterberg limits testing indicate an inorganic silty clay of low to intermediate plasticity.

Field vane shear strength testing was carried out in the softer grey sandy silty clay layer and the results are summarized in the table below. As shown, peak and remoulded undrained shear strengths ranged from between about 29 and 103 kilopascals and between about 14 and 83 kilopascals, respectively. The soil sensitivity (ratio of peak to remoulded undrained shear strength) ranged from 1.2 to 2.1, indicating that the materials would be classified as slightly to medium sensitive to strength loss due to disturbance. The average sensitivity was 1.7, indicating that the materials would be classified as slightly sensitive to strength loss due to disturbance on average.

Table 1: Summary of Peak and Remoulded Undrained Shear Strengths

Borehole ID	Test Depth (metres)	Test Elevation[(1)] (metres)	Undrained Shear Strength (kilopascals)		Soil Sensitivity
			Peak	Remoulded	
101	8.7	91.3	103	75	1.4
101	9.0	91.0	98	83	1.2
101	10.2	89.8	68	39	1.7
101	10.5	89.5	36	19	1.9
101	11.7	88.3	53	30	1.8

Borehole ID	Test Depth (metres)	Test Elevation[1] (metres)	Undrained Shear Strength (kilopascals)		Soil Sensitivity
			Peak	Remoulded	
101	12.0	88.0	43	29	1.5
101	13.3	86.7	35	19	1.9
101	13.6	86.4	43	22	2.0
101	14.8	85.2	36	17	2.1
101	15.1	84.9	47	26	1.8
102	5.6	94.4	132	N/A[2]	N/A[2]
102	7.2	92.9	68	37	1.8
102	7.5	92.6	82	65	1.3
102	8.7	91.4	83	55	1.5
102	10.2	89.9	40	24	1.6
102	10.5	89.6	75	55	1.4
102	11.7	88.3	29	14	2.0
102	12.0	88.0	32	19	1.7

(1) Test elevation referenced to local datum (see section 4.0)
(2) Remoulded field vane shear strength testing was not carried out at a test depth of 5.6 metres in borehole BH-102 since the peak undrained shear strength nearly exceeded the capacity of the testing apparatus.

5.4 Groundwater Conditions

Groundwater seepage conditions were observed in the boreholes during drilling, as shown on the Record of Borehole sheets. It was observed that boreholes BH-101 and BH-102 were both dry during drilling and no seepage into the open boreholes was observed. It should be noted that groundwater conditions are generally dependent on the amount of precipitation, site grading and other measures in place to control surface water drainage, as well as the time of year, and can fluctuate significantly in elevation over time.

The depth below which the native sandy silty clay stratum is permanently saturated can be inferred by the depth of colour change from brown to grey, which was observed at depths of about 4.1 to 6.4 metres below the existing ground surface.

6.0 DISCUSSION

This section of the report provides our interpretation of the factual geotechnical data obtained during the field work and it is intended for the guidance of the design engineer. Where comments are made on construction, they are provided only to highlight those aspects which could affect the design of the project. Contractors bidding on or undertaking the works should examine the factual results of the investigation, satisfy themselves as to the adequacy of the information for construction, and make their own independent interpretation of the subsurface

information provided as it affects their proposed construction means and methods, equipment selection, scheduling, pricing, and the like.

This report addresses only the geotechnical (physical) aspects of the subsurface conditions at the Site. The geo-environmental (chemical) aspects of the subsurface soils are reported under separate cover.

6.1 Site Preparation

It is recommended that all surficial vegetation, topsoil, uncontrolled fill and any loose, organic, excessively wet or deleterious materials be sub-excavated from the areas of the proposed pump station footprint. Topsoil was encountered at the ground surface in boreholes BH-101 and BH-102 and was about 150 millimetres to 240 millimetres thick. Beneath the topsoil, a layer of sandy silty clay fill with organics was encountered and was about 0.8 metres to 1.3 metres thick. Beneath the sandy silty clay fill, borehole BH-102 encountered an approximately 0.7-metre-thick layer of native sandy silty clay with organics. The stripped/excavated materials are not considered to be suitable as subgrade materials, general backfill or for the support of structures and must be completely removed from the limits of the proposed development. Consideration may be given to placing these materials in landscaped areas where post-construction settlement can be tolerated.

6.2 Excavations and Groundwater Control

All excavations should be carried out in accordance with the latest edition of the Ontario Occupational Health and Safety Act and Regulations for Construction Projects (OHSA). The OHSA regulations governing excavation support and maximum side wall inclinations apply to excavations extending to depths of greater than 1.2 metres below the adjacent ground surface.

Based on the data from the previous explorations and preliminary geotechnical exploration, excavations for pump station construction will encounter topsoil and fill materials underlain by an extensive deposit of generally firm to very stiff (based on the field vane shear strength testing results) native sandy silty clay. Although not specifically encountered in the boreholes, cobbles and boulders should be anticipated within the sandy silty clay stratum.

As per OHSA, any stiff to very stiff silty clay would be classified as a Type 2 soil, whereas any soft to firm silty clay would be classified as Type 3 soils. Under the OHSA criteria, unsupported excavations in Type 2 and 3 soils should have side slopes inclined no steeper than 1 horizontal to 1 vertical.

In all cases, the OHSA soil type categories are based on generalized ground behaviour conditions with respect to the need for worker protection and compliance with the Act. Further, layered soil types or construction staging of excavations can change the OHSA categorization that might apply. During construction, the exposed ground should be observed by experienced geotechnical personnel to confirm the OHSA classification that will apply.

Considering the relatively low permeability of the soils encountered in the preliminary boreholes, groundwater seepage should be relatively minor. Nevertheless, some groundwater seepage into open excavations should be anticipated. Inflows may be controlled by pumping from properly filtered sumps located within the excavation. The anticipated pumping rates would likely be sufficiently low that a Permit to Take Water (PTTW) or registration on the Environmental Activity and Sector Registry (EASR) should not be required. If encountered, water inflows

due to perched groundwater within any surficial granular fills or native sands or silt overlying the less permeable cohesive materials should be expected.

Care should be taken to direct all surface water away from excavations. Depending on the prevailing weather conditions, it may be necessary to flatten excavation side slopes in the fill materials and/or blanket the slopes with free-draining material to enhance stability and control ground losses.

6.2.1 Supported Excavations

Any shoring systems that may be designed as part of the proposed works should include an evaluation of base stability, soil squeezing stability and hydraulic uplift stability as defined in the Canadian Foundation Engineering Manual (CFEM, 2006). The shoring system should be designed to account for horizontal/lateral earth loads, surcharge loads, groundwater pressure and the effects of weather as well as the project requirements for controlling ground displacements. Where existing buildings or infrastructure lie within the zone of influence of the shoring (as defined by a line drawn upward and outward from the base of the excavation at an inclination of 1 horizontal to 1 vertical) the shoring deflections need to be strictly limited.

Lateral pressures for design of the temporary structures will depend on the temporary structure design and the nature and spacing of the lateral support (bracing, rakers, or tie-backs) provided. The distribution of lateral pressures and shape of the apparent lateral pressure envelope on a shoring system depends greatly on the methods used, the stiffness, and the degree of lateral bracing, prestressing or restraint. As such, the distribution of lateral earth pressures for such a system is best left to the ultimate specialist designer of the shoring who can best account for such conditions. It is a common practice for a specialist contractor to design and install the excavation support system.

Although the final design of the shoring will be completed by the contractor, the parameters presented in Table 2, below, are provided to enable the structural designer to develop a conceptual design and assess the approximate construction costs for the shoring systems.

Table 2: Estimated Soil Parameter Values for Excavation Support Systems

Soil Type	Bulk Soil Unit Weight[1] (kg/m^3)	Angle of Internal Friction (degrees)	Coefficient of Active Earth Pressure[2] (K_a)	Coefficient of Passive Earth Pressure[2] (K_p)	Coefficient of At-Rest Earth Pressure[2] (K_o)	Coefficient of Friction (μ)
Native Silty Clay	1,800	28	0.36	2.77	0.53	0.35
Granular 'A' (OPSS[3] 1010)	2,100	35	0.27	3.69	0.43	0.47
Granular 'B' Type I (OPSS 1010)	2,000	33	0.29	3.39	0.46	0.43

(1) Saturated unit weights may be calculated by multiplying the bulk unit weights by 1.1; buoyant unit weights may be calculated by subtracting 1,000 kilograms per cubic metre from the saturated unit weights. Hydrostatic pressures should be added where buoyant unit weights are assumed.

(2) The earth pressure coefficients noted above are based on a horizontal surface adjacent to the excavation. If sloped surfaces are present, the coefficient of earth pressure should be adjusted accordingly.
(3) Ontario Provincial Standard Specification

The total passive resistance below the base of the excavation (i.e., adjacent to the temporary protection system) may be calculated based on the values of K_p indicated above but reduced by an appropriate factor that considers the allowable wall movement to account for the fact that a large strain would be required for mobilization of the full passive resistance. For longer-term (drained) analyses, cohesion should be assumed to be nil for all soil types.

Settlement monitoring should be carried out twice daily on adjacent buildings and infrastructure which lie within the zone of influence of the excavation. If half of the settlement tolerance of any such building or infrastructure elements is exceeded, excavation should cease, and the contractor's means and methods re-evaluated.

For trench excavations, analyses of excavation depths and undrained shear strengths yield the relationship presented below in Table 3 between the maximum stable depth of a trench excavation and the undrained shear strength of the cohesive soil forming the side walls and base of the excavation based on a factor of safety against basal instability of 1.5, and an assumed surcharge of 20 kilopascals.

Table 3: Undrained Shear Strength and Corresponding Maximum Stable Depth of Trench Excavations

Undrained Shear Strength C_u, kilopascals	Maximum Depth of Excavation (metres)
20	4.1
25	5.3
30	6.6
35	7.7
40	8.9
45	10.2
50	11.4

If a trench liner box is used, it should be noted that this system is designed primarily for worker protection and does not restrict the lateral movement of the adjacent soil mass or prevent loss of ground due to flowing soils under the influence of groundwater. All infrastructure founded within the zone of influence of the excavation (as defined by a line drawn upwards and outwards from the base of the excavation at an inclination of 1 horizontal to 1 vertical) should be accurately located and properly supported. In addition, any gaps between the exterior of the liner box and the excavation wall should be filled immediately to restore lateral support. Trench liner boxes are not permitted for use in excavations of 6 metres or greater in depth.

6.3 General Backfill

Any existing topsoil, fill, organics, wet, or deleterious fill materials excavated from the Site are not considered suitable as general backfill. Based on the results of the boreholes, the topsoil and sandy silty clay fill materials would not be considered suitable for re-use as general backfill, whereas native sandy silty clay materials extending up to the depth of excavation of the proposed wet well would be considered suitable for re-use as general backfill from a geotechnical perspective.

Materials should not be considered acceptable as backfill when the placement water content exceeds the optimum water content (as determined by the standard Proctor compaction test, ASTM International D698) by more than about 2 to 3 per cent (depending on the nature of the material). Further, material that is more than 3 per cent dry of the optimum water content should be wetted during compaction to limit post construction settlement or should not be used.

The native silty clay soils are cohesive in nature. When these cohesive soils are used for backfilling, it is essential that these materials be broken down and compacted thoroughly to reduce the size and frequency of voids and reduce the potential for settlement. Should very moist to wet soils be encountered during the excavation operations, these soils will require extensive air-drying in order to achieve the specified field compaction. If time constraints do not permit air-drying of soils, they will have to be disposed of properly off-site and replaced with a suitable approved alternative such as OPSS Granular 'B' Type I.

If any utility alignments are located beneath proposed pavements, trench backfill material extending upward from the base of the trench to one meter below the pavement subgrade should be placed in loose lifts not exceeding a maximum thickness of 300 millimetres for granular materials and 200 millimetres for the native cohesive soils, and uniformly compacted to a minimum of 95 per cent of the material's standard Proctor maximum dry density (SPMDD) value. The upper one metre of backfill which comprises the pavement subgrade should be uniformly compacted to at least 98 per cent of SPMDD. If lesser degrees of compaction are achieved, increased settlements will result.

6.3.1 Pipe Bedding

The bedding material for any underground utilities constructed at the site should consist of an approved granular material, consistent with the type and class of pipe to be used. OPSS Granular 'A' is considered to be an appropriate bedding material for the site. The bedding should extend from 150 millimetres below the pipe invert to at least 300 millimetres above the pipe obvert. The pipe bedding should be uniformly compacted to at least 95 per cent of SPMDD in loose lifts not exceeding 300 millimetres in thickness. Hand tamping around the pipe may be required to ensure that no voids are present below the springline of the pipe. It is also important to provide well compacted granular bedding within the approach zone of the pipes at any manholes. In general, the use of material known locally as "graded clear stone" might be considered for pipe bedding up to the springline of the pipes; however, in general, such "clear stone" should not be used without the corresponding use of a non-woven geotextile filter fabric completely encapsulating the stone. Otherwise, the native fine-grained soils can soften over time as a result of water within the stone void spaces saturating the surrounding clay and allowing deformation and migration of the native soils into this void space.

Granular materials used for pipe bedding can create a subsurface reservoir or conduit for the accumulation and flow of water and, if such flow is not acceptable, low-permeability trench plugs around the pipe may be required. Should a trench support system be utilized (such as a trench liner box), care should be taken when removing the support system to not disturb and destabilize the compacted bedding material.

6.4 Bearing Pressures

It is understood that the proposed wet well is to be founded at a depth of approximately 10.6 metres below the existing ground surface. Based on the subsurface conditions encountered in the preliminary boreholes and the

anticipated founding elevation, a factored net geotechnical resistance at the Ultimate Limit State (ULS) of 125 kilopascals and a net geotechnical reaction at the Serviceability Limit State (SLS) of 75 kilopascals (net pressure increase) may be used for preliminary design purposes. Prior to final design, it is recommended that a borehole be advanced to a depth of about 2 times the width of the pump station foundation below the pump station invert. A groundwater observation well should be installed and monitored to evaluate if pressurized groundwater conditions exist in the underlying soil strata.

In the case of soft clays underlying the base of an excavation where the factor of safety against basal instability is less than 2, substantial deformations may occur and if interlocking sheet piles are used for shoring, stability analyses should be carried out to determine the required depth of the sheeting toe to prevent basal instability or if unloading of the soil around the perimeter of the excavation is required. The preliminary lateral earth pressures on the sheeted excavations may be calculated using the earth pressure coefficients provided above in section 6.2.1

Prior to constructing the pump station foundation, the foundation excavation should be inspected by the geotechnical engineer to confirm that the footings are located in a competent bearing stratum, which has been cleaned of ponded water and loosened or softened material. The native sandy silty clay materials are considered slightly to medium sensitive to disturbance. Should it be necessary to keep foundation excavations open for an extended period of time, the bases should be protected with a working mat of lean concrete following approval of the founding surface by the geotechnical engineer.

6.5 Subsurface Walls

Any subsurface walls that may be installed as part of the infrastructure of this project will be subjected to unbalanced earth pressures and must be designed to resist a pressure that can be calculated based on the following equation:

$$P = K[Y(h-h_w) + Y'h_w + q] + Y_w h_w$$

where: P = horizontal pressure at depth

h = depth of soil from grade to top of footing (metres)

K = earth pressure coefficient

h_w = depth below groundwater level (metres)

Y = bulk unit weight of soil (kilonewtons per cubic metre)

Y' = submerged unit weight of the exterior soil (kilonewtons per cubic metre)

Y_w = unit weight of water (kilonewtons per cubic metre)

q = total surcharge loading from adjacent equipment and/or materials (kilopascals)

Perimeter drainage of the soils adjacent to any subsurface infrastructure or facility is typically recommended in order to effectively drain the granular backfill in order to eliminate the hydrostatic pressures acting on any walls and floors. For fully drained conditions, the previous equation can thereby be simplified to:

$$P = K(Yh + q)$$

An adequate perimeter drainage system will prevent seepage of groundwater through the walls of any subsurface structures and prevent build-up of excess hydrostatic pressure. This drainage system would typically consist of a perforated perimeter drainage pipe appropriately graded to sumps and either to gravity drainage off-site or pumps. The perforated drainage pipe should be encased in a geotextile filter fabric ("sock") that is filter compatible with the granular backfill. In addition, the drainage pipe should be fully surrounded by a minimum of 0.3 metres of appropriately graded granular backfill material to provide appropriate filtration against migration of fine soil particles from the surrounding native soils. If a perimeter drain is considered infeasible due to the depth of the pump station and granular backfill is used, the backfill will hold water following precipitation events and the facility should be designed assuming full hydrostatic pressures and buoyant uplift with a water level coincident with the ground surface. It would be beneficial to backfill the upper 0.5 metres of the excavation with native silty clay to limit the infiltration of surface water into the perimeter drainage system.

Alternatively, the pump station may be designed as a fully-waterproofed (i.e., "tanked") structure, in which case full hydrostatic pressures and uplift should be considered in the design based on a groundwater level coincident with the ground surface.

Section 6.2.1 provides estimated soil parameter values for the native soils and common backfill materials for use in the preliminary design of the pump station.

6.6 Geotechnical Monitoring, Inspections and Testing

The subsurface conditions encountered in the previous and current explorations in the area of the Site are generally typical of the Windsor and Essex County area. The development of a pump station at the Site is considered to be geotechnically feasible; no exceptional geotechnical development constraints have been identified.

Continued geotechnical involvement is required during the design and construction stages of this project. As preliminary design progresses, a site-specific geotechnical exploration and testing program should be carried out to address all infrastructure components. Geotechnical explorations for conventional shallow foundations should consist of at least one borehole at each structure foundation element and should extend to a minimum depth of approximately two to four times the width of the foundation below the expected foundation elevation, depending on the foundation geometry. Boreholes for any pipes or utilities should be advanced to a minimum depth of 1 metre below the pipe bedding bottom elevations and be spaced at regular intervals. If deep foundations are planned, geotechnical boreholes should be advanced to evaluate the depth and quality of the underlying rock (which typically subcrops between depths of about 46 to 53 metres below grade, based on available bedrock mapping). Typically, the upper 3 metres of bedrock in selected boreholes is cored to confirm the elevation of the bedrock surface and assess the quality and strength of the rock.

Following the completion of the exploration and testing program, the preliminary recommendations in this report may be revised/refined based on the new information.

During construction, a regular program of geotechnical inspections and testing should be carried out to confirm subsurface conditions consistent with those discussed herein and to ensure that the intent of the various design recommendations is met. We trust that this report provides the preliminary geotechnical information currently required. Should any point require further clarification, please do not hesitate to contact this office.

Signature Page

Your truly,

Golder Associates Ltd.

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MH/MAS/an

https://golderassociates.sharepoint.com/sites/157243/project files/6 deliverables/ph 1000-geo/21507944-r01-rev0 (final) geo assess and prelim geo expl pontiac pump station lrpcp stantec windsor_09june2022.docx

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The report is of a summary nature and is not intended to stand alone without reference to the instructions given to Golder by the Client, communications between Golder and the Client, and to any other reports prepared by Golder for the Client relative to the specific site described in the report. In order to properly understand the suggestions, recommendations and opinions expressed in this report, reference must be made to the whole of the report. Golder can not be responsible for use of portions of the report without reference to the entire report.

Unless otherwise stated, the suggestions, recommendations and opinions given in this report are intended only for the guidance of the Client in the design of the specific project. The extent and detail of investigations, including the number of test holes, necessary to determine all of the relevant conditions which may affect construction costs would normally be greater than has been carried out for design purposes. Contractors bidding on, or undertaking the work, should rely on their own investigations, as well as their own interpretations of the factual data presented in the report, as to how subsurface conditions may affect their work, including but not limited to proposed construction techniques, schedule, safety and equipment capabilities.

Soil, Rock and Ground Water Conditions: Classification and identification of soils, rocks, and geologic units have been based on commonly accepted methods employed in the practice of geotechnical engineering and related disciplines. Classification and identification of the type and condition of these materials or units involves judgment, and boundaries between different soil, rock or geologic types or units may be transitional rather than abrupt. Accordingly, Golder does not warrant or guarantee the exactness of the descriptions.

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Special risks occur whenever engineering or related disciplines are applied to identify subsurface conditions and even a comprehensive investigation, sampling and testing program may fail to detect all or certain subsurface conditions. The environmental, geologic, geotechnical, geochemical and hydrogeologic conditions that Golder interprets to exist between and beyond sampling points may differ from those that actually exist. In addition to soil variability, fill of variable physical and chemical composition can be present over portions of the site or on adjacent properties. The professional services retained for this project include only the geotechnical aspects of the subsurface conditions at the site, unless otherwise specifically stated and identified in the report. The presence or implication(s) of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources are outside the terms of reference for this project and have not been investigated or addressed.

Soil and groundwater conditions shown in the factual data and described in the report are the observed conditions at the time of their determination or measurement. Unless otherwise noted, those conditions form the basis of the recommendations in the report. Groundwater conditions may vary between and beyond reported locations and can be affected by annual, seasonal and meteorological conditions. The condition of the soil, rock and groundwater may be significantly altered by construction activities (traffic, excavation, groundwater level lowering, pile driving, blasting, etc.) on the site or on adjacent sites. Excavation may expose the soils to changes due to wetting, drying or frost. Unless otherwise indicated the soil must be protected from these changes during construction.

Sample Disposal: Golder will dispose of all uncontaminated soil and/or rock samples 90 days following issue of this report or, upon written request of the Client, will store uncontaminated samples and materials at the Client's expense. In the event that actual contaminated soils, fills or groundwater are encountered or are inferred to be present, all contaminated samples shall remain the property and responsibility of the Client for proper disposal.

Follow-Up and Construction Services: All details of the design were not known at the time of submission of Golder's report. Golder should be retained to review the final design, project plans and documents prior to construction, to confirm that they are consistent with the intent of Golder's report.

During construction, Golder should be retained to perform sufficient and timely observations of encountered conditions to confirm and document that the subsurface conditions do not materially differ from those interpreted conditions considered in the preparation of Golder's report and to confirm and document that construction activities do not adversely affect the suggestions, recommendations and opinions contained in Golder's report. Adequate field review, observation and testing during construction are necessary for Golder to be able to provide letters of assurance, in accordance with the requirements of many regulatory authorities. In cases where this recommendation is not followed, Golder's responsibility is limited to interpreting accurately the information encountered at the borehole locations, at the time of their initial determination or measurement during the preparation of the Report.

Changed Conditions and Drainage: Where conditions encountered at the site differ significantly from those anticipated in this report, either due to natural variability of subsurface conditions or construction activities, it is a condition of this report that Golder be notified of any changes and be provided with an opportunity to review or revise the recommendations within this report. Recognition of changed soil and rock conditions requires experience and it is recommended that Golder be employed to visit the site with sufficient frequency to detect if conditions have changed significantly.

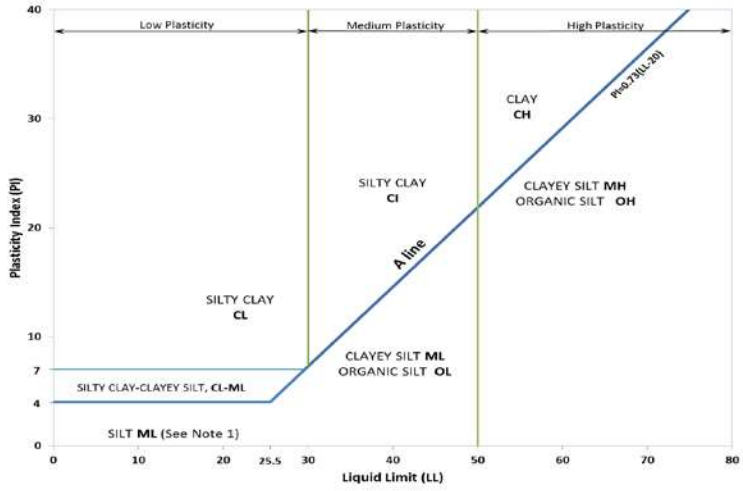
Drainage of subsurface water is commonly required either for temporary or permanent installations for the project. Improper design or construction of drainage or dewatering can have serious consequences. Golder takes no responsibility for the effects of drainage unless specifically involved in the detailed design and construction monitoring of the system.

METHOD OF SOIL CLASSIFICATION

The Golder Associates Ltd. Soil Classification System is based on the Unified Soil Classification System (USCS)

Organic or Inorganic	Soil Group	Type of Soil		Gradation or Plasticity	$Cu = \frac{D_{60}}{D_{10}}$	$Cc = \frac{(D_{30})^2}{D_{10} x D_{60}}$	Organic Content	USCS Group Symbol	Group Name
INORGANIC (Organic Content ≤30% by mass)	COARSE-GRAINED SOILS (>50% by mass is larger than 0.075 mm)	GRAVELS (>50% by mass of coarse fraction is larger than 4.75 mm)	Gravels with ≤12% fines (by mass)	Poorly Graded	<4	≤1 or ≥3	≤30%	GP	GRAVEL
				Well Graded	≥4	1 to 3		GW	GRAVEL
			Gravels with >12% fines (by mass)	Below A Line	n/a			GM	SILTY GRAVEL
				Above A Line	n/a			GC	CLAYEY GRAVEL
		SANDS (≥50% by mass of coarse fraction is smaller than 4.75 mm)	Sands with ≤12% fines (by mass)	Poorly Graded	<6	≤1 or ≥3		SP	SAND
				Well Graded	≥6	1 to 3		SW	SAND
			Sands with >12% fines (by mass)	Below A Line	n/a			SM	SILTY SAND
				Above A Line	n/a			SC	CLAYEY SAND

Organic or Inorganic	Soil Group	Type of Soil	Laboratory Tests	Field Indicators					Organic Content	USCS Group Symbol	Primary Name
				Dilatancy	Dry Strength	Shine Test	Thread Diameter	Toughness (of 3 mm thread)			
INORGANIC (Organic Content ≤30% by mass)	FINE-GRAINED SOILS (≥50% by mass is smaller than 0.075 mm)	SILTS (Non-Plastic or PI and LL plot below A-Line on Plasticity Chart below)	Liquid Limit <50	Rapid	None	None	>6 mm	N/A (can't roll 3 mm thread)	<5%	ML	SILT
				Slow	None to Low	Dull	3mm to 6 mm	None to low	<5%	ML	CLAYEY SILT
				Slow to very slow	Low to medium	Dull to slight	3mm to 6 mm	Low	5% to 30%	OL	ORGANIC SILT
			Liquid Limit ≥50	Slow to very slow	Low to medium	Slight	3mm to 6 mm	Low to medium	<5%	MH	CLAYEY SILT
				None	Medium to high	Dull to slight	1 mm to 3 mm	Medium to high	5% to 30%	OH	ORGANIC SILT
		CLAYS (PI and LL plot above A-Line on Plasticity Chart below)	Liquid Limit <30	None	Low to medium	Slight to shiny	~ 3 mm	Low to medium	0% to 30% (see Note 2)	CL	SILTY CLAY
			Liquid Limit 30 to 50	None	Medium to high	Slight to shiny	1 mm to 3 mm	Medium		CI	SILTY CLAY
			Liquid Limit ≥50	None	High	Shiny	<1 mm	High		CH	CLAY
HIGHLY ORGANIC SOILS (Organic Content >30% by mass)		Peat and mineral soil mixtures							30% to 75%	PT	SILTY PEAT, SANDY PEAT
		Predominantly peat, may contain some mineral soil, fibrous or amorphous peat							75% to 100%		PEAT



Note 1 – Fine grained materials with PI and LL that plot in this area are named (ML) SILT with slight plasticity. Fine-grained materials which are non-plastic (i.e. a PL cannot be measured) are named SILT.
Note 2 – For soils with <5% organic content, include the descriptor "trace organics" for soils with between 5% and 30% organic content include the prefix "organic" before the Primary name.

Dual Symbol — A dual symbol is two symbols separated by a hyphen, for example, GP-GM, SW-SC and CL-ML.
For non-cohesive soils, the dual symbols must be used when the soil has between 5% and 12% fines (i.e. to identify transitional material between "clean" and "dirty" sand or gravel.
For cohesive soils, the dual symbol must be used when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart (see Plasticity Chart at left).

Borderline Symbol — A borderline symbol is two symbols separated by a slash, for example, CL/CI, GM/SM, CL/ML.
A borderline symbol should be used to indicate that the soil has been identified as having properties that are on the transition between similar materials. In addition, a borderline symbol may be used to indicate a range of similar soil types within a stratum.

ABBREVIATIONS AND TERMS USED ON RECORDS OF BOREHOLES AND TEST PITS

PARTICLE SIZES OF CONSTITUENTS

Soil Constituent	Particle Size Description	Millimetres	Inches (US Std. Sieve Size)
BOULDERS	Not Applicable	>300	>12
COBBLES	Not Applicable	75 to 300	3 to 12
GRAVEL	Coarse Fine	19 to 75 4.75 to 19	0.75 to 3 (4) to 0.75
SAND	Coarse Medium Fine	2.00 to 4.75 0.425 to 2.00 0.075 to 0.425	(10) to (4) (40) to (10) (200) to (40)
SILT/CLAY	Classified by plasticity	<0.075	< (200)

MODIFIERS FOR SECONDARY AND MINOR CONSTITUENTS

Percentage by Mass	Modifier
>35	Use 'and' to combine major constituents (*i.e.,* SAND and GRAVEL)
> 12 to 35	Primary soil name prefixed with "gravelly, sandy, SILTY, CLAYEY" as applicable
> 5 to 12	some
≤ 5	trace

PENETRATION RESISTANCE

Standard Penetration Resistance (SPT), N:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) required to drive a 50 mm (2 in.) split-spoon sampler for a distance of 300 mm (12 in.). Values reported are as recorded in the field and are uncorrected.

Cone Penetration Test (CPT)

An electronic cone penetrometer with a 60° conical tip and a project end area of 10 cm^2 pushed through ground at a penetration rate of 2 cm/s. Measurements of tip resistance (q_t), porewater pressure (u) and sleeve frictions are recorded electronically at 25 mm penetration intervals.

Dynamic Cone Penetration Resistance (DCPT); N_d:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) to drive uncased a 50 mm (2 in.) diameter, 60° cone attached to "A" size drill rods for a distance of 300 mm (12 in.).

PH: Sampler advanced by hydraulic pressure
PM: Sampler advanced by manual pressure
WH: Sampler advanced by static weight of hammer
WR: Sampler advanced by weight of sampler and rod

SAMPLES

AS	Auger sample
BS	Block sample
CS	Chunk sample
DD	Diamond Drilling
DO or DP	Seamless open ended, driven or pushed tube sampler – note size
DS	Denison type sample
GS	Grab Sample
MC	Modified California Samples
MS	Modified Shelby (for frozen soil)
RC	Rock core
SC	Soil core
SS	Split spoon sampler – note size
ST	Slotted tube
TO	Thin-walled, open – note size (Shelby tube)
TP	Thin-walled, piston – note size (Shelby tube)
WS	Wash sample

SOIL TESTS

w	water content
PL , w_p	plastic limit
LL , w_L	liquid limit
C	consolidation (oedometer) test
CHEM	chemical analysis (refer to text)
CID	consolidated isotropically drained triaxial test[1]
CIU	consolidated isotropically undrained triaxial test with porewater pressure measurement[1]
D_R	relative density (specific gravity, Gs)
DS	direct shear test
GS	specific gravity
M	sieve analysis for particle size
MH	combined sieve and hydrometer (H) analysis
MPC	Modified Proctor compaction test
SPC	Standard Proctor compaction test
OC	organic content test
SO_4	concentration of water-soluble sulphates
UC	unconfined compression test
UU	unconsolidated undrained triaxial test
V (FV)	field vane (LV-laboratory vane test)
γ	unit weight

1. Tests anisotropically consolidated prior to shear are shown as CAD, CAU.

NON-COHESIVE (COHESIONLESS) SOILS

Compactness[2]

Term	SPT 'N' (blows/0.3m)[1]
Very Loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	>50

1. SPT 'N' in accordance with ASTM D1586, uncorrected for the effects of overburden pressure.
2. Definition of compactness terms are based on SPT 'N' ranges as provided in Terzaghi, Peck and Mesri (1996). Many factors affect the recorded SPT 'N' value, including hammer efficiency (which may be greater than 60% in automatic trip hammers), overburden pressure, groundwater conditions, and grainsize. As such, the recorded SPT 'N' value(s) should be considered only an approximate guide to the soil compactness. These factors need to be considered when evaluating the results, and the stated compactness terms should not be relied upon for design or construction.

Field Moisture Condition

Term	Description
Dry	Soil flows freely through fingers.
Moist	Soils are darker than in the dry condition and may feel cool.
Wet	As moist, but with free water forming on hands when handled.

COHESIVE SOILS

Consistency

Term	Undrained Shear Strength (kPa)	SPT 'N'[1,2] (blows/0.3m)
Very Soft	<12	0 to 2
Soft	12 to 25	2 to 4
Firm	25 to 50	4 to 8
Stiff	50 to 100	8 to 15
Very Stiff	100 to 200	15 to 30
Hard	>200	>30

1. SPT 'N' in accordance with ASTM D1586, uncorrected for overburden pressure effects; approximate only.
2. SPT 'N' values should be considered ONLY an approximate guide to consistency; for sensitive clays (e.g., Champlain Sea clays), the N-value approximation for consistency terms does NOT apply. Rely on direct measurement of undrained shear strength or other manual observations.

Water Content

Term	Description
w < PL	Material is estimated to be drier than the Plastic Limit.
w ~ PL	Material is estimated to be close to the Plastic Limit.
w > PL	Material is estimated to be wetter than the Plastic Limit.

Unless otherwise stated, the symbols employed in the report are as follows:

I. GENERAL

π	3.1416
ln x	natural logarithm of x
$\log_{10}$	x or log x, logarithm of x to base 10
g	acceleration due to gravity
t	time

II. STRESS AND STRAIN

γ	shear strain
Δ	change in, e.g. in stress: $\Delta\sigma$
ε	linear strain
ε_v	volumetric strain
η	coefficient of viscosity
υ	Poisson's ratio
σ	total stress
σ'	effective stress ($\sigma' = \sigma - u$)
σ'_{vo}	initial effective overburden stress
$\sigma_1, \sigma_2, \sigma_3$	principal stress (major, intermediate, minor)
σ_{oct}	mean stress or octahedral stress $= (\sigma_1 + \sigma_2 + \sigma_3)/3$
τ	shear stress
u	porewater pressure
E	modulus of deformation
G	shear modulus of deformation
K	bulk modulus of compressibility

III. SOIL PROPERTIES

(a) Index Properties

$\rho(\gamma)$	bulk density (bulk unit weight)*
$\rho_d(\gamma_d)$	dry density (dry unit weight)
$\rho_w(\gamma_w)$	density (unit weight) of water
$\rho_s(\gamma_s)$	density (unit weight) of solid particles
γ'	unit weight of submerged soil ($\gamma' = \gamma - \gamma_w$)
D_R	relative density (specific gravity) of solid particles ($D_R = \rho_s / \rho_w$) (formerly G_s)
e	void ratio
n	porosity
S	degree of saturation

* Density symbol is ρ. Unit weight symbol is γ where $\gamma = \rho g$ (i.e. mass density multiplied by acceleration due to gravity)

(a) Index Properties (continued)

w	water content
w_l or LL	liquid limit
w_p or PL	plastic limit
I_p or PI	plasticity index = $(w_l - w_p)$
NP	non-plastic
w_s	shrinkage limit
I_L	liquidity index = $(w - w_p) / I_p$
I_C	consistency index = $(w_l - w) / I_p$
e_{max}	void ratio in loosest state
e_{min}	void ratio in densest state
I_D	density index = $(e_{max} - e) / (e_{max} - e_{min})$ (formerly relative density)

(b) Hydraulic Properties

h	hydraulic head or potential
q	rate of flow
v	velocity of flow
i	hydraulic gradient
k	hydraulic conductivity (coefficient of permeability)
j	seepage force per unit volume

(c) Consolidation (one-dimensional)

C_c	compression index (normally consolidated range)
C_r	recompression index (over-consolidated range)
C_s	swelling index
C_α	secondary compression index
m_v	coefficient of volume change
c_v	coefficient of consolidation (vertical direction)
c_h	coefficient of consolidation (horizontal direction)
T_v	time factor (vertical direction)
U	degree of consolidation
σ'_p	pre-consolidation stress
OCR	over-consolidation ratio = σ'_p / σ'_{vo}

(d) Shear Strength

τ_p, τ_r	peak and residual shear strength
ϕ'	effective angle of internal friction
δ	angle of interface friction
μ	coefficient of friction = tan δ
c'	effective cohesion
c_u, s_u	undrained shear strength ($\phi = 0$ analysis)
p	mean total stress $(\sigma_1 + \sigma_3)/2$
p'	mean effective stress $(\sigma'_1 + \sigma'_3)/2$
q	$(\sigma_1 - \sigma_3)/2$ or $(\sigma'_1 - \sigma'_3)/2$
q_u	compressive strength $(\sigma_1 - \sigma_3)$
S_t	sensitivity

Notes: 1 $\tau = c' + \sigma' \tan \phi'$

2 shear strength = (compressive strength)/2

PROJECT: 21507944

LOCATION: N 4688039; E 269583

RECORD OF BOREHOLE: 101

BORING DATE: April 14, 2022

SHEET 1 OF 2

DATUM: Local

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		100.00							
0	Power Auger; 200 mm Diam. (Hollow Stem)	TOPSOIL - sandy SILTY CLAY; brown, contains organic matter (rootlets)		0.00							
		FILL - sandy SILTY CLAY, some gravel; brown		0.15	1	SS	8				
1		FILL - sandy SILTY CLAY, trace gravel; dark grey, contains organic matter (rootlets)		99.02 0.98	2	SS	11				
		(CL) sandy SILTY CLAY, some gravel; brown, mottled; firm		98.55 1.45	3	SS	6				
2		(CL) sandy SILTY CLAY, trace gravel; brown; stiff to very stiff		97.79 2.21	4	SS	12				
3					5	SS	17				
4					6	SS	13				
5					7	SS	8			MH	
6				93.60	8	SS	6				
		(CL) sandy SILTY CLAY, trace gravel; grey; very soft to very stiff		6.40							
7											
8					9	SS	5				
9								⊕ >100 ⊕ +			
					10	SS	2				
10		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 50

LOGGED: HK

CHECKED: MH

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PROJECT: 21507944

LOCATION: N 4688039; E 269583

RECORD OF BOREHOLE: 101

BORING DATE: April 14, 2022

SHEET 2 OF 2

DATUM: Local

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
10		*--- CONTINUED FROM PREVIOUS PAGE ---*									
10	Power Auger 200 mm Diam. (Hollow Stem)	(CL) sandy SILTY CLAY, trace gravel; grey; very soft to very stiff									
11					11	SS	2				
12					12	SS	1				
13											
14					13	SS	1				
15					14	SS	2				Borehole dry during drilling on April 14, 2022
				84.15							
16		End of Borehole		15.85							
17											
18											
19											
20											

DEPTH SCALE

1 : 50

GOLDER

LOGGED: HK

CHECKED: MH

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PROJECT: 21507944

LOCATION: N 4688039; E 269548

RECORD OF BOREHOLE: 102

BORING DATE: April 14, 2022

SHEET 1 OF 2

DATUM: Local

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		100.07							
0	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL - sandy SILTY CLAY; brown, contains organic matter (rootlets)		0.00 / 99.83							
		FILL - sandy SILTY CLAY, some gravel; brown, contains organic matter (rootlets)		0.24 / 99.00	1	SS	9				
1		(CL) sandy SILTY CLAY; dark grey, contains organic matter (rootlets)		1.07 / 98.30	2	SS	9				
2		(CL) sandy SILTY CLAY, trace gravel; brown to grey, mottled; firm to stiff		1.77 / 97.10	3	SS	7				
					4	SS	8				
3		(CL) sandy SILTY CLAY, trace gravel; brown; stiff		2.97 / 95.96	5	SS	10				
4		(CL) sandy SILTY CLAY, trace gravel; grey; soft to very stiff		4.11	6	SS	14				
					7	SS	8				
5								>100			
6					8	SS	6				
7								⊕ +			
					9	SS	4	⊕ +			
8								⊕ +			
9					10	SS	7			MH	
10		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 50

LOGGED: HK

CHECKED: MH

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PROJECT: 21507944

LOCATION: N 4688039; E 269548

RECORD OF BOREHOLE: 102

BORING DATE: April 14, 2022

SHEET 2 OF 2

DATUM: Local

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (20 40 60 80) nat V. + Q - ● rem V. ⊕ U - ○	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
10	Power Auger 200 mm Diam. (Hollow Stem)	(CL) sandy SILTY CLAY, trace gravel; grey; soft to very stiff									
11					11	SS	3				
12					12	SS	2				Borehole dry during drilling on April 14, 2022
				87.27							
		End of Borehole		12.80							
13											
14											
15											
16											
17											
18											
19											
20											

DEPTH SCALE

1 : 50

LOGGED: HK

CHECKED: MH

GOLDER

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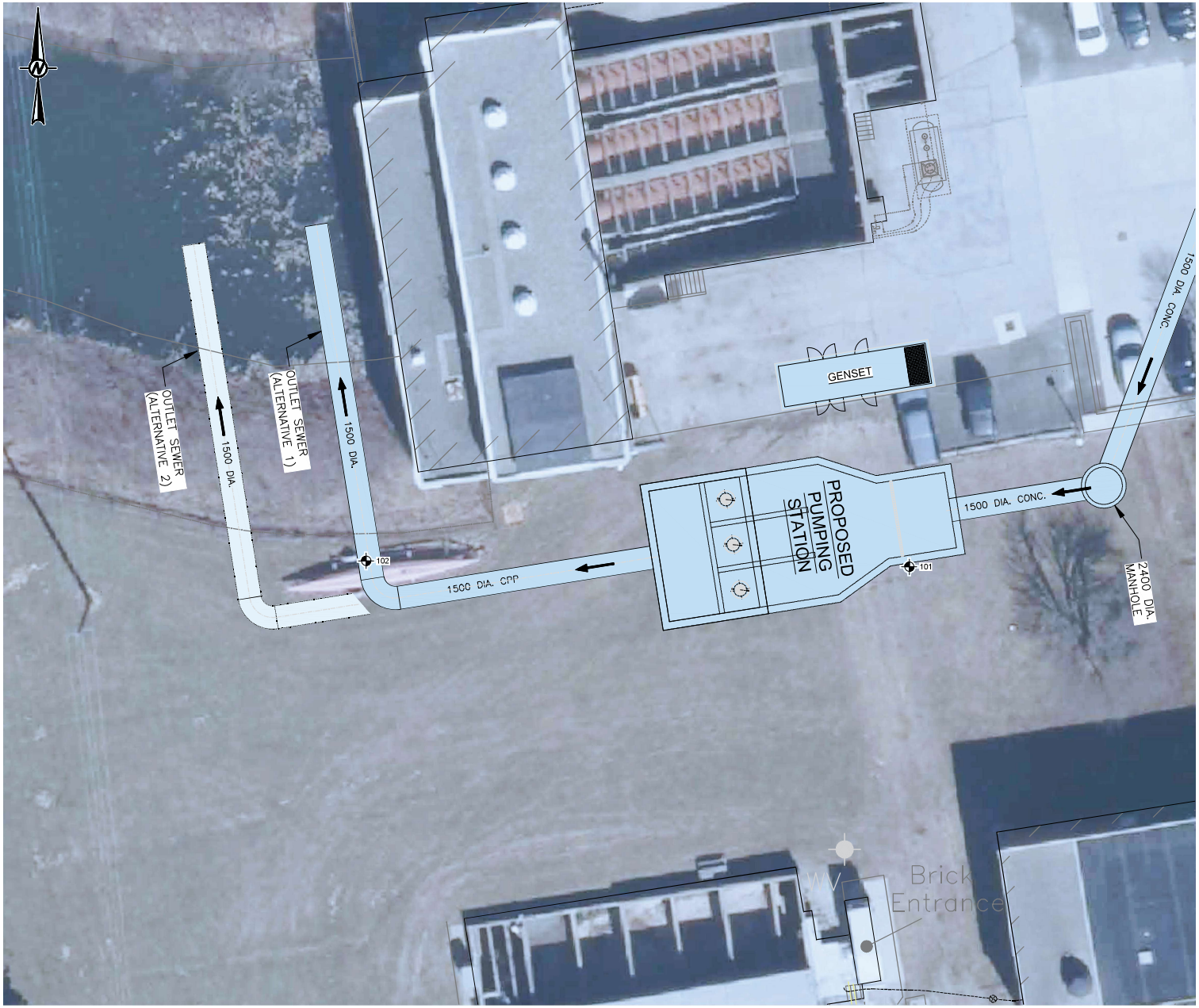


KEY MAP

SCALE: 1:50,000 m

LEGEND

BOREHOLE LOCATION

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. BASE PLAN SUPPLIED BY STANTEC CONSULTING LIMITED ON APRIL 19, 2022
DRAWING FILE NO. 165620249_SW-101.DWG
2. PROJECTION: TRANSVERSE MERCATOR, DATUM NAD 83,
COORDINATE SYSTEM: MTM ZONE 11, VERTICAL DATUM CGVD28

0 5 10
1:250 METRES

CLIENT
STANTEC CONSULTING LIMITED

PROJECT
GEOTECHNICAL EXPLORATION AND TESTING PROGRAM, LITTLE RIVER POLLUTION CONTROL PLANT - PONTIAC PUMP STATION, 9400 LITTLE RIVER ROAD, WINDSOR, ONTARIO

TITLE
LOCATION PLAN - CURRENT (2022) EXPLORATION

CONSULTANT
WSP GOLDER

YYYY-MM-DD	2022-04-20
DESIGNED	----
PREPARED	ZS
REVIEWED	MH
APPROVED	MH

PROJECT NO.	CONTROL	REV.	FIGURE
21507944	0001	A	1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B

Path: \\golder.gds\corp\esda\office\Ontario\SIM\Clients\City_of_Windsor\Little_River_Pollution_Control_Plant\99_PRO\21507944_Stantec_EArch_PRO\0001_Geotech\ | File Name: 21507944-0001-BG-0001.dwg | Last Edited By: zsauve Date: 2022-04-25 Time:4:55:13 PM | Printed By: ZSauve Date: 2022-04-25 Time:4:56:28 PM

LEGEND

- BOREHOLE LOCATION - CURRENT EXPLORATION
- BOREHOLE LOCATION - PREVIOUS EXPLORATION (20148676)
- BOREHOLE LOCATION - PREVIOUS EXPLORATION (031-140318)
- BOREHOLE LOCATION - PREVIOUS EXPLORATION (031-140333)
- BOREHOLE LOCATION - PREVIOUS EXPLORATION (06-1140-029)
- BOREHOLE LOCATION - PREVIOUS EXPLORATION (09-1140-W091A)
- BOREHOLE LOCATION - PREVIOUS EXPLORATION (09-1140-W091B)

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. BASE PLAN SUPPLIED BY STANTEC CONSULTING LIMITED ON APRIL 19, 2022
DRAWING FILE NO. 165620249_SW-101.DWG
2. PROJECTION: TRANSVERSE MERCATOR, DATUM NAD 83,
COORDINATE SYSTEM: MTM ZONE 11, VERTICAL DATUM CGVD28

0 250 500
1:10,000 METRES

CLIENT
STANTEC CONSULTING LIMITED

PROJECT
GEOTECHNICAL EXPLORATION AND TESTING PROGRAM
LITTLE RIVER POLLUTION CONTROL PLAN - PONTIAC PUMP STATION, 9400 LITTLE RIVER ROAD, WINDSOR, ONTARIO

TITLE
LOCATION PLAN - PREVIOUS EXPLORATIONS

CONSULTANT
WSP GOLDER

YYYY-MM-DD	2022-05-04
DESIGNED	---
PREPARED	ZS
REVIEWED	MH
APPROVED	MH

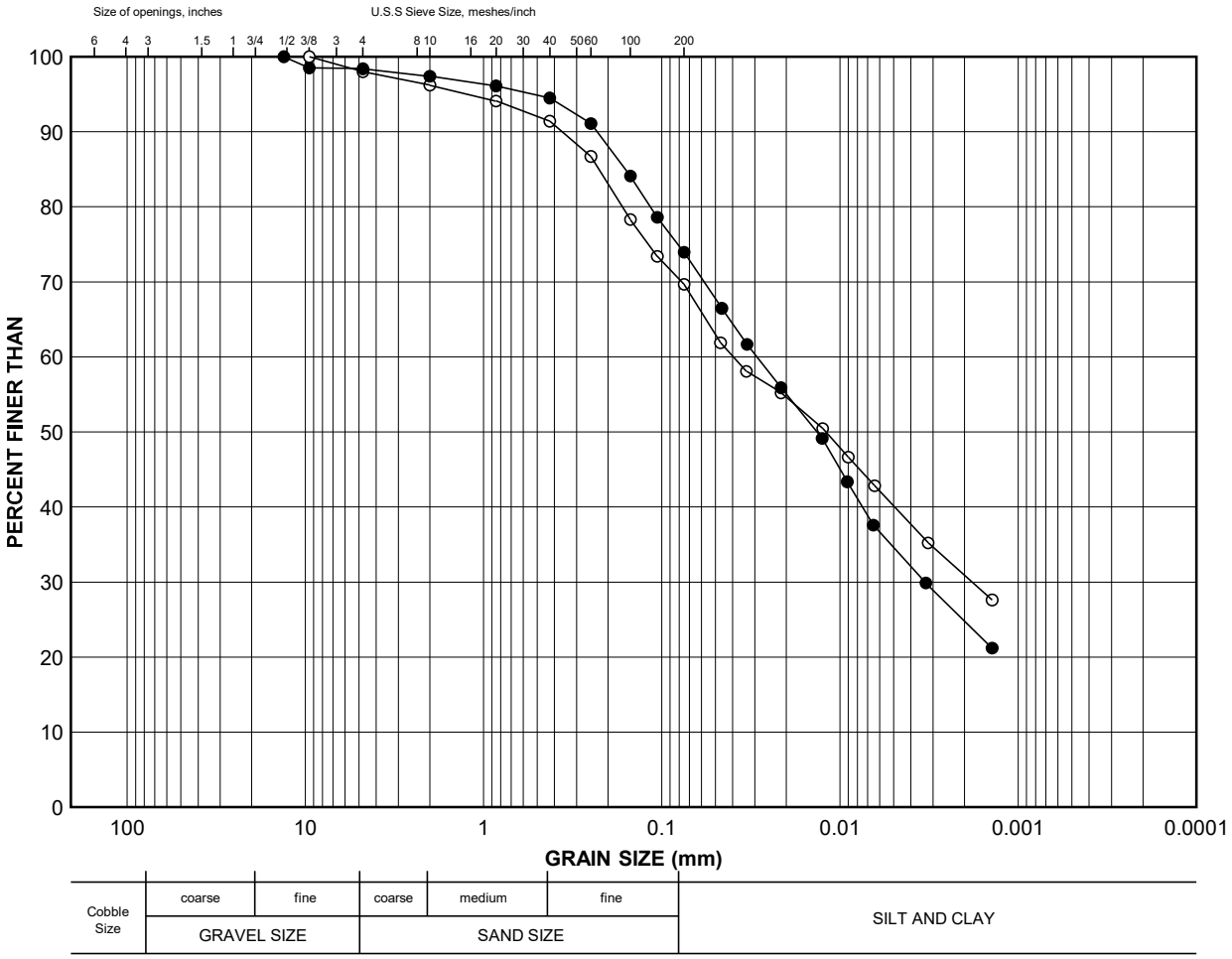
PROJECT NO.	CONTROL	REV.	FIGURE
21507944	0001	A	2

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B

25 mm

0

Path: \\golder.gds\corp\esta\office\Ontario\SIM\Clients\City_of_Windsor\Little_River_Pollution_Control_Plant\99_PROJ\21507944_Stantec_EA4D_PROD\0001_Geotech | File Name: 21507944-0001-BG-0002.dwg | Last Edited By: zsauve Date: 2022-05-05 Time:9:32:02 AM | Printed By: zsauve Date: 2022-05-05 Time:9:34:37 AM



LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH (m)
○	101	7	4.8
●	102	10	9.3

PROJECT
GEOTECHNICAL EXPLORATION AND TESTING PROGRAM
LITTLE RIVER POLLUTION CONTROL PLANT
PONTIAC PUMP STATION
9400 LITTLE RIVER ROAD, WINDSOR, ONTARIO

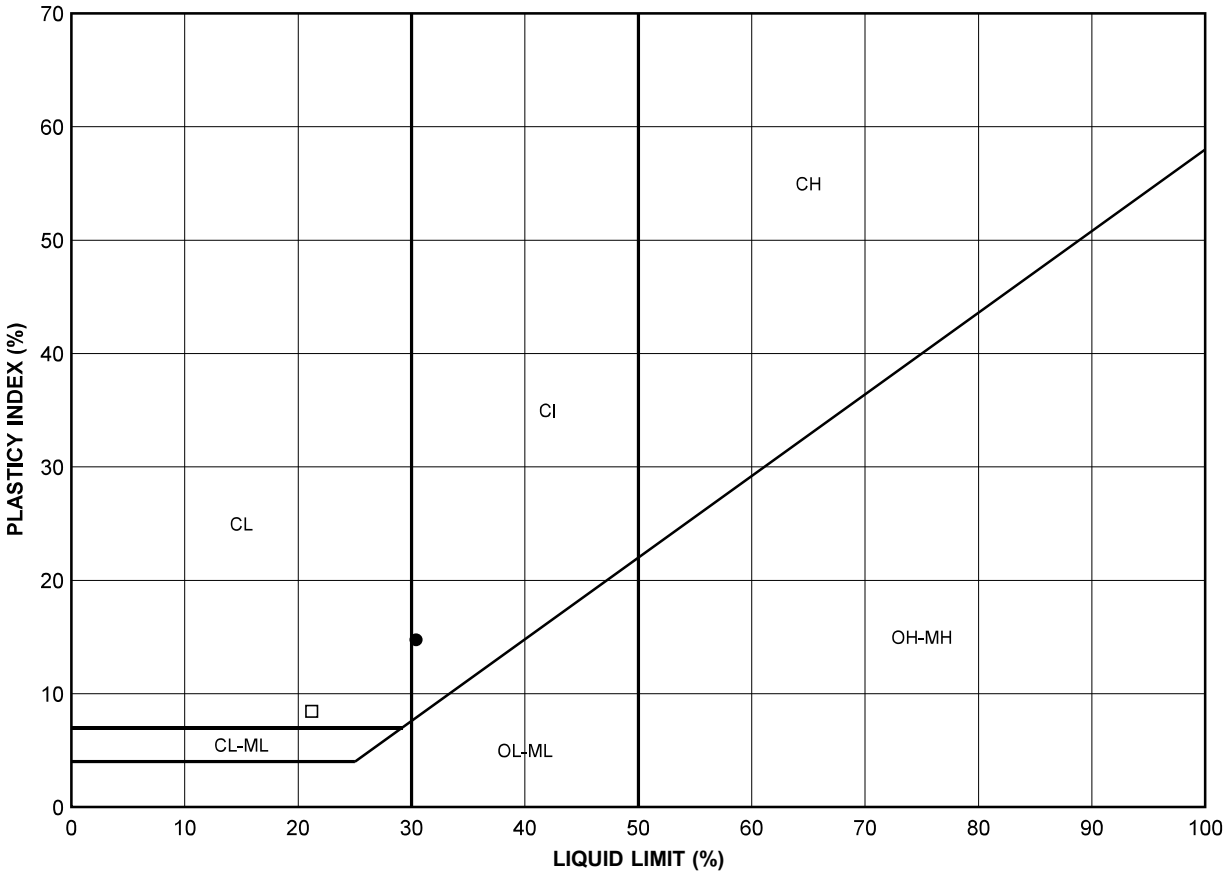
TITLE
GRAIN SIZE DISTRIBUTION
sandy SILTY CLAY

WSP GOLDER

PROJECT No.		21507944	FILE No.	GSD-v2.xlsm.Figure 1
			SCALE	N/A REV. 0
DRAWN	HK	2022-05-05		
CHECK	MH			

FIGURE 3

\\golder.gds\gal\London\Admin\Windsor\LAB\01 All REPORTS\Report Store\Geotech\21507944\GSD-v2.xlsm



LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH (m)
●	101	7	4.8
□	102	10	9.3

PROJECT: GEOTECHNICAL EXPLORATION AND TESTING PROGRAM
LITTLE RIVER POLLUTION CONTROL PLANT
PONTIAC PUMP STATION
9400 LITTLE RIVER ROAD, WINDSOR, ONTARIO

TITLE: **PLASTICITY CHART**

WSP GOLDER

PROJECT No.		21507944	FILE No.	21507944_Limits.xlsm.Figure 1
			SCALE N/A	REV. 0
DRAWN	HK	2022-05-05		
CHECK	MH			

FIGURE 4

\\golder.gds\gal\London\Admin\Windsor\LAB\01 All REPORTS\Report Store\Geotech\21507944\21507944_Limits.xlsm

APPENDIX A

Records of Previous Boreholes

PROJECT: 031-140318

RECORD OF BOREHOLE 101

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 16, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE		175.03								
	MANUAL AUGER SOLID STEM	Black, clayey **TOPSOIL**		0.00	1	AS	-	175				
				174.65	2	AS	-					
				0.38	3	AS	-					
1		Mottled brown and grey, **SILTY CLAY**, some sand, trace gravel (TILL)			4	AS	-	174				Borehole dry during drilling on December 16, 2003
				173.51	5	AS	-					
		END OF BOREHOLE		1.52								
2												
3												

PROJECT: 031-140318

RECORD OF BOREHOLE 102

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 18, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		PAVEMENT SURFACE		174.87								
	POWER AUGER SOLID STEM	**ASPHALT**		0.00								
		Granular road base (FILL)		0.15								
				0.30								
1		Mottled brown and grey, **SILTY CLAY**, some sand, trace gravel, fissured (TILL)			1	AS	-	174				Borehole dry during drilling on December 18, 2003
				173.35								
		END OF BOREHOLE		1.52								
2												
3												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: A.B.

CHECKED: GM

LDN_DBL 031-140318.GPJ GLDR_LDN.GDT 2/10/04 DATA INPUT: Tony Mastroianni

PROJECT: 031-140318

RECORD OF BOREHOLE 103

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 18, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa: nat V. + Q - ●, rem V. ⊕ U - ○ (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT: Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER, SOLID STEM	PAVEMENT SURFACE		175.05				175						
		ASPHALT		0.00										
		Granular road base (FILL)		0.15										
				174.46										
		Black, clayey **TOPSOIL**		0.59	1	AS	-							Borehole dry during drilling on December 18, 2003
1				173.68				174						
		Mottled brown and grey, **SILTY CLAY**, some sand, trace gravel (TILL)		1.37										
		END OF BOREHOLE		1.52										
2														
3														

PROJECT: 031-140318

RECORD OF BOREHOLE 104

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 18, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa: nat V. + Q - ●, rem V. ⊕ U - ○ (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT: Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER, SOLID STEM	PAVEMENT SURFACE		174.98				174						
		ASPHALT		0.00										
		Granular road base (FILL)		0.17										
				174.42										
		Black, clayey **TOPSOIL**		0.56	1	AS	-							Borehole dry during drilling on December 18, 2003
1				173.61										
		Mottled brown and grey, **SILTY CLAY**, some sand, trace gravel (TILL)		1.37										
		END OF BOREHOLE		1.52										
2														
3														

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: C.C.

CHECKED: GM

LDN_DBL 031-140318.GPJ GLDR_LDN.GDT 2/10/04 DATA INPUT: Tony Mastroianni

PROJECT: 031-140318

RECORD OF BOREHOLE 105

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 18, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER SOLID STEM	GROUND SURFACE		174.84								
		Granular base (FILL)		0.00								
		Black, clayey topsoil (FILL)		0.10 / 174.54								
		Brown, silty clay, with topsoil pockets (FILL)		0.30 / 174.23								
1		Black, clayey **TOPSOIL**		0.61	1	AS	-	174				Borehole dry during drilling on December 18, 2003
				173.32								
		END OF BOREHOLE		1.52								
2												
3												

PROJECT: 031-140318

RECORD OF BOREHOLE 106

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 15, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER SOLID STEM	PAVEMENT SURFACE		175.43								
		ASPHALT		0.00								
		Granular road base (FILL)		0.11 / 174.83				175				
1		Brown and grey, silty clay, some sand, trace gravel, pockets of topsoil (FILL)		0.60	1	AS	-					Borehole dry during drilling on December 15, 2003
				173.91				174				
		END OF BOREHOLE		1.52								
2												
3												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: C.C.

CHECKED: GM

LDN_DBL 031-140318.GPJ GLDR_LDN.GDT 2/10/04 DATA INPUT: Tony Mastroianni

PROJECT: 031-140318

RECORD OF BOREHOLE 107

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 16, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	MANUAL AUGER SOLID STEM	GROUND SURFACE		175.57								
		Black, sand, trace to some organics, trace to some gravel (FILL)		0.00	1	AS	-					
				174.96				175				
1		Black, clayey **TOPSOIL**		0.61	2	AS	-					Borehole dry during drilling on December 16, 2003
					3	AS	-					
				174.20								
		Mottled, brown and grey, **SILTY CLAY**, some sand, trace gravel (TILL)		1.37	4	AS	-					
		END OF BOREHOLE		1.52								
2												
3												

PROJECT: 031-140318

RECORD OF BOREHOLE 108

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 16, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	MANUAL AUGER SOLID STEM	GROUND SURFACE		175.51								
		Dark grey, sand and gravel with topsoil (FILL)		0.00	1	AS	-					
		Dark brown silty clay with pockets of topsoil (FILL)		0.10	2	AS	-					
				175.05				175				
		Black, clayey **TOPSOIL**		0.46	3	AS	-					Borehole dry during drilling on December 16, 2003
1				174.51	4	AS	-					
		Mottled brown and grey, **SILTY CLAY**, some sand, trace gravel (TILL)		1.00	5	AS	-					
				173.99				174				
		END OF BOREHOLE		1.52								
2												
3												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: A.B.

CHECKED: GM

LDN_DBL 031-140318.GPJ GLDR_LDN.GDT 2/10/04 DATA INPUT: Tony Mastroianni

PROJECT: 031-140318

RECORD OF BOREHOLE 109

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 17, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	MANUAL AUGER SOLID STEM	GROUND SURFACE		176.26								
		Black, clayey topsoil, with pockets of brown silty clay (FILL)		0.00 / 176.06	1	AS	-	176				
		Brown, silty clay, pockets of topsoil (FILL)		0.20	2	AS	-					Borehole dry during drilling on December 17, 2003
1				175.04				175				
		Black, clayey **TOPSOIL**		1.22 / 174.74	3	AS	-					
		Mottled brown and grey, **SILTY CLAY**, some sand, trace gravel, pockets of topsoil (TILL)		1.52	4	AS	-					
2		END OF BOREHOLE		1.68								
3												

PROJECT: 031-140318

RECORD OF BOREHOLE 110

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 17, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	MANUAL AUGER SOLID STEM	GROUND SURFACE		175.71								
		Brown, clayey topsoil, trace gravel (FILL)		0.00 / 175.10	1	AS	-	175				Borehole dry during drilling on December 17, 2003
		Black, clayey **TOPSOIL**, with roots		0.61 / 174.80	2	AS	-					
1		Mottled brown and grey, **SILTY CLAY**, some sand, trace gravel, pockets of topsoil, trace gravel, occ. roots (TILL)		0.91 / 174.19	3	AS	-					
2		END OF BOREHOLE		1.52								
3												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: A.B.

CHECKED: GM

LDN_DBL 031-140318.GPJ GLDR_LDN.GDT 2/10/04 DATA INPUT: Tony Mastroianni

PROJECT: 031-140318

RECORD OF BOREHOLE 111

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 17, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	MANUAL AUGER SOLID STEM	GROUND SURFACE		175.48								
		Black, clayey **TOPSOIL**		0.00	1	AS	-					
				174.87	2	AS	-	175				
1		Mottled brown and grey, **SILTY CLAY**, some sand, trace gravel, occ. pockets of topsoil (TILL)		0.61	3	AS	-					Borehole dry during drilling on December 17, 2003
				173.96				174				
		END OF BOREHOLE		1.52								
2												
3												

PROJECT: 031-140318

RECORD OF BOREHOLE 112

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 17, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	MANUAL AUGER SOLID STEM	GROUND SURFACE		175.51								
		Black, clayey **TOPSOIL**		0.00	1	AS	-					
					2	AS	-	175				
				174.60	3	AS	-					Borehole dry during drilling on December 17, 2003
1		Mottled brown and grey, **SILTY CLAY**, some sand, trace gravel, occ. pockets of topsoil (TILL)		0.91								
				174.29								
		END OF BOREHOLE		1.22								
2												
3												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: A.B.

CHECKED: GM

LDN_DBL 031-140318.GPJ GLDR_LDN.GDT 2/10/04 DATA INPUT: Tony Mastroianni

PROJECT: 031-140318

RECORD OF BOREHOLE 113

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 1, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER / HOLLOW STEM	GROUND SURFACE		175.83								
		Black, clayey topsoil (FILL)		0.00	1	AS	-					
				175.22								
1		Stiff dark brown silty clay, occasional pockets of topsoil (FILL)		0.61	2	50 DO	13	175				
				174.69								
		Stiff to very stiff, mottled brown and grey, **SILTY CLAY**, some sand, trace gravel, fissured (TILL)		1.14	3	50 DO	17	174				
2					4	50 DO	30					
				173.09								
3		Hard to very stiff, brown, **SILTY CLAY**, some sand, trace gravel, fissured (TILL)		2.74	5	50 DO	45	173				
					6	50 DO	30	172				Borehole dry during drilling on December 1, 2003
4				171.26								
		Stiff to very stiff, grey, **SILTY CLAY**, some sand, trace gravel (TILL)		4.57	7	50 DO	13	171				
5												
6								170				
					8	50 DO	11					
7								169	>96+ / >96+			
					9	50 DO	9	168				
8				167.75								
		END OF BOREHOLE		8.08								
9												
10												

LDN_BHS 031-140318.GPJ GLDR_CAN.GDT 2/10/04 DATA INPUT: Tony Mastrojanni

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: C.C

CHECKED: GM

PROJECT: 031-140318

RECORD OF BOREHOLE 114

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 1, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W WI) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER / HOLLOW STEM	GROUND SURFACE		175.37								
		Black, clayey **TOPSOIL**		0.00	1	AS	-	175				
				174.61								
1		Stiff to very stiff, mottled brown and grey, **SILTY CLAY**, some sand, trace gravel (TILL)		0.76	2	50 DO	11					
								174				
					3	50 DO	22					
2				173.27								
		Hard to very stiff, brown, **SILTY CLAY**, some sand, trace gravel, fissured (TILL)		2.10	4	50 DO	39	173				
3												
				172.09	5	50 DO	20					
		Very stiff to firm, grey, **SILTY CLAY**, some sand, trace gravel (TILL)		3.28				172				Borehole dry during drilling on December 1, 2003
4					6	50 DO	11					
								171				
					7	50 DO	8					
5												
								170				
6												
					8	50 DO	11	169				
7				168.27								
		Compact, grey, **SILTY FINE SAND**, trace gravel, occ. clay pockets		7.10				168				
					9	50 DO	21					
8				167.29								
		END OF BOREHOLE		8.08								
9												
10												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: C.C

CHECKED: GM

LDN_BHS 031-140318.GPJ GLDR_CAN.GDT 2/13/04 DATA INPUT: Tony Mastroianni

PROJECT: 031-140318

RECORD OF BOREHOLE 115

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 17, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE		175.44								
	MANUAL AUGER / SOLID STEM	Black, clayey **TOPSOIL**		0.00	1	AS	-	175		○		
				174.68	2	AS	-			○		Borehole dry during drilling on December 17, 2003
1		Mottled brown and grey, **SILTY CLAY**, some sand, trace gravel (TILL)		0.76	3	AS	-			○		
				173.92				174				
		END OF BOREHOLE		1.52								
2												
3												

PROJECT: 031-140318

RECORD OF BOREHOLE 116

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 17, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE		175.57								
	MANUAL AUGER / SOLID STEM	Black, clayey topsoil (FILL)		0.00	1	AS	-	175		○		
				175.27								
		Black, clayey **TOPSOIL**		0.30	2	AS	-			○		Borehole dry during drilling on December 17, 2003
				174.81	3	AS	-			○		
1		Mottled, brown and grey, **SILTY CLAY**, some sand, trace gravel, occ. topsoil pockets (TILL)		0.76	4	AS	-			○		
				174.05								
		END OF BOREHOLE		1.52								
2												
3												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: A.B.

CHECKED: GM

LDN_DBL 031-140318.GP; GLDR_LDN.GDT 2/10/04 DATA INPUT: Tony Mastroianni

PROJECT: 031-140318

RECORD OF BOREHOLE 117

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 17, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE		175.43								
	MANUAL AUGER / SOLID STEM	Black, clayey **TOPSOIL**		0.00 / 175.13	1	AS	-	175				
1	MANUAL AUGER / SOLID STEM	Mottled, brown and grey, **SILTY CLAY**, trace to some sand and gravel (TILL)		0.30 / 174.21	2	AS	-					Borehole dry during drilling on December 17, 2003
		END OF BOREHOLE		1.22								
2												
3												
4												
5												
6												
7												
8												
9												
10												

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: A.B.
CHECKED: GM

LDN_BHS_031-140318.GPJ_GLDR_CAN.GDT 2/10/04 DATA INPUT: Tony Mastroianni

PROJECT: 031-140333

RECORD OF BOREHOLE 1

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 16, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER / HOLLOW STEM	GROUND SURFACE		175.11								
		Grey/ brown, granular base (**FILL**)		0.00				175				
		Black, clayey **TOPSOIL**		0.18	1	AS	-					
				174.35								
1		Stiff, mottled brown and grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)		0.76	2	50 DO	10	174				
					3	50 DO	14					
2				172.97				173				
		Hard to very stiff, brown, **SILTY CLAY**, some sand and gravel, fissured (**TILL**)		2.13	4	50 DO	31					Borehole dry during drilling on December 16, 2003
3					5	50 DO	26	172				
				171.45								
4		Stiff, grey, **SILTY CLAY**, trace to some sand and gravel (**TILL**)		3.66	6	50 DO	13	171				
					7	50 DO	11					
5				170.08								
		END OF BOREHOLE		5.03								
6												
7												
8												
9												
10												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: C.C.

CHECKED:

LDN_BHS 031-140333.GPJ GLDR_CAN.GDT 16/2/04 DATA INPUT: Tony Mastroianni

PROJECT: 031-140333

RECORD OF BOREHOLE 2

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 16, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE		176.43								
		Black, clayey topsoil (**FILL**)		0.00 176.18								
				0.25	1	AS	-	176		○		
1					2	50 DO	12			○		
		Stiff to firm, brown, silty clay, some sand, trace gravel, with some topsoil intermixing/ pockets and layers (**FILL**)						175				
2					3	50 DO	11			○		
					4	50 DO	6	174		○		
				173.53								
3		Very stiff, mottled brown and grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)		2.90 173.08	5	50 DO	15			○		
				3.35				173				
4		Very stiff, brown, **SILTY CLAY**, some sand and gravel, fissured (**TILL**)			6	50 DO	27			○		
								172				
					7	50 DO	20			○		
5	POWER AUGER HOLLOW STEM			171.40								
				5.03				171				
6												
					8	50 DO	15	170		○		
7		Very stiff to firm, grey, **SILTY CLAY**, trace to some sand and gravel, occ. silty sand and sandy silt pockets/ seams (**TILL**)										
								169				
8					9	50 DO	9					
								168	⊕ + ⊕ +			Water seepage into borehole encountered at about 166.98m during drilling on Deember 16, 2003
9										○		
				166.98	10	50 DO	16	167				
		Compact, grey, **SANDY SILT** (**TILL**)		9.45 166.68						○		
10		END OF BOREHOLE		9.75								

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: C.C.

CHECKED:

LDN_BHS 031-140333.GPJ GLDR_CAN.GDT 16/2/04 DATA INPUT: Tony Mastrojanni

PROJECT: 031-140333

LOCATION: SEE LOCATION PLAN

SAMPLER HAMMER, 63.5kg; DROP, 760mm

RECORD OF BOREHOLE 3

BORING DATE: DECEMBER 16-17, 2003

SHEET 1 OF 4

DATUM: GEODETIC

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER / HOLLOW STEM	GROUND SURFACE		177.06 / 0.00				177				
		Stiff to very stiff, brown, silty clay, some sand, trace gravel, with black topsoil, intermixing, pockets and layers (**FILL**)			1	AS	-					
1					2	50 DO	14	176				
					3	50 DO	21					
2								175				
					4	50 DO	20					
3												
					5	50 DO	21	174				
4				173.25 / 3.81								
		Very stiff, mottled brown and grey, **SILTY CLAY**, some sand, trace gravel, occ. fine sand partings (**TILL**)			6	50 DO	26	173				
				172.64 / 4.42								
5		Very stiff, brown, **SILTY CLAY**, some sand and gravel, fissured (**TILL**)			7	50 DO	27					Borehole dry during drilling on December 16, 2003 prior to commencing wash boring
				171.88 / 5.18				172				
					8	50 DO	13					
6												
					9	50 DO	9	171				
7		Stiff, grey, **SILTY CLAY**, trace to some sand and gravel, occ. silty sand and sandy silt till pockets/ seams (**TILL**)						170	⊕ +			
									⊕ +			
8	WASH BORING / HOLLOW STEM				10	50 DO	9					
								169				
				168.53 / 8.53					>96+			
9	WASH BORING / UNCASED	Dense, grey, **SANDY SILT**, trace to some clay and gravel (**TILL**)			11	50 DO	35		>96+			
				167.76 / 9.30				168				
		Firm to stiff, grey, **SILTY CLAY**, trace sand and gravel, occ. silt and fine sand partings/ pockets (**TILL**)		167.31 / 9.75								
10												
		— CONTINUED NEXT PAGE —										

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: C.C.

CHECKED:

LDN_BHS 031-140333.GPJ GLDR_CAN.GDT 16/2/04 DATA INPUT: Tony Mastroianni

PROJECT: 031-140333

RECORD OF BOREHOLE 3

SHEET 2 OF 4

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 16-17, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (20 40 60 80) nat V. + Q - ● rem V. ⊕ U - ○	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
10		— CONTINUED FROM PREVIOUS PAGE —						167				
					12	50 DO	5			○		
11								166				
12					13	50 DO	5			○		
								165				
13												
					14	50 DO	5	164		○		
14												
								163				
15	WASH BORING UNCASED	Stiff to very stiff, grey, **SILTY CLAY**, trace to some sand and gravel, occ. silty sand and sandy silt till partings/ layers **(TILL)**			15	50 DO	4			○		
								162				
16												
					16	50 DO	4	161		○		
17												
								160	⊕ + ⊕ +			
18					17	50 DO	7	159				
19								158				
					18	50 DO	10			○		
20		— CONTINUED NEXT PAGE —										

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: C.C.
CHECKED:

LDN_BHS 031-140333.GPJ GLDR_CAN.GDT 16/2/04 DATA INPUT: Tony Mastrojanni

PROJECT: 031-140333

RECORD OF BOREHOLE 3

SHEET 3 OF 4

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 16-17, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (20 40 60 80) nat V. + Q - ● rem V. ⊕ U - ○	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
20		— CONTINUED FROM PREVIOUS PAGE —						157				
21					19	50 DO	10	156				
22								155				
23					20	50 DO	17	154				
24	WASH BORING	Stiff to very stiff, grey, **SILTY CLAY**, trace to some sand and gravel, occ. silty sand and sandy silt till partings/ layers **(TILL)**			21	50 DO	17	153				
25	UNCASED							152				
26					22	50 DO	10	151				
27				150.09 26.97	23	50 DO	7	150				
		Loose, grey, **SILTY FINE SAND**		149.48 27.58								
28								149				
29		Very stiff, grey, **SILTY CLAY**, trace to some sand and gravel **(TILL)**			24	50 DO	17	148				
30		— CONTINUED NEXT PAGE —										

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: C.C.

CHECKED:

LDN_BHS 031-140333.GPJ GLDR_CAN.GDT 16/2/04 DATA INPUT: Tony Mastroianni

PROJECT: 031-140333

RECORD OF BOREHOLE 3

SHEET 4 OF 4

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 16-17, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
30		— CONTINUED FROM PREVIOUS PAGE —										
	UNCASED	Very stiff, grey, **SILTY CLAY**, trace to some sand and gravel **(TILL)**		146.58	25	50 DO	25	147		W ○		
		END OF BOREHOLE		30.48								
31												
32												
33												
34												
35												
36												
37												
38												
39												
40												

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: C.C.

CHECKED:

LDN_BHS 031-140333.GPJ GLDR_CAN.GDT 16/2/04 DATA INPUT: Tony Mastroianni

PROJECT: 031-140333

RECORD OF BOREHOLE 4

SHEET 1 OF 4

LOCATION: SEE LOCATION PLAN

BORING DATE: DECEMBER 8-11, 2003

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER / HOLLOW STEM	GROUND SURFACE		177.16				177				
		Black, clayey topsoil, occ. gravel and brick fragments (**FILL**)		0.00 / 176.40	1	AS	-					
1		Very stiff, brown to brown and grey, silty clay, some sand, trace gravel, some black topsoil intermixing (**FILL**)		0.76 / 175.03	2	50 DO	19	176				
					3	50 DO	15					
2		Stiff dark brown to black, clayey **TOPSOIL**		2.13 / 174.26	4	50 DO	14	175				
3		Stiff to very stiff, mottled brown and grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)		2.90 / 172.74	5	50 DO	10	174				
4					6	50 DO	19	173				
5		Very stiff, brown, **SILTY CLAY**, some sand and gravel, fissured (**TILL**)		4.42 / 171.22	7	50 DO	28	172			MH	Borehole dry during drilling on December 8, 2003 prior to commencing washboring
					8	50 DO	28					
6		Very stiff to stiff, grey, **SILTY CLAY**, trace to some sand and gravel (**TILL**)		5.94 / 170.00	9	50 DO	9	171	>96+			
7					10	50 DO	14	170				
	WASH BORING / HQ CASING	Compact, grey, **SILTY FINE SAND**		7.16 / 169.69								
8		Stiff to very stiff, grey, **SILTY CLAY**, trace to some sand and gravel, occ. silty sand and sandy silt till pockets/ seams (**TILL**)		7.47	11	50 DO	9	169	>96+			
9	WASH BORING / UNCASED				12	50 DO	8	168	>96+			
10		— *CONTINUED NEXT PAGE* —							⊕ +			

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: C.C.

CHECKED:

LDN_BHS 031-140333.GPJ GLDR_CAN.GDT 16/2/04 DATA INPUT: Tony Mastrolanni

PROJECT: 031-140333

LOCATION: SEE LOCATION PLAN

SAMPLER HAMMER, 63.5kg; DROP, 760mm

RECORD OF BOREHOLE 4

BORING DATE: DECEMBER 8-11, 2003

SHEET 2 OF 4

DATUM: GEODETIC

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. + Q - ●; rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp W WI; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
10	WASH BORING UNCASED	— CONTINUED FROM PREVIOUS PAGE —												
		Compact, grey, **SANDY SILT (TILL)**		167.19 10.06	13	50 DO	20	167		>96+				
				166.64 10.52										
11								166						
12					14	50 DO	8						MH	
13								165						
					15	50 DO	11	164						
14														
								163						
15		Firm to stiff, grey, **SILTY CLAY**, trace to some sand and gravel, with occ. silty sand and sandy silt till pockets/ seams **(TILL)**			16	50 DO	10							
								162						
16														
					17	50 DO	6	161						
17														
								160						
18					18	50 DO	8							
								159						
19														
								158						
					19	50 DO	9							
20		— CONTINUED NEXT PAGE —												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: C.C.

CHECKED:

LDN_BHS 031-140333.GPJ GLDR_CAN.GDT 16/2/04 DATA INPUT: Tony Mastroianni

PROJECT: 031-140333

LOCATION: SEE LOCATION PLAN

SAMPLER HAMMER, 63.5kg; DROP, 760mm

RECORD OF BOREHOLE 4

BORING DATE: DECEMBER 8-11, 2003

SHEET 3 OF 4

DATUM: GEODETIC

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		— CONTINUED FROM PREVIOUS PAGE —										
20	WASH BORING UNCASED	Firm to stiff, grey, **SILTY CLAY**, trace to some sand and gravel, with occ. silty sand and sandy silt till pockets/ seams **(TILL)**						157				
21					20	50 DO	8	156				
22												
23					21	50 DO	8	155				
24								154				
25					22	50 DO	10	153				
26								152				
27					23	50 DO	9	151				
28								150				
29					24	50 DO	7	149				
30								148				
		— CONTINUED NEXT PAGE —			25	50 DO	12					
					26		14					

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: C.C.

CHECKED:

LDN_BHS 031-140333.GPJ GLDR_CAN.GDT 16/2/04 DATA INPUT: Tony Mastroianni

PROJECT: 031-140333

LOCATION: SEE LOCATION PLAN

SAMPLER HAMMER, 63.5kg; DROP, 760mm

RECORD OF BOREHOLE 4

BORING DATE: DECEMBER 8-11, 2003

SHEET 4 OF 4

DATUM: GEODETIC

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
30		*--- CONTINUED FROM PREVIOUS PAGE ---*			26	50 DO	14	147				
31	WASH BORING UNCASED	Firm to stiff, grey, **SILTY CLAY**, trace to some sand and gravel, with occ. silty sand and sandy silt till pockets/ seams **(TILL)**						146				
32					27	50 DO	15	145				
33				144.85 / 32.31	28	50 DO	21	144				
34		Very stiff to hard grey, **SILTY CLAY**, some sand, occ. gravel, with some silt partings **(TILL)**						143				
35				142.26 / 34.90	29	50 DO	36	142				
36		Hard, grey, **SILTY CLAY**, occ. siltier/ sandier zones **(TILL)**		141.19 / 35.97	30	50 DO	143	141				
37		Hard, grey, **CLAYEY SILT**, some sand and gravel, occ. cobbles/ boulders **(TILL)**						140				
38	ROTARY DRILL ROCK CORE			139.09 / 38.07	31	50 DO	107	139				
39		Grey, highly fractured dolomitic, **LIMESTONE**			32	NX RC	PH	138				
		Grey, **WEATHERED SHALE**		137.87 / 39.29	33	NX RC	PH					
40		END OF BOREHOLE		137.44 / 39.72								

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: C.C.

CHECKED:

LDN_BHS 031-140333.GPJ GLDR_CAN.GDT 16/2/04 DATA INPUT: Tony Mastroianni

PROJECT: 031-140333

LOCATION: SEE LOCATION PLAN

SAMPLER HAMMER, 63.5kg; DROP, 760mm

RECORD OF BOREHOLE 5

BORING DATE: DECEMBER 15, 2003

SHEET 1 OF 1

DATUM: GEODETIC

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W WI; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE		175.66 0.00	1	AS	-	175				
1		Very stiff to stiff, brown, silty clay, some sand, trace gravel, with black topsoil intermixing pockets **(FILL)**			2	50 DO	17					
2					3	50 DO	12	174				
				173.37 2.29	4	50 DO	30	173				
3		Hard mottled, brown and grey, **SILTY CLAY**, some sand, trace gravel **(TILL)**		172.76 2.90	5	50 DO	32					
4		Hard to very stiff, brown, **SILTY CLAY**, some sand and gravel, fissured **(TILL)**		171.69 3.96	6	50 DO	15	172				
5	POWER AUGER / HOLLOW STEM				7	50 DO	7	171				Borehole dry during drilling on December 15, 2003
6					8	50 DO	6	170	>96+			
7		Very stiff to stiff, grey, **SILTY CLAY**, trace to some sand and gravel **(TILL)**			9	50 DO	7	169	>96+ >96+			
8								168				
9					10	50 DO	5	167				
				165.90				166				
10		END OF BOREHOLE		9.75								

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: C.C.

CHECKED:

LDN_BHS 031-140333.GPJ GLDR_CAN.GDT 16/2/04 DATA INPUT: Tony Mastroianni

PROJECT: 031-140333

LOCATION: SEE LOCATION PLAN

SAMPLER HAMMER, 63.5kg; DROP, 760mm

RECORD OF BOREHOLE 6

BORING DATE: DECEMBER 15, 2003

SHEET 1 OF 1

DATUM: GEODETIC

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER HOLLOW STEM	GROUND SURFACE		175.45								
		Brown, silty clay, some sand, trace gravel, occ. topsoil pockets (FILL)		0.00 / 174.84	1	AS	-	175				
1		Stiff, black, clayey topsoil, with brown silty clay pockets (FILL)		0.61 / 174.08	2	50 DO	9					
		Very stiff, mottled brown and grey, SILTY CLAY, some sand, trace gravel (TILL)		1.37 / 173.32	3	50 DO	15	174				
2												
		Very stiff, brown, SILTY CLAY, some sand and gravel, fissured (TILL)		2.13 / 171.79	4	50 DO	27	173				Borehole dry during drilling on December 15, 2003
3					5	50 DO	17	172				
		Stiff to firm, grey, SILTY CLAY, trace to some sand and gravel (TILL)		3.66 / 170.42	6	50 DO	9					
4								171				
		END OF BOREHOLE		5.03	7	50 DO	7					
5												
6												
7												
8												
9												
10												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: C.C.

CHECKED:

LDN_BHS 031-140333.GPJ GLDR_CAN.GDT 16/2/04 DATA INPUT: Tony Mastrojanni

PROJECT: 06-1140-029

RECORD OF BOREHOLE 1

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: MARCH 8, 2006

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER HOLLOW STEM	PAVEMENT SURFACE		178.62								
		ASPHALT		0.00								
		Granular road base (**FILL**)		0.13	1	AS	-	178		○		
				177.86								
1		Very dense, brown, medium to coarse sand, some gravel (**FILL**)		0.76	2	SS	75			○		
				177.25								
		Stiff, mottled brown and grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)		1.37	3	SS	8	177		○		
2					4	SS	12	176		○		
				175.88								
		Very stiff, brown, **SILTY CLAY**, some sand, trace gravel (**TILL**)		2.74	5	SS	27	175		○		
3												
4					6	SS	20			○		
				174.36								
		Stiff to very stiff, grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)		4.27	7	SS	10	174		○		Borehole dry during drilling on March 8, 2006
5									⊕ +			
								173	⊕ +			
6					8	SS	6			○		
								172	⊕ + ⊕ +			
7												
					9	SS	17	171		○ ○		
8				170.65								
		Compact, grey, **SILTY FINE SAND**, some clay and gravel		7.98								
				170.01				170				
		Very stiff, grey, **CLAYEY SILT**, some sand, trace gravel (**TILL**)		8.61	10	SS	21			○		
9								169				
				168.87								
		END OF BOREHOLE		9.75								
10												

LDN_BHS 06-1140-029.GPJ GLDR_CAN.GDT 4/26/06 DATA INPUT: Tony Mastroianni

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: N.R.

CHECKED:

PROJECT: 06-1140-029

RECORD OF BOREHOLE 2

SHEET 1 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: FEBRUARY 23, 2006

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s; WATER CONTENT PERCENT (Wp, W, Wl)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER HOLLOW STEM	GROUND SURFACE		178.00				178				
		Black, clayey **TOPSOIL**		0.00 / 177.67	1	AS	-					
				0.33								
1		Stiff, mottled brown and grey, **SILTY CLAY**, some sand, trace gravel **(TILL)**			2	SS	10	177				
					3	SS	13					
2				176.02				176				
		Very stiff, brown, **SILTY CLAY**, some sand, trace gravel **(TILL)**		1.98	4	SS	26					
3					5	SS	15	175				
				174.35 / 3.66								
4					6	SS	5	174				
5					7	SS	7	173				Borehole dry during drilling on February 23, 2006
6					8	SS	4	172				
7		Stiff to very stiff, grey, **SILTY CLAY**, some sand, trace gravel **(TILL)**						171				
6					9	SS	7	170				
9								169	>144			
					10	SS	7					
10		*— CONTINUED NEXT PAGE —*										

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: N.R.

CHECKED:

LDN_BHS 06-1140-029.GPJ GLDR_CAN.GDT 4/26/06 DATA INPUT: Tony Mastroianni

PROJECT: 06-1140-029

RECORD OF BOREHOLE 2

SHEET 2 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: FEBRUARY 23, 2006

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		— CONTINUED FROM PREVIOUS PAGE —										
10	POWER AUGER HOLLOW STEM	Stiff to very stiff, grey, **SILTY CLAY**, some sand, trace gravel **(TILL)**						168	⊕			
11					11	SS	10	167		○		
				166.88								
		END OF BOREHOLE		11.13								
12												
13												
14												
15												
16												
17												
18												
19												
20												

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: N.R.
CHECKED:

LDN_BHS 06-1140-029.GPJ GLDR_CAN.GDT 4/26/06 DATA INPUT: Tony Mastroianni

PROJECT: 06-1140-029

RECORD OF BOREHOLE 3

SHEET 1 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: FEBRUARY 23, 2006

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER HOLLOW STEM	GROUND SURFACE		178.09								
		Dark brown, clayey **TOPSOIL**		0.00	1	AS	-	178				
				0.15								
1		Stiff, mottled brown and grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)			2	SS	6	177				
					3	SS	14					
2				176.11								
				1.98				176				
		Very stiff, brown, **SILTY CLAY**, some sand, trace gravel (**TILL**)			4	SS	25					
3								175				
				174.76	5	SS	17					
				3.33								
4					6	SS	8	174				
					7	SS	5					
5								173				
									⊕ +			
									144			
6		Stiff to very stiff, grey, **SILTY CLAY**, some sand, trace gravel, occ. sand pockets (**TILL**)						172				
					8	SS	9					
7								171				
									144			
					9	SS	22					
8								170				Water seepage into borehole encountered at about elevation 168.95m during drilling
				169.48								
				8.61								
9		Very dense, grey, medium to coarse **SAND**, trace silt and gravel						169				
				168.72	10	SS	52					
				9.37								
10		Hard to firm, grey, **CLAYEY SILT** to **SILTY CLAY**, some sand, trace gravel, sand/ silt seams (**TILL**)										
		— CONTINUED NEXT PAGE —										

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: N.R.

CHECKED:

LDN_BHS 06-1140-029.GPJ GLDR_CAN.GDT 4/26/06 DATA INPUT: Tony Mastroianni

PROJECT: 06-1140-029

RECORD OF BOREHOLE 3

SHEET 2 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: FEBRUARY 23, 2006

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		— CONTINUED FROM PREVIOUS PAGE —										
10	POWER AUGER / HOLLOW STEM	Hard to firm, grey, **CLAYEY SILT** to **SILTY CLAY**, some sand, trace gravel, sand/ silt seams (**TILL**)						168				
					11	SS	7			W		
11				166.96				167				
		END OF BOREHOLE		11.13								
12												
13												
14												
15												
16												
17												
18												
19												
20												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: N.R.

CHECKED:

LDN_BHS 06-1140-029.GPJ GLDR_CAN.GDT 4/26/06 DATA INPUT: Tony Mastroianni

PROJECT: 06-1140-029

RECORD OF BOREHOLE 4

SHEET 1 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: FEBRUARY 23, 2006

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER / HOLLOW STEM	GROUND SURFACE		178.44								
		Dark brown, clayey topsoil (**FILL**)		0.00	1	AS	-	178		○		
				0.13								
1		Firm, dark brown, silty clay, some sand and gravel, mixed with topsoil (**FILL**)			2	SS	4			○		
				177.07				177				
				1.37								
2		Firm, mottled brown and grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)			3	SS	7					
					4	SS	7	176		○		
				175.55								
3				2.90								
					5	SS	20	175		○		
4		Very stiff, brown, **SILTY CLAY**, some sand, trace gravel (**TILL**)			6	SS	19			○		
				174.02				174				
				4.42								
					7	SS	10			○		Borehole dry during drilling on February 23, 2006
5								173	⊕ +			
6									⊕ +			
					8	SS	14	172				
7		Stiff to very stiff, grey, **SILTY CLAY** to **CLAYEY SILT**, some sand, trace gravel, occ. sand pockets (**TILL**)										
					9	SS	4	171		○		
8									⊕ +			
								170	⊕ +			
9					10	SS	5			○		
								169				
10		— *CONTINUED NEXT PAGE* —										

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: N.R.

CHECKED:

LDN_BHS 06-1140-029.GPJ GLDR_CAN.GDT 4/26/06 DATA INPUT: Tony Mastrolanni

PROJECT: 06-1140-029

RECORD OF BOREHOLE 4

SHEET 2 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: FEBRUARY 23, 2006

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		— CONTINUED FROM PREVIOUS PAGE —										
10	POWER AUGER HOLLOW STEM	Stiff to very stiff, grey, **SILTY CLAY** to **CLAYEY SILT**, some sand, trace gravel, occ. sand pockets (**TILL**)						168	⊕ + ⊕ 129			
11					11	SS	4			O		
		END OF BOREHOLE		167.32 / 11.13								
12												
13												
14												
15												
16												
17												
18												
19												
20												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: N.R.

CHECKED:

LDN_BHS 06-1140-029.GPJ GLDR_CAN.GDT 4/26/06 DATA INPUT: Tony Mastroianni

PROJECT: 06-1140-029

RECORD OF BOREHOLE 5

SHEET 1 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: FEBRUARY 24, 2006

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE		178.47								
		Dark brown, sandy topsoil, some gravel (FILL)		0.00 / 178.09	1	AS	-	178				
1		Loose, dark brown, silty medium to coarse sand, clay partings (FILL)		0.38 / 177.38	2	SS	4					
		Firm, mottled brown and grey, silty clay, some sand, trace gravel, mixed with topsoil (FILL)		1.09 / 177.10								
		Firm, mottled brown and grey, **SILTY CLAY**, some sand, trace gravel (TILL)		1.37 / 175.95	3	SS	6	177				
2					4	SS	17	176				Water seepage into borehole encountered at about elevation 176.95m during drilling
3		Very stiff, brown, **SILTY CLAY**, some sand, trace gravel (TILL)		2.51 / 174.81	5	SS	23	175				Borehole dry upon completion of drilling on February 24, 2006
4		Stiff, grey, **SILTY CLAY**, some sand, trace gravel (TILL)		3.66 / 174.05	6	SS	10					
5	POWER AUGER HOLLOW STEM	Stiff, grey, laminated **SILTY CLAY**, some sand, trace gravel, fissured (TILL)		4.42 / 172.90	7	SS	6	174				
6					8	SS	5	173				
7		Stiff to firm, grey, **SILTY CLAY**, some sand, trace gravel (TILL)		5.56				172				
8					9	SS	4	171				
9								170				
10					10	SS	8	169				
		Compact to dense, grey, **SANDY SILT**, trace clay and gravel (TILL)		168.87 / 9.60								
		— CONTINUED NEXT PAGE —										

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: N.R.

CHECKED:

LDN_BHS 06-1140-029.GPJ GLDR_CAN.GDT 4/26/06 DATA INPUT: Tony Mastroianni

PROJECT: 06-1140-029

RECORD OF BOREHOLE 5

SHEET 2 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: FEBRUARY 24, 2006

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - O) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		— CONTINUED FROM PREVIOUS PAGE —										
10	POWER AUGER HOLLOW STEM	Compact to dense, grey, **SANDY SILT**, trace clay and gravel (**TILL**)			11	SS	34	168		C		
11				166.81				167				
12		Compact, grey, **SILTY FINE TO MEDIUM SAND**, trace gravel		11.66	12	SS	29	166		O		
				165.82								
		END OF BOREHOLE		12.65								
13												
14												
15												
16												
17												
18												
19												
20												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: N.R.

CHECKED:

LDN_BHS 06-1140-029.GPJ GLDR_CAN.GDT 4/26/06 DATA INPUT: Tony Mastroianni

PROJECT: 06-1140-029

RECORD OF BOREHOLE 6

SHEET 1 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: FEBRUARY 24, 2006

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER / HOLLOW STEM	GROUND SURFACE		178.80								
		Firm, black, clayey topsoil, rootlets organics (**FILL**)		0.00	1	AS	-	178		○		
1					2	SS	4					Water level in borehole at about elevation 178.40 m during drilling on February 24, 2006
				177.43								
		Firm, mottled brown and grey, silty clay, some sand, trace gravel, pieces of wood and construction debris (**FILL**)		1.37	3	SS	6	177		○		
2				176.67								
		Very stiff to stiff, brown, **SILTY CLAY**, some sand, trace gravel, fissured (**TILL**)		2.13	4	SS	18	176		○		
3					5	SS	23			○		
					6	SS	13	175		○		
4												
					7	SS	14	174		○		
5				173.24								
		Firm to stiff, grey, **SILTY CLAY**, some sand, trace gravel (**TILL**)		5.56	8	SS	4	173		○		
6												
								172	⊕ + ⊕ +			
7					9	SS	4	171		○		
8									⊕ +			
								170	⊕ +			
9					10	SS	9			○		
								169				
10		— *CONTINUED NEXT PAGE* —										

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: N.R.

CHECKED:

LDN_BHS 06-1140-029.GPJ GLDR_CAN.GDT 4/26/06 DATA INPUT: Tony Mastroianni

PROJECT: 06-1140-029

RECORD OF BOREHOLE 6

SHEET 2 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: FEBRUARY 24, 2006

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
10		*— CONTINUED FROM PREVIOUS PAGE —*										
	POWER AUGER HOLLOW STEM	Very stiff, grey, **CLAYEY SILT**, some sand, trace gravel, sand seams (**TILL**)		168.67 10.13					>144			
11					11	SS	17	168				
12					12	SS	17	167				
		END OF BOREHOLE		166.15 12.65								
13												
14												
15												
16												
17												
18												
19												
20												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: N.R.

CHECKED:

LDN_BHS 06-1140-029.GPJ GLDR_CAN.GDT 4/26/06 DATA INPUT: Tony Mastroianni

PROJECT: 06-1140-029

RECORD OF BOREHOLE 7

SHEET 1 OF 1

LOCATION: SEE LOCATION PLAN

BORING DATE: MARCH 8, 2006

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl, 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE		178.26 / 0.00				178				
	POWER AUGER HOLLOW STEM	Brown, sandy silt, trace clay and gravel **(FILL)**			1	AS	-			○		
				177.50 / 0.76								
1		Very stiff, mottled brown and grey, silty clay, some sand, trace gravel mixed with topsoil **(FILL)**			2	SS	20			○		
				176.89 / 1.37				177				
		Stiff, mottled brown and grey, **SILTY CLAY**, some sand, trace gravel **(TILL)**			3	SS	12			○		
2				176.28 / 1.98								
					4	SS	28	176		○		
3		Very stiff to stiff, brown, **SILTY CLAY**, some sand, trace gravel **(TILL)**			5	SS	21	175		○		
4					6	SS	13			○		
				173.84 / 4.42				174				
		Stiff, grey, **SILTY CLAY**, some sand, trace gravel **(TILL)**			7	SS	8			○		
5				172.69 / 5.56				173	>144			
												Water seepage into borehole encountered at about elevation 172.47m during drilling
6					8	SS	18	172		○		
7		Very stiff to stiff, grey, **CLAYEY SILT**, some sand, trace gravel, occ. sand seams **(TILL)**						171				
8					9	SS	16			○		
								170				Water level in borehole at about elevation 168.66m upon completion of drilling on March 8, 2006
9					10	SS	10	169		○		
				168.50 / 9.75								
10		END OF BOREHOLE										

DEPTH SCALE

1 : 50

LOGGED: N.R.

CHECKED:

Golder Associates

LDN_BHS 06-1140-029.GPJ GLDR_CAN.GDT 4/27/06 DATA INPUT: Tony Mastroianni

PROJECT: 09-1140-W091A

RECORD OF BOREHOLE 1

SHEET 1 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: August 27, 2009

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER / HOLLOW STEM	GROUND SURFACE		177.50								
		Black clayey topsoil **(FILL)**		0.00 / 177.20	1	CS						
		Very stiff, brown silty clay, some sand, trace gravel, trace rootlets **(FILL)**		0.30	2	SS	15	177				Borehole dry during drilling on August 27, 2009.
1					3	SS	13					
				176.13 / 1.37				176				
2		Firm to stiff, brown **SILTY CLAY**, some sand, trace gravel, trace fissures, occasional silt partings **(TILL)**			4	SS	7					
					5	SS	14	175				
3					6	SS	12					
				173.84 / 3.66				174				
4					7	SS	3					
					8	SS	3	173				
5												
					9	SS	1	172				
6												
		Stiff, grey **SILTY CLAY**, some sand, trace gravel, occasional silt partings **(TILL)**						171				
7												
					10	SS	1	170				
8												
								169				
9												
					11	SS	6	168				
		--- CONTINUED NEXT PAGE ---										

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: TA

CHECKED:

LDN_BHS_02 091140W091A.GPJ GLDR_LON.GDT 9/21/09 DATA INPUT: SJL

PROJECT: 09-1140-W091A

RECORD OF BOREHOLE 1

SHEET 2 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: August 27, 2009

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---										
10	POWER AUGER HOLLOW STEM			167.44 / 10.06				167				
		Dense, grey **SILTY SAND**, trace gravel and clay			12	SS	35			W		
11				166.37								
		END OF BOREHOLE		11.13								
12												
13												
14												
15												
16												
17												
18												
19												

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: TA
CHECKED:

LDN_BHS_02 091140W091A.GPJ GLDR_LON.GDT 9/21/09 DATA INPUT: SJL

PROJECT: 09-1140-W091A

RECORD OF BOREHOLE 2

SHEET 1 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: August 27, 2009

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp W WI; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER / HOLLOW STEM	GROUND SURFACE		177.42								
		Black clayey topsoil **(FILL)**		0.00 / 177.24	1	CS						
		Stiff to very stiff, brown silty clay, some sand, trace gravel **(FILL)**		0.18	2	SS	24	177				Borehole dry during drilling on August 27, 2009.
		Black clayey **TOPSOIL**		176.66 / 0.76								
1		Stiff to firm, mottled brown and grey **SILTY CLAY**, some sand, trace gravel, occasional sand pockets and silt partings **(TILL)**		0.89	3	SS	12					
					4	SS	5	176				
2				175.29 / 2.13	5	SS	21	175				
		Very stiff, brown **SILTY CLAY**, some sand, trace gravel, occasional sand pockets and silt partings **(TILL)**			6	SS	19					
				173.76 / 3.66	7	SS	9	174				
3					8	SS	3	173				
4												
5					9	SS	5	172				
6		Firm to very stiff, grey **SILTY CLAY**, some sand, trace gravel, occasional silt partings **(TILL)**						171	>96 / >96			
7					10	SS	2	170				
8								169				
9					11	SS	3	168				
		--- CONTINUED NEXT PAGE ---										

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: TA

CHECKED:

LDN_BHS_02 091140W091A.GPJ GLDR_LON.GDT 9/21/09 DATA INPUT: SJL

PROJECT: 09-1140-W091A

RECORD OF BOREHOLE 2

SHEET 2 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: August 27, 2009

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---										
10	POWER AUGER HOLLOW STEM	Firm to very stiff, grey **SILTY CLAY**, some sand, trace gravel, occasional silt partings **(TILL)**						167	⊕ 20, + 40, ⊕ 20, + 40			
11				166.29	12	SS	2			○ 20		
		END OF BOREHOLE		11.13								
12												
13												
14												
15												
16												
17												
18												
19												

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: TA
CHECKED:

LDN_BHS_02 091140W091A.GPJ GLDR_LON.GDT 9/21/09 DATA INPUT: SJL

PROJECT: 09-1140-W091A

RECORD OF BOREHOLE 3

SHEET 1 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: August 27, 2009

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp W WI, 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER / HOLLOW STEM	GROUND SURFACE		177.74								
		Brown clayey topsoil **(FILL)**		0.00 / 177.44	1	CS						
		Stiff to firm, mottled brown and grey **SILTY CLAY**, some sand, trace gravel **(TILL)**		0.30	2	SS	12	177				Borehole dry during drilling on August 27, 2009.
1					3	SS	4					
				176.37 / 1.37								
2		Stiff to very stiff, brown **SILTY CLAY**, some sand, occasional gravel **(TILL)**			4	SS	9	176				
					5	SS	16					
3								175				
					6	SS	13					
				174.08 / 3.66				174				
4					7	SS	7					
					8	SS	2	173				
5									⊕ + >96			
6								172				
					9	SS	3					
		Firm to very stiff, grey **SILTY CLAY**, some sand, trace gravel, occasional silt and sand seams/layers at a depth of about 9.1m **(TILL)**						171	>96 +			
7												
					10	SS	2	170				
8									⊕ +			
								169	>96 +			
9					11	SS	5					
								168				
		--- CONTINUED NEXT PAGE ---										

DEPTH SCALE

1 : 50

LOGGED: TA

CHECKED:

Golder Associates

LDN_BHS_02 091140W091A.GPJ GLDR_LON.GDT 9/21/09 DATA INPUT: SJL

PROJECT: 09-1140-W091A

RECORD OF BOREHOLE 3

SHEET 2 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: August 27, 2009

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp W WI; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---										
10	POWER AUGER HOLLOW STEM	Firm to very stiff, grey **SILTY CLAY**, some sand, trace gravel, occasional silt and sand seams/layers at a depth of about 9.1m **(TILL)**						167				
11				166.61	12	SS	1					
		END OF BOREHOLE		11.13								
12												
13												
14												
15												
16												
17												
18												
19												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: TA

CHECKED:

LDN_BHS_02 091140W091A.GPJ GLDR_LON.GDT 9/21/09 DATA INPUT: SJL

PROJECT: 09-1140-W091A

RECORD OF BOREHOLE 4

SHEET 1 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: August 28, 2009

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE		176.96					SHEAR STRENGTH Cu, kPa (20 40 60 80); nat V. + Q - ●; rem V. ⊕ U - ○	WATER CONTENT PERCENT (10 20 30 40); Wp, W, Wl		
0	POWER AUGER / HOLLOW STEM	Stiff, black clayey topsoil, occasional rootlets **(FILL)**		0.00	1	CS						
					2	SS	9					Borehole dry during drilling on August 28, 2009.
				176.27								
1		Stiff, mottled brown and grey **SILTY CLAY**, some sand, trace gravel, occasional to numerous silt partings, occasional silt seams **(TILL)**		0.69	3	SS	9	176				
					4	SS	10					
2				174.83				175				
		Very stiff, brown **SILTY CLAY**, some sand, trace gravel, some silt seams **(TILL)**		2.13	5	SS	29					
3					6	SS	17	174				
				173.45								
4				3.51	7	SS	5	173				
					8	SS	3					
5								172				
6					9	SS	2	171				
7		Stiff, grey **SILTY CLAY**, some sand, trace gravel, occasional silt partings with dense sand layer at a depth of about 9.5m **(TILL)**						170				
8					10	SS	3	169				
9								168				
					11	SS	28					
		--- CONTINUED NEXT PAGE ---										

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: TA

CHECKED:

LDN_BHS_02 091140W091A.GPJ GLDR_LON.GDT 9/21/09 DATA INPUT: SJL

PROJECT: 09-1140-W091A

RECORD OF BOREHOLE 4

SHEET 2 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: August 28, 2009

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---										
10	POWER AUGER HOLLOW STEM	Stiff, grey **SILTY CLAY**, some sand, trace gravel, occasional silt partings with dense sand layer at a depth of about 9.5m **(TILL)**						167				
11					12	SS	3	166		○		
		END OF BOREHOLE		165.83 11.13								
12												
13												
14												
15												
16												
17												
18												
19												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: TA

CHECKED:

LDN_BHS_02 091140W091A.GPJ GLDR_LON.GDT 9/21/09 DATA INPUT: SJL

PROJECT: 09-1140-W091A

RECORD OF BOREHOLE 5

SHEET 1 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: August 31, 2009

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●; rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER / HOLLOW STEM	GROUND SURFACE		177.22								
		Black clayey **TOPSOIL**		0.00 176.92	1	CS		177				
		Firm to stiff, mottled black clayey topsoil, trace sand and gravel **(FILL)**		0.30	2	SS	7					
1					3	SS	9					
				175.85				176				
		Firm, mottled brown and grey **SILTY CLAY**, some sand, trace gravel, trace organic material **(TILL)**		1.37	4	SS	7					
2				175.09				175				
		Stiff to very stiff, brown **SILTY CLAY**, some sand, trace gravel, trace fissures **(TILL)**		2.13	5	SS	16					
3					6	SS	24	174				
					7	SS	14					
4				172.80				173				
				4.42	8	SS	4					
5								172	⊕ + ⊕ +			
6					9	SS	2	171				
		Stiff to very stiff, grey **SILTY CLAY**, some sand, trace gravel, occasional silt partings, occasional sand pockets at depth **(TILL)**							⊕ +			
7								170	>96 +			
					10	SS	1					
8								169	⊕ +			
									>96 +			
9					11	SS	11	168				
		--- CONTINUED NEXT PAGE ---										

Borehole dry during drilling on August 31, 2009.

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: TA

CHECKED:

LDN_BHS_02 091140W091A.GPJ GLDR_LON.GDT 9/21/09 DATA INPUT: SJL

PROJECT: 09-1140-W091A

RECORD OF BOREHOLE 5

SHEET 2 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: August 31, 2009

DATUM: GEODETIC

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---										
10	POWER AUGER HOLLOW STEM	Compact, grey **SILTY SAND**, trace clay, trace gravel		167.75 / 9.47	11	SS	11	167		○		
		Firm, grey **CLAYEY SILT**, some sand, trace gravel **(TILL)**		167.16 / 10.06	12	SS	7			○		
11		END OF BOREHOLE		166.09 / 11.13								

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: TA

CHECKED:

LDN_BHS_02 091140W091A.GPJ GLDR_LON.GDT 9/21/09 DATA INPUT: SJL

PROJECT: 09-1140-W091A

RECORD OF BOREHOLE 6

SHEET 1 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: August 31, 2009

DATUM: NOT SURVEYED

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (20 40 60 80): nat V. + Q - ●, rem V. ⊕ U - ○	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3); WATER CONTENT PERCENT (10 20 30 40): Wp, W, Wl	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER / HOLLOW STEM	GROUND SURFACE										
		Stiff, brown silty clay, some sand, trace gravel, occasional sand pockets, trace organic seams, trace rootlets **(FILL)**		0.00	1	CS						
					2	SS	8					Borehole dry during drilling on August 31, 2009.
1		Firm, mottled brown and grey **SILTY CLAY**, some sand, trace gravel, trace rootlets, trace organic material **(TILL)**		0.76	3	SS	7					
		Very stiff, brown **SILTY CLAY**, some sand, trace gravel, trace fissures, occasional silt partings **(TILL)**		1.37	4	SS	18					
2					5	SS	19					
3		Firm to very stiff, grey **SILTY CLAY**, some sand, trace gravel, occasional silt partings, clayey silt zone at a depth of about 7.9m **(TILL)**		2.90	6	SS	12					
4					7	SS	5					
5					8	SS	4		>96 +			
6					9	SS	4		>96 +			
7									⊕ +			
8					10	SS	4		⊕ +			
9					11	SS	2		⊕ +			
		--- CONTINUED NEXT PAGE ---										

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: TA

CHECKED:

LDN_BHS_02 091140W091A.GPJ GLDR_LON.GDT 9/21/09 DATA INPUT: SJL

PROJECT: 09-1140-W091A

RECORD OF BOREHOLE 6

SHEET 2 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: August 31, 2009

DATUM: NOT SURVEYED

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---										
10	POWER AUGER, HOLLOW STEM	Firm to very stiff, grey **SILTY CLAY**, some sand, trace gravel, occasional silt partings, clayey silt zone at a depth of about 7.9m **(TILL)**			11	SS	2		⊕ + ⊕ +			
11					12	SS	4			○		
		END OF BOREHOLE		11.13								
12												
13												
14												
15												
16												
17												
18												
19												

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: TA
CHECKED:

LDN_BHS_02 091140W091A.GPJ GLDR_LON.GDT 9/21/09 DATA INPUT: SJL

PROJECT: 09-1140-W091B

RECORD OF BOREHOLE 7

SHEET 1 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: August 31, 2009

DATUM: NOT SURVEYED

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE										
	POWER AUGER / HOLLOW STEM	Black clayey topsoil **(FILL)**		0.00	1	CS						
		Firm to stiff, brown silty clay, some sand, trace gravel, trace rootlets, occasional sand pockets **(FILL)**		0.28	2	SS	11					
1					3	SS	8					
					4	SS	5					
2		Firm, grey silty clay, some sand, trace gravel **(FILL)**		1.80								
		Firm, mottled brown and grey silty clay, some sand, trace gravel, some topsoil **(FILL)**		2.13	5	SS	6					
3		Stiff to very stiff, brown **SILTY CLAY**, some sand, trace gravel, trace fissures, occasional silt seams/partings **(TILL)**		2.90	6	SS	10					
4					7	SS	23					
					8	SS	19					
5				4.95								
6					9	SS	2					
7		Stiff to very stiff, grey **SILTY CLAY**, some sand, trace gravel, occasional silt partings **(TILL)**							⊕ + >96			
					10	SS	7					
8									⊕ + >96			
9				8.99								
		Firm, grey **SILTY CLAY**			11	SS	2					
		--- CONTINUED NEXT PAGE ---										

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: TA

CHECKED:

LDN_BHS_02 091140W091B.GPJ GLDR_LON.GDT 10/26/09 DATA INPUT: SJL

PROJECT: 09-1140-W091B

RECORD OF BOREHOLE 7

SHEET 2 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: August 31, 2009

DATUM: NOT SURVEYED

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp W WI) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---										
10	POWER AUGER HOLLOW STEM	Firm, grey **SILTY CLAY**			12	SS	1					WL ▽
12					13	SS	2					Water level in borehole at a depth of about 12.0m upon completion of drilling on August 31, 2009.
		END OF BOREHOLE		12.65								
13												
14												
15												
16												
17												
18												
19												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: TA

CHECKED:

LDN_BHS_02 091140W091B.GPJ GLDR_LON.GDT 10/26/09 DATA INPUT: SJL

PROJECT: 09-1140-W091B

RECORD OF BOREHOLE 8

SHEET 1 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: September 1, 2009

DATUM: NOT SURVEYED

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s; WATER CONTENT PERCENT (Wp, W, Wl)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE										
0	POWER AUGER / HOLLOW STEM	Stiff, black clayey topsoil, trace to some rootlets **(FILL)**		0.00	1	CS						
		Firm to stiff, mottled brown and grey **SILTY CLAY**, some sand, trace gravel **(TILL)**		0.36	2	SS	10					Borehole dry during drilling on September 1, 2009.
1					3	SS	7					
2		Stiff to very stiff, brown **SILTY CLAY**, some sand, trace gravel, trace fissures, occasional silt partings **(TILL)**		1.75	4	SS	10					
					5	SS	24					
3					6	SS	15					
				3.51	7	SS	4					
4					8	SS	2					
5												
6					9	SS	5					
		Stiff, grey **SILTY CLAY**, some sand, trace gravel, occasional silt partings **(TILL)**										
7												
					10	SS	2					
8												
9					11	SS	4					
		--- CONTINUED NEXT PAGE ---										

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: TA

CHECKED:

LDN_BHS_02 091140W091B.GPJ GLDR_LON.GDT 10/26/09 DATA INPUT: SJL

PROJECT: 09-1140-W091B

RECORD OF BOREHOLE 8

SHEET 2 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: September 1, 2009

DATUM: NOT SURVEYED

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---										
10	POWER AUGER HOLLOW STEM	Stiff, grey **SILTY CLAY**, some sand, trace gravel, occasional silt partings **(TILL)**							⊕ + ⊕ +			
		Soft, grey **SILTY CLAY**, occasional silt partings		10.50	12	SS	2			○		
11		END OF BOREHOLE		11.13								
12												
13												
14												
15												
16												
17												
18												
19												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: TA

CHECKED:

LDN_BHS_02 091140W091B.GPJ GLDR_LON.GDT 10/26/09 DATA INPUT: SJL

PROJECT: 09-1140-W091B

RECORD OF BOREHOLE 9

SHEET 1 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: September 1, 2009

DATUM: NOT SURVEYED

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		GROUND SURFACE										
0	POWER AUGER / HOLLOW STEM	Black clayey topsoil, trace rootlets **(FILL)**		0.00	1	CS						
		Firm, mottled brown and grey **SILTY CLAY**, some sand, trace gravel, occasional sand pockets **(TILL)**		0.30	2	SS	6					Borehole dry during drilling on September 1, 2009.
1					3	SS	6					
		Stiff to very stiff, brown **SILTY CLAY**, some sand, trace gravel, occasional silt seams/partings **(TILL)**		1.37	4	SS	15					
2					5	SS	18					
3					6	SS	13					
		Stiff to very stiff, grey **SILTY CLAY**, some sand, trace gravel, occasional silt partings **(TILL)**		3.28	7	SS	2					
4					8	SS	4					
5												
		Compact, grey **SILTY SAND**, some clay, trace to some gravel		5.94	9	SS	16					
6												
		Stiff, grey **SILTY CLAY**, some sand, trace gravel, occasional silt partings **(TILL)**		6.71	10	SS	3					
7												
8					11	SS	3					
9												
		--- CONTINUED NEXT PAGE ---										

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: TA

CHECKED:

LDN_BHS_02 091140W091B.GPJ GLDR_LON.GDT 10/26/09 DATA INPUT: SJL

PROJECT: 09-1140-W091B

RECORD OF BOREHOLE 9

SHEET 2 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: September 1, 2009

DATUM: NOT SURVEYED

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---										
10	POWER AUGER HOLLOW STEM	Stiff, grey **SILTY CLAY**, some sand, trace gravel, occasional silt partings **(TILL)**							⊕ + ⊕ +			
		Soft, grey **SILTY CLAY**		10.67	12	SS	3			○		
11		END OF BOREHOLE		11.13								
12												
13												
14												
15												
16												
17												
18												
19												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: TA

CHECKED:

LDN_BHS_02 091140W091B.GPJ GLDR_LON.GDT 10/26/09 DATA INPUT: SJL

PROJECT: 09-1140-W091B

RECORD OF BOREHOLE 10

SHEET 1 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: September 2, 2009

DATUM: NOT SURVEYED

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp W WI; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER / HOLLOW STEM	GROUND SURFACE										
		Stiff, black clayey topsoil, trace rootlets **(FILL)**		0.00	1	CS						
		Stiff, brown silty clay, some sand, trace gravel, topsoil pockets **(FILL)**		0.36	2	SS	13					Borehole dry during drilling on September 2, 2009.
1		Soft to firm, brown and grey silty clay, some sand, trace gravel, trace organics **(FILL)**		0.76	3	SS	6					
					4	SS	5					
2					5	SS	3					
3					6	SS	2					
		Soft, brown **SILTY CLAY**, some sand, trace gravel, trace organics **(TILL)**		3.40	7	SS	2					
4		Stiff to very stiff, grey **SILTY CLAY**, some sand, trace gravel, occasional silt partings **(TILL)**		4.42	8	SS	3					
5												
6					9	SS	3					
7		Compact, grey **SANDY SILT**, trace to some clay, trace gravel **(TILL)**		7.32	10	SS	24					
8		Stiff, grey **SILTY CLAY**, some sand, occasional gravel **(TILL)**		8.23	11	SS	8					
9		Dense, grey **SANDY SILT**, some clay **(TILL)**		9.14	12	SS	36					
		--- CONTINUED NEXT PAGE ---										

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: TA

CHECKED:

LDN_BHS_02 091140W091B.GPJ GLDR_LON.GDT 10/26/09 DATA INPUT: SJL

PROJECT: 09-1140-W091B

RECORD OF BOREHOLE 10

SHEET 2 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: September 2, 2009

DATUM: NOT SURVEYED

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---										
10	POWER AUGER / HOLLOW STEM	Dense, grey **SANDY SILT**, some clay **(TILL)**										
11	POWER AUGER / HOLLOW STEM	Firm, grey **SILTY CLAY**, some sand, trace gravel, occasional silt partings **(TILL)**		10.74	13	SS	6					
		END OF BOREHOLE		11.13								
12												
13												
14												
15												
16												
17												
18												
19												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: TA

CHECKED:

LDN_BHS_02 091140W091B.GPJ GLDR_LON.GDT 10/26/09 DATA INPUT: SJL

PROJECT: 09-1140-W091B

RECORD OF BOREHOLE 11

SHEET 1 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: September 2, 2009

DATUM: NOT SURVEYED

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER / HOLLOW STEM	GROUND SURFACE										
		Black clayey topsoil, trace rootlets **(FILL)**		0.00	1	CS						Cuttings
				0.25	2	SS	7					
1		Firm, brown silty clay, some sand, trace gravel, trace rootlets, trace organics **(FILL)**			3	SS	6					Bentonite
		Soft, brown and grey **SILTY CLAY**, some sand, trace gravel, trace to some organics **(TILL)**		1.52	4	SS	3					
2				2.13	5	SS	29					
		Very stiff, brown **SILTY CLAY**, some sand, trace gravel, occasional silt seams/partings **(TILL)**			6	SS	21					Cuttings
3				3.66								
		Firm, grey **SILTY CLAY**, some sand, trace gravel, occasional silt partings **(TILL)**			7	SS	7					
4				4.57	8	SS	13					
		Compact, grey **SANDY SILT**, some clay, occasional silty clay layers **(TILL)**										WL Sept. 3
5				5.49								Bentonite
					9	SS	2					
6												
		Firm to very stiff, grey **SILTY CLAY to CLAYEY SILT**, some sand, occasional silt pockets and seams **(TILL)**										Cuttings
7												
					10	SS	2					
8												WL Sept. 2
												Screen
9		--- CONTINUED NEXT PAGE ---										

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: TA

CHECKED:

LDN_BHS_02 091140W091B.GPJ GLDR_LON.GDT 10/26/09 DATA INPUT: SJL

PROJECT: 09-1140-W091B

RECORD OF BOREHOLE 11

SHEET 2 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: September 2, 2009

DATUM: NOT SURVEYED

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3); WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---										
10	POWER AUGER HOLLOW STEM	Firm to very stiff, grey **SILTY CLAY to CLAYEY SILT**, some sand, occasional silt pockets and seams **(TILL)**			11	SS	9		>96 +			Screen
11		Soft, grey **SILTY CLAY**, occasional silt pockets		10.67	12	SS	3					
		END OF BOREHOLE		11.13								Water level in borehole at a depth of about 8.4m upon completion of drilling on September 2, 2009. Water level in standpipe at a depth of about 5.1m on September 3, 2009.
12												
13												
14												
15												
16												
17												
18												
19												

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: TA
CHECKED:

LDN_BHS_02 091140W091B.GPJ GLDR_LON.GDT 10/26/09 DATA INPUT: SJL

PROJECT: 09-1140-W091B

RECORD OF BOREHOLE 12

SHEET 1 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: September 2, 2009

DATUM: NOT SURVEYED

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa — nat V. + Q - ● / rem V. ⊕ U - ○ (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT — Wp W WI (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER / HOLLOW STEM	GROUND SURFACE										
		Firm to stiff, black clayey topsoil **(FILL)**		0.00	1	CS						
		Firm, brown and grey silty clay, some topsoil **(FILL)**		0.30	2	SS	8					Borehole dry during drilling on September 2, 2009.
1					3	SS	6					
		Firm, mottled brown and grey **SILTY CLAY**, some sand, trace gravel, occasional sand pockets **(TILL)**		1.37	4	SS	6					
2		Very stiff, brown **SILTY CLAY**, some sand, trace gravel, occasional silt partings **(TILL)**		2.13	5	SS	20					
3		Stiff, grey **SILTY CLAY**, some sand, trace gravel, occasional silty partings **(TILL)**		3.05	6	SS	12					
		Stiff, grey **CLAYEY SILT**, some sand, trace gravel **(TILL)**		3.66	7	SS	10					
4				4.42	8	SS	8		>96 + >96 +			
5												
6					9	SS	2					
7		Firm to very stiff, grey **SILTY CLAY**, some sand, trace gravel, occasional silt and sand partings at depth **(TILL)**							⊕ + ⊕ +			
8					10	SS	WH		⊕ + ⊕ +			
9					11	SS	3					
		--- CONTINUED NEXT PAGE ---										

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: TA

CHECKED:

LDN_BHS_02 091140W091B.GPJ GLDR_LON.GDT 10/26/09 DATA INPUT: SJL

PROJECT: 09-1140-W091B

RECORD OF BOREHOLE 12

SHEET 2 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: September 2, 2009

DATUM: NOT SURVEYED

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---										
10	POWER AUGER / HOLLOW STEM	Firm to very stiff, grey **SILTY CLAY**, some sand, trace gravel, occasional silt and sand partings at depth **(TILL)**							⊕ +			
				10.67					⊕ +			
11		Very soft, grey **SILTY CLAY**			12	SS	WH			○		
		END OF BOREHOLE		11.13								
12												
13												
14												
15												
16												
17												
18												
19												

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: TA
CHECKED:

LDN_BHS_02 091140W091B.GPJ GLDR_LON.GDT 10/26/09 DATA INPUT: SJL

PROJECT: 09-1140-W091B

RECORD OF BOREHOLE 13

SHEET 1 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: September 3, 2009

DATUM: NOT SURVEYED

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp W WI; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0		GROUND SURFACE										
	POWER AUGER HOLLOW STEM	Grey crushed limestone **(FILL)**		0.00	1	AS						
		Very stiff, black clayey topsoil, some sand, trace gravel **(FILL)**		0.15	2	SS	19					Borehole dry during drilling on September 3, 2009.
1		Firm to stiff, brown silty clay, some sand, trace gravel, occasional sand seams/pockets **(FILL)**		0.76	3	SS	8					
					4	SS	4					
2		Firm, mottled brown and grey **SILTY CLAY**, some sand, trace gravel **(TILL)**		2.13								
				2.44	5	SS	8					
3		Firm to stiff, brown **SILTY CLAY**, some sand, trace gravel, occasional silt seams/partings **(TILL)**			6	SS	15					
4					7	SS	7					
				4.42								
5					8	SS	6					
6					9	SS	3					
7		Stiff, grey **SILTY CLAY**, some sand, trace gravel, occasional silt partings **(TILL)**										
8					10	SS	5					
9												
		Compact, grey **SANDY SILT**, trace to some clay, trace gravel **(TILL)**		9.30	11	SS	23					
				9.75								
		--- CONTINUED NEXT PAGE ---										

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: TA

CHECKED:

LDN_BHS_02 091140W091B.GPJ GLDR_LON.GDT 10/26/09 DATA INPUT: SJL

PROJECT: 09-1140-W091B

RECORD OF BOREHOLE 13

SHEET 2 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: September 3, 2009

DATUM: NOT SURVEYED

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---										
10	POWER AUGER HOLLOW STEM	Stiff, grey **SILTY CLAY**, some sand, trace gravel **(TILL)**			12	SS	6			W ○		
11					13	SS	2			○		
		END OF BOREHOLE		11.13								
12												
13												
14												
15												
16												
17												
18												
19												

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: TA

CHECKED:

LDN_BHS_02 091140W091B.GPJ GLDR_LON.GDT 10/26/09 DATA INPUT: SJL

PROJECT: 09-1140-W091B

RECORD OF BOREHOLE 14

SHEET 1 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: September 3, 2009

DATUM: NOT SURVEYED

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER / HOLLOW STEM	GROUND SURFACE										
		Black clayey topsoil, numerous rootlets **(FILL)**		0.00	1	CS						
				0.20	2	SS	7					Borehole dry during drilling on September 3, 2009.
1		Firm, brown silty clay, some sand, trace gravel **(FILL)**			3	SS	4					
		Firm, mottled brown and grey **SILTY CLAY**, some sand, trace gravel **(TILL)**		1.37	4	SS	4					
2				2.13	5	SS	19					
3		Stiff to very stiff, brown **SILTY CLAY**, some sand, trace gravel, occasional silt partings **(TILL)**			6	SS	14					
				3.66	7	SS	3					
4					8	SS	3					
5		Stiff to very stiff, grey **SILTY CLAY**, some sand, trace gravel, occasional silt partings **(TILL)**										
6					9	SS	4					
7				7.01					>96 + >96 +			
		Loose, grey **SANDY SILT**, some clay, trace gravel **(TILL)**			10	SS	9					
8				8.23					>96 + >96 +			
9		Very stiff to stiff, grey **CLAYEY SILT**, some sand and gravel **(TILL)**			11	SS	7					
		--- CONTINUED NEXT PAGE ---										

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: TA

CHECKED:

LDN_BHS_02 091140W091B.GPJ GLDR_LON.GDT 10/26/09 DATA INPUT: SJL

PROJECT: 09-1140-W091B

RECORD OF BOREHOLE 14

SHEET 2 OF 2

LOCATION: SEE LOCATION PLAN

BORING DATE: September 3, 2009

DATUM: NOT SURVEYED

SAMPLER HAMMER, 63.5kg; DROP, 760mm

PENETRATION TEST HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^0 10^1 10^2 10^3) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---										
10	POWER AUGER, HOLLOW STEM	Very stiff to stiff, grey **CLAYEY SILT**, some sand and gravel **(TILL)**							>96 +			
11		Soft, grey **SILTY CLAY**		10.82	12	SS	3		⊕ +	O		
		END OF BOREHOLE		11.13								
12												
13												
14												
15												
16												
17												
18												
19												

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: TA
CHECKED:

LDN_BHS_02 091140W091B.GPJ GLDR_LON.GDT 10/26/09 DATA INPUT: SJL

PROJECT: 20148676

RECORD OF BOREHOLE BH-101

SHEET 1 OF 1

LOCATION: REFER TO LOCATION PLAN

BORING DATE: August 30, 2020
DRILLING CONTRACTOR: Henderson Drilling Inc.

DATUM: NOT SURVEYED

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER 152mm OD SOLID STEM	PAVEMENT SURFACE **ASPHALT**		0.13										
		FILL, sand and gravel, some silt; grey;			1	AS	-						M	Enc. WL ▽ Groundwater encountered at about 0.41m bgs during drilling on August 30, 2020.
1		**FILL**, sand, some silt, trace gravel; brown; loose		0.76	2	SS	7							
		(CL) sandy **SILTY CLAY**, trace gravel; mottled brown and grey to brown; firm to stiff		0.99	3	SS	11							
2		END OF BOREHOLE		1.98										
3														

PROJECT: 20148676

RECORD OF BOREHOLE BH-102

LOCATION: REFER TO LOCATION PLAN

BORING DATE: August 30, 2020
DRILLING CONTRACTOR: Henderson Drilling Inc.

DATUM: NOT SURVEYED

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER 152mm OD SOLID STEM	PAVEMENT SURFACE **ASPHALT**		0.20										
		FILL, sand and gravel, some silt; grey;			1	AS	-							Borehole dry during drilling on August 30, 2020
1		(CL) sandy **SILTY CLAY**, trace gravel, with organics from about 0.9m - 1.0m; mottled brown and grey; firm to very stiff		0.91	2	SS	6							
					3	SS	16							
2		END OF BOREHOLE		1.98										
3														

DEPTH SCALE
1 : 50

GOLDER

LOGGED: MH
CHECKED:

LDN_BHS_06 20148676.GPJ GLDR_LDN.GDT 15/09/20 10:28 DATA INPUT: DCH

PROJECT: 20148676

RECORD OF BOREHOLE BH-103

SHEET 1 OF 1

LOCATION: REFER TO LOCATION PLAN

BORING DATE: August 30, 2020
DRILLING CONTRACTOR: Henderson Drilling Inc.

DATUM: NOT SURVEYED

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER 152mm OD SOLID STEM	PAVEMENT SURFACE												
		ASPHALT												
		FILL, sand and gravel, some silt; grey;		0.25	1	AS	-							Borehole dry during drilling on August 30, 2020
1		(CL) sandy **SILTY CLAY**, trace gravel, with organics; mottled brown and dark grey to black; firm		0.76	2	SS	5							
		(CL) sandy **SILTY CLAY**, trace gravel; mottled brown and grey to brown; firm		1.22	3	SS	7							
2		END OF BOREHOLE		1.98										
3														

PROJECT: 20148676

RECORD OF BOREHOLE BH-104

LOCATION: REFER TO LOCATION PLAN

BORING DATE: August 30, 2020
DRILLING CONTRACTOR: Henderson Drilling Inc.

DATUM: NOT SURVEYED

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	POWER AUGER 152mm OD SOLID STEM	PAVEMENT SURFACE												
		ASPHALT												
		FILL, sand and gravel, some silt, with organics; brown and grey to black; compact		0.46	1	AS	-						M	Borehole dry during drilling on August 30, 2020
1		(CL) sandy **SILTY CLAY**, trace gravel, with organics, mottled brown and grey; stiff		1.07	2	SS	12							
		(CL) sandy **SILTY CLAY**, trace gravel; mottled brown and grey; firm		1.22	3	SS	7							
2		END OF BOREHOLE		1.98										
3														

DEPTH SCALE
1 : 50

GOLDER

LOGGED: MH
CHECKED:

LDN_BHS_06 20148676.GPJ GLDR_LDN.GDT 15/09/20 10:28 DATA INPUT: DCH

PROJECT: 20148676

RECORD OF BOREHOLE AH-101

SHEET 1 OF 1

LOCATION: REFER TO LOCATION PLAN

BORING DATE: August 30, 2020
DRILLING CONTRACTOR: Golder

DATUM: NOT SURVEYED

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	MANUAL DRILLING	GROUND SURFACE										
		FILL, sand and gravel, some silt; brown and grey to black										Auger hole dry during drilling on August 30, 2020
1		(CL) sandy **SILTY CLAY**, trace gravel, with organics; mottled brown and dark grey to black		1.07								
		(CL) sandy **SILTY CLAY**, trace gravel; mottled brown and grey		1.22								
				1.52								
2												
3												

PROJECT: 20148676

RECORD OF BOREHOLE AH-102

LOCATION: REFER TO LOCATION PLAN

BORING DATE: August 30, 2020
DRILLING CONTRACTOR: Golder

DATUM: NOT SURVEYED

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	ELEVATION	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	INSTALLATION AND GROUNDWATER OBSERVATIONS
0	MANUAL DRILLING	GROUND SURFACE										
		FILL, sand and gravel, some silt; grey										Auger hole dry during drilling on August 30, 2020
1		**FILL**, sand, some silt, trace gravel; brown		0.91								
		(CL) sandy **SILTY CLAY**, trace gravel; mottled brown and dark grey to black		1.07								
				1.37								
2												
3												

DEPTH SCALE
1 : 50

GOLDER

LOGGED: MH
CHECKED:

LDN_BHS_06 20148676.GPJ GLDR_LDN.GDT 15/09/20 10:28 DATA INPUT: DCH

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APPENDIX C

Preliminary Soil Characterization Report

August 5, 2022 Project No. 21507944-L01-Rev0

Mr. Jian Li, Ph.D., P.Eng., PE
Stantec Consulting Ltd.
2555 Ouellette Avenue, Suite 100
Windsor, Ontario N8X 1L9

PRELIMINARY SOIL CHARACTERIZATION REPORT (SCR) FOR MANAGEMENT OF EXCESS SOILS CLASS ENVIRONMENTAL ASSESSMENT STUDY, PROPOSED PONTIAC PUMP STATION IMPROVEMENTS
LITTLE RIVER POLLUTION CONTROL PLANT, CITY OF WINDSOR, ONTARIO

Dear Mr. Li:

This letter provides the results of the environmental soil quality characterization carried out by WSP Golder ("Golder") for the proposed Class Environmental Assessment (EA) study as part of the proposed Pontiac pump station improvements at the Little River Pollution Control Plant located at 9400 Little River Road in the City of Windsor, Ontario (referred to hereinafter as "the Site" or "the Project Area").

As per the scope of work outlined in our December 13, 2021 proposal (Ref. CX21507944), Golder was retained by Stantec Consulting Ltd. (referred to hereinafter as "Stantec" or "the Client") to provide geotechnical services in support of the Class EA study for the Pontiac pump station improvements. The purpose of the geotechnical services were to evaluate the subsurface soil and groundwater conditions at the Site and provide preliminary recommendations for the geotechnical design aspects of the proposed works.

Concurrent with the geotechnical work, environmental soil sampling and analysis was carried out to help characterize the environmental quality of Excess Soils[1] that may be generated during construction. This letter outlines the findings of the Excess Soil sampling and analyses, provides recommendations for finalization of the sampling and analysis plan (SAP), and provides a preliminary evaluation of management options for the Excess Soil, as per the requirements of Ontario Regulation (O.Reg.) 406/19.

[1] As per Ontario Regulation 406/19, "Excess Soil" means soil, or soil mixed with rock, that has been excavated as part of a Project and removed from the Project Area.

1.0 INTRODUCTION

1.1 Description of Project and Project Area

Based on the information provided by Stantec, it is understood that the improvements to the existing Pontiac pump station will consist of a new wet well constructed at the northwest corner of the Little River Pollution Control Plant. As currently proposed, the new wet well will measure 9.5 metres by 16.5 metres in plan and will extend to a depth of approximately 10.6 metres below grade. In addition, an outlet from the new wet well structure to the Little River Drain, adjacent to the existing Pontiac pump station, will be constructed as part of the proposed improvement works (these construction activities are collectively referred to hereinafter as the "Project").

1.2 Previous Subsurface Explorations

Golder previously carried out multiple geotechnical explorations near the Project Area and the results were summarized in the following reports:

- Golder Project No. 031-140318 titled 'Geotechnical Investigation, Wyandotte Street Extension, Glendale Drive to Florence Avenue, Windsor, Ontario' dated February 16, 2004;
- Golder Project No. 031-140333 titled 'Geotechnical Investigation, Proposed Bridge Over Little River, Wyandotte Street East Extension, City of Windsor, Ontario' dated February 27, 2004;
- Golder Project No. 06-1140-029 titled 'Geotechnical Investigation, Sanitary Servicing of Annexed Lands and Town of Tecumseh Lands, Phase 1B, Windsor, Ontario" dated April 27, 2006;
- Golder Project No. 09-1140-W091A titled 'Geotechnical Investigation, Sandwich South Trunk Sanitary Sewer, McHugh Street to Peppervine Street, Windsor, Ontario' dated September 2009;
- Golder Project No. 09-1140-W091B titled 'Geotechnical Investigation, Sandwich South Trunk Sanitary Sewer, Peppervine Street to Little River Pollution Control Plant, Windsor, Ontario' dated October 2009;
- Golder Project No. 20148676-R01 titled 'Geotechnical Exploration, Little River Pollution Control Plant Gate 1 Entrance, 9400 Little River Road, Windsor, Ontario' dated September 2020; and
- Golder Project No. 21507944-R01-RevA titled 'Geotechnical Assessment and Preliminary Geotechnical Exploration and Testing Program, Class Environmental Assessment Study, Proposed Pontiac Pump Station Improvements, Little River Pollution Control Plant, City of Windsor, Ontario' dated May 11, 2022.

2.0 BACKGROUND AND OBJECTIVES

2.1 Regulatory Overview

On December 4, 2019, the Ministry of the Environment, Conservation and Parks (MECP) released O.Reg. 406/19, *On-Site and Excess Soil Management* (the "Regulation") which imposes new requirements on both generators and receivers of Excess Soil, outlines a defined process for assessing Excess Soil, and provides new standards for the assessment of Excess Soil quality. Under the Regulation, all Excess Soil materials (removed from the Project Area) is considered a "waste" unless certain conditions are met.

The implementation dates for various sections of O.Reg. 406/19 are staggered through 2026; the first provisions (including the Excess Soil quality standards, or ESQS[2]) came into effect on January 1, 2021. The regulatory sampling requirements (frequency and analytical parameters), and reporting requirements for a given Project depend on a number of factors, including the type of Project, the final volume of soil requiring off-site management and specific requirements of the intended receiver of the soil (i.e., of the "Reuse Site").

The Regulation creates new responsibilities for the source site generator (Project Leader) of the Excess Soil to ensure it meets the applicable standards. Owners, planners and engineers involved in construction should develop plans for compliance with O.Reg. 406/19. The identification, characterization, and planning for the reuse of Excess Soil will need to occur / have occurred much earlier in the development timeline and prior to movement of soil off-site (i.e., outside of the Project Area). Going forward, all Excess Soil should be managed with the support of a Qualified Person (QP), as defined in O.Reg. 153/04, in accordance with best management practices[3] and municipal bylaws applicable to the Reuse Site.

Additional regulatory requirements will come into effect as of January 1, 2023, most notably a requirement for many projects to file a notice on the public Registry (designed by O.Reg. 406/19) for Excess Soil[4]. Although numerous cases will exist for exemptions to filing a notice on the Registry (including for infrastructure projects), these will need to be evaluated on a case-by-case basis. For those projects where notification is required, the mandatory planning requirements of O.Reg. 406/19 (i.e., site assessment reporting, sampling and analysis, and reporting on reuse site characteristics, all to be prepared by a QP) will also come into effect, along with the formal tracking requirements and filing on a public Registry (designed by O.Reg. 406/19).

Although one or more "exemptions" (regarding notification on the Registry and/or preparation of the planning documents) may apply to a project, it is advisable to assess Excess Soil quality at Project Areas (i.e., source sites) in general accordance with the sampling and analysis requirements of O.Reg. 406/19, particularly for larger construction projects that may be active in 2023 onward, to the extent that this is commercially acceptable or is driven by the Reuse Site requirements. This may relate to the preparation of planning documents (whether or not notification on the Registry is mandated by the Regulation) or sample frequency (or analytical parameters). **It is important to note that the Reuse Site's specifications for the Excess Soil may be more stringent than the minimum regulatory requirements (of O.Reg. 406/19).**

2.2 Understanding of Client Objectives

Excess Soils generated during the Project and removed from the Project Area will need to be managed in accordance with O. Reg. 406/19. It is understood that some **9,000 cubic metres (m^3)** of excavated soil materials are anticipated to be generated during construction. The alternatives available for beneficial reuse of Excess Soil are assessed based on the volume of soil to be removed from the Project Area (excavated material remaining

[2] The "Rules for Soil Management and Excess Soil Quality Standards". Adopted by reference in Ontario Regulation 406/19 (On-Site and Excess Soil Management) made under the *Environmental Protection Act*, R.S.O. 1990, C.E.19 (EPA), updated December 8, 2020 (the "Soil Rules").

[3] Ontario Environment Industry Association, 2021: Best Practices for Qualified Persons for Consideration with O.Reg.406/19: Onsite and Excess Soil Management in Ontario – Version 2, dated January 11, 2021.

[4] On April 20, 2022, the MECP released O.Reg. 388/22, amending O.Reg. 406/19 which delays regulatory requirements that previously came into effect on January 1, 2022 until January 1, 2023.

within the boundaries of the Project Area are not considered to be Excess Soils), the chemical characteristics of the Excess Soil, the characteristics of the reuse site (receiver site) and any specific requirements (regulatory or otherwise) that the reuse site may have regarding the import of Excess Soil onto their property. It is understood that, at this time, specific reuse options for the soil have not yet been identified.

The soil characterization data summarized herein will assist the Project Leader to assess, on a preliminary basis, the potential management, reuse, and disposal requirements for Excess Soils generated during the Project.

3.0 EXPLORATORY SCOPE OF WORK

The field work for the geotechnical exploration and testing program was carried out on April 14, 2022, at which time two (2) boreholes, designated as boreholes (BH)-101 and BH-102, were advanced within the Project Area to depths of about 15.9 metres and 12.8 metres below the existing ground surface, respectively. The approximate locations of the boreholes are shown on the Soil Sample Location Plan, Figure 1. As shown, borehole BH-101 was advanced within the proposed footprint of the wet well and borehole BH-102 was advanced at the location of the proposed sewer outlet to the Little River Drain.

The boreholes were advanced using a truck-mounted drilling rig supplied and operated by a specialist drilling contractor licensed by the Ministry of the Environment, Conservation and Parks (MECP). The field work was supervised by a qualified member of Golder's engineering staff who located the boreholes in the field, obtained underground utility clearances, directed the drilling and sampling operations, logged the boreholes, and cared for the soil samples obtained.

The purpose of the work was to evaluate the subsurface soil and groundwater conditions in support of preliminary geotechnical design objectives, and to assess the chemical composition of representative soil samples from within the Project Area to guide Excess Soil management alternatives. Additional details of Golder's geotechnical exploration methods, findings and analyses are provided under separate cover (Golder Report No. 21507944-R01-RevA dated May 11, 2022).

3.1 Sampling and Analysis Plan

3.1.1 Analytical Parameters

Based on current interpretation of the requirements outlined in O.Reg. 406/19, the minimum sampling and analysis requirements for Excess Soil include O.Reg. 153/04 metals (including hydrides), EC and SAR, pH, petroleum hydrocarbons (PHCs) (F1 to F4 fractions) and BTEX (benzene, toluene, ethylbenzene and total xylenes). Collectively, these parameters comprise the minimum parameter list, as per the O.Reg. 406/19 Soil Rules, for the characterization of Excess Soils when no specific contaminants of potential concern (COPC) have been identified.

To characterize the environmental quality of the soils encountered during the exploration, which will require management during construction (including off-site reuse and/or disposal), and in consideration of the O.Reg. 406/19 Soil Rules, each of the selected soil samples were submitted for laboratory analysis of the above noted parameters, as well as volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs) which were included for due diligence purposes.

As noted herein, based on the results of the preliminary bulk analysis, and in consideration of the limited scope of the investigation and current regulatory requirements, one representative soil sample (sample BH-102-3B) was also submitted for modified synthetic precipitation leaching procedure (mSPLP) for analysis of specific leachable metals.

3.1.2 Field Procedure

As part of the borehole drilling program, preliminary environmental soil sampling was carried out concurrently with the geotechnical field work. Soil sampling was carried out from ground surface to borehole termination using 35-millimetre (mm) inside diameter, 610-mm long split-spoon samplers. Soil samples were collected in the split-spoons at selected intervals over the depth of each borehole. The split-spoons were decontaminated between each sampling run using detergent and water.

The sampling was carried out in accordance with accepted industry practices and applicable Canadian Standards Association (CSA) standards for subsurface environmental investigations. The samples were logged in the field for observations relating to petroleum hydrocarbon or other chemical impacts (e.g., odour, staining). Samples were placed in 1-litre (L) sealable plastic bags for headspace vapour testing, which was completed using an RKI Eagle II detector, calibrated to a hexane standard for combustible vapours and operated in the methane elimination mode. Measured headspace vapour concentrations were recorded as parts per million (ppm) by volume. Soil samples selected for chemical analyses were placed in a cooler containing ice and delivered by courier under chain-of-custody procedures to Paracel Laboratories of Windsor, Ontario. Remaining soil samples not initially submitted for chemical analyses were stored at Golder's Windsor office and kept refrigerated, for possible subsequent laboratory submission.

3.1.3 Sample Selection and Submission

To provide a preliminary environmental characterization of the soils that are likely to be excavated during construction, four soil samples (collected within the anticipated depth of Project excavations) were submitted from each borehole for laboratory analysis.

A summary of the samples submitted for analysis is provided below, and in Table A (attached). The stratigraphic units described below comprise the main stratigraphic units encountered during the exploration.

Project Component	Stratigraphic Unit	Number of Samples Submitted for Analytical Testing	Sample IDs
New Wet Well *(BH-101)*	**FILL**, sandy silty clay, trace to some gravel; brown to dark grey	3	BH-101-1B, BH-101-2A, BH-101-2B
	(CL) sandy **SILTY CLAY**, some gravel; mottled brown and grey	1	BH-101-3
Sewer Outlet *(BH-102)*	**FILL**, sandy silty clay, some gravel; brown, contains organic matter	2	BH-102-1B, BH-102-2A

Project Component	Stratigraphic Unit	Number of Samples Submitted for Analytical Testing	Sample IDs
	(CL) sandy **SILTY CLAY**, trace gravel; mottled brown and grey; firm to stiff	2 (+1 duplicate)	BH-102-3B, BH-102-4, BH-DUP

Based on the results of the preliminary bulk analysis, one representative soil sample (sample BH-102-3B) was also submitted for modified synthetic precipitation leaching procedure (mSPLP) for analysis of specific leachable metals.

3.2 Applicable Soil Quality Standards

With the first portion of O.Reg. 406/19 now in effect, starting January 1, 2021, including the incorporation of the ESQS, it is current standard practice to compare soil analytical results to the ESQS for the purposes of determining acceptable Reuse Sites. The ESQS are generally more stringent than the current corresponding O.Reg.153/04 site condition standards, with the exception of a few parameters. O.Reg. 406/19 also includes Leachate Screening Levels (LSLs) and Ceiling Values (CVs) for Excess Soil reuse which are implemented to protect potential sensitive receptors at generic Reuse Sites.

To determine which ESQS (specifically, Table 1 and Tables 2.1 through 9.1 in *"Rules for Soil Management and Excess Soil Quality Standards"*) are applicable for assessing beneficial reuse, details of the source and receiving sites are required such as (but not inclusive to) the source site soil chemistry, volume of source site soil that will report to a reuse location, the type of property use at the reuse location, the intended use at the reuse location and whether the groundwater usage is potable or non-potable at the reuse site, among other things.

To evaluate potential options and limitations regarding the potential beneficial reuse of the Excess Soil, the results of the sampling analysis were compared to the following ESQS (as referenced in Table A):

- Table 1 ESQS (Full Depth Background Site Condition Standards) for agricultural or other property use ("Table 1 agricultural") *[the most conservative ESQS];* and
- Table 2.1 ESQS (Full Depth Excess Soil Quality Standards in a Potable Groundwater Condition) for residential/parkland/institutional (RPI) property use ("Table 2.1 RPI") *[considered applicable for most residential/institutionally zoned properties].*

3.3 Soil Quality

3.3.1 Field Observations

In general, the subsurface conditions at the Site consisted of surficial topsoil (measuring about 150 to 240 mm thick) underlain by an approximately 0.8 m to 1.3 m thick layer of sandy silty clay fill. Beneath the sandy silty clay fill, both boreholes encountered, and were terminated in, an extensive deposit of native sandy silty clay after exploring the stratum for depths ranging from about 11.7 to 14.4 m.

Both boreholes were dry upon completion of drilling, and no seepage into the open boreholes was observed. No obvious staining or odours indicative of potentially significant chemical impacts were observed in the soil samples collected from the boreholes. The measured headspace combustible vapour concentrations for the soils most likely to comprise the Excess Soil that could be generated during the Project ranged from 0 ppm (i.e., below detection limits) to 80 ppm, and not indicative of potential volatile chemical impacts to soil quality.

3.3.2 Analytical Results for Soil Samples

A description of the soil samples submitted for analysis, along with a summary interpretation of the analytical results as compared to the Table 1 (agricultural) and Table 2.1 (RPI) ESQS, is provided in Table A. As noted in Table A, a total of eight samples (plus one duplicate sample) were submitted for analysis of PHCs F1-F4, BTEX, O.Reg. 153/04 metals and metal hydrides, pH, EC, SAR, VOCs and PAHs. The laboratory certificate of analysis, with the analytical results compared to the Table 1 (agricultural) ESQS, is provided in Appendix A.

Environmental Quality of Sandy Silty Clay Fill

- As summarized in Table A, five samples of sandy silty clay fill (samples BH-101-1B, BH-101-2A, BH-101-2B, BH-102-1B, and BH-102-2A) were submitted for laboratory analysis.
- Based on the analytical results, measured concentrations or values of one or more parameters, specifically metals parameters (antimony, molybdenum, nickel, and/or arsenic) and SAR, exceeded the **Table 1 (agricultural) ESQS** in all fill samples analysed except sample BH-101-2B.
- When compared to the **Table 2.1 (RPI) ESQS**, no exceedances were detected in the fill samples analysed.

Environmental Quality of Native Sandy Silty Clay

- As summarized in Table A, three samples of native sandy silty clay (samples BH-101-3, BH-102-3B, and BH-102-4) were submitted for laboratory analysis.
- Based on the analytical results, measured concentrations of one or more metals parameters (molybdenum or arsenic or both) exceeded the **Table 1 (agricultural) ESQS** in samples BH-102-3B and BH-102-4.
- When compared to the **Table 2.1 (RPI) ESQS**, no exceedances were detected in the native sandy silty clay samples analysed.

In addition to the bulk analyses, one representative soil sample (sample BH-102-3B) was submitted for mSPLP analyses for specific leachable metals. The mSPLP results are provided on the laboratory certificate of analysis in Appendix A. As shown, the results were compared to O.Reg. 406/19 Table 1: Leachate Screening Levels for Excess Soil Reuse (agricultural use) for metals and all measured leachate concentrations were below the Table 1 Leachate Screening Levels (LSLs).

4.0 EXCESS SOIL MANAGEMENT

4.1 Administrative Requirements

The soil characterization data generated by the environmental sampling program will assist the Project Leader to assess, on a preliminary basis, the potential management, reuse, and disposal requirements for Excess Soils generated during the Project. As of January 1, 2023 and depending on the actual volume of Excess Soil that will be generated during the Project, the following additional administrative requirements, as outlined in O.Reg. 406/19 and the Soil Rules, may apply to the Project; however, it is noted that the Reuse Site's specifications for the Excess Soil may be more stringent than the minimum regulatory requirements of O.Reg. 406/19.

- **Required Soil Sampling Frequency:** In the event that the minimum sampling frequencies outlined in O.Reg. 406/19 are applicable to this project, additional soil samples may need to be analysed to support off-Site re-use (depending on the total volume requiring characterization). A total of 8 samples, plus one duplicate sample, were submitted for analysis as part of the preliminary environmental sampling program. By applying the minimum sampling frequencies outlined in O.Reg. 406/19 to this project[5], the number of samples analysed **should support the off-Site removal of up to 1,600 m^3 of Excess Soil,** assuming the samples were collected from areas where Excess Soil will be generated.

- **Chemicals of Potential Concern ("COPCs"):** Based on current interpretation of the requirements outlined in O.Reg. 406/19, the minimum sampling and analysis requirements for Excess Soil include O.Reg. 153/04 metals (including hydrides), electrical conductivity and sodium adsorption ratio, pH, petroleum hydrocarbons (F1 to F4 fractions), benzene, toluene, ethylbenzene and xylene. These parameters comprise the minimum parameter list, as per the Soil Rules (MECP, 2020), for the characterization of Excess Soils when no specific COCs have been identified and represent the parameter list analysed during the exploration. In general, under O.Reg. 406/19, additional parameters are required if COPCs are identified in the APU report (see below). Additional parameters analysed during the exploration included VOCs and PAHs.

- **Excess Soil Management Plan:** As part of an excess soil management plan (ESMP), the tasks that would be required to comply with the O.Reg. 406/19 Excess Soil Planning requirements (depending on the volume of excess soil generated), include:

  1) Assessment of Past Uses (APU) – similar to a Phase One ESA, completion of an APU would help identify COPCs that may be present in Excess Soil generated during the Project. Whether or not required under the Regulation, prospective re-use sites may require completion of an APU prior to accepting Excess Soil from a Project as part of their own due diligence protocols;

  2) Sampling and Analysis Plan (SAP) – This updated plan would incorporate the findings from the preliminary soil quality assessment (as reported herein) and identify potential data gaps, if any;

  3) Soil Characterization Report (SCR) – This updated report would incorporate the findings of all relevant soil quality testing (including the data reported herein);

[5] For "in-situ" soil sampling, and for cases where a Sampling and Analysis Plan is required, O.Reg.406/19 requires a minimum of one sample for every 200 cubic metres of excess soil for the first 10,000 cubic metres of excess soil to be generated, one sample for every 450 cubic metres from 10,001 cubic metres to 40,000 cubic metres of excess soil and one sample for every 2,000 cubic metres after 40,001 cubic metres of excess soil to be generated at the Project Area.

4) Excess Soil Destination Assessment Report (ESDAR) – This report would be prepared based on the intended Reuse Site (when identified). This is provisional based on the results of the above actions; however, for the Project Leader's due diligence purposes, preparation of an ESDAR would provide formal documentation that the quality of the Excess Soil is compatible with the intended re-use site; and,

5) Soil Tracking System – The system would be developed during the Reuse Site Planning stage and implemented during construction. Whether or not a formal tracking system is required for the Project, for the Project Leader's due diligence purposes, and to document that all Excess Soil has reached the pre-approved re-use (or disposal) sites, some form of tracking and soil movement documentation is recommended.

- **Authorization for Reuse:** For their records, due diligence and obligation under the Regulation, the Project Leader must obtain a written agreement specifically between the parties (the Project Leader and each individual Reuse Site owner/operator) that provides appropriate (and clear) assurances that the Reuse Site has been provided with satisfactory information and that they are in agreement with receiving the Excess Soil. The source site details, soil type, environmental and geotechnical quality, volume and intended beneficial reuse of the soil should be outlined in that agreement.

4.2 Discussion on Management and Disposal Options

Based on the preliminary environmental sampling program, the following opinions and recommendations are provided in relation to the management of Excess Soils that may be generated during the proposed construction activities:

- **Geotechnical Considerations:** As detailed in Golder's geotechnical report for the Project (Ref. 21507944-R01-RevA dated May 11, 2022), the native sandy silty clay extending to the anticipated depth of Project excavations should be suitable for re-use as general backfill from a geotechnical perspective. The topsoil and sandy silty clay fill materials would not be considered suitable for re-use as general backfill from a geotechnical perspective (due to the presence of organics); however, consideration may be given to placing these materials in landscaped areas where post-construction settlement can be tolerated.

- **Potential for Off-Site Re-Use of Sandy Silty Clay Fill**: Due to the concentrations of various metals (antimony, molybdenum, nickel, and/or arsenic) detected in the sandy silty clay fill materials, these soils would not likely be accepted for beneficial re-use at a quarry for pit rehabilitation (which generally requires that soils meet Table 1 soil quality standards). When compared to the Table 2.1 (RPI) ESQS, no exceedances were detected in the sandy silty clay fill samples analysed. Therefore, the soils may be considered acceptable for beneficial re-use at a residential / parkland / institutional land use site (for example), subject to the specific requirements (if any) that the receiving site may have in place and subject to the results of any additional testing carried out. Based on the environmental characteristics of the soil materials that have been assessed, there are no restrictions regarding the on-site reuse of the Excess Soils that will be generated at the site during future construction activities.

- **Potential for Off-Site Re-use of Native Sandy Silty Clay:** As noted herein, the measured concentrations of molybdenum or arsenic (or both) in samples of the native sandy silty clay marginally exceeded the respective Table 1 (agricultural) ESQS. Therefore, the soils may or may not be considered acceptable for

beneficial re-use at a quarry for pit rehabilitation (based on the presence of molybdenum and/or arsenic at slightly elevated concentrations), subject to the specific requirements that the receiving site may have in place and subject to the results of any additional testing that may be carried out. With the exception of SAR, no other exceedances of the Table 1 or Table 2.1 (RPI) ESQS were identified in the native sandy silty clay soils encountered during the exploration. Provided these materials are placed at depth (see supporting rationale below), the elevated SAR detected in the native sandy silty clay should not restrict the off-site re-use of the materials.

- **Special Compliance Considerations:** Based on the results of the soil sampling and analytical program and proximity of the Project Area to nearby paved areas, the identified impacts to soil quality (i.e., SAR) were inferred to be related to the use of a substance (i.e., "salt") for the safety of vehicular or pedestrian traffic (applied under conditions of snow or ice). In accordance with the O.Reg. 406/19 "Soil Rules", the ESQS for SAR are deemed to be met if the following criteria are met:
  - The excess soil is finally placed at one of the following locations:
    - *where it is reasonable to expect that the soil will be affected by the same chemicals as a result of continued application of a substance for the safety of vehicular or pedestrian traffic under conditions of snow or ice;*
    - *at an industrial or commercial property to which non-potable groundwater standards would be applicable; or*
    - *at least 1.5 metres below the surface of the soil.*
  - The excess soil is not finally placed at any of the following locations:
    - *within 30 metres of a waterbody;*
    - *within 100 metres of a potable water well or area with an intended property use that may require a potable water well; or,*
    - *a location that will be used for growing crops or pasturing livestock unless the excess soil is placed 1.5 metres or greater below the soil surface.*
  - The Project Leader or operator of the Project Area has informed the reuse site owner or operator that the excess soil is from a location that may be expected to contain the chemical and, if sampling and analysis has been conducted in accordance with the regulation, the Project Leader or operator of the Project Area has provided relevant sampling results to the reuse site owner or operator, including the SCR if prepared, and identified and communicated any potential risks to surface water and groundwater to the reuse site owner or operator.
- Once potential re-use site(s) have been identified, the analytical results reported herein should be compared against the excess soil standards appropriate for the specific re-use site(s).
- In the event the soils are disposed of at a waste disposal facility, they would likely be acceptable for use as "daily cover" (as opposed to non-hazardous waste), subject to approval by the disposal facility. Additional laboratory testing (i.e., Toxicity Characteristic Leachate Testing) may be required to support disposal as a non-hazardous waste.

5.0 LIMITATIONS

This letter was prepared for the exclusive use by Stantec Consulting Ltd. and the Corporation of the City of Windsor (understood to be the Project Leader for this Project) and is intended to provide a limited assessment of the quality of the Excess Soil materials specifically identified herein. Golder will not be responsible for any use of this letter by any other party or for the consequences thereof.

There is no warranty, expressed or implied, by Golder that this assessment has identified all potential sources of contaminants at the Project Areas or that the Excess Soil (as characterized herein) is free from any and all contamination from past or current practices other than that noted, nor that all issues of environmental compliance have been addressed (including, but not necessarily limited to, the requirements of Ontario Regulation 406/19, as amended, that may apply to the Project). The environmental characterization of the Excess Soil materials located at the Project Area were based on the results of chemical analysis of samples collected on the date(s) and location(s) as described herein. No assurance is made regarding the quality of other Excess Soil material that may be generated at the Project Area (i.e., not reasonably represented by the material investigated and tested as part of this investigation).

The soil conditions in the area of investigation have been inferred based on conditions observed at a limited number of sampling locations in accessible areas; however, it should be noted that conditions between and beyond sampling locations may vary. In addition, the assessment is dependent upon the accuracy of the analytical data generated through sample analysis and is limited to determining the presence of contaminants for which analyses have been conducted.

In evaluating the environmental quality of the Excess Soil (as identified herein), Golder has relied in good faith on information provided by individuals and organizations noted in this letter. We assume that the information provided is factual and accurate. We accept no responsibility for any deficiency, misstatements or inaccuracies contained in this letter as a result of omissions, misinterpretations or fraudulent acts of the persons interviewed or contacted.

Where references have been made to regulatory guidelines and documents, it should be noted that regulatory statutes and guidelines are subject to interpretation and these guidelines and documents and their interpretation may be subject to change over time. Further, as indicated herein, a third-party reuse site may have other and additional requirements for site assessment, soil testing and documentation (and with consideration of broader regulatory requirements that may apply).

Golder accepts no responsibility for the consequential effects of this factual letter on the real or perceived costs associated with the development of the Project Site or the management of the Excess Soil generated during construction.

6.0 CLOSURE

We trust that this letter provides the necessary soil characterization information presently required. Should you at any point require clarification, or have any comments on this technical memorandum, please do not hesitate to contact the undersigned.

Yours truly,

Golder Associates Ltd.

Mark Henderson, P.Eng.
Geotechnical Engineer III

Carl Schroeder, P.Eng.
Senior Environmental Engineer, QPESA

MH/CES/an

CC: Hannah.Rindlisbacher@stantec.com

Attachments: Important Information and Limitations of this Report
Table A – Summary of Soil Samples Collected and Submitted for Laboratory Analysis
Method of Soil Classification
Abbreviations and Terms Used on Records of Boreholes and Test Pits
List of Symbols
Records of Boreholes
Figure 1 – SCR – Soil Sample Location Plan
Appendix A – Laboratory Certificates of Analysis

https://golderassociates.sharepoint.com/sites/157243/project files/6 deliverables/scr (reva)/21507944-l01-rev0 (final) scr lrpcp pontiac ps cow_05aug2022.docx

IMPORTANT INFORMATION AND LIMITATIONS OF THIS REPORT

Standard of Care: Golder Associates Ltd. (Golder) has prepared this report in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering and science professions currently practising under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this report. No other warranty, expressed or implied is made.

Basis and Use of the Report: This report has been prepared for the specific site, design objective, development and purpose described to Golder by the Client. The factual data, interpretations and recommendations pertain to a specific project as described in this report and are not applicable to any other project or site location. Any change of site conditions, purpose, development plans or if the project is not initiated within eighteen months of the date of the report may alter the validity of the report. Golder cannot be responsible for use of this report, or portions thereof, unless Golder is requested to review and, if necessary, revise the report.

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Unless otherwise stated, the suggestions, recommendations and opinions given in this report are intended only for the guidance of the Client in the design of the specific project. The extent and detail of investigations, including the number of test holes, necessary to determine all of the relevant conditions which may affect construction costs would normally be greater than has been carried out for design purposes. Contractors bidding on, or undertaking the work, should rely on their own investigations, as well as their own interpretations of the factual data presented in the report, as to how subsurface conditions may affect their work, including but not limited to proposed construction techniques, schedule, safety and equipment capabilities.

Soil, Rock and Ground Water Conditions: Classification and identification of soils, rocks, and geologic units have been based on commonly accepted methods employed in the practice of geotechnical engineering and related disciplines. Classification and identification of the type and condition of these materials or units involves judgment, and boundaries between different soil, rock or geologic types or units may be transitional rather than abrupt. Accordingly, Golder does not warrant or guarantee the exactness of the descriptions.

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Special risks occur whenever engineering or related disciplines are applied to identify subsurface conditions and even a comprehensive investigation, sampling and testing program may fail to detect all or certain subsurface conditions. The environmental, geologic, geotechnical, geochemical and hydrogeologic conditions that Golder interprets to exist between and beyond sampling points may differ from those that actually exist. In addition to soil variability, fill of variable physical and chemical composition can be present over portions of the site or on adjacent properties. The professional services retained for this project include only the geotechnical aspects of the subsurface conditions at the site, unless otherwise specifically stated and identified in the report. The presence or implication(s) of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources are outside the terms of reference for this project and have not been investigated or addressed.

Soil and groundwater conditions shown in the factual data and described in the report are the observed conditions at the time of their determination or measurement. Unless otherwise noted, those conditions form the basis of the recommendations in the report. Groundwater conditions may vary between and beyond reported locations and can be affected by annual, seasonal and meteorological conditions. The condition of the soil, rock and groundwater may be significantly altered by construction activities (traffic, excavation, groundwater level lowering, pile driving, blasting, etc.) on the site or on adjacent sites. Excavation may expose the soils to changes due to wetting, drying or frost. Unless otherwise indicated the soil must be protected from these changes during construction.

Sample Disposal: Golder will dispose of all uncontaminated soil and/or rock samples 90 days following issue of this report or, upon written request of the Client, will store uncontaminated samples and materials at the Client's expense. In the event that actual contaminated soils, fills or groundwater are encountered or are inferred to be present, all contaminated samples shall remain the property and responsibility of the Client for proper disposal.

Follow-Up and Construction Services: All details of the design were not known at the time of submission of Golder's report. Golder should be retained to review the final design, project plans and documents prior to construction, to confirm that they are consistent with the intent of Golder's report.

During construction, Golder should be retained to perform sufficient and timely observations of encountered conditions to confirm and document that the subsurface conditions do not materially differ from those interpreted conditions considered in the preparation of Golder's report and to confirm and document that construction activities do not adversely affect the suggestions, recommendations and opinions contained in Golder's report. Adequate field review, observation and testing during construction are necessary for Golder to be able to provide letters of assurance, in accordance with the requirements of many regulatory authorities. In cases where this recommendation is not followed, Golder's responsibility is limited to interpreting accurately the information encountered at the borehole locations, at the time of their initial determination or measurement during the preparation of the Report.

Changed Conditions and Drainage: Where conditions encountered at the site differ significantly from those anticipated in this report, either due to natural variability of subsurface conditions or construction activities, it is a condition of this report that Golder be notified of any changes and be provided with an opportunity to review or revise the recommendations within this report. Recognition of changed soil and rock conditions requires experience and it is recommended that Golder be employed to visit the site with sufficient frequency to detect if conditions have changed significantly.

Drainage of subsurface water is commonly required either for temporary or permanent installations for the project. Improper design or construction of drainage or dewatering can have serious consequences. Golder takes no responsibility for the effects of drainage unless specifically involved in the detailed design and construction monitoring of the system.

Table A: Summary of Soil Samples Collected and Submitted for Laboratory Analysis

Sample ID	Depth (mbgs)[1]	Approximate Location within Project Area (See Figure 1)	Description of Soil Material Encountered[2]	Parameters Analysed									Exceedances of MECP Excess Soil Quality Standards (ESQS)[5]	
				Inorganics[3]				Organics[4]						
				Metals / Hydrides	EC	SAR	pH	PHC F1-F4 + BTEX	VOCs	PAHs	SVOCs / ABN	PCBs	Table 1 (Full Depth, Background, Agricultural Land Use)[T1]	Table 2.1 (Full Depth, Potable, Residential/Parkland/Institutional Land Use)[T2.1]
BH-101-1B	0.2 – 0.6	Southeast corner of proposed wet well footprint	**FILL,** sandy silty clay, some gravel; brown; *no field evidence of potentially significant impact to soil quality.*	●	●	●	●	●	●	●	–	–	Metals (Sb, Mo, Ni)[M]	*None*
BH-101-2A	0.8 – 1.0		**FILL**, sandy silty clay, some gravel; brown; *no field evidence of potentially significant impact to soil quality.*	●	●	●	●	●	●	●	–	–	Metals (Sb, Mo)[M]	*None*
BH-101-2B	1.0 – 1.4		**FILL**, sandy silty clay, trace gravel; dark grey, contains organic matter; *no field evidence of potentially significant impact to soil quality., 40 ppm headspace vapour (HEX) noted*	●	●	●	●	●	●	●	–	–	*None*	*None*
BH-101-3	1.5 – 2.1		(CL) sandy **SILTY CLAY**, some gravel; mottled brown and grey; firm; *no field evidence of potentially significant impact to soil quality., 35 ppm headspace vapour (HEX) noted*	●	●	●	●	●	●	●	–	–	*None*	*None*
BH-102-1B	0.3 – 0.6	Proposed sewer outlet location to Little River Drain	**FILL**, sandy silty clay, some gravel; brown, contains organic matter (rootlets); *no field evidence of potentially significant impact to soil quality.65 ppm headspace vapour (HEX) noted*	●	●	●	●	●	●	●	–	–	Inorganics (SAR) Metals (Mo)[M]	*None*
BH-102-2A	0.8 – 1.1		**FILL**, sandy silty clay, some gravel; brown, contains organic matter (rootlets); *no field evidence of potentially significant impact to soil quality., 80 ppm headspace vapour (HEX) noted*	●	●	●	●	●	●	●	–	–	Metals (Mo)[M]	*None*
BH-102-3B	1.8 – 2.1		(CL) sandy **SILTY CLAY**, trace gravel; mottled brown and grey; firm to stiff; *no field evidence of potentially significant impact to soil quality., 70 ppm headspace varpour (HEX) noted*	●	●	●	●	●	●	●	–	–	Metals (As, Mo)[M]	*None*
BH-102-4	2.3 – 2.9		(CL) sandy **SILTY CLAY**, trace gravel; mottled brown and grey; firm to stiff; *no field evidence of potentially significant impact to soil quality., 70 ppm headspace vapour (HEX) noted*	●	●	●	●	●	●	●	–	–	Metals (Mo)[M]	*None*
BH-102-4 *(BH-DUP)*	2.3 – 2.9		(CL) sandy **SILTY CLAY**, trace gravel; mottled brown and grey; firm to stiff; *no field evidence of potentially significant impact to soil quality., 70 ppm headspace vapour (HEX) noted*	●	●	●	●	●	●	●	–	–	Metals (Mo)[M]	*None*

NOTES:

1. All sample depths are expressed as metres below ground surface (mbgs).
2. Headspace vapours measured in parts per million (ppm) and indicative of combustible headspace vapours, measured against a hexane (HEX) standard. Headspace vapour concentrations measured as 0 ppm for samples BH-101-1B and BH-101-2A.
3. Inorganic parameters: O.Reg. 406/19 metals and metal hydrides, electrical conductivity (EC), sodium adsorption ratio (SAR) and pH.
4. Organic parameters: Petroleum hydrocarbons (PHCs) F1 to F4 fractions and BTEX (benzene, toluene, ethylbenzene, and total xylenes), volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), semi-volatile organic compounds (SVOCs) / acid base neutrals (ABNs) (SVOCs / ABNs including PAHs), and polychlorinated biphenyls (PCBs).
5. Ontario Ministry of Environment, Conservation and Parks (MECP), formerly the Ministry of Environment and Climate Change (MOECC), formerly the Ministry of Environment (MOE).

T1. Table 1 ESQS (Full Depth Background Site Condition Standards) for agricultural or other property use ("Table 1 agricultural").

T2.1 Table 2.1 ESQS (Full Depth Excess Soil Quality Standards in a Potable Groundwater Condition) for residential/parkland/institutional (RPI) property use ("Table 2.1 RPI").

M Metals: Antimony (Sb); Molybdenum (Mo), Nickel (Ni), Lead (Pb), Arsenic (As).

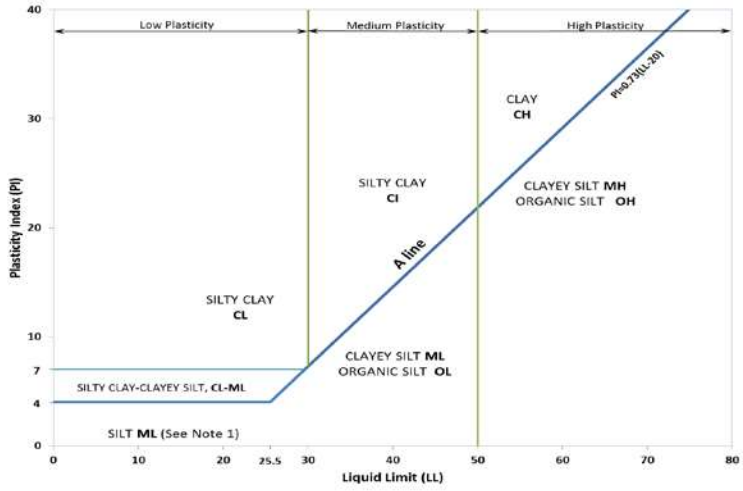
Prepared By: MH
Checked By: CES

METHOD OF SOIL CLASSIFICATION

The Golder Associates Ltd. Soil Classification System is based on the Unified Soil Classification System (USCS)

Organic or Inorganic	Soil Group	Type of Soil		Gradation or Plasticity	$Cu = \frac{D_{60}}{D_{10}}$	$Cc = \frac{(D_{30})^2}{D_{10} x D_{60}}$	Organic Content	USCS Group Symbol	Group Name
INORGANIC (Organic Content ≤30% by mass)	COARSE-GRAINED SOILS (>50% by mass is larger than 0.075 mm)	GRAVELS (>50% by mass of coarse fraction is larger than 4.75 mm)	Gravels with ≤12% fines (by mass)	Poorly Graded	<4	≤1 or ≥3	≤30%	GP	GRAVEL
				Well Graded	≥4	1 to 3		GW	GRAVEL
			Gravels with >12% fines (by mass)	Below A Line	n/a			GM	SILTY GRAVEL
				Above A Line	n/a			GC	CLAYEY GRAVEL
		SANDS (≥50% by mass of coarse fraction is smaller than 4.75 mm)	Sands with ≤12% fines (by mass)	Poorly Graded	<6	≤1 or ≥3		SP	SAND
				Well Graded	≥6	1 to 3		SW	SAND
			Sands with >12% fines (by mass)	Below A Line	n/a			SM	SILTY SAND
				Above A Line	n/a			SC	CLAYEY SAND

Organic or Inorganic	Soil Group	Type of Soil	Laboratory Tests	Field Indicators					Organic Content	USCS Group Symbol	Primary Name
				Dilatancy	Dry Strength	Shine Test	Thread Diameter	Toughness (of 3 mm thread)			
INORGANIC (Organic Content ≤30% by mass)	FINE-GRAINED SOILS (≥50% by mass is smaller than 0.075 mm)	SILTS (Non-Plastic or PI and LL plot below A-Line on Plasticity Chart below)	Liquid Limit <50	Rapid	None	None	>6 mm	N/A (can't roll 3 mm thread)	<5%	ML	SILT
				Slow	None to Low	Dull	3mm to 6 mm	None to low	<5%	ML	CLAYEY SILT
				Slow to very slow	Low to medium	Dull to slight	3mm to 6 mm	Low	5% to 30%	OL	ORGANIC SILT
			Liquid Limit ≥50	Slow to very slow	Low to medium	Slight	3mm to 6 mm	Low to medium	<5%	MH	CLAYEY SILT
				None	Medium to high	Dull to slight	1 mm to 3 mm	Medium to high	5% to 30%	OH	ORGANIC SILT
		CLAYS (PI and LL plot above A-Line on Plasticity Chart below)	Liquid Limit <30	None	Low to medium	Slight to shiny	~ 3 mm	Low to medium	0% to 30% (see Note 2)	CL	SILTY CLAY
			Liquid Limit 30 to 50	None	Medium to high	Slight to shiny	1 mm to 3 mm	Medium		CI	SILTY CLAY
			Liquid Limit ≥50	None	High	Shiny	<1 mm	High		CH	CLAY
HIGHLY ORGANIC SOILS (Organic Content >30% by mass)		Peat and mineral soil mixtures							30% to 75%	PT	SILTY PEAT, SANDY PEAT
		Predominantly peat, may contain some mineral soil, fibrous or amorphous peat							75% to 100%		PEAT



Note 1 – Fine grained materials with PI and LL that plot in this area are named (ML) SILT with slight plasticity. Fine-grained materials which are non-plastic (i.e. a PL cannot be measured) are named SILT.
Note 2 – For soils with <5% organic content, include the descriptor "trace organics" for soils with between 5% and 30% organic content include the prefix "organic" before the Primary name.

Dual Symbol — A dual symbol is two symbols separated by a hyphen, for example, GP-GM, SW-SC and CL-ML.
For non-cohesive soils, the dual symbols must be used when the soil has between 5% and 12% fines (i.e. to identify transitional material between "clean" and "dirty" sand or gravel.
For cohesive soils, the dual symbol must be used when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart (see Plasticity Chart at left).

Borderline Symbol — A borderline symbol is two symbols separated by a slash, for example, CL/CI, GM/SM, CL/ML.
A borderline symbol should be used to indicate that the soil has been identified as having properties that are on the transition between similar materials. In addition, a borderline symbol may be used to indicate a range of similar soil types within a stratum.

ABBREVIATIONS AND TERMS USED ON RECORDS OF BOREHOLES AND TEST PITS

PARTICLE SIZES OF CONSTITUENTS

Soil Constituent	Particle Size Description	Millimetres	Inches (US Std. Sieve Size)
BOULDERS	Not Applicable	>300	>12
COBBLES	Not Applicable	75 to 300	3 to 12
GRAVEL	Coarse Fine	19 to 75 4.75 to 19	0.75 to 3 (4) to 0.75
SAND	Coarse Medium Fine	2.00 to 4.75 0.425 to 2.00 0.075 to 0.425	(10) to (4) (40) to (10) (200) to (40)
SILT/CLAY	Classified by plasticity	<0.075	< (200)

MODIFIERS FOR SECONDARY AND MINOR CONSTITUENTS

Percentage by Mass	Modifier
>35	Use 'and' to combine major constituents (*i.e.,* SAND and GRAVEL)
> 12 to 35	Primary soil name prefixed with "gravelly, sandy, SILTY, CLAYEY" as applicable
> 5 to 12	some
≤ 5	trace

PENETRATION RESISTANCE

Standard Penetration Resistance (SPT), N:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) required to drive a 50 mm (2 in.) split-spoon sampler for a distance of 300 mm (12 in.). Values reported are as recorded in the field and are uncorrected.

Cone Penetration Test (CPT)

An electronic cone penetrometer with a 60° conical tip and a project end area of 10 cm^2 pushed through ground at a penetration rate of 2 cm/s. Measurements of tip resistance (q_t), porewater pressure (u) and sleeve frictions are recorded electronically at 25 mm penetration intervals.

Dynamic Cone Penetration Resistance (DCPT); N_d:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) to drive uncased a 50 mm (2 in.) diameter, 60° cone attached to "A" size drill rods for a distance of 300 mm (12 in.).

PH: Sampler advanced by hydraulic pressure
PM: Sampler advanced by manual pressure
WH: Sampler advanced by static weight of hammer
WR: Sampler advanced by weight of sampler and rod

SAMPLES

AS	Auger sample
BS	Block sample
CS	Chunk sample
DD	Diamond Drilling
DO or DP	Seamless open ended, driven or pushed tube sampler – note size
DS	Denison type sample
GS	Grab Sample
MC	Modified California Samples
MS	Modified Shelby (for frozen soil)
RC	Rock core
SC	Soil core
SS	Split spoon sampler – note size
ST	Slotted tube
TO	Thin-walled, open – note size (Shelby tube)
TP	Thin-walled, piston – note size (Shelby tube)
WS	Wash sample

SOIL TESTS

w	water content
PL , w_p	plastic limit
LL , w_L	liquid limit
C	consolidation (oedometer) test
CHEM	chemical analysis (refer to text)
CID	consolidated isotropically drained triaxial test[1]
CIU	consolidated isotropically undrained triaxial test with porewater pressure measurement[1]
D_R	relative density (specific gravity, Gs)
DS	direct shear test
GS	specific gravity
M	sieve analysis for particle size
MH	combined sieve and hydrometer (H) analysis
MPC	Modified Proctor compaction test
SPC	Standard Proctor compaction test
OC	organic content test
SO_4	concentration of water-soluble sulphates
UC	unconfined compression test
UU	unconsolidated undrained triaxial test
V (FV)	field vane (LV-laboratory vane test)
γ	unit weight

1. Tests anisotropically consolidated prior to shear are shown as CAD, CAU.

NON-COHESIVE (COHESIONLESS) SOILS

Compactness[2]

Term	SPT 'N' (blows/0.3m)[1]
Very Loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	>50

1. SPT 'N' in accordance with ASTM D1586, uncorrected for the effects of overburden pressure.
2. Definition of compactness terms are based on SPT 'N' ranges as provided in Terzaghi, Peck and Mesri (1996). Many factors affect the recorded SPT 'N' value, including hammer efficiency (which may be greater than 60% in automatic trip hammers), overburden pressure, groundwater conditions, and grainsize. As such, the recorded SPT 'N' value(s) should be considered only an approximate guide to the soil compactness. These factors need to be considered when evaluating the results, and the stated compactness terms should not be relied upon for design or construction.

Field Moisture Condition

Term	Description
Dry	Soil flows freely through fingers.
Moist	Soils are darker than in the dry condition and may feel cool.
Wet	As moist, but with free water forming on hands when handled.

COHESIVE SOILS

Consistency

Term	Undrained Shear Strength (kPa)	SPT 'N'[1,2] (blows/0.3m)
Very Soft	<12	0 to 2
Soft	12 to 25	2 to 4
Firm	25 to 50	4 to 8
Stiff	50 to 100	8 to 15
Very Stiff	100 to 200	15 to 30
Hard	>200	>30

1. SPT 'N' in accordance with ASTM D1586, uncorrected for overburden pressure effects; approximate only.
2. SPT 'N' values should be considered ONLY an approximate guide to consistency; for sensitive clays (e.g., Champlain Sea clays), the N-value approximation for consistency terms does NOT apply. Rely on direct measurement of undrained shear strength or other manual observations.

Water Content

Term	Description
w < PL	Material is estimated to be drier than the Plastic Limit.
w ~ PL	Material is estimated to be close to the Plastic Limit.
w > PL	Material is estimated to be wetter than the Plastic Limit.

Unless otherwise stated, the symbols employed in the report are as follows:

I. GENERAL

π	3.1416
ln x	natural logarithm of x
$\log_{10}$	x or log x, logarithm of x to base 10
g	acceleration due to gravity
t	time

II. STRESS AND STRAIN

γ	shear strain
Δ	change in, e.g. in stress: $\Delta\sigma$
ε	linear strain
ε_v	volumetric strain
η	coefficient of viscosity
υ	Poisson's ratio
σ	total stress
σ'	effective stress ($\sigma' = \sigma - u$)
σ'_{vo}	initial effective overburden stress
$\sigma_1, \sigma_2, \sigma_3$	principal stress (major, intermediate, minor)
σ_{oct}	mean stress or octahedral stress $= (\sigma_1 + \sigma_2 + \sigma_3)/3$
τ	shear stress
u	porewater pressure
E	modulus of deformation
G	shear modulus of deformation
K	bulk modulus of compressibility

III. SOIL PROPERTIES

(a) Index Properties

$\rho(\gamma)$	bulk density (bulk unit weight)*
$\rho_d(\gamma_d)$	dry density (dry unit weight)
$\rho_w(\gamma_w)$	density (unit weight) of water
$\rho_s(\gamma_s)$	density (unit weight) of solid particles
γ'	unit weight of submerged soil ($\gamma' = \gamma - \gamma_w$)
D_R	relative density (specific gravity) of solid particles ($D_R = \rho_s / \rho_w$) (formerly G_s)
e	void ratio
n	porosity
S	degree of saturation

* Density symbol is ρ. Unit weight symbol is γ where $\gamma = \rho g$ (i.e. mass density multiplied by acceleration due to gravity)

(a) Index Properties (continued)

w	water content
w_l or LL	liquid limit
w_p or PL	plastic limit
I_p or PI	plasticity index = $(w_l - w_p)$
NP	non-plastic
w_s	shrinkage limit
I_L	liquidity index = $(w - w_p) / I_p$
I_C	consistency index = $(w_l - w) / I_p$
e_{max}	void ratio in loosest state
e_{min}	void ratio in densest state
I_D	density index = $(e_{max} - e) / (e_{max} - e_{min})$ (formerly relative density)

(b) Hydraulic Properties

h	hydraulic head or potential
q	rate of flow
v	velocity of flow
i	hydraulic gradient
k	hydraulic conductivity (coefficient of permeability)
j	seepage force per unit volume

(c) Consolidation (one-dimensional)

C_c	compression index (normally consolidated range)
C_r	recompression index (over-consolidated range)
C_s	swelling index
C_α	secondary compression index
m_v	coefficient of volume change
c_v	coefficient of consolidation (vertical direction)
c_h	coefficient of consolidation (horizontal direction)
T_v	time factor (vertical direction)
U	degree of consolidation
σ'_p	pre-consolidation stress
OCR	over-consolidation ratio = σ'_p / σ'_{vo}

(d) Shear Strength

τ_p, τ_r	peak and residual shear strength
ϕ'	effective angle of internal friction
δ	angle of interface friction
μ	coefficient of friction = tan δ
c'	effective cohesion
c_u, s_u	undrained shear strength ($\phi = 0$ analysis)
p	mean total stress $(\sigma_1 + \sigma_3)/2$
p'	mean effective stress $(\sigma'_1 + \sigma'_3)/2$
q	$(\sigma_1 - \sigma_3)/2$ or $(\sigma'_1 - \sigma'_3)/2$
q_u	compressive strength $(\sigma_1 - \sigma_3)$
S_t	sensitivity

Notes: 1 $\tau = c' + \sigma' \tan \phi'$

2 shear strength = (compressive strength)/2

PROJECT: 21507944

RECORD OF BOREHOLE: 101

SHEET 1 OF 2

LOCATION: N 4688039; E 269583

BORING DATE: April 14, 2022

DATUM: Local

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] (ND = Not Detected) 100 200 300 400 / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] (ND = Not Detected) 100 200 300 400	HYDRAULIC CONDUCTIVITY, k, cm/s 10^{-6} 10^{-5} 10^{-4} 10^{-3} / WATER CONTENT PERCENT Wp W Wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		100.00							
0	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL - sandy SILTY CLAY; brown, contains organic matter (rootlets)		0.00	1A			ND			
		FILL - sandy SILTY CLAY, some gravel; brown		0.15	1B	SS	8				
				99.02	2A						
1		FILL - sandy SILTY CLAY, trace gravel; dark grey, contains organic matter (rootlets)		0.98	2B	SS	11				
				98.55							
		(CL) sandy SILTY CLAY, some gravel; brown, mottled; firm		1.45	3	SS	6				
2				97.79							
		(CL) sandy SILTY CLAY, trace gravel; brown; stiff to very stiff		2.21	4	SS	12				
3					5A						
					5B	SS	17				
					6A						
4					6B	SS	13				
					7	SS	8			MH	
5											
6				93.60	8	SS	6				
		(CL) sandy SILTY CLAY, trace gravel; grey; very soft to very stiff		6.40							
7											
					9A						
8					9B	SS	5				
9											
					10A						
10					10B	SS	2				
		CONTINUED NEXT PAGE									

DEPTH SCALE

1 : 50

LOGGED: HK

CHECKED: MH

GTA-BHS 001 S:\CLIENTS\CITY_OF_WINDSOR\LITTLE_RIVER_POLLUTION_CONTROL_PLANT\02_DATA\GINT\PONTIAC_PUMPING_STATION.GPJ GAL-MIS.GDT 8/5/22 ZS

PROJECT: 21507944

RECORD OF BOREHOLE: 101

SHEET 2 OF 2

LOCATION: N 4688039; E 269583

BORING DATE: April 14, 2022

DATUM: Local

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] (ND = Not Detected) ⊕ 100 200 300 400 / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] (ND = Not Detected) □ 100 200 300 400	HYDRAULIC CONDUCTIVITY, k, cm/s 10^{-6} 10^{-5} 10^{-4} 10^{-3} / WATER CONTENT PERCENT Wp W Wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---								
10	Power Auger 200 mm Diam. (Hollow Stem)	(CL) sandy SILTY CLAY, trace gravel; grey; very soft to very stiff								
11					11A	SS	2	⊕	○	
					11B			⊕	○	
12					12	SS	1		○	
13										
14					13	SS	1		○	
15					14	SS	2		○	Borehole dry during drilling on April 14, 2022
				84.15						
16		End of Borehole		15.85						
17										
18										
19										
20										

DEPTH SCALE
1 : 50

WSP GOLDER

LOGGED: HK
CHECKED: MH

GTA-BHS 001 S:\CLIENTS\CITY_OF_WINDSOR\LITTLE_RIVER_POLLUTION_CONTROL_PLANT\02_DATA\GINT\PONTIAC_PUMPING_STATION.GPJ GAL-MIS.GDT 8/5/22 ZS

PROJECT: 21507944

LOCATION: N 4688039; E 269548

RECORD OF BOREHOLE: 102

SHEET 1 OF 2

BORING DATE: April 14, 2022

DATUM: Local

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] (ND = Not Detected) 100 200 300 400 / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] (ND = Not Detected) 100 200 300 400	HYDRAULIC CONDUCTIVITY, k, cm/s 10^{-6} 10^{-5} 10^{-4} 10^{-3} / WATER CONTENT PERCENT Wp W Wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		100.07							
0	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL - sandy SILTY CLAY; brown, contains organic matter (rootlets)		0.00 / 99.83	1A			⊕	○		
		FILL - sandy SILTY CLAY, some gravel; brown, contains organic matter (rootlets)		0.24	1B	SS	9	⊕	○		
1				99.00	2A			⊕	○		
		(CL) sandy SILTY CLAY; dark grey, contains organic matter (rootlets)		1.07	2B	SS	9	⊕	○		
				98.30	3A			⊕	○		
2		(CL) sandy SILTY CLAY, trace gravel; brown to grey, mottled; firm to stiff		1.77	3B	SS	7	⊕	○		
					4A			⊕	○		
					4B	SS	8	⊕	○		
				97.10							
3		(CL) sandy SILTY CLAY, trace gravel; brown; stiff		2.97	5	SS	10	⊕	○		
					6A			⊕	○		
4				95.96		SS	14				
		(CL) sandy SILTY CLAY, trace gravel; grey; soft to very stiff		4.11	6B			⊕	○		
					7A			⊕	○		
5					7B	SS	8	⊕	○		
6					8	SS	6				
7											
					9A				○		
8					9B	SS	4		○		
9					10A				○		
					10B	SS	7		○	MH	
10		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 50

LOGGED: HK

CHECKED: MH

GTA-BHS 001 S:\CLIENTS\CITY_OF_WINDSOR\LITTLE_RIVER_POLLUTION_CONTROL_PLANT\02_DATA\GINT\PONTIAC_PUMPING_STATION.GPJ GAL-MIS.GDT 8/5/22 ZS

PROJECT: 21507944

RECORD OF BOREHOLE: 102

SHEET 2 OF 2

LOCATION: N 4688039; E 269548

BORING DATE: April 14, 2022

DATUM: Local

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

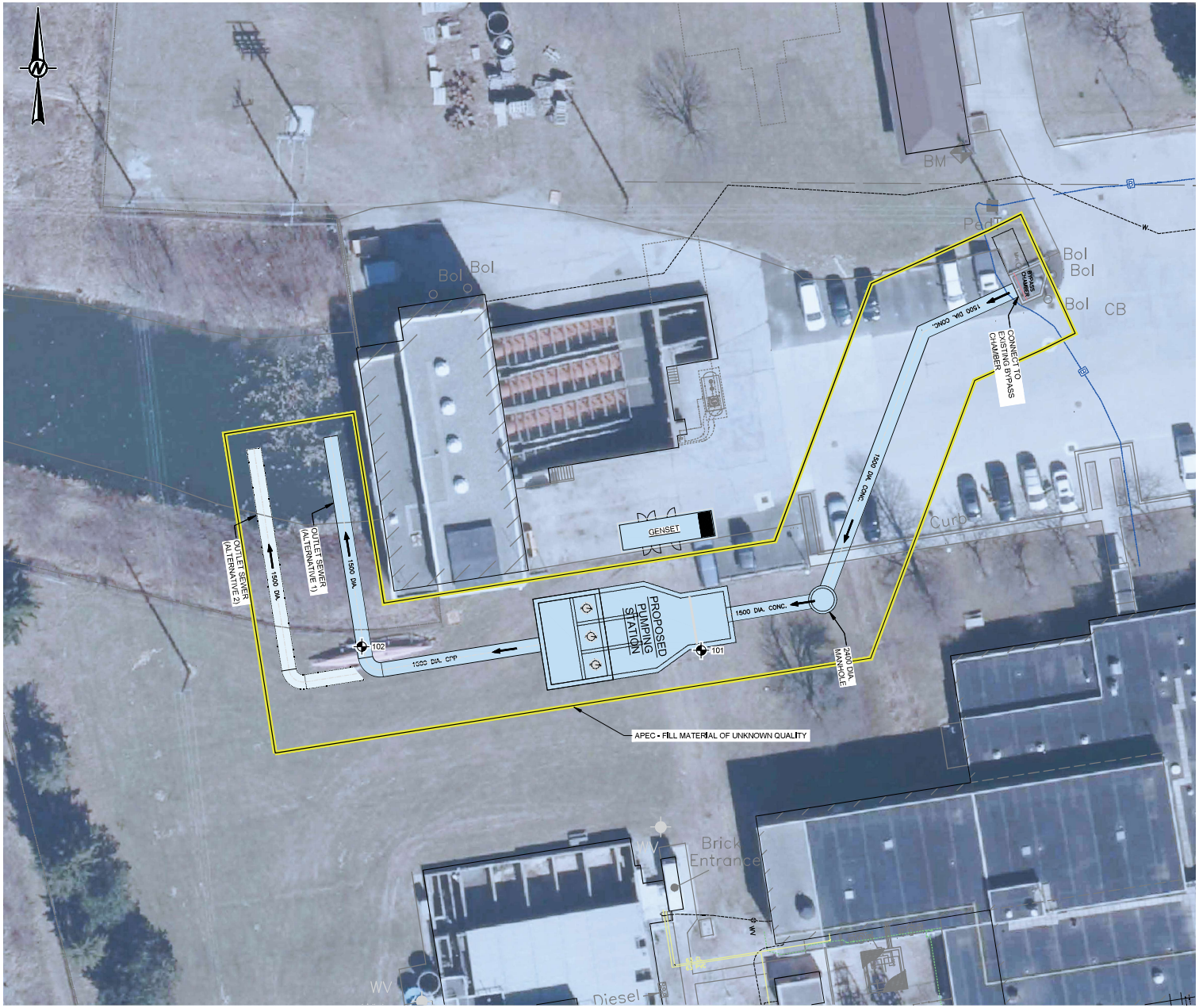
DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ND = Not Detected (100 200 300 400) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] ND = Not Detected (100 200 300 400)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
10		--- *CONTINUED FROM PREVIOUS PAGE* ---									
10	Power Auger 200 mm Diam. (Hollow Stem)	(CL) sandy SILTY CLAY, trace gravel; grey; soft to very stiff			11A	SS	3				
11					11B						
12					12	SS	2				Borehole dry during drilling on April 14, 2022
				87.27							
		End of Borehole		12.80							
13											
14											
15											
16											
17											
18											
19											
20											

DEPTH SCALE
1 : 50

WSP GOLDER

LOGGED: HK
CHECKED: MH

GTA-BHS 001 S:\CLIENTS\CITY_OF_WINDSOR\LITTLE_RIVER_POLLUTION_CONTROL_PLANT\02_DATA\GINT\PONTIAC_PUMPING_STATION.GPJ GAL-MIS.GDT 8/5/22 ZS



KEY MAP

SCALE: 1:50,000 m

LEGEND

- BOREHOLE LOCATION
- PROJECT AREA

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. BASE PLAN SUPPLIED BY STANTEC CONSULTING LIMITED ON APRIL 19, 2022 DRAWING FILE NO. 165620249_SW-101.DWG
2. PROJECTION: TRANSVERSE MERCATOR, DATUM NAD 83, COORDINATE SYSTEM: MTM ZONE 11, VERTICAL DATUM CGVD28

0 10 20
1:400 METRES

CLIENT
STANTEC CONSULTING LIMITED

PROJECT
SOIL CHARACTERIZATION REPORT (SCR) FOR MANAGEMENT OF EXCESS SOILS CLASS ENVIRONMENTAL ASSESSMENT STUDY, PROPOSED PONTIAC PUMP STATION IMPROVEMENTS, LITTLE RIVER POLLUTION CONTROL PLANT, CITY OF WINDSOR, ONTARIO

TITLE
SCR – SOIL SAMPLE LOCATION PLAN

CONSULTANT
WSP GOLDER

YYYY-MM-DD	2022-05-19
DESIGNED	CS
PREPARED	ZS
REVIEWED	MH
APPROVED	MH

PROJECT NO.	CONTROL	REV.	FIGURE
21507944	0002	A	1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B

25 mm

0

Path: \\golder.gds\corp\esdata\office\Ontario\SIM\Clients\City_of_Windsor\Little_River_Pollution_Control_Plant\99_PROJ\21507944_Stantec_EAMS_PROD\0002_Environ | File Name: 21507944-0002-HS-0001.dwg | Last Edited By: zsalvve Date: 2022-05-20 Time:9:36:23 AM | Printed By: ZSalvve Date: 2022-05-20 Time:9:37:30 AM

APPENDIX A

Laboratory Certificates of Analysis

PARACEL LABORATORIES LTD.
TRUSTED. RESPONSIVE. RELIABLE.

351 Nash Road North, unit 9B
Hamilton, ON L8H 7P4
1-800-749-1947
www.paracellabs.com

Certificate of Analysis

Golder Associates Ltd. (Windsor)
1825 Provincial Rd
Windsor, ON N8W 5V7
Attn: Mark Henderson

Client PO:
Project: 21507944
Custody:

Report Date: 6-May-2022
Order Date: 22-Apr-2022

Order #: 2218013

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
2218013-01	BH-101-1B
2218013-02	BH-101-2A
2218013-03	BH-101-2B
2218013-04	BH-101-3
2218013-05	BH-102-1B
2218013-06	BH-102-2A
2218013-07	BH-102-3B
2218013-08	BH-102-4
2218013-09	BH-DUP

Approved By:

Dale Robertson, BSc
Laboratory Director

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Conductivity	MOE E3138 - probe @25 °C, water ext	28-Apr-22	28-Apr-22
pH, soil	EPA 150.1 - pH probe @ 25 °C, CaCl buffered ext.	26-Apr-22	27-Apr-22
PHC F1	CWS Tier 1 - P&T GC-FID	27-Apr-22	27-Apr-22
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	27-Apr-22	29-Apr-22
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	28-Apr-22	28-Apr-22
REG 153: PAHs by GC-MS	EPA 8270 - GC-MS, extraction	27-Apr-22	30-Apr-22
REG 153: VOCs by P&T GC/MS	EPA 8260 - P&T GC-MS	27-Apr-22	27-Apr-22
SAR	Calculated	28-Apr-22	28-Apr-22
Solids, %	Gravimetric, calculation	27-Apr-22	27-Apr-22

Summary of Criteria Exceedances

(If this page is blank then there are no exceedances)

Only those criteria that a sample exceeds will be highlighted in

Regulatory Comparison:

Paracel Laboratories has provided regulatory guidelines on this report for informational purposes only and makes no representations or warranties that the data is accurate or reflects the current regulatory values. The user is advised to consult with the appropriate official regulations to evaluate compliance. Sample results that are highlighted have exceeded the selected regulatory limit. Calculated uncertainty estimations have not been applied for determining regulatory exceedances.

Sample	Analyte	MDL / Units	Result	Reg 406/19 -T1 Agr	-
BH-101-1B	Antimony	1.0 ug/g	3.2	1 ug/g	-
BH-101-1B	Molybdenum	1.0 ug/g	2.3	2 ug/g	-
BH-101-1B	Nickel	5.0 ug/g	48.6	37 ug/g	-
BH-101-2A	Antimony	1.0 ug/g	1.6	1 ug/g	-
BH-101-2A	Molybdenum	1.0 ug/g	2.5	2 ug/g	-
BH-102-1B	SAR	0.01 N/A	1.27	1 N/A	-
BH-102-1B	Molybdenum	1.0 ug/g	2.3	2 ug/g	-
BH-102-2A	Molybdenum	1.0 ug/g	2.5	2 ug/g	-
BH-102-3B	Arsenic	1.0 ug/g	14.7	11 ug/g	-
BH-102-3B	Molybdenum	1.0 ug/g	3.1	2 ug/g	-
BH-102-4	Molybdenum	1.0 ug/g	2.1	2 ug/g	-
BH-DUP	Molybdenum	1.0 ug/g	2.1	2 ug/g	-

	Client ID:	BH-101-1B	BH-101-2A	BH-101-2B	BH-101-3	Criteria:	
	Sample Date:	14-Apr-22 00:00	14-Apr-22 00:00	14-Apr-22 00:00	14-Apr-22 00:00	Reg 406/19 -T1 Agr	-
	Sample ID:	2218013-01	2218013-02	2218013-03	2218013-04		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Physical Characteristics							
% Solids	0.1 % by Wt.	90.1	87.4	82.0	83.1	-	-
General Inorganics							
SAR	0.01 N/A	0.07	0.12	0.22	0.34	1 N/A	-
Conductivity	5 uS/cm	183	164	215	167	0.47 mS/cm	-
pH	0.05 pH Units	7.63	7.38	7.31	7.38	5.00 - 9.00 pH Units	-
Metals							
Antimony	1.0 ug/g	3.2	1.6	<1.0	<1.0	1 ug/g	-
Arsenic	1.0 ug/g	6.5	7.0	5.8	9.1	11 ug/g	-
Barium	1.0 ug/g	64.3	67.8	67.4	97.0	210 ug/g	-
Beryllium	0.5 ug/g	0.6	0.6	0.9	0.8	2.5 ug/g	-
Boron	5.0 ug/g	9.5	11.8	9.0	9.3	36 ug/g	-
Cadmium	0.5 ug/g	<0.5	<0.5	<0.5	<0.5	1 ug/g	-
Chromium	5.0 ug/g	31.7	19.5	22.8	23.6	67 ug/g	-
Cobalt	1.0 ug/g	7.8	8.9	7.9	12.2	19 ug/g	-
Copper	5.0 ug/g	19.1	17.2	21.0	14.0	62 ug/g	-
Lead	1.0 ug/g	16.5	11.1	16.3	10.5	45 ug/g	-
Molybdenum	1.0 ug/g	2.3	2.5	<1.0	1.9	2 ug/g	-
Nickel	5.0 ug/g	48.6	23.5	23.6	29.9	37 ug/g	-
Selenium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	1.2 ug/g	-
Silver	0.3 ug/g	<0.3	<0.3	<0.3	<0.3	0.5 ug/g	-
Thallium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	1 ug/g	-
Uranium	1.0 ug/g	<1.0	<1.0	1.1	<1.0	1.9 ug/g	-
Vanadium	10.0 ug/g	25.3	27.6	32.6	33.2	86 ug/g	-
Zinc	20.0 ug/g	63.3	53.8	63.1	61.6	290 ug/g	-
Volatiles							

Certificate of Analysis

Report Date: 06-May-2022

Client: **Golder Associates Ltd. (Windsor)**

Order Date: 22-Apr-2022

Client PO:

Project Description: 21507944

	Client ID:	BH-101-1B	BH-101-2A	BH-101-2B	BH-101-3	Criteria:	
	Sample Date:	14-Apr-22 00:00	14-Apr-22 00:00	14-Apr-22 00:00	14-Apr-22 00:00	Reg 406/19 -T1 Agr	-
	Sample ID:	2218013-01	2218013-02	2218013-03	2218013-04		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Volatiles							
Acetone	0.50 ug/g	<0.50	<0.50	<0.50	<0.50	0.5 ug/g	-
Benzene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	0.02 ug/g	-
Bromodichloromethane	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
Bromoform	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
Bromomethane	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
Carbon Tetrachloride	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
Chlorobenzene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
Chloroform	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
Dibromochloromethane	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
Dichlorodifluoromethane	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
1,2-Dichlorobenzene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
1,3-Dichlorobenzene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
1,4-Dichlorobenzene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1-Dichloroethane	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
1,2-Dichloroethane	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1-Dichloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
cis-1,2-Dichloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
trans-1,2-Dichloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
1,2-Dichloropropane	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
cis-1,3-Dichloropropylene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
trans-1,3-Dichloropropylene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
1,3-Dichloropropene, total	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
Ethylbenzene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
Ethylene dibromide (dibromoethane,	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
Hexane	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-

	Client ID:	BH-101-1B	BH-101-2A	BH-101-2B	BH-101-3	Criteria:	
	Sample Date:	14-Apr-22 00:00	14-Apr-22 00:00	14-Apr-22 00:00	14-Apr-22 00:00	Reg 406/19 -T1 Agr	-
	Sample ID:	2218013-01	2218013-02	2218013-03	2218013-04		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Volatiles							
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g	<0.50	<0.50	<0.50	<0.50	0.5 ug/g	-
Methyl Isobutyl Ketone	0.50 ug/g	<0.50	<0.50	<0.50	<0.50	0.5 ug/g	-
Methyl tert-butyl ether	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
Methylene Chloride	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
Styrene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1,1,2-Tetrachloroethane	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1,2,2-Tetrachloroethane	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
Tetrachloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
Toluene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.2 ug/g	-
1,1,1-Trichloroethane	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1,2-Trichloroethane	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
Trichloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
Trichlorofluoromethane	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
Vinyl chloride	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	0.02 ug/g	-
m,p-Xylenes	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
Dibromofluoromethane	Surrogate	97.0%	98.6%	98.6%	104%	-	-
Toluene-d8	Surrogate	109%	113%	113%	119%	-	-
4-Bromofluorobenzene	Surrogate	96.3%	100%	97.7%	99.4%	-	-
Hydrocarbons							
F1 PHCs (C6-C10)	7 ug/g	<7	<7	<7	<7	17 ug/g	-
F2 PHCs (C10-C16)	4 ug/g	<4	<4	<4	<4	10 ug/g	-
F3 PHCs (C16-C34)	8 ug/g	61	45	<8	<8	240 ug/g	-
F4 PHCs (C34-C50)	6 ug/g	23	17	<6	<6	120 ug/g	-

	Client ID:	BH-101-1B	BH-101-2A	BH-101-2B	BH-101-3	**Criteria:**	
	Sample Date:	14-Apr-22 00:00	14-Apr-22 00:00	14-Apr-22 00:00	14-Apr-22 00:00	**Reg 406/19 -T1 Agr**	-
	Sample ID:	2218013-01	2218013-02	2218013-03	2218013-04		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Semi-Volatiles							
Acenaphthene	0.02 ug/g	-	<0.02	<0.02	<0.02	0.05 ug/g	-
Acenaphthylene	0.02 ug/g	-	<0.02	<0.02	<0.02	0.093 ug/g	-
Anthracene	0.02 ug/g	-	<0.02	<0.02	<0.02	0.05 ug/g	-
Benzo [a] anthracene	0.02 ug/g	-	<0.02	<0.02	<0.02	0.095 ug/g	-
Benzo [a] pyrene	0.02 ug/g	-	<0.02	<0.02	<0.02	0.05 ug/g	-
Benzo [b] fluoranthene	0.02 ug/g	-	<0.02	<0.02	<0.02	0.3 ug/g	-
Benzo [g,h,i] perylene	0.02 ug/g	-	<0.02	<0.02	<0.02	0.2 ug/g	-
Benzo [k] fluoranthene	0.02 ug/g	-	<0.02	<0.02	<0.02	0.05 ug/g	-
Chrysene	0.02 ug/g	-	<0.02	<0.02	<0.02	0.18 ug/g	-
Dibenzo [a,h] anthracene	0.02 ug/g	-	<0.02	<0.02	<0.02	0.1 ug/g	-
Fluoranthene	0.02 ug/g	-	0.04	<0.02	<0.02	0.24 ug/g	-
Fluorene	0.02 ug/g	-	<0.02	<0.02	<0.02	0.05 ug/g	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g	-	<0.02	<0.02	<0.02	0.11 ug/g	-
1-Methylnaphthalene	0.02 ug/g	-	<0.02	<0.02	<0.02	0.05 ug/g	-
2-Methylnaphthalene	0.02 ug/g	-	<0.02	<0.02	<0.02	0.05 ug/g	-
Methylnaphthalene (1&2)	0.04 ug/g	-	<0.04	<0.04	<0.04	0.05 ug/g	-
Naphthalene	0.01 ug/g	-	<0.01	<0.01	<0.01	0.05 ug/g	-
Phenanthrene	0.02 ug/g	-	0.04	<0.02	<0.02	0.19 ug/g	-
Pyrene	0.02 ug/g	-	0.04	<0.02	<0.02	0.19 ug/g	-
2-Fluorobiphenyl	Surrogate	-	106%	96.5%	92.3%	-	-
Terphenyl-d14	Surrogate	-	107%	110%	120%	-	-

	Client ID:	BH-102-1B	BH-102-2A	BH-102-3B	BH-102-4	Criteria:	
	Sample Date:	14-Apr-22 00:00	14-Apr-22 00:00	14-Apr-22 00:00	14-Apr-22 00:00	Reg 406/19 -T1 Agr	-
	Sample ID:	2218013-05	2218013-06	2218013-07	2218013-08		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Physical Characteristics							
% Solids	0.1 % by Wt.	86.2	86.6	81.6	86.8	-	-
General Inorganics							
SAR	0.01 N/A	1.27	0.93	0.69	0.53	1 N/A	-
Conductivity	5 uS/cm	329	273	204	221	0.47 mS/cm	-
pH	0.05 pH Units	7.70	7.47	7.46	7.50	5.00 - 9.00 pH Units	-
Metals							
Antimony	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	1 ug/g	-
Arsenic	1.0 ug/g	7.6	8.4	14.7	5.9	11 ug/g	-
Barium	1.0 ug/g	68.3	69.8	58.3	54.0	210 ug/g	-
Beryllium	0.5 ug/g	0.7	0.7	0.8	0.7	2.5 ug/g	-
Boron	5.0 ug/g	9.7	9.1	8.7	10.6	36 ug/g	-
Cadmium	0.5 ug/g	<0.5	<0.5	<0.5	<0.5	1 ug/g	-
Chromium	5.0 ug/g	21.5	19.8	21.9	19.9	67 ug/g	-
Cobalt	1.0 ug/g	9.4	9.1	12.9	9.0	19 ug/g	-
Copper	5.0 ug/g	19.8	18.0	16.8	18.3	62 ug/g	-
Lead	1.0 ug/g	35.3	11.6	11.0	12.0	45 ug/g	-
Molybdenum	1.0 ug/g	2.3	2.5	3.1	2.1	2 ug/g	-
Nickel	5.0 ug/g	27.5	24.5	30.2	23.9	37 ug/g	-
Selenium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	1.2 ug/g	-
Silver	0.3 ug/g	<0.3	<0.3	<0.3	<0.3	0.5 ug/g	-
Thallium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	1 ug/g	-
Uranium	1.0 ug/g	1.0	<1.0	<1.0	<1.0	1.9 ug/g	-
Vanadium	10.0 ug/g	29.9	29.4	35.9	28.4	86 ug/g	-
Zinc	20.0 ug/g	59.4	56.8	54.5	52.5	290 ug/g	-
Volatiles							

Certificate of Analysis

Report Date: 06-May-2022

Client: **Golder Associates Ltd. (Windsor)**

Order Date: 22-Apr-2022

Client PO:

Project Description: 21507944

	Client ID:	BH-102-1B	BH-102-2A	BH-102-3B	BH-102-4	Criteria:	
	Sample Date:	14-Apr-22 00:00	14-Apr-22 00:00	14-Apr-22 00:00	14-Apr-22 00:00	Reg 406/19 -T1 Agr	-
	Sample ID:	2218013-05	2218013-06	2218013-07	2218013-08		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Volatiles							
Acetone	0.50 ug/g	<0.50	<0.50	<0.50	<0.50	0.5 ug/g	-
Benzene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	0.02 ug/g	-
Bromodichloromethane	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
Bromoform	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
Bromomethane	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
Carbon Tetrachloride	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
Chlorobenzene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
Chloroform	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
Dibromochloromethane	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
Dichlorodifluoromethane	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
1,2-Dichlorobenzene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
1,3-Dichlorobenzene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
1,4-Dichlorobenzene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1-Dichloroethane	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
1,2-Dichloroethane	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1-Dichloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
cis-1,2-Dichloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
trans-1,2-Dichloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
1,2-Dichloropropane	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
cis-1,3-Dichloropropylene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
trans-1,3-Dichloropropylene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
1,3-Dichloropropene, total	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
Ethylene dibromide (dibromoethane,	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
Ethylbenzene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
Hexane	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-

	Client ID:	BH-102-1B	BH-102-2A	BH-102-3B	BH-102-4	Criteria:	
	Sample Date:	14-Apr-22 00:00	14-Apr-22 00:00	14-Apr-22 00:00	14-Apr-22 00:00	Reg 406/19 -T1 Agr	-
	Sample ID:	2218013-05	2218013-06	2218013-07	2218013-08		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Volatiles							
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g	<0.50	<0.50	<0.50	<0.50	0.5 ug/g	-
Methyl Isobutyl Ketone	0.50 ug/g	<0.50	<0.50	<0.50	<0.50	0.5 ug/g	-
Methyl tert-butyl ether	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
Methylene Chloride	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
Styrene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1,1,2-Tetrachloroethane	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1,2,2-Tetrachloroethane	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
Tetrachloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
Toluene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.2 ug/g	-
1,1,1-Trichloroethane	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1,2-Trichloroethane	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
Trichloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
Trichlorofluoromethane	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
Vinyl chloride	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	0.02 ug/g	-
m,p-Xylenes	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.05 ug/g	-
4-Bromofluorobenzene	Surrogate	93.3%	95.1%	98.1%	98.1%	-	-
Dibromofluoromethane	Surrogate	97.0%	99.5%	103%	101%	-	-
Toluene-d8	Surrogate	112%	111%	118%	111%	-	-
Hydrocarbons							
F1 PHCs (C6-C10)	7 ug/g	<7	<7	<7	<7	17 ug/g	-
F2 PHCs (C10-C16)	4 ug/g	<4	<4	<4	<4	10 ug/g	-
F3 PHCs (C16-C34)	8 ug/g	24	18	<8	<8	240 ug/g	-
F4 PHCs (C34-C50)	6 ug/g	<6	<6	<6	<6	120 ug/g	-

	Client ID:	BH-102-1B	BH-102-2A	BH-102-3B	BH-102-4	Criteria:	
	Sample Date:	14-Apr-22 00:00	14-Apr-22 00:00	14-Apr-22 00:00	14-Apr-22 00:00	Reg 406/19 -T1 Agr	-
	Sample ID:	2218013-05	2218013-06	2218013-07	2218013-08		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Semi-Volatiles							
Acenaphthene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	0.05 ug/g	-
Acenaphthylene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	0.093 ug/g	-
Anthracene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	0.05 ug/g	-
Benzo [a] anthracene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	0.095 ug/g	-
Benzo [a] pyrene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	0.05 ug/g	-
Benzo [b] fluoranthene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	0.3 ug/g	-
Benzo [g,h,i] perylene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	0.2 ug/g	-
Benzo [k] fluoranthene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	0.05 ug/g	-
Chrysene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	0.18 ug/g	-
Dibenzo [a,h] anthracene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	0.1 ug/g	-
Fluoranthene	0.02 ug/g	<0.02	0.03	<0.02	<0.02	0.24 ug/g	-
Fluorene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	0.05 ug/g	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	0.11 ug/g	-
1-Methylnaphthalene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	0.05 ug/g	-
2-Methylnaphthalene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	0.05 ug/g	-
Methylnaphthalene (1&2)	0.04 ug/g	<0.04	<0.04	<0.04	<0.04	0.05 ug/g	-
Naphthalene	0.01 ug/g	<0.01	<0.01	<0.01	<0.01	0.05 ug/g	-
Phenanthrene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	0.19 ug/g	-
Pyrene	0.02 ug/g	<0.02	0.02	<0.02	<0.02	0.19 ug/g	-
2-Fluorobiphenyl	Surrogate	97.0%	97.7%	122%	85.3%	-	-
Terphenyl-d14	Surrogate	109%	108%	122%	110%	-	-

	Client ID:	BH-DUP				Criteria:	
	Sample Date:	14-Apr-22 00:00				Reg 406/19 -T1 Agr	-
	Sample ID:	2218013-09					
	Matrix:	Soil					
	MDL/Units						
Physical Characteristics							
% Solids	0.1 % by Wt.	87.6	-	-	-	-	-
General Inorganics							
SAR	0.01 N/A	0.52	-	-	-	1 N/A	-
Conductivity	5 uS/cm	230	-	-	-	0.47 mS/cm	-
pH	0.05 pH Units	7.62	-	-	-	5.00 - 9.00 pH Units	-
Metals							
Antimony	1.0 ug/g	<1.0	-	-	-	1 ug/g	-
Arsenic	1.0 ug/g	6.9	-	-	-	11 ug/g	-
Barium	1.0 ug/g	55.4	-	-	-	210 ug/g	-
Beryllium	0.5 ug/g	0.7	-	-	-	2.5 ug/g	-
Boron	5.0 ug/g	11.4	-	-	-	36 ug/g	-
Cadmium	0.5 ug/g	<0.5	-	-	-	1 ug/g	-
Chromium	5.0 ug/g	21.0	-	-	-	67 ug/g	-
Cobalt	1.0 ug/g	9.6	-	-	-	19 ug/g	-
Copper	5.0 ug/g	18.7	-	-	-	62 ug/g	-
Lead	1.0 ug/g	10.1	-	-	-	45 ug/g	-
Molybdenum	1.0 ug/g	2.1	-	-	-	2 ug/g	-
Nickel	5.0 ug/g	24.6	-	-	-	37 ug/g	-
Selenium	1.0 ug/g	<1.0	-	-	-	1.2 ug/g	-
Silver	0.3 ug/g	<0.3	-	-	-	0.5 ug/g	-
Thallium	1.0 ug/g	<1.0	-	-	-	1 ug/g	-
Uranium	1.0 ug/g	<1.0	-	-	-	1.9 ug/g	-
Vanadium	10.0 ug/g	30.5	-	-	-	86 ug/g	-
Zinc	20.0 ug/g	53.2	-	-	-	290 ug/g	-
Volatiles							

	Client ID:	BH-DUP				Criteria:	
	Sample Date:	14-Apr-22 00:00				Reg 406/19 -T1 Agr	-
	Sample ID:	2218013-09					
	Matrix:	Soil					
	MDL/Units						
Volatiles							
Acetone	0.50 ug/g	<0.50	-	-	-	0.5 ug/g	-
Benzene	0.02 ug/g	<0.02	-	-	-	0.02 ug/g	-
Bromodichloromethane	0.05 ug/g	<0.05	-	-	-	0.05 ug/g	-
Bromoform	0.05 ug/g	<0.05	-	-	-	0.05 ug/g	-
Bromomethane	0.05 ug/g	<0.05	-	-	-	0.05 ug/g	-
Carbon Tetrachloride	0.05 ug/g	<0.05	-	-	-	0.05 ug/g	-
Chlorobenzene	0.05 ug/g	<0.05	-	-	-	0.05 ug/g	-
Chloroform	0.05 ug/g	<0.05	-	-	-	0.05 ug/g	-
Dibromochloromethane	0.05 ug/g	<0.05	-	-	-	0.05 ug/g	-
Dichlorodifluoromethane	0.05 ug/g	<0.05	-	-	-	0.05 ug/g	-
1,2-Dichlorobenzene	0.05 ug/g	<0.05	-	-	-	0.05 ug/g	-
1,3-Dichlorobenzene	0.05 ug/g	<0.05	-	-	-	0.05 ug/g	-
1,4-Dichlorobenzene	0.05 ug/g	<0.05	-	-	-	0.05 ug/g	-
1,1-Dichloroethane	0.05 ug/g	<0.05	-	-	-	0.05 ug/g	-
1,2-Dichloroethane	0.05 ug/g	<0.05	-	-	-	0.05 ug/g	-
1,1-Dichloroethylene	0.05 ug/g	<0.05	-	-	-	0.05 ug/g	-
cis-1,2-Dichloroethylene	0.05 ug/g	<0.05	-	-	-	0.05 ug/g	-
trans-1,2-Dichloroethylene	0.05 ug/g	<0.05	-	-	-	0.05 ug/g	-
1,2-Dichloropropane	0.05 ug/g	<0.05	-	-	-	0.05 ug/g	-
cis-1,3-Dichloropropylene	0.05 ug/g	<0.05	-	-	-	-	-
trans-1,3-Dichloropropylene	0.05 ug/g	<0.05	-	-	-	-	-
1,3-Dichloropropene, total	0.05 ug/g	<0.05	-	-	-	0.05 ug/g	-
Ethylbenzene	0.05 ug/g	<0.05	-	-	-	0.05 ug/g	-
Ethylene dibromide (dibromoethane,	0.05 ug/g	<0.05	-	-	-	0.05 ug/g	-
Hexane	0.05 ug/g	<0.05	-	-	-	0.05 ug/g	-

	Client ID:	BH-DUP				**Criteria:**	
	Sample Date:	14-Apr-22 00:00				**Reg 406/19 -T1 Agr**	-
	Sample ID:	2218013-09					
	Matrix:	Soil					
	MDL/Units						
Volatiles							
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g	<0.50	-	-	-	0.5 ug/g	-
Methyl Isobutyl Ketone	0.50 ug/g	<0.50	-	-	-	0.5 ug/g	-
Methyl tert-butyl ether	0.05 ug/g	<0.05	-	-	-	0.05 ug/g	-
Methylene Chloride	0.05 ug/g	<0.05	-	-	-	0.05 ug/g	-
Styrene	0.05 ug/g	<0.05	-	-	-	0.05 ug/g	-
1,1,1,2-Tetrachloroethane	0.05 ug/g	<0.05	-	-	-	0.05 ug/g	-
1,1,2,2-Tetrachloroethane	0.05 ug/g	<0.05	-	-	-	0.05 ug/g	-
Tetrachloroethylene	0.05 ug/g	<0.05	-	-	-	0.05 ug/g	-
Toluene	0.05 ug/g	<0.05	-	-	-	0.2 ug/g	-
1,1,1-Trichloroethane	0.05 ug/g	<0.05	-	-	-	0.05 ug/g	-
1,1,2-Trichloroethane	0.05 ug/g	<0.05	-	-	-	0.05 ug/g	-
Trichloroethylene	0.05 ug/g	<0.05	-	-	-	0.05 ug/g	-
Trichlorofluoromethane	0.05 ug/g	<0.05	-	-	-	0.05 ug/g	-
Vinyl chloride	0.02 ug/g	<0.02	-	-	-	0.02 ug/g	-
m,p-Xylenes	0.05 ug/g	<0.05	-	-	-	-	-
o-Xylene	0.05 ug/g	<0.05	-	-	-	-	-
Xylenes, total	0.05 ug/g	<0.05	-	-	-	0.05 ug/g	-
Toluene-d8	Surrogate	114%	-	-	-	-	-
Dibromofluoromethane	Surrogate	96.4%	-	-	-	-	-
4-Bromofluorobenzene	Surrogate	96.1%	-	-	-	-	-
Hydrocarbons							
F1 PHCs (C6-C10)	7 ug/g	<7	-	-	-	17 ug/g	-
F2 PHCs (C10-C16)	4 ug/g	<4	-	-	-	10 ug/g	-
F3 PHCs (C16-C34)	8 ug/g	<8	-	-	-	240 ug/g	-
F4 PHCs (C34-C50)	6 ug/g	<6	-	-	-	120 ug/g	-

	Client ID:	BH-DUP				**Criteria:**	
	Sample Date:	14-Apr-22 00:00				**Reg 406/19 -T1 Agr**	-
	Sample ID:	2218013-09					
	Matrix:	Soil					
	MDL/Units						
Semi-Volatiles							
Acenaphthene	0.02 ug/g	<0.02	-	-	-	0.05 ug/g	-
Acenaphthylene	0.02 ug/g	<0.02	-	-	-	0.093 ug/g	-
Anthracene	0.02 ug/g	<0.02	-	-	-	0.05 ug/g	-
Benzo [a] anthracene	0.02 ug/g	<0.02	-	-	-	0.095 ug/g	-
Benzo [a] pyrene	0.02 ug/g	<0.02	-	-	-	0.05 ug/g	-
Benzo [b] fluoranthene	0.02 ug/g	<0.02	-	-	-	0.3 ug/g	-
Benzo [g,h,i] perylene	0.02 ug/g	<0.02	-	-	-	0.2 ug/g	-
Benzo [k] fluoranthene	0.02 ug/g	<0.02	-	-	-	0.05 ug/g	-
Chrysene	0.02 ug/g	<0.02	-	-	-	0.18 ug/g	-
Dibenzo [a,h] anthracene	0.02 ug/g	<0.02	-	-	-	0.1 ug/g	-
Fluoranthene	0.02 ug/g	<0.02	-	-	-	0.24 ug/g	-
Fluorene	0.02 ug/g	<0.02	-	-	-	0.05 ug/g	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g	<0.02	-	-	-	0.11 ug/g	-
1-Methylnaphthalene	0.02 ug/g	<0.02	-	-	-	0.05 ug/g	-
2-Methylnaphthalene	0.02 ug/g	<0.02	-	-	-	0.05 ug/g	-
Methylnaphthalene (1&2)	0.04 ug/g	<0.04	-	-	-	0.05 ug/g	-
Naphthalene	0.01 ug/g	<0.01	-	-	-	0.05 ug/g	-
Phenanthrene	0.02 ug/g	<0.02	-	-	-	0.19 ug/g	-
Pyrene	0.02 ug/g	<0.02	-	-	-	0.19 ug/g	-
2-Fluorobiphenyl	Surrogate	92.2%	-	-	-	-	-
Terphenyl-d14	Surrogate	105%	-	-	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics								
Conductivity	ND	5	uS/cm					
Hydrocarbons								
F1 PHCs (C6-C10)	ND	7	ug/g					
F2 PHCs (C10-C16)	ND	4	ug/g					
F3 PHCs (C16-C34)	ND	8	ug/g					
F4 PHCs (C34-C50)	ND	6	ug/g					
Metals								
Antimony	ND	1.0	ug/g					
Arsenic	ND	1.0	ug/g					
Barium	ND	1.0	ug/g					
Beryllium	ND	0.5	ug/g					
Boron	ND	5.0	ug/g					
Cadmium	ND	0.5	ug/g					
Chromium	ND	5.0	ug/g					
Cobalt	ND	1.0	ug/g					
Copper	ND	5.0	ug/g					
Lead	ND	1.0	ug/g					
Molybdenum	ND	1.0	ug/g					
Nickel	ND	5.0	ug/g					
Selenium	ND	1.0	ug/g					
Silver	ND	0.3	ug/g					
Thallium	ND	1.0	ug/g					
Uranium	ND	1.0	ug/g					
Vanadium	ND	10.0	ug/g					
Zinc	ND	20.0	ug/g					
Semi-Volatiles								
Acenaphthene	ND	0.02	ug/g					
Acenaphthylene	ND	0.02	ug/g					
Anthracene	ND	0.02	ug/g					
Benzo [a] anthracene	ND	0.02	ug/g					
Benzo [a] pyrene	ND	0.02	ug/g					
Benzo [b] fluoranthene	ND	0.02	ug/g					

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Benzo [g,h,i] perylene	ND	0.02	ug/g					
Benzo [k] fluoranthene	ND	0.02	ug/g					
Chrysene	ND	0.02	ug/g					
Dibenzo [a,h] anthracene	ND	0.02	ug/g					
Fluoranthene	ND	0.02	ug/g					
Fluorene	ND	0.02	ug/g					
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g					
1-Methylnaphthalene	ND	0.02	ug/g					
2-Methylnaphthalene	ND	0.02	ug/g					
Methylnaphthalene (1&2)	ND	0.04	ug/g					
Naphthalene	ND	0.01	ug/g					
Phenanthrene	ND	0.02	ug/g					
Pyrene	ND	0.02	ug/g					
Surrogate: 2-Fluorobiphenyl	*1.39*		*ug/g*	*104*	*50-140*			
Surrogate: Terphenyl-d14	*1.69*		*ug/g*	*127*	*50-140*			
Volatiles								
Acetone	ND	0.50	ug/g					
Benzene	ND	0.02	ug/g					
Bromodichloromethane	ND	0.05	ug/g					
Bromoform	ND	0.05	ug/g					
Bromomethane	ND	0.05	ug/g					
Carbon Tetrachloride	ND	0.05	ug/g					
Chlorobenzene	ND	0.05	ug/g					
Chloroform	ND	0.05	ug/g					
Dibromochloromethane	ND	0.05	ug/g					
Dichlorodifluoromethane	ND	0.05	ug/g					
1,2-Dichlorobenzene	ND	0.05	ug/g					
1,3-Dichlorobenzene	ND	0.05	ug/g					
1,4-Dichlorobenzene	ND	0.05	ug/g					
1,1-Dichloroethane	ND	0.05	ug/g					
1,2-Dichloroethane	ND	0.05	ug/g					
1,1-Dichloroethylene	ND	0.05	ug/g					

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
cis-1,2-Dichloroethylene	ND	0.05	ug/g					
trans-1,2-Dichloroethylene	ND	0.05	ug/g					
1,2-Dichloropropane	ND	0.05	ug/g					
cis-1,3-Dichloropropylene	ND	0.05	ug/g					
trans-1,3-Dichloropropylene	ND	0.05	ug/g					
1,3-Dichloropropene, total	ND	0.05	ug/g					
Ethylbenzene	ND	0.05	ug/g					
Ethylene dibromide (dibromoethane, 1,2-)	ND	0.05	ug/g					
Hexane	ND	0.05	ug/g					
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g					
Methyl Isobutyl Ketone	ND	0.50	ug/g					
Methyl tert-butyl ether	ND	0.05	ug/g					
Methylene Chloride	ND	0.05	ug/g					
Styrene	ND	0.05	ug/g					
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g					
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g					
Tetrachloroethylene	ND	0.05	ug/g					
Toluene	ND	0.05	ug/g					
1,1,1-Trichloroethane	ND	0.05	ug/g					
1,1,2-Trichloroethane	ND	0.05	ug/g					
Trichloroethylene	ND	0.05	ug/g					
Trichlorofluoromethane	ND	0.05	ug/g					
Vinyl chloride	ND	0.02	ug/g					
m,p-Xylenes	ND	0.05	ug/g					
o-Xylene	ND	0.05	ug/g					
Xylenes, total	ND	0.05	ug/g					
Surrogate: 4-Bromofluorobenzene	*8.87*		*ug/g*	*111*	*50-140*			
Surrogate: Dibromofluoromethane	*8.11*		*ug/g*	*101*	*50-140*			
Surrogate: Toluene-d8	*8.70*		*ug/g*	*109*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
SAR	0.08	0.01	N/A	0.07			13.3	30	
Conductivity	175	5	uS/cm	183			4.6	5	
pH	7.30	0.05	pH Units	7.25			0.7	2.3	
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g	ND			NC	40	
F2 PHCs (C10-C16)	ND	4	ug/g	ND			NC	30	
F3 PHCs (C16-C34)	ND	8	ug/g	ND			NC	30	
F4 PHCs (C34-C50)	ND	6	ug/g	ND			NC	30	
Metals									
Antimony	3.0	1.0	ug/g	ND			NC	30	
Arsenic	3.3	1.0	ug/g	2.9			14.8	30	
Barium	29.4	1.0	ug/g	26.8			9.3	30	
Beryllium	ND	0.5	ug/g	ND			NC	30	
Boron	5.8	5.0	ug/g	ND			NC	30	
Cadmium	ND	0.5	ug/g	ND			NC	30	
Chromium	10.1	5.0	ug/g	11.6			13.7	30	
Cobalt	3.2	1.0	ug/g	3.1			5.1	30	
Copper	17.9	5.0	ug/g	17.0			5.0	30	
Lead	18.6	1.0	ug/g	19.2			3.3	30	
Molybdenum	ND	1.0	ug/g	ND			NC	30	
Nickel	7.3	5.0	ug/g	7.0			4.3	30	
Selenium	ND	1.0	ug/g	ND			NC	30	
Silver	ND	0.3	ug/g	ND			NC	30	
Thallium	ND	1.0	ug/g	ND			NC	30	
Uranium	ND	1.0	ug/g	ND			NC	30	
Vanadium	15.1	10.0	ug/g	14.6			3.4	30	
Zinc	67.4	20.0	ug/g	65.9			2.2	30	
Physical Characteristics									
% Solids	89.3	0.1	% by Wt.	87.4			2.1	25	
Semi-Volatiles									

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Acenaphthene	ND	0.02	ug/g	ND			NC	40	
Acenaphthylene	ND	0.02	ug/g	ND			NC	40	
Anthracene	ND	0.02	ug/g	ND			NC	40	
Benzo [a] anthracene	ND	0.02	ug/g	ND			NC	40	
Benzo [a] pyrene	ND	0.02	ug/g	ND			NC	40	
Benzo [b] fluoranthene	ND	0.02	ug/g	ND			NC	40	
Benzo [g,h,i] perylene	ND	0.02	ug/g	ND			NC	40	
Benzo [k] fluoranthene	ND	0.02	ug/g	ND			NC	40	
Chrysene	ND	0.02	ug/g	ND			NC	40	
Dibenzo [a,h] anthracene	ND	0.02	ug/g	ND			NC	40	
Fluoranthene	ND	0.02	ug/g	ND			NC	40	
Fluorene	ND	0.02	ug/g	ND			NC	40	
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g	ND			NC	40	
1-Methylnaphthalene	ND	0.02	ug/g	ND			NC	40	
2-Methylnaphthalene	ND	0.02	ug/g	ND			NC	40	
Naphthalene	ND	0.01	ug/g	ND			NC	40	
Phenanthrene	ND	0.02	ug/g	ND			NC	40	
Pyrene	ND	0.02	ug/g	ND			NC	40	
Surrogate: 2-Fluorobiphenyl	*1.96*		*ug/g*		*122*	*50-140*			
Surrogate: Terphenyl-d14	*1.92*		*ug/g*		*119*	*50-140*			
Volatiles									
Acetone	ND	0.50	ug/g	ND			NC	50	
Benzene	ND	0.02	ug/g	ND			NC	50	
Bromodichloromethane	ND	0.05	ug/g	ND			NC	50	
Bromoform	ND	0.05	ug/g	ND			NC	50	
Bromomethane	ND	0.05	ug/g	ND			NC	50	
Carbon Tetrachloride	ND	0.05	ug/g	ND			NC	50	
Chlorobenzene	ND	0.05	ug/g	ND			NC	50	
Chloroform	ND	0.05	ug/g	ND			NC	50	
Dibromochloromethane	ND	0.05	ug/g	ND			NC	50	
Dichlorodifluoromethane	ND	0.05	ug/g	ND			NC	50	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
1,2-Dichlorobenzene	ND	0.05	ug/g	ND			NC	50	
1,3-Dichlorobenzene	ND	0.05	ug/g	ND			NC	50	
1,4-Dichlorobenzene	ND	0.05	ug/g	ND			NC	50	
1,1-Dichloroethane	ND	0.05	ug/g	ND			NC	50	
1,2-Dichloroethane	ND	0.05	ug/g	ND			NC	50	
1,1-Dichloroethylene	ND	0.05	ug/g	ND			NC	50	
cis-1,2-Dichloroethylene	ND	0.05	ug/g	ND			NC	50	
trans-1,2-Dichloroethylene	ND	0.05	ug/g	ND			NC	50	
1,2-Dichloropropane	ND	0.05	ug/g	ND			NC	50	
cis-1,3-Dichloropropylene	ND	0.05	ug/g	ND			NC	50	
trans-1,3-Dichloropropylene	ND	0.05	ug/g	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g	ND			NC	50	
Ethylene dibromide (dibromoethane, 1,2-)	ND	0.05	ug/g	ND			NC	50	
Hexane	ND	0.05	ug/g	ND			NC	50	
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g	ND			NC	50	
Methyl Isobutyl Ketone	ND	0.50	ug/g	ND			NC	50	
Methyl tert-butyl ether	ND	0.05	ug/g	ND			NC	50	
Methylene Chloride	ND	0.05	ug/g	ND			NC	50	
Styrene	ND	0.05	ug/g	ND			NC	50	
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g	ND			NC	50	
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g	ND			NC	50	
Tetrachloroethylene	ND	0.05	ug/g	ND			NC	50	
Toluene	ND	0.05	ug/g	ND			NC	50	
1,1,1-Trichloroethane	ND	0.05	ug/g	ND			NC	50	
1,1,2-Trichloroethane	ND	0.05	ug/g	ND			NC	50	
Trichloroethylene	ND	0.05	ug/g	ND			NC	50	
Trichlorofluoromethane	ND	0.05	ug/g	ND			NC	50	
Vinyl chloride	ND	0.02	ug/g	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g	ND			NC	50	
o-Xylene	ND	0.05	ug/g	ND			NC	50	
Surrogate: 4-Bromofluorobenzene	*8.12*		*ug/g*		*91.7*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Surrogate: Dibromofluoromethane	*8.33*		*ug/g*		*94.1*	*50-140*			
Surrogate: Toluene-d8	*9.67*		*ug/g*		*109*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	161	7	ug/g	ND	80.6	80-120			
F2 PHCs (C10-C16)	81	4	ug/g	ND	73.1	60-140			
F3 PHCs (C16-C34)	272	8	ug/g	ND	101	60-140			
F4 PHCs (C34-C50)	190	6	ug/g	ND	111	60-140			
Metals									
Antimony	39.3	1.0	ug/g	ND	77.2	70-130			
Arsenic	44.6	1.0	ug/g	1.1	87.0	70-130			
Barium	50.0	1.0	ug/g	10.7	78.5	70-130			
Beryllium	42.7	0.5	ug/g	ND	85.3	70-130			
Boron	43.2	5.0	ug/g	ND	82.5	70-130			
Cadmium	39.5	0.5	ug/g	ND	78.8	70-130			
Chromium	45.3	5.0	ug/g	ND	81.5	70-130			
Cobalt	42.1	1.0	ug/g	1.2	81.8	70-130			
Copper	45.6	5.0	ug/g	6.8	77.6	70-130			
Lead	45.0	1.0	ug/g	7.7	74.7	70-130			
Molybdenum	40.7	1.0	ug/g	ND	81.1	70-130			
Nickel	43.5	5.0	ug/g	ND	81.3	70-130			
Selenium	40.6	1.0	ug/g	ND	81.0	70-130			
Silver	40.2	0.3	ug/g	ND	80.4	70-130			
Thallium	40.9	1.0	ug/g	ND	81.8	70-130			
Uranium	43.4	1.0	ug/g	ND	86.5	70-130			
Vanadium	47.3	10.0	ug/g	ND	82.9	70-130			
Zinc	62.1	20.0	ug/g	26.4	71.5	70-130			
Semi-Volatiles									
Acenaphthene	0.193	0.02	ug/g	ND	96.0	50-140			
Acenaphthylene	0.162	0.02	ug/g	ND	80.5	50-140			
Anthracene	0.156	0.02	ug/g	ND	77.9	50-140			
Benzo [a] anthracene	0.155	0.02	ug/g	ND	77.1	50-140			
Benzo [a] pyrene	0.155	0.02	ug/g	ND	77.4	50-140			
Benzo [b] fluoranthene	0.225	0.02	ug/g	ND	112	50-140			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Benzo [g,h,i] perylene	0.161	0.02	ug/g	ND	80.3	50-140			
Benzo [k] fluoranthene	0.205	0.02	ug/g	ND	102	50-140			
Chrysene	0.171	0.02	ug/g	ND	85.0	50-140			
Dibenzo [a,h] anthracene	0.177	0.02	ug/g	ND	88.2	50-140			
Fluoranthene	0.172	0.02	ug/g	ND	85.6	50-140			
Fluorene	0.180	0.02	ug/g	ND	89.9	50-140			
Indeno [1,2,3-cd] pyrene	0.166	0.02	ug/g	ND	82.8	50-140			
1-Methylnaphthalene	0.211	0.02	ug/g	ND	105	50-140			
2-Methylnaphthalene	0.225	0.02	ug/g	ND	112	50-140			
Naphthalene	0.211	0.01	ug/g	ND	105	50-140			
Phenanthrene	0.162	0.02	ug/g	ND	80.9	50-140			
Pyrene	0.170	0.02	ug/g	ND	84.8	50-140			
Surrogate: 2-Fluorobiphenyl	*1.59*		*ug/g*		*99.0*	*50-140*			
Surrogate: Terphenyl-d14	*1.88*		*ug/g*		*117*	*50-140*			
Volatiles									
Acetone	10.6	0.50	ug/g	ND	106	50-140			
Benzene	4.04	0.02	ug/g	ND	101	60-130			
Bromodichloromethane	3.71	0.05	ug/g	ND	92.7	60-130			
Bromoform	3.50	0.05	ug/g	ND	87.6	60-130			
Bromomethane	2.80	0.05	ug/g	ND	69.9	50-140			
Carbon Tetrachloride	3.94	0.05	ug/g	ND	98.5	60-130			
Chlorobenzene	4.11	0.05	ug/g	ND	103	60-130			
Chloroform	4.05	0.05	ug/g	ND	101	60-130			
Dibromochloromethane	3.59	0.05	ug/g	ND	89.7	60-130			
Dichlorodifluoromethane	3.26	0.05	ug/g	ND	81.4	50-140			
1,2-Dichlorobenzene	3.53	0.05	ug/g	ND	88.2	60-130			
1,3-Dichlorobenzene	3.57	0.05	ug/g	ND	89.3	60-130			
1,4-Dichlorobenzene	3.53	0.05	ug/g	ND	88.4	60-130			
1,1-Dichloroethane	3.74	0.05	ug/g	ND	93.5	60-130			
1,2-Dichloroethane	3.78	0.05	ug/g	ND	94.6	60-130			
1,1-Dichloroethylene	3.76	0.05	ug/g	ND	94.0	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
cis-1,2-Dichloroethylene	3.95	0.05	ug/g	ND	98.9	60-130			
trans-1,2-Dichloroethylene	4.03	0.05	ug/g	ND	101	60-130			
1,2-Dichloropropane	3.79	0.05	ug/g	ND	94.7	60-130			
cis-1,3-Dichloropropylene	3.94	0.05	ug/g	ND	98.4	60-130			
trans-1,3-Dichloropropylene	4.08	0.05	ug/g	ND	102	60-130			
Ethylbenzene	4.10	0.05	ug/g	ND	102	60-130			
Ethylene dibromide (dibromoethane, 1,2-)	3.78	0.05	ug/g	ND	94.4	60-130			
Hexane	4.35	0.05	ug/g	ND	109	60-130			
Methyl Ethyl Ketone (2-Butanone)	8.26	0.50	ug/g	ND	82.6	50-140			
Methyl Isobutyl Ketone	11.9	0.50	ug/g	ND	119	50-140			
Methyl tert-butyl ether	12.6	0.05	ug/g	ND	126	50-140			
Methylene Chloride	3.41	0.05	ug/g	ND	85.2	60-130			
Styrene	3.87	0.05	ug/g	ND	96.8	60-130			
1,1,1,2-Tetrachloroethane	3.98	0.05	ug/g	ND	99.5	60-130			
1,1,2,2-Tetrachloroethane	4.26	0.05	ug/g	ND	107	60-130			
Tetrachloroethylene	4.09	0.05	ug/g	ND	102	60-130			
Toluene	4.42	0.05	ug/g	ND	110	60-130			
1,1,1-Trichloroethane	4.06	0.05	ug/g	ND	101	60-130			
1,1,2-Trichloroethane	4.05	0.05	ug/g	ND	101	60-130			
Trichloroethylene	4.07	0.05	ug/g	ND	102	60-130			
Trichlorofluoromethane	4.02	0.05	ug/g	ND	100	50-140			
Vinyl chloride	2.62	0.02	ug/g	ND	65.6	50-140			
m,p-Xylenes	8.30	0.05	ug/g	ND	104	60-130			
o-Xylene	4.08	0.05	ug/g	ND	102	60-130			
Surrogate: 4-Bromofluorobenzene	*7.84*		*ug/g*		*98.0*	*50-140*			
Surrogate: Dibromofluoromethane	*7.19*		*ug/g*		*89.9*	*50-140*			
Surrogate: Toluene-d8	*7.07*		*ug/g*		*88.4*	*50-140*			

Qualifier Notes:

QC Qualifiers :

Sample Data Revisions:

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

NC: Not Calculated

Soil results are reported on a dry weight basis unlesss otherwise noted.

Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.

- F1 range corrected for BTEX.

- F2 to F3 ranges corrected for appropriate PAHs where available.

- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.

- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.

- When reported, data for F4G has been processed using a silica gel cleanup.

Any use of these results implies your agreement that our total liabilty in connection with this work, however arising, shall be limited to the amount paid by you for this work, and that our employees or agents shall not under any circumstances be liable to you in connection with this work.

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Certificate of Analysis

Golder Associates Ltd. (Windsor)
1825 Provincial Rd
Windsor, ON N8W 5V7
Attn: Mark Henderson

Client PO:
Project: 21507944
Custody:

Report Date: 25-May-2022
Order Date: 22-Apr-2022

Order #: 2221229

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
2221229-01	BH-102-3B

Approved By:

Dale Robertson, BSc
Laboratory Director

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
REG 406: Metals, leachate	mSPLP EPA 6020 - Digestion - ICP-MS	24-May-22	24-May-22

Certificate of Analysis

Report Date: 25-May-2022

Client: **Golder Associates Ltd. (Windsor)**

Order Date: 22-Apr-2022

Client PO:

Project Description: 21507944

Summary of Criteria Exceedances

(If this page is blank then there are no exceedances)

Only those criteria that a sample exceeds will be highlighted in

Regulatory Comparison:

Paracel Laboratories has provided regulatory guidelines on this report for informational purposes only and makes no representations or warranties that the data is accurate or reflects the current regulatory values. The user is advised to consult with the appropriate official regulations to evaluate compliance. Sample results that are highlighted have exceeded the selected regulatory limit. Calculated uncertainty estimations have not been applied for determining regulatory exceedances.

Sample	Analyte	MDL / Units	Result	Reg 406/19 -Leachate T1 Res/Park/Ind/Com	Reg 406/19 -Leachate T1 Agr

Certificate of Analysis

Report Date: 25-May-2022

Client: **Golder Associates Ltd. (Windsor)**

Order Date: 22-Apr-2022

Client PO:

Project Description: 21507944

	Client ID:	BH-102-3B	-	-	-	Criteria:	
	Sample Date:	14-Apr-22 00:00	-	-	-	Reg 406/19 -Leachate T1 Res/Park/Ind/Com	Reg 406/19 -Leachate T1 Agr
	Sample ID:	2221229-01	-	-	-		
	Matrix:	Soil	-	-	-		
	MDL/Units						
mSPLP Leachate Metals							
Antimony	0.5 ug/L	0.6	-	-	-	-	6 ug/L
Arsenic	1.0 ug/L	<1.0	-	-	-	-	-
Barium	1.0 ug/L	45.4	-	-	-	-	-
Beryllium	0.5 ug/L	<0.5	-	-	-	-	-
Boron	10.0 ug/L	17.3	-	-	-	-	-
Cadmium	0.2 ug/L	<0.2	-	-	-	-	-
Chromium	1.0 ug/L	5.8	-	-	-	-	-
Cobalt	0.5 ug/L	2.1	-	-	-	-	-
Copper	0.5 ug/L	4.6	-	-	-	-	-
Lead	0.2 ug/L	4.1	-	-	-	-	-
Molybdenum	0.5 ug/L	0.8	-	-	-	23 ug/L	23 ug/L
Nickel	1.0 ug/L	7.4	-	-	-	-	-
Selenium	1.0 ug/L	<1.0	-	-	-	-	-
Silver	0.2 ug/L	<0.2	-	-	-	0.3 ug/L	0.3 ug/L
Thallium	0.5 ug/L	<0.5	-	-	-	2 ug/L	2 ug/L
Uranium	0.2 ug/L	0.3	-	-	-	-	-
Vanadium	0.5 ug/L	7.4	-	-	-	-	-
Zinc	5.0 ug/L	22.1	-	-	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
mSPLP Leachate Metals								
Antimony	ND	0.5	ug/L					
Arsenic	ND	1.0	ug/L					
Barium	ND	1.0	ug/L					
Beryllium	ND	0.5	ug/L					
Boron	ND	10.0	ug/L					
Cadmium	ND	0.2	ug/L					
Chromium	ND	1.0	ug/L					
Cobalt	ND	0.5	ug/L					
Copper	ND	0.5	ug/L					
Lead	ND	0.2	ug/L					
Molybdenum	ND	0.5	ug/L					
Nickel	ND	1.0	ug/L					
Selenium	ND	1.0	ug/L					
Silver	ND	0.2	ug/L					
Thallium	ND	0.5	ug/L					
Uranium	ND	0.2	ug/L					
Vanadium	ND	0.5	ug/L					
Zinc	ND	5.0	ug/L					

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
mSPLP Leachate Metals									
Antimony	0.60	0.5	ug/L	0.59			2.5	50	
Arsenic	ND	1.0	ug/L	ND			NC	50	
Barium	48.5	1.0	ug/L	45.4			6.5	50	
Beryllium	ND	0.5	ug/L	ND			NC	50	
Boron	16.5	10.0	ug/L	17.3			4.5	50	
Cadmium	ND	0.2	ug/L	ND			NC	50	
Chromium	5.89	1.0	ug/L	5.80			1.5	50	
Cobalt	2.16	0.5	ug/L	2.09			3.7	50	
Copper	4.56	0.5	ug/L	4.60			0.9	50	
Lead	4.29	0.2	ug/L	4.14			3.5	50	
Molybdenum	0.85	0.5	ug/L	0.83			3.3	50	
Nickel	7.73	1.0	ug/L	7.41			4.2	50	
Selenium	ND	1.0	ug/L	ND			NC	50	
Silver	ND	0.2	ug/L	ND			NC	50	
Thallium	ND	0.5	ug/L	ND			NC	50	
Uranium	0.31	0.2	ug/L	0.30			3.5	50	
Vanadium	7.66	0.5	ug/L	7.43			3.1	50	
Zinc	22.5	5.0	ug/L	22.1			1.8	50	

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
mSPLP Leachate Metals									
Antimony	44.8	0.5	ug/L	0.59	88.4	70-130			
Arsenic	48.8	1.0	ug/L	ND	96.1	70-130			
Barium	93.0	1.0	ug/L	45.4	95.0	70-130			
Beryllium	48.3	0.5	ug/L	ND	95.9	70-130			
Boron	65.8	10.0	ug/L	17.3	97.1	70-130			
Cadmium	46.1	0.2	ug/L	ND	92.0	70-130			
Chromium	51.4	1.0	ug/L	5.80	91.2	70-130			
Cobalt	48.3	0.5	ug/L	2.09	92.3	70-130			
Copper	46.5	0.5	ug/L	4.60	83.8	70-130			
Lead	47.3	0.2	ug/L	4.14	86.4	70-130			
Molybdenum	47.4	0.5	ug/L	0.83	93.2	70-130			
Nickel	50.6	1.0	ug/L	7.41	86.5	70-130			
Selenium	46.4	1.0	ug/L	ND	92.3	70-130			
Silver	43.9	0.2	ug/L	ND	87.8	70-130			
Thallium	45.6	0.5	ug/L	ND	91.2	70-130			
Uranium	46.8	0.2	ug/L	0.30	92.9	70-130			
Vanadium	55.7	0.5	ug/L	7.43	96.6	70-130			
Zinc	64.8	5.0	ug/L	22.1	85.4	70-130			

Certificate of Analysis

Report Date: 25-May-2022

Client: **Golder Associates Ltd. (Windsor)**

Order Date: 22-Apr-2022

Client PO:

Project Description: 21507944

Qualifier Notes:

:

Sample Data Revisions:

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

NC: Not Calculated

Soil results are reported on a dry weight basis unlesss otherwise noted.

Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

Any use of these results implies your agreement that our total liabilty in connection with this work, however arising, shall be limited to the amount paid by you for this work, and that our employees or agents shall not under any circumstances be liable to you in connection with this work.

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APPENDIX C

Stage 2 Archaeological Assessment Report

STAGE 2 ARCHAEOLOGICAL ASSESSMENT: PONTIAC PUMPING STATION MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT

Part of Lot 134, Concession 1 Petite Côte, Geographic Township of Sandwich East, former Essex County, now City of Windsor, Ontario

July 6, 2022

Prepared for:
City of Windsor
350 City Hall Square West, Suite 310
P.O. Box 150
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Prepared by:
Stantec Consulting Ltd.
600 - 171 Queens Avenue
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Licensee: Parker Dickson, MA
License Number: P256
Project Information Form Number:
P256-0715-2022
Project Number:
165620249

ORIGINAL REPORT

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Executive Summary

Stantec Consulting Ltd. (Stantec) was retained by the City of Windsor (the City) to complete Stage 2 archaeological assessment for the area to be impacted by the proposed Pontiac Pumping Station Capacity Upgrades (the Project). The Stage 2 archaeological assessment was undertaken by Stantec, on behalf of the City, in the preliminary planning and design process as part of the Schedule "C" Municipal Class Environmental Assessment (Class EA) for the Project under the Ontario *Environmental Assessment Act* (Government of Ontario 1990a). The study area for the Project is approximately 0.75 hectares and is located in part of Lot 134, Concession 1 Petite Côte, Geographic Township of Sandwich East, former Essex County, now City of Windsor, Ontario.

The Stage 1 archaeological assessment by Fisher Archaeological Consulting (FAC) determined that portions of the study area retained potential for the identification and recovery of archaeological resources and Stage 2 archaeological assessment was required (FAC 2020). The Stage 2 archaeological assessment was completed under Project Information Form number P256-0715-2022 issued to Parker Dickson, MA, of Stantec, by the Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI). The Stage 2 archaeological assessment was conducted by Stantec on May 19, 2022.

No archaeological resources were identified during the Stage 2 archaeological assessment of the of the study area. Thus, in accordance with Section 2.2 and Section 7.8.4 of the MHSTCI's 2011 *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011), **no further archaeological assessment of the study area is required**.

The MHSTCI is asked to review the results presented and to accept this report into the *Ontario Public Register of Archaeological Reports*.

The Executive Summary highlights key points from the report only; for complete information and findings, the reader should examine the complete report.

Project Personnel

Project Manager:	Jian Li, Ph.D., P.Eng., PE
Project Coordinator:	Hannah Rindlisbacher, B.Sc., E.I.T.
Licensed Archaeologist:	Parker Dickson, MA (P256)
Licensed Field Director:	Darren Kipping, MA (P422)
Field Crew:	Ruth Dickau, Ph.D. (R1171), Damieon Vella-Zarb, Megan Switzer
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Quality Review:	Parker Dickson, MA (P256)
Independent Review:	Tracie Carmichael, BA, B.Ed. (R140)

Acknowledgments

City of Windsor:	Chandana Walgama, Pollution Control
Ministry of Heritage, Sport, Tourism and Culture Industries:	Robert von Bitter, Archaeological Data Coordinator

1 Project Context

Stantec Consulting Ltd. (Stantec) was retained by the City of Windsor (the City) to complete Stage 2 archaeological assessment for the area to be impacted by the proposed Pontiac Pumping Station Capacity Upgrades (the Project). These upgrades are necessary as part of the Little River Pollution Control Plan (LRPCP) By-Pass improvements to long-term solution to improve efficiency and reduce the risk of flooding caused by severe storm events in the expanded Pontiac drainage area. The Stage 2 archaeological assessment was undertaken by Stantec, on behalf of the City, in the preliminary planning and design process as part of the Schedule "C" Municipal Class Environmental Assessment (Class EA) for the Project under the Ontario *Environmental Assessment Act* (Government of Ontario 1990a).

The study area for the Project is approximately 0.75 hectares and is located in part of Lot 134, Concession 1 Petite Côte, Geographic Township of Sandwich East, former Essex County, now City of Windsor, Ontario (Figures 1 and 2). The municipal address of the study area is 9400 Little River Road, Windsor, Ontario. A Stage 1 archaeological assessment of the study area by Fisher Archaeological Consulting (FAC) in 2020 recommended Stage 2 archaeological assessment for portions of the study area (FAC 2020). Additional information related to the previous archaeological assessment of the study area is provided in Section 1.3.4.

1.1.1 Objectives

The Stage 2 archaeological assessment was completed in compliance with the provincial standards and guidelines set out in the Ministry of Heritage, Sport, Tourism and Culture Industries' (MHSTCI) 2011 *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011). The objectives of the Stage 2 assessment were to document archaeological resources present within the study area, to determine whether any of the resources might be artifacts or archaeological sites with cultural heritage value or interest requiring further assessment, and to provide specific Stage 3 direction for the protection, management and/or recovery of the identified archaeological resources (Government of Ontario 2011).

Permission to enter the study area to conduct the archaeological assessment was provided by the City.

1.2 Historical Context

1.2.1 Post-contact Indigenous Resources

"Contact" is typically used as a chronological benchmark when discussing Indigenous archaeology in Canada and describes the contact between Indigenous and European cultures. The precise moment of contact is a constant matter of discussion. Contact in what is now the province of Ontario is broadly assigned to the 16th century (Loewen and Chapdelaine 2016).

At the turn of the 16th century, the study area is documented to have been occupied by the Western Basin Tradition archaeological culture (see Section 1.3.2). Following the turn of the 17th century, the region of the study area is understood to have been within the territory of the Fire Nation, an Algonkian group

occupying the western end of Lake Erie. It is argued, however, that the Atawandaron (Neutral) expanded extensively westward, displacing the Fire Nation (Lennox and Fitzgerald 1990: 418-419). It is debated whether the Fire Nation was descendent from the archaeologically described Western Basin Tradition, or if they migrated into the western part of Lake Erie, displacing a previous Indigenous culture (Murphy and Ferris 1990:193-194). Historians understand that the displaced Fire Nation moved across the St. Clair and Detroit Rivers into what is modern-day lower Michigan, and their populations are synonymous with the later Kickapoo, Miami, Potawatomi, Fox, and Sauk (Heidenreich 1990: Figure 15.1). Bkejwanong (Walpole Island) First Nation oral tradition states that the Three Fires (a political confederacy constituted of the Potawatomi, Ojibwa, and Ottawa) have occupied the delta of the St. Clair River and the surrounding region continually for thousands of years (Walpole Island First Nation [WIFN] n.d.). In 1649, the Seneca, with the Mohawk, led a campaign into southern Ontario and dispersed the resident populations, and the Seneca used the lower Great Lakes basin as a prolific hinterland for beaver hunting (Heidenreich 1978; Trigger 1978:345).

By 1690, Ojibwa-speaking people had begun to displace the Seneca from southern Ontario. The Indigenous economy, since the turn of the 18th century, focused on fishing and the fur trade, supplemented by agriculture and hunting (Konrad 1981; Rogers 1978). The study area falls within the traditional territory of the WIFN, the Aamjiwnaang (Sarnia) First Nation (Aamjiwnaang First Nation), the Wiiwkwedong and Aazhoodena (Kettle Point and Stony Point) First Nation (Lytwyn 2009), and the Deshkaan Ziibing Anishnaabeg (Chippewas of the Thames First Nation). Some populations of Wyandot (an Indigenous population of historically amalgamated Petun and Huron-Wendat individuals) also had moved to the region of Lake St. Clair at the turn of the 18th century and resided with the Three Fires (Tooker 1978:398).

In Essex County, and specifically in the Windsor region, a splinter group of Ottawa settled in the area (Cultural Resource Management Group Limited *et al*. 2005:2-14 to 2-15). Also, the surviving remnants of the Huron and Petun were settling in the Windsor region as the Wyandot, exhibiting continuities with their 16th and 17th century predecessors from the Midland and Blue Mountain regions (Garrad 2014; Steckley 2014). Given the amalgamated nature of the Wyandot people, sometimes one of the contributing Indigenous peoples was recognized over another, the Wyandot were known as Huron in the Windsor region (Garrad 2014:16-54). Therefore, the Wyandot settlement in the Windsor region is commonly referred to as the “Huron Village” and related place names survive in Windsor today, such as Huron Church Road (but also note Wyandotte Street). A 1749 French map of the Detroit River region (Chaussegros de Léry 1752) depicts Ottawa and Huron villages on the waterfront of the Windsor region (Figure 3).

Despite the dispersal and movement of Indigenous groups throughout southern Ontario during the 17th and 18th centuries, archaeologically they can be characterized by continuity with their pre-contact Indigenous counterparts. These peoples still maintained a Terminal Woodland archaeological culture, albeit with some features of European material culture. While there was cultural and social change occurring due to contact with European colonial powers, there was equally a definite persistence of Indigenous socio-cultural practices since these groups were not so profoundly affected by European contact that they left their former lifeways behind (Ferris 2009).

In the middle of the 18th century, the Chippewa were located on the south shores of Lake Huron, the east shores of Georgian Bay, and on the west end of Lake Ontario. Indigenous peoples and their communities continue to play a large role in the occupation of the study area and its environs. Under British administration in the 19th century, the various Indigenous groups were divided into separate bands. The Anishinaabe included the western Algonquian peoples, among them the Chippewa and the Ottawa. Until the 18th century, the central Algonquian-speaking peoples, including the Potawatomi, were located in the Michigan Peninsula (Blackbird 1887).

Following the American Revolutionary War, Britain (the Crown) focused on the settlement of European immigrants into what became the province of Upper Canada in 1791. To enable widespread settlement, the Crown negotiated a series of treaties with Indigenous peoples. One of the earliest treaties involving lands located in close proximity to the study area was made on May 19, 1790 (Figure 4). Originally identified as the Detroit Treaty, the chiefs of the Ottawa, Chippewa, Potawatomi, and Huron nations and representatives of the Crown established a vast tract of land "…from the Detroit River easterly to Catfish Creek and south of the river La Tranche [now Thames River] and Chenail Ecarte [now St. Clair River], and contains Essex County except Anderdon Township and Part of West Sandwich; Kent County except Zone Township, and Gores of Camden and Chatham; Elgin County except Bayham Township and parts of South Dorchester and Malahide…[i]n Middlesex County, Del[a]ware and Westminster Township and part of North Dorchester" (Morris 1943:17). Today, this treaty is identified as Treaty Number 2, illustrated by the letter "C" on Figure 5. A plaque erected by the Historic Sites and Monuments Board of Canada further identifies this treaty as *McKee's Purchase*. A commemorative plaque located in Blenheim Memorial Park in Blenheim, Ontario reads:

> *In May 1790 Alexander McKee, Deputy Agent of the British Indian Department, and the principal chiefs of the Ottawa, Potawatomi, Chippewa and Wyandot negotiated a treaty whereby the British Crown acquired title to what is now southwestern Ontario. This treaty completed the process begun with Niagara treaties of 1781 and 1784, with the result that most of the Ontario peninsula was soon opened to British and Loyalist settlement.*
>
> (Government of Canada 2010)

In addition to the above, Figure 6 reproduces a map from the *History of the Windsor Border Region* (Lajeunesse 1960) which depicts several Indigenous sites and trails documented in Essex County during the late 18th century. The study area for the Project is located near Trail G. Trail G represents an early path along the south shore of Lake St. Clair, connecting the Thames River to Sandwich (now, the City of Windsor). This road was travelled by Governor Simcoe in 1793 (Lajeunesse 1960:xxxix).

The nature of Indigenous settlement size, population distribution, and material culture shifted as European settlers encroached upon Indigenous territory. However, despite this shift, "written accounts of material life and livelihood, the correlation of historically recorded villages to their archaeological manifestations, and the similarities of those sites to more ancient sites have revealed an antiquity to documented cultural expressions that confirms a deep historical continuity to…systems of ideology and thought" (Ferris 2009:114). As a result, Indigenous peoples have left behind archaeological resources throughout the region which show continuity with past peoples, even if they have not been explicitly recorded in Euro-Canadian documentation.

1.2.2 Euro-Canadian Resources

The first French settlers arrived in the Detroit-Windsor area in 1701 when the Sieur De Lamothe Cadillac and roughly 100 military and civilian personnel established Fort Pontchartrain on the Detroit side of the Detroit River (Fuller 1972:6-8). The French settlement remained on the Detroit side until 1748 when the Jesuit mission to the Huron (or Wyandot) was established on the south shore near the foot of the present-day Huron Church Road and the Ambassador Bridge. Fort Pontchartrain surrendered to the British in 1760 and remained under British control until 1796, although it was officially a part of the United States from 1783 onwards. During this period, the settlement continued to grow, but remained predominantly French. The area (now in present-day Windsor) across the river from Fort Pontchartrain (later to become Detroit) was called “Petite côte” and served the agricultural needs of the fort (Archives of Ontario 2014). The street pattern of the City of Windsor still reflects the French method of agricultural land division; for example, the long narrow parcels fronting the river where the “Petite côte” was located (Morrison 1954:3-4). In 1796, the original townsite of Sandwich was established to accommodate new immigrants of both French and British origin from the United States who wished to remain under British rule following American occupation of Detroit. This constituted the first urban settlement in what is now the City of Windsor and the first significant migration of English-speaking people into the Windsor area (Neal 1909:86-87).

Essex County was originally part of the District of Hesse, and in 1792 was renamed the Western District. On January 1, 1800, in the *Act for the Better Division of the Province*, the townships of Rochester, Mersea, Gosfield, Maidstone, Sandwich, and Malden were created as part of the County of Essex. The townships of Essex County were surveyed by Patrick McNiff, Abraham Iredell, and Thomas Smith (Clarke 2010).

As the area began to attract more European and American interest, Patrick McNiff was assigned to survey and organize the area into a township, also to be named Sandwich. His survey of the township was completed in 1793. The form of the concessions noted as “Petite côte” were dictated by the land divisions already used by the French farmers in the “Petite côte” area, in what was to become Concession 1 Petite Côte. In fact, on his original township map where he measured the Concession 1 lots, Patrick McNiff notes that “on my measuring the farms in front from No. 1 to No. 154 found their division Lines to run in the very irregular manner they appear on the Plan” (McNiff 1956). The most accurate maps produced of the township at this time was completed by Abraham Iredell between 1797 and 1803, who resurveyed the area and renumbered the lots from Lot 82 onwards in Concessions 1 to 3 Petite Côte (Iredell 1803; Morris 1929). Soulier is the landowner indicated for Lot 134 on Iredell’s 1803 map and the Little River is illustrated in the north part of the lot (Figure 7).

By the mid-1850s, the community of Windsor became more established and grew large enough to compete with the adjacent community of Sandwich for important industrial development. For example, the Great Western Railway chose Windsor over Sandwich as its termination point in 1854. The arrival of the railway also allowed for the foundation of Walkerville, the third oldest settlement that is now part of the City of Windsor. In 1857, Hiram Walker established his distillery in the downtown area of Windsor where the Great Western Railway first met the waterfront (Morrison 1954:26).

In 1858, both Windsor and Sandwich were incorporated as towns (Morrison 1954:42). In 1861, the Township of Sandwich was subdivided into the Townships of Sandwich West, Sandwich East, and Sandwich South (Neal 1909:12). The 1877 *Map of Essex County, Ontario* (Walling 1877) indicates that Ben. Soulier owned the north portion of Lot 134 where the study area is located. No structures are depicted on the 1877 map within Lot 134 (Figure 8).

The 1881 Essex Supplement in the *Illustrated Atlas of the Dominion of Canada* (Belden & Co. 1881) does not list any landowner or features for Lot 134 (Figure 9). The Little River is depicted crossing the lot. The Essex County historical atlas of 1881 documents a total population of 36,258 for Essex County at that time (Belden & Co. 1881:8). Of the total population, 25,303 settlers lived in rural settings, while 10,955 lived in urban settings (Belden & Co. 1881:8).

In discussing 18th and 19th century historical mapping it must be remembered that many historical county atlases were produced primarily to identify factories, offices, residences, and landholdings of subscribers and were funded by subscription fees. Landowners who did not subscribe were not always listed on the maps (Caston 1997:100). As such, structures were not necessarily depicted or placed accurately (Gentilcore and Head 1984). Further, review of historical mapping has inherent accuracy difficulties due to potential error in georeferencing. Georeferencing is conducted by assigning spatial coordinates to fixed locations and using these points to spatially reference the remainder of the map. Due to changes in "fixed" locations over time (e.g., road intersections, road alignments, shorelines, etc.), errors/difficulties of scale and the relative idealism of the historical cartography, historical maps may not translate accurately into real space points. This may provide obvious inconsistencies during historical map review.

1.3 Archaeological Context

1.3.1 The Natural Environment

The study area is situated in the St. Clair Clay Plains physiographic region, as identified by Chapman and Putnam (1984). This region is described as:

> *Adjoining Lake St. Clair in Essex and Kent County Counties and the St. Clair River in Lambton County are extensive clay plains covering 2,270 square miles. The region is one of little relief, lying between 575 and 700 feet a.s.l., except for the moraine at Ridgetown and Blenheim which rises 50 to 500 feet higher…. Glacial Lake Whittlesey, which deeply covered all of these lands, and Lake Warren which subsequently covered nearly the whole area, failed to leave deep stratified beds of sediment on the underlying clay till except around Chatham, between Blenheim and the Rondeau marshes, and in a few other smaller areas. Most of Lambton and Essex Counties, therefore, are essentially till plains smoothed by shallow deposits of lacustrine clay which settled in the depressions while the knolls were being lowered by wave action.*
>
> (Chapman and Putnam 1984:147)

Original soils in the study area are classified as Clyde Clay, a poorly drained deep black clay over mottled blue-grey clay (Richards *et al.* 1949). The poor drainage of these soils would have made them generally unsuitable for Indigenous or Euro-Canadian agriculture and their proximity to the Little River would have resulted in periodic flooding.

The original channel of the Little River is located 46 metres northeast of the study area. Between 1921 and 1931, the Little River was channelized and straightened (FAC 2020). This modern canal now forms the western boundary of the study area. The Little River empties into the Detroit River 870 metres to the north of the study area. Use of the Detroit River has evolved over time from being a transportation route used by early Indigenous inhabitants and Euro-Canadian explorers and settlers, to an industrial power source to support the early mills of the area, to a commercial shipping route, and finally to a water course used for recreational purposes throughout the 20th and 21st centuries.

1.3.2 Pre-contact Indigenous Resources

This portion of southwestern Ontario has been occupied by Indigenous peoples since the retreat of the Wisconsin glacier approximately 11,000 years ago. Much of what is understood about the lifeways of Indigenous peoples is derived from archaeological evidence and ethnographic analogy. In Ontario, Indigenous culture prior to the period of contact with European peoples has been distinguished into cultural periods based on observed changes in material culture. These cultural periods are largely based in observed changes in formal lithic tools, and separated into the Early Paleo-Indian, Late Paleo-Indian, Early Archaic, Middle Archaic, and Late Archaic periods. Following the advent of ceramic technology in the Indigenous archaeological record, cultural periods are separated into the Early Woodland, Middle Woodland, and Late Woodland periods, based primarily on observed changes in formal ceramic decoration. It should be noted that these cultural periods do not necessarily represent specific cultural identities but are a useful paradigm for understanding changes in Indigenous culture through time. The current understanding of Indigenous archaeological culture is summarized in Table 1, based on Ellis and Ferris (1990). The provided time periods are based on the “Common Era” calendar notation system, i.e., Before Common Era (BCE) and Common Era (CE).

Table 1: Cultural Chronology for Essex County

Period	Characteristics	Time Period	Comments
Early Paleo-Indian	Fluted Projectiles	9000 – 8400 BCE	Spruce parkland/caribou hunters
Late Paleo-Indian	Hi-Lo Projectiles	8400 – 8000 BCE	Smaller but more numerous sites
Early Archaic	Kirk and Bifurcate Base Points	8000 – 6000 BCE	Slow population growth
Middle Archaic	Brewerton-like Points	6000 – 2500 BCE	Environment similar to present
Late Archaic	Narrow Point	2500 – 1800 BCE	Increasing site size
	Broad Point	1800 – 1500 BCE	Large chipped lithic tools
	Small Point	1500 – 1100 BCE	Introduction of bow hunting
Terminal Archaic	Hind Points	1100 – 950 BCE	Emergence of true cemeteries
Early Woodland	Meadowood Points	950 – 400 BCE	Introduction of pottery
Middle Woodland	Couture Corded Pottery	400 BCE – 500 CE	Increased sedentism

Period	Characteristics	Time Period	Comments
	Riviere au Vase Phase	500 – 800 CE	Seasonal hunting and gathering
Late Woodland	Younge Phase	800 – 1200 CE	Incipient agriculture
	Springwells Phase	1200 – 1400 CE	Agricultural villages
	Wolf Phase	1400 – 1550 CE	Earth worked villages, warfare
Contact Indigenous	Various Algonkian and Iroquoian Groups	1600 – 1875 CE	Early written records and treaties
Historical	French/Euro-Canadian	1749 CE – present	European settlement

Between 9000 and 8000 BCE, Indigenous populations were sustained by hunting, fishing, and foraging and lived a relatively mobile existence across an extensive geographic territory. Despite these wide territories, social ties were maintained between groups. One method in particular was through gift exchange, evident through exotic lithic material documented on many sites (Ellis 2013:35-40).

By approximately 8000 BCE, evidence exists and becomes more common for the production of ground-stone tools such as axes, chisels and adzes. These tools themselves are believed to be indicative specifically of woodworking. This evidence can be extended to indicate an increase in craft production and arguably craft specialization. This latter statement is also supported by evidence, dating to approximately 7000 BCE, of ornately carved stone objects which would be laborious to produce and have explicit aesthetic qualities (Ellis 2013:41). This is indirectly indicative of changes in social organization which permitted individuals to devote time and effort to craft specialization. Since 8000 BCE, the Great Lakes basin experienced a low-water phase, with shorelines significantly below modern lake levels (Stewart 2013: Figure 1.1.C). It is presumed that the majority of human settlements would have been focused along these former shorelines. At approximately 6500 BCE the climate had warmed considerably since the recession of the glaciers and the environment had grown more similar to the present day. By approximately 4500 BCE, evidence exists from southern Ontario for the utilization of native copper (naturally occurring pure copper metal) (Ellis 2013:42). The known origin of this material along the north shore of Lake Superior indicates the existence of extensive exchange networks across the Great Lakes basin.

At approximately 3500 BCE, the isostatic rebound of the North American plate following the melt of the Laurentide glacier had reached a point which significantly affected the watershed of the Great Lakes basin. Prior to this, the Upper Great Lakes had drained down the Ottawa Valley via the French-Mattawa River valleys. Following this shift in the watershed, the drainage course of the Great Lakes basin had changed to its present course. This also prompted a significant increase in water-level to approximately modern levels (with a brief high-water period); this change in water levels is believed to have occurred catastrophically (Stewart 2013:28-30). This change in geography coincides with the earliest evidence for cemeteries (Ellis 2013:46). By 2500 BCE, the earliest evidence exists for the construction of fishing weirs (Ellis *et al*. 1990: Figure 4.1). However, the construction of fishing weirs could have occurred as early as 6650 BCE (Stevens 2004). Regardless, construction of these weirs would have required a large amount of communal labour and are indicative of the continued development of social organization and communal identity. The large-scale procurement of food at a single location also has significant implications for permanence of settlement within the landscape. This period is also marked by further

population increase and by 1500 BCE evidence exists for substantial permanent structures (Ellis 2013:45-46).

By approximately 950 BCE, the earliest evidence exists for populations using ceramics. Populations are understood to have continued to seasonally exploit natural resources. This advent of ceramic technology correlated, however, with the intensive exploitation of seed foods such as goosefoot and knotweed as well as mast such as nuts (Williamson 2013:48). The use of ceramics implies changes in the social organization of food storage as well as in the cooking of food and changes in diet. Fish also continued to be an important facet of the economy at this time. Evidence continues to exist for the expansion of social organization (including hierarchy), group identity, ceremonialism (particularly in burial), interregional exchange throughout the Great Lakes basin and beyond, and craft production (Williamson 2013:48-54).

By approximately 550 CE, evidence emergences for the introduction of maize into southern Ontario. This crop would have initially only supplemented the Indigenous diet and economy (Birch and Williamson 2013:13-14). Maize-based agriculture gradually became more important to societies and by approximately 900 CE permanent communities emerge which are primarily focused on agriculture and the storage of crops, with satellite locations oriented toward the procurement of other resources through hunting, fishing, and foraging. By approximately 1250 CE, evidence exists for the common cultivation of historic Indigenous cultigens, including maize, beans, squash, sunflower, and tobacco. The cultural affiliation of populations within the region of the study area at this time period is debated, whether they may have spoken a form of Iroquoian language or Algonquian (Murphy and Ferris 1990). The extant archaeological record demonstrates many cultural traits similar to historical Indigenous nations (Williamson 2013:55).

By the Late Woodland period there was a distinctive cultural occupation in southwestern Ontario, including Essex, Kent, and Lambton counties. The primary Late Woodland occupants of the Windsor area were populations described by archaeologists as belonging to the Western Basin Tradition. Murphy and Ferris (1990:189) indicate that these people had ties with populations in southeastern Michigan and northwestern Ohio and represent an *in situ* cultural development from the earlier Middle Woodland groups. The Western Basin Tradition seems to have been centered in the territory comprising the eastern drainage basin of Lake Erie, Lake St. Clair, and the southern end of Lake Huron. The Western Basin Tradition is divided into four phases based on differences in settlement and subsistence strategies and pottery attributes. By the time of increased European interaction in the last half of the 16th century and early 17th century, there were no Western Basin Tradition sites in the Essex County area, having moved west into Michigan (Ferris 2009:32-33).

1.3.3 Registered Archaeological Sites and Surveys

In Canada, archaeological sites are registered within the Borden system, a national grid system designed by Charles Borden in 1952 (Borden 1952). The grid covers the entire surface area of Canada and is divided into major units containing an area that is two degrees in latitude by four degrees in longitude. Major units are designated by upper case letters. Each major unit is subdivided into 288 basic unit areas, each containing an area of 10 minutes in latitude by 10 minutes in longitude. The width of basic units reduces as one moves north due to the curvature of the earth. In southern Ontario, each basic unit

measures approximately 13.5 kilometres east-west by 18.5 kilometres north-south. In northern Ontario, adjacent to Hudson Bay, each basic unit measures approximately 10.2 kilometres east-west by 18.5 kilometres north-south. Basic units are designated by lower case letters. Individual sites are assigned a unique, sequential number as they are registered. These sequential numbers are issued by the MHSTCI who maintain the *Ontario Archaeological Sites Database*. The study area under review straddles the boundary of two Borden Block designations: AbHr and AcHr.

Information concerning specific site locations is protected by provincial policy and is not fully subject to the *Freedom of Information and Protection of Privacy Act* (Government of Ontario 1990b). The release of such information in the past has led to looting or various forms of illegally conducted site destruction. Confidentiality extends to media capable of conveying location, including maps, drawings, or textual descriptions of a site location. The MHSTCI will provide information concerning site location to the party or an agent of the party holding title to a property, or to a licensed archaeologist with relevant cultural resource management interests.

An examination of the *Ontario Archaeological Sites Database* has shown that there is one registered archaeological site located within a one-kilometre radius of the study area (Government Ontario 2022a). Table 2 summarizes the registered archaeological site within one kilometre of the study area. The Nicodemo-Dupuis site (AbHr-19) is not located within 50 metres of the study area.

Table 2: Registered Archaeological Sites within One Kilometre

Borden Number	Site Name	Cultural Affiliation	Site Type
AbHr-19	Nicodemo-Dupuis	Indigenous	Campsite

A query of the *Ontario Public Register of Archaeological Reports* (Government of Ontario 2022b) identified one archaeological assessment within 50 metres of the study area (Table 3).

Table 3: Previous Archaeological Assessment Reports

Consultant	Report Title	Project Information Form (PIF) Number	Year
Fisher Archaeological Consulting	*City of Windsor Sewer Master Plan, Type 2, City of Windsor: Archaeological Stage 1: Background Study in the Geographic Township of Sandwich, Essex County, Ontario*	P359-0117-2019	2020

In 2020, FAC conducted a Stage 1 archaeological assessment for the Windsor Sewer Master Plan, which included the Pontiac Pumping Station study area (FAC 2020). This report is described in more detail in Section 1.3.4.

1.3.4 Previous Archaeological Investigations

The proposed Pontiac Pumping Station upgrades are part of the City's Windsor Sewer Master Plan. A Stage 1 archaeological assessment for the Windsor Sewer Master Plan was conducted in 2020 by FAC. FAC (2020) determined that portions of the study area are previously and deeply disturbed by existing infrastructure and construction, including the dredged and channelized portion of Little River leading to the existing facility, and retain no to low archaeological potential. However, FAC (2020) also determined that two portions of the study area retain archaeological potential due to their proximity to the original course of the Little River. FAC (2020) recommended Stage 2 archaeological assessment be undertaken on these portions of the Pontiac Pumping Station study area prior to any construction impacts.

1.4 Existing Conditions

The study area for the Stage 2 assessment of the Project comprises approximately 0.75 hectares and is located on part of Lot 134, Concession 1 Petite Côte, Geographic Township of Sandwich East, former Essex County, now City of Windsor, Ontario. The study area includes areas of manicured lawn on the property of the existing Pontiac Pumping Station and areas previously identified as disturbed by deep and extensive construction activities and land grading.

2 Field Methods

Stage 2 archaeological assessment of the study area was conducted on May 19, 2022, under Project Information Form (PIF) number P256-0715-2022 issued to Parker Dickson, MA of Stantec by the MHSTCI. Overall, the study area is approximately 0.75 hectares and comprises part of Lot 134, Concession 1 Petite Côte, Geographic Township of Sandwich East, former Essex County, now City of Windsor, Ontario. Prior to the start of the Stage 2 archaeological assessment, the study area mapping from the Stage 1 archaeological assessment (FAC 2020) was geo-referenced by Stantec's Geographical Information Services (GIS) team and a digital file (i.e., a shape file) was created of the study area. The digital file was uploaded to handheld Global Positioning Service (GPS) devices for use in the field.

During the Stage 2 survey, assessment conditions were adequate and at no time was the archaeological assessment conducted when the field, weather, or lighting conditions were detrimental to the identification and recovery of archaeological resources (Table 4). Photographic documentation in Section 8.1 of this report confirms that field conditions met the requirements for a Stage 1-2 archaeological assessment, as per the MHSTCI's 2011 *Standards and Guidelines for Consultant Archaeologists* (Section 7.8.6 Standard 1.a; Government of Ontario 2011). An overview of the Stage 2 assessment methodology, as well as photograph locations and directions, is depicted on Figure 10 in Section 9.0 of this report.

Table 4: Weather and Ground Conditions

Date	Field Director	Weather	Comment
May 19, 2022	Darren Kipping (P422)	Sunny, warm	Soil is dry and friable; screens well

Approximately 34.7% of the study area comprises manicured lawn that was inaccessible for ploughing. This area was subject to test pit survey in accordance with Section 2.1.2 of the MHSTCI's 2011 *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011). The excavated test pits were at least 30 centimetres in diameter and excavated five centimetres into sterile subsoil. The soils were examined for stratigraphy, cultural features, or evidence of fill. The soil was screened through six-millimetre mesh hardware cloth to facilitate the recovery of small artifacts and then used to backfill the pit. In some test pits, particularly in the northeast corner of the study area, evidence of previous disturbance in the form of construction gravel, asphalt and concentre inclusions, and recent plastics were encountered. In this area, the test pit survey interval was increased to 10 metres in accordance with Section 2.1.8 of the MHSTCI's 2011 *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011) to confirm previous disturbance. Overall, approximately 32.0% of the study area was subject to test pit survey at a five-metre interval and approximately 2.7% of the study area was subject to test pit survey at a 10-metre interval.

No archaeological resources were recovered during the test pit survey of the study area and so no further test pit methodology was required. Photographs illustrating the test pit survey of the study area are provided in Section 8.2 accordance with Section 7.8.6 Standard 1.b of the MHSTCI's 2011 *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011).

The remaining portion of the study area, approximately 65.3%, was previously assessed by FAC (2020) as disturbed and was evaluated as retaining low to no archaeological potential. This portion of the study area was not subject to Stage 2 archaeological assessment. However, Photos 5 to 8 provide examples of the typical previous disturbances noted within the study area.

As part of the Stage 2 survey, Stantec archaeologists were joined by a representative from Chippewas of the Thames First Nation. Additional information regarding Indigenous engagement for the archaeological component of the Project can be found in the *Record of Indigenous Engagement* document associated with this report. The Record of Indigenous Engagement is a separate document submitted to the MHSTCI which may include who was engaged, engagement procedures, dates of engagement, strategies to incorporate community input, and processes for providing results to the community. Similar to sensitive information documented in the Supplementary Documentation (e.g., exact site location, UTM coordinates, etc.), the Record of Indigenous Engagement is provided as a separate document and does not form a part of the *Ontario Public Register of Archaeological Reports*.

3 Record of Finds

The Stage 2 archaeological assessment was conducted employing the methods described in Section 2.0. An inventory of the documentary record generated by fieldwork is provided in Table 5.

Table 5: Inventory of Documentary Record

Document Type	Current Location of Document Type	Additional Comments
1 page of field notes	Stantec office, London, Ontario	In original field book and digitized on server
1 digital map	Stantec office, London, Ontario	Stored digitally in the cloud
1 map provided by the City	Stantec office, London, Ontario	Hard and digital copies in project file
23 digital photographs	Stantec office, London, Ontario	Stored digitally in project file

No archaeological resources were identified within the study area and so no material culture was collected. As a result, no artifact storage arrangements were required.

4 Analysis and Conclusions

Stantec was retained by the City to conduct Stage 2 archaeological assessment of the study area associated with the Project. The previous Stage 1 archaeological assessment determined that portions of the study area retained potential for the identification and recovery of archaeological resources and Stage 2 archaeological assessment was required (FAC 2020). The Stage 2 archaeological assessment was conducted on May 19, 2022. No archaeological resources were identified during the Stage 2 survey.

5 Recommendations

No archaeological resources were identified during the Stage 2 archaeological assessment of the of the study area. Thus, in accordance with Section 2.2 and Section 7.8.4 of the MHSTCI's 2011 *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011), **no further archaeological assessment of the study area is required (Figure 10)**.

The MHSTCI is asked to review the results presented and to accept this report into the *Ontario Public Register of Archaeological Reports*.

6 Advice on Compliance with Legislation

In accordance with Section 7.5.9 of the MHSTCI's 2011 Standards and Guidelines for Consultant Archaeologists (Government of Ontario 2011), the following standard statements are a required component of archaeological reporting and are provided verbatim from the MHSTCI's 2011 Standards and Guidelines for Consultant Archaeologists (Government of Ontario 2011).

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 (Government of Ontario 1990c). 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 Ministry of Heritage, Sport, Tourism and Culture Industries, 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* (Government of Ontario 1990c) 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 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 Archaeological Reports* referred to in Section 65.1 of the *Ontario Heritage Act* (Government of Ontario 1990c).

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* (Government of Ontario 1990c). 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* (Government of Ontario 1990c).

The *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33 (Government of Ontario 2002) requires that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the Ministry of Government and Consumer Services.

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8 Images

8.1 Photographs

Photo 1: Test pit survey in progress, facing west

Photo 2: Test pit survey in progress, facing east

Photo 3: Test pit survey in progress, facing south

Photo 4: Test pit survey in progress, facing southeast

Photo 5: Previously assessed (FAC 2020) as disturbed, facing northwest

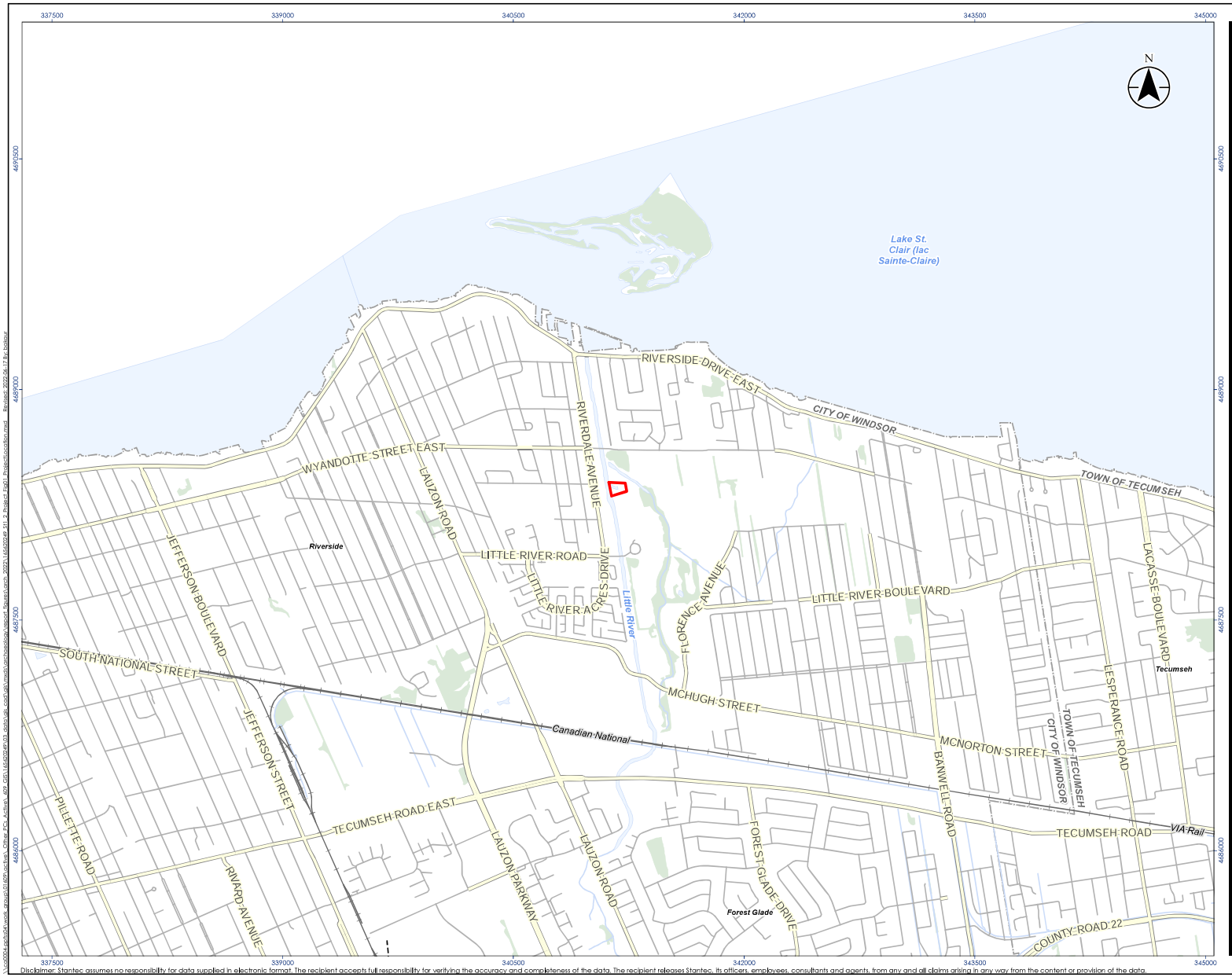
Photo 6: Previously assessed (FAC 2020) as disturbed, facing southwest

Photo 7: Previously assessed (FAC 2020) as disturbed, facing west

Photo 8: Previously assessed (FAC 2020) as disturbed, facing southeast

9 Maps

General maps of the study area follow on succeeding pages.



Stantec

Legend

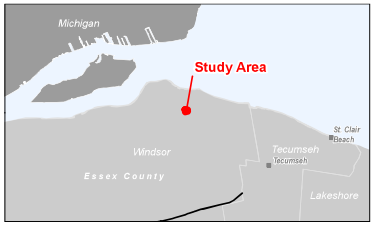
- Study Area
- Gas Pipeline
- Major Road
- Minor Road
- Railway
- Watercourse
- Municipal Boundary, Lower
- Waterbody
- Wooded Area

0 0.5 1 km

1:25,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2022.



Project Location
City of Windsor

165620249 REVA
Prepared by KB on 2022-06-17
Technical Review by DH on 2022-06-17

Client/Project
CITY OF WINDSOR
STAGE 2 ARCHAEOLOGICAL ASSESSMENT: PONTIAC PUMPING STATION MUNCIPAL CLASS ENVIRONMENTAL ASSESSMENT

Figure No.
1

Title
Location of Project

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Stantec

Legend

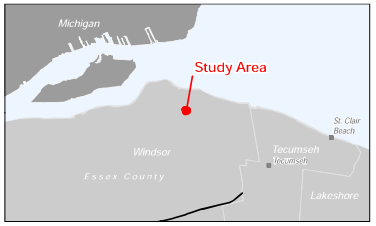
- Study Area
- Watercourse
- Waterbody

0 50 100 Metres

1:2,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2018.
3. Orthoimagery © First Base Solutions, 2022. Imagery Date: 2021.



Project Location Municipality of

165620249 REVA
Prepared by KB on 2022-06-17
Technical Review by DH on 2022-06-17

Client/Project

CITY OF WINDSOR
STAGE 2 ARCHAEOLOGICAL ASSESSMENT: PONTIAC PUMPING STATION MUNCIPAL CLASS ENVIRONMENTAL ASSESSMENT

Figure No.

2

Title

Location of Study Area

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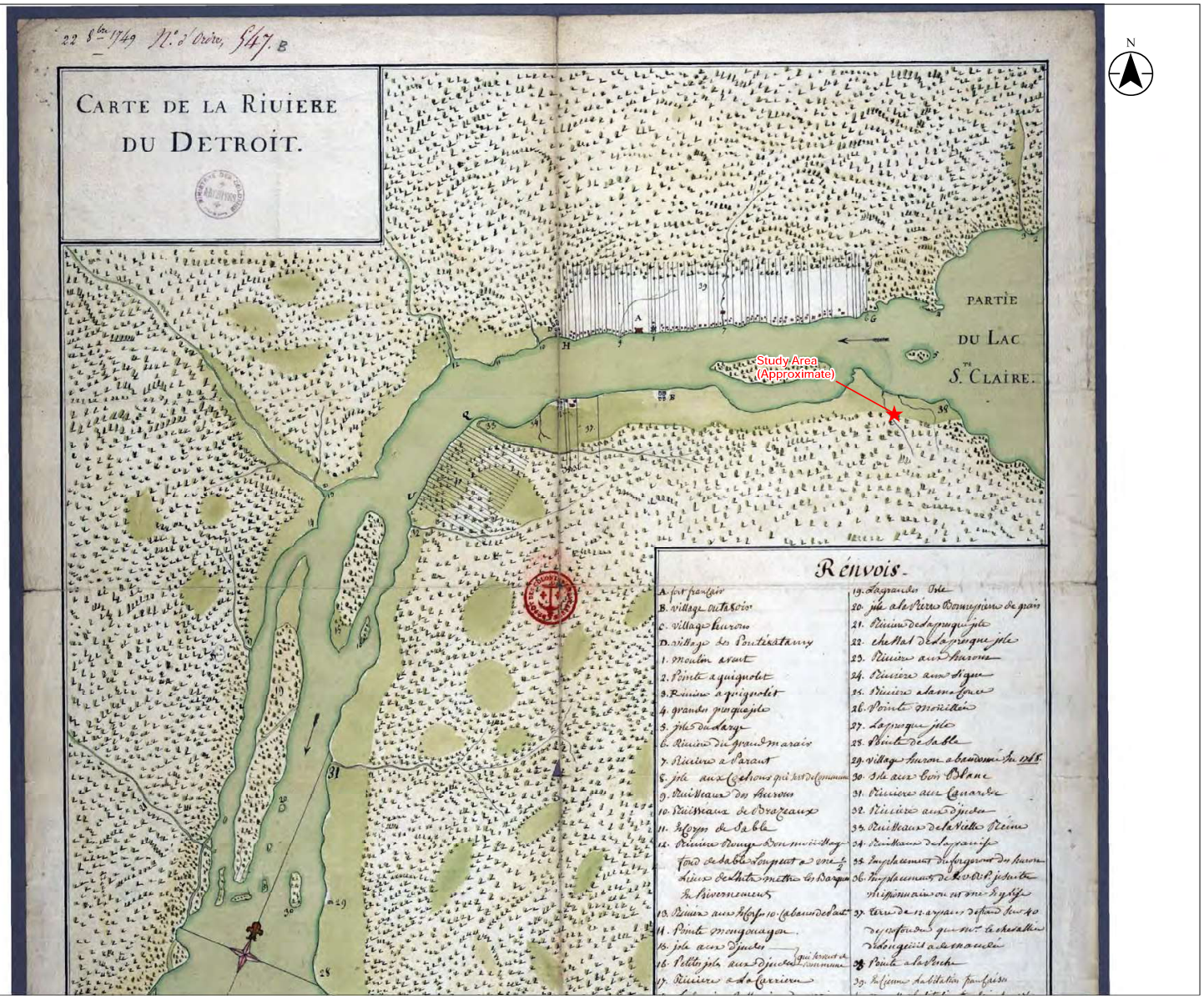


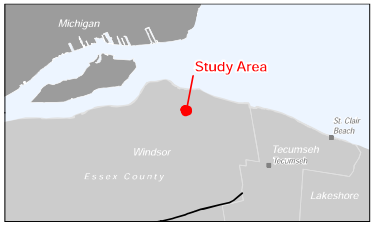
Stantec

Legend

★ Study Area (Approximate)

Figure Not to Scale

Notes
1. Reference: Chaussegros de Lery, Gaspar-Joseph, 1752, Carte de La Riviere du Detroit depuis de le Lac Erie jusques au Lac S. Claire, Department of Marine, Paris.



Project Location
City of Windsor

165620239 REVA
Prepared by KB on 2022-06-20
Technical Review by DH on 2022-06-20

Client/Project
CITY OF WINDSOR
STAGE 2 ARCHAEOLOGICAL ASSESSMENT: PONTIAC PUMPING STATION MUNCIPAL CLASS ENVIRONMENTAL ASSESSMENT

Figure No.
3

Title
Portion of the 1749 Map of the Detroit River

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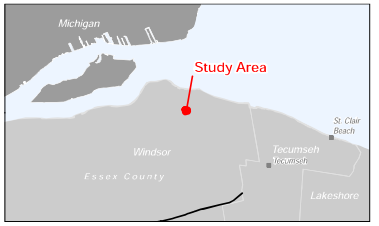
Legend

★ Study Area (Approximate)

Figure Not to Scale

Notes
1. Reference: Government of Canada. n.d.a. Map of Treaty Areas in Upper Canada. Ottawa: Department of Indian Affairs, Survey Branch.



Project Location
City of Windsor

165620249 REVA
Prepared by KB on 2022-06-20
Technical Review by DH on 2022-06-20

Client/Project
CITY OF WINDSOR
STAGE 2 ARCHAEOLOGICAL ASSESSMENT: PONTIAC PUMPING STATION MUNCIPAL CLASS ENVIRONMENTAL ASSESSMENT

Figure No.
4

Title
Map of Treaty Areas of Upper Canada

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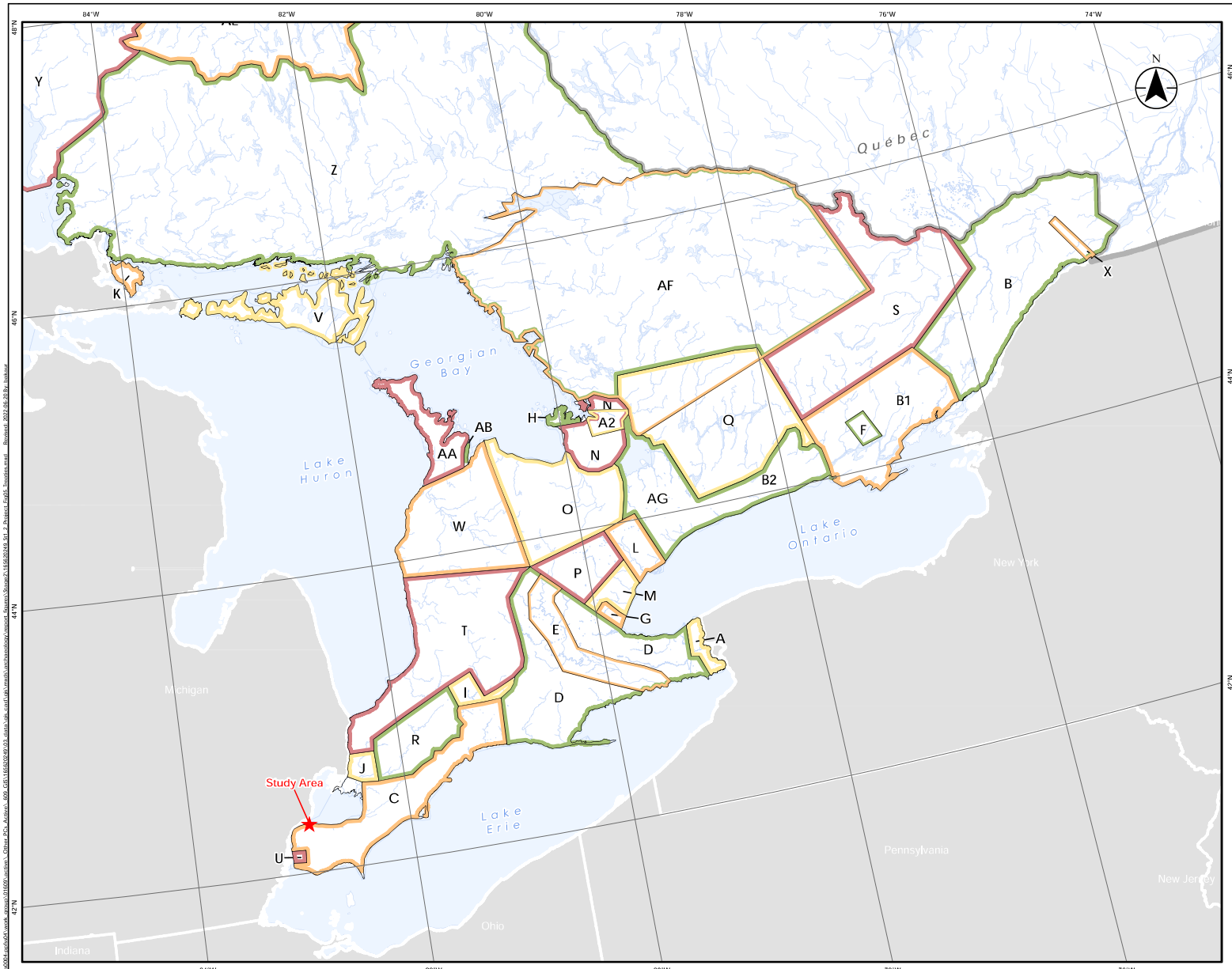

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Legend

Study Area

Waterbody

A Treaty No. 381, May 9th, 1781 (Mississauga and Chippewa)
AA Treaty No. 72, October 30th, 1854 (Chippewa)
AB Treaty No. 82, February 9th, 1857 (Chippewa)
AE Treaty No. 9, James Bay 1905, 1906 (Ojibway and Cree)
AF Williams Treaty, October 31st and November 15th, 1923 (Chippewa and Mississauga)
AG Williams Treaty, October 31st, 1923 (Chippewa)
A2 John Collins' Purchase, 1785 (Chippewa)
B Crawford's Purchase, October 9th, 1783 (Algonquin and Iroquois)
B1 Crawford's Purchase, October 9th, 1783 (Mississauga)
B2 Crawford's Purchase, 1783, 1787, 1788 (Mississauga)
C Treaty No. 2, May 19th, 1790 (Odawa, Chippewa, Pottawatomi, and Huron)
D Treaty No. 3, December 2nd, 1792 (Mississauga)
E Haldimand Tract: from the Crown to the Mohawk, 1793
F Tyendinaga: from the Crown to the Mohawk, 1793
G Treaty No. 3 3/4: from the Crown to Joseph Brant, October 24th, 1795
H Treaty No. 5, May 22nd, 1798 (Chippewa)
I Treaty No. 6, September 7th, 1796 (Chippewa)
J Treaty No. 7, September 7th, 1796 (Chippewa)
K Treaty No. 11, June 30th, 1798 (Chippewa)
L Treaty No. 13, August 1st, 1805 (Mississauga)
M Treaty No. 13A, August 2nd, 1805 (Mississauga)
N Treaty No. 16, November 18th, 1815 (Chippewa)
O Treaty No. 18, October 17th, 1818 (Chippewa)
P Treaty No. 19, October 28th 1818 (Chippewa)
Q Treaty No. 20, November 5th, 1818 (Chippewa)
R Treaty No. 21, March 9th, 1819 (Chippewa)
S Treaty No. 27, May 31st, 1819 (Mississauga)
T Treaty No. 27½, April 25th, 1825 (Ojibwa and Chippewa)
U Treaty No. 35, August 13th, 1833 (Wyandot or Huron)
V Treaty No. 45, August 9th, 1836 (Chippewa and Odawa, "For All Indians To Reside Thereon")
W Treaty No. 45½, August 9th, 1836 (Saugeen)
X Treaty No. 57, June 1st, 1847 (Iroquois of St. Regis)
Y Treaty No. 60, Robinson, Superior, September 7th, 1850 (Ojibwa)
Z Treaty No. 61, Robinson, Huron, September 9th, 1850 (Ojibwa)

0 50 100 Km

1:3,000,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 Statistics Canada Lambert
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2018.
3. Treaty boundaries adapted from Morris 1943 (1964 reprint). For cartographic representation only.

Project Location
City of Windsor

Prepared by KB on 2022-06-20
Technical Review by DH on 2022-06-20

Client/Project
CITY OF WINDSOR
STAGE 2 ARCHAEOLOGICAL ASSESSMENT: PONTIAC PUMPING STATION MUNCIPAL CLASS ENVIRONMENTAL ASSESSMENT

Figure No.
5

Title
Treaties and Purchases (Adapted from Morris 1943)

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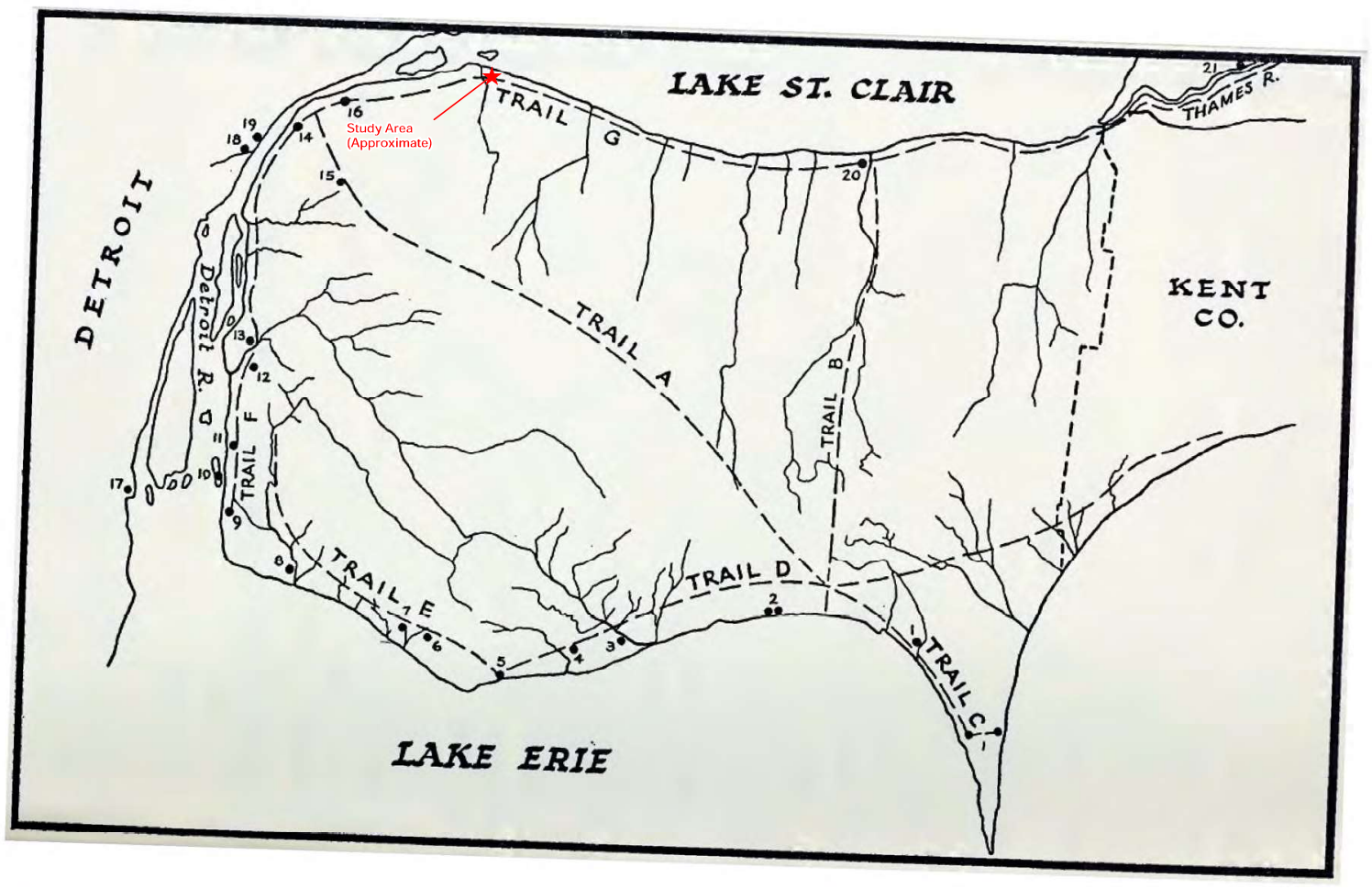

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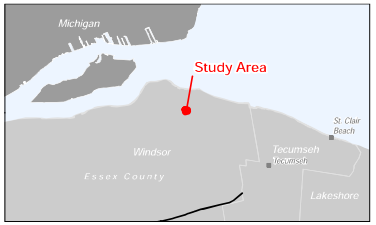
Legend

★ Study Area (Approximate)

Figure Not to Scale

Notes
1. Reference: Lajeunesse, Ernest J. 1960, The Windsor Border Region: Canada's Southernmost Frontier. The Champlain Society. Toronto: University of Toronto Press.



Project Location
City of Windsor

165620249 REVA
Prepared by KB on 2022-06-20
Technical Review by DH on 2022-06-20

Client/Project
CITY OF WINDSOR
STAGE 2 ARCHAEOLOGICAL ASSESSMENT: PONTIAC PUMPING STATION MUNCIPAL CLASS ENVIRONMENTAL ASSESSMENT

Figure No.
6

Title
Documented Indigenous Activity in Essex County

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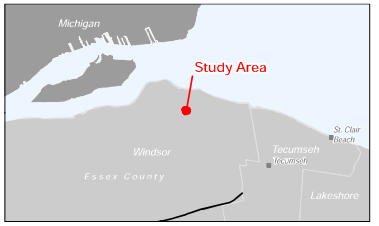
Legend

Study Area (Approximate)

Figure Not to Scale

Notes

1. Reference: Iredell, Abraham, 1803. Sandwich, Map A35, Unpublished map, on file with the Ministry of Natural Resources Crown Land Survey Records Office, Peterborough, Ontario.



Project Location
City of Windsor

165620249 REVA
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Technical Review by DH on 2022-06-20

Client/Project
CITY OF WINDSOR
STAGE 2 ARCHAEOLOGICAL ASSESSMENT: PONTIAC PUMPING STATION MUNCIPAL CLASS ENVIRONMENTAL ASSESSMENT

Figure No.
7

Title
Portion of the 1803 Plan of a Portion of Sandwich Township

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C:\2022\projects\work_groups\01000-archaeo - Other APs\Archaeo - 800_GIS\165620249\03_data\mxds\archaeology\report figures\Stage2_165620249_Rpt_2_Project_Fig01_1803_Historic.mxd Reviewed: 2022-06-20 By: barbara

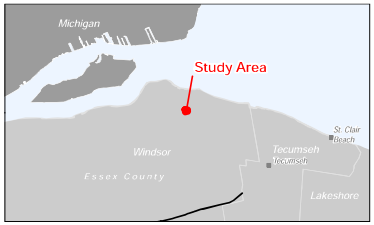
Stantec

Legend

Study Area (Approximate)

Figure Not to Scale

Notes
1. Reference: Walling, H.F. 1877. Map of Essex County, Ontario. R.M. Tackabury.



Project Location City of Windsor	165620249 REVA Prepared by KB on 2022-06-20 Technical Review by DH on 2022-06-20

Client/Project
CITY OF WINDSOR
STAGE 2 ARCHAEOLOGICAL ASSESSMENT: PONTIAC PUMPING STATION MUNCIPAL CLASS ENVIRONMENTAL ASSESSMENT

Figure No.
8

Title
Portion of the 1877 Map of Essex County

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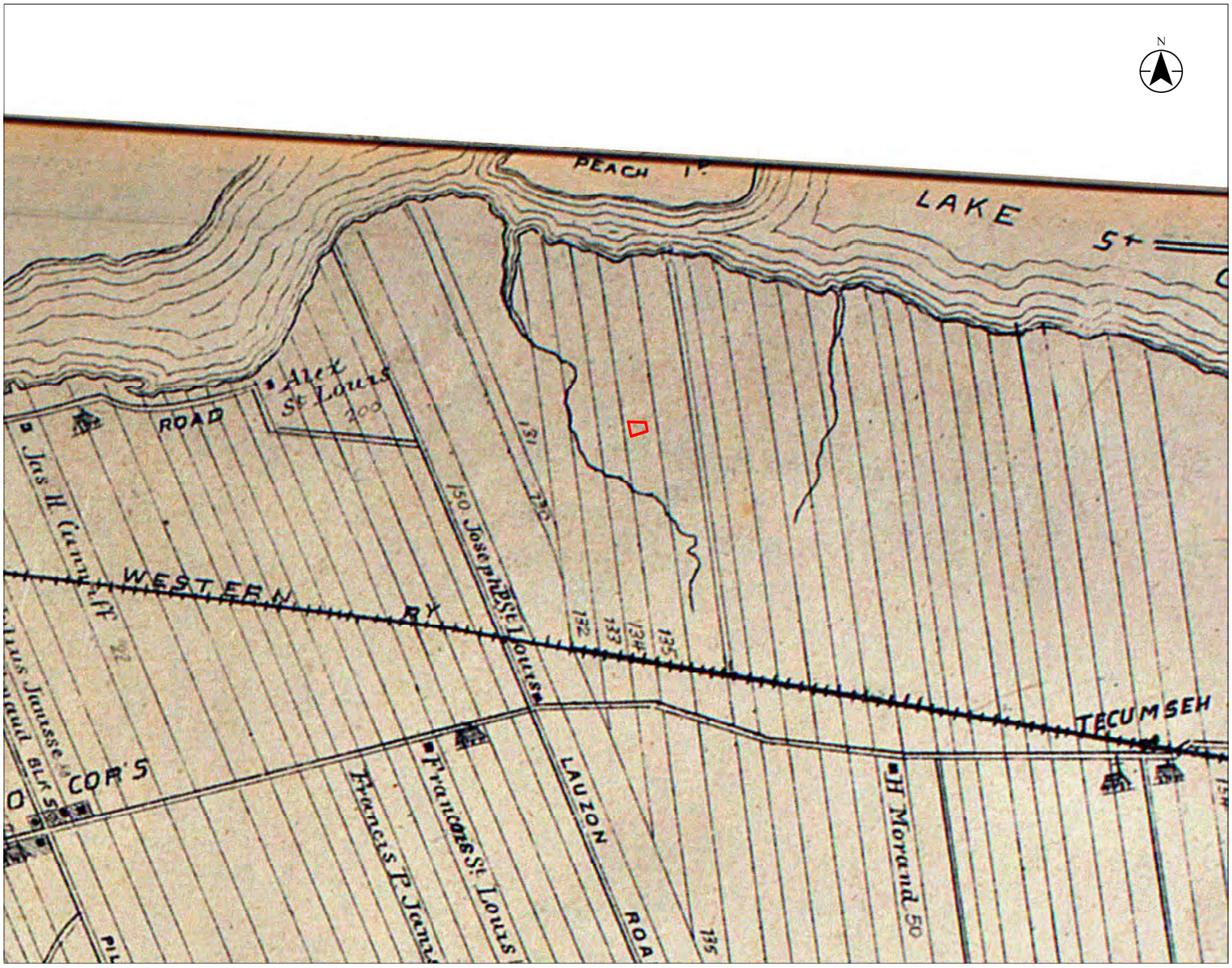


Stantec

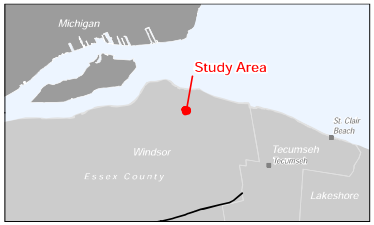
Legend

Study Area (Approximate)

Figure Not to Scale

Notes

1. Reference: Belden, H. and Co. 1881. Essex Supplement in Illustrated Historical Atlas of the Dominion of Canada. Toronto: Belden and Co.



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City of Windsor

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Technical Review by DH on 2022-06-20

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CITY OF WINDSOR
STAGE 2 ARCHAEOLOGICAL ASSESSMENT: PONTIAC PUMPING STATION MUNCIPAL CLASS ENVIRONMENTAL ASSESSMENT

Figure No.
9

Title
Portion of the 1881 Map of Sandwich Township

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Legend

- Archaeology Photo Log
- Study Area
- Constructed Drain
- Watercourse
- Waterbody

Assessment Method Other

- Disturbed (FAC 2020) – No Further Work Required
- Test Pit Survey, 5 m Intervals
- Test Pit Survey, 10 m Intervals

0 50 100 Metres

1:2,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2018.
3. Orthoimagery © First Base Solutions, 2022. Imagery Date, 2021.

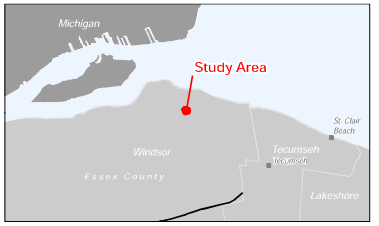

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Figure No.
10

Title
Stage 1-2 Methods and Results

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10 Closure

This report documents work that was performed in accordance with generally accepted professional standards at the time and location in which the services were provided. No other representations, warranties or guarantees are made concerning the accuracy or completeness of the data or conclusions contained within this report, including no assurance that this work has uncovered all potential archaeological resources associated with the identified property.

All information received from the client or third parties in the preparation of this report has been assumed by Stantec to be correct. Stantec assumes no responsibility for any deficiency or inaccuracy in information received from others.

Conclusions made within this report consist of Stantec's professional opinion as of the time of the writing of this report and are based solely on the scope of work described in the report, the limited data available and the results of the work. The conclusions are based on the conditions encountered by Stantec at the time the work was performed. Due to the nature of archaeological assessment, which consists of systematic sampling, Stantec does not warrant against undiscovered environmental liabilities or that the sampling results are indicative of the condition of the entire property.

This report has been prepared for the exclusive use of the client identified herein and any use by any third party is prohibited. Stantec assumes no responsibility for losses, damages, liabilities or claims, howsoever arising, from third party use of this report. We trust this report meets your current requirements. Please do not hesitate to contact us should you require further information or have additional questions about any facet of this report.

Quality Review Dickson, Parker
2022.07.06
10:55:37 -04'00'

(signature)

Parker Dickson – Associate, Senior Archaeologist

Tracie Carmichael
2022.07.06
10:57:28 -04'00'

Independent Review

(signature)

Tracie Carmichael – Managing Principal, Environmental Services

APPENDIX C

Ministry of Tourism, Culture and Sport Letter Affirming Entry of 'Stage 2 Archaeological Assessment Report' into the Ontario Public Register

Ministry of Tourism, Culture and Sport (MTCS)

Archaeology Program Unit
Programs and Services Branch
Heritage, Tourism and Culture Division
5th Floor, 400 University Ave.
Toronto ON M7A 2R9
Tel.: (416) 418-0949
Email: Zeeshan.Abedin@ontario.ca

Ministère du Tourisme, de la Culture et du Sport (MTCS)

Unité des programme d'archéologie
Direction des programmes et des services
Division du patrimoine, du tourisme et de la culture
5e étage, 400 ave. University
Toronto ON M7A 2R9
Tél. : (416) 418-0949
Email: Zeeshan.Abedin@ontario.ca

Jul 6, 2022

Parker S. Dickson (P256)
Stantec Consulting
171 Queens London ON N6A 5J7

RE: Entry into the Ontario Public Register of Archaeological Reports: Archaeological Assessment Report Entitled, "STAGE 2 ARCHAEOLOGICAL ASSESSMENT: PONTIAC PUMPING STATION MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT, Part of Lot 134, Concession 1 Petite Côte, Geographic Township of Sandwich East, former Essex County, now City of Windsor, Ontario", Dated Jul 6, 2022, Filed with MHSTCI Toronto Office on N/A, MHSTCI Project Information Form Number P256-0715-2022, MHSTCI File Number 0008580

Dear Mr. Dickson:

The above-mentioned report, which has been submitted to this ministry as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18, has been entered into the Ontario Public Register of Archaeological Reports without technical review.[1]

Please note that the ministry makes no representation or warranty as to the completeness, accuracy or quality of reports in the register.

Should you require further information, please do not hesitate to send your inquiry to Archaeology@Ontario.ca

cc. Archaeology Licensing Officer
Chandana Walgama,City of Windsor
Kristina Tang,City of Windsor

1*In no way will the ministry be liable for any harm, damages, costs, expenses, losses, claims or actions that may result: (a) if the Report(s) or its recommendations are discovered to be inaccurate, incomplete, misleading or fraudulent; or (b) from the issuance of this letter. Further measures may need to be taken in the event that additional artifacts or archaeological sites are identified or the Report(s) is otherwise found to be inaccurate, incomplete, misleading or fraudulent.*

APPENDIX C

Natural Heritage Impact Assessment Report

LITTLE RIVER POLLUTION CONTROL PLANT BY-PASS IMPROVEMENTS AT PONTIAC PUMPING STATION SCHEDULE "C" MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT - NATURAL HERITAGE IMPACT ASSESSMENT

FINAL REPORT

August 23, 2022

Prepared for:
The City of Windsor
350 City Hall Square
Windsor, ON N9A 6S1

Prepared by:
Stantec Consulting Ltd.
300W-675 Cochrane Drive
Markham, ON L3R 0B8

Project Number:
165620249

Limitations and Sign-off

This document entitled Little River Pollution Control Plant By-Pass Improvements at Pontiac Pumping Station Schedule "C" Municipal Class Environmental Assessment - Natural Heritage Impact Assessment was prepared by Stantec Consulting Ltd. ("Stantec") for the account of The City of Windsor (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by: Digitally signed by Ellis, Kayla Date: 2022.08.23 18:54:26 -04'00'
Signature

Kayla Ellis, BES
Terrestrial Ecologist
Printed Name and Title

Prepared by: Den Haas, Taco Digitally signed by Den Haas, Taco Date: 2022.08.23 10:52:49 -04'00'
Signature

Taco Den Haas, M.Sc., CISEC #0377
Senior Fisheries Biologist
Printed Name and Title

Reviewed by: Sean Geddes, B.Sc.
Senior Aquatic Biologist
Printed Name and Title

Reviewed by: Debbie Giesbrecht, M.Sc.
Senior Ecologist
Printed Name and Title

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1 Introduction

Stantec Consulting Ltd. (Stantec) was retained by The City of Windsor (The City) to complete a Natural Heritage Impact Assessment in support of the Schedule C Municipal Class Environmental Assessment for Improvements to the Little River Pollution Control Plant (LRPCP) By-Pass at Pontiac Pumping Station. The Pumping Station is located at St. Rose Beach (the Site). The Site location is shown on **Figure 1, Appendix A**.

In February 2021, City Council approved The Sewer and Coastal Flood Protection Master Plan (SMP), which outlines short and long-term solutions for water management and flood control. The SMP identified that the LRPCP currently does not have the capacity to treat the significant increase of wet weather flows that are conveyed to the plant during major rain events. The SMP recommended that a controlled by-pass be provided at the LRPCP, which would relieve the wastewater treatment process and mitigate the upstream sanitary system back-up.

The SMP also identified the need for a new pumping station to the south of the existing Pontiac Pumping Station for LRPCP by-pass improvements. These improvements will include the installation of a new underground pipe from the LRPCP by-pass manhole to the new pumping station. A new underground forcemain will also be installed at the new pumping station that will direct flow to the Little River through an outlet located within the existing Pontiac Pumping Station discharge channel.

For this natural heritage impact assessment, the Study Area includes lands within 120 metres (m) from the project footprint as shown on **Figure 2, Appendix A**. The Study Area includes part of the LRPCP lands and a section of the Little River.

2 Methods

2.1 Background Data Collection Sources

The following background documentation and related information sources were reviewed to identify natural heritage features and constraints in the Study Area:

- Ministry of Natural Resources Forestry's (MNRF) Land Information Ontario (LIO) digital mapping of natural heritage features (MNRF 2021a)
- MNRF's Constructed Drains digital dataset (MNRF 2021b)
- City of Windsor Official Plan (Durham Region 1993)
- Satellite imagery (Google Earth Pro 2022)
- ERCA Regulation Mapping (ERCA 2021)
- ERCA Regulatory Floodplain (ERCA 2021)

A list of species at risk (SAR) and species of conservation concern (SOCC) with potential to occur in the Study Area was prepared by reviewing the following sources:

- NDMNRF's Natural Heritage Information Centre (NHIC) Biodiversity Explorer database (NDMNRF 2022b)
- Fisheries and Oceans Canada's (DFO) Aquatic Species at Risk Maps (DFO 2021a)
- Species at Risk in Ontario (SARO) List Schedule 2 & 3 (MECP 2022)
- *Species at Risk Act*, 2002 (SARA), Schedule 1 (Government of Canada 2022a)
- eBird online database of bird distribution and abundance (eBird 2022)
- Atlas of Mammals of Ontario (Dobbyn 1994)
- Ontario Reptile and Amphibian Atlas (Ontario Nature 2019)
- Ontario Breeding Bird Atlas (Cadman et. al., 2007)
- Ontario Butterfly Atlas (TEA 2021)

These resources generally do not provide specific locations of species occurrences, with accuracy ranging from 1 km^2 (NHIC database) to 10 km^2 (wildlife atlases) or to municipal boundaries or watersheds. Results were screened to assess their relevance to the Study Area and species were removed from consideration if no suitable habitat was observed in the Study Area (e.g., open-water aquatic species).

For screening purposes, SAR are defined as:

- Endangered and threatened species that are on the SARO List and protected by the provincial *Endangered Species Act,* 2007 (ESA)

- Endangered and threatened aquatic species and migratory birds that are listed on Schedule 1 of the federal SARA

Non-aquatic species and non-migratory birds listed on Schedule 1 of SARA are excluded because protection under SARA is generally not provided outside of federal lands.

SOCC are defined as:

- Special concern species on the SARO List
- Species assessed as special concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) regardless of its listing on Schedule 1 of SARA
- Species with provincial ranks of S1 to S3

Provincial ranks (S ranks) are used by the NHIC to set protection priorities for rare species and vegetation communities. They are based on the number of occurrences in Ontario and are not legal designations. Species with provincial ranks of S1 to S3 are tracked by the MNRF and considered SOCC. Provincial S ranks are defined as follows:

S1: Critically imperiled; usually fewer than 5 occurrences
S2: Imperiled; usually fewer than 20 occurrences
S3: Vulnerable; usually fewer than 100 occurrences
S4: Apparently secure; uncommon but not rare, usually more than 100 occurrences
S5: Secure, common, widespread and abundant

2.2 Agency Consultation

Consultation with the agency responsible for provincially regulated SAR (i.e., the Ministry of the Environment, Conservation and Parks (MECP)) is now a proponent driven process; proponents are expected to review the background documentation and related information sources outlined above. For this reason, Stantec did not submit specific information requests for provincially designated features, SOCC and/or SAR.

Municipal agencies have also made data on natural heritage features and constraints available on publicly accessible geoportals or web viewers and encourage proponents to complete their own background data reviews. These include ERCA regulation mapping and the City of Windsor's Greenway System.

2.3 Field Investigations

Stantec completed a site visit on April 13, 2022 to characterize existing conditions with respect to natural heritage in the Study Area. Surveys included characterization of vegetation communities using Ecological Land Classification (ELC), a SAR habitat assessment, and a fish habitat assessment of the Little River shoreline. Surveys were also completed to confirm the natural heritage features in the Study Area that

were identified through the background review. **Table 2.1** summarizes the field surveys that were completed.

Table 2.1 Field Survey Details

Purpose of Investigation	Date	Start/End Time (24 hours)	Weather Conditions	Biologist
• Ecological Land Classification • Species at Risk Habitat Suitability Assessment • Fish Habitat Assessment	April 13, 2022	10:00 – 16:00	Temperature: 15°C Wind (km/hr): 30 Precipitation: rain 24/hr Precipitation: none	Kayla Ellis/ Jordan Brooks

* Source: Climate data for Windsor A Station - Government of Canada (2022a) Environmental Canada historical weather web application

2.3.1 Ecological Land Classification Assessment

Vegetation communities were initially characterized by interpreting available aerial imagery. Vegetation was identified, and communities were verified and assessed in the field. Community characterizations (ecosites and vegetation types) were based on the Ontario ELC system (Lee et. al. 1998). Dominant vegetation species within each community were recorded. Common names and scientific nomenclature of the species observed followed the provincial *Ontario Species List - Vascular Plants* provided by the NHIC (NDMNRF 2022c). Provincial significance of vegetation communities and plant species was based on the rankings assigned by the NHIC (NDMNRF 2022b).

2.3.2 Species at Risk Habitat Suitability Assessment

SAR habitat assessments focused on identifying potential SAR habitat (e.g., SAR bat maternity roost trees) or occurrences (e.g., butternut (*Juglans cinerea*)). SAR habitat assessments were completed for species protected under the ESA that may occur in the area, including species identified in the NHIC database and Ontario wildlife atlases during the background review. If encountered, these features were identified, recorded and assessed for potential use by SAR. All wildlife species observed by sight, sound and/or through distinctive signs (e.g., tracks, scat) were also recorded.

As the timing of the survey was outside of the wildlife active season and the presence of wildlife, including SAR, was anticipated to be limited, ELC was used to assess SAR habitat suitability.

2.3.3 Significant Wildlife Habitat Assessment

The NDMNRF's Significant Wildlife Habitat Technical Guide (SWHTG) (MNR 2000) describes significant wildlife habitat (SWH) in four categories:

1. Seasonal concentration areas
2. Rare vegetation communities or specialized habitats for wildlife
3. Habitats of SOCC (excluding the habitats of Endangered or Threatened species)

4. Animal movement corridors

Habitats within the Study Area were assessed for candidate SWH, as defined in the Ecoregion 7E-1 Criterion Schedule (MNRF 2015). Wildlife observations and evidence of wildlife (e.g., tracks, burrows, vocalizations) were recorded during the site visit. Targeted species-use surveys are generally required to determine if candidate features qualify as confirmed SWH. Because targeted species-use surveys were not completed, any identified SWH features were considered candidate, unless they were confirmed through direct observations or background review.

2.3.4 Fish Habitat Assessment

Stantec completed a fish habitat assessment at the Site on April 13, 2022. The assessment was completed using a canoe in the Little River and a side channel that connects with the Little River. Sediment was observed using an anchor dredge. Water depth was also recorded at each location. A fish community survey was not completed as fish community data are available for the Little River.
A photographic record of aquatic habitat conditions is contained in **Appendix B**.

3 Results

3.1 Background Data Collection

3.1.1 Natural Heritage and Planning Documentation

Significant natural features are present within the Study Area (MNRF 2021a). There are two watercourses (Little River and an unnamed tributary of The Little River); the Little River includes an aquatic species at risk distribution (**Figure 1**).

3.1.2 Species at Risk

There were 6 SAR identified in the 1 x 1 km NHIC squares that overlap the Study Area. Thirteen additional records of SAR, that were documented or have the potential to occur within the Study Area were identified in the background review. A list of the SAR identified during the background review is provided in **Table 3.1**.

Table 3.1 Records of SAR in the Vicinity of the Study Area

Common Name	Scientific Name	Provincial S-Rank	SARO Status	SARA Status
Birds				
Bank Swallow[2,5,9]	*Riparia riparia*	S4B	THR	THR
Barn Swallow[1,2,5,9]	*Hirundo rustica*	S4B	THR	THR
Bobolink[2,5]	*Dolichonyx oryzivorus*	S4B	THR	THR
Chimney Swift[2,5,9]	*Chaetura pelagica*	S3B	THR	THR
Eastern Meadowlark[1,2,5,9]	*Sturnella magna*	S4B,S3N	THR	THR
Eastern Whip-poor-will[5]	*Antrostomus vociferus*	S4B	THR	THR
Least Bittern[1,9]	*Ixobrychus exilis*	S4B	THR	THR
Louisiana Waterthrush[5]	*Parkesia motacilla*	S2B	THR	THR
Prothonotary Warbler[5]	*Protonotaria citrea*	S1B	END	END
Red-headed Woodpecker[2]	*Melanerpes erythrocephalus*	S3	END	END
Mammals				
Eastern Small-footed Myotis[8]	*Myotis leibii*	S2S3	END	
Little Brown Myotis[6]	*Myotis lucifugus*	S3	END	END
Northern Myotis[8]	*Myotis septentrionalis*	S3	END	END
Tricolored Bat[8]	*Perimyotis subflavus*	S3?	END	END

Table 3.1 Records of SAR in the Vicinity of the Study Area

Common Name	Scientific Name	Provincial S-Rank	SARO Status	SARA Status
Reptiles				
Blanding's Turtle[3]	*Emydoidea blandingii*	S3	THR	
Butler's Gartersnake[1,3]	*Thamnophis butleri*	S2	END	END
Eastern Foxsnake (Carolinian population)[3]	*Pantherophis vulpinus*	S3	END	END
Plants				
Kentucky Coffee-tree[1,9]	*Gymnocladus dioicus*	S2	THR	THR
Aquatic Species				
Northern Madtom[1]	*Noturus stigmosus*	S1	END	END

[1] NHIC Database (NDMNRF 2021b)
[2] Ontario Breeding Bird Atlas (Cadman et. al., 2007)
[3] Ontario Reptile and Amphibian Atlas (Ontario Nature, 2019)
[4] Ontario Butterfly Atlas (TEA 2021)
[5] eBird Database (eBird 2022)
[6] Atlas of the Mammals of Ontario (Dobbyn 1994)
[7] Aquatic species at risk map (DFO 2022)
[8] Species at Risk in Ontario List (MECP 2022)
[9] iNaturalist (iNat 2022)
[10] Ontario Odonata Atlas Database (Ontario Odonata Atlas 2021)

3.1.3 Species of Conservation Concern

There were five (5) SOCC identified in the 1 x 1 km NHIC squares that overlap with the Study Area.

A review of species databases found 12 additional SOCC, that have been previously documented or have the potential to occur within the Study Area. A list of the SOCC identified during the background review is provided in **Table 3.2**.

Table 3.2 Records of SOCC in the Vicinity of the Study Area

Common Name	Scientific Name	Provincial S-Rank	SARO Status	SARA Status
Birds				
Bald Eagle[5]	*Haliaeetus leucocephalus*	S4	SC	
Canada Warbler[5]	*Cardellina canadensis*	S5B	SC	THR
Common Nighthawk[2,5,9]	*Chordeiles minor*	S4B	SC	THR
Eastern Wood-pewee[2,5,9]	*Contopus virens*	S4B	SC	SC
Peregrine Falcon[5,9]	*Falco peregrinus*	S4	SC	
Wood Thrush[2,5,9]	*Hylocichla mustelina*	S4B	SC	THR

Table 3.2 Records of SOCC in the Vicinity of the Study Area

Common Name	Scientific Name	Provincial S-Rank	SARO Status	SARA Status
Reptiles				
Midland Painted Turtle[3]	*Chrysemys picta marginata*	S4		SC
Northern Map Turtle[3]	*Graptemys geographica*	S3	SC	SC
Snapping Turtle[1,3,9]	*Chelydra serpentina*	S4	SC	SC
Plants				
Climbing Prairie Rose[1]	*Rosa setigera*	S2S3	SC	SC
Honey Locust[9]	*Gleditsia triacanthos*	S2?		
Aquatic Species				
Brindled Madtom[1,7]	Noturus miurus	S2	NAR	
Insects				
Differential Grasshopper[1,9]	*Melanoplus differentialis*	S3		
Monarch[1,9]	*Danaus plexippus*	S2N,S4B	SC	SC
Elusive Clubtail[10]	*Stylurus notatus*	S3		
Swamp Darner[10]	*Epiaeschna heros*	S3S4		
Variegated Meadowhawk[10]	*Sympetrum corruptum*	S3		

[1] NHIC Database (MNRF 2021b)
[2] Ontario Breeding Bird Atlas (Cadman et. al., 2007)
[3] Ontario Reptile and Amphibian Atlas (Ontario Nature, 2019)
[4] Ontario Butterfly Atlas (TEA 2021)
[5] eBird Database (eBird 2022)
[6] Atlas of the Mammals of Ontario (Dobbyn 1994)
[7] Aquatic species at risk map (DFO 2022)
[8] Species at Risk in Ontario List (MECP 2022)
[9] iNaturalist (iNat 2022)
[10] Ontario Odonata Atlas Database (Ontario Odonata Atlas 2021)

3.1.4 Fish and Fish Habitat

The Study Area includes the Little River and a unnamed tributary to the Little River. There is one Aquatic Resource Area (ARA) survey point with fish collection records within 500 m of the Study Area (MNRF 2022a). The fish collection was completed on September 26, 2017 by an unspecified consulting company. Eight (8) species of fish were captured and are listed in **Table 3.3** below. These species belong to cool and warm water thermal guilds. All species are either secure or apparently secure provincially. Species at risk were previously discussed in **Sections 3.1.2**. and **3.1.3**.

Table 3.3 Fish Species collected from the Little River on September 26, 2017 (MNRF 2022a)

Common Name	Scientific Name	Thermal Regime	Status[1]
Bowfin	*Amia calva*	warm	S4
Brook Silverside	*Labidesthes sicculus*	Warm	S4
Central Mudminnow	*Umbra limi*	Cool	S5
Gizzard Shad	*Dorosoma cepedianum*	Cool	S4
Golden Shiner	*Notemigonus crysoleucas*	Cool	S5
Logperch	*Percina caprodes*	Warm	S5
Rock Bass	*Ambloplites rupestris*	Cool	S5
Yellow Perch	*Perca flavescens*	Cool	S5

[1] Subnational Rankings

S4: Apparently Secure - At a fairly low risk of extirpation in the jurisdiction due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.

S5: Secure - At very low or no risk of extirpation in the jurisdiction due to a very extensive range, abundant populations or occurrences, with little to no concern from declines or threats.

The Little River is mapped as a DFO Drain Class E. Drains with this classification are permanent waterbodies with sensitive warmwater fish species present. The restricted activity timing window for this drain class is associated with the spring window (i.e., March 15 to July 15).

The tributary to the Little River is mapped as a DFO Drain Class F (MNRF 2022b). There are no other watercourses in the Study Area (MNRF 2022a). Drains with this classification are intermittent waterbodies. Typically, maintenance or activities in drains of this classification are timed to coincide with periods of no flow.

3.2 Field Investigations

3.2.1 Ecological Land Classification

The Study Area is comprised of infrastructure, thickets, parkland and aquatic habitat. Descriptions of vegetation communities present in the Study Area are in **Table 3.4** below. Vegetation communities located within the Study Area are shown on **Figure 2**.

Table 3.4 Ecological Land Classification Vegetation Types in the Study Area

ELC TYPE	Community Description
Aquatic System (AQ)	
Open Water (OA)	Aquatic system defined by depth >2m. This is comprised of Little River to the west and a DFO Drain to the north and east. The DFO Drain is dominated by European reed (*Phragmites australis* subsp. *australis*)

Table 3.4 Ecological Land Classification Vegetation Types in the Study Area

ELC TYPE	Community Description
Constructed (CV)	
Sewage and Water Treatment (CVI_3)	Water treatment plant. Some planted trees, grass is maintained.
Single Family Residential (CVR_3)	Community comprised of residential houses.
Agriculture (AG)	
Nursery (SAGM5)	Tree and shrub nursery north of the water treatment plant, roadside assessment only.
Fencerow (TAGM5)	Planted fencerow comprised predominately of Norway spruce (*Picea abies*), white spruce (*Picea glauca*), Austrian pine (*Pinus nigra*).
Thicket (TH)	
Dry - Fresh Deciduous Hedgerow Thicket Ecosite (THDM3)	Two thicket communities are adjacent to the banks of Little River (OA), the community north of the water treatment plant was assessed from a distance, no-walkthroughs. The canopy species comprised are of: Maple (*Acer* sp.), green ash (*Franxinus pennsylvanica*), and eastern cottonwood (*Populus deltoides*). The sub-canopy species are comprised of: Cherry species (*Prunus* sp.), Apple species (*Malus* sp.), and white mulberry (*Morus alba*). The understory species are dominated by red-osier dogwood (*Cornus sericea*), grey dogwood (*Cornus racemosa*), rose species (*Rosa* sp.), and honeysuckle species (*Ionicera* sp.). The ground layer is dominated by: common teasel (*Dipsacus fullonum*), Angelica (*Angelica* sp.), ground ivy (*Glechoma hederacea*), and Kentucky bluegrass (*Poa pratensis*).
Swamp (SW)	
Swamp Maple Mineral Deciduous Swamp Type/Green Lands (SWDM3-3/CGL)	Forested Swamp community with a trail system to the north and east of the sewage and water treatment plant. This community was assessed from a distance, no-walkthroughs. The canopy is dominated by Freeman's maple (*Acer freemanii*) with some European reed in the ground layer.

3.2.2 Fish Habitat Assessment

Aquatic habitat characteristics were examined along the shoreline of an embayment between the Pontiac Pumping Station with the Little River. The bay has constructed features such as straight and uniform steep banks that are armoured with concrete blocks. The banks are sparsely vegetated by shrubs such as staghorn sumac (*Rhus typha*) and red-osier dogwood. The bay had a flat morphology with an average depth of 0.8m deep. Substrate consisted exclusively of muck. No flow movement was observed in the bay. No aquatic macrophytes were observed; however, floating algae were observed. No critical habitat for fish was observed. A photographic record of site conditions in included in **Appendix B**.

Aquatic habitat characteristics in the unnamed tributary to the Little River were not documented as the top of bank of this watercourse is more than 40 m from the footprint of the proposed activities.

4 Assessment of Significance

4.1 Ecological Land Classification

All ELC vegetation communities identified in the Study Area are common in southern Ontario.

4.2 Species at Risk Habitat Suitability Assessment

Potential habitat was identified in the Study Area during the SAR habitat assessment for seven (1) out of the nineteen (19) provincially threatened and endangered species identified in the background review. The SAR habitat assessment and potential presence of each species is discussed in **Table 4.1**.

Table 4.1 SAR Habitat Suitability Assessment in the Study Area

Species	Habitat Description	Assessment Results
Bank Swallow	The Bank Swallow excavates nests in exposed earth banks along watercourses and lakeshores, roadsides, stockpiles of soil, and the sides of sand and gravel pits. Single nests may occur, although colonies are typical and range from two to several thousand. Adjacent grasslands and watercourses are used for foraging habitat (Cadman et al. 2007).	**ABSENT –** The artificial shoreline is unlikely to provide suitable nesting habitat.
Barn Swallow	The Barn Swallow commonly nests on walls or ledges of barns, bridges, culverts or other man-made structures.	**CANDIDATE –**Buildings on site may provide suitable nesting habitat. Cup nests were noted on a building with the CVI_3 community. Investigations recommended during the breeding bird season.
Bobolink	Nests primarily in forage crops with a mixture of grasses and broad-leaved forbs, predominantly hayfields and pastures. Bobolink is an area-sensitive species, with reported lower reproductive success in small habitat fragments.	**ABSENT –** The maintained lawn in the Study Area does not support Bobolink.
Chimney Swift	Chimney Swift uses chimneys for roosting and breeding, and less commonly, nest in large hollow trees.	**CANDIDATE –** The buildings within the Study Area may provide suitable chimney structures for nesting Chimney Swifts.
Eastern Meadowlark	Prefers grassy pastures, meadows and hay fields. Nests are always on the ground and usually hidden in or under grass clumps.	**ABSENT –** The maintained lawn in the Study Area does not support Eastern Meadowlark.

Table 4.1 SAR Habitat Suitability Assessment in the Study Area

Species	Habitat Description	Assessment Results
Least Bittern	The Least Bittern is a relatively small bird that nests in freshwater marshes where dense aquatic vegetation occurs with woody vegetation and open water. They are found most commonly in marshes greater than 5 ha in size (Gibbs et al., 1992).	**ABSENT –** There were no suitable dense aquatic vegetation communities idenitified in the Study Area that would provide suitable habitat for Least Bittern.
Red-headed Woodpecker	Occupies a wide range of habitats, but most are characterized by open areas for foraging, snags for roosting, and a secure food supply. This species requires multiple snags for nesting, roosting, and foraging. Some of the habitats used are: open deciduous and riparian woodlands, orchards, parks, savanna-like grasslands, beaver ponds with snags, forest edges, burned forests, and flooded bottomland forests. (N.A.S. 2012).	**CANDIDATE –** The SWDM3-3/CGL community within the Study Area may provide suitable habitat for Red-headed Woodpecker.
Myotis sp. (Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis. Tri-colored Bat)	Maternity roosts are located in cavity trees and under loose bark. The trees located within the park may have the potential to provide habitat for roosting endangered bats.	**CANDIDATE –** There may be suitable cavity trees in the SWDM3-3/CGL community within the Study Area that provide suitable habitat for bat maternity roosts.
Blanding's Turtle	Blanding's Turtles frequent lakes, ponds, and marshes, and prefer shallow water with abundant aquatic vegetation and a soft bottom (MacCulloch 2002).	**ABSENT –** The aquatic habitat in the Study Area does not support Blanding's Turtle.
Butler's Gartersnake	This species is typically found in open areas such as grasslands, old fields, tall-grass prairie habitats, urban, industrial, and disturbed sites, typically in proximity to wet areas such as seasonal marshes, swales, and small waterbodies (ECCC 2018). Butler's Gartersnakes hibernate from mid-September until early April, typically near wetland or open water within crayfish or small mammal burrows, drains, log piles, and other underground sites (ECCC 2018). In Ontario, this species is found in three areas: scattered populations within 10 km of the Detroit River, Lake St. Clair, the St. Clair River, and Lake Huron in Essex and Lambton counties; Skunk's Misery, in Middlesex and Lambton counties; and Luther Marsh, in Dufferin and Wellington counties. Although its distribution is limited, the species is frequently locally abundant where it does occur (COSEWIC 2010).	**CANDIDATE –** The artificial shoreline may provide suitable hibernaculum and thickets provide suitable habitat for hunting

Table 4.1 SAR Habitat Suitability Assessment in the Study Area

Species	Habitat Description	Assessment Results
Eastern Foxsnake (Carolinian population)	Eastern Foxsnakes of the Carolinian population primarily use un-forested areas, such as old fields, prairies, marshes and dune shorelines. Farm field hedgerows and riparian zones along drainage canals are also used regularly, particularly in areas of intensive agriculture. Brush piles, table rocks, tree stumps, root systems of downed trees, driftwood are also often used for Shelter and basking sites (COSEWIC, 2008).	**CANDIDATE –** The artificial shoreline may provide suitable hibernaculum. Thickets and hedgerows may provide suitable hunting habitat.
Northern Madtom	The Northern Madtom prefers habitats ranging from large creeks to big rivers, with clear to turbid water, and moderate to swift current. The fish occurs on bottoms of sand, gravel, and stones, occasionally with silt, detritus, and accumulated debris. It is sometimes associated with large aquatic plants, and is typically collected at depths of less than 7 m.	**Absent–**Aquatic habitat conditions in the bay are not suitable for Northern Madtom. For exmaple no flow was observed, the substrate cosnsits of muck, no aquatic macprohytes are present.
Kentucky Coffee-tree		**ABSENT –** Kentucky Coffee-tree was not observed on site.

4.3 Significant Wildlife Habitat

Each of the four categories of SWH are briefly described below in the context of the Study Area.

Seasonal Concentration Areas

Seasonal concentration areas are those sites where large numbers of a species gather at one time of the year, or where several species congregate. Examples include deer yards, snake and bat hibernacula, waterfowl staging and molting areas, raptor roosts, bird nesting colonies, shorebird staging areas, and passerine migration concentrations. Only the best examples of these concentration areas are usually designated as SWH.

Rare or Specialized Habitat

Rare or specialized habitats are two separate components of SWH. Rare habitats are those with vegetation communities that are considered rare in the province. Specialized habitats are microhabitats that are critical to some wildlife species. The SWHTG (MNR 2000) identifies habitats that could be considered specialized habitats, such as habitat for area-sensitive species, forests providing a high diversity of habitats, amphibian woodland breeding ponds, turtle nesting habitat, highly diverse sites, seeps, and springs. High quality habitat features generally occur outside of the influence of edge effects and wildlife mortality that are associated with major roadways.

Habitat for Species of Conservation Concern

Data from the field site visit were used to assess the potential for habitat of SOCC to occur within the Study Area. Habitat assessments for these species were completed through a combination of satellite photo interpretation and field investigations to determine whether suitable habitat may be present in the right-of way.

Potential habitat was identified in the Study Area during the SOCC habitat assessment for nine (9) out of the thirteen (13) SOCC species identified in the Study Area during the background review. The SOCC habitat assessment and potential presence of each species is discussed in **Table 4.2**.

Table 4.2 SOCC Habitat Suitability Assessment in the Study Area

Species	Habitat Description	Assessment Results
Bald Eagle	The Bald Eagle almost always nests near water, usually on large lakes. Large stick nests are placed in trees located within mature woodlots. They usually prefer 250 ha of mature forest for breeding, however, along Lake Erie, where the lake provides a valuable food source, the eagles will nest in smaller woodlots or even single trees (Sandilands, 2005).	**ABSENT**: No suitable forest habitat identified in the Study Area during the field investigation.
Common Nighthawk	Prefers open, vegetation- free habitats, including dunes, beaches, recently harvested forests, burnt-over areas, logged areas, rocky outcrops, rocky barrens, grasslands, pastures, peat bogs, marshes, lakeshores, and riverbanks.	**ABSENT**: No suitable vegetation-free habitats identified in the Study Area during the field investigation
Eastern Wood-Pewee	Associated with deciduous and mixed forests. Within mature and intermediate age stands it prefers areas with little understory vegetation as well as forest clearings and edges.	**CANDIDATE**: The SWDM3-3/CGL community within the Study Area may provide suitable forest habitat.
Peregrine Falcon	Traditionally, in Ontario, it has been a rare breeder, preferring suitable rock cliffs, particularly those adjacent to water. More recently the species has been released in various urban centers in Ontario where it successfully nests on tall buildings. Relatively recent increases in abundance and distribution are owing to now established populations in natural areas and urban environments, both of which are separate and distinct populations. These increases reflect the large-scale recovery efforts across the species range (Cadman et al, 2007).	**ABSENT**: No suitable rock cliffs or tall buildings identified in the Study Area during the field investigation.

Table 4.2 SOCC Habitat Suitability Assessment in the Study Area

Species	Habitat Description	Assessment Results
Wood Thrush	Nests mainly in second-growth and mature deciduous and mixed forests, with saplings and well-developed understory layers. Prefers large forest mosaics, but may also nest in small forest fragments.	**CANDIDATE**: The SWDM3-3/CGL community within the Study Area may provide suitable forest habitat.
Midland Painted Turtle	Painted turtles inhabit waterbodies, such as ponds, marshes, lakes and slow-moving creeks, that have a soft bottom and provide abundant basking sites and aquatic vegetation. These turtles often bask on shorelines or on logs and rocks that protrude from the water. The midland painted turtle hibernates on the bottom of waterbodies (Ontario Nature, 2019).	**CANDIDATE**: The OA communities (Little River and the DFO Drain) within the Study Area may provide suitable habitat.
Northern Map Turtle	Inhabits both lakes and rivers, showing a preference for slow moving currents, muddy bottoms, and abundant aquatic vegetation. These turtles need suitable basking sites (such as rocks and logs) and exposure to the sun for at least part of the day.	**CANDIDATE**: The OA communities (Little River and the DFO Drain) within the Study Area may provide suitable habitat.
Snapping Turtle	Inhabits shallow waters where they can hide under the soft mud and leaf litter. Nesting sites usually occur on gravely or sandy areas along streams. Snapping Turtles often take advantage of man-made structures for nest sites, including roads (especially gravel shoulders), dams and aggregate pits.	**CANDIDATE**: The OA communities (Little River and the DFO Drain) within the Study Area may provide suitable habitat.
Climbing Prairie Rose	Climbing Prairie rose occurs only in close proximity to the great lakes, primarily in Essex County, with additional populations in Chatham-Kent, Lambton County, and Middlesex County. It colonizes open habitats including agricultural land and unoccupied urban habitat, showing a preference for those with moist heavier soils (COSEWIC, 2003).	**CANDIDATE:** May occur within the THDM3 community where rose species were identified during the field investigation. Recommended that species be verified later in the season.
Honey Locust	Occurs on moist, rich bottomlands, species is intolerant of shade (Farrar, 1995).	**CANDIDATE:** The SWDM3-3/CGL community within the Study Area may provide suitable habitat.
Monarch	Exist primarily wherever milkweed and wildflowers exist; abandoned farmland, along roadsides, and other open spaces	**CANDIDATE**: The THDM3 communities within the Study Area may provide an abundance of Common Milkweed.
Differential Grasshopper	Restricted to southwestern Ontario where it can be locally extremely abundant in late summer and fall. It appears to prefer moist meadows and areas adjacent to bodies of water. Large populations in several parks	**CANDIDATE**: The THDM3 communities adjacent to the OA communities within the Study Area may provide suitable habitat.

Table 4.2 SOCC Habitat Suitability Assessment in the Study Area

Species	Habitat Description	Assessment Results
	and conservation areas (Marshall and Paiero 2006)	
Brindled Madtom	The Brindled Madtom lives on bottoms of sand, gravel, and wood debris in the warm shallows of slow-moving streams.	**ABSENT –**The unifrom constructed steep armourstone shoreline and muck substrate lacking aquatic macrohytes growth do not provide suitable conditions preferred by this species.

Animal Movement Corridors

Migration corridors are areas that are traditionally used by wildlife to move from one habitat to another. This is usually in response to different seasonal habitat requirements. There is one type of animal movement corridor in Ecoregion 7E: amphibian movement corridors. This corridor is identified after amphibian breeding habitat (woodlands) areas are confirmed. Amphibian breeding surveys were not conducted for the Project and are beyond the scope of this assessment.

A summary of the SWH assessment for the Study Area is documented in **Table 4.3**.

Table 4.3 Significant Wildlife Habitat Assessment

Type	Habitat Type (MNRF 2015)	Habitat Description	Candidate SWH in Study Area
Seasonal Concentration Areas	Bat hibernacula	Abandoned mine shafts, underground foundations, caves, and crevices.	**ABSENT**
	Deer wintering congregation areas and deer yards	Deer yards are mapped by MNRF.	**ABSENT:** No deer yards are mapped by NDMNRF in the Study Area (NDMNRF 2021a).
	Colonially – nesting bird breeding habitat (bank and cliff)	Eroding banks, sandy hills, steep slopes, rock faces or piles. Cliff faces. Does not include disturbed soil areas such as berms, embankments, oil or aggregate stockpiles.	**ABSENT**
	Colonially – nesting bird breeding habitat (trees/shrubs)	Dead trees in large marshes and lakes, flooded timber, and shrubs, with nests of Great Blue Heron, Great Egret, Green Heron, or Black-crowned Night-Heron.	**ABSENT**
	Colonially – nesting bird breeding habitat (ground)	Rock islands and peninsulas in a lake or large river.	**ABSENT**

Table 4.3 Significant Wildlife Habitat Assessment

Type	Habitat Type (MNRF 2015)	Habitat Description	Candidate SWH in Study Area
	Waterfowl stopover and staging areas	Fields with evidence of annual spring flooding from meltwater or runoff; aquatic habitats such as ponds, marshes, lakes, bays, and watercourses used during migration, including large marshy wetlands.	**CANDIDATE:** Little River may support large aggregations of waterfowl.
	Shorebird migratory stopover area	Muddy and unvegetated shorelines, beach areas, bars.	**ABSENT**
	Raptor wintering areas	Combination of fields and woodland (>20 ha).	**ABSENT**
	Bat maternity colonies	Mixed and deciduous forests and swamps with large diameter dead or dying trees with cavities.	**ABSENT**
	Reptile hibernacula	Rock piles or slopes, stone fences, crumbling foundations.	**ABSENT**
	Turtle wintering area	Permanent waterbodies and large wetlands with sufficient dissolved oxygen; man-made ponds are not considered SWH.	**CANDIDATE:** Little River and the DFO Drain may provide suitable overwintering habitat.
	Migratory butterfly stopover area	Fields and forests that are a minimum of 10 ha and are located within 5 km of Lake Erie or Lake Ontario.	**ABSENT:** The Study Area is > 5 km from Lake Ontario or Lake Erie.
	Land bird migratory stopover area	Woodlands of a minimum size located within 5 km of Lake Erie or Lake Ontario.	**ABSENT**
Rare Vegetation Communities	Sand barren, alvar, cliffs and talus slopes	Sand barren, Alvar, Cliff and Talus ELC Community Classes, and other areas of exposed bed rock and patchy soil development, near vertical exposed bedrock and slopes of rock rubble.	**ABSENT**
	Prairie and savannah	Open canopy habitats (tree cover < 60%) dominated by prairie species.	**ABSENT**
	Old growth forest	Relatively undisturbed, structurally complex; dominant trees > 100 years' old.	**ABSENT**
	Other rare vegetation communities	Vegetation communities ranked S1-S3 by the NHIC.	**ABSENT**

Table 4.3 Significant Wildlife Habitat Assessment

Type	Habitat Type (MNRF 2015)	Habitat Description	Candidate SWH in Study Area
Specialized Habitat for Wildlife	Waterfowl nesting areas	Upland habitats adjacent to wetlands.	**ABSENT:** Wetland communities are too small to support adjacent significant waterfowl nesting areas.
	Bald Eagle and Osprey nesting, foraging and perching habitat	Treed communities adjacent to rivers, lakes, ponds, and other wetlands with stick nests of Bald Eagle or Osprey.	**ABSENT:** No stick nests were observed during field investigations.
	Woodland raptor nesting habitat	Stick nests in forested ELC communities >30 ha with 10 ha of interior habitat.	**ABSENT**
	Turtle nesting areas	Exposed soil, including sand and gravel in open sunny areas in proximity to wetlands.	**ABSENT:** No natural turtle nesting habitat was observed.
	Seeps and springs	Any forested area with groundwater at surface within the headwaters of a stream or river system.	**CANDIDATE** The SWDM3-3/CGL community within the Study Area may contain seeps and springs.
	Amphibian breeding habitat (woodland and wetland)	Treed uplands with vernal pools, and wetland ecosites.	**CANDIDATE** The SWDM3-3/CGL community within the Study Area may contain suitable amphibian breeding habitat.
	Woodland area sensitive breeding bird habitat	Large mature forest stands, woodlots >30 ha with interior forest habitat (i.e. at least 200 m from edge).	**ABSENT**
Habitat for Species of Conservation Concern	Open country bird breeding habitat	Large grasslands and fields (>30 ha) with two or more of the following species: Upland Sandpiper, Grasshopper Sparrow, Vesper Sparrow, Northern Harrier, Savannah Sparrow OR with nesting Short-eared Owls.	**ABSENT**
	Shrub/early successional bird breeding habitat	Large shrub and thicket habitats (>10 ha) with: • At least one Brown Thrasher or Clay-colored Sparrow breeding, OR • At least two of Field Sparrow, Black-billed Cuckoo, Eastern Towhee and Willow Flycatcher, OR • Nesting Yellow-breasted Chat or Golden-winged Warbler.	**ABSENT**

Table 4.3 Significant Wildlife Habitat Assessment

Type	Habitat Type (MNRF 2015)	Habitat Description	Candidate SWH in Study Area
	Marsh bird breeding habitat	Wetlands with shallow water and emergent aquatic vegetation with American Bittern, Virginia Rail, Sora, Common Moorhen, American Coot, Pied-billed Grebe, Marsh Wren, Sedge Wren, Common Loon, Sandhill Crane, Green Heron, Trumpeter Swan, Black Tern, or Yellow Rail	**ABSENT**
	Terrestrial Crayfish	Wet meadows and edges of shallow marshes with burrows or chimneys.	**ABSENT:** There were no crayfish chimneys identified.
	Special Concern and provincially rare (S1-S3) wildlife	An assessment of habitat for special concern and provincially rare wildlife is included in **Table 4.2**.	**PRESENT:** Potentially suitable habitat for Eastern Wood-Pewee, Wood Thrush, Midland Painted Turtle, Northern Map Turtle, Snapping Turtle, Climbing Prairie Rose, Honey Locust, Monarch, and Differential Grasshopper is present in the Study Area.
Animal Movement Corridors	Amphibian movement corridors	Associated with confirmed amphibian breeding habitat.	**CANDIDATE:** Dependent on amphibian surveys, the Study Area may provide suitable habitat for amphibian movement.

4.4 Fish Habitat

The Little River and the embayment connecting the Little River with the Pumping Station provide fish habitat as defined in subsection 2(1) of the *Fisheries Act*. Up to eight (8) species of fish have been recorded in the Little River.

5 Description of Work

The new pumping station is proposed to the south of the existing Pontiac Pumping Station for LRPCP by-pass improvements. A new underground pipe would be installed from the LRPCP by-pass manhole to the new pumping station and a new underground forcemain would be installed at the new pumping station, which will discharge the flow to the Little River at a downstream location of the existing Pontiac Pumping Station discharge channel. **Figure 3** shows the footprint of the proposed building and connecting infrastructure on the aerial photograph. Design drawings are included in **Appendix C.**

6 Impact Assessment

Potential impacts associated with the construction of the proposed building and connecting infrastructure include soil compaction, siltation of adjacent natural communities, vegetation disturbance, spills of deleterious substances into the Little River, noise disturbance and encounters with wildlife. The impacts are considered short term, localized to the construction area during construction activities, and will be mitigated through the application of appropriate construction techniques and mitigation measures as discussed in **Section 7**.

6.1 Terrestrial Habitat

Impacts from construction of the proposed building and connecting infrastructure will primarily be limited to anthropogenic habitats that do not support wildlife. Construction of the outlet sewer will result in a small, short-term impact to a thicket communities. No permanent impacts to breeding birds, reptiles or other wildlife species, is expected as a result of the construction of the proposed building and connecting infrastructure provided mitigation measures recommended in **Section 7** are implemented.

6.2 Species at Risk and Species of Conservation Concern

Eight SAR have the potential to be present in the Study Area: Barn Swallow, Chimney Swift, bat SAR (4 species), Butler's Gartersnake and Eastern Foxsnake. Of these, Butler's Gartersnake and Eastern Foxsnake are the only SAR that have potential to be present within the work zone. Mitigation measures for SAR snakes are discussed in **Section 7**.

Climbing prairie rose is a SOCC that may be present within the impacted thicket community. A site visit to look for this species is recommended prior to vegetation removal. If the species is present, relocation may be needed.

6.3 Fish and Fish Habitat

Construction of the proposed building and connecting infrastructure will result in a short-term impact to fish habitat as a result of the temporary isolation and dewatering of the work area. No permanent impacts to fish and fish habitat are expected as a result of the construction of the proposed building and connecting infrastructure provided mitigation and contingency measures are followed. Mitigation measures for the protection of fish and fish habitat are provided in **Section 7**.

7 Mitigation Measures

7.1 General Mitigation Measures

The following general mitigation measures are recommended:

- Construction fencing shall be installed prior to the start of construction, after layout, and shall be reviewed by an engineer.
- A containment and spill management plan will be implemented to reduce the risk of deleterious substances from entering the watercourse.
- An emergency spill kit will be kept on site.
- Service equipment shall be washed, refueled and/or a minimum of 30 m from watercourses to reduce the risk of deleterious substances entering the watercourse.
- Construction machinery shall be cleaned prior to entering the site to reduce the potential for establishment of invasive species, such as *Phragmites*.

7.2 Erosion and Sediment Control

Appropriate erosion and sediment controls should be employed during all phases of construction to reduce erosion and sediment transport into the Little River to the extent possible. Mitigation measures to reduce the risk of negative effects on fish, fish habitat and water quality in the Little River are listed below.

- Silt fence will be installed around the perimeter of the work area
- Materials requiring stockpiling (fill, topsoil, etc.) will be stabilized and kept outside of the floodplain
- All disturbed areas are to be restored with erosion protection/vegetative cover following disturbance
- Erosion and sediment control materials (silt fence, strawbales, clear stone) are to be kept on site for emergencies and repairs
- Erosion and sediment controls should be monitored and maintained, as required. Controls are to be removed only after the soils of the construction area have been stabilized and adequately protected until cover is re-established
- Conditions of the anticipated ERCA permit under Ontario Regulation (O. Reg.) 158/06 should be followed during these activities

7.3 Protection of Migratory Birds

The *Migratory Birds Convention Act,* 1995 (MBCA) provides legal protection of migratory birds and their active nests in Canada. The loss of migratory bird nests, eggs and/or nestlings due to tree cutting or other vegetation clearing can be avoided by limiting clearing of vegetation to outside of the general nesting

period for migratory birds in this region (C2) as identified by Environment and Climate Change Canada (ECCC) (i.e., between April 1 and August 31) (ECCC 2019). If work must be performed within this window, a survey for active nests or breeding activity should be conducted by a qualified biologist before work commences and additional mitigation measures (e.g., implementation of avoidance distances during construction) implemented, if required.

7.4 Butler's Gartersnake and Eastern Foxsnake Mitigation

The sensitive periods of the year for Butler's Gartersnake and Eastern Foxsnake include hibernation and breeding. The breeding and birthing period for this species is between late May and September (COSEWIC 2010) while the hibernation period for the species is approximately November 1 – March 31, but individuals may emerge earlier during warm spring weather (MECP 2019; COSEWIC 2010).

If work is to be completed between April 1 and October 31 (i.e., during the active period for the species; MECP 2019, COSEWIC 2010) the following mitigation is recommended :

- All persons entering the site should be provided training about Butler's Gartersnakes and Eastern Foxsnake and proper steps to take upon encountering these species.
- If Crayfish burrows, ant hills, small mammal burrows or other potential hibernacula features are observed, they should not be impacted during a time of year when they may be in use by hibernating snakes (i.e., October 1 to April 30).
- Vegetation brushing or removal that is required to facilitate the Activity must be limited to the smallest extent possible, ideally under guidance of a qualified biologist, and while air temperatures are above 10°C, when snakes are more active and able to flee.
- To reduce interaction with Butler's Gartersnake and Eastern Foxsnake, sediment fencing is recommended along the border of the Work Zone to reduce interactions of snakes on site. Installation of sediment fencing will occur before April 1 or after October 31 (i.e., outside of snake active season) to define Work Zones and restrict the movement of snakes into the working area. If the installation of fencing occurs during the active season, it is recommended that the area be searched by a Qualified Biologist for the presence of snakes prior to installation of fencing. Fencing materials with plastic mesh will not be used due to risk of entanglement of snakes or other wildlife. Further specifications for reptile exclusion fencing should follow *Best Practices Technical Note – Reptile and Amphibian Exclusion Fencing* (MNR 2013) and *Best Management Practices for Mitigating the Effects of Road Mortality on Amphibian and Reptile Species at Risk in Ontario* (MNRF 2016). As per the recommendations fencing should be buried to a depth of 10-20cm and a height of 200cm. The exclusion fencing is to be maintained around the work area for the duration of the active season and checked daily to identify any repairs that may be needed. Fencing should be repaired immediately if it is found to be deficient.
- A thorough visual search of the Work Zone by construction contractors is recommended before work commences each day. Visual searches should include inspection of machinery and equipment, prior to starting equipment, particularly during the peak reptile activity period from April 1 to October 31.

- In the unlikely event that a Butler's Gartersnake or Eastern Foxsnake enters the work area and is in immediate danger, a 30 m buffer should be placed on the work area and construction activities should cease until the snake has vacated the work area on its own accord before recommencing construction activity. If the reptile does not vacate the area within a reasonable time, a qualified individual may be used to relocate the reptile to a safe location away from the Work Zone.

7.5 Protection of Fish and fish Habitat

In addition to the measures identified in **Sections 7.1** and **7.2** the following specific measures are recommended to protect fish and fish habitat should in-water work be required.

- Avoid in-water work during the restricted activity period for spring spawning fish species in the MNRF's Southern Region (i.e., no in-water work March 15 to July 15) (MNR 2013).
- The contractor should monitor the five-day weather forecast on a daily basis to anticipate weather conditions and should be prepared to leave the site in a stable and secure condition should water levels rise.
- Prior to instream construction activity, fish should be rescued from the isolated work areas by implementing a fish removal and relocation plan.
- During dewatering of the in-water work areas the dewatering pump inlet should be covered with filter fabric or clear stone. The outlet should discharge to a sediment bag or trap. Discharge from the bag should be released to a relatively flat vegetated location or if vegetated location is not available, a flow dissipating structure should be provided.
- Water from dewatering and unwatering operations should be directed to a sediment control measure and/or a vegetated discharge are 30 m away from the waterbodies or as far as practical form the top of bank of any waterbody, prior to discharge to the natural environment. No dewatering shall be sent directly to a sewer. These control measures shall be monitored for effectiveness and maintained or revised to meet the objective of reducing the risk of the entry of sediment into the watercourse.
- All water intakes used to dewater area(s) that may contain fish should be screened to reduce the risk of the impingement and entrainment of fish as per DFO's *Interim Code of Practice: End-of-Pipe Fish Protection Screens for Small Water Intakes in Freshwater* (DFO 2021c).

8 Permitting Considerations

8.1 Essex Region Conservation Authority

Conservation Authorities Act - The Study Area is located in ERCA's regulated area related to the Little River and its associated floodplain. As such, development in the ERCA regulated area is subject to the policies of O. Reg. 158/06 under the *Conservation Authorities Act*.

8.2 Ministry of the Environment, Conservation and Parks

***Endangered Species Act,* 2007** - Nine SAR have the potential to be present in the Study Area: Barn Swallow, Chimney Swift, bat SAR (4 species), Butler's Gartersnake and Eastern Foxsnake However, there is a low likelihood of occurrence within the Work Zone as the area is heavily disturbed. Avoidance of the migratory bird nesting season (April 1 - August 31) and active reptile season (April 1 and October 31) is recommended. If this is not possible, then bird nesting surveys must be completed in advance of construction as well as the erection of proper exclusionary fencing for reptiles form the Work Zone. With the implementation of this mitigation, no authorizations are anticipated under the ESA.

8.3 Fisheries and Oceans Canada

Fisheries Act* and *Species at Risk Act - Under the fish and fish habitat protection provisions of the *Fisheries Act*, works, undertaking or activity of a project must incorporate measures to avoid causing the death of fish and the harmful alteration, disruption or destruction (HADD) of fish habitat. To assist proponents with determining if their project will comply with the fish and fish habitat provisions, DFO provides measures to protect fish and fish habitat (DFO 2022b) as well as several standards and codes of practice (DFO 2022c). If it is determined that a project cannot implement the measures to protect fish and fish habitat and if there are no applicable standards and codes of practice, then it is recommended that the proponent request a review of the project by DFO. If DFO determines that a project will result in the death of fish and/or HADD if fish habitat an Authorization under the *Fisheries Act* may be required (DFO 2021d).

Based on the presence of fish habitat in the Study Area, the proposed activities, and DFO's current guidelines, Stantec recommends that a DFO Request for Review form be completed and submitted to DFO for review of the project under the *Fisheries Act*. DFO also reviews projects under the federal *Species at Risk Act*; however, there are no records of federally regulated aquatic SAR in the Study Area.

9 Summary

The City is proposing to construct a new pumping station to the south of the existing Pontiac Pumping Station for LRPCP by-pass improvements. A new underground pipe would be installed from the LRPCP by-pass manhole to the new pumping station. A new underground forcemain would be installed at the new pumping station that discharges the flow to the Little River at a downstream location of the existing Pontiac Pumping Station discharge channel.

The proposed activities have the potential to impact warmwater fish habitat and vegetation communities. Impacts to fish and fish habitat and terrestrial natural heritage resources can be avoided through mitigation measures described in **Section 7** of this report. No provincially or federally protected species will be impacted by the proposed activities.

With respect to permitting requirements, a permit will be required from ERCA under O. Reg. 158/06. Due to the need to construct below the high water level of the Little River, a DFO Request for Review is recommended. No permitting requirements were identified under the provincial ESA or federal SARA.

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APPENDICES

Appendix A Figures

Stantec

Legend

- Study Area (120 m)
- Constructed Drain (NDMNRF 2022)
- Watercourse (Permanent)(NDMNRF 2022)
- Lot
- Thermal Regime, Warm
- Waterbody
- Wooded Area (NDMNRF 2022)

0 20 40 m

1:1,600 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2022.
3. Orthoimagery © First Base Solutions, 2022. Imagery Date, 2021.

Project Location
City of Windsor

165620249 REV4
Prepared by BK on 2022-06-07
Technical Review by DH on 2022-03-30

Client/Project
CITY OF WINDSOR
PONTIAC PUMPING STATION

Figure No.
1

Title
Site Location and Background Data

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Stantec

Legend

- Study Area (120 m)
- ELC Boundary
- Constructed Drain (NDMNRF 2022)
- Watercourse (Permanent) (NDMNRF 2022)
- Wooded Area (NDMNRF 2022)

ELC Description

CVI_3: Sewage and Water Treatment Plant

CVR_3: Single Family Residential

OA: Open Water

SAGM5: Nursery

SWDM3-3 / CGL: Swamp Maple Mineral Deciduous Swamp Type / Green Lands

TAGM5: Fencerow

THDM3: Dry - Fresh Deciduous Hedgerow Thicket Ecosite

0 20 40 m

1:1,600 (At original document size of 11x17)

Notes

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Project Location
City of Windsor

165620249 REV4
Prepared by BK on 2022-06-07
Technical Review by DH on 2022-03-30

Client/Project
CITY OF WINDSOR
PONTIAC PUMPING STATION

Figure No.
2

Title
Existing Conditions

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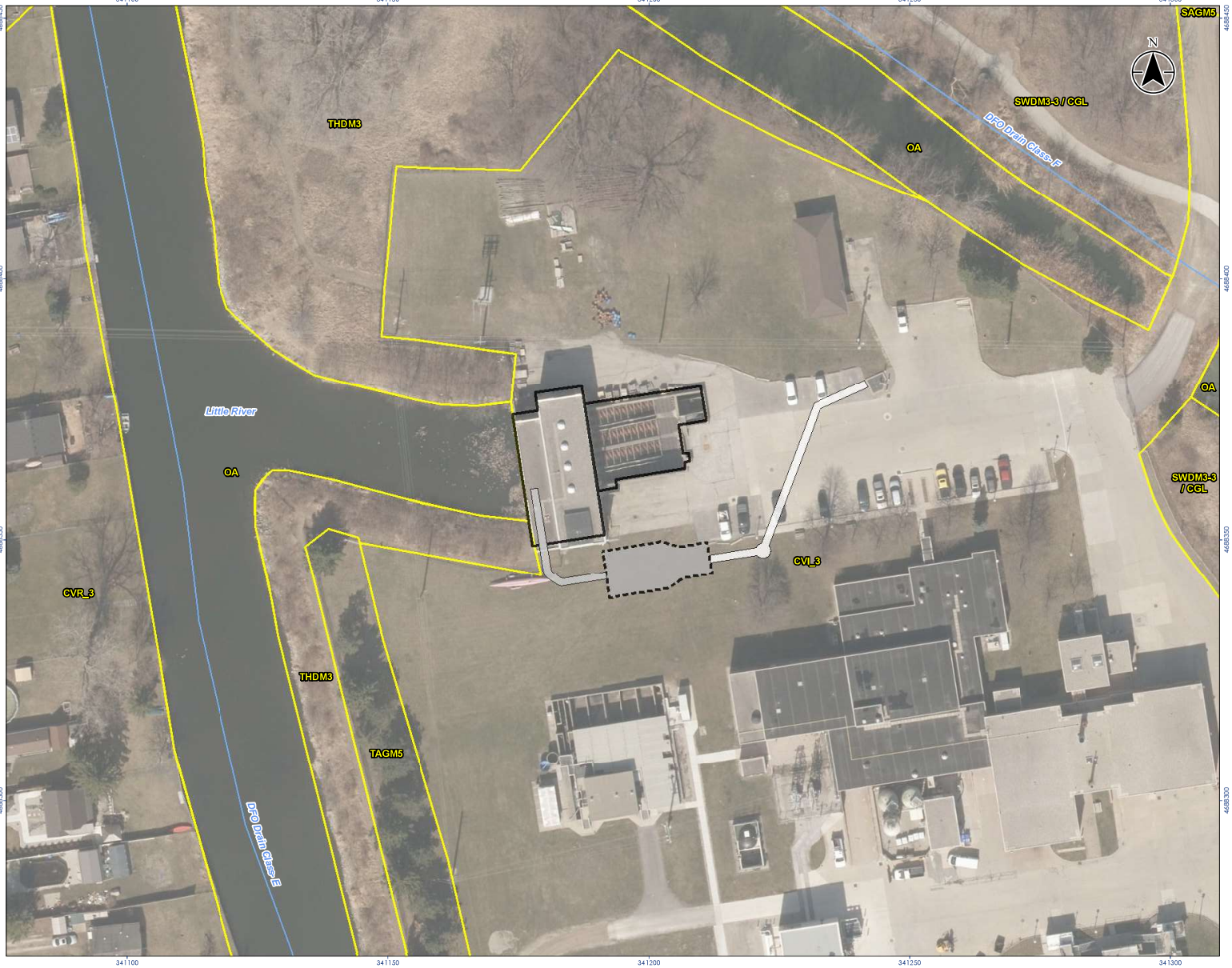

Stantec

Legend

- Proposed Pumping Station
- Existing Pontiac Pumping Station
- Proposed Connecting Pipe
- Proposed Outlet Sewer (Alternative 1)
- ELC Boundary
- Constructed Drain (NDMNRF 2022)

ELC Description

CVI_3: Sewage and Water Treatment Plant

CVR_3: Single Family Residential

OA: Open Water

SAGM5: Nursery

SWDM3-3 / CGL: Swamp Maple Mineral Deciduous Swamp Type / Green Lands

TAGM5: Fencerow

THDM3: Dry - Fresh Deciduous Hedgerow Thicket Ecosite

0 10 20 m

1:750 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
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3. Orthoimagery © First Base Solutions, 2022. Imagery Date, 2021.

Project Location
City of Windsor

165620249 REV4
Prepared by BK on 2022-08-15
Technical Review by DH on 2022-03-30

Client/Project
CITY OF WINDSOR
PONTIAC PUMPING STATION

Figure No.
3

Title
Proposed Construction

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Appendix B Photographic Record

Photo 1: Conditions along the shoreline facing east. Date: April 13, 2022.

Photo 2: Conditions along the shoreline facing southeast. Date: April 13, 2022.

Photo 3: Conditions along the shoreline facing north. Date: April 13, 2022.

Photo 4: Conditions at the proposed pumping station facing south. Date: April 13, 2022.

Photo 5: Conditions at the proposed pumping station facing east. Date: April 13, 2022.

Photo 6: Conditions at the proposed pumping station facing west. Date: April 13, 2022.

Stantec

Client/Project	Date
The City of Windsor	16/06/2022
LRPCP By-Pass Improvements at Pontiac Pumping Station	Project No. 165620249
Appendix B PHOTOGRAPHIC RECORD	Page Page 1 of 1

Appendix C By-Pass Improvements Design

AERIAL PLAN
SCALE: 1:250

Stantec

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www.stantec.com

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Legend

Notes

Revision	By	Appd.	YY.MM.DD
A	J.L.	J.L.	2022.04.04
Issued	By	Appd.	YY.MM.DD
File Name: 165620249_SW-101_option	Q.K. Dwn.	J.L. Chkd.	J.L. Dsgn.	2021.09.14 YY.MM.DD

Permit/Seal

PRELIMINARY NOT FOR CONSTRUCTION

Not for permits, pricing or other official purposes. This document has not been completed or checked and is for general information or comment only.

Client/Project
CORPORATION OF THE CITY OF WINDSOR
LITTLE RIVER POLLUTION CONTROL PLANT
PONTIAC PUMPING STATION UPGRADE
NEW PUMPING STATION

City of Windsor, Ontario

Title
SITE PLAN

Project No.
165620249

Scale
AS SHOWN

Revision Sheet

Drawing No.
SW-101

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APPENDIX C

Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes – Checklist

Ontario

Ministry of Tourism, Culture and Sport

Programs & Services Branch
401 Bay Street, Suite 1700
Toronto ON M7A 0A7

Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes

A Checklist for the Non-Specialist

The **purpose of the checklist** is to determine:

- if a property(ies) or project area:
    - is a recognized heritage property
    - may be of cultural heritage value
- it includes all areas that may be impacted by project activities, including – but not limited to:
    - the main project area
    - temporary storage
    - staging and working areas
    - temporary roads and detours

Processes covered under this checklist, such as:

- *Planning Act*
- *Environmental Assessment Act*
- *Aggregates Resources Act*
- *Ontario Heritage Act* – Standards and Guidelines for Conservation of Provincial Heritage Properties

Cultural Heritage Evaluation Report (CHER)

If you are not sure how to answer one or more of the questions on the checklist, you may want to hire a qualified person(s) (see page 5 for definitions) to undertake a cultural heritage evaluation report (CHER).

The CHER will help you:

- identify, evaluate and protect cultural heritage resources on your property or project area
- reduce potential delays and risks to a project

Other checklists

Please use a separate checklist for your project, if:

- you are seeking a Renewable Energy Approval under Ontario Regulation 359/09 – separate checklist
- your Parent Class EA document has an approved screening criteria (as referenced in Question 1)

Please refer to the Instructions pages for more detailed information and when completing this form.

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Project or Property Name

Pontiac Pumping Station Capacity Upgrades, Schedule C Class EA, City of Windsor

Project or Property Location (upper and lower or single tier municipality)

Little River Pollution Control Plant in Windsor Ontario

Proponent Name

Chandana Walgama, P. Eng, Pollution Control Project Engineer, City of Windsor

Proponent Contact Information

Address: 4155 Ojibway Parkway. Windsor, Ontario N9C 4A5 Email: cwalgama@citywindsor.ca

Screening Questions

	Yes	No
1. Is there a pre-approved screening checklist, methodology or process in place?	☐	☑

If Yes, please follow the pre-approved screening checklist, methodology or process.

If No, continue to Question 2.

Part A: Screening for known (or recognized) Cultural Heritage Value

	Yes	No
2. Has the property (or project area) been evaluated before and found **not** to be of cultural heritage value?	☐	☑

If Yes, do **not** complete the rest of the checklist.

The proponent, property owner and/or approval authority will:

- summarize the previous evaluation and
- add this checklist to the project file, with the appropriate documents that demonstrate a cultural heritage evaluation was undertaken

The summary and appropriate documentation may be:

- submitted as part of a report requirement
- maintained by the property owner, proponent or approval authority

If No, continue to Question 3.

	Yes	No
3. Is the property (or project area):		
a. identified, designated or otherwise protected under the *Ontario Heritage Act* as being of cultural heritage value?	☐	☑
b. a National Historic Site (or part of)?	☐	☑
c. designated under the *Heritage Railway Stations Protection Act*?	☐	☑
d. designated under the *Heritage Lighthouse Protection Act*?	☐	☑
e. identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office (FHBRO)?	☐	☑
f. located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site?	☐	☑

If Yes to any of the above questions, you need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report, if a Statement of Cultural Heritage Value has not previously been prepared or the statement needs to be updated

If a Statement of Cultural Heritage Value has been prepared previously and if alterations or development are proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If No, continue to Question 4.

Part B: Screening for Potential Cultural Heritage Value

	Yes	No
4. Does the property (or project area) contain a parcel of land that:		
a. is the subject of a municipal, provincial or federal commemorative or interpretive plaque?	☐	☑
b. has or is adjacent to a known burial site and/or cemetery?	☐	☑
c. is in a Canadian Heritage River watershed?	☐	☑
d. contains buildings or structures that are 40 or more years old?	☑	☐

Part C: Other Considerations

	Yes	No
5. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area):		
a. is considered a landmark in the local community or contains any structures or sites that are important in defining the character of the area?	☐	☑
b. has a special association with a community, person or historical event?	☐	☑
c. contains or is part of a cultural heritage landscape?	☐	☑

If Yes to one or more of the above questions (Part B and C), there is potential for cultural heritage resources on the property or within the project area.

You need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report (CHER)

If the property is determined to be of cultural heritage value and alterations or development is proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If No to all of the above questions, there is low potential for built heritage or cultural heritage landscape on the property.

The proponent, property owner and/or approval authority will:

- summarize the conclusion
- add this checklist with the appropriate documentation to the project file

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g. under the *Environmental Assessment Act, Planning Act* processes
- maintained by the property owner, proponent or approval authority

Instructions

Please have the following available, when requesting information related to the screening questions below:

- a clear map showing the location and boundary of the property or project area
  - large scale and small scale showing nearby township names for context purposes
- the municipal addresses of all properties within the project area
- the lot(s), concession(s), and parcel number(s) of all properties within a project area

For more information, see the Ministry of Tourism, Culture and Sport's Ontario Heritage Toolkit or Standards and Guidelines for Conservation of Provincial Heritage Properties.

In this context, the following definitions apply:

- **qualified person(s)** means individuals – professional engineers, architects, archaeologists, etc. – having relevant, recent experience in the conservation of cultural heritage resources.
- **proponent** means a person, agency, group or organization that carries out or proposes to carry out an undertaking or is the owner or person having charge, management or control of an undertaking.

1. Is there a pre-approved screening checklist, methodology or process in place?

An existing checklist, methodology or process may already be in place for identifying potential cultural heritage resources, including:

- one endorsed by a municipality
- an environmental assessment process e.g. screening checklist for municipal bridges
- one that is approved by the Ministry of Tourism, Culture and Sport (MTCS) under the Ontario government's Standards & Guidelines for Conservation of Provincial Heritage Properties [s.B.2.]

Part A: Screening for known (or recognized) Cultural Heritage Value

2. Has the property (or project area) been evaluated before and found not to be of cultural heritage value?

Respond 'yes' to this question, if all of the following are true:

A property can be considered not to be of cultural heritage value if:

- a Cultural Heritage Evaluation Report (CHER) - or equivalent - has been prepared for the property with the advice of a qualified person and it has been determined not to be of cultural heritage value and/or
- the municipal heritage committee has evaluated the property for its cultural heritage value or interest and determined that the property is not of cultural heritage value or interest

A property may need to be re-evaluated, if:

- there is evidence that its heritage attributes may have changed
- new information is available
- the existing Statement of Cultural Heritage Value does not provide the information necessary to manage the property
- the evaluation took place after 2005 and did not use the criteria in Regulations 9/06 and 10/06

Note: Ontario government ministries and public bodies [prescribed under Regulation 157/10] may continue to use their existing evaluation processes, until the evaluation process required under section B.2 of the Standards & Guidelines for Conservation of Provincial Heritage Properties has been developed and approved by MTCS.

To determine if your property or project area has been evaluated, contact:

- the approval authority
- the proponent
- the Ministry of Tourism, Culture and Sport

3a. Is the property (or project area) identified, designated or otherwise protected under the *Ontario Heritage Act* as being of cultural heritage value e.g.:

i. designated under the *Ontario Heritage Act*

- individual designation (Part IV)
- part of a heritage conservation district (Part V)

Individual Designation – Part IV

A property that is designated:

- by a municipal by-law as being of cultural heritage value or interest [s.29 of the *Ontario Heritage Act*]
- by order of the Minister of Tourism, Culture and Sport as being of cultural heritage value or interest of provincial significance [s.34.5]. **Note**: To date, no properties have been designated by the Minister.

Heritage Conservation District – Part V

A property or project area that is located within an area designated by a municipal by-law as a heritage conservation district [s. 41 of the *Ontario Heritage Act*].

For more information on Parts IV and V, contact:

- municipal clerk
- Ontario Heritage Trust
- local land registry office (for a title search)

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ii. subject of an agreement, covenant or easement entered into under Parts II or IV of the *Ontario Heritage Act*

An agreement, covenant or easement is usually between the owner of a property and a conservation body or level of government. It is usually registered on title.

The primary purpose of the agreement is to:

- preserve, conserve, and maintain a cultural heritage resource
- prevent its destruction, demolition or loss

For more information, contact:

- Ontario Heritage Trust - for an agreement, covenant or easement [clause 10 (1) (c) of the *Ontario Heritage Act*]
- municipal clerk – for a property that is the subject of an easement or a covenant [s.37 of the *Ontario Heritage Act*]
- local land registry office (for a title search)

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iii. listed on a register of heritage properties maintained by the municipality

Municipal registers are the official lists - or record - of cultural heritage properties identified as being important to the community.

Registers include:

- all properties that are designated under the *Ontario Heritage Act* (Part IV or V)
- properties that have not been formally designated, but have been identified as having cultural heritage value or interest to the community

For more information, contact:

- municipal clerk
- municipal heritage planning staff
- municipal heritage committee

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iv. subject to a notice of:

- intention to designate (under Part IV of the *Ontario Heritage Act*)
- a Heritage Conservation District study area bylaw (under Part V of the *Ontario Heritage Act*)

A property that is subject to a **notice of intention to designate** as a property of cultural heritage value or interest and the notice is in accordance with:

- section 29 of the *Ontario Heritage Act*
- section 34.6 of the *Ontario Heritage Act.* **Note**: To date, the only applicable property is Meldrum Bay Inn, Manitoulin Island. [s.34.6]

An area designated by a municipal by-law made under section 40.1 of the *Ontario Heritage Act* as a **heritage conservation district study area**.

For more information, contact:

- municipal clerk – for a property that is the subject of notice of intention [s. 29 and s. 40.1]
- Ontario Heritage Trust

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v. included in the Ministry of Tourism, Culture and Sport's list of provincial heritage properties

Provincial heritage properties are properties the Government of Ontario owns or controls that have cultural heritage value or interest.

The Ministry of Tourism, Culture and Sport (MTCS) maintains a list of all provincial heritage properties based on information provided by ministries and prescribed public bodies. As they are identified, MTCS adds properties to the list of provincial heritage properties.

For more information, contact the MTCS Registrar at registrar@ontario.ca.

3b. Is the property (or project area) a National Historic Site (or part of)?

National Historic Sites are properties or districts of national historic significance that are designated by the Federal Minister of the Environment, under the *Canada National Parks Act*, based on the advice of the Historic Sites and Monuments Board of Canada.

For more information, see the National Historic Sites website.

3c. Is the property (or project area) designated under the *Heritage Railway Stations Protection Act*?

The *Heritage Railway Stations Protection Act* protects heritage railway stations that are owned by a railway company under federal jurisdiction. Designated railway stations that pass from federal ownership may continue to have cultural heritage value.

For more information, see the Directory of Designated Heritage Railway Stations.

3d. Is the property (or project area) designated under the *Heritage Lighthouse Protection Act*?

The *Heritage Lighthouse Protection Act* helps preserve historically significant Canadian lighthouses. The Act sets up a public nomination process and includes heritage building conservation standards for lighthouses which are officially designated.

For more information, see the Heritage Lighthouses of Canada website.

3e. Is the property (or project area) identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office?

The role of the Federal Heritage Buildings Review Office (FHBRO) is to help the federal government protect the heritage buildings it owns. The policy applies to all federal government departments that administer real property, but not to federal Crown Corporations.

For more information, contact the Federal Heritage Buildings Review Office.

See a directory of all federal heritage designations.

3f. Is the property (or project area) located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site?

A UNESCO World Heritage Site is a place listed by UNESCO as having outstanding universal value to humanity under the Convention Concerning the Protection of the World Cultural and Natural Heritage. In order to retain the status of a World Heritage Site, each site must maintain its character defining features.

Currently, the Rideau Canal is the only World Heritage Site in Ontario.

For more information, see Parks Canada – World Heritage Site website.

Part B: Screening for potential Cultural Heritage Value

4a. Does the property (or project area) contain a parcel of land that has a municipal, provincial or federal commemorative or interpretive plaque?

Heritage resources are often recognized with formal plaques or markers.

Plaques are prepared by:

- municipalities
- provincial ministries or agencies
- federal ministries or agencies
- local non-government or non-profit organizations

For more information, contact:

- municipal heritage committees or local heritage organizations – for information on the location of plaques in their community
- Ontario Historical Society's Heritage directory – for a list of historical societies and heritage organizations
- Ontario Heritage Trust – for a list of plaques commemorating Ontario's history
- Historic Sites and Monuments Board of Canada – for a list of plaques commemorating Canada's history

4b. Does the property (or project area) contain a parcel of land that has or is adjacent to a known burial site and/or cemetery?

For more information on known cemeteries and/or burial sites, see:

- Cemeteries Regulations, Ontario Ministry of Consumer Services – for a database of registered cemeteries
- Ontario Genealogical Society (OGS) – to locate records of Ontario cemeteries, both currently and no longer in existence; cairns, family plots and burial registers
- Canadian County Atlas Digital Project – to locate early cemeteries

In this context, adjacent means contiguous or as otherwise defined in a municipal official plan.

4c. Does the property (or project area) contain a parcel of land that is in a Canadian Heritage River watershed?

The Canadian Heritage River System is a national river conservation program that promotes, protects and enhances the best examples of Canada's river heritage.

Canadian Heritage Rivers must have, and maintain, outstanding natural, cultural and/or recreational values, and a high level of public support.

For more information, contact the Canadian Heritage River System.

If you have questions regarding the boundaries of a watershed, please contact:

- your conservation authority
- municipal staff

4d. Does the property (or project area) contain a parcel of land that contains buildings or structures that are 40 or more years old?

A 40 year 'rule of thumb' is typically used to indicate the potential of a site to be of cultural heritage value. The approximate age of buildings and/or structures may be estimated based on:

- history of the development of the area
- fire insurance maps
- architectural style
- building methods

Property owners may have information on the age of any buildings or structures on their property. The municipality, local land registry office or library may also have background information on the property.

Note: 40+ year old buildings or structure do not necessarily hold cultural heritage value or interest; their age simply indicates a higher potential.

A building or structure can include:

- residential structure
- farm building or outbuilding
- industrial, commercial, or institutional building
- remnant or ruin
- engineering work such as a bridge, canal, dams, etc.

For more information on researching the age of buildings or properties, see the Ontario Heritage Tool Kit Guide Heritage Property Evaluation.

Part C: Other Considerations

5a. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) is considered a landmark in the local community or contains any structures or sites that are important to defining the character of the area?

Local or Aboriginal knowledge may reveal that the project location is situated on a parcel of land that has potential landmarks or defining structures and sites, for instance:

- buildings or landscape features accessible to the public or readily noticeable and widely known
- complexes of buildings
- monuments
- ruins

5b. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) has a special association with a community, person or historical event?

Local or Aboriginal knowledge may reveal that the project location is situated on a parcel of land that has a special association with a community, person or event of historic interest, for instance:

- Aboriginal sacred site
- traditional-use area
- battlefield
- birthplace of an individual of importance to the community

5c. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) contains or is part of a cultural heritage landscape?

Landscapes (which may include a combination of archaeological resources, built heritage resources and landscape elements) may be of cultural heritage value or interest to a community.

For example, an Aboriginal trail, historic road or rail corridor may have been established as a key transportation or trade route and may have been important to the early settlement of an area. Parks, designed gardens or unique landforms such as waterfalls, rock faces, caverns, or mounds are areas that may have connections to a particular event, group or belief.

For more information on Questions 5.a., 5.b. and 5.c., contact:

- Elders in Aboriginal Communities or community researchers who may have information on potential cultural heritage resources. Please note that Aboriginal traditional knowledge may be considered sensitive.
- municipal heritage committees or local heritage organizations
- Ontario Historical Society's "Heritage Directory" - for a list of historical societies and heritage organizations in the province

An internet search may find helpful resources, including:

- historical maps
- historical walking tours
- municipal heritage management plans
- cultural heritage landscape studies
- municipal cultural plans

Information specific to trails may be obtained through Ontario Trails.

APPENDIX C

Heritage Overview Memo

Stantec

Memo

To:	Hannah Rindlisbacher Windsor, ON	From:	Laura Walter and Tracie Carmichael Markham, ON
File:	165620249	Date:	October 25, 2022

Reference: Heritage Overview – Pontiac Pumping Station Capacity Upgrades, Schedule 'C' Municipal Class Environmental Assessment

INTRODUCTION

Stantec Consulting Ltd. (Stantec) was retained by the City of Windsor (the City), to carry out a Municipal Class Environmental Assessment (EA) for the Pontiac Pumping Station Capacity Upgrades (the Project). The Project is classified as a Schedule C project under the Municipal Class EA process. Schedule C projects require the preparation and filing of an Environmental Study Report (ESR) for review by the public and relevant agencies. This Heritage Overview has been completed to identify heritage resources, including built heritage and cultural heritage landscapes, present within, and adjacent to, the Study Area (Appendix A, Figure 1).

In 2018, the City undertook a comprehensive study to understand the causes of the widespread flooding in the City and surrounding municipalities, identify areas and locations in which severe flooding occurs, evaluate high-level alternative solutions to address the flooding, complete high-level designs and cost estimates, and provide an implementation strategy and timing for the proposed solutions. In July of 2020, this study was adopted by the City as the Sewer & Coastal Flood Protection Master Plan (SMP). The SMP identified the need for the expansion of the Pontiac drainage area and hydraulic capacity upgrades at the Pontiac Pumping Station, located on the site of the Little River Pollution Control Plant (LRPCP) at 9400 Little River Road, in the City. The SMP identified the need for a new wet well structure to house three new stormwater pumps, that would increase the level of service in the expanded Pontiac drainage area and provide capacity for a controlled bypass of the LRPCP in the case of a severe storm event. The purpose of this ESR is to evaluate and report on the alterative design concepts for the Pontiac Pumping Station.

This heritage overview consists of completion of the Ministry of Citizenship and Multiculturalism (MCM) *Criteria for Evaluating Potential for built Heritage Resources and Cultural Heritage Landscapes Checklist* (the Checklist). The Checklist identifies protected and potential properties within the Study Area and makes recommendations for further work, as appropriate. The Checklist includes consultation with the municipality, and relevant agencies as well as review of available online materials. Consultation with the City, the Ontario Heritage Trust (OHT), and MCM determined that no heritage properties are located within or adjacent to the Study Area.

The Checklist was prepared by a full member of the Canadian Association of Heritage Professionals (CAHP) who specializes in the identification of heritage resources and the evaluation of cultural heritage value or interest (CHVI).

Reference: **Heritage Overview – Pontiac Pumping Station Capacity Upgrades, Schedule 'C' Municipal Class Environmental Assessment**

METHODOLOGY

REGULATORY REQUIREMENTS

The requirement to consider cultural heritage in the EA process is discussed in the Municipal Class EA Document (Municipal Engineers Association 2015). In this process, the cultural environment, including built heritage resources, cultural heritage landscapes, and archaeological resources, is considered as one in a series of environmental factors when undertaking a Municipal Class EA. The identification of cultural heritage resources is particularly important when describing existing and future conditions, assessing development alternatives, and determining of the preferred alternative. The Municipal Class EA process recognizes that cultural heritage resources that retain heritage attributes should be identified early in the EA process and avoided where possible. Where avoidance is not possible, potential effects to these attributes should be identified and minimized. Adverse impacts should be mitigated according to provincial and municipal guidelines. The requirement to consider cultural heritage is also discussed in the revised 2020 *Provincial Policy Statement* (PPS) (Government of Ontario 2020). Section 2.6 of the PPS addresses cultural heritage in the land use planning process and, as such, these types of resources were considered. The applicable provisions include:

> *2.6.1 - Significant built heritage resources and significant cultural heritage landscapes shall be conserved.*
>
> *2.6.3 - Planning authorities shall not permit development and site alteration on adjacent lands to protected heritage property except where the proposed development and site alteration has been evaluated and it has been demonstrated that the heritage attributes of the protected heritage property will be conserved.*
>
> (Government of Ontario 2020: 31)

MUNICIPAL POLICY FRAMEWORK

The City's *Official Plan* under Section 9 *Heritage Conservation* includes the City's goal, objectives, and policies related to heritage conservation. This section of the plan was approved by the Ministry of Municipal Affairs and Housing on January 6, 2012 (City of Windsor 2013: 9-1). Applicable to this Heritage Overview is the following policies:

9.3.1.2 *Built heritage resources include buildings, structures, monuments, installations or remains associated with architectural, social, political, economic or military history.*

9.3.1.3 *Cultural heritage landscapes are defined geographical areas of heritage significance, which have been modified by human activities such as archaeological sites, heritage conservation districts, parks/gardens, golf courses, neighbourhoods, cemeteries, trail ways, streets, street patterns and industrial complexes of cultural heritage value.*

9.3.6.1 (c) *Ensuring that the activities of all Municipal departments respect the character and significance of Windsor's heritage resources.*

Reference: **Heritage Overview – Pontiac Pumping Station Capacity Upgrades, Schedule 'C' Municipal Class Environmental Assessment**

9.3.7.1 (b) *Ensuring that secondary plan studies, community improvement plans and other planning studies identify heritage resources which may exist in the areas under study and propose means to protect and enhance those heritage resources.*

(City of Windsor 2013)

MUNICIPAL AND AGENCY CONSULTATION

Agency consultation was conducted to determine the presence of previously identified protected properties within, or adjacent to, the Study Area. Forms of protection range from inclusion on a municipal register or list of potential heritage resources to designation under the *Ontario Heritage Act* (OHA) or a provincial easement made under the OHA. In order to determine the presence of any of these protected properties, consultation included correspondence with the following:

- MCM
- OHT
- City of Windsor

EXISTING CONDITIONS

MUNICIPAL AND AGENCY CONSULTATION

Consultation occurred via email and included mapping of the Study Area. At the provincial level, Karla Barboza, Team Lead, Heritage with MCM, responded that there are no properties designated by the Minister or provincial heritage properties within the Study Area. Kevin Baksh, Provincial Heritage Register with OHT, confirmed that the OHT does not have any conservation easements or Trust-owned properties within or adjacent to the Study Area. At the City level, Kristina Tang, Heritage Planner reported that there is no apparent CHVI within the Study Area.

REVIEW OF HISTORIC MAPPING

Late 19th century historic mapping of the Study Area was reviewed to identify the presence of structures, settlements, and other potential resources within the Study Area. The Study Area is situated on part Lot 134, Concession 1 Petite Cote, in the former Township of Sandwich. The 1877 *Map of Essex County Ontario* prepared by H.F. Walling was reviewed (Appendix A, Figure 2). The map depicts Ben Soulier on the north portion of the property with no structures, and Jos. Soulier on the south portion with two structures fronting Tecumseh Road. The map also shows the Great Western Railway line across the south portion of the lot. No structures or settlements are depicted within or adjacent to the Study Area.

The 1881 map of the Township of Sandwich East from the Essex supplement in the *Illustrated Historical Atlas of the Dominion of Canada*, was also reviewed (Appendix A, Figure 3). This map depicts no structures or settlements in relation to the Study Area. The map depicts Little River west of the Study Area, and the Great Western Railway line to the south. Topographic mapping and aerial photography from the 20th century was also reviewed to confirm a date range for structures within and adjacent to the Study Area. Specifically, mapping material was reviewed from 1912, 1920, 1931, 1940, 1954, 1961, 1962, and 1975.

Reference: **Heritage Overview – Pontiac Pumping Station Capacity Upgrades, Schedule 'C' Municipal Class Environmental Assessment**

With the incorporation of the Town of Riverside in 1921, various sewer and drainage improvements were undertaken (Fullarton 2008). By 1931, Little River's course had been straightened and dredged along the western part of Lot 134, from the Detroit River to the Canadian National Railway line (former Great Western Railway line), along the western side of the Study Area (Fisher Archaeological Consulting 2020). By 1940, the first residences were constructed on the west side of the Little River, along Riverdale Avenue. The LRPCP was commissioned in 1966 and expanded in 1974 (City of Windsor 2022). The LRPCP is depicted on the 1975 topographic mapping. The Pontiac Pumping Station was constructed in 1977.

SITE DESCRIPTION

Details and photographs for the site description were taken from the *Pollution Control Asset Condition Assessment for Little River Pollution Control Plant* prepared by Stantec in 2019 and the *Pollution Control Asset Condition Assessment for Large Pumping Stations* prepared by Stantec in 2020. The Study Area is located within an urban area on the east end of the City, known as East Riverside. To the west of the Study Area is the Little River and a residential neighbourhood that primarily dates to the mid to late 20th century. To the south, east, and north is parkland associated with the Little River Corridor.

The LRPCP is located on a 16.2 hectare (40 acre) site (Photo 1). The Plant treats sanitary and industrial wastewater from the portion of the City east of Pillette Road, and the nearby Town of Tecumseh. The LRPCP was originally constructed in 1965 and has undergone several expansions, most recent upgrades were completed in 1993. The original plant began its operation in 1966 as a primary treatment plant with a rated capacity of 18,000 cubic metres per day (m^3/d). In 1974, it was upgraded and expanded to 36,000 m^3/d. The plant was expanded again in the early 1990s to a rated capacity of 73,000 m^3/d. The major unit operations at the LRPCP include fine bar screening, raw wastewater pumping station, grit removal, primary clarifiers, aeration tanks, final clarifiers, ultraviolet (UV) disinfection, and sludge dewatering by centrifuges. Adjacent to the Pontiac Pumping Station is the Operations Building built in 1966 (Photo 2 and Photo 3), the UV disinfection building No. 1 built in 1991 (Photo 4), and a storage building built in 1965 (Photo 5).

Reference: **Heritage Overview – Pontiac Pumping Station Capacity Upgrades, Schedule 'C' Municipal Class Environmental Assessment**

Photo 1: Aerial Image of the LRPCP, Pontiac Pumping Station denoted by red arrow

Photo 2: Operations Building, Plant Office, north elevation looking south

Photo 3: Operations Building, north elevation looking south

Reference: **Heritage Overview – Pontiac Pumping Station Capacity Upgrades, Schedule 'C' Municipal Class Environmental Assessment**

Photo 4: Aerial view of UV Building No. 1

Photo 5: Pontiac Pumping Station (left) and Storage Building (right) looking west

The Pontiac Pumping Station is a one storey structure with a flat roof (Photo 6 to Photo 9). It is of masonry wall construction clad with red bricks and concrete blocks. The structure is supported by a reinforced concrete foundation. The exterior has aluminum frame windows, and a mixture of aluminum and metal doors. The Pontiac Pumping Station is primarily a stormwater pumping station that services the Pontiac drainage area and acts as an emergency bypass for the LRPCP in the case of a severe storm event. The stormwater from the drainage area flows by gravity to the stormwater inlet chamber and further to the Pontiac Pumping Station where it is lifted and discharged to the Little River. The existing infrastructure in the Pontiac drainage area consists of separate sanitary and stormwater collection systems as well as two stormwater management ponds. The Pontiac Pumping Station has a firm capacity of 4812 litres per second (L/s) and a total capacity of 6935 L/s. It is equipped with four screw pumps that are electronically driven.

Photo 6: Pontiac Pumping Station east elevation, looking northwest

Photo 7: Pontiac Pumping Station south elevation, looking north

Reference: **Heritage Overview – Pontiac Pumping Station Capacity Upgrades, Schedule 'C' Municipal Class Environmental Assessment**

Photo 8: Pontiac Pumping Station north elevation, looking southwest

Photo 9: Pontiac Pumping Station west elevation, looking northeast

MHSTCI CHECKLIST

The Checklist was completed for the Study Area based on the results of the background research, municipal and agency consultation, and review of historic and topographic mapping. Overall, one indicator of cultural heritage value or interest were identified within the Study Area. The results of the Checklist are summarized in Table 1 and the completed checklist is included in Appendix B.

Table 1 : Indicators of CHVI According to the MCM Checklist

Indicators of Cultural Heritage Value or Interest (CHVI)	Identified within the Study Area
Property identified, designated or otherwise protected under the OHA as being of cultural heritage value	Not Identified
A National Historic Site (or part of)	Not Identified
Designated under the *Heritage Railway Stations Protections Act*	Not Identified
Designated under the Heritage *Lighthouse Protection Act*	Not Identified
Identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office	Not Identified
Located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site	Not Identified
Is the subject of a municipal, provincial or federal commemorative or interpretative plaque	Not Identified
Has or is adjacent to a known burial site and/or cemetery	Not Identified
Is in a Canadian Heritage River watershed	Not Identified
Contains buildings or structures that are 40 or more years old	**Identified**
Local or Aboriginal knowledge that the property is considered a landmark in the local community or contains structures or sites that are important in defining the character of the area	Not Identified

Reference: **Heritage Overview – Pontiac Pumping Station Capacity Upgrades, Schedule 'C' Municipal Class Environmental Assessment**

Indicators of Cultural Heritage Value or Interest (CHVI)	Identified within the Study Area
Local or Aboriginal knowledge that the property has a special association with a community, person, or historical event	Not Identified
Local or Aboriginal knowledge that the property contains or is part of a cultural heritage landscape	Not identified

The MCM Checklist identified one indicator of CHVI, that of the Study Area containing structures that are 40 or more years old. This includes the Pontiac Pumping Station, Operations Building, and the Storage Building. These structures as part of the LRPCP property were evaluated for CHVI according to *Ontario Regulation* (O. Reg.) *9/06: Criteria for Determining Cultural Heritage Value or Interest* under the *Ontario Heritage Act* in Table 2 (Government of Ontario 2006).

Table 2: Evaluation of LRPCP according to O. Reg. 9/06

Criteria of O. Reg. 9/06	Y/N	Comments
Design or Physical Value		
Is a rare, unique, representative, or early example of a style, type, expression, material, or construction method	N	The structures on the LRPCP property were constructed between the 1960s and 1990s, as purpose-built utilitarian structures. The buildings within and adjacent to the Study Area are simple in design and lack architectural design details. The design and construction of the buildings was standard for municipal wastewater treatment plants in the province. The Pontiac Pumping Station was built in 1977, and is a later interpretation of a type, as stations existed in the province by the mid-19th century. The City has 55 pumping stations and combined sewer overflows located throughout its boundaries (City of Windsor 2019). The LRPCP is one of two wastewater treatment plants in the City. The LRPCP serves the east half of the City and the Lou Romano Water Reclamation Plant (LRWRP) the west half. The LRWRP was built in 1969 and has since undergone several expansions between 1970 and 2011. Both plants are similar in their construction periods and designs. Thus, the LRPCP is not rare, unique, representative, or an early example of a style, type, expression, material, or construction method.
Displays a high degree of craftsmanship or artistic merit	N	The structures on the LRPCP property do not display a high degree of craftmanship or artistic merit. Its structures were built according to industrial standards for the late 20th century, with contemporary updates.
Demonstrates a high degree of technical or scientific achievement	N	The structures on the LRPCP property do not demonstrate a high degree of technical or scientific achievement. They are standard for municipal wastewater treatment plants.

Reference: **Heritage Overview – Pontiac Pumping Station Capacity Upgrades, Schedule 'C' Municipal Class Environmental Assessment**

Criteria of O. Reg. 9/06	Y/N	Comments
Historical or Associative Value		
Has direct associations with a theme, event, belief, person, activity, organization, or institution that is significant to a community	N	The LRPCP was constructed in 1966 to meet the growth of the City to provide for sanitary and industrial wastewater treatment. In 1951, about 80% of raw sewage from municipalities across Canada was discharged directly into lakes, rivers, and surrounding oceans without being treated. In the mid-20th century municipalities began establishing water treatment facilities (Goodings 2017). The need for wastewater treatment facilities was also influenced by the post-Second war boom and the growth of development outside of cities. LRPCP was one of many plants established throughout the province in the mid to late 20th century.
Yields, or has the potential to yield, information that contributes to an understanding of a community or culture	N	The property does not have the potential to yield information to contribute to an understanding of a community.
Demonstrates or reflects the work or ideas of an architect, artist, builder, designer, or theorist who is significant to a community	N	The property does not demonstrate or reflect the work or ideas of an architect, builder, designer, or theorist who is significant to the community.
Contextual Value		
Is important in defining, maintaining, or supporting the character of an area	N	The LRPCP is an industrial property within an urban landscape adjacent to a residential subdivisions and parkland. The property does not define, maintain, or support the character of the area.
Is physically, functionally, visually, or historically linked to its surroundings	N	The Pontiac Pumping Station and the other structures on the LRPCP are functionally linked to their surroundings, similar to other pumping stations throughout the City. The function of the station is a inherent feature of all pumping stations and wastewater treatment plants. From a cultural heritage perspective, the property is not physically, visually, or historically linked to its surroundings.
Is a landmark	N	The LRPCP property is not a landmark. The property is not discernible in the public viewscape as the property is set away from the main public roadways and subdivisions, separated by the Little River and vegetation. The property is fenced off and not accessible to the public. Public trails run nearby the property; however, the trails are separated from structures by Little River Boulevard, metal fencing, and vegetation.

Reference: **Heritage Overview – Pontiac Pumping Station Capacity Upgrades, Schedule 'C' Municipal Class Environmental Assessment**

Based on a review of available information and O. Reg. 9/06, it was determined that there was no CHVI identified for the LRPCP property and the structures within and adjacent to the Study Area. The structures do not display any design or physical value as the style and construction of the buildings was standard for municipal wastewater treatment plants in the province. They were built with typical late 20th century construction materials and methods. From the review of historic and topographic mapping, and the completion of the MCM Checklist no historical or associative value was identified. The LRPCP was constructed in the mid-20th century to meet the growth of the City to provide for sanitary and industrial wastewater treatment, similar to other plants across the province. Lastly, the property has no contextual value given that it is an industry property within an urban area adjacent to residential subdivisions and parkland. The property is not discernible in the public viewscape.

RECOMMENDATIONS

Based on consultation with the appropriate regulatory bodies no protected heritage resources were identified within the Study Area. Review of historic mapping indicated no potential for 19th century structures in the Study Area. One indicator of CHVI was identified according to the MCM Checklist for the Study Area, however following further examination and discussion of the LRPCP property and the structures within the Study Area, there was no confirmed CHVI for the Study Area.

Given the findings of the Heritage Overview, no additional heritage studies are recommended, and this memo fulfills the Municipal Class EA and PPS requirements.

CLOSURE

This report has been prepared for the sole benefit of the City of Windsor and may not be used by any third party without the express written consent of Stantec Consulting Ltd., and the City of Windsor.

We trust this report meets your current requirements. Please do not hesitate to contact us should you require further information or have additional questions about any facet of this report.

Regards

Laura Walter
Digitally signed by Walter, Laura
Date: 2022.10.25 16:26:44 -04'00'

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Managing Principal, Environmental Services
Phone: 519-675-6603
Tracie.Carmichael@stantec.com

Attachment: Appendix A – Figures
Appendix B – MCM Checklist

Reference: **Heritage Overview – Pontiac Pumping Station Capacity Upgrades, Schedule 'C' Municipal Class Environmental Assessment**

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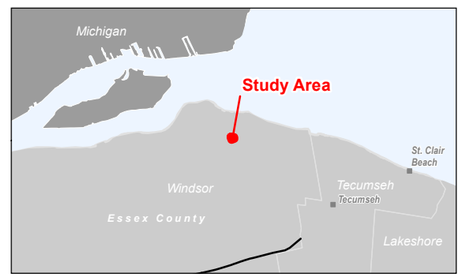
APPENDIX A - FIGURES

Stantec

Legend
- Study Area
- Watercourse
- Waterbody

0 50 100 Metres
1:2,000 (At original document size of 11x17)

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2018.
3. Orthoimagery © First Base Solutions, 2022. Imagery Date, 2021.



Project Location
Windsor, ON

165620249 REVA
Prepared by KB on 2022-06-17
Technical Review by DH on 2022-06-17

Client/Project
CITY OF WINDSOR
HERITAGE OVERVIEW: PONTIAC PUMPING STATION MUNCIPAL CLASS ENVIRONMENTAL ASSESSMENT

Figure No.
1

Title
Location of Study Area

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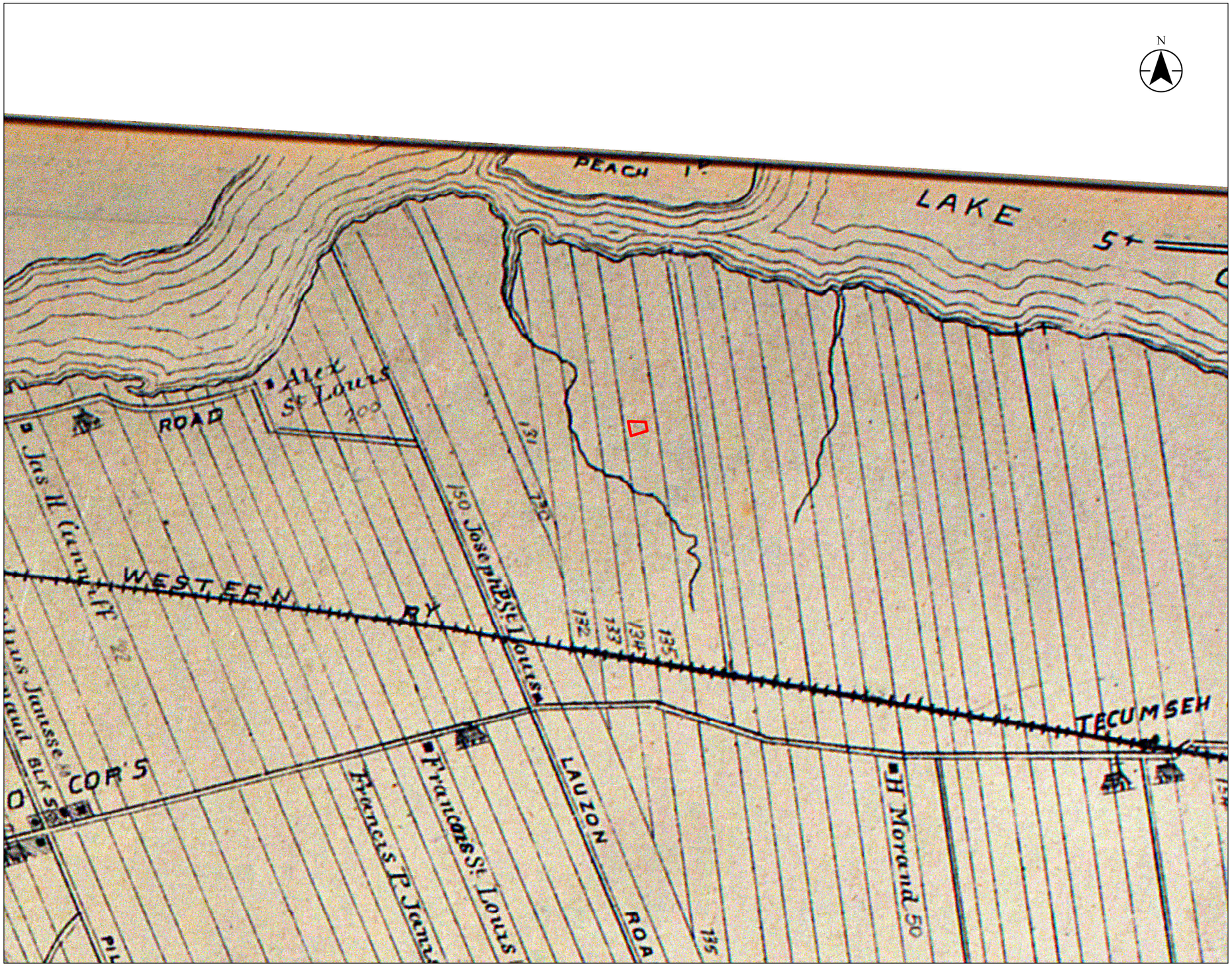
N
128
129W Section
131
134
135
Ber. Seguin 32
Jos. Goulet 28
Jos. Seguin 26
Jos. Chenier
Jos. Seguin 170
Jos. Langlois 170
P. Cecil 100
P. Cecil 100
Ant. Cecil 35
Jos. St. Louis 105
Ant. Cecil 35
Jos. St. Louis 105
Ant. Cecil 35
Jos. St. Louis 105



Stantec

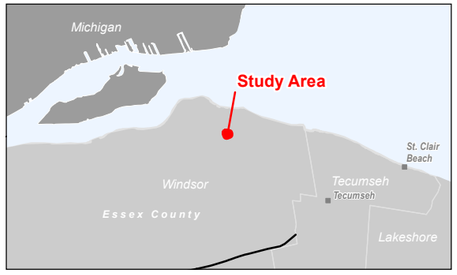
Legend

Study Area (Approximate)

Figure Not to Scale

Notes

1. Reference: Belden, H. and Co. 1881. Essex Supplement in Illustrated Historical Atlas of the Dominion of Canada. Toronto: Belden and Co.



Project Location
Windsor, ON

165620249 REVA
Prepared by KB on 2022-06-20
Technical Review by DH on 2022-06-20

Client/Project
CITY OF WINDSOR
HERITAGE OVERVIEW: PONTIAC PUMPING STATION MUNCIPAL CLASS ENVIRONMENTAL ASSESSMENT

Figure No.
3

Title
Portion of the 1881 Map of Sandwich Township

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APPENDIX B – MCM CHECKLIST

Project or Property Name

Pontiac Pumping Station Capacity Upgrades, Schedule C Class EA, City of Windsor

Project or Property Location (upper and lower or single tier municipality)

Little River Pollution Control Plant in Windsor Ontario

Proponent Name

Chandana Walgama, P. Eng, Pollution Control Project Engineer, City of Windsor

Proponent Contact Information

Address: 4155 Ojibway Parkway. Windsor, Ontario N9C 4A5 Email: cwalgama@citywindsor.ca

Screening Questions

	Yes	No
1. Is there a pre-approved screening checklist, methodology or process in place?		✓

If Yes, please follow the pre-approved screening checklist, methodology or process.

If No, continue to Question 2.

Part A: Screening for known (or recognized) Cultural Heritage Value

	Yes	No
2. Has the property (or project area) been evaluated before and found **not** to be of cultural heritage value?		✓

If Yes, do **not** complete the rest of the checklist.

The proponent, property owner and/or approval authority will:

- summarize the previous evaluation and
- add this checklist to the project file, with the appropriate documents that demonstrate a cultural heritage evaluation was undertaken

The summary and appropriate documentation may be:

- submitted as part of a report requirement
- maintained by the property owner, proponent or approval authority

If No, continue to Question 3.

	Yes	No
3. Is the property (or project area):		
a. identified, designated or otherwise protected under the *Ontario Heritage Act* as being of cultural heritage value?		✓
b. a National Historic Site (or part of)?		✓
c. designated under the *Heritage Railway Stations Protection Act*?		✓
d. designated under the *Heritage Lighthouse Protection Act*?		✓
e. identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office (FHBRO)?		✓
f. located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site?		✓

If Yes to any of the above questions, you need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report, if a Statement of Cultural Heritage Value has not previously been prepared or the statement needs to be updated

If a Statement of Cultural Heritage Value has been prepared previously and if alterations or development are proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If No, continue to Question 4.

Part B: Screening for Potential Cultural Heritage Value	Yes	No
4. Does the property (or project area) contain a parcel of land that:		
a. is the subject of a municipal, provincial or federal commemorative or interpretive plaque?		✓
b. has or is adjacent to a known burial site and/or cemetery?		✓
c. is in a Canadian Heritage River watershed?		✓
d. contains buildings or structures that are 40 or more years old?	✓	

Part C: Other Considerations	Yes	No
5. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area):		
a. is considered a landmark in the local community or contains any structures or sites that are important in defining the character of the area?		✓
b. has a special association with a community, person or historical event?		✓
c. contains or is part of a cultural heritage landscape?		✓

If Yes to one or more of the above questions (Part B and C), there is potential for cultural heritage resources on the property or within the project area.

You need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report (CHER)

If the property is determined to be of cultural heritage value and alterations or development is proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If No to all of the above questions, there is low potential for built heritage or cultural heritage landscape on the property.

The proponent, property owner and/or approval authority will:

- summarize the conclusion
- add this checklist with the appropriate documentation to the project file

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g. under the *Environmental Assessment Act, Planning Act* processes
- maintained by the property owner, proponent or approval authority