Town of Petrolia

Bright's Grove Water Treatment Plant Intake Replacement

Class Environmental Assessment Project File Report

Thursday, November 23, 2023

T001646A

CIMA+

900-101 Frederick Street
Kitchener, ON N2H 6R2
T 519 772-2299 **F** 519 772-2298
cima.ca

Contact

Stuart Winchester, P.Eng.
stuart.winchester@cima.ca
T 519 772-2299, 6202

Engineering for **people**

Project File Report

Bright's Grove Water Treatment Plant Intake Replacement Class Environmental Assessment

Project no T001646A | File no 081

Prepared by:

Adam Moore, P.Eng.

Verified by:

Stuart Winchester, P.Eng.

Executive Summary

Introduction and Background

The Town of Petrolia Water Supply System is owned by the Corporation of the Town of Petrolia and operated under contract by the Ontario Clean Water Agency (OCWA) under Permit No. 034-201. The Water Supply system consists of the Bright's Grove Water Treatment Plant (WTP), the Mandaumin Reservoir and Booster Pumping Station, the Centre Street Elevated Tank, and trunk and local water distribution mains. The Town of Petrolia Water Supply System provides service to the urban area of the Town of Petrolia, as well as areas within the Townships of Enniskillen and Dawn-Euphemia, and the Village of Oil Springs.

The Bright's Grove WTP is located at 2701 Old Lakeshore Road in the City of Sarnia (formerly Bright's Grove). The Bright's Grove WTP is a membrane micro-filtration plant with a current rated capacity of 12 million litres per day (MLD). Raw water is taken from Lake Huron through a 400mm (16") cast iron pipe extending approximately 400m into Lake Huron. The existing Bright's Grove WTP intake pipe was constructed in 1944 and is at the end of its useful service life.

Municipal Class Environmental Assessment Process

The Class EA study for the Bright's Grove WTP Intake replacement has been completed in accordance with the requirements of a Schedule B undertaking of the Municipal Class Environmental Assessment document (Municipal Engineers Association, October 2000 as amended in 2007, 2011 & 2015).

As part of the study, a comprehensive review of background information and water quality data was conducted to confirm and formulate the need for the project and the opportunity being addressed (Phase 1), and to develop the basis for the identification and evaluation of potential water supply alternative solutions (Phase 2). Public and agency consultation was carried out throughout the study in conformance with the consultation requirements for Phase 2.

This document summarizes Phases 1 and 2 of the Class EA Study and completes the Class EA study process with the preparation of the Project File Report (PFR). The PFR will be placed on the public record and will be available for review by the general public for thirty (30) calendar days, as per the Municipal Class EA document. Agencies and the public will be notified through the issuance of a "Notice of Project Completion". Provided that no significant issues arise during the review period which cannot be resolved in consultation with the Town, and that no Section 16 Order requests are

received, the recommendations of the Class EA study, as outlined in this report, will be considered approved and may proceed implementation. Detailed design and all necessary agency and Ministry approvals will be secured prior to construction.

In the event that there are outstanding concerns regarding potential adverse impacts to constitutionally protected Aboriginal and treaty rights, Section 16 Order requests on those matters should be addressed in writing to the Minister of Environment, Conservation and Parks (MECP) and the Director of Environmental Assessment Branch. Interested persons may provide written comments and concerns related to the project. All comments and concerns should be sent directly to the Project Team members through the Town's website: https://town.petrolia.on.ca/planning-development/brights-grove-wtp/

Identification of the Problem / Opportunity Statement

The problem / opportunity statement for the Bright's Grove WTP Upgrade Class EA Study was defined as follows:

> *The existing raw water intake for the Bright's Grove Water Treatment Plant is at or near the end of its useful service life. A raw water supply solution is required to ensure a secure and reliable source of water to the Bright's Grove Water Treatment Plant to ensure that the Town can continue to deliver high quality drinking water to the residents of the Town of Petrolia and the surrounding areas.*

Public and Agency Consultation

Public and agency input was sought throughout the Class EA process. A Notice of Commencement was issued on August 11, 2021, to all parties included on the Master Contact List.

During the course of the Study, two Public Information Sessions were held by the Town. The first Public Information Centre (PIC) was held April 4, 2023, from 2:00 to 5:00 pm in the Main Lobby at Victoria Hall, to provide an opportunity for the interested public to learn about the and to provide input into the planning of the project. Presentation Boards were available to provide information to the Public, and staff from the Town and from CIMA+ were available to discuss the Project with interested individuals. The PIC material was also made available on the Town's webpage.

The second public meeting for this Class EA study was held on July 26, 2023, from 2:00 to 4:00 pm at the Bright's Grove WTP. A Notice of Public Meeting was advertised in the local paper - Sarnia News Today and was posted on the Town's website. This additional meeting was held near the project site so that the public and stakeholders

located in the City of Sarnia had the opportunity to attend. No members of the public attended this meeting, and no comments were received.

Development and Evaluation of Alternative Intake Solutions

In accordance with Phase 2 of the Municipal Class EA process, water supply alternative solutions were identified to ensure a secure and reliable source of water to the Bright's Grove WTP and to address current maintenance and operational concerns associated with the condition of the existing Bright's Grove WTP intake.

An assessment of the available water supply solutions was carried out to determine the feasibility of the alternatives based on capacity requirements, compliance, and technical considerations, as well as their ability to address the Problem / Opportunity Statement of the Class EA study.

Table ES- 1: Preliminary Screening Results

Alternative Solutions	Screening Observations	Recommendation
1 – Do Nothing	Alternative does not address current concerns identified with the existing intake pipe.	Screened out from further consideration
2 – Limit Community Growth	Does not comply with the Planning Act Does not comply with the Town of Petrolia Official Plan Alternative does not address current concerns identified with the existing intake pipe.	Screened out from further consideration
3 – Reduce water demands through conservation measures	Alternative does not address current concerns identified with the existing intake pipe.	Screened out from further consideration

Alternative Solutions	Screening Observations	Recommendation
4 – Obtain Raw Water from Another Source	Extend raw water supply from the Lambton Area Water Supply System (LAWSS) Security concerns with a single source of supply for Petrolia. Major capital expenditure with new infrastructure and upgrades required at the treatment plant. Alternative does not address current concerns identified with the existing intake pipe.	Screened out from further consideration
5 – Expand / Upgrade / Modify Existing System by Refurbishing Existing Intake	Physical measures would be implemented to try to restore existing intake pipe. Questionable integrity of retrofitted pipe. Challenges to allow continuous operation of existing plant during construction.	Screened out from further consideration
6 – Replacing Existing Intake	New intake pipe and intake crib would be installed. Alternative addresses current concerns identified with the existing intake pipe.	Recommended for further consideration

Preliminary screening identified Alternative 6: Replacing Existing Intake as the preferred alternation solution to be considered further in the Class EA study. The major advantages provided by this alternative solution include:

- Alternative addresses structural deficiencies associated with the aging intake pipeline.
- Provides reduced risk for security of supply.
- Best optimizes existing infrastructure and processes.
- Economically advantageous relative to other alternatives under consideration.
- Less constructability challenges and lower associated costs.

High-level alternative concepts for Alternative 6 were further conceptualized to consider possible new intake locations and intake pipe alignments. Key factors considered in the establishment of the alternative concepts included sufficient intake depth to provide security for the intake screen structure, water quality conditions, and the length of the new intake pipeline to minimize marine pipeline installation costs.

Three (3) alternative intake locations for the new intake were identified. A general map showing the existing intake pipeline and three (3) alternative intake structures is presented below in Figure ES- 1. The approximate depth, distance and key characteristics of the possible locations is summarized in Table ES- 1.

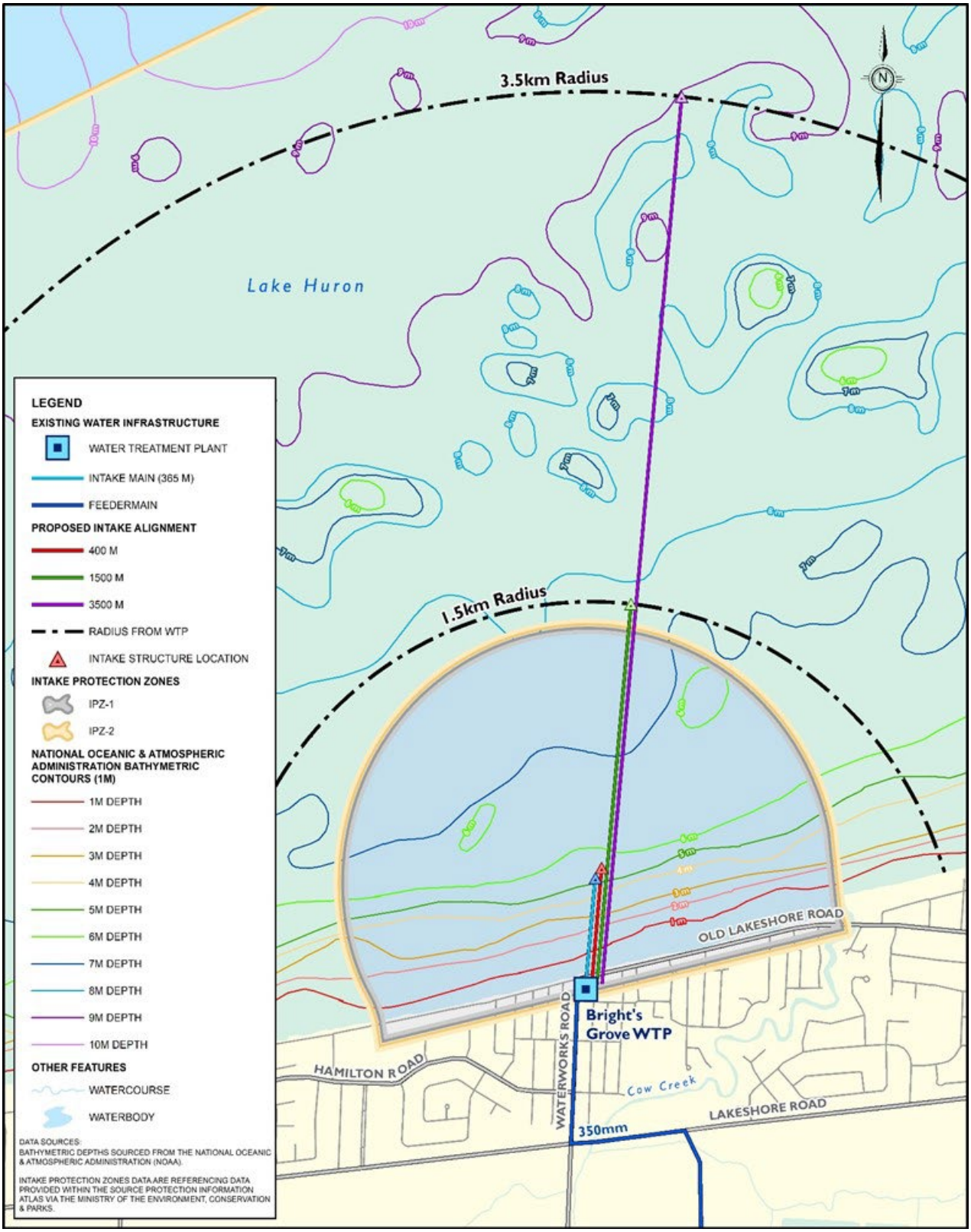


Figure ES- 1: Proposed Intake Locations

Table ES- 2: New Intake Location Alternatives

Intake Option	Distance from Shoreline (m)	Lakebed Depth (m)	Approximate Freeboard [1] (m)	Description
1	400	5.5	3.5	Essentially same location as existing intake Within existing IPZ1, 0.5m deeper than existing
2	1,500	6.5	4.5	Within existing IPZ2, 1m deeper than existing
3	3,500	8.5	6.5	Outside existing IPZ2, 3.5m deeper than existing

Notes:

1) Lakebed Depths provided by the Office of Coast Survey from NOAA, USA
2) Approximate freeboard calculated based on minimum monthly average Lake Huron level of 175.95m and assuming an intake configuration similar to existing conditions.

Preferred Recommended Intake Solution

Based on the results of the detailed evaluation process and public consultation, the preferred water supply solution required to ensure a secure and reliable source of water to the Bright's Grove WTP and to address current maintenance and operational concerns associated with the condition of the existing Bright's Grove WTP intake is:

- Alternative 6 – constructing a new intake pipeline approximately 400m into Lake Huron at an intake location close to the existing intake, that provides a preferred minimum cover of 3.0m over the intake screen.

  The conceptual intake alignment and intake structure location for the preferred recommended water supply solution is shown in Figure ES- 2. Alternative 6 provides the following major advantages, relative to the other alternative concepts considered:

- The associated intake pipeline alignment provides opportunities for locating staging and laydown areas away from the beach and naturalized areas, minimizes impacts to terrestrial and aquatic habitats, interruptions to continuous operation of the WTP, and protection of existing intake pipe.

- Long-term impacts on adjacent property are eliminated by confining in-land works within existing site limits. No land acquisition is required.
- In-land works minimize construction challenges for the connection to the existing low lift pumping station.

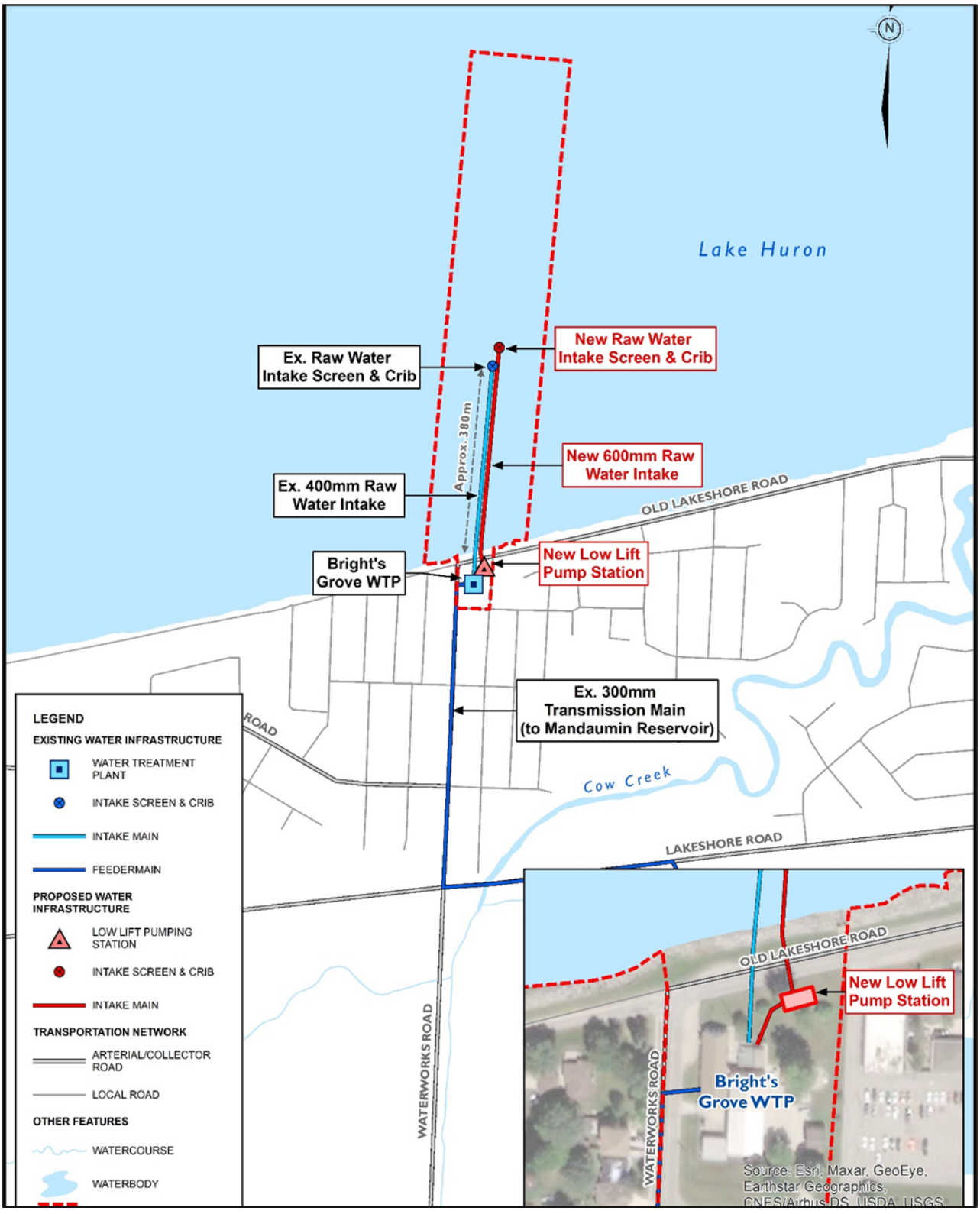


Figure ES- 2: Preferred Intake Solution with New LLPS in an Open Concept Design

Proposed Mitigation of Potential Impacts

Implementation of the preferred water supply solution is expected to have some impacts on the existing natural and socio-cultural environment. Construction timing will be critical to this project from a technical, environmental, and water delivery perspective.

Construction activities will be planned and executed accordingly to ensure that potential impacts to the existing terrestrial, wildlife and aquatic habitats identified within the project study area are reduced, as much as possible. In addition, construction staging, and sequencing will be carefully planned to ensure the protection and adequate operation of the existing intake pipe, until the new intake is connected to the plant and ready for service. With the exception of a temporary shut-down of relatively short duration, the Bright's Grove WTP will continue to be operational during construction, to ensure the uninterrupted provision of drinking water services.

Short-term construction impacts such as noise, dust, vibration, and restrictions to recreational uses will be felt mainly by the immediate local residents. Specific mitigation measures, as described below, are recommended for implementation to reduce anticipated potential impacts.

Socio-Cultural

Based on the nature of the proposed works, potential impacts to the socio-cultural environment are anticipated to be of short-term duration and resulting from construction works only. Long-term effects related to the operation and/or maintenance of the new intake pipeline or intake structure are not anticipated. Navigational routes are not present within the anticipated in-water construction limits, however, in-water related construction activities will need to comply with the Canadian Navigable Waters Act, as required.

The following measures will be taken to mitigate anticipated short- and long-term impacts to adjacent residents and local users:

- Temporary fencing will be used around the construction areas (in-land) to minimize noise, dust, mud, and visual impacts.
- Construction of the project will be carried out in accordance with the local municipal noise requirements. Construction equipment will be operated according to the applicable Town of Sarnia Noise Control By-Law, which imposes limitations and restrictions for operation of construction equipment between 8:00 pm and 7:00 am, any day of the week, with Sunday's and Stat Holidays prohibited.

- Construction equipment will be appropriately maintained to ensure that any exhaust emissions meet industry standards.
- Property owners adjacent to the Bright's Grove WTP where construction activities will take place will be notified in advance and provided with the Town's contact information should they encounter any problems during construction.

Climate Change

The intake structure for the preferred alternative, would be located at an approximate lakebed depth of 4m (deeper than the existing intake lakebed depth of 3m), which will provide a security buffer to the intake should water levels in Lake Huron start to decrease from potential extreme droughts, although not historically experienced.

Marine construction for the intake pipeline will include a top layer of scour protection to ensure pipeline protection from potential extreme climatic conditions, such as strong wave actions and storms. Excavated rock material from lake bottom is expected to be used to backfill the remainder of the trench and return lake bottom to its original contours, which will eliminate/reduce the need to transport and dispose excavated material offsite.

Source Water Protection

In consultation with the St. Clair Regional Conservation Authority (SCRCA) and Thames-Sydenham and Region Drinking Water Source Protection, the source water protection modelling did not need to be updated based on the preferred intake alternative location and alignment. During detailed engineering, the Thames-Sydenham and Region Drinking Water Source Protection requested a review of where the final intake location will be as well as if there are any drainage or transport pathways that have become closer to the new intake.

Disturbance to Natural Environmental Features

Construction methods for the entire intake pipe alignment (500m) from the shoreline out to the offshore intake structure position have yet to be determined. The impact to aquatic habitats and species will need to be considered and available mitigation measures include implementation of timing windows, setbacks and erosion and sediment control measures will need to be considered. An Erosion and Sediment Control Plan will be developed and implemented prior to start of construction to effectively isolate the extent of construction related activities and mitigate the potential for silt and sediment entry into surface water features and adjacent lands. There is a

setback allowance from Cow Creek to the West of the WTP that may impact the new low-lift pump station placement.

The construction timing window will be determined through further consultation with Department of Fisheries and Oceans (DFO), the Ministry of the Environment, Conservation and Parks (MECP), the Ministry of Natural Resources and Forestry (MNRF) and the St. Clair Town Conservation Authority (SCRCA). Potential for impacts to suitable habitat occurring within the study area will need to be reviewed at detailed design to confirm the need for compliance with the Endangered Species Act, should any species at risk are anticipated to be impacted. Staging and laydown areas will most likely be confined to the west, away from the beach and to minimize impacts to habitats and within the paved right of way of Old Lakeshore Road.

Disturbance to Archaeological Features

No archaeological impacts, inland or offshore, are anticipated as a result of the potential construction disturbance activities associated with the Project within the project area. Should the project boundary be revised and extend beyond the study area limits, additional archaeological assessment may be required due to the potential for submerged archaeological resources located in the surrounding vicinity of the current study area. Further to that, if any deeply buried archaeological resources are identified during ground disturbance activity associated with the proposed developments in the Study Area, ground disturbance activities should be immediately halted and the Archaeology Division of the Culture Programs Unit of the Ministry of Heritage, Sports, Tourism and Culture Industries be notified.

Disturbance to Cultural Heritage Features

The Heritage Screening Report determined that the 2701 Old Lakeshore Road is of cultural heritage value or interest (CHVI). The scope of the project poses no direct impact to the identified heritage value of 2701 Old Lakeshore Road. Some mitigation measures to avoid or reduce adverse impacts to the built heritage resources evaluated to have CHVI include carrying out construction activities possibly away from the study area boundary, use of appropriate fencing to limit the temporary construction disturbances such as dust and vibration, etc. Should the project boundary be revised and extend beyond the study area limits, additional cultural heritage assessment may be required for potential features located in the surrounding vicinity of the current study area.

Public, Agency, and First Nation Consultation

Public and agency input was sought at key stages of the Class EA process. A virtual PIC was held between September 9 and September 30, 2021. The PIC material included a PowerPoint presentation and online comment form, which were available on the project webpage for the entire duration of the virtual PIC.

Public concerns were raised by the Bright's Grove Woodlot Association, mainly related to the construction phase disturbance to the natural and socio-cultural environment including public safety and disturbance to the neighboring residents during the construction duration. No other comments were received regarding the recommended water supply option for the project. An official response to the residents were provided by the Project Team through a letter. A copy of the letter is included in Appendix C.

Public feedback was considered to confirm the recommended water supply solution. Communication with neighbouring residents will continue during the design and construction phases of this project. The Town will continue to inform and provide updates as the project progresses. A dedicated contact person from the Town will be available to respond to any immediate issues or concerns that may come up before or during construction.

Conclusions and Recommendations

Through completion of a Municipal Class EA study, constructing a new intake, extending approximately 400m into Lake Huron with an open design concept has been identified as the preferred solution. A bathymetry survey was completed to confirm the alignment and depth of the new intake.

Public and agency input was sought at key stages of the Class EA process to provide the public with opportunities to comment on the project. Potential impacts associated with the implementation of the recommended alternative solution were identified as well as available mitigation measures. The socio-cultural implications of this project are directly related to the short-term construction related impacts, such as dust, noise, vibration, and restrictions to recreational uses to be felt mainly by the immediate local residents. Due to the nature of this project, some inevitable effects in terms of dust, noise, and vibration will be felt around the construction areas. Potential effects can be reduced or avoided by implementation of mitigation measures outlined in this report, as a minimum.

Since the existing intake is currently operational, some construction complexity will be experienced during the construction of the proposed intake, mainly while connecting the new intake to the wet well at the existing low lift pumping station. Careful design and

installation of shoring system around the existing intake pipe will be provided. A phased implementation approach will be developed to ensure the protection of the existing intake and ability to remain in service during construction.

Construction of marine components will be implemented within the in-water construction window and necessary mitigation measures to protect aquatic habitats and species. Specific mitigation measures and timing windows will be confirmed, during the detailed design stage, and in consultation with the appropriate regulatory agencies including DFO, MECP, MNRF and NPCA. Intake pipe alignment to the west of the existing pipe facilitates the connection to the existing wet well/wet well expansion.

It is recommended that this Project File Report be accepted by the Town, subject to public review. Provided that no major objections or Section 16 Order requests are received during the review period, the project should proceed to implementation.

Table of Contents

List of Tables

List of Figures

List of Appendices

1 Introduction

1.1 Background

The Bright's Grove Water Treatment Plant (WTP) is owned by the Corporation of the Town of Petrolia and operated under contract by the Ontario Clean Water Agency (OCWA) – Southwest Town, Lambton Cluster. The Bright's Grove WTP is located at 2701 Old Lakeshore Road, Bright's Grove and services the Town of Petrolia.

The Bright's Grove WTP, supplied by raw water from Lake Huron, is a membrane water treatment plant with a current rated capacity of 12 MLD (139 L/s). The current Permit to Take Water (PTTW) #7644-CT3NGH allows a maximum water taking from Lake Huron of 15.6 MLD (180 L/s). The existing Bright's Grove WTP intake pipe, constructed in 1944, is a 400mm cast iron pipe extending approximately 400m into Lake Huron. There is an additional 163m of intake pipe on the shoreline that connects to the raw water inlet chamber at the low lift pumping station. Intake video inspections of the existing intake pipeline have identified structural deficiencies, corroded areas, dents and deformations along the intake pipe. Also, excessive deposition of sediments and zebra mussel shells in the intake pipe result in significant operation and maintenance issues, as well as costs for underwater cleaning. The existing intake has reached the end of its service life, so replacement of the intake pipe and its associated crib structure is necessary.

CIMA+ was retained by the Town of Petrolia to undertake the Class EA Study for the intake replacement for the Bright's Grove WTP.

1.2 Objectives of the Class EA Study

The primary goal of this Class EA Study is to:

- Identify a preferred water supply solution to ensure a secure and reliable source of water to the Bright's Grove WTP and to address current maintenance and operational concerns associated with the condition of the existing Bright's Grove WTP intake.

To support the primary goal of the Class EA study, the following objectives have been developed:

- To complete a comprehensive examination of alternative water supply solutions and select a preliminary preferred solution with consideration given to a broad range of criteria including natural environmental, socio-cultural, technical and operational, and financial considerations.
- To provide meaningful consultation with all affected and interested parties; and,

- To document the study process in compliance with all phases of the Municipal Class EA planning process.

1.3 Project File Report (PFR)

This PFR describes the planning and decision-making process followed during the Class EA Study for the Bright's Grove WTP New Intake. The PFR describes the following:

- Problem / Opportunity Statement
- Existing conditions of the study area
- Water Supply Alternative Solutions considered in the study.
- Evaluation methodology and evaluation criteria used to assess the different water supply alternatives and alternative concepts.
- The preferred water supply solution and its associated anticipated potential impacts, proposed mitigation measures and proposed implementation plan
- Details of the public and agency consultation process.

The Municipal Class EA process gives members of the public, interest groups and review agencies a chance to review the PFR during a minimum of a 30-day review period. The review period gives individuals an opportunity to address outstanding concerns regarding the project with the Town.

The Project File Report will be placed on the public record and will be available for review by the public for thirty (30) calendar days. Agencies and the public will be notified through the issuance of a "Notice of Study Completion". Provided that no significant issues arise during the review period which cannot be resolved in consultation with the Town, and that no Section 16 Order requests are received, the recommendations of the Class EA study, as outlined in this report, will be approved, and may proceed directly to implementation.

In the event there are outstanding concerns regarding potential adverse impacts to constitutionally protected Aboriginal and treaty rights, Section 16 Order requests on those matters should be addressed in writing to the Minister of Environment, Conservation and Parks (MECP) and the Director of Environmental Assessment Branch. Interested persons may provide written comments and concerns related to the project. All comments and concerns should be sent directly to the Project Team members at the Town.

1.4 Report Outline

This report was prepared to meet the requirements of the Ontario Municipal Engineer's Association (MEA) Municipal Class EA Planning Process (October 2000, as amended in 2007, 2011 & 2015). This report combines all phases of the planning process under one cover and includes steps that are considered essential for meeting the requirements of the Environmental Assessment Act (EAA). The report includes the following sections:

- **Section 1: Introduction** – Provides background information leading to the initiation of this study, provides the objectives of both the Class EA Study and the PFR, and describes the format of this report.
- **Section 2: Municipal Class Environmental Assessment Process** – Provides a summary description of the framework and activities to be completed to meet the Municipal Class EA process requirements related specifically to the Bright's Grove WTP New Intake Class EA study.
- **Section 3: Public and Agency Consultation Process** – Describes the consultation program with the public and agencies, and public engagement activities.
- **Section 4: Study Area Overview** – Outlines the study area location and provides a brief overview of the main characteristics of the study area.
- **Section 5: Existing Conditions** – Presents a description of the existing conditions of the of the project study area.
- **Section 6: Design Criteria** – Presents the design criteria for water servicing.
- **Section 7: Class EA Phase 1** – Problem/ Opportunity Statement - Presents the problem/opportunity statement for this Class EA Study
- **Section 8: Evaluation Methodology** - Presents the evaluation methodology used for the Bright's Grove WTP New Intake Class EA study to select the preliminary water supply solution.
- **Section 9: Class EA Phase 2: Identification and Evaluation of Alternative Water Supply Solutions** – Presents a comprehensive review of water servicing strategies by providing information on a long list of alternatives and identifies a short list of feasible alternatives based on a set of must-meet criteria. Short-listed alternatives are further developed and evaluated based on the detailed evaluation methodology.
- **Section 10: Preferred Water Supply Solution** – Describes the recommended water supply solution, provides an implementation schedule of the preferred solution as well as the associated permits and approvals needed prior to start of construction.

- **Section 11: Proposed Mitigation of Potential Impacts and Monitoring** - Summarizes the proposed mitigation measures to be undertaken to minimize potential impacts expected due to implementation of the proposed works.
- **Section 12: Phase 4 – Project File Report** - Summarizes the need for the project, the main activities undertaken as part of this Class EA study, the public and agency consultation project, the recommended solution, and the overall implications of the implementation of the preferred alternative solution.
- **Section 13: References** - Lists the key sources of information and reports that were used and consulted during the Class EA study process and in the preparation of the Project File Report.

2 Municipal Class Environmental Assessment Process

2.1 Municipal Class Environmental Assessment

This project was planned under the Municipal Class EA Planning Process for Municipal Water and Wastewater Projects – 2015 as a Schedule B Undertaking. The Municipal Class Environmental Assessment (MEA, October 2000 as amended in 2007, 2011 & 2015) is an approved process that proponents of municipal infrastructure projects must follow in order to meet the requirements of the Environmental Assessment Act (EA Act).

The Municipal Class EA was created to ensure that all aspects of the environment are considered during the planning and construction phases of a project. The Class EA process outlines the steps that must be followed to satisfy the EA requirements for water, wastewater, and road projects.

The various phases of the Municipal Class EA process are described in Figure 1. In summary the five phases are:

- **Phase 1**: Identification of the problem or opportunity
- **Phase 2**: Identification of alternative solutions to the problem or opportunity and their respective impacts to the environment. Evaluation of alternative solutions and selection of a preferred solution considering public and review agency input
- **Phase 3**: Identification and evaluation of alternative design approaches for the preferred solution. Selection of the preferred design concept based upon public and review agency input.
- **Phase 4**: Documentation of the planning, rationale, design, and consultation process in a Project File Report (PFR). The PFR must be available to the public and review agencies.
- **Phase 5**: Implementation of the preferred alternative design concept and monitoring for environmental provisions and mitigation measures.

Public and agency consultation is an important part of the Class EA planning process. Gaining input from individuals and groups can help identify project concerns early, and to find ways to address concerns wherever possible. Public consultation is carried out at key stages of the Class EA process to allow time to review and provide input related to the project.

Projects subject to the Class EA process are classified into three possible "schedules" (or categories), depending on the degree of expected impacts:

- **Schedule A** projects represent minor operational and maintenance activities and are approved without the need of further assessment.
- **Schedule A+** projects also represent minor activities and are pre-approved but require public notification prior to project implementation.
- **Schedule B** projects require screening of alternatives for their environmental impacts and Phases 1 and 2 of the planning process must be completed. A Class EA report, also referred to as a Project File Report, consistent with Phase 4 of the Class EA process must be completed following completion of Phase 2 and be filed for public review.
- **Schedule C** projects must satisfy all five phases of the Class EA planning process. These projects have the potential for greater environmental impacts. Phase 3 involves the assessment of alternative methods of carrying out the project, as well as public consultation on the preferred design concept. Phase 4 includes the preparation of a Project File Report (PFR) that is filed for public review.

2.2 Bright's Grove Water Treatment Plant New Intake Class Environmental Assessment Study

This Class EA study has been carried out as a Schedule B Class EA undertaking. As part of the study, a comprehensive review of background information and water quality data was conducted to confirm and formulate the need for the project and the opportunity being addressed (Phase 1), and to develop the basis for the identification and evaluation of potential water supply alternative solutions (Phase 2).

This document summarizes Phases 1 and 2 of the Class EA process and fulfills the documentation requirements for Schedule B undertakings. This Project File Report (PFR) will be placed on the public record and will be available for review by the general public for thirty (30) calendar days. Agencies and the public will be notified through the issuance of a "Notice of Study Completion". The Notice of Completion will advise that interested persons may provide written comments to the project team within the review period and all comments and concerns should be sent directly to the Proponent. In addition, if there are outstanding concerns regarding potential adverse impacts to constitutionally protected Aboriginal and treaty rights, a Section 16 Order request on those matters should be addressed in writing to the Minister of Environment, Conservation and Parks (MECP) and the Director of Environmental Assessment

Branch. The Town cannot proceed with the project until at least 30 days after the end of the comment period provided for in the Notice of Completion.

If no significant issues arise during the review period which cannot be resolved in consultation with the Town, and also that no Section 16 Order requests are received, the project will be considered approved and may proceed implementation. Detailed design and necessary testing and approvals will be completed prior to construction.

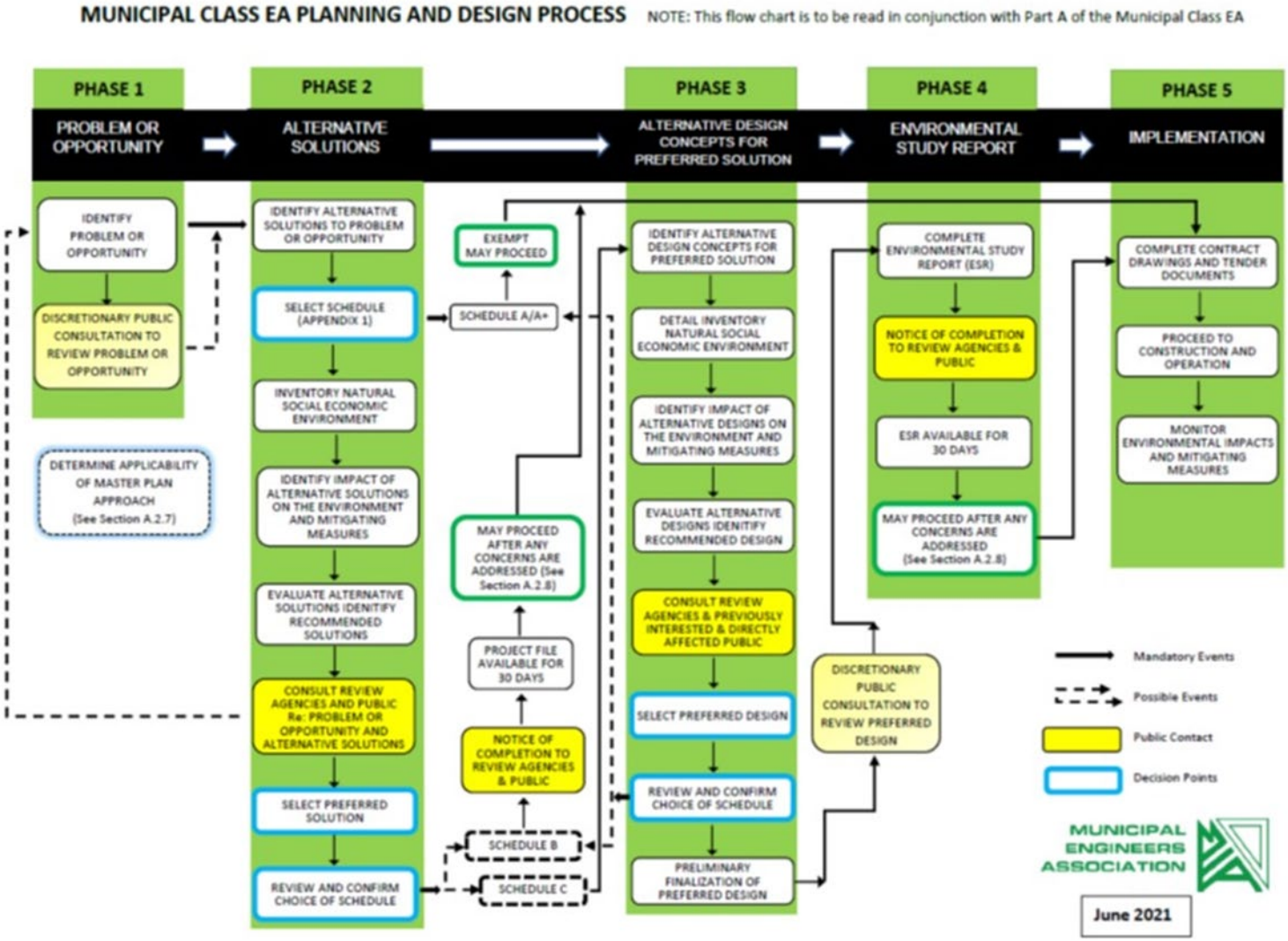


Figure 2-1: Municipal Class Environmental Assessment (EA) Planning and Design Process

2.3 Information on Section 16 Order Requests

The Minister of the Environment, Conservation and Parks has the authority and discretion to make an Order under Section 16 (formerly Part II Order) of the Environmental Assessment Act.

A Section 16 Order may require the proponent of a project going through a Class Environmental Assessment (Class EA) process:

1) Submit and application for approval of the project before they proceed. This is generally referred to as an individual Environmental Assessment.
2) Meet conditions in addition to the conditions of the Class EA. This could include conditions for:
   a) Further study
   b) Monitoring
   c) Consultation

The minister can also refer a matter in relation to a section 16(6) Order request to mediation.

Interested persons may provide written comments to the project team. All comments and concerns should be sent directly to the Proponent. Should you be unable to resolve any concerns with the project proponent through the Class EA process, you may be able to submit a request to the minister for a Section 16 Order. You can ask the minister for a Section 16 Order if:

- You have outstanding concerns that a project going through a Class EA process may have a potential adverse impact on constitutionally protected Aboriginal and treaty rights.
- You believe that an Order may prevent, mitigate, or remedy this impact.

For more information on the Section 16 order process, please visit:

https://www.ontario.ca/page/class-environmental-assessments-section-16-order

The request should be sent in writing or by email to:

Minister of the Environment, Conservation and Parks
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

The requests should also be sent to the Proponent by mail or email.

3 Public Consultation Process

Public consultation is an important part of the Class EA process. Successful public consultation programs build and maintain community trust and credibility, improve project decision-making, and identify community concerns and issues early in the process.

This section provides a description of the communication and consultation activities undertaken at key stages of this Class EA Study. Appendix A provides additional details regarding public, agency and First Nations consultation activities and events.

3.1 Consultation and Communication

A Communication and Consultation Program was implemented to manage public relations between the community and the Project Team and to establish opportunities to gather feedback from the public. Key objectives of this program were to:

- Inform the interested public and stakeholders about the project and provide information.
- Facilitate and communicate opportunities for public input.
- Promote a public consultation strategy that includes stakeholders as valued participants.
- Tailor the consultation and communication program to the specific needs of the interested members of the public and stakeholder groups, while meeting and exceeding all legislated requirements
- Involve stakeholders by identifying appropriate mitigation measures and to assure them that these measures will be implemented.

3.1.1 Stakeholders

Various groups of stakeholders which were considered to have an interest in the Bright's Grove WTP New Intake Class EA Study were identified. Key stakeholder groups are outlined below:

- Environmental stakeholders and conservation authorities.
- Review agencies: Provincial ministries and agencies, Federal Government departments and agencies, local area municipalities, district and planning boards, emergency services (fire, police, health), school boards, and local associations.
- Indigenous communities.

A comprehensive Project Contact List was developed at the beginning of the Class EA Study to include all stakeholders considered to have an interest in the project. A copy of the Project Contact List is included in Appendix A for further reference.

3.1.2 Public Consultation, Communication Strategies and Tactics

The public consultation and communication program included a number of strategies to ensure that local residents and interested parties were informed about the project activities. The Municipal Engineers Association Class EA document outlines mandatory and discretionary consultation contact points with the public and agencies. In order to communicate the project progress and goals and to solicit proper feedback and insight throughout the process, the following communication and consultation activities were undertaken:

- **Project Contact List**: A master project contact list was created at the onset of the project to include representatives from government and regulatory agencies, Indigenous groups, utilities, landowners, developers, and several technical review agencies and organizations that may have an interest in this project. Interested members of the public were added to the mailing list upon request and all individuals on the list were kept informed about project updates and upcoming meetings through direct mail.
- **Notice of Study Commencement**: A "Notice of Study Commencement" was published on the Town of Petrolia website on August 11, 2021. A copy of the notice was also mailed out to all individuals and groups on the Project Contact List. A copy of the Notice of Study Commencement is provided in Appendix A.1.
- **Public Information Centre (PIC)**: The first public meeting for this Class EA study was held on April 4, 2023, from 2:00 to 5:00 pm at Victoria Hall, in the Main Lobby. The meeting allowed all members of the public and stakeholders that may have an interest in the project to learn more about the need for the project, the Class EA process, preliminary environmental and archaeological findings in the study area and to provide feedback on the information presented. The meeting was held near the study area in anticipation that residents within the study area would attend. This meeting had three (3) attendees in total. Comments were received from one (1) individual.
- **Public Information Centre 2**: The second public meeting for this Project was held on July 26, 2023, from 2:00 to 4:00 pm at the Bright's Grove WTP. Notice of the Public Meeting was advertised in the Sarnia News Today on July 25. This additional meeting was held at the site of the project so that local public and

stakeholders from the City of Sarnia had the opportunity to attend. No members of the Public attended this meeting.

- **Notice of Study Completion**: A "Notice of Study Completion" notifying the public and agencies that the Project File Report has been placed on the public record for review was issued on November 23, 2023. The Notice advised the public about where to find the Project File Report, as well as their ability to place a Section 16 Order, as discussed in Section 2.2.

The Notice of Study Completion was advertised in the Independent. The notice will also be posted on the Town of Petrolia website https://town.petrolia.on.ca/residents/water-wastewater/ and sent to all individuals and groups on the project contact list. A copy of the Notice of Study Completion is included in Appendix A.1.

3.2 Summary of Public Issues, Comments and Concerns

Members of the public were encouraged to review the PIC material and provide feedback / comments, enabling project team members to explain the main activities and findings up to this point. One comment was received after the PIC, during the review period. The comment agreed with the preliminary preferred alternative.

3.2.1 Agency Consultation

Consultation with government review agencies and the public is a necessary and important component of the Class EA process. In conformance with the consultation for this Class EA Study, the Town ensured that similarly to the public, appropriate review agencies were informed and given a chance to contribute during the study. This section outlines the agency consultation component of the study.

A list of agencies was prepared at the start of the project that included all relevant Town's Representatives, Federal Government departments and agencies, Provincial ministries and agencies, local municipalities, and agencies, as well as some local associations. The opportunity for these agencies to participate in the project was provided through the distribution of the Notice of Study Commencement and PIC via direct letter mailing or through email if specified, which also served as a direct invitation to participate in the formal PIC. The complete list of all agencies contacted is included in Appendix A of this report.

3.2.1.1 Ministry of Environment, Conservation and Parks (MECP)

Consultation with the Ontario Ministry of the Environment, Conservation and Parks (MECP) was undertaken as part of the Bright's Grove WTP Intake Replacement Class EA Study. Notices of commencement and PICs 1 and 2 were sent to the MECP.

3.2.1.2 Ministry of Citizenship and Multiculturalism (MCM)

Consultation with the Ministry of Citizenship and Multiculturalism (MCM) was undertaken as part of the Bright's Grove WTP New Intake Class EA Study. Email correspondence was received from the MHSTCI on April 12, 2023, in response to the Notice of PIC, with the following major comments:

- MCM'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. Other recommendations included engagement with Indigenous Communities regarding any potential cultural heritage resources that might be of value to them, and community input.
- *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*: If the EA project area exhibits archaeological potential, then an archaeological assessment (AA) shall be undertaken by an archaeologist licenced under the Ontario Heritage Act (OHA), who is responsible for submitting the report directly to MCM for review.
- *Built Heritage Resources and Cultural Heritage Landscapes*: If there is potential for built heritage resources and/or cultural heritage landscapes on the property or within the project area, a Cultural Heritage Evaluation Report (CHER) should be undertaken by a qualified person to determine the cultural heritage value or interest of the property (or project area). If the property (or project area) is determined to be of cultural heritage value or interest and alterations or development is proposed, MCM recommends that a Heritage Impact Assessment (HIA), prepared by a qualified consultant, be completed to assess potential project impacts. Please send the HIA to MCM for review and comment and make it available to local organizations or individuals who have expressed interest in review.
- *Environmental Assessment Reporting*: All technical cultural heritage studies and their recommendations are to be addressed and incorporated into EA projects. Please advise MCM whether any technical cultural heritage studies will be completed for this EA project and provide them to MCM before issuing a Notice of Completion or commencing any work on the site. 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.

3.2.1.3 St. Clair Region Conservation Authority

Consultation with the St. Clair Region Conservation Authority (SCRCA) was undertaken as part of the Bright's Grove WTP New Intake Class EA Study. The following comments were provided by SCRCA.

- SCRCA would like to minimize the impacts from drilling and impacts to the shoreline.
- There is a setback allowance from Cow Creek that may impact the pump station placement.
- SCRCA stated the area of the WTP near the shoreline is in the floodplain elevation and flood proofing to the pumping station should be considered.

3.2.1.4 Infrastructure Canada

Consultation with Infrastructure Canada was undertaken as part of the Bright's Grove WTP New Intake Class EA Study. Email correspondence and a determination letter was received from on April 25, 2022, in response to the Notice of Commencement, with the following major comments:

- Following the federal Ministerial approval of funding for the Bright's Grove Water Treatment Plant Intake Replacement Project (the Project) under the Investing in Canada Infrastructure Program (ICIP), Infrastructure Canada (INFC) has reviewed all information provided to date on the proposed Project to assess if there are any federal requirements under the Impact Assessment Act (IAA). INFC has also reviewed the information provided to determine INFC's obligation to consult with Indigenous Peoples, including the identification of next steps.
- Based on the information provided by the Corporation of the Town of Petrolia for this Project, INFC is of the opinion that this project has no requirements under the IAA.
- INFC's intent is to work with project proponents to engage and consult with Indigenous groups that may have a potential interest in the project they propose. Our understanding is that consultation activities with Indigenous groups have been initiated by the Corporation of the Town of Petrolia for this Project and our intent is to rely on this consultation process as much as possible. To this effect, we would appreciate if the Corporation of the Town of Petrolia could provide updates on the consultation process with Indigenous groups as the Project proceeds. The updates provided should focus on the following information:
    - Issues or concerns expressed by the Indigenous groups consulted.

- Implementation of mitigation and/or compensation measures identified during the consultation process, if any; and
- Accommodation agreements, if any, being negotiated with Indigenous groups.

3.2.2 First Nations

Consultation with First Nation communities is an important part of the decision-making process for projects that may impact their traditional territory and the resources upon which their cultures and livelihoods depend. Based on the project study area, the following First Nations were included in the project mailing list and have been consulted during this Class EA study to determine their interest and desired level of communication:

- Aamjiwnaang First Nation
- Chippewas of the Thames First Nation
- Oneida Nation of the Thames
- Delaware Nation
- Bkejwanong Territory (Walpole Island)
- Assembly of First Nations
- Chippewas of Kettle and Stony Point First Nation
- Great Lakes Métis Council
- Caldwell First Nation
- Métis Nation of Ontario
- Munsee Delaware Nation

Public notices and invitations to the project PCCs were distributed via mail on August 11, 2021, to each of the groups noted above. The first direct form of contact was meant to confirm the communities' project awareness regarding the project notice, project information, and method of contact, if additional information or consultation related to the project was required.

3.2.2.1 Chippewas of the Thames First Nation (COTTFN)

The following summarizes the email correspondence between COTTFN and the project team in response to the invitations to participate in the enabling studies. All correspondence records regarding notices, agreements and the PIC are summarized in Appendix A:

- The Notice of Commencement was issued to COTTFN on August 11, 2021.On September 10, 2021, COTTFN indicated that they wished to participate in the Archaeological Assessment for the Project.
- On November 7, a notice was issued to COTTFN indicating that the proponent was proceeding with the Marine portion of the Archaeological Assessment. An email was received from COTTFN on November 7, 2022, expressing their interest in the project and willing to participate in the marine assessment component of the study. The Project Team confirmed via email on December 7, 2022, the signed agreements were sent back to COTTFN.
- Field Liaison Representatives (FLRs) from COTTFN were present during the Stage 2 AA fieldwork to witness the field investigations.
- Notifications were sent out by the project team on April 20, 2023, to COTTFN about field work being scheduled for the land assessment component of the study. COTTFN responded on April 26, 2023, that prior to scheduling an Archaeology Field Liaison, they would require the agreement to be signed by both the consultant/proponent and COTTFN. A signed agreement was sent back to COTTFN from the Town on April 26, 2023, through a secure link; however, the Agreement was not received by COTTFN.
- The project team followed up with a phone call to COTTFN apologizing for the miscommunication regarding fieldwork scheduling and agreement execution. The project team did complete the Stage 2 field work on April 26, 2023. The project Team submitted a draft Archaeological report to COTTFN for review on August 31 and was to provide feedback on September 15, 2023.
- COTTFN followed up by email on September 9, 2023 stating they have no comments or concerns with the AA draft report.

3.2.2.2 Caldwell First Nation (CFN)

The following summarizes the email correspondence between CFN and the project team in response to the notice to participate in the enabling studies.

- The Notice of Commencement was issued to CFN on August 11, 2021. On October 13, 2022, an invitation was sent toe CFN requesting to participate in the Stage 1 portion of the AA. CFN indicated that they wished to participate in the Archaeological Assessment for the Project.
- A request for information to the Cultural Heritage Assessment was sent to CFN on November 21, 2022.
- A follow up invitation to participate in the Stage 1 portion of the AA was sent out February 3, 2023.An email was received from CFN on February 8, 2023,

expressing their interest in the project and willing to participate in the study. The Project Team confirmed via email on February 21, 2023, the intent to involve them and keep them appraised about the findings of Stage 1 and 2 Archaeology Assessments (AA) and sent them the agreements.

- A Technical Review Agreement and Fieldwork Participation was finalized between CFN and the Town of Petrolia on March 8, 2023.
- On July 25, 2023, CFN requested that further communications be sent to consultwithcaldwell.ca and confirmed interest in participating in the Stage 2 portion of the AA. The signed agreements from the Town were sent to CFN on July 30, 2023. Signed agreements were received from CFN on August 9, 2023.
- The project Team submitted a draft Archaeological report to COTTFN for review on August 31 and was to provide feedback on September 15, 2023.
- CFN responded by email on September 20, 2023, stating they were still sorting out the TR Agreement for this project, and we must do before reviewing the draft AA report. The project team followed by email on September 21, 2023, requesting an update on the TR agreement. CFN responded the same day stating the Proponent recommended to our technical review agreement, which has not yet been signed and that they will have to wait to queue this review until the agreement is signed. The project team responded the same day clarifying the attached signed agreements, originally sent to CFN on August 9, 2023, were the TR agreements in question. CFN responded by email on September 26, 2023, that they had the project title mixed up with another project and that they ensure this project is queued for our review and to follow up early the following week (October 2-6) and they should have completed it by then.

4 Study Area Overview

4.1 Bright's Grove WTP

The Bright's Grove Water Treatment Plant (WTP) was originally constructed in 1895 and is located at 2701 Old Lakeshore Road in the Bright's Grove area of the City of Sarnia. The Bright's Grove WTP is permitted to take raw water from Lake Huron under Permit to Take Water (PTTW) Number 3431-98DKSC (expires June 5, 2023) and is permitted to take up to 15,586 m^3/d of raw water from Lake Huron. The plant has a current rated capacity of 12,000 m^3/d and operated under Drinking Water Works Permit No. 034-201. The Ontario Clean Water Agency (OWCA) has been the operating authority for the Bright's Grove WTP and the transmission main since November 15, 2010.

The Bright's Grove WTP facility currently draws raw water from Lake Huron directly through a 400mm cast iron intake pipe originally installed in 1944 as part of an "open" intake system. The existing intake has been maintained and/or modified on several occasions since 1944 with the most recent upgrades occurring in 2005 and in 2019.

In 2003, consideration was given to upgrading and/or replacing the intake to meet projected demands. A Technical Memo for Intake Upgrades (KMK, June 2003) identified that the level of headloss through the existing intake pipe would create pump cavitation issues when demands increase. When system demands approach 13 MLD, the existing low lift suction pipe would be operating at or near vacuum conditions. In addition, timelines for approval of a new intake and the anticipated capital cost of a new intake was deemed to be prohibitive. As a result, the decision was made to convert the existing intake from an open system to a closed system, and the low lift pumps were directly connected to the intake pipeline, acting as a direct suction pipe from the lake. As part of the intake conversion, the intake was provided with a new intake screen fabricated with Z-alloy. Raw water was pumped directly to the membrane filtration system. Although this conversion was successful in temporarily increasing the raw water supply and extending the life of the intake, it was not intended to be a long-term solution for the community's future water demands. It is important to note that cavitation of the pumps has been experienced since the conversion which has resulted in a reduction of the service life of the low lift pumps.

In 2014, the Town undertook a Condition Assessment of the Water treatment plant facility, including the intake. The inspection of the intake noted that the intake screen had shifted, likely due to ice movement in the area. Following this inspection, in 2014 a new crib structure was installed over the intake to protect and re-stabilize the intake screen. During the winter of 2017 / 2018, the intake was cleaned to remove an

accumulation of zebra mussels. During the cleaning operation, a 2.0m long crack was identified within the intake pipe. In addition, a gate valve on the intake line was found to be broken in a partially closed position.

Finally, in 2019 as part of the Clearwell and High Lift Pumping Station Upgrades project, zebra mussel and frazil-ice control systems were installed in the existing intake to address the operational issues arising from the zebra mussel infestation and frazil ice blockages of the intake.

4.1.1 Background Studies

Various studies have been completed at the Bright's Grove WTP since the plant was upgraded in 2005. A list of relevant studies is provided below in Table 4-1.

Table 4-1: Summary of Previous Reports and Studies

Title	Author	Date	Description
Technical Memo for Intake Upgrades	KMK Consultants	June 10, 2003	Investigated the capacity of the existing intake and different screen designs. Identified direct connection is required.
Replacement and Extension of Petrolia WTP Intake Memo	KMK Consultants	March 29, 2010	Preliminary assessment of constructing a new intake that extends approximately 1.5 km into Lake Huron from the shoreline. Recommended to extend the intake.
Condition Assessment of Bright's Grove WTP Report	CIMA+	March 12, 2014	Assessing the condition of the process, electrical, and structural assets.
Asset Management Plan	CIMA+	March 31, 2014	Report outlining a high-level condition of the Town's major infrastructure assets including water, sanitary, storm, roads, and public facilities.
Technical Memorandum for Intake Upgrades 2014	CIMA+	November 11, 2014	Recommended solutions for the intake pipe to address damage and operational impacts from frazil ice.

Title	Author	Date	Description
Bright's Grove WTP Clearwell Expansion Design Brief	CIMA+	October 2019	Design for replacement of the existing high lift pumps and treated water storage clearwell.

4.2 Study Area Location and Site Features

The Bright's Grove intake pipeline extends from the low-lift pump station in the Water Treatment Plant across Old Lakeshore Road to the Lake Huron shoreline, and approximately 365m into Lake Huron terminating with at an intake structure complete with a double headed intake screen made of a zinc-alloy material. The existing alignment of the Bright's Grove WTP Intake is shown below in Figure 4-1.

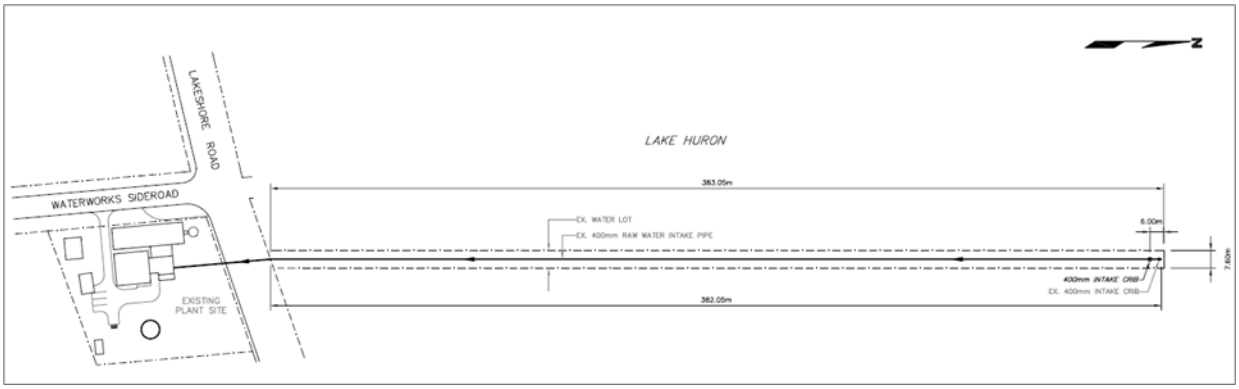


Figure 4-1: Existing Intake Alignment

Historical drawings indicate other infrastructure is present in the front yard of the WTP which will be an important consideration for the design of future improvements. This infrastructure includes live and abandoned storm and sanitary drains, tanks, valves, manholes, catch basins, and trees.

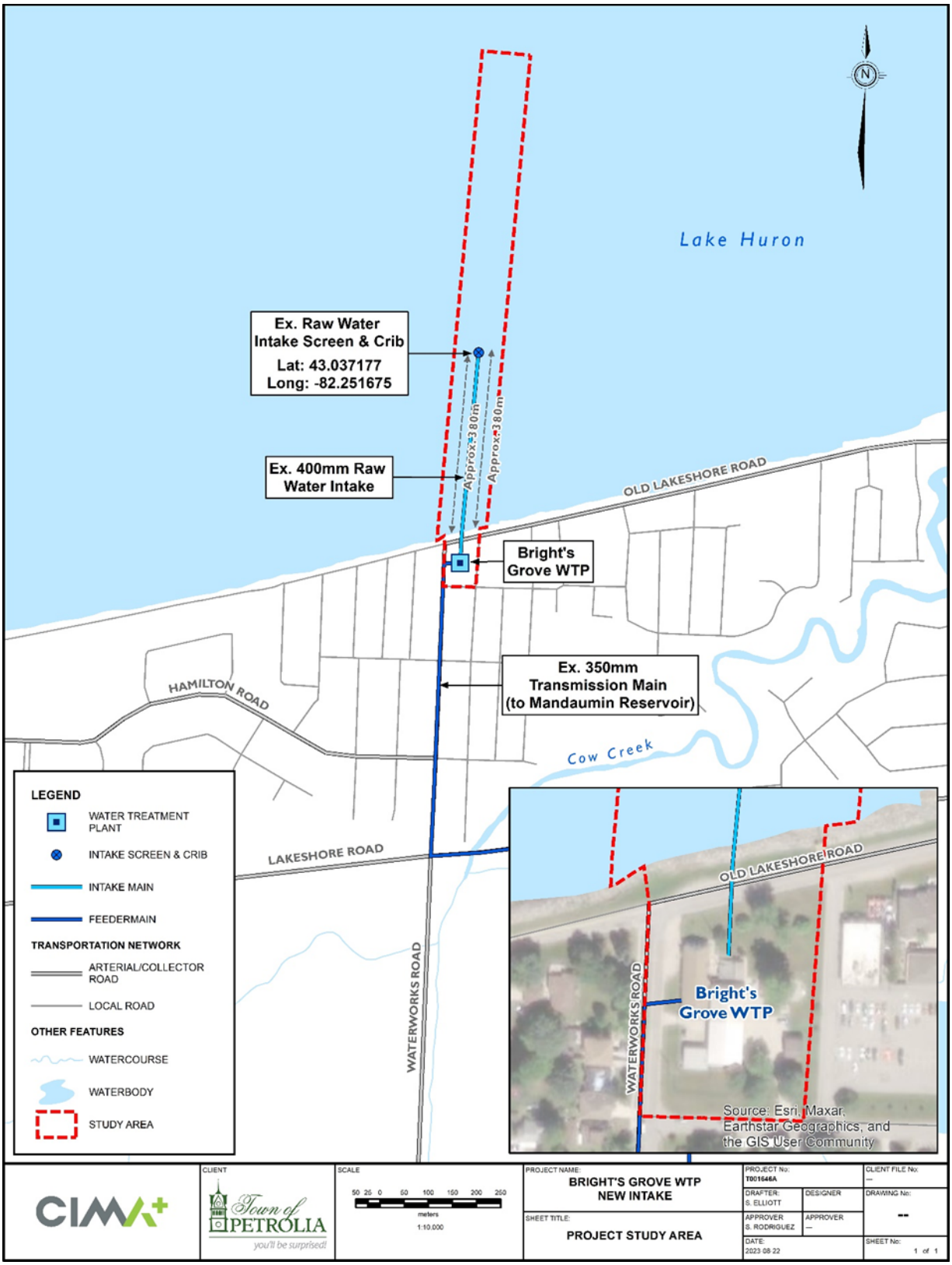


Figure 4-2: Project Study Area

4.3 Existing Natural Environment

The study area is under the jurisdiction of the St. Clair Regional Conservation Authority (SCRCA) and falls within the regulation limits (O.reg 155/06). The study area is located within the Cow and Perch Creek sub-watershed and is a part of the Southeast Lake Huron Shoreline watershed. It is located within Coastal Margin (depth < 3m) and Nearshore (depth 3-15 m) Lake Huron Habitat Zones. The City of Sarnia's Official Plan (updated in 2022) indicates that the study area falls within Thunder Bay Woodlot Wetland Complex (not provincially significant) and the Natural Heritage System of the Growth Plan for the Greater Golden Horseshoe. The City's Official Plan indicates the Lake Huron shoreline, which the study area enters, is not within any Natural Areas or Environmental Corridors which the municipality has outlined. The shoreline is also a part of the Natural Hazards Floodplain mapping and is considered a Natural Heritage System (City of Sarnia, 2014 (updated 2022)).

A desktop-based review of natural heritage constraints for the study area was completed. The review was intended to determine if there are any known natural areas (i.e., Areas of Natural and Scientific Interest, Provincially Significant Wetlands, Environmental Protection Areas, Significant Woodlands or Significant Wildlife Habitat) or records of rare or sensitive species that could be impacted by the project. Based on the desktop review, there are no Provincially Significant Wetlands (PSW) or Areas of Natural and Scientific Interest (ANSI) in the study area.

4.4 Existing Socio-Cultural Environment

4.4.1 Land Uses

The City of Sarnia Official Plan (OP) has designated the lands within Bright's Grove settlement area for various types of land uses. The Land Use Plan, Schedule "A" forms part of this Plan and sets out the generalized distribution of the major land use categories. It is intended that lands in Bright's Grove will be developed in accordance with the land use pattern shown on Schedule "A".

4.4.2 Cultural Heritage Assessment

Cultural Heritage Screening Report was completed on January 17, 2023, by Parslow Heritage Consultancy Inc. (PHCI) for the Bright's Grove Water Treatment Plant located at 2701 Old Lakeshore Road in the City of Sarnia. The assessment for this report consisted of data collection, background historic research, review of secondary source material and field review. This report is included in Appendix B.

PHCI concluded that 2701 Old Lakeshore Road is a Listed property in the City of Sarnia's Heritage Register, and that the identified heritage value is confined to the original 1896 pumping station located at the corner of Old Lakeshore Road and Waterworks Road. They also concluded that the proposed work poses no direct impact to the identified Heritage value of 2701 Old Lakeshore Road. The following items were identified as recommendations moving forward with the design project:

1) Given the current inclusion of 2701 Old Lakeshore Road on the City of Sarnia's heritage register, the cultural heritage value or interest (CHVI) of the structure has been established; the Listing report in Appendix B should be accepted in lieu of a CHER.
2) It is acknowledged that in keeping with the Cultural Heritage Checklist (Appendix B), a Heritage Impact Assessment (HIA) should be recommended to identify potential impacts to a structure with CHVI. It is understood the Town may consider undertaking select repairs to components of the structure identified in 2014 as requiring repair or replacement as part of the current contract to install a new intake pipe; potential repairs include, but are not limited to, foundation repairs, roof replacement, and stucco repair. The plant would remain operation during any proposed repairs. It is recommended that Recommendations 5 through 7 of the CHSR be considered in lieu of a HIA, provided that no alteration to the roofline is made and materials are replaced, as necessary, in kind. As a further measure, the Town may consider undertaking a Conservation Plan prior to any alterations to identified heritage attributes of the 1896 pumping station.
3) It is acknowledged that consideration is being given to the installation of a raw-water pre-treatment system within the 1896 pumping station structure; it is understood that should a raw-water pre-treatment system be installed the exterior of the structure will not be impacted. It is recommended that Recommendations 5 through 6 of the CHSR be considered in lieu of a HIA.
4) Related to recommendations 2 and 3, the limits of the original 1896 pumping station be illustrated on all construction schematics and formal 'no-go' instructions be issued to all site personnel.
5) The Project Area be subject to a pre-construction vibration assessment, and subsequent vibration monitoring of the 1896 pumping station, as necessary.
6) Should future work on the Project Area require alteration to the exterior of the 1896 pumping station, a HIA be undertaken at that time.

4.4.3 Archaeological Assessment

Stage 1 and 2 archaeological assessment was undertaken on in September 2022 by Archaeological Research Associates Ltd. (ARA) for the Study Area between the site of the Water Treatment Plant and the shoreline of Lake Huron. A Stage 1 AA consists of a review of geographic, land use and historical information for the property and the relevant surrounding area, and contacting MCM to find out whether, or not, 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 and 2 AA Report is included in Appendix C.

The Stage 1 assessment determined that the study area comprised a mixture of areas of archaeological potential, areas of no archaeological potential and areas previously subject to marine assessment. The Stage 2 assessment did not result in the identification of any archaeological materials. It is recommended that no further land-based assessment be required within the study area.

Archaeological Research Associates Ltd. (ARA) was also retained to complete a marine archaeological assessment of the Study Area between the shoreline and the potential intake location. The Archaeological work was conducted under marine archaeological license 2022-19 issued to Scarlett Janusas.

A snorkel survey and an autonomous underwater vehicle (AUV) scan were performed for the assessment of the current intake area. From this investigation it was found that segments of the existing intake pipe from 1896 still exist. It is unlikely to be impacted in the construction of a new intake pipe and therefore no mitigation is recommended. The existing intake pipe from 1944 is not of historical or archaeological significance and therefore there is no recommendations concerning it. Furthermore, there were no cultural resources discovered in the study area and no additional archaeological mitigation is recommended for this study area.

Compliance with legislation is to be adhered to in the event of that cultural material or features is discovered.

4.5 Source Water Protection

An intake protection zone (IPZ) is the area around a surface water intake that is defined to protect the source water for a municipal residential drinking water system. An IPZ is a vulnerable area where potential contaminants could pose a significant risk or threat to the source water.

The Bright's Grove WTP draws raw water directly from Lake Huron, and therefore it was classified as "Type A" (Great Lake) intake per classification standards. Primary and

secondary Intake Protection Zones (IPZ-1 and IPZ-2, respectively) for the Bright's Grove WTP intake were delineated as part of the Assessment Report. The limits of the existing IPZs are shown in Figure 4-3. The resulting IPZ-1 is a circle with a centre on the intake crib and a radius of approximately 1,000m. Delineation of IPZ-2 includes in-water, upland and up-tributary components based on travel time of a contaminant to the intake.

Any storm sewer shed that can potentially contribute water to the intake within 2 hours time of travel is included as part of the IPZ-2. As such, three (3) storm sewer catchment areas considered part of the IPZ-2 include Crystal Beach, Thunder Bay and Crescent Park. These catchment areas are assumed to have 13 outfalls within the IPZ-2, and 11 municipal drains.

The vulnerability of the intake and its IPZs is primarily determined based on its depth, distance from land and historical water quality concerns. The relative degree to which a threat could affect the drinking water supply is generally expressed in terms of vulnerability scores (10, 8, 6, 4 and 2). The higher the vulnerability score, the higher is the degree of threat posed in that area. The assessment report indicates that the vulnerability score for the Bright's Grove IPZ-1 and IPZ-2 (7.0 and 5.6, respectively) is low and therefore there are no significant potential prescribed threats within each IPZ, that could affect the source water quality.

In 2015, the St Clair Town Source Protection Plan was completed and came into effect. The Petrolia Intake Protection Zone Map showing the community area, surface water intake, setbacks, and geographical limits of the protection zones (IPZ-1, IPZ-2) as shown in the St. Clair Town Source Protection Plan is provided below in Figure 4 3.

Locally, the lake receives direct discharges from storm water outfalls, municipal and industrial wastewater treatment facilities, industries, as well as indirect discharges from agricultural runoff. The lake is also used for recreational purposes. Within the direct vicinity of the intake are several creeks including Cow Creek which is 0.5 km east and receives agricultural runoff and lagoon effluent as well as Perch Creek which is 0.5 km west.

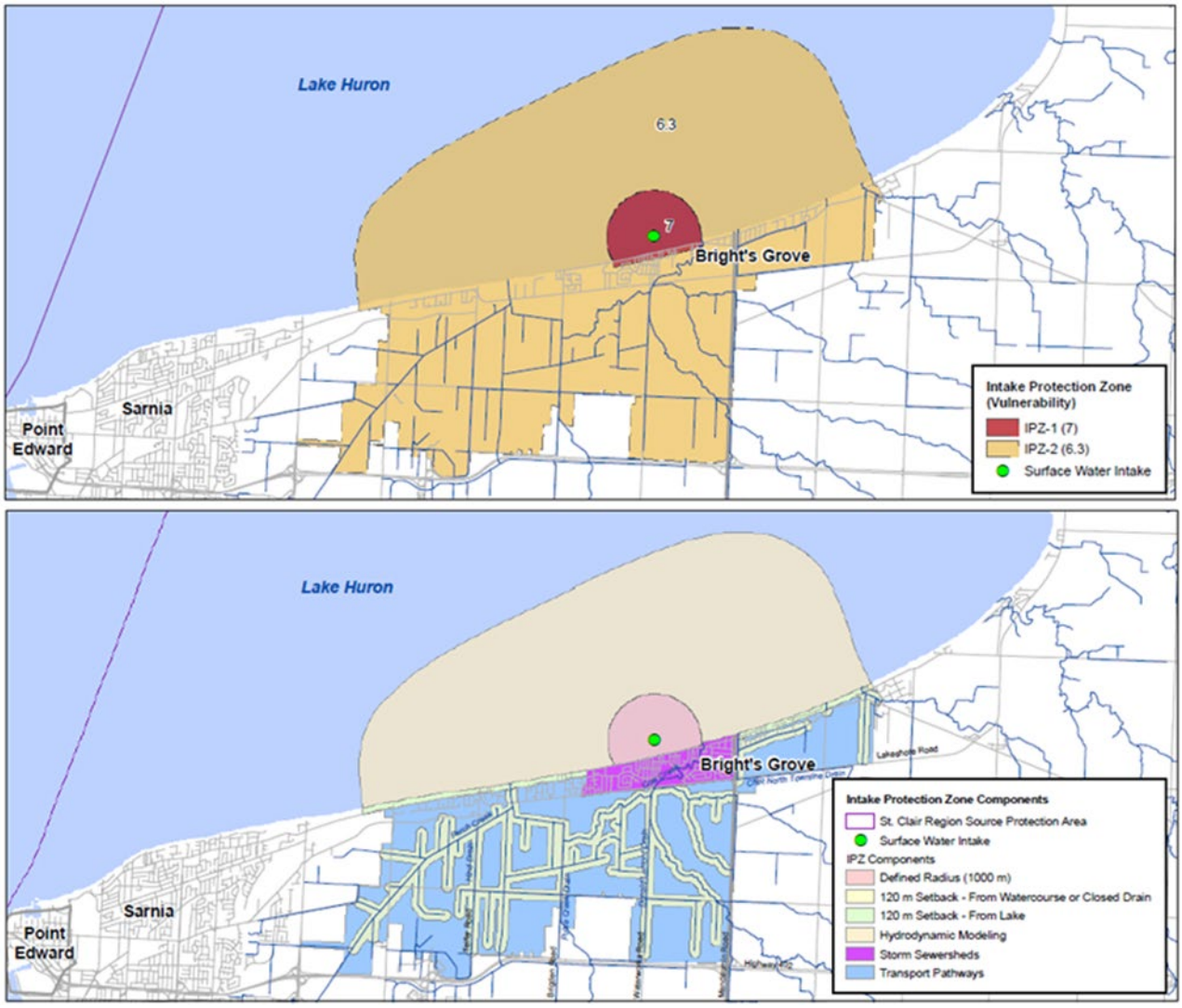


Figure 4-3: Bright's Grove WTP Intake Protection Zone (Thames-Sydenham and Region Source Water Protection, 2010)

If the location of the intake changes significantly from the current location, then the Source Water Protection Plan for the Bright's Grove WTP would need to be updated. Updating the Source Protection Plan could result in additional lands being included within IPZ-2 or designated as potential transport pathways. The vulnerability of the new intake to contaminants and threats (if any) would be highly dependant on the distance of the new intake structure from the shoreline and the depth of intake.

5 Existing Conditions

5.1 Lake Huron

Lake Huron is located within the Great Lakes and has a surface area of 59,600km. It has a southwest to northwest orientation, maximum length of more than 332km and average width of approximately 295km. Historical water level data obtained from the Fisheries and Oceans Canada website has been plotted to provide an indication of lake water level variations. The monitoring gauge in Lake Huron at Point Edward near Sarnia is the closest to the Bright's Grove WTP intake. Table 5-1 below shows the average yearly mean water levels in Lake Huron.

Table 5-1: Historic Lake Levels

Condition	Water Elevation	Year
High Water Level	177.24 masl	1986
Average Water Level	175.95 masl	2003
Low Water Level	175.57 masl	2013

MECP Guidelines suggest that the top of an intake should be set a minimum of 3.0m below the historic low-water level. However, given that the effects of climate change may result in lower lake levels than seen historically, it is recommended that the intake elevation be set as low as possible, while providing adequate separation from the lake bottom to prevent scouring of sands and silts onto the raw water intake.

5.2 Bright's Grove WTP Intake

The existing intake pipe connects directly to the low-lift pumps in a dry well in the Bright's Grove WTP. Key characteristics of the existing intake structure include:

- The intake pipe is a 400mm diameter cast iron, extending 365m into Lake Huron, at the north end of Old Lakeshore Road in Bright's Grove.
- The intake is provided with a screen elevated approximately 2m above the lakebed.
- A crib structure is provided over the intake screen. The crib is comprised of a bolted steel frame and was provided to protect the intake screen from ice movement and boat traffic. The crib structure is 6.1m wide at the base and 7.5m long. Based on the average lake level (175.95m), the intake screen is 3m below the water surface.

- A chlorination system is in place for zebra mussel control. Sodium hypochlorite is injected into the intake pipe when the low-lift pumps are in operation, and when the raw water temperature is above 12oC. Hypochlorite is injected via a Polyethylene (PE) line originating from a manifold in the main plant basement and terminating at a diffuser in the intake pipeline at the intake screen location.

Key characteristics of the existing intake are listed in Table 5-2, and the intake screen configuration is shown in Figure 5-1 below.

Table 5-2: Existing Bright's Grove WTP Intake

Criteria	Distance (m)	Notes / Observations
Intake pipe length	365	Distance from the shoreline to crib
Lakebed depth	5	Based on average Lake Huron level of 175.95m and lakebed depth of 170.95 m (175.95-170.95 = 5)
Intake crib freeboard	3	Based on average Lake Huron level of 175.95m and top of intake crib level of 172.95m (175.95-172.95 = 3)

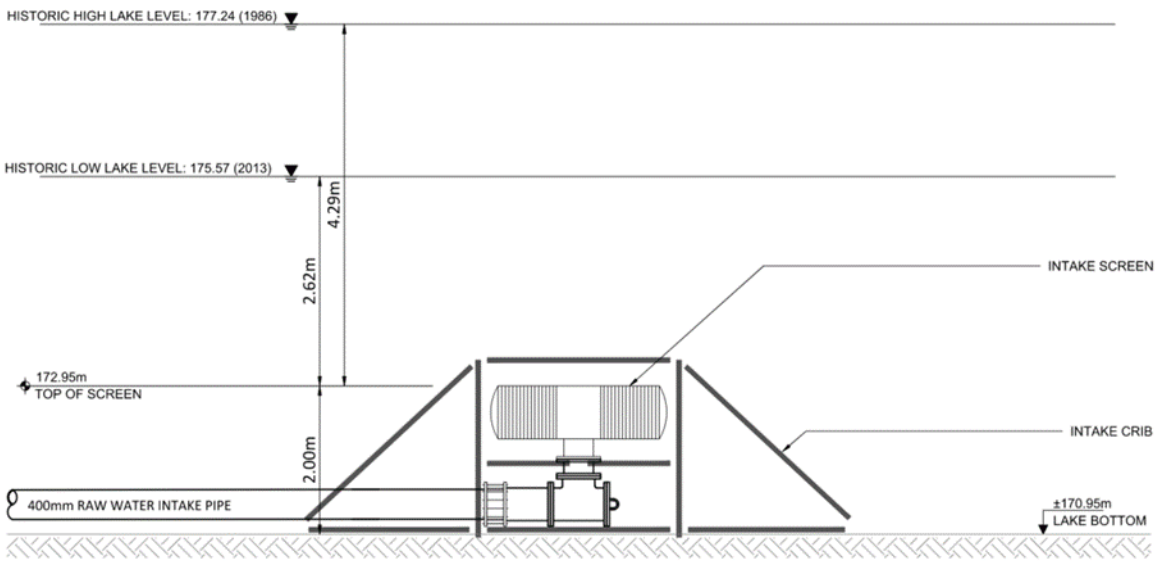


Figure 5-1: Existing Bright's Grove WTP Intake Crib Structure and Screen (Source: CIMA+)

Various works have been completed on the intake over the years. A summary of the more recent major works completed on the intake is summarized in Table 5-3.

Table 5-3: Recent Major Work Completed on the Bright's Grove WTP Intake

Year	Task	Details
2005	Intake screen installed	• Screen fabricated out of metal alloys that repels zebra mussel growth.
2005 - 2013	Under water video inspection	• Various video inspections of the intake screen only. Concrete bags installed to support the screen.
2014	Underwater inspection	• Galcon Marine (Galcon) was retained to inspect the intake. • The intake screen was observed to be leaning on an approximate 45-degree angle to the west.
Summer 2017	Crib structure installed	• Galcon was retained to construct and install a crib structure to protect and to re-stabilize the intake. • The first 400 mm coupling / flange adapter and approximately 10 m of pipe length was required to be removed and replaced. During this removal, a thick layer (approximately 75 mm) of zebra mussels was observed around the inside diameter.
Winter 2017/2018	Pressure washing intake	• Galcon Marine was retained to clean the intake and to remove the zebra mussel layer inside the intake. • The entire length of intake was high pressure washed at 13,780kPa (2,000 psi). • An ROV camera inspection was conducted by ASI Marine to assess the results of the cleaning. The zebra mussel layer was still partially present, covering approximately the top half of the inside diameter a few meters from the newly installed pipe at the intake elbow. The bottom third of the inside diameter was not covered with zebra mussels, which suggests that the bottom half of the intake was likely covered with sand. The majority of inside the intake was observed to be spotted with some corrosion identified as iron tuberculation. • During the cleaning a horizontal crack approximately 2m long was observed just below the springline of the pipe, approximately 167m from the WTP. The crack is not considered to pose an imminent risk; however, it is indicative of the overall condition of the aging pipeline.

In 2017, the existing intake screen was removed for inspection and cleaning and was found to be in very poor condition with zebra mussels attached to the outer surface (Figure 5-2). During the inspection, a six-meter section of the 400 mm (16 inch) diameter cast iron intake pipe was found to be damaged at the screen connection. The damaged pipe section was removed and replaced with a new section of pipe and repair coupling. Once removed, the section of pipe removed was found to be infested with zebra mussels (Figure 5-3 and Figure 5-5), reducing the inside diameter of the pipe by approximately 40% (from 400 mm to 250 mm). The reduced cross section of the intake pipe, combined with the increased roughness of the pipe walls, has resulted in higher head losses through the intake pipe which has resulted in cavitation at the low lift pumps. Cavitation at the pumps has resulted in significant damage to the low-lift pumps (Figure 5-4). In 2018, the entire length of the intake pipe was high-pressure washed at 14,000 kPa (2000 psi) to remove sediments (sand) and zebra mussels in the intake. An ROV camera inspection completed afterwards revealed the zebra mussel infestation remained present in over 75% of the entire length of the intake pipe. During the inspection, in addition to the partial intake blockage due to zebra mussels, the pipe was determined to be significantly corroded, a 1.2 m long crack was observed along the bottom third of the pipe near the shoreline (Figure 5-6) and an old isolation valve was found to be inoperable and partially closed blocking 25% of the inside diameter of the intake pipe. Finally, the presence of the zebra mussels within the intake pipe has resulted in shells being conveyed to the intake screens which has resulted in rapid clogging of the screens and increased needs for backwashing (Figure 5-7).

Figure 5-2: Intake Screen

Figure 5-3: Zebra Mussel Infestation

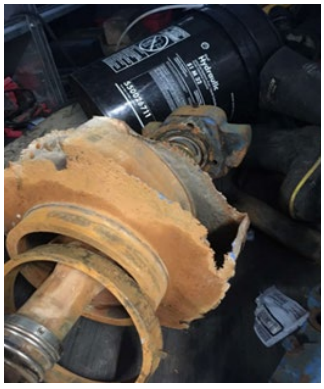


Figure 5-4: Damaged Impeller

Figure 5-5: Zebra Mussels Infestation

Figure 5-6: Cracked Intake

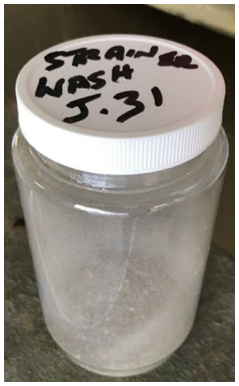


Figure 5-7: Ground Shells

5.3 Operational Performance

MECP Water Design Guidelines (2008) states "the minimum submergence from top of intake structure to minimum recorded water levels should be 3.0m". The intake screen depth of submergence ranges from approximately 3.0m (low lake level) to 4.5 m (high lake level). Despite, meeting the MOECC Design Guidelines for cover, the plant still experiences operational performance issues that are common to shallow intakes:

- Zebra Mussels
- Frazil Ice
- Turbidity and Settleable Solids (Sand)

To CIMA's knowledge there have been no maintenance practices in place for the intake pipe since its installation, other than video inspections of the intake screen.

5.3.1 Zebra Mussel and Frazil Ice

During the installation of the intake crib in the summer of 2016, a section of intake pipe was required to be removed and revealed a 75mm encrusted layer of zebra mussel shells on the inside of the 400mm intake reducing the pipe diameter from 400mm to approximately 250mm. The infestation of zebra mussel shells confirmed that although the intake screens were constructed from a Z-alloy that prevents the growth of zebra mussels on the screen itself; the Z-alloy does not prevent the zebra mussel larva from entering the screen's 10mm opening and attaching to the intake pipe itself.

The zebra mussel infestation has resulted in the following process impacts:

- Increased head losses though the intake due to the reduced diameter inside the intake

- Damage to the membrane filter material
- Damage to the low lift pump impellers

The Bright's Grove WTP has experienced regular issues with frazil ice during the winter, which results in a reduction in raw water flow to the plant or completely restricting flow through the intake altogether. Frazil ice caused loss of flow through the intake during the winters in 2015, 2016, and 2018, which resulted in the WTP operating at a reduced capacity or shutting down completely.

Frazil ice are particles that commonly appear as discoid fragments which form near the surface in turbulent super cooled water and because they have little buoyancy, are readily carried below the surface by comparatively weak currents. When the ice particles are carried into the intake, they obstruct the flow by adhering to the screen and accumulating into large thin wafers. They have been known to travel up to 2 km under sheet ice when carried by currents. If there is no surface to adhere to, they accumulate into slush ice and if a current brings slush ice to an intake it immediate forms into frazil blockage.

As part of the 2019 Clearwell and High-Lift Pumping Station Upgrades Project (completed in 2016), the existing intake was upgraded to include zebra mussel and frazil ice control systems. A 150mm drinking water supply line was connected to the intake which allows for the operator to backflush relatively warm water through the existing intake to dislodge and melt any frazil ice accumulations on the intake screen. In addition, a chloring injection point was added at the intake to inject chlorine into the raw water when the low-lift pumps are operating. Provision of chlorinated water at the intake prevent the zebra mussel larvae from settling on the pipeline surface and increasing the infestation.

The cast iron pipeline transitions to shoreline connecting to a failed open isolation valve located along north side of Old Lakeshore Road. The pipeline is buried under Old Lakeshore Road and connects directly to the low lift pumps in a dry pump well.

5.3.2 Raw Water Quality

The current intake location for the Bright's Grove WTP presents a risk of microbiological contamination of raw water from the surrounding outfalls. Bacteriological sampling results have shown the presence of fecal coliform / *E. Coli*. The WTP raw water quality has measured *E. coli* ranging up to 200 cfu/100mL and Total Coliform up to 4400 cfu/100mL which is considerably high. However, the existing treatment process has been designed to address the existing raw water quality, and all water produced and distributed has consistently met all Drinking Water Quality Objectives.

Raw water results have also shown turbidity spikes up to 502 NTU (2022) and average turbidity ranging between 11 NTU to 41 NTU (2013) which is also considerably high. High and variable turbidity levels illustrate the influence of shoreline activities and discharge, as well as seasonal effects on water quality due to storm and wind effects resulting in a major impact to the treatability efficiency of the current membrane filters. It was observed during the intake cleaning video inspection in Winter 2017 / 2018 that the bottom third of the inside of the intake did not have any zebra mussels attached and that there was a visible line on the intake wall. This suggests that sediment had accumulated along the bottom of the intake since its installation and before zebra mussels were introduced to the Great Lakes in the 1980s. The intake cleaning operating in Winter 2017 / 2018 was likely the first time the inside of the intake pipe was cleaned since it was installed. The turbid raw water comprised of suspended solids and sand has resulted in the following process impacts:

- Damage to the strainers
- Damage to the membrane filter material
- Damage to the low lift pump impellers

5.4 Expected Useful Life Remaining

The intake pipe was installed in 1944 (approximately 79 years old in 2023). The typical expected useful life for cast iron pipes is between 75 years and 100 years; therefore, the intake pipe is now at the end of its expected useful life.

6 Design Criteria

6.1 Intake Design Capacity

The Ontario Ministry of Environment (currently the Ministry of Environment, Conservation and Parks) Design Guidelines for Drinking Water Systems, 2008, recommend that intake pipes be sized to accommodate a design period in excess of 20 years given the difficult nature and high cost of marine construction.

Under Permit Number 7644-CT3NGH, the Town is currently permitted to take 15,586 m^3/d of raw water from Lake Huron. Based on the projected demands, this volume of raw water should be sufficient to meet demands for the next 20 years. The current PTTW is due to expire on June 5, 2033. An application to the MECP to increase the PTTW allowance will be required once raw water demands approach 15,000 m^3/d.

The following is a summary of the WTP flow rates and rated capacities.

Table 6-1: Summary of Flow Rates and Rated Capacities

Component	Design Capacities (m^3/d)	Design Capacities (m^3/d)	Design Capacities (m^3/d)
	Existing	20-Year	50-Year
Design Flow Raw Water Supply Backwash Rated Capacity	 13,200 1,200 12,000	 13,200 1,200 12,000	 22,000 2,000 20,000
Intake Permit-To-Take-Water Intake Screen Intake Pipe	 15,600 19,500 13,200*	• PTTW to be updated when demand approaches 15,000m^3/d • Structures should be designed to accommodate the 50-year design demands, while equipment should be designed for 20-year raw water demands.	• PTTW to be updated when demand approaches 15,000m^3/d • Structures should be designed to accommodate the 50-year design demands, while equipment should be designed for 20-year raw water demands.

It is recommended that the existing intake pipe be designed for the fifty-year projected demands of 22 MLD, and that the remaining equipment be designed to accommodate the twenty-year projected demands.

The new intake should be equipped with zebra mussel and frazil ice control systems similar to the systems installed in the existing intake.

6.2 Intake Design Considerations

6.2.1 Open vs Closed System

In general, there are two distinct approaches for the design and operation of a surface water Intake: a closed suction system or an open gravity system. For a closed system, the intake is directly connected to the low lift pumps and acts as a suction intake (existing configuration). For an open system, the water levels between the lake and the wet well will equalize by gravity. The low lift pumps remove water from the wet well and the differential head between the lake level and wet-well level will convey water to the wet-well. The open system is an effective and widely used approach for surface water intakes.

6.2.2 Sizing Considerations

The selection of a closed or an open system does not affect the sizing of the intake and therefore all options consist of installing a new intake structure and intake pipe sized for the 50-year flow when the C-value friction factor has been diminished from 120 to 100.

The existing intake is 400mm in diameter and does not have sufficient capacity to meet the needs of the Bright's Grove WTP long term water demand needs. Increasing the size of the intake pipeline would improve the intake capacity and alleviate the current risk of pump cavitation under higher flows allowing the existing Low lift pumping configuration to remain in place until future expansion of the plant and/or turbidity reduction plant upgrades.

The critical design elevations of the intake utilize Lake Huron historical HWL (177.29m ASL), LWL (175.57m ASL) and the existing lowest allowable elevation (174.04m ASL). Preliminary sizing of the intake pipeline of 600mm pipe was based on head-losses over the varying pipe diameters assuming a C value of 100 and a pipe length of 400m.

In achieving the 50-year design flow, a tandem intake system can be also considered which includes a parallel intake system utilizing the existing 400mm intake only as an emergency back up. The benefits of a tandem intake system are that the original intake system can stay in place as backup/standby or as contribution to the total design flow.

Should any future improvements be required on the intake system then there would greater flexibility due to the nature of the two intakes.

Preliminary pipe sizes using the Hazen-Williams equation are plotted to determine the minimum pipe size for the 50-year design flow as shown in Figure 6-1.

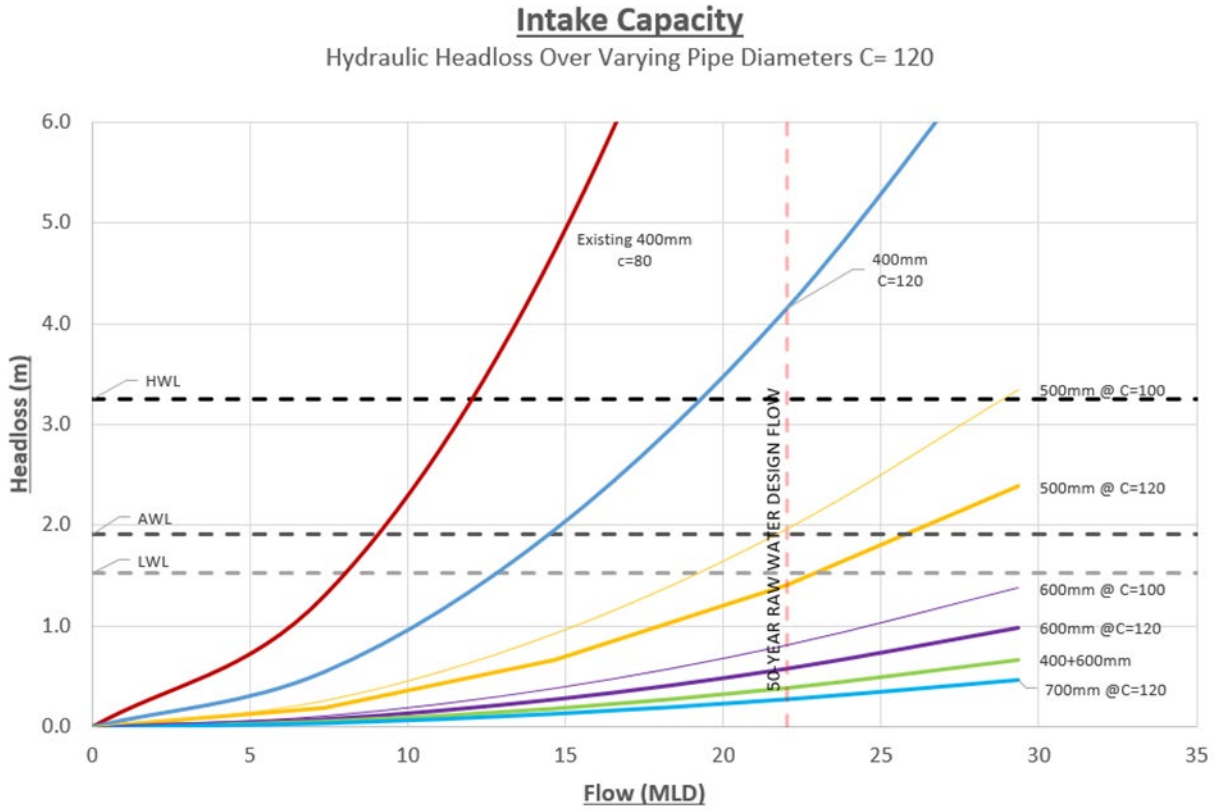


Figure 6-1: Intake Capacity at Varying Pipe Sizes

Assuming a C-value of 120 for an initial year and C-value of 100 for the 50-year, the minimum pipe sizes that are appropriate for the established raw water design flow of 22MLD is a 600mm diameter pipe. The Ministry recommends a maximum intake pipe velocity of 1.0m/s therefore a pipe diameter of 600mm is conservative. Larger diameter pipelines resulting in lower velocities may reduce the effectiveness of the intake backflush feature which helps to physically push frazil ice away from the intake screen. Although lower velocities are expected in the larger diameter pipe, the backflushing will utilize warmer distribution water which been successful in thermally treating frazil ice at the existing intake.

The following Figure 6-2 shows the water velocities over the ranging pipe diameters and how it compares to the Ministry's guideline.

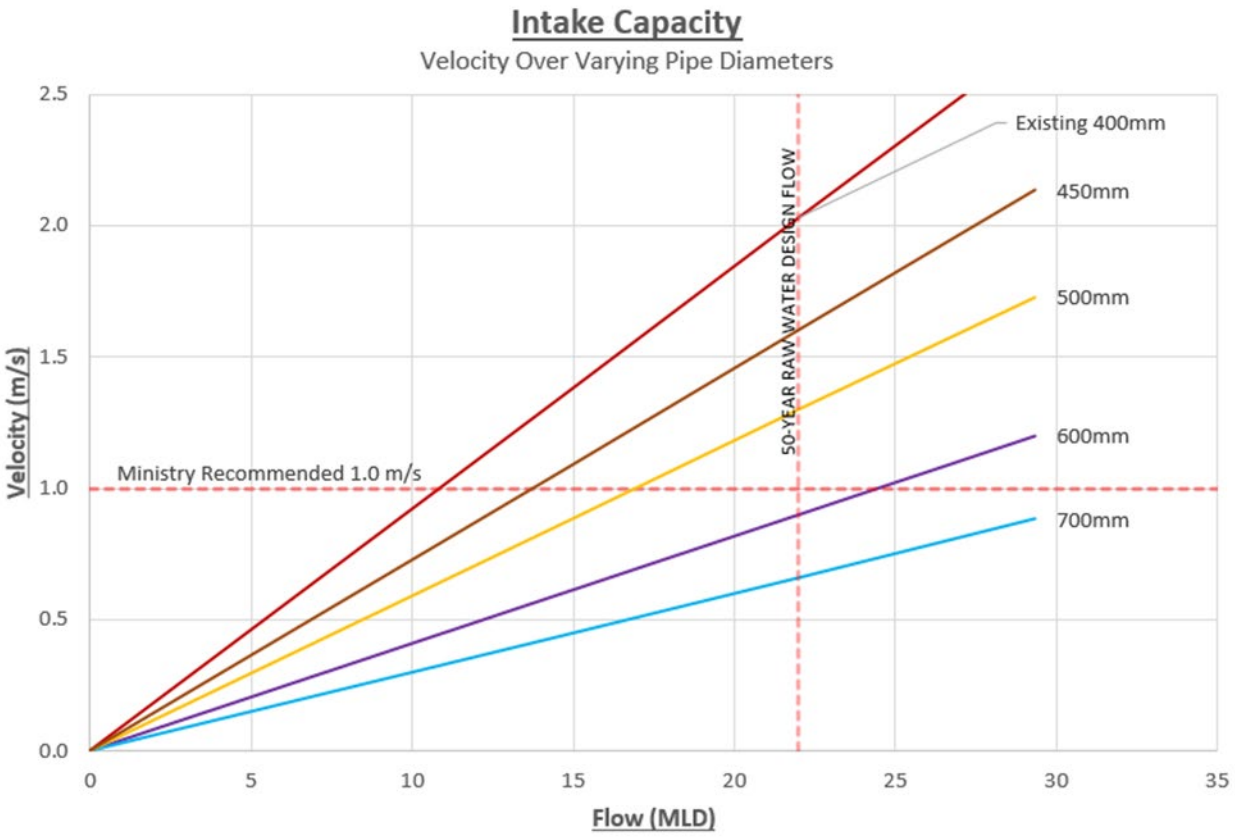


Figure 6-2: Water Velocity Over Varying Pipe Diameters

The larger 600mm pipeline provides a water velocity that both meets the design flow and is less than 1.0 m/s, as recommended by MECP. This diameter is conservative and the differential cost increase from one size lower is insignificant since costs are primarily driven by installation. However, the smaller sized pipe will result in higher velocities which may be beneficial to mitigating frazil ice and may save the project on some capital costs. Low water velocities also provide a challenge as sediment can build up within the pipeline requiring operations to clean the intake pipeline, therefore an access point at or near the low lift station would be beneficial for maintenance.

7 Class EA Phase 1 – Problem / Opportunity Statement

Phase 1 of the Municipal Class EA planning process requires the proponent of an undertaking to first document factors leading to the conclusion that the improvement is needed, and to develop a clear statement of the problem / opportunity to be investigated.

The problem / opportunity statement for the Bright's Grove WTP New Intake Class EA Study was defined as follows:

> *The existing raw water intake for the Bright's Grove Water Treatment Plant is at or near the end of its useful service life. A raw water supply solution is required to ensure a secure and reliable source of water to the Bright's Grove Water Treatment Plant to ensure that the Town can continue to deliver high quality drinking water to the residents of the Town of Petrolia and the surrounding areas.*

8 Evaluation Methodology

The evaluation methodology is essential in guiding the decision-making process. A well-structured comprehensive evaluation methodology provides the foundation for a decision-making process that is sound, defensible, traceable and consistent with the project objectives.

The following decision-making methodology was used for the Bright's Grove WTP Class EA:

- Development of evaluation categories and criteria to assess a list of alternative solutions for the Bright's Grove WTP and Intake,
- Development of alternative solutions for Bright's Grove WTP and Intake,
- Detailed evaluation of the alternative solutions using a multi-criteria analysis (MCA) decision-making process, and
- Identification of the preliminary preferred alternative solution based on the results of the decision-making process.

The decision-making model for the Bright's Grove WTP Intake Replacement Class EA study was centred on an MCA. The MCA provides a structured approach to determine overall benefits among alternative options, where the options accomplish several objectives. This evaluation methodology requires specification of desirable objectives and identification of corresponding indicators, which are then used to measure/assess the ability of each alternative option to meet a specific objective.

The MCA approach includes the following major components:

- **Evaluation Categories**: Primary evaluation categories group the evaluation criteria.
- **Evaluation Criteria**: A set of evaluation criteria is developed to reflect aspects of importance for a specific project. Alternative options are assessed and compared relative to the others against the evaluation criteria.
- **Qualitative Rating**: Each alternative option is assigned a rating that reflects its ability to meet each evaluation criterion relative to the performance of the other alternative options.

A general schematic of the evaluation methodology is outlined in Figure 8-1 and described in more detail in subsequent sections.

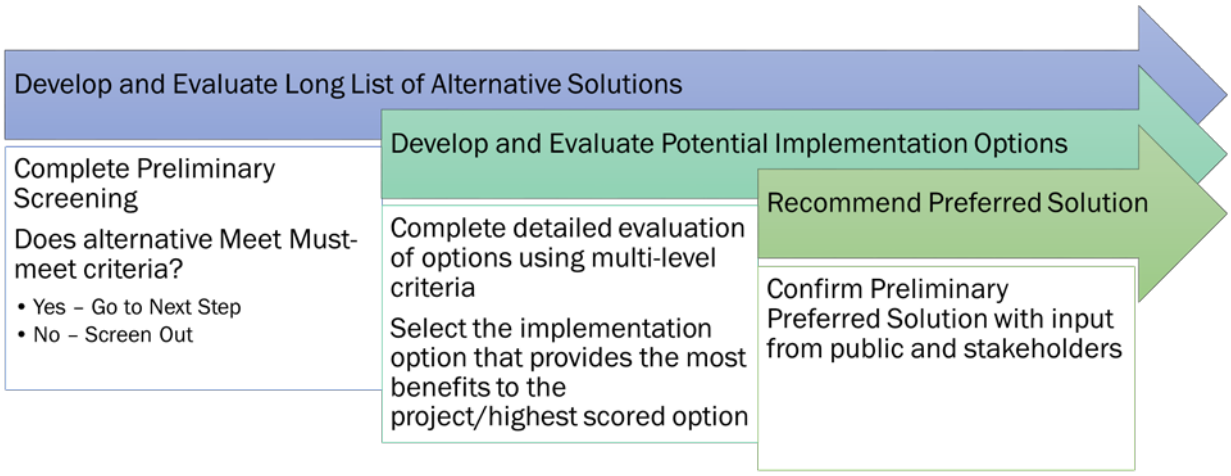


Figure 8-1: Overview of Evaluation Approach

8.1 Preliminary Screening

A list of available alternative water supply solutions was initially developed to include potential supply servicing scenarios, including the Status Quo, to reflect the current supply conditions at the Bright's Grove WTP. Each water supply alternative solution was assessed against a set of preliminary screening criteria with the purpose of narrowing down the list to only those that were considered "feasible" and eliminating alternatives that were unrealistic from further analysis and consideration. The preliminary screening step helped to avoid the need to carry an unrealistic or clearly inferior water supply alternative through the next steps of the evaluation process which included further development of the alternative, determination of probable costs, and a detailed comparative assessment.

Preliminary screening was accomplished by applying the "must-meet" criteria shown in Table 8-1. Must-meet criteria were established to capture key objectives established for this project. The "must-meet" criteria were considered in a "yes/no" or "pass/fail" basis. Alternative water supply solutions must pass all "must-meet" criteria to be short-listed or carried forward through the next step in the evaluation process.

Table 8-1: Preliminary "Must-Meet" Screening Criteria

Must-Meet Criteria	Description
Capacity Requirements	• Does the water supply alternative solution have the ability to meet the long-term water demand projections for the Town of Petrolia

Must-Meet Criteria	Description
Compliance	• Does the water supply alternative solution allow the Bright's Grove WTP to continuously meet and/or exceed treated water quality standards, objectives and guidelines? • Does the water supply alternative solution have the ability to effectively and safely contribute to a multi-barrier approach?
Technical Feasibility	• Does the water supply alternative solution maximize the use of existing assets and infrastructure in the serviced area? • Is the water supply alternative solution compatible with existing treatment processes and operational practices, such that its implementation will not impact significantly the existing operations? • Can the water supply alternative solution be implemented in a manner that minimizes the constructability complexity, relative to the other alternative solutions, and is fiscally responsible by balancing capital and operating costs.

8.2 Evaluation Criteria

The feasible alternative solutions were subjected to a detailed comparative evaluation using an evaluation matrix that enables a systematic and rational comparison of the alternatives and focuses on a set of criteria for four main categories:

- Environmental,
- Social,
- Technical, and
- Financial.

Secondary criteria or sub-criteria were identified within each primary criterion, as shown in Table 8-2. The sub-criteria were intended to represent specific aspects and considerations of the category being evaluated, and most relevant to this project.

Table 8-2: Evaluation Criteria and Indicators

Criteria (Weighting factor %)	Indicators What information is used in the evaluation?
Natural Environmental (20%)	
Wildlife	• Potential impact on wildlife and species at risk.
Natural Environmental Features	• Potential impacts to existing natural environment.

Criteria (Weighting factor %)	Indicators What information is used in the evaluation?
Climate Change	• Potential impact on climatic conditions during construction and project vulnerability to changing climatic conditions.
Source Water Protection	• Potential impact on source water protection areas and compliance with source water protection policies.
Socio-Cultural (15%)	
Public Health and Safety	• Potential risk to public and operations staff health and safety related to water quality, and construction and operation of new intake pipeline and structure.
Long-term Impacts	• Potential long-term impact on adjacent residents and local users from siting of new infrastructure.
Short-term Impacts	• Potential short-term disruption to local residents, businesses, commercial and recreational activities due to construction (i.e., noise, dust, vibration, visual, access, parking, road and beach areas closures)
Cultural Heritage Features	• Potential impacts to existing natural environment, including terrestrial and aquatic habitats, wildlife and wildlife habitats, sensitive features, areas of natural and scientific interest, etc.
Archaeological Features	• Potential impact from construction to existing archaeological and cultural heritage features.
Technical and Operational (45%)	
Raw Water Quality	• Concentration of water quality parameters and chemicals of concern in the sediments for each potential intake location
Risk to Contaminants	• Potential vulnerability/risk of new intake to contaminants based on intake depth, distance from shore, proximity to potential sources of contaminants such as creek discharges, storm outfalls, drainage ditches, etc.)
Ease of Implementation	• Potential level of complexity during construction, conflicts with existing infrastructure, ability to facilitate construction with uninterrupted supply of water and within a reasonable timeframe.

Criteria (Weighting factor %)	Indicators What information is used in the evaluation?
Operational Complexity	• Relative added complexity to existing operational practices resulting from construction and operation of new infrastructure.
Construction Duration	• Duration of project construction and potential for staging and phased construction.
Regulatory Approvals	• Number and complexity of permits/approvals needed for project construction.
Property Acquisition	• Need for land acquisition and availability of property, including temporary and permanent easements.
Economic (20%)	
Construction Cost	• Relative scale of construction costs at various intake locations

8.3 Qualitative Rating

The evaluation methodology consisted of a descriptive or qualitative evaluation of alternative solutions / strategies and identified advantages and disadvantages of each alternative option with respect to the evaluation criteria. In this respect, comparisons and trade-offs were made between alternatives. Trade-offs can involve forfeiting an advantage or accepting a disadvantage to address a higher priority consideration.

Life cycle costs were evaluated using quantitative means. High-level estimates were generated for this criterion, and they were evaluated using a relative rating provided for each alternative as it compares to each of the other alternatives.

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

- Risk and/or potential impacts for each criterion,
- Approaches to mitigating risks and/or impacts,
- Scoring rationale, based on degree of risk and/or mitigation required, and
- Score, which were assigned as follows:

Table 8-3: Overall Scoring Approach

Graphic	Rating	Description
●	5	Very well aligned with criteria
◕	4	Well aligned with criteria
◑	3	Somewhat aligned with criteria
◔	2	Not well aligned with criteria
○	1	Low alignment with criteria

The total score within the category was determined by summing the individual scores assigned to each evaluation criterion. Category scores were then summed to determine the overall score of an alternative solution. The alternative solution that scored the highest was ranked first and selected as the preliminary preferred solution. The alternative solution with the second highest score was ranked second, and so on.

9 Identification of Alternative Solutions

In accordance with Phase 2 of the Municipal Class EA process, alternative solutions were identified to address the existing opportunities and constraints associated with the Bright's Grove WTP and Intake.

The following general alternative solutions were identified:

1) Do Nothing.
2) Limit Community Growth.
3) Reduce water demands through conservation measures.
4) Obtain Raw Water from Another Source.
5) Expand / Upgrade / Modify Existing System by Refurbishing Existing Intake.
6) Replacing Existing Intake.

A general description of each alternative solution is described in the following sections.

9.1.1 Do Nothing

The "Do Nothing" alternative represents the existing conditions where the current Bright's Grove WTP intake pipeline and structure would be maintained as is. No improvements or changes would be made to address the identified problem (deficiency) or opportunity.

The "Do Nothing" alternative does not address the current concerns with the structural integrity of the intake pipeline at the Bright's Grove WTP, and could potentially place current and future residences, businesses, or industries at risk from lack of water supply for domestic use, should a pipeline failure occur. In addition, the operational, maintenance and costly requirements resulting from current state of the intake pipeline and structure would continue to increase.

9.1.2 Limit Community Growth

The "Limit Community Growth" alternative represents a scenario where future growth in the areas serviced by the Bright's Grove WTP is limited to the extent that the existing facilities and infrastructure are sufficient.

The existing intake pipeline has enough capacity to accommodate projected flows, in the areas serviced by the Bright's Grove WTP beyond the 20-year planning horizon.

The "Limit Community Growth" alternative does not address the current concerns with the structural integrity of the intake pipeline at the Bright's Grove WTP, and could potentially place current and future residences, businesses, or industries at risk from

lack of water supply for domestic use, should a pipeline failure occur. In addition, the operational, maintenance and costly requirements resulting from current state of the intake pipeline and structure would continue to increase.

9.1.3 Reduce Water Demands

The "Reduce Water Demands" through implementation of water conservation and water efficiency measures represents a scenario where improvements in water conservation and water efficiency would reduce water consumption to the extent that the existing facilities and infrastructure are sufficient.

As noted earlier, the existing intake pipeline has enough capacity to accommodate projected flows in the area serviced from the Bright's Grove WTP beyond the 20-year planning horizon.

The "Reduced Water Demands" alternative does not address the current concerns with the structural integrity of the intake pipeline at the Bright's Grove WTP, nor the increasing operational, maintenance and costly requirements associated with it.

9.1.4 Obtain Water from Another Source

The "Obtain Water from Another Source" alternative represents a scenario where the existing surface water supply source for the Bright's Grove WTP would be abandoned and a separate existing water supply source from another area would be brought in for further treatment and distribution.

This alternative would involve obtaining raw water supply from the nearest water treatment facility in the area, the Lambton Area Water Supply Service (LAWSS). LAWSS is located approximately 25km away from the Bright's Grove WTP, that uses Lake Huron as the raw water source. Extending the water supply from LAWSS to the Town of Petrolia would result in the need for new major infrastructure as well as major modifications to some of the existing facilities. The significant capital expenditure associated with this alternative would most likely approach or surpass the costs associated within providing a brand-new intake pipeline and structure for the Bright's Grove WTP. In addition, there would be significant constructability challenges associated with construction staging that would need to be carefully planned and implemented to accommodate the continued operation of LAWSS and the Bright's Grove WTPs during construction. Water security concerns would also be an important future consideration for the Town of Petrolia due to reliance on a 25km pipeline as the only source of supply.

Also, the "Obtain Water from Another Source" alternative does not address the current concerns with the structural integrity of the intake pipeline at the Bright's Grove WTP, nor the increasing operational, maintenance and costly requirements associated with it.

9.1.5 Refurbish Existing Intake

This alternative would involve implementation of physical means to try to restore the structural deficiencies that have been visually observed along the intake pipeline, which include corroded areas, dents and deformations. If so equipped, serious concerns with respect to the integrity of the intake pipeline, reportedly installed in the 1960's would still remain.

Although the existing 400mm cast iron intake pipe has capacity to accommodate projected flows for the 20-year planning horizon, this alternative would also require the installation of a temporary raw water intake and connection to the existing treatment facility, to accommodate continued operation of the Bright's Grove WTP.

Given the need for a temporary intake and retrofit to the existing intake pipe that has questionable integrity, the costs associated with the refurbishment alternative would likely be comparable to the costs associated with providing a new intake.

9.1.6 Replace Existing Intake

This alternative would involve replacement of the existing intake system with a new intake pipeline and intake structure, to be constructed at the bottom of Lake Huron.

To accommodate continued operation of the Bright's Grove WTP, the new intake would be constructed while the existing intake remains in service. Risk minimization and mitigation to protect the existing intake will be paramount during construction. This alternative would include a staging strategy to accommodate the transition between intakes, once the new intake pipeline is in place, and with consideration to the physical arrangement of the Bright's Grove low lift pumping station alternatives.

9.2 Preliminary Screening of Alternative Solutions

A preliminary screening of each alternative solution was performed to ensure alternatives meet the long-term servicing needs for the Bright's Grove WTP and intake. A summary of the preliminary screening of alternative solutions alternatives is provide in Table 9-1.

Table 9-1: Preliminary Screening Results

Alternative Solution	Description	Short-listed Yes/No
Do nothing	**Capacity requirements**: Existing intake pipe cannot satisfy the capacity requirements. **Compliance**: Bright's Grove WTP would continue to meet its treated water standards; however, if observed structural deficiencies are not addressed, the intake pipeline could potentially fail and place public at risk from lack of supply. **Technical feasibility**: alternative maximizes the use of existing assets and is compatible with existing processes; however, it is not fiscally responsible due to the associated increasing operating and maintenance costs.	No
Limit Community Growth	**Capacity requirements**: This project is not triggered by growth projections. Limiting community growth will not address the structural deficiencies of the existing intake due to age, nor the increasing operational, maintenance and costly requirements associated with it. **Compliance**: Bright's Grove WTP would continue to meet its treated water standards; however, if observed structural deficiencies are not addressed, the intake pipeline could potentially fail and place public at risk from lack of supply. **Technical feasibility**: alternative maximizes the use of existing assets and is compatible with existing processes; however, it is not fiscally responsible due to the associated increasing operating and maintenance costs.	No
Reduce water demands through conservation measures	**Capacity requirements**: This project is not triggered by increased water demands. The Bright's Grove WTP and intake have surplus capacity to support future growth. Water demands projections established in the service area has recognized impacts from water efficiency and conservation measures. **Compliance**: Bright's Grove WTP would continue to meet its treated water standards; however, if observed structural deficiencies are not addressed, the intake pipeline could potentially fail and place public at risk from lack of supply. **Technical feasibility**: option maximizes the use of existing assets and is compatible with existing processes; however, it is not fiscally responsible due to the associated increasing operating and maintenance costs.	No
Obtain water from another source	**Capacity requirements**: The Lambton Area Water Supply System (LAWSS) does not have adequate capacity in its distribution network to meet current demands for the service area. Major pumping, storage and distribution system upgrades would be required in the LAWSS system. Besides significant capital expenditures, this alternative would result in higher water supply rates impacting 4 municipalities. **Compliance**: Bright's Grove WTP would continue to meet its treated water standards; however, process and operational modifications may be needed at the plant to ensure adequate treatment of the new raw water supply source. Having a single supply line, about 25 km apart from the plant, introduces major security concerns with the water supply. In addition, if observed structural deficiencies are not addressed, the intake pipeline could potentially fail and place public at risk from lack of supply. **Technical feasibility**: alternative requires construction of new infrastructure, as well as major retrofits of several existing treatment facilities and buildings at both LAWSS and the Bright's Grove WTP sites, which results in a significant capital expenditure. This option does not efficiently use existing assets and processes and is not fiscally responsible due to the associated implementation costs and risks.	No

Alternative Solution	Description	Short-listed Yes/No
Refurbish Existing Intake	**Capacity requirements**: The existing 400 mm diameter intake pipe has reached the end of its useful life and needs to be replaced to prevent potential system failures. Due to the deteriorated stage of the intake pipe. The existing intake pipe has reached the end of its useful life and needs to be replaced to prevent potential system failures. Due to the deteriorated stage of the intake pipe, refurbishment costs would likely be comparable to the costs of providing a new intake. To accommodate continued operation of the plant, installation of a temporary raw water intake will be required to allow refurbishing of the existing intake. **Compliance**: Bright's Grove WTP would continue to meet its treated water standards; however, the integrity of a retrofitted intake pipeline would still be questionable due to the age of the pipe and the structural deficiencies observed along the pipe. **Technical feasibility**: option maximizes the use of existing assets and is compatible with existing processes; however, installation of a temporary raw water intake and connection to the existing treatment facility would be required during construction to accommodate continued operation of the Bright's Grove WTP. Careful construction staging would be required, potentially resulting in constructability challenges and additional costs. This alternative is not considered fiscally responsible.	No
Replace Existing Intake	**Capacity requirements**: A new intake pipe will be built in Lake Huron, in the general area where the existing intake pipe is located but extended further away from the shoreline to deeper water. To accommodate continued operation of the Bright's Grove WTP, the new intake would be constructed while the existing intake remains in service. The new intake will not alter the rated capacity of the plant. **Compliance**: a new intake pipe would allow the Bright's Grove WTP to safely continue to meet its treated water standards. **Technical feasibility**: alternative maximizes the use of existing assets and is compatible with existing processes and allows the existing intake pipe to safely remain operational during construction. A construction staging strategy would be required to accommodate the transition between intakes, but this alternative provides a reasonable balance between costs and risks, relative to the other alternative solutions.	Yes

9.2.1 Preliminary Screening Summary

As shown in Table 9-1, one (1) water supply alternative solution met all the preliminary screening criteria, and was short-listed to be explored in more detail:

- Alternative 6: Replace Existing Intake

Major advantages provided by this alternative solution included:

- Addresses structural deficiencies associated with the old age of the intake pipe
- Provides reduced risk with security of supply
- Best optimizes existing infrastructure and processes
- Economically advantageous relative to other alternatives under consideration
- Less constructability challenges and associated costs

10 Alternative Concept Identification

10.1 Alternate Concepts

The preferred alternative solution of Replacing the Existing Intake was further developed to reflect potential alternative concepts that included new intake locations, new intake pipe alignments and connection of the new intake pipe to a low lift pumping station (LLPS).

In general, alternative intake locations were established with the primary goal of reducing intake vulnerability; therefore, having sufficient depth and distance from land. Water quality was also a key consideration, as described in further sections of this report. Also, since marine construction costs are heavily influenced by the length of the intake pipe and the lakebed topography conditions (bathymetry) along the pipe route, a reasonable longer length for the new intake pipe, relative to existing conditions, was considered preferable.

Three (3) new alternative concepts were developed at different lengths from shoreline and subsequently different lake depths. The three (3) alternatives are summarized in Table 10-2 and shown in Figure 10-1. The accuracy of this data will have to be verified through completion of a bathymetric survey in the detailed design stage of the project.

10.2 Intake Location Alternatives

10.2.1 Similar Location – 400m

For this alternative, the pipe length of the intake location will remain approximately the same, only a small extension out to 400m from the shoreline. It appears costs required to gain incremental water depths are not reasonable and a further extension out into the lake will most likely not improve raw water quality. In the event the intake is to be extended, a raw water and sedimentation sampling program is recommended to confirm the existing water quality and to determine the benefits. Locating the intake close to the existing would likely avoid the need for additional water quality and sedimentation sampling programs to confirm the impact on treatment. Further reporting should consider life-cycle-cost and impacts of extending the intake to better waters, operating the facility as-is, and with upgrades addressing the water quality concerns, however, is outside the scope of this report. The raw water quality should be confirmed by samples taken over four seasons at the location and depth of the proposed intake as recommended by provincial design guidelines.

Alternative 1 extends approximately 400m into Lake Huron and terminates at the intake crib located at a lakebed depth of 3m. The proposed intake alternative is similar in length to the existing intake, located approximately 365m away from the shoreline and at similar depth of 3m. Reconfiguration of the existing LLPS or constructing a new LLPS will be necessary to accommodate the staged construction works, as well as removal of the existing intake pipe. A connection of the new intake pipe to the LLPS will be staged to minimize interruptions to operation and protection of existing intake pipe.

10.2.1.1 Key Considerations

- Proposed intake depth (minimum 3m) will provide a minimal security buffer to the intake should water levels in Lake Huron start to decrease from potential extreme droughts, although not historically experienced.
- The long intake pipeline (relative to existing conditions) may potentially reduce the overall intake vulnerability as a result of increased distance from the land.
- Installation of the onshore portion of the intake pipe will traverse vegetation communities, which support terrestrial and wildlife habitats.
- Staging and laydown areas will most likely be confined to the west and away from the beach to minimize impacts to habitats and within the paved right of way and termination of Old Lakeshore Road.
- All proposed work will be confined to City of Sarnia property boundaries.
- A new LLPS wet well will require careful design and consideration of the shoring system.
- No land acquisition anticipated. An extension of the existing water lot may be required to accommodate new intake pipe.

10.2.2 Extended Intake – 1500m

It is ideal for intakes to be in deeper waters to take advantage better quality of water, less disturbance which would otherwise stir up unwanted particulates, improve the protection from quagga/zebra mussels and avoid any potential impacts from frazil ice.

A 2010 intake assessment study recommend extending the intake pipeline out to 1,500m from the shoreline where improved water quality is observed, however the extension was never completed. The existing intake system currently is complete with an intake structure which was installed in 2017 connected to the 1944 ductile iron pipe.

Publicly available nautical charts indicate Lake Huron water depth is fairly shallow and does not change significantly as pipe length increases further into the lake. These depths are found only at distances greater than 1,500m from shoreline or more,

indicating a long pipe length may be required to gain little depth. The following Figure 10-1 shows the water depths found at various distances and the areas of the intake protection zones and should be confirmed with a bathymetric survey.

Alternative 2 extends approximately 1,500m into Lake Huron and terminates at the intake crib located at an approximate lakebed depth of 6m. Similar to Alternative 1, reconfiguration of the existing wet well will be necessary to accommodate the staged construction works, as well as removal of the existing intake pipe. A western extension of the existing wet well and connection of the new intake pipe to the LLPS will be staged to minimize interruptions to operation and protection of existing intake pipe.

10.2.2.1 Key Considerations

Key considerations for Alternative 2 are fundamentally the same as those described for Alternative 1. The proposed intake depth of approximately 6m for Alternative 2 will provide greater protection to the new crip structure.

10.2.3 Extended Intake – 3500m

The most desirable water depths of approximately 8m (or 26ft) are seen at 3.5km from shoreline. Furthermore, extending to 3.5km would position the intake outside of the existing Intake Protection Zones. Extending the intake would mitigate some of the risk of microbiological contamination of raw water from creeks, storm sewers and effluent discharges, and minimize influence from algae, frazil ice impact, and seasonal turbidity spikes along the shoreline.

In 2019, a budgetary quotation estimated at $8.0M for the supply and installation of an intake pipe at a length of 1.5km. By comparison, similar projects drawing from Lake Huron matching Bright's Grove existing design and pipeline length of 400m have estimated high-level budgetary construction cost between $2.5-$3.0M. Therefore, by linear approximation a 3.5km intake can be upwards to $18.0M or $20M for 4.0km. A high-level desktop evaluation of the proposed intake location indicates it may not significantly change from its current location; however, further investigations may be needed to eliminate the alternative of extending the intake.

10.2.3.1 Alternative 3

Alternative 3 extends approximately 3,500m into Lake Huron and terminates at the intake crib located at a lakebed depth of 8m. The proposed intake alternative extends considerably further than the existing intake. Reconfiguration of the existing wet well will be necessary to accommodate the staged construction works, as well as removal of the existing intake pipe. An eastern extension of the existing wet well and connection of the

new intake pipe to the LLPS will be staged to minimize interruptions to operation and protection of existing intake pipe.

10.2.3.1.1 Key Considerations

Key considerations for Alternative 2 are fundamentally the same as those described for Alternative 1. The proposed intake depth of approximately 6m for Alternative 2 will provide greater protection to the new crip structure.

Table 10-1: New Intake Location Alternatives

Intake Option	Distance from Shoreline (m)	Lakebed Depth (m)	Approximate Freeboard [1] (m)	Description
1	400	5.5	3.5	Within existing IPZ1, 0.5m deeper than existing crib
2	1,500	6.5	4.5	Within existing IPZ2, 1m deeper than existing crib
3	3,500	8.5	6.5	Outside existing IPZ2, 3.5m deeper than existing crib

Notes:

1) Approximate freeboard calculated based on average Lake Huron level of 175.95m and assuming an intake crib configuration similar to existing conditions.

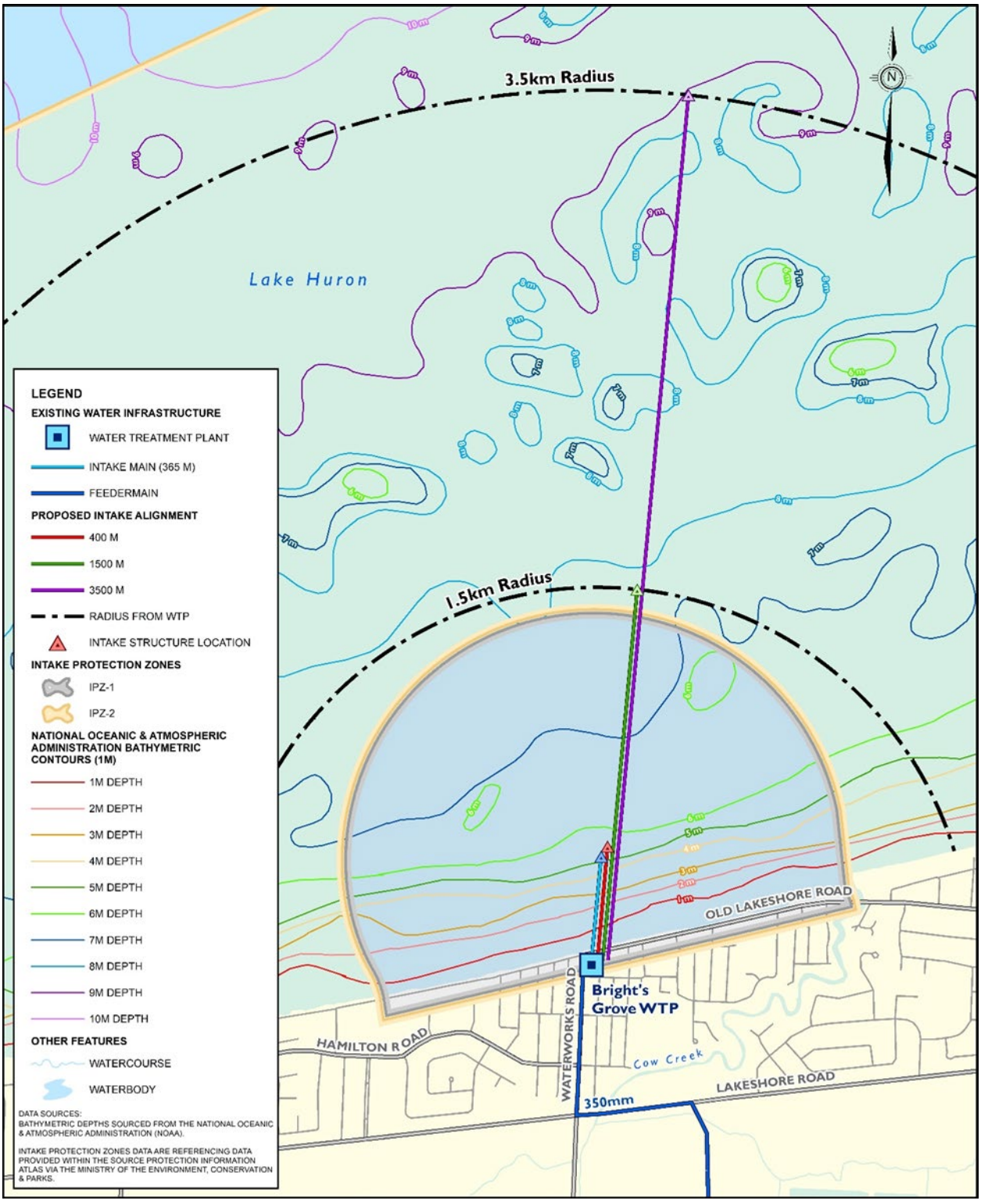


Figure 10-1: Water Depths and Intake Lengths at Various Distances from Shoreline

10.2.4 Opinion of Probable Costs

Opinion of probable capital construction costs were developed for each alternative concept and summarized in Table 10-2. Detailed cost estimates are provided in Appendix H.

The following general assumptions were made when developing the opinion of probable costs:

- Cost estimates are based on 2023 construction costs. Inflation and escalation for the actual expected prices at the time of construction cannot be accounted for at this time.
- Capital cost estimates include construction and installation of intake pipeline, intake structure, chlorination lines along the intake alignment, and all other components associated with the onshore connection of the new intake pipe to the existing or new LLPS wet well.
- Cleanup and restoration efforts, as well as implementation of associated marine and environmental protection measures have been accounted for in the estimates.
- Estimates of probable capital costs provided by CIMA+ have been developed on a conceptual design level and based on prices and data in CIMA+'s possession, as well as previous experience from projects of similar nature and scope.
- In accordance with ASTM E 2516 (Standard Classification for Cost Estimate Classification System) the preliminary opinion of total project costs is anticipated to be within a range of -30% to +50%, based on a Class 5 level of accuracy.
- The following costs have been excluded from the estimates:
    - All taxes (including the 13% HST).
    - Costs associated with necessary updates to the source water protection plan and pertinent hydraulic modeling.
    - Design, testing and inspection costs are excluded.
    - Costs associated with a potential extension of the existing water lot as the limits of the existing water lot were not available/not provided to CIMA+.
    - Operation and maintenance costs, since no changes to the existing operational practices are expected, while maintenance costs will be significantly reduced after completion of the new intake.

Additional installation / construction assumptions and considerations for the intake pipeline include the following and will be developed further during detailed engineering:

- The portion of the intake pipeline from the LLPS to the shoreline will be land trenched.
- The intake pipeline will be marine trenched from the onshore to the offshore terminus at the intake structure, to avoid any ice conditions due to shallow water. levels in the Lake Huron.
- The excavated trench will be backfilled by imported granular material. The excavated material will be temporarily placed on the lakeshore and reused to provide the scour protection layer on top of the backfill layered over the crown of intake pipeline.

The following Table 10-2 summarizes the estimated costs of intakes at varying lengths and depths. It is assumed the estimated costs are largely comprised of installation costs and therefore the size and material selection of the pipe would be relatively insignificant. Once size and pipe material are established a more precise budgetary estimate can be provided. The provincial guidelines recommend the intake depth to have a minimum of 3.0m of water cover measured from the lowest recorded surface water elevation. With the onset of climate change additional depth to this baseline could be an approach to combat unknowns in future lake elevations.

Table 10-2: Summary of Intake Alternatives

Intake Location	Advantages	Disadvantages	Cost Estimate
Length 400m Crib Depth of 3.0m to 3.5m	Lowest Capital Cost Minimal changes to source water protection plan	Same location, same risks Very close to minimum recommended depth of submergence of 3.0m Will require high turbidity to be addressed at Treatment Plant	$2.5M to $3.0M

Intake Location	Advantages	Disadvantages	Cost Estimate
Length 1.5 km Crib Depth of 7.0 to 8.0m	Improved protection due to higher water depth. Best slope ratio of 0 Additional 1km gets another 4m depth (slope of 0.4% Greater than 3.0m cover Similar intake depths to neighbouring communities	Moderate Costs Source water protection plan is required Will require high turbidity to be addressed at Treatment Plant	$7.0 to 8.0M
Length 3.5 km Crib Depth 8.0 to 9.0 m	Best protection Likely best water quality Additional 3km gets another 7m of depth (slope of 0.2%) Greater than 3.0m cover	Highest cost Additional treatment may still be necessary (but to be confirmed by water quality samples) Source water protection plan is required	$18M to $20M

Notes:

1) Capital cost estimates include a 15% contingency. Cost estimates are preliminary only and based on assumed design parameters and site conditions.

10.3 Open vs Closed System Design Concepts

10.3.1 Closed System

10.3.1.1 General

The closed intake system alternatives comprise of a suction intake pipe. Raw water would then be pumped from the wet well using the same pumps to the treatment system.

10.3.1.2 Alternative 1: Retrofit Existing LLPS

The existing low-lift pump station could be retrofitted with new low-lift pumps, with the new intake connected to the existing pump suction header elbow located in the low lift station and would accommodate a complex switch over, as depicted below in

Figure 10-2. The figure shows the existing low lift pumping station from plan and profile perspective with the new intake connecting to the alternative suction header allowing the existing low lift pumps to remain in service until future plant expansion and/or process upgrades. This alternative would allow for future upgrades of the Low-Lift pumps by utilizing the existing configuration of pump replacement with inline dry submersible pumps and/or the conversion of the from a dry well to a wet well with submersible pumps.

Advantages:

- Minimizes the need for major construction compared to other alternatives.
- Utilizes existing infrastructure and minimizes the need for major retrofitting of existing low-lift pumping station
- Easy to adapt to a future pre-treatment addition

Disadvantages:

- Challenges to maintain continuous operation of water treatment plant during construction
- Inflexible for future upgrades
- Complex integration of the new intake into the existing wet well
- Complex excavation support system necessary to protect existing Heritage structure

10.3.1.3 Alternative 2: Construct New LLPS

A new low lift station could be designed and constructed as a wet well with submersible pumps; or as a wet-well / dry pit configuration with flooded suction pumps. The pumps should be selected with consideration given to the capability to handle high particulates for the seasonally high turbidity events. A new low lift station will provide an opportunity to excavate lower and increase the differential head between the LLPS and the Lake, which would increase the available capacity for a given pipe diameter. In addition, lowering the base of the new LLPS will provide additional contingency in the event that climate change results in lowered lake levels when compared to the historic low lake level. Another advantage of creating a higher head difference is that it could result in a smaller diameter intake pipe requirement, potentially lowering costs of installation into Lake Huron. For instance, the lowest allowable elevation is currently 174.04m ASL and with a new low lift station it could be set to approximately 172 m ASL resulting in a higher water elevational difference and making a 600mm pipe more feasible for a design flow.

Advantages:

- Similar to Alternative 1; however, new submersible pumps are required to replace existing low-lift pumps.

Disadvantages:

- There are challenges to maintain continuous operation of water treatment plant during construction.
- Complex excavation support system necessary to protect existing Heritage structure.

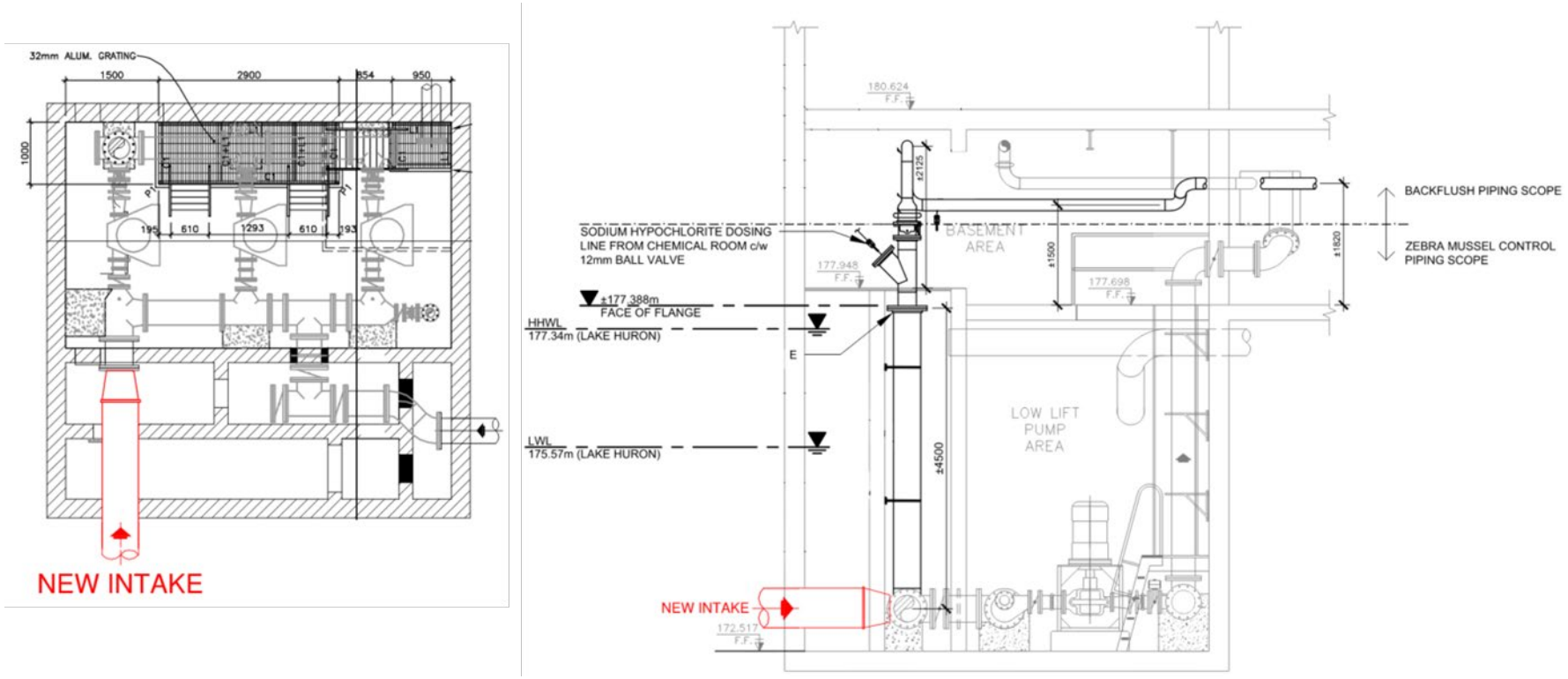


Figure 10-2: Conceptual Diagram of New Intake Retrofit to the Existing LLPS

10.3.2 Open System

10.3.2.1 General

The open intake system alternatives comprise of a gravity fed intake pipe into a wet-well exposed to atmospheric pressure. Raw water would then be pumped from the wet well using submersible pumps or flooded suction pumps to the treatment system. Raw water would flow from the lake to the wet well based on the relative water elevation within the wet well.

10.3.2.2 Alternative 3: Convert Existing LLPS

For this Alternative, the existing low lift station would be converted into an open system, the existing dry well would be converted into a wet well. Removal of all of the existing pumps and equipment would be required prior to the installation of new submersible pumps. A temporary by-pass pumping system would be required while the existing station is offline and being converted. The new intake pipeline could be installed and connected to the existing wet-well.

Advantages

- This alternative minimizes the need for water treatment plant shutdowns.
- Flexibility for future improvements.

Disadvantages

- Larger footprint for low-lift pump station to accommodate below-grade pump room.
- Potential need for superstructure over low-lift pumping station which would result in a visual impact for residents on Bright Street.

10.3.2.3 Alternative 4: Construct New LLPS

This alternative is the same as Alternative 2, except the intake pipe is a gravity fed intake pipe into a wet-well exposed to atmospheric pressure. The new pump station could also be design with sperate chamber for settling out some suspended solids before the raw water is conveyed to the pre-treatment system. Once the new low-lift station is commissioned, raw water would be pumped directly from the wet well of the pump station to the treatment system.

Advantages

- This alternative is similar to Alternative 3 with a smaller footprint.
- Minimizes need for water treatment plant shutdowns.

- There is potential to provide some pre-treatment in new LLPS wet-well.

Disadvantages

- Higher Capital Cost compared to Alternatives 1 and 2.
- Limited opportunity for future capacity expansion.
- Complex excavation support system necessary to protect existing Heritage structure.

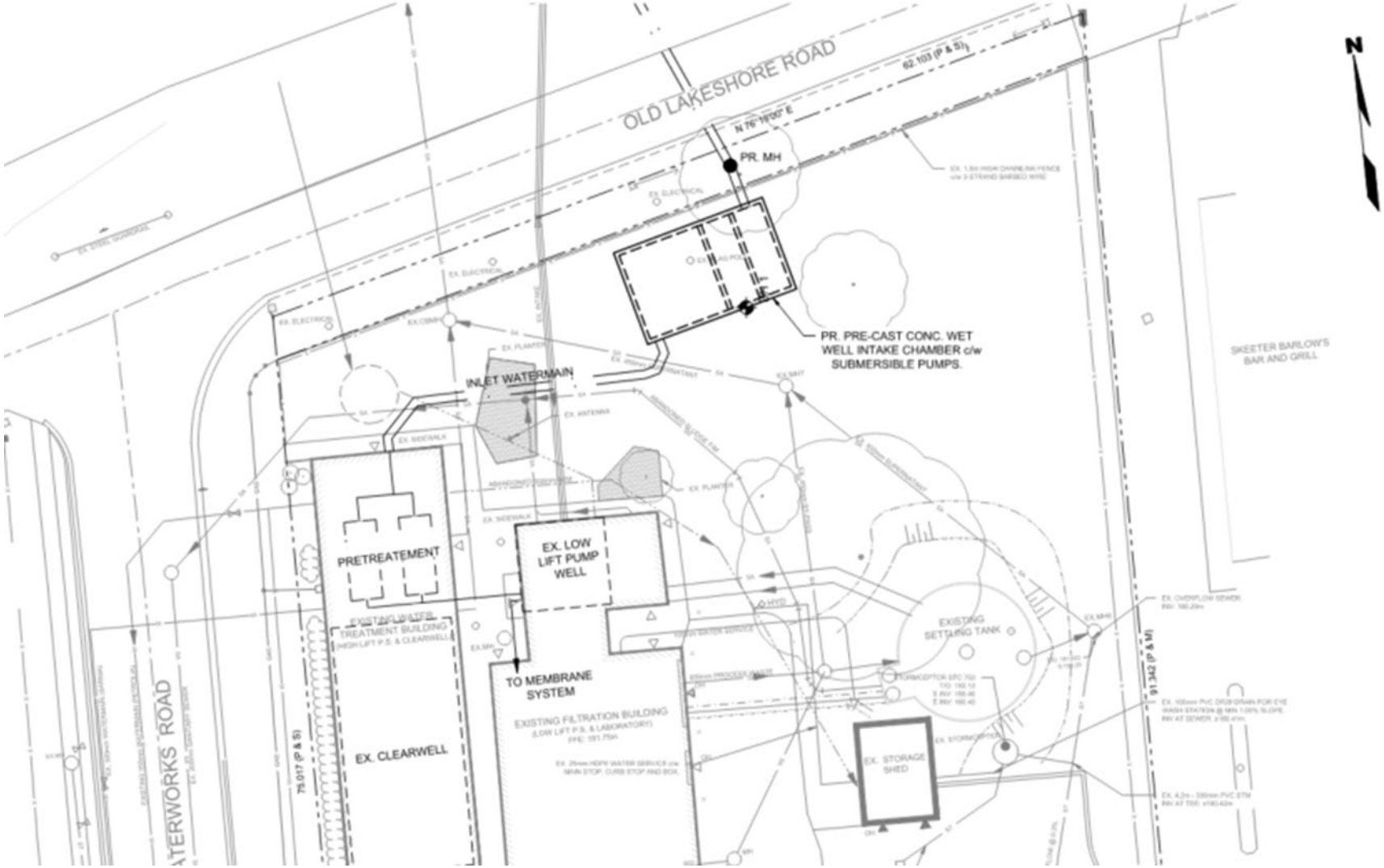


Figure 10-3: Conceptual Diagram of New Intake with New LLPS

10.3.3 Detailed Evaluation Results

The detailed comparative evaluation of the three (3) potential alternatives for the intake locations and the four (4) intake design concepts was completed in accordance with the evaluation methodology described in Section 8.3. The detailed evaluation matrix, describing the rationale and preliminary scoring assigned to each alternative is included in Appendix M.

Preliminary individual scores assigned for each alternative was reviewed and confirmed in collaboration with the Project Team. A summary of the overall total scores and preliminary ranking of the alternatives, based on the information and scores assigned in the evaluation matrix, is provided in Table 10-3 and Table 10-4.

Table 10-3: Summary of Intake Location Alternatives

Alternatives	Score Representation	Ranking
Alternative 1 – Intake Length of 400m with a Crib Depth of 2.5m to 3.0m		1
Alternative 2 - Intake Length of 1.5km with a Crib Depth of 6.0m to 7.0m		2
Alternative 3 - Intake Length of 3.5km with a Crib Depth of 6.0m to 7.0m		3

Table 10-4: Summary of Alternative Design Concepts for the Intake

Alternatives	Score Representation	Ranking
Alternative 1 – Retrofit as Closed System using existing low-lift pumping station		4
Alternative 2 – Retrofit as Open System using existing low-lift pump station		3
Alternative 3 - Closed System with new low-lift pumping station		2
Alternative 4 - Open System with new low-lift pumping station		1

10.4 Preferred Recommended Water Supply Solution

Based on the results of the detailed evaluation process, the preliminary preferred water supply solution required to ensure a secure and reliable source of water to the Town of Petrolia and to address current maintenance and operational concerns associated with the condition of the existing Bright's Grove WTP intake is summarized as the following:

- Intakes Solution
    - Alternative 1 – constructing a new intake approximately 400m into Lake Huron at an intake crib location with an approximate lakebed depth of a minimum of 3m.
- Intake Design Concept
    - Alternative 4 - Open system with new low-lift pumping station

From a comparative evaluation with the other three (3) intake location alternatives identified; Alternative 1 provided the following major advantages:

- The new intake will be approximately the same distance from the shoreline and the alignment as the existing intake thereby reducing the impacts to the source water protections zones.
- Opportunity for staging and laydown areas away from the shoreline and beach edges to minimize impacts to terrestrial and aquatic habitats.
- Long-term impacts on adjacent properties are eliminated by confining the majority of the in-land works within existing water treatment site limits. No land acquisition required.
- In-land works minimize construction challenges for the connection to the new low lift pumping station.
- Staging opportunities to minimize interruptions to operation and protection of existing intake pipe.

11 Proposed Mitigation of Potential Impacts and Monitoring

11.1 Overview

The preferred water supply solution recommended for implementation has been selected with consideration to the results of the evaluation process and feedback obtained from the public throughout the Class EA study. The results of the decision-making process followed in this Class EA study support the selection of Alternative 6 - extending approximately 400m into Lake Huron at an intake crib location with an approximate lakebed depth of at least 3m as key components of the preferred water supply solution.

The intake alignment and intake structure location for the preferred water supply solution has been shown below in Figure 11-1. The exact intake alignment and location of the intake crib will be determined through completion of a bathymetric study during the detailed design stage. Other supporting studies including geotechnical and hydrogeological investigation will be completed during the detailed design stage.

In general, the following major infrastructure components will be comprised in the preferred alternative.

- Intake Structure, located in Lake Huron at an approximate lakebed depth of 3m or greater. The intake structure will be installed inside a large steel crib with sizable intake screen allow raw water supply.
- Intake Pipeline, a solid wall pipe with an outside diameter of 600mm. The intake pipe material to be determined during detailed design. The new intake pipeline will connect to a new LLPS on the shore with an open system design concept.
- Currently there is a setback allowance from the shoreline from Cow Creek to the East of the WTP property. Both the land and marine sections of the new pipeline will be installed by conventional open cut marine trenching from the LLPS through the near shore area and out into the lake to the pipeline terminus at the intake structure.
- Design and installation of a chlorination piping distribution and sample system extending the full length of the pipeline to inject controlled levels of chlorine solution into the water at the offshore intake structure.
- Connection of new intake pipeline to the new LLPS wet well has been conceptualized to be constructed in stages to accommodate the intake construction separately form the new LLPS.

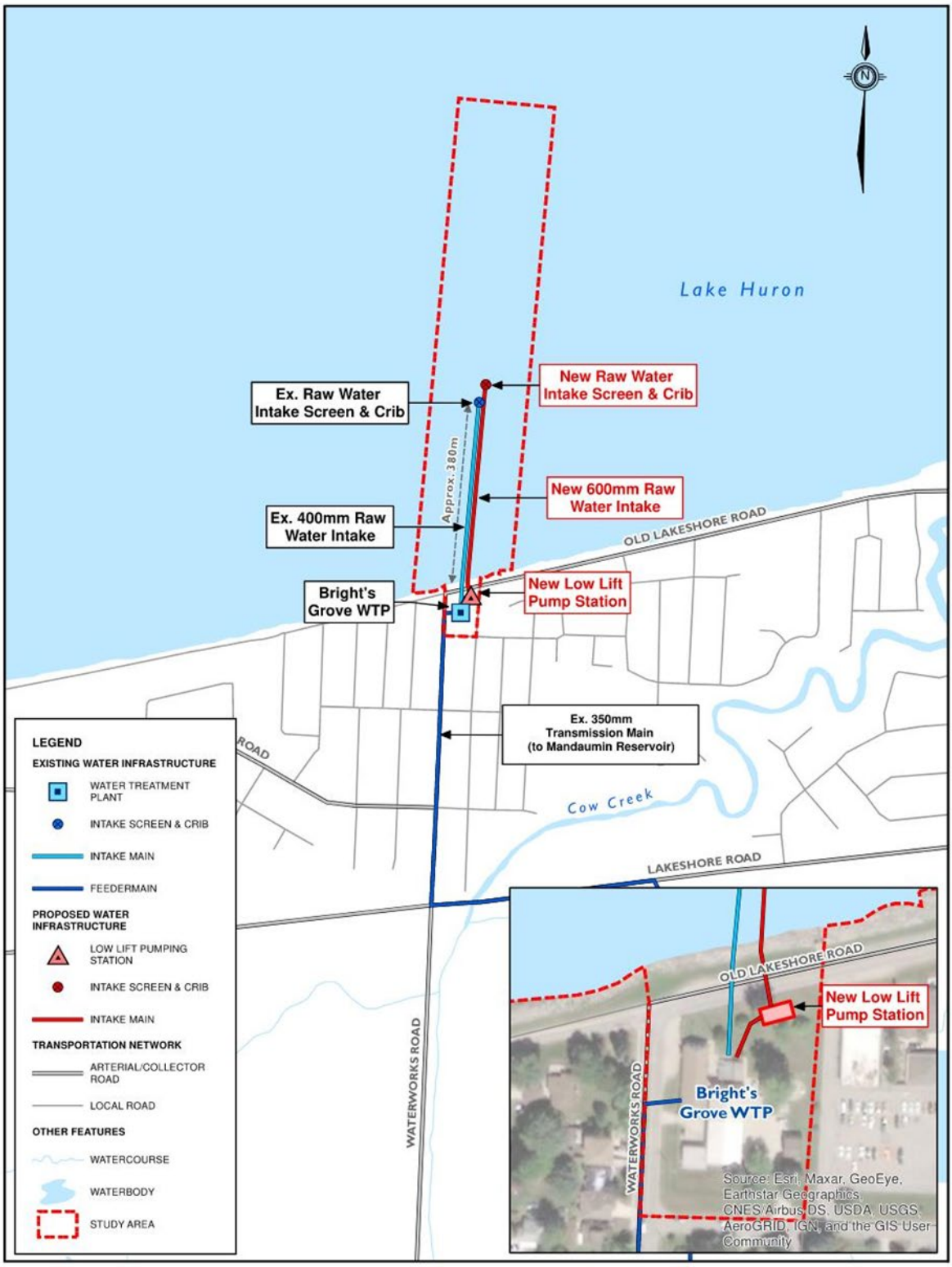


Figure 11-1: Preferred Intake Solution

11.2 Required Permits, Approvals and Additional Investigations

Review and approvals from regulatory agencies will be required during the detailed design prior to construction and implementation of the new intake, as listed in Table 11-1.

Table 11-1: Anticipated Permits, Approvals and Additional Investigations

Approval Agency	Permit / Approval Required
St. Clair Region Conservation Authority (SCRCA)	Application for Development, Interference with Wetlands and Alterations to Shorelines and Watercourse, Update to Source Water Protection Program
Thames-Sydenham and Region Drinking Water Source Protection	Update to Source Water Protection Program
Ministry of the Environment, Conservation and Parks (MECP)	Amendments to DWWP, MDWL, and Source Water Protection Program Update, SARs, Potential for temporary PTTW if construction dewatering >400,000 L/day, it is anticipated dewatering construction will be < 400,000 L/d, therefore an EASR would be required. Completion of Information gathering Form (IGF)
Ministry of Natural Resources (MNR)	Work Permit subject to construction timeframe limitations for in-water works and potentially SARs permit (subject to IGF)
Department of Fisheries and Oceans (DFO)	Permit to Take Fish by Means other than Fishing (depending on construction technique and blasting requirements)
Transport Canada	Approval under Navigable Water Act for in water works

11.3 Implementation Schedule

Detailed design and construction of the new intake pipeline and LLPS is anticipated to take place in 2024 / 2025.

11.4 Proposed Mitigation of Potential Impacts and Monitoring

The following section provides a description of some of the potential impacts on key criteria anticipated as a result of the implementation of the preferred water supply solution, as outlined in this report, as well as some mitigation measures proposed to minimize or avoid such anticipated impacts.

Implementation of the proposed new intake is expected to have some impacts on the existing natural and socio-cultural environment. Construction timing is critical to this project from a technical and water delivery perspective, mainly to mitigate the potential impacts to terrestrial, wildlife and aquatic habitats that have been identified within the project study area. Construction staging and sequencing would have to be carefully planned and implemented during the installation of new intake while the existing intake is in operation. Short-term construction impacts such as noise, dust, vibration and restrictions to recreational uses will be felt mainly by the immediate local residents.

In general, public health and safety is a priority to the Town and as such, all design and construction related to the new intake will adhere to strict safety guidelines and all applicable codes and standards. All construction work must be carried out in accordance with the Occupational Health and Safety Act (OHSA) and other local regulations. Specific mitigation measures, as described below, are recommended for implementation to reduce anticipated potential impacts.

11.5 Socio-Cultural

Based on the nature of the proposed works, potential impacts to the socio-cultural environment are anticipated to be of short-term duration and resulting from construction works only. Long-term effects related to the operation and/or maintenance of the new intake pipeline or intake structure are not anticipated. Since no navigational routes are currently present within the potential in water construction limits, navigation is not expected to be impacted; however, all in water works will need to comply with the Canadian Navigable Waters Act to ensure they do not interfere with navigation in case there is revision to in-water construction limits.

The following mitigation measures will be taken to mitigate anticipated short and long-term impacts to the adjacent residents:

- Temporary fencing will be used around the construction areas (inland) to minimize noise, dust, mud and visual impacts.
- Construction of the project will be carried out in accordance with the municipal noise requirements. Construction equipment will be operated according to the

applicable City of Sarnia Noise Control By-Law, which imposes limitations and restrictions for operation of construction equipment between 9:00pm and 7:00am any day of the week.

- Construction equipment will be appropriately maintained to ensure that any exhaust emissions meet industry standards.
- Property owners adjacent to the Bright's Grove WTP where construction activities will take place will be notified in advance and provided with Town's contact information should they encounter any problems during construction.
- Public safety is important to the Town and mitigating factors will be considered during any on-site works to ensure public safety while minimizing impacts to local residents. Any possible efforts will be made to protect private property from public use.
- The condition of Bright's Grove Road will be considered, and damage caused as a result of the Intake Replacement project will be remediated prior to project completion.

11.6 Climate Change

The intake structure for the preferred alternative, Alternative 1, would be located at an approximate lakebed depth of at least 3m, which will provide a security buffer to the intake should water levels in Lake Huron start to decrease from potential extreme droughts, although not historically experienced.

Marine construction for the intake pipeline will include a top layer of scour protection to ensure pipeline protection from potential extreme climatic conditions, such as strong wave actions and storms. Excavated rock material from lake bottom is expected to be used to backfill the remainder of the trench and return lake bottom to its original contours, which will eliminate / reduce the need to transport and dispose excavated material offsite.

11.7 Source Water Protection

In consultation with the St. Clair Regional Conservation Authority (SCRCA) and Thames-Sydenham and Region Drinking Water Source Protection, the source water protection modelling did not need to be updated based on the preferred intake alternative location and alignment. During detailed engineering, the Thames-Sydenham and Region Drinking Water Source Protection requested a review of where the final intake location will be as well as if there are any drainage or transport pathways that have become closer to the new intake.

11.8 Construction Related Impacts

11.8.1 Noise and Vibration

Potential noise and vibration effects are anticipated in connection with bedrock drilling and blasting during the short in-water construction period, construction traffic and construction equipment. Noise resulting from operation of the new intake is not expected to differ from the existing intake operation conditions. The proposed mitigation measures include the following:

- Demolition and construction noise can be minimized by the use of construction walls or fencing around the construction areas.
- Construction of the project to be carried out in accordance with the municipal noise requirements. Construction equipment will be operated according to the applicable City of Sarnia Noise Control By-Law, which imposes limitations and restrictions for operation of construction equipment between certain hours.
- Ensuring all vehicles and construction equipment are equipped with effective muffling devices and are operated in a fashion to minimize noise in the project area.
- Throughout the construction period, the Town of Petrolia and City of Sarnia will ensure the contractors undertake measures to reduce noise disturbances as much as possible.

11.8.2 Dust / Mud

Bedrock drilling and blasting during the short in-water construction period and some construction traffic on Bright's Grove Road could create additional dust and mud. There are no anticipated concerns regarding dust and mud during normal intake operation. The proposed mitigation measures include the following:

- Dust control measures such as the application of water onshore to be implemented as required.
- The Town will ensure that the contractor maintain public roadways clean and free of mud on a consistent basis.

11.8.3 Limitations to Recreational Activities

Construction of a 1060m long in-water intake pipe would impact boat traffic and potential navigation ways and may impede or limit recreational activities on the adjacent

private beaches during the in-water construction window. Some proposed mitigation measures include the following:

- The disturbance due to in-water construction work will be limited by minimizing the extent of disturbance wherever possible through coordination of project related planning, including design, staging and scheduling.

11.8.4 Geotechnical Investigation

EnVision Consultants Ltd. (EnVision) is completing a geotechnical Investigation in the vicinity of the water treatment plant as a component of this project to document site specific soil conditions, including relevant borehole logs, encountered strata descriptions, and shall provide recommendations to successfully complete the design and construction phase of this project Preliminary findings are summarized below. A draft of the hydrogeological report is in Appendix E.

The investigative work involved the drilling of two (2) boreholes (BH23-1 and BH23-2), as well as the installation of monitoring wells after the drilling was complete. The purpose of the investigation was to determine the conditions of the subsurface soil and groundwater.

1) The subsurface conditions of the boreholes generally consist of topsoil at the ground surface. This is followed by a layer of fill materials of varying texture, including silty sand, sandy silt, and silty clay. The final underlaying stratum is the predominant layer of firm to very stiff silty clay.
2) The groundwater levels were measured to range from 1.8m to 5.5m below the existing ground surface corresponding to elevations of 176.1m and 179.7m on March 17, 2023. The groundwater measurements are not likely to be stabilized readings as the screens of the wells were set into soil with a low hydraulic conductivity. Perched water and seepage from any existing utility backfill and bedding should be expected.

Based on these findings, geotechnical recommendations were provided for the proposed inlet chamber structure and piping connections.

1) The predominant underlying layer of firm to very stiff silty clay is anticipated to provide adequate support for both a 450mm diameter and 600mm diameter pipe. This layer of silty clay till will also provide satisfactory pipe support for Class B bedding. However, the overlying layer of fill materials will not provide proper support for pipes, and if pipe alignments run through it, this material must be sub-excavated and replaced with thickened bedding granulars.

2) During open cut trenching, little water seepage is expected within the silty clay stratum due to its low hydraulic conductivity. The use of conventional pumping from collection sumps should be able to sufficiently control this seepage. Within the layer of fill materials more complex dewatering processes, such as closely spaced vacuum or eductor well points may be required to control seepage.
3) A raft foundation on the silty clay layer is recommended to support the proposed wet well intake chamber structure. A temporary excavation support system, soldier piles and timber lagging or interlocking steel sheet piles with wales and struts could be considered.

11.8.5 Hydrogeological Investigation

A Hydrogeological Investigation is also being completed by EnVision in support of anticipated groundwater control requirements for construction. The scope of this assessment included the site as well as a Hydrogeological Study Area, which included a 500m buffer extending outwards from the property boundary. Preliminary findings are summarized below. A draft of the hydrogeological report is in Appendix F.

1) The maximum expected dewatering for open cut trenching for the proposed structure was determined to be 80,100 L/Day.
2) Since the estimated dewatering rate is greater than 50,000 L/Day and less than 400,000 L/Day, registration as an Environmental and Sector Registry (EASR) is recommended for permitting under the Ministry of Environment, Conservation and Parks (MECP). This will require filing by a Qualified Person, as well as require a Water Taking and Discharge Plan as per O.Reg. 63/16.
3) It is recommended that groundwater discharge be pumped to a municipal sewer for disposal during the dewatering process. This would require a permit from the Town of Petrolia and will also have additional constraints on quality of the effluent and flow rate.

11.9 Disturbance to Natural Environmental Features

In-land installation of intake pipe for the preferred recommended Alternative 1, will traverse vegetation communities, which support terrestrial and wildlife habitats. Removal of rock piles near the shoreline and/or some retaining walls which are suitable habitat for Species at Risk (bats and birds) may be required to accommodate open cut trenching for the offshore pipe section. Potential impacts can be mitigated by minimizing tree removal, avoiding construction in their habitat or through application of timing windows for tree clearing activities and breeding, if needed.

In-water works may fall within spawning locations. Open-cut marine trench in the lake bottom will be dredged along the entire pipe alignment (400 m) from the shoreline out to the offshore intake structure position that will impact aquatic habitats and species. Available mitigation measures include implementation of timing windows, setbacks and erosion and sediment control measures.

The construction timing window will be determined through further study of potential spawning habitat and through consultation with Department of Fisheries and Oceans (DFO), the Ministry of the Environment, Conservation and Parks (MECP), the Ministry of Natural Resources and Forestry (MNRF) and the St. Clair Regional Conservation Authority (SCRCA). Potential for impacts to suitable habitat occurring within the study area will need to be reviewed at detailed design to confirm the need for compliance with the Endangered Species Act, should any species at risk are anticipated to be impacted.

Staging and laydown areas will most likely be confined to the west and away from the beach edges to minimize impacts to habitats and within the paved right of way and termination of Old Lakeshore Road.

An Erosion and Sediment Control Plan will be developed and implemented prior to start of construction to effectively isolate the extent of construction related activities and mitigate the potential for silt and sediment entry into surface water features and adjacent lands. SCRCA would like to minimize the impacts from drilling and impacts to the shoreline. There is a setback allowance from Cow Creek that may impact the pump station placement and will be incorporated into the pump station location. SCRCA stated the area of the WTP near the shoreline is in the floodplain elevation and flood proofing to the pumping station should also be considered.

11.10 Disturbance to Archaeological Features

No archaeological impacts, inland and offshore, are anticipated as a result of the potential construction disturbance activities associated with the Project within the project area. Should the project boundary be revised and extend beyond the study area limits, additional archaeological assessment may be required due to the potential for submerged archaeological resources located in the surrounding vicinity of the current study area. Further to that, if any deeply buried archaeological resources are identified during ground disturbance activity associated with the proposed developments in the Study Area, ground disturbance activities should be immediately halted and the Archaeology Division of the Culture Programs Unit of the Ministry of Heritage, Sports, Tourism and Culture Industries be notified.

11.11 Disturbance to Cultural Heritage Features

Potential indirect impacts during construction would need to be confirmed during the detailed design stage. Further consultation with the City of Sarnia and Town of Petrolia would be required to determine if a Cultural Heritage Report: Existing Conditions and Preliminary Impact Assessment (CHR) is required prior to detailed design.

Some mitigation measures to avoid or reduce adverse impacts to the built heritage resources evaluated to have CHVI include carrying out construction activities possibly away from the study area boundary, use of appropriate fencing to limit the temporary construction disturbances such as dust and vibration, etc. Should the project boundary be revised and extend beyond the study area limits, additional cultural heritage assessment may be required for potential features located in the surrounding vicinity of the current study area.

1) Given the current inclusion of 2701 Old Lakeshore Road on the City of Sarnia's heritage register, the Cultural Heritage Value or Interest (CHVI) of the structure has been established; the Listing report in Appendix B should be accepted in lieu of a CHER.
2) It is acknowledged that in keeping with the Cultural Heritage Checklist (Appendix B), a Heritage Impact Assessment (HIA) should be recommended to identify potential impacts to a structure with CHVI; given the proposed upgrades involved a new intake pipe in Lake Huron, while maintaining the operation of existing infrastructure, it is recommended that Recommendations 5 through 7 of the CHSR be considered in lieu of a HIA.
3) It is acknowledged that in keeping with the Cultural Heritage Checklist (Appendix B), a Heritage Impact Assessment (HIA) should be recommended to identify potential impacts to a structure with CHVI. It is understood the Town may consider undertaking select repairs to components of the structure identified in the 2014 condition assessment as requiring repair or replacement as part of the current contract to install a new intake pipe; potential repairs include, but are not limited to, foundation repairs, roof replacement, and stucco repair. The plant would remain operational during any proposed repairs. It is recommended that Recommendations 5 through 7 of the CHSR be considered in lieu of a HIA, provided that no alteration to the roofline is made and materials are replaced, as necessary, in kind. As a further measure, the Town may consider undertaking a Conservation Plan prior to any alterations to identified heritage attributes of the 1896 pumping station.
4) It is acknowledged that consideration is being given to the installation of a raw-water pre-treatment system within the 1896 pumping station structure; it is

understood that should a raw-water pre-treatment system be installed the exterior of the structure will not be impacted. It is recommended that Recommendations 5 through 6 of the CHSR be considered in lieu of a HIA.

5) Related to recommendations 2 and 3, the limits of the original 1896 pumping station be illustrated on all construction schematics and formal 'no-go' instructions be issued to all site personnel.
6) The Project Area be subject to a pre-construction vibration assessment, and subsequent vibration monitoring of the 1896 pumping station, as necessary.
7) Should future work on the Project Area require alteration to the exterior of the 1896 pumping station, a HIA be undertaken at that time.

11.12 Public Consultation

Public and agency input was sought at key stages of the Class EA process. An in-person PIC was held April 4, 2023. The PIC boards were on display in an open format in Victoria Hall in Petrolia. An online comment form was available on the project webpage. No other comments were received regarding the recommended water supply option for the project. Official responses to the residents were provided by the Project Team. Public feedback was considered to confirm the recommended water supply solution.

Communication with neighbouring residents will continue during the design and construction of this project. The Town will continue to inform and provide updates as the project progresses. A dedicated contact person from the Town will be available to respond to any immediate issues or concerns that may come up before or during construction.

12 Class EA Phase 4 – Class EA Report Conclusions and Recommendations

Through completion of a Municipal Class EA study, construction a new intake, approximately 400m into Lake Huron at an intake crib location with an approximate lakebed depth of at least 3m, has been identified as the preferred water supply solution. A bathymetry survey has been completed to confirm the alignment and depth of the new intake.

Public and agency input was sought at key stages of the Class EA process to provide the public with opportunities to comment on the project. Through the consultation process, some public concerns and issues were raised associated with the construction of new intake including the risks and disturbance during the construction duration. Potential impacts associated with the implementation of the recommended alternative solution were identified as well as available mitigation measures. The socio-cultural implications of this project are directly related to the short-term construction related impacts, such as dust, noise, vibration and restrictions to recreational uses to be felt mainly by the immediate local residents. Due to the nature of this project, some inevitable effects in terms of dust, noise, and vibration will be felt around the construction areas. Potential effects can be reduced or avoided by implementation of mitigation measures outlined in this report, as a minimum.

Since the existing intake is currently operational, some construction complexity will be experienced during the construction of the proposed intake, mainly while connecting the new intake to the wet well at the LLPS. Careful design and installation of shoring system around the existing intake pipe will be provided. A phased implementation approach will be developed to ensure the protection of the existing intake and ability to remain in service during construction.

Construction of marine components will be implemented within the in-water construction window and necessary mitigation measures to protect aquatic habitats and species. Specific mitigation measures and timing windows will be confirmed, during the detailed design stage, and in consultation with the appropriate regulatory agencies including DFO, MECP, MNRF and NPCA. Intake pipe alignment to the west of the existing pipe facilitates the connection to the existing wet well/wet well expansion.

The Town will provide site inspection and contract administration throughout the construction phases of the project. The site inspector will ensure that the Contractor is building the works as per the contractual drawings and specifications, as well as maintaining the necessary environmental protection measures. Construction progress

meetings will be held regularly to monitor the progress of the project and address any issues that may arise during the construction phases.

It is recommended that the Town proceed with the detailed design and construction of the preferred water supply solution, as outlined in this PFR, subject to receiving the necessary approvals. This PFR is being filed for a 30-day public review period. Provided that no major objections or Section 16 Orders are received during the review period, the project will proceed through the detailed design and construction phases as outlined in this PFR.

13 References

CIMA Canada Inc. (2018). *Bright's Grove WTP Clearwell & HLPS Upgrades Design Report.* Petrolia: CIMA Canada Inc.

CIMA Canada Inc. (2014). *Condition Assessment of Bright's Grove WTP, Petrolia, Ontario*. Petrolia: CIMA Canada Inc.

CIMA Canada Inc. (2015). *Bright's Grove Water Treatment Plant Clearwell Upgrades Technical Memorandum*. Petrolia: CIMA Canada Inc.

City of Sarnia. (2014 (updated 2022)). *City of Sarnia Official Plan*. Sarnia: City of Sarnia.

KMK Consultants. (2003). *Technical Memo for Intake Upgrades*. Petrolia: KMK Consultants.

KMK Consultants. (2004). *Petrolia Water Treatment Plant Upgrades Detailed Design Report*. Petrolia: KMK Consultants.

KMK Consultants Limited. (2005). *Petrolia Water Treatment Plant Operations Manual*. Petrolia: KMK Consultants Limited.

Thames-Sydenham and Region Source Water Protection. (2010). *St. Clair Region Assessment Report*. Thames-Sydenham and Region Source Water Protection.

THM. (2010). *Memorandum - Replacement and Extension of Petrolia WTP Intake*. Petrolia.

W.F. Baird & Associates Coastal Engineers. (2011). *Spill Modelling in Support of IPZ-3 Delineation and Designation of Significant Threats*. Petrolia; Sarnia; Wallaceburg: W.F. Baird & Associates Coastal Engineers.

A

Appendix A: Public Consultation

Town of Petrolia

Bright's Grove Water Treatment Plant Intake Replacement Intake Class Environmental Assessment

Public Consultation Records

Date: August 2023

T0016464A / 081

Submitted by
CIMA Canada Inc.

900-101 Frederick Street
Kitchener, ON N2H 6R2
T 519 772-2299 F 519 772-2298
cima.ca

Contact

Stuart Winchester, P.Eng.
Stuart Winchester@cima.ca
T 519-772-2299, 6202

Public Consultation Records

Bright's Grove Water Treatment Plant Intake Replacement
Project no T001646A | File no 081

PREPARED BY:

Adam Moore, M.A.Sc., P.Eng.

Stuart Winchester, P.Eng.

VERIFIED BY:

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

CIMA+
900-101 Frederick Street
Kitchener, Ontario N2H 6R2
December 2023

Table of Contents

1 Project Stakeholders

A stakeholder list was compiled for the project, representing all parties that were expected to have an interest or regulatory authority over some portion of the project. The stakeholder list was comprised of members of the public, adjacent property owners, government review agencies, municipal staff, Indigenous communities, and any other organizations or individuals that expressed an interest in the project.
Table 1 provides a list of stakeholders that received notification of project information throughout the study.

Table 1: Project Stakeholders

Stakeholder Group	Organization Name	First	Last	Title	Address	City	Prov	Postal Code
Federal Agency	Environment Canada	Sandro	Leonardelli	Manager, EA Section	4905 Dufferin Street	Toronto	ON	M3H 5T4
Federal Agency	Canadian Transportation Agency Rail, Air and Marine Disputes Directorate	Luc	Fortin	Senior Environmental Officer	15 Eddy Street Gatineau, QC, K1A 0N9	Gatineau	QC	K1A 0N9
Federal Agency	Transport Canada Marine Safety	Sue	MacDonald-Simcox	Navigable Waters Protection Officer	100 Front Street	Sarnia	ON	N7T 2M4
Federal Agency	Navigation Canada	Neil	Wilson	President and Chief Executive Officer	77 Metcalfe St, P.O. Box 3411	Ottawa	ON	K1P 5L6
Federal Agency	Fisheries and Oceans Canada			Blank	867 Lakeshore Rd.	Burlington	ON	L2R 4A6
Federal Agency	Indigenous Services Canada	Cheyenne	Loon	Senior Environmental Advisor	25 St. Clair Ave. East, 8th Floor	Toronto	ON	M4T 1M2
Federal Agency	Indigenous Services Canada	Shannon	Doyle	Regional Manager	25 St. Clair Ave. East, 8th Floor	Toronto	ON	M4T 1M2
Federal Agency	Indigenous Services Canada	John	Schmied	Sr. Information Officer	25 St. Clair Ave. East, 8th Floor	Toronto	ON	M4T 1M2
Federal Agency	Indigenous Services Canada	Pauline	Haarmeyer	Senior Land Negotiations Officer	25 St. Clair Ave. East, 8th Floor	Toronto	ON	M4T 1M2
Federal Agency	Indigenous Services Canada				655 Bay St. Suite 700	Toronto	ON	M5G 2K4
Municipal Agency	Ministry of Environment, Conservation, and Parks Sarnia District Office	Sean	Morrison	Director	1094 London Rd.	Sarnia	ON	N7S 1P1
Provincial Agency	Federal Economic Development Agency for Southern Ontario	Alex	Sirianni	Acting Manger, Program Delivery	151 Yonge Street, 3rd floor	Toronto	ON	M5C 2W7
Provincial Agency	Ministry of Heritage, Sport, Tourism and Culture Industries Culture Services Unit	Dan	Minkin	Heritage Planner	401 Bay St, Suite 1700	Toronto	ON	M7A 0A7
Provincial Agency	Ministry of Heritage, Sport, Tourism and Culture Industries Culture Services Unit	Joesph	Harvey	Heritage Planner	401 Bay St, Suite 1700	Toronto	ON	M7A 0A7
Provincial Agency	Ministry of Heritage, Sport, Tourism and	Andrea	Williams	Archaeology Review Officer	401 Bay St, Suite 1700	Toronto	ON	M7A 0A7

Stakeholder Group	Organization Name	First	Last	Title	Address	City	Prov	Postal Code
	Culture Industries Archaeology Program Unit							
Provincial Agency	Ministry of Municipal Affairs and Housing Housing and Municipal Affairs Department	Alex	Earthy	Senior Advisor	777 Bay St, 2nd Floor	Toronto	ON	M7A 2J3
Provincial Agency	Infrastructure Ontario	Lisa	Myslicki	Environmental Advisor	1 Dundas St W, Suite 200	Toronto	On	M5G 2L5
Provincial Agency	Ministry of Northern Development, Mines, Natural Resources and Forestry - Aylmer District			Director	615 John St. N.	Aylmer	ON	N5H 2S8
Provincial Agency	Ministry of Citizenship and Multiculturalism – Archaeology Program Unit	Andrea	Williams	Archaeology Review Officer	401 Bay St. Suite 170	Toronto	ON	M7A 0A7
Municipal Agency	Lambton County	Ken	Melanson	Manager, Planning and Development Services	789 Broadway Street, Box 3000	Wyoming	ON	N0N 7N2
Municipal Agency	City of Sarnia	Chris	Carter	CAO	255 Christina Street North	Sarnia	ON	N7T 7N2
Municipal Agency	Town of Petrolia	Richard	Charlebois	CAO		Petrolia	ON	
Municipal Agency	St. Clair Region Conservation Authority	Jeff	Vlasman	Environmental Planner	205 Mill Pond Cres.	Strathroy	ON	N7G 3P9
Municipal Agency	St. Clair Region Conservation Authority	Melissa	Deisley	Director of Planning and Regulations	205 Mill Pond Cres.	Strathroy	ON	N7G 3P9
Municipal Agency	Upper Thames River Conservation Authority	Julie	Welker	Source Water Protection Coordinator	1424 Clarke Rd.	London	ON	N5V 5B9
First Nation	Aamjiwnaang First Nation	Chris	Plain	Chief	Aamjiwnaang Administration Office 978 Tashmoo Ave	Sarnia	ON	N7T 7H5
First Nation	Aamjiwnaang First Nation	Cathleen	O'Brien		Aamjiwnaang Administration Office 978 Tashmoo Ave	Sarnia	On	N7T 7H5
First Nation	Aamjiwnaang First Nation	Wanda	Maness		Aamjiwnaang Administration Office 978 Tashmoo Ave	Sarnia	ON	N7T 7H5
First Nation	Chippewas of the Thames First Nation	Myeengun	Henry	Chief	320 Chippewa Road	Muncey	ON	N0L 1Y0
First Nation	Chippewas of the Thames First Nation	Fallon	Burch	Consultation Coordinator	320 Chippewa Road	Muncey	ON	N0L 1Y0

Stakeholder Group	Organization Name	First	Last	Title	Address	City	Prov	Postal Code
First Nation	Chippewas of the Thames First Nation	Jacqueline	French	Chief	320 Chippewa Road	Muncey	ON	N0L 1Y0
First Nation	Oneida Nation of the Thames	Jessica	Hill	Chief	2212 Elm Ave	Southwold	ON	N0L 2G0
First Nation	Oneida Nation of the Thames	Todd	Cornelius		2212 Elm Ave	Southwold	ON	N0L 2G0
First Nation	Delaware Nation	Denise	Stonefish	Chief	14760 School House Line, R.R.#3	Thamesville	ON	N0P 2K0
First Nation	Bkejwanong Territory (Walpole Island)	Daniel	Miskokomon	Chief	117 Tahgahoning Road, R.R. #3	Wallaceburg	ON	N84 4K9
First Nation	Assembly of First Nations	RoseAnne	Archibald	Regional Chief				N0N 1J1
First Nation	Chippewas of Kettle and Stony Point First Nation	Jason	Henry	Chief	Kettle & Stony Point Band Office 6247 Indian Lane	Kettle & Stony Point	ON	N0N 1J1
First Nation	Great Lakes Métis Council	Peter	Coture	President	380 9th Street East	Owen Sound	ON	N4K 1P1
First Nation	Caldwell First Nation	Mary	Duckworth	Chief	14 Orange Street	Leamington	ON	N8H 1P5
First Nation	Caldwell First Nation	Zack	Hamm	Environment and Consultation Department Manager	14 Orange Street	Leamington	ON	N8H 1P5
First Nation	Métis Nation of Ontario	Mark	Knell	Manager, Environmental Assessments and Regulatory Issues	311-75 Sherbourne Street	Toronto	ON	M5A 2P9
First Nation	Métis Nation of Ontario	Ethan	Roy	Regions 4 &7 Consultations Advisor	134 John Street	Sault Ste. Marie	ON	P3A 2T2

2 Project Notices and Advertisements

This project included three (3) notices: Notice of Study Commencement and Notice of Public Consultation Centre No. 1; and Notice of Study Completion. All notices were prepared following the Region of Waterloo's standard format and mailed hard copy to those on the stakeholder list that provided a mailing address, and by an email distributed by the Region. A draft of the email blast was provided to the Region.

The Notice of Commencement was not direct mailed to Private Residences due to the size of the study area. When the Notice of Public Information Centre was issued, a radius around the proposed project sites was determined and residences within the radius received a direct mail copy of the notice. All notices were published on two dates in local newspapers, posted on social media, and posted on the project website in accessible PDF format. A Public Service Announcement was also arranged by the Region.

The notices had the following requirements:

- Name and address of the proponent
- A brief description of the project which outlined the nature of the problem or opportunity and the need for a solution
- A study area map
- The Freedom of Information and Protection of Privacy (FIPPA) disclaimer
- Reference to the project following the requirements of the Municipal Class Environmental Assessment
- Details of when and where information was available to the public
- Date of first publication

Distribution of the Notices to the Ministry of the Environment, Conservation and Parks (MECP) followed the new submission format mandated as of May 1, 2018.

The notices were also published in the local newspaper, The Record. Copies of the notices and advertisements are provided as Figures 1 through 5.

Town of PETROLIA
you'll be surprised!

Municipal Class Environmental Assessment
Notice of Study Commencement

Bright's Grove Water Treatment Plant (City of Sarnia)

Raw Water Intake Replacement

The Town of Petrolia is initiating a Class Environmental Assessment (EA) study to address current operational concerns associated with the existing Bright's Grove Water Treatment Plant (WTP) raw water intake. The Bright's Grove WTP is located in the City of Sarnia, approximately 20 km from the Town of Petrolia, and supplies potable water to the Town of Petrolia and other service area municipalities including the Townships of Enniskillen and Dawn-Euphemia, and the Village of Oil Springs. The existing intake for the WTP was constructed in 1944 and is approaching the end of its useful service life. A plan is required to rehabilitate or replace the existing intake structure to ensure a safe, secure, and reliable long-term source of raw water to the plant.

The Class EA study is being conducted according to the requirements of a Schedule 'B' project under the Municipal Class Environmental Assessment Planning Process (October 2000, as amended in 2007, 2011 & 2015). The study will identify and evaluate replacement intake alternatives. The adjacent map covers the approximate limits of the study area. The preferred solution will be selected to minimize technical, community, natural environmental and economic impacts.

Public consultation is an integral component of the Class EA process, and we value your input during the planning process. If you wish to be placed on the mailing list to receive notices and information, or, you wish to provide comments at any time during the process you can do so by contacting:

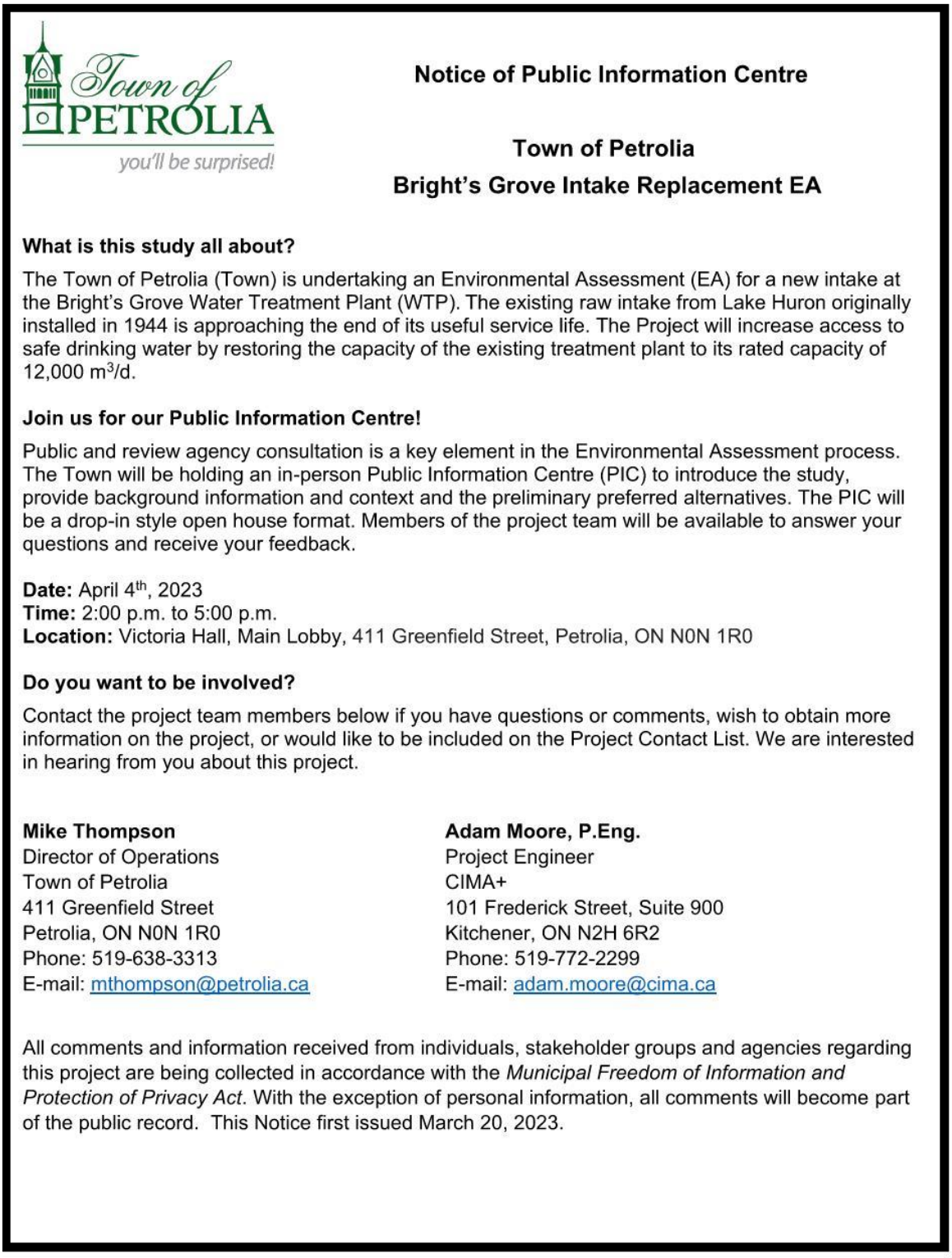
Mike Thompson
Director of Operations
Town of Petrolia
411 Greenfield Street, P.O. Box 1270
Petrolia, ON N0N 1R0
519-882-2350 Ext. 235
mthompson@town.petrolia.on.ca

Stuart Winchester, P. Eng
Project Manager
CIMA+
900 – 101 Frederick Street
Kitchener, ON N2H 6R2
519-772-2299 Ext. 6202
stuart.winchester@cima.ca

Personal information collected or submitted in writing at public meetings will be collected, used, and disclosed by Town staff in accordance with the Municipal Freedom of Information and Protection of Privacy Act (MFIPPA). The written submissions including names, contact information and reports of public meetings will be made available. Questions should be referred to the Town's project manager.

This notice was first issued on August 11, 2021.

Figure 1: Notice of Study Commencement – Issued August 11, 2021



Town of PETROLIA
you'll be surprised!

Notice of Public Information Centre

Town of Petrolia
Bright's Grove Intake Replacement EA

What is this study all about?

The Town of Petrolia (Town) is undertaking an Environmental Assessment (EA) for a new intake at the Bright's Grove Water Treatment Plant (WTP). The existing raw intake from Lake Huron originally installed in 1944 is approaching the end of its useful service life. The Project will increase access to safe drinking water by restoring the capacity of the existing treatment plant to its rated capacity of 12,000 m^3/d.

Join us for our Public Information Centre!

Public and review agency consultation is a key element in the Environmental Assessment process. The Town will be holding an in-person Public Information Centre (PIC) to introduce the study, provide background information and context and the preliminary preferred alternatives. The PIC will be a drop-in style open house format. Members of the project team will be available to answer your questions and receive your feedback.

Date: April 4th, 2023
Time: 2:00 p.m. to 5:00 p.m.
Location: Victoria Hall, Main Lobby, 411 Greenfield Street, Petrolia, ON N0N 1R0

Do you want to be involved?

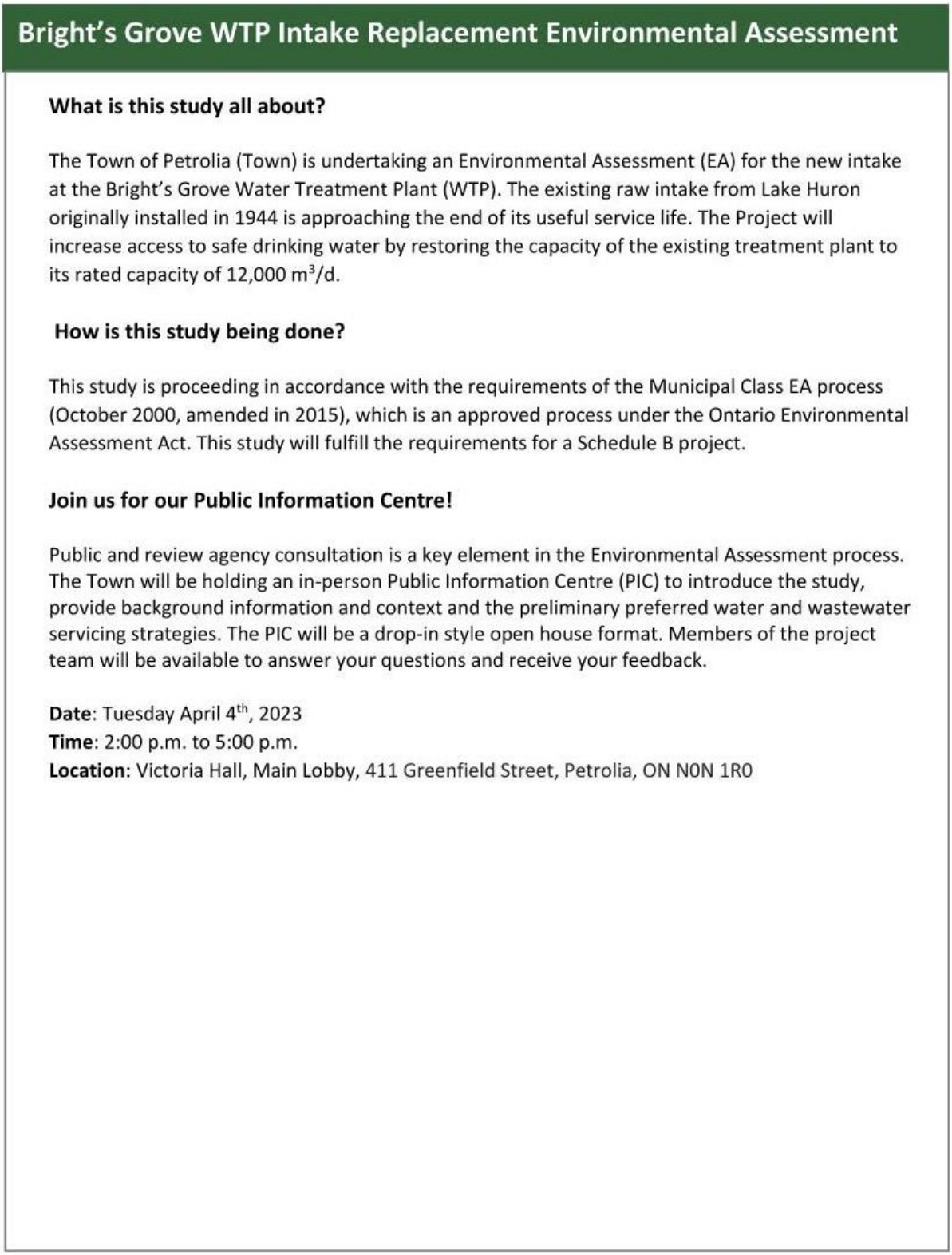
Contact the project team members below if you have questions or comments, wish to obtain more information on the project, or would like to be included on the Project Contact List. We are interested in hearing from you about this project.

Mike Thompson
Director of Operations
Town of Petrolia
411 Greenfield Street
Petrolia, ON N0N 1R0
Phone: 519-638-3313
E-mail: mthompson@petrolia.ca

Adam Moore, P.Eng.
Project Engineer
CIMA+
101 Frederick Street, Suite 900
Kitchener, ON N2H 6R2
Phone: 519-772-2299
E-mail: adam.moore@cima.ca

All comments and information received from individuals, stakeholder groups and agencies regarding this project are being collected in accordance with the *Municipal Freedom of Information and Protection of Privacy Act*. With the exception of personal information, all comments will become part of the public record. This Notice first issued March 20, 2023.

Figure 2: Notice of Public Information Centre No. 1 Advertised March 20, 2023, in The Record



Bright's Grove WTP Intake Replacement Environmental Assessment

What is this study all about?

The Town of Petrolia (Town) is undertaking an Environmental Assessment (EA) for the new intake at the Bright's Grove Water Treatment Plant (WTP). The existing raw intake from Lake Huron originally installed in 1944 is approaching the end of its useful service life. The Project will increase access to safe drinking water by restoring the capacity of the existing treatment plant to its rated capacity of 12,000 m^3/d.

How is this study being done?

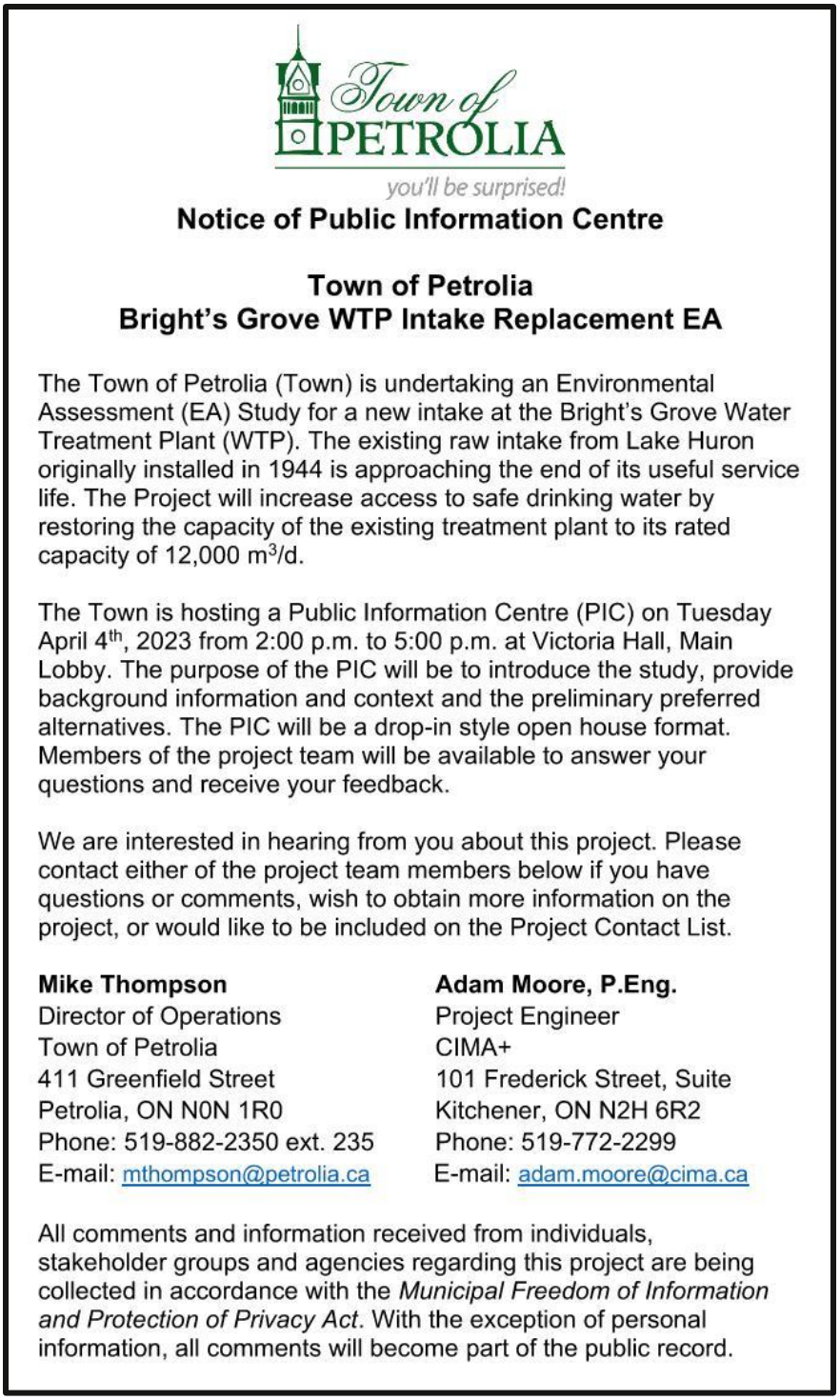
This study is proceeding in accordance with the requirements of the Municipal Class EA process (October 2000, amended in 2015), which is an approved process under the Ontario Environmental Assessment Act. This study will fulfill the requirements for a Schedule B project.

Join us for our Public Information Centre!

Public and review agency consultation is a key element in the Environmental Assessment process. The Town will be holding an in-person Public Information Centre (PIC) to introduce the study, provide background information and context and the preliminary preferred water and wastewater servicing strategies. The PIC will be a drop-in style open house format. Members of the project team will be available to answer your questions and receive your feedback.

Date: Tuesday April 4th, 2023
Time: 2:00 p.m. to 5:00 p.m.
Location: Victoria Hall, Main Lobby, 411 Greenfield Street, Petrolia, ON N0N 1R0

Figure 3: Notice of Study Commencement and Public Information Centre No. 1 Advertised on the Town of Petrolia Website March 21, 2023



Town of PETROLIA
you'll be surprised!

Notice of Public Information Centre

Town of Petrolia
Bright's Grove WTP Intake Replacement EA

The Town of Petrolia (Town) is undertaking an Environmental Assessment (EA) Study for a new intake at the Bright's Grove Water Treatment Plant (WTP). The existing raw intake from Lake Huron originally installed in 1944 is approaching the end of its useful service life. The Project will increase access to safe drinking water by restoring the capacity of the existing treatment plant to its rated capacity of 12,000 m^3/d.

The Town is hosting a Public Information Centre (PIC) on Tuesday April 4th, 2023 from 2:00 p.m. to 5:00 p.m. at Victoria Hall, Main Lobby. The purpose of the PIC will be to introduce the study, provide background information and context and the preliminary preferred alternatives. The PIC will be a drop-in style open house format. Members of the project team will be available to answer your questions and receive your feedback.

We are interested in hearing from you about this project. Please contact either of the project team members below if you have questions or comments, wish to obtain more information on the project, or would like to be included on the Project Contact List.

Mike Thompson
Director of Operations
Town of Petrolia
411 Greenfield Street
Petrolia, ON N0N 1R0
Phone: 519-882-2350 ext. 235
E-mail: mthompson@petrolia.ca

Adam Moore, P.Eng.
Project Engineer
CIMA+
101 Frederick Street, Suite
Kitchener, ON N2H 6R2
Phone: 519-772-2299
E-mail: adam.moore@cima.ca

All comments and information received from individuals, stakeholder groups and agencies regarding this project are being collected in accordance with the *Municipal Freedom of Information and Protection of Privacy Act*. With the exception of personal information, all comments will become part of the public record.

Figure 4: Notice of Public Information Centre No. 1 Advertised March 10, 2023, in The Independent

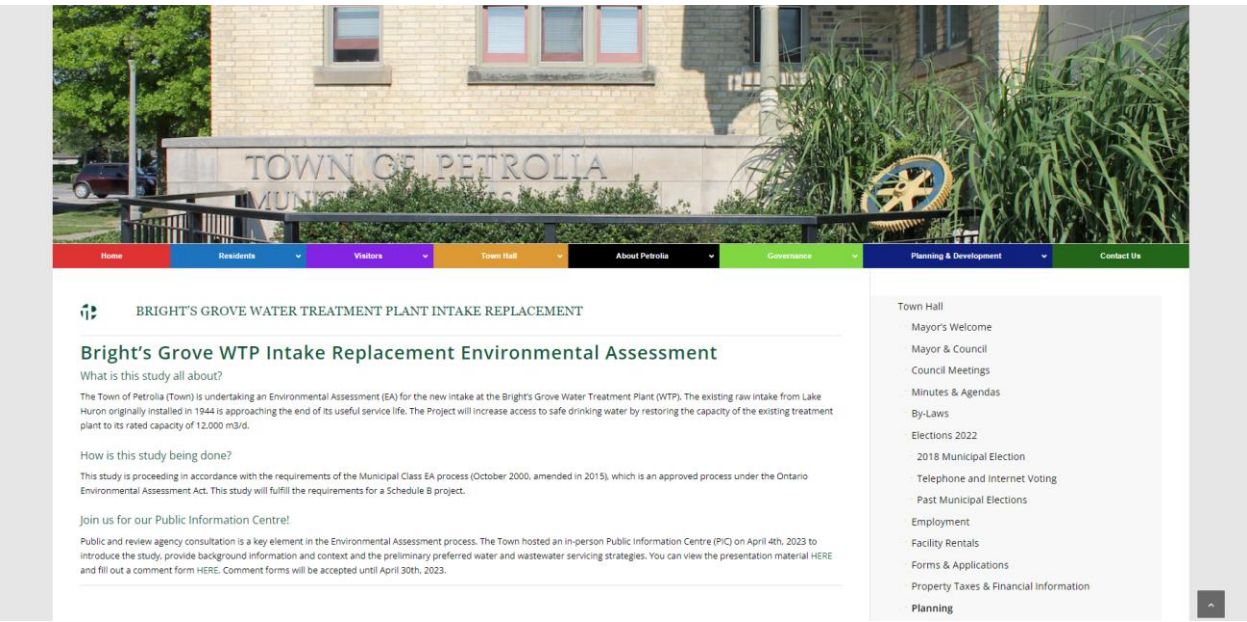
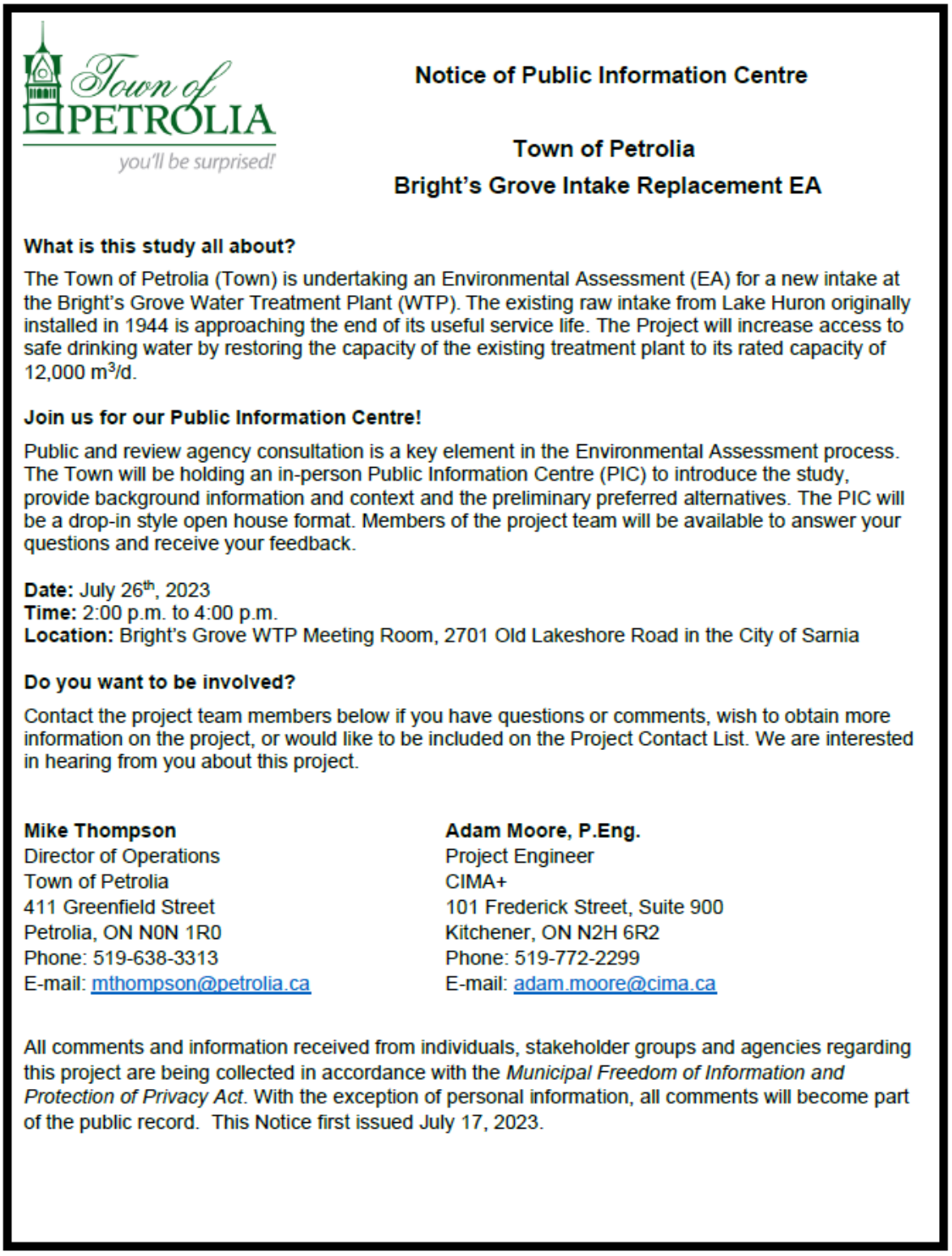


Figure 5: Notice of Public Information Centre Advertised on the Town of Petrolia Website March 10, 2023



Town of PETROLIA
you'll be surprised!

Notice of Public Information Centre

Town of Petrolia
Bright's Grove Intake Replacement EA

What is this study all about?

The Town of Petrolia (Town) is undertaking an Environmental Assessment (EA) for a new intake at the Bright's Grove Water Treatment Plant (WTP). The existing raw intake from Lake Huron originally installed in 1944 is approaching the end of its useful service life. The Project will increase access to safe drinking water by restoring the capacity of the existing treatment plant to its rated capacity of 12,000 m^3/d.

Join us for our Public Information Centre!

Public and review agency consultation is a key element in the Environmental Assessment process. The Town will be holding an in-person Public Information Centre (PIC) to introduce the study, provide background information and context and the preliminary preferred alternatives. The PIC will be a drop-in style open house format. Members of the project team will be available to answer your questions and receive your feedback.

Date: July 26th, 2023
Time: 2:00 p.m. to 4:00 p.m.
Location: Bright's Grove WTP Meeting Room, 2701 Old Lakeshore Road in the City of Sarnia

Do you want to be involved?

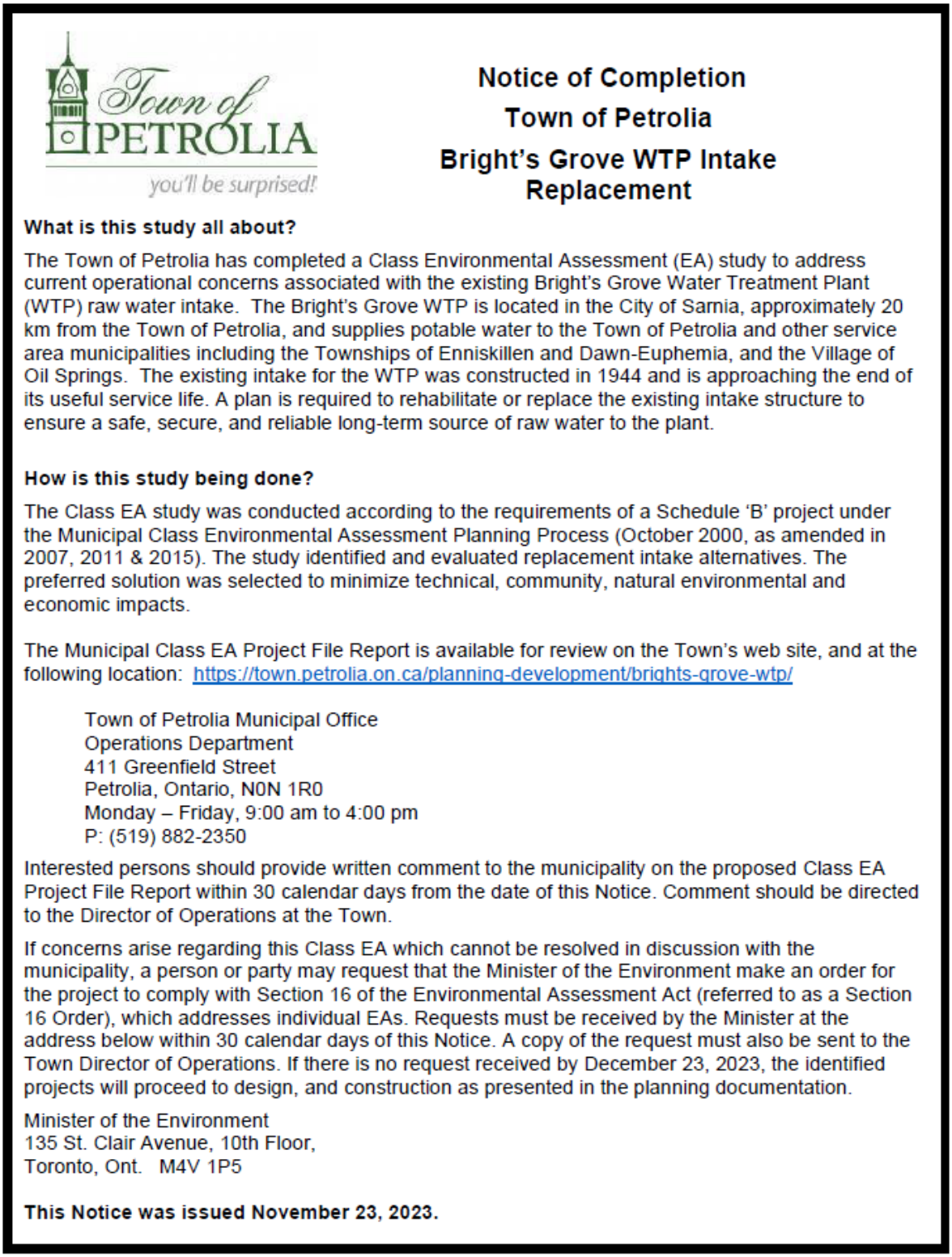
Contact the project team members below if you have questions or comments, wish to obtain more information on the project, or would like to be included on the Project Contact List. We are interested in hearing from you about this project.

Mike Thompson
Director of Operations
Town of Petrolia
411 Greenfield Street
Petrolia, ON N0N 1R0
Phone: 519-638-3313
E-mail: mthompson@petrolia.ca

Adam Moore, P.Eng.
Project Engineer
CIMA+
101 Frederick Street, Suite 900
Kitchener, ON N2H 6R2
Phone: 519-772-2299
E-mail: adam.moore@cima.ca

All comments and information received from individuals, stakeholder groups and agencies regarding this project are being collected in accordance with the *Municipal Freedom of Information and Protection of Privacy Act*. With the exception of personal information, all comments will become part of the public record. This Notice first issued July 17, 2023.

Figure 6: Notice of Public Information Centre No. 2 issued July 17, 2023



Town of PETROLIA
you'll be surprised!

Notice of Completion
Town of Petrolia
Bright's Grove WTP Intake Replacement

What is this study all about?

The Town of Petrolia has completed a Class Environmental Assessment (EA) study to address current operational concerns associated with the existing Bright's Grove Water Treatment Plant (WTP) raw water intake. The Bright's Grove WTP is located in the City of Sarnia, approximately 20 km from the Town of Petrolia, and supplies potable water to the Town of Petrolia and other service area municipalities including the Townships of Enniskillen and Dawn-Euphemia, and the Village of Oil Springs. The existing intake for the WTP was constructed in 1944 and is approaching the end of its useful service life. A plan is required to rehabilitate or replace the existing intake structure to ensure a safe, secure, and reliable long-term source of raw water to the plant.

How is this study being done?

The Class EA study was conducted according to the requirements of a Schedule 'B' project under the Municipal Class Environmental Assessment Planning Process (October 2000, as amended in 2007, 2011 & 2015). The study identified and evaluated replacement intake alternatives. The preferred solution was selected to minimize technical, community, natural environmental and economic impacts.

The Municipal Class EA Project File Report is available for review on the Town's web site, and at the following location: https://town.petrolia.on.ca/planning-development/brights-grove-wtp/

Town of Petrolia Municipal Office
Operations Department
411 Greenfield Street
Petrolia, Ontario, N0N 1R0
Monday – Friday, 9:00 am to 4:00 pm
P: (519) 882-2350

Interested persons should provide written comment to the municipality on the proposed Class EA Project File Report within 30 calendar days from the date of this Notice. Comment should be directed to the Director of Operations at the Town.

If concerns arise regarding this Class EA which cannot be resolved in discussion with the municipality, a person or party may request that the Minister of the Environment make an order for the project to comply with Section 16 of the Environmental Assessment Act (referred to as a Section 16 Order), which addresses individual EAs. Requests must be received by the Minister at the address below within 30 calendar days of this Notice. A copy of the request must also be sent to the Town Director of Operations. If there is no request received by December 23, 2023, the identified projects will proceed to design, and construction as presented in the planning documentation.

Minister of the Environment
135 St. Clair Avenue, 10th Floor,
Toronto, Ont. M4V 1P5

This Notice was issued November 23, 2023.

Figure 7: Notice of Study Completion, issued on and advertised in The Independent on November 23, 2023.

3 Public Information Centre

A Public Information Centre (PIC) was held on April 4th. It was held in the Town of Petrolia. The PIC allowed the public opportunity to provide input to the identification of the problem as well as potential alternate solutions.

The PIC format included a formal presentation, display boards, handout materials, comment sheets and an attendance register. Draft presentation material was made available to the Town, including a digital copy of the display boards and the handout materials, two (2) weeks prior to the event.


Town of PETROLIA
you'll be surprised!
Welcome
Bright's Grove Intake Replacement
Municipal Environmental Assessment
Public Information Centre
April 4th, 2023
CIMA+
Welcome!
Town of PETROLIA
you'll be surprised!
Bright's Grove Water Treatment Plant Intake Replacement
Municipal Class Environmental Assessment Study
1
Please Sign in
Meeting is a "Drop-in" format.
2
Review Display Materials
Our representatives will be pleased to discuss the study with you, or any questions or concerns that you may have.
3
Complete a Comment Sheet
Drop off your completed Comment Sheet in the Box tonight or return it to the contact people shown on the Comment Sheet by April 30, 2023.
CIMA+

Why are we here?

Town of PETROLIA
you'll be surprised!

Your feedback is important to this Class Environmental Assessment Study!

Please review the Public Information Centre presentation to learn about the process, the activities completed to date, and the **Preliminary Preferred Solution being recommended.**

Your opinion is important to us! Members of the project team are available to answer questions via email or telephone.

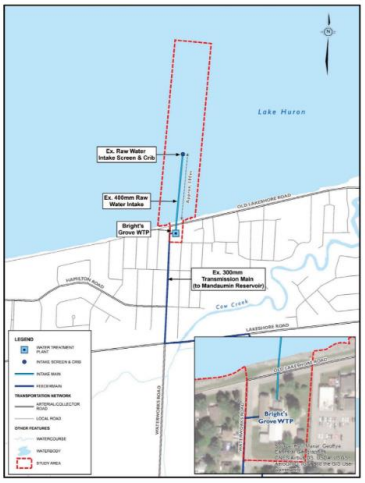
Please complete a **Comment Sheet** after reviewing the materials.

CIMA+

Project Background

Town of PETROLIA
you'll be surprised!

- The Bright's Grove Water Treatment Plant located at 2701 Old Lakeshore Road provides high-quality drinking water to the Petrolia Drinking Water System. The Petrolia Drinking Water System provides service to residents and businesses in the Town of Petrolia, as well as in the Village of Oil Springs and the Townships of Enniskillen and Dawn-Euphemia.
- The raw water quality at the existing intake location has historically been good, with periods of high turbidity experienced during storm events.
- Due to the relatively shallow depth of the intake, the intake has experienced blockage of the intake due to frazil ice.



Project Background (continued)

- Existing intake pipe:
  - Installed in 1944 to replace the original intake pipeline constructed in 1896.
  - Extends approximately 400m into Lake Huron.
  - 400mm diameter cast iron pipe.
  - Equipped with an intake screen to allow water flow into the pipe and crib structure to protect the screen.
  - Recently retrofitted with zebra mussel and frazil ice control systems.
- **Intake pipe is at the end of its useful life.** Its current condition results in hydraulic capacity limitations, maintenance concerns resulting in risk of failure.
- Expected capital costs are $16.2Million.

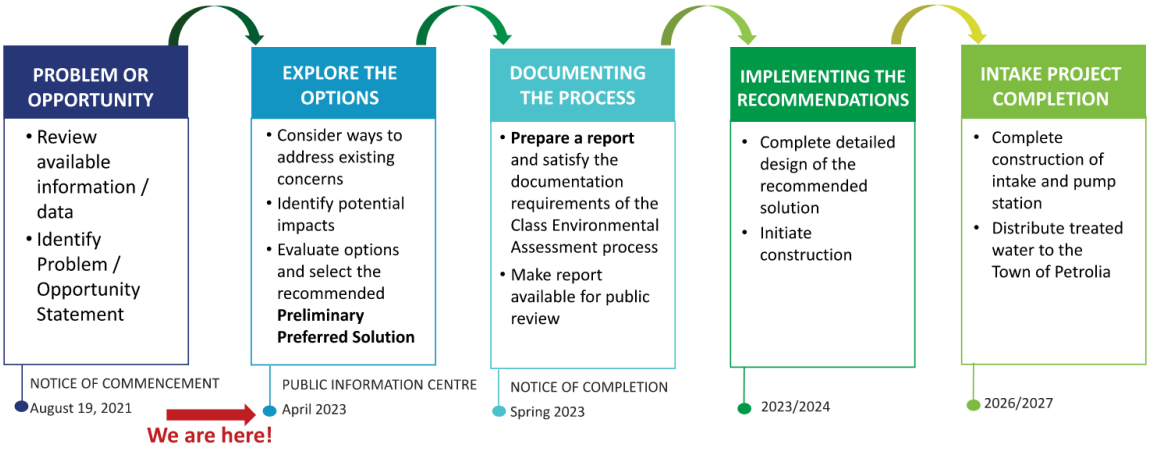
Photos taken of intake screen, pipe cut-out section, zebra mussel infestation, pipeline crack near the shoreline.

Purpose of the Study

- To identify a preferred water supply source to ensure a secure and reliable source of raw water to the Petrolia Water Treatment Plant and to address current maintenance concerns with the existing intake pipe; and,
- To recommend a preferred solution that ensures a safe and reliable source of water for the Petrolia Drinking Water System, while minimizing impacts on the natural and socio-cultural environments, and with regards to technical and financial implications.

Municipal Class Environmental Assessment Study - Process and Timeline

Town of PETROLIA
you'll be surprised!



CIMA+

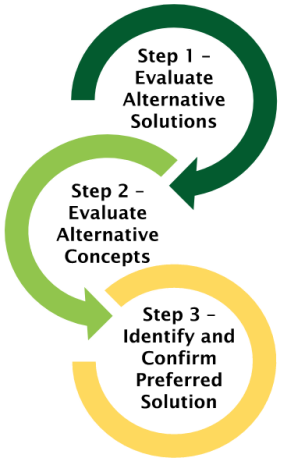
Environmental Assessment Phase 1 – Problem/Opportunity Statement

Town of PETROLIA
you'll be surprised!

A preferred raw water supply solution is required to ensure a secure and reliable source of raw water for the Town of Petrolia Drinking Water System to address current concerns associated with the capacity and condition of the existing intake

CIMA+

Selecting the Preferred Solution – The Process

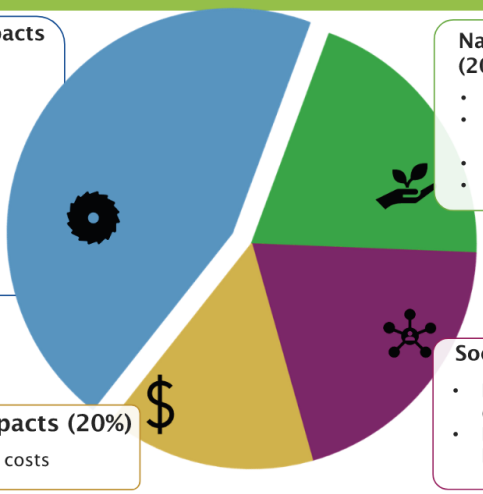


- Alternatives were screened based on ability to meet:
  - Capacity requirements
  - Water quality standards, objectives and guidelines for the plant, and
  - Maximize existing infrastructure, compatibility with existing processes, and constructability simplicity
- **Replacing the Existing Intake was selected as the Preliminary Preferred Alternative Solution.**
- **Alternative concepts** for replacing the existing intake were developed.
- Options were assessed based on evaluation criteria, shown in next panel.
- The option with the overall best score is being **recommended as the Preliminary Preferred Water Supply Solution**.
- Feedback from the public and stakeholders is being requested.
- The preferred solution will be confirmed with input from the public and review agencies.

Evaluating the Alternative Concepts – Evaluation Criteria

Technical and Operational Impacts (45%)

- Raw water quality
- Vulnerability to contaminants
- Constructability issues
- Operation and maintenance complexity
- Construction duration, staging opportunities
- Approvals
- Land acquisition



Natural Environmental Impacts (20%)

- Natural habitat, terrestrial, aquatic, etc.
- Archaeological and cultural heritage features
- Vulnerability to climate changes
- Source water protection

Socio-Cultural Impacts (15%)

- Public and staff health and safety concerns
- Impacts / disruption to residents and local users

Financial Impacts (20%)

- Construction costs

Alternative Solutions Considered and Screening Results

Alternative Solutions	Screening Observations	Recommendation
1 - DO NOTHING	• No improvements to the existing intake pipe. • This alternative does not address the concerns identified with the intake pipe.	**Not recommended**
2 - LIMIT COMMUNITY GROWTH	• No additional growth in the serviced area. • This alternative does not address the concerns identified with the intake pipe.	**Not recommended**
3 - IMPLEMENT WATER CONSERVATION MEASURES	• This alternative does not address the concerns identified with the existing intake pipe.	**Not recommended**
4 - OBTAIN RAW WATER FROM ANOTHER SOURCE	• Extend raw water supply from a neighboring municipality into Petrolia. • Major capital expenditure with new work and upgrades. • This alternative does not address the concerns identified with the intake pipe.	**Not recommended**
5 - REFURBISH EXISTING INTAKE	• Physical measures would be implemented to try to restore existing intake pipe. • Questionable integrity of retrofitted pipe. Challenges to allow continuous operation of existing plant during construction.	**Not recommended**
6 - REPLACE EXISTING INTAKE	• New intake pipe and intake crib would be installed. • This alternative addresses concerns identified with the intake pipe.	**Recommended for further consideration**

Existing Conditions – Cultural Heritage

Built and Cultural Heritage Resources

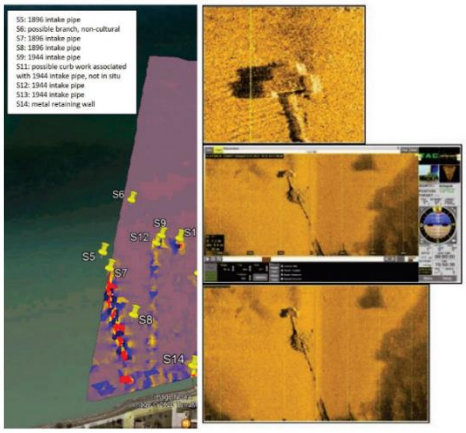
- The existing Petrolia Water Treatment Plant (2701 Old Lakeshore Road) was identified as a building with heritage value
- The identified heritage value of the property is confined to the original 1896 pumping station located at the corner of property
- The scope of the proposed work poses no direct impact of the identified heritage value

Updated colorized historic image of 'Petrolia Water Works' - Cultural Heritage Screening Report - PHC Group (2022) – Town of Petrolia

Existing Conditions – Archaeological Study

Archaeological Marine Findings

- Through snorkeling investigations 30m off the coast the existing intake pipes were inspected
- From the investigations it was found that an intake pipe from 1896 still exists and the new intake will not impact it
- The 1944 intake pipe is considered "modern" archaeological artifact and will provide no significant archaeological information

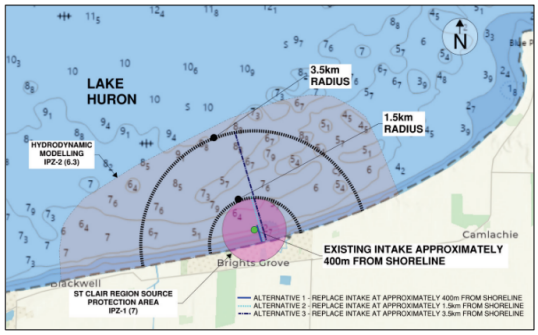


Existing Intake Pipes - Marine Archaeological Report - ARA Group. (2022). Town of Petrolia.

Alternative Intake Locations

- Preliminary Preferred Water Supply Solution **– Replace Existing Intake**
- **Three (3) alternative locations for the intake replacement**

Alternative	Description
1	Similar location as existing, approximate length of 0.4km, depth over intake 3.0m at historic low lake level
2	Extend to 1.5km length and increase depth over intake to 7.0m at historic low lake level
3	Extend to 3.5km length and increase depth over intake to 8.0m at historic low lake level



Potential Intake Lengths and Depths

Assessment of Alternative – Intake Locations

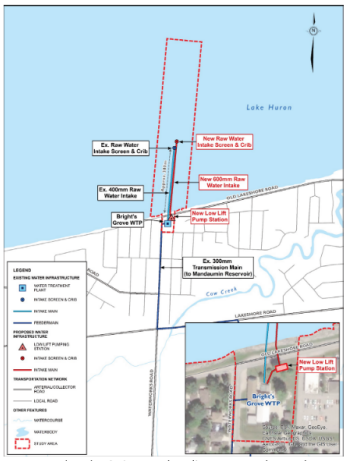
Alternative Locations	Advantages	Disadvantages
Length – 0.4km, depth 3.0m	• Historically good quality raw water • No significant impact to Source Protection Plan • Lowest Capital Cost	• Minimum cover over proposed intake, highest risk of frazil ice blockage and risk of surface ice impacts to intake screen.
Length – 1.5km, depth 7.0m	• Additional depth of water over intake will reduce risk of frazil ice blockage • Potential reduction in high turbidity in raw water due to storm events • Increased depth will reduce risk of surface ice impacts to intake screen and crib	• Will require an update to Source Protection Plan which will delay implementation and may impact proposed developments in Sarnia • Greater impact to Navigable Waters • Higher Capital Cost for intake replacement
Length – 3.5km, depth 8.0m	• Same as above	• Will require an update to Source Protection Plan which will delay implementation and may impact proposed developments in Sarnia • Greatest impact to Navigable Waters • Highest Capital Cost for intake replacement

Evaluation of Alternative Design Concepts for Intake

No.	Alternative Design	Advantages	Disadvantages
1	Retrofit as Closed System using existing low-lift pumping station	• Utilizes existing infrastructure and minimizes the need for major retrofitting of existing low-lift pumping station • Easy to adapt to a future pre-treatment addition	• Challenges to maintain continuous operation of water treatment plant during construction • Inflexible for future upgrades • Complex excavation support system necessary to protect existing Heritage structure
2	Retrofit as Open System using existing low-lift pump station	• Similar to Option 1; however, new submersible pumps required to replace existing low-lift pumps	• Challenges to maintain continuous operation of water treatment plant during construction • Complex excavation support system necessary to protect existing Heritage structure
3	Closed System with new low-lift pumping station	• Minimizes need for water treatment plant shut-downs • Flexibility for future improvements	• Larger footprint for low-lift pump station to accommodate below-grade pump room. • Potential need for superstructure over low-lift pumping station which would result in a visual impact for residents on Bright Street.
4	Open System with new low-lift pumping station	• Smaller footprint compared to Concept 3 • Minimizes need for water treatment plant shut-downs • Potential to provide some pre-treatment in wet-well	• Higher Capital Cost compared to Concept 1 and 2 • Limited opportunity for future capacity expansion

Preliminary Preferred Solution

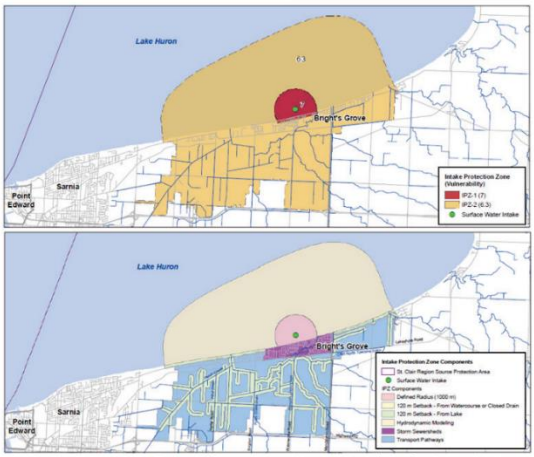
- **New Intake operating as an Open system with a new low-lift pumping station**. The new intake will extend approximately the same distance, approximately 400m from the shoreline.
- **Key advantages:**
  - An **Open System** is the preferred solution to be both cost-effective and have the capacity for growing demand
  - **Maintaining current depth and location** of the intake pipe is the preferred option due to small cost-to-benefit ratio of extending the intake
  - **Long-term impacts on adjacent property are eliminated** by confining in-land works within existing site limits. **No land acquisition required.**
  - In-land works **minimize construction challenges** for the connection to a new low-lift pumping station.
  - Staging opportunities to **minimize interruptions to operation and protection of existing intake pipe while construction is taking place.**
  - New intake will include **Zebra Mussel and Frazil Ice Control** systems to prevent frazil ice blockages and Zebra Mussel infestation



Proposed and Existing Intake Alignment and Length

Source Water Protection Update

- Intake Protection Zones represent vulnerable areas around source water intakes:
  - IPZ-1 – most vulnerable area immediately surrounding the intake. Represented by a typical distance from the intake (1 km radius).
  - IPZ-2 – larger area of concern. Modelled based on enough time to allow an operator to respond to a water quality event at the intake.
  - Intake Protection Zones will be re-assessed to ensure there is no major changes to any drainage patterns or new Transport Pathways



Source Water Protection Zone and Components, Map 4.3 Petrolia Intake Protection Zone (IPZ) St. Clair Region Source Protection Area Assessment Report, 2010

Overview of Mitigation Measures

Town of PETROLIA
you'll be surprised!

Natural Environment

- Implement setbacks and erosion and sediment control measures.
- Minimize vegetation and tree removals through design. Apply timing window for tree clearing activities.
- Avoid construction within Species at Risk habitat or outside breeding windows. Additional screening for Species at Risk.
- All activities to comply with Endangered Species Act.
- Use previously disturbed areas for construction laydown and staging to the extent possible.

Technical and Operational

- Phased-implementation approach for the protection and continued operation of the existing intake.
- Appropriate standard construction techniques and mitigation measures will be implemented.
- Bathymetric survey has been completed to confirm the approximate location of new intake.
- Confirm delineation of Intake Protection Zones.

Socio-Cultural Environment

- All construction will adhere to strict safety guidelines.
- Temporary measures will be undertaken during construction to minimize noise, dust and vibration impacts.
- In-water works will comply with the Canadian Navigable Waters Act to ensure no interference with navigation.
- On-shore construction to be confined within the water treatment plant property limits or the adjacent shoreline with minimal interference to the neighboring residents.
- Notification to adjacent property owners prior to construction.

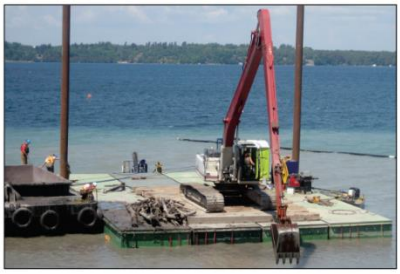
Cultural Heritage

- Completion of a Cultural Heritage Impact Assessment.

CIMA+

Typical Marine Construction Equipment

Town of PETROLIA
you'll be surprised!



Excavation of marine trench with floating dredging equipment

Installation of intake pipeline with ballast to prevent pipeline from floating

Onshore installation of intake pipeline

CIMA+

Thank you for Participating! Please Stay Engaged

After the virtual Public Information Centre, the project team will:

- Review and consider input received during the virtual Public Information Centre
- Confirm the recommended water supply solution
- Prepare Class Environmental Assessment Report
- Issue Notice of Study Completion
- File Class Environmental Assessment Report on the public record for public review

Stay Involved!

Please complete the **Online Comment Form** available on the webpage by **April 30, 2023**.

Project Information

- For more information about this project, please visit our webpage:

  town.petrolia.on.ca/planning-development/brights-grove-wtp/

- Should you have any questions or comments at any time during the project, please contact:

Mike Thompson
Town of Petrolia
Director of Operations
mthompson@petrolia.ca

Adam Moore
CIMA+
Project Engineer
adam.moore@cima.ca

Town of PETROLIA
you'll be surprised!

Thank You!

We appreciate your time and interest in this project

CIMA+

Town of Petrolia Bright's Grove Intake Replacement Environmental Assessment
Public Information Centre – April 4, 2023 | Victoria Hall, 411 Greenfield Street, Petrolia

Sign-in is optional. If you wish to be added to the project contact list, please provide an email address.

Town of PETROLIA
you'll be surprised!

First Name	Last Name	Mailing Address	Email Address

Personal information on this sign in sheet is being collected under the authority of the Municipal Act, 2001, as amended, for the purposes of adding you to the project contact list. By providing your email or mailing address, you will be added to the project contact list and receive subsequent information in relation to this project. Questions regarding the collection of personal information should be directed to the offices of the CAO or Director of Public Works, Town of Petrolia, 411 Greenfield Street, Petrolia, ON N0N 1R0; Telephone (519) 882-2350.

Town of Petrolia
Bright's Grove Intake Replacement EA
Public Information Centre
April 4th, 2023
Victoria Hall, 411 Greenfield Street

Please provide your comments below. Use the back of this sheet if you need more space.

Contact Information Optional. Please provide an address if you wish to be added to the project contact list.
Name:
Mailing and/or Email Address:

Personal information on this sign in sheet is being collected under the authority of the Municipal Act, 2001, as amended, for the purposes of adding you to the project contact list. By providing your email or mailing address, you will be added to the project contact list and receive subsequent information in relation to this project. Questions regarding the collection of personal information should be directed to the offices of the CAO or Director of Public Works, Town of Petrolia, 411 Greenfield Street, Petrolia, ON N0N 1R0; Telephone (519) 882-2350.

4 Indigenous Community Consultation

Identification of First Nations and Indigenous communities followed provincial guidance provided by MECP, which was updated on June 26, 2018. This included review of the Aboriginal and Treaty Rights Information System (ATRIS). Initial consultation with First Nations / Indigenous Communities included written correspondence introducing the project and identifying the project contacts. This correspondence was sent on letterhead by email, followed by CIMA+ mailing a hard-copy version of the Notice.

In cases where receipt of the correspondence was not confirmed, follow up phone calls were made by CIMA+. CIMA+ maintained a detailed record of indigenous consultation, including all communication records, as seen in Table 2 and Appendix A.5, materials prepared, and documents issued. Correspondence with all First Nation Communities was tracked throughout the project.

Table 2: Summary of responses from First Nation communities.

First Nation	First Nation Correspondence	Project Team Correspondence
Aamjiwnaang First Nation	N/A	August 11, 2021 - Notice of Commencement via mail
		October 13, 2022 - Invitation to participate in Archaeological Investigation via email
		November 7, 2022 – Follow up invitation to participate via email.
		November 12, 2022 - Request for input to Cultural Heritage Assessment via email.
		April 20, 2023 - Deployment details for the Stage 1 property inspection on 26-Apr-23 via email.
		March 20, 2023 – Notice of PIC via email.
		June 29, 2023 - Deployment details for the Stage 2 archaeological Assessment on 07-Jul-23 via email.
		July 17, 2023 – Notice of 2nd PIC sent via email

	August 31, 2023 – Wanda replied to confirm that the report was satisfactory via email.	August 31, 2023 – Sent Draft report for Stage 1 and Stage 2 AA via email
		November 23, 2023 – Notice of Completion sent via mail and email where applicable.
Chippewas of the Thames First Nation	September 10, 2021 – Response letter to Notice of Commencement via email	August 11, 2021 - Notice of Commencement via mail
		October 13, 2022 – Invitation to participate in archeological investigation via email
	November 7, 2022 – Response to invitation to participate in Archaeological Investigation and sent an Archeology Field Liasion Agreement via email	November 7, 2022 – Follow up invitation to participate in Archaeological Investigation via email.
		November 21, 2022 - Request for input to Cultural Heritage Assessment via email
		December 7, 2022 - Submission of Archaeology Field Liaison Agreement via email
	April 26, 2023 – Notified ARA that the client had not yet executed the COTTFN participation agreement as required before fieldwork.	April 20, 2023 - Deployment details for the Stage 1 property inspection on 26-Apr-23 via email.
		April 26, 2023 – Notice of completion of fieldwork and apology for miscommunication in the completion of the agreement via phone/email.
		March 20, 2023 – Notice of PIC via email
		June 29, 2023 - Deployment details for the Stage 2 archaeological Assessment on 07-Jul-23 via email.
	July 17, 2023 – Fallon Burch Inquired if the PIC information would be posted on the Town's website	July 17, 2023 – Notice of 2nd PIC sent via email

	August 24, 2023 – Fallon reviewed the PIC materials posted and said they had no questions or concerns	July 17, 2023 – Confirmed that PIC material and comment forms were posted
	September 8, 2023 – Fallon reviewed the draft report and said they had no questions or concerns	August 31, 2023 – Sent Draft report for Stage 1 and Stage 2 AA
		September 11, 2023 – Thanked Fallon via email.
		November 23, 2023 – Notice of Completion sent via mail and email where applicable.
Oneida Nation of the Thames	N/A	August 11, 2021 - Notice of Commencement via mail
		November 21, 2022 - Request for input to Cultural Heritage Assessment via email
		February 3, 2023 – Invitation to participate in Archeological Investigation.
		March 10, 2023 – Follow up invitation to participate in Archeological Investigation via email.
		March 20, 2023 – Notice of PIC via email
		April 20, 2023 - Deployment details for the Stage 1 property inspection on 26-Apr-23 via email.
		June 29, 2023 - Deployment details for the Stage 2 archaeological Assessment on 07-Jul-23 via email.
		July 17, 2023 – Notice of 2nd PIC sent via email
		August 31, 2023 – Sent Draft report for Stage 1 and Stage 2 AA
		September 19, 2023 – Inquiry as to status of report made via phone. No answer; left voicemail.

		November 23, 2023 – Notice of Completion sent via mail and email where applicable.
Delaware Nation	N/A	August 11, 2021 - Notice of Commencement via mail
		November 21, 2022 - Request for input to Cultural Heritage Assessment via email
		February 3, 2023 – Invitation to participate in Archaeological Investigation via email.
		March 10, 2023 – Follow-up invitation to participate in Archeological investigation via email.
		March 20, 2023 – Notice of PIC via email
		April 20, 2023 - Deployment details for the Stage 1 property inspection on 26-Apr-23 via email.
		June 29, 2023 - Deployment details for the Stage 2 archaeological Assessment on 07-Jul-23 via email.
		July 17, 2023 – Notice of 2nd PIC sent via email.
		August 31, 2023 – Sent Draft report for Stage 1 and Stage 2 AA
		September 19, 2023 – Inquiry as to status of report via email.
		September 26, 2023 – Inquiry as to status of report made via phone. ARA was directed to resubmit the report to the attention of Chief Logan.
		November 23, 2023 – Notice of Completion sent via mail and email where applicable.

Bkejwanong Territory (Walpole Island)	N/A	August 11, 2021 - Notice of Commencement via mail
		October 13, 2022 - Invitation to participate in Archaeological Investigation via email
		November 7, 2022 - Invitation to participate in Stage 2 of Archaeological Investigation via email
		November 21, 2022 - Request for input to Cultural Heritage Assessment via email
		March 10, 2023 – Follow up invitation to participate in archaeological investigation.
		March 20, 2023 – Notice of PIC via email
		April 20, 2023 - Deployment details for the Stage 1 property inspection on 26-Apr-23 via email.
		June 29, 2023 - Deployment details for the Stage 2 archaeological Assessment on 07-Jul-23 via email.
		July 17, 2023 – Notice of 2nd PIC sent via email
		August 31, 2023 – Sent Draft report for Stage 1 and Stage 2 AA
		September 19, 2023 – Inquiry as to status of report via email.
		September 26, 2023 – Inquiry as to status of report via phone. No answer; no option to leave voicemail.
		November 23, 2023 – Notice of Completion sent via mail and email where applicable.

Assembly of First Nations	N/A	August 11, 2023 - Notice of Commencement via mail
		October 13, 2022 - Invitation to participate in Archaeological Investigation via email
		February 8, 2023 – Follow up invitation to participate in Archaeological investigation via email.
		March 10, 2023 – Follow up invitation to participate in Archaeological investigation via email.
		March 20, 2023 – Notice of PIC via email
		November 21, 2022 - Request for input to Cultural Heritage Assessment via email
		April 20, 2023 - Deployment details for the Stage 1 property inspection on 26-Apr-23 via email.
		June 29, 2023 - Deployment details for the Stage 2 archaeological Assessment on 07-Jul-23 via email.
		July 17, 2023 – Notice of 2nd PIC sent via email
		August 31, 2023 – Sent Draft report for Stage 1 and Stage 2 AA
		September 19, 2023 – Inquiry as to status of report made via email.
		November 23, 2023 – Notice of Completion sent via mail and email where applicable.
Chippewas of Kettle and Stony Point First Nation	N/A	August 11, 2021 - Notice of Commencement via mail
		October 13, 2021 - Invitation to participate in Archaeological Investigation via email

		November 7, 2022 – Follow up invitation to participate in Archaeological Investigation via email
		November 21, 2022 - Request for input to Cultural Heritage Assessment via email
		March 10, 2023 – Invitation to participate in Stage 1 Archaeological Investigation
		March 20, 2023 – Notice of PIC via email
		March 27, 2023 – Jason Henry confirmed interest in project via email.
		April 20, 2023 - Deployment details for the Stage 1 property inspection on 26-Apr-23 via email.
		June 29, 2023 - Deployment details for the Stage 2 archaeological Assessment on 07-Jul-23 via email.
		July 17, 2023 – Notice of 2nd PIC sent via email
		August 31, 2023 – Sent Draft report for Stage 1 and Stage 2 AA
		September 19, 2023 – Follow up email to request comments by September 22.
	September 29, 2023 – CKSPFN stated that the report was reviewed and that they agree with the recommendations in the report.	September 26, 2023 – Inquiry as to status of report review made via phone. R. Lukascs stated that comments would be provided shortly.
		November 23, 2023 – Notice of Completion sent via mail and email where applicable.
Great Lakes Métis Council		August 11, 2021 - Notice of Commencement via mail

	November 22, 2021 - Requested a map of the study area and that any future requests be submitted to consultations@metisnations.org	November 21, 2022 - Request for input to Cultural Heritage Assessment via email
		November 22, 2022 - Provided a map of the Study Area via email
		October 13, 2022 - Invitation to participate in Archaeological Investigation via email
		March 20, 2023 – Notice of PIC via email
		July 17, 2023 – Notice of 2nd PIC sent via email
		August 31, 2023 – Sent Draft report for Stage 1 and Stage 2 AA
		November 23, 2023 – Notice of Completion sent via mail and email where applicable.
Caldwell First Nation		August 11, 2021 - Notice of Commencement via mail (Sent by CIMA+)
		November 21, 2022 - Request for input to Cultural Heritage Assessment via email
		March 20, 2023 – Notice of PIC via email
	February 8, 2023 – Zack responded to confirm participation from CFN in the assessment.	February 3, 2023 – Invitation to participate in archaeological investigation via email.
	March 8, 2023 – Received signed agreements from Zack. Agreement dated February 28, 2023.	February 21, 2023 – Sent Agreements for CFN's participation in the Stage 1 Archeological Assessment
		April 20, 2023 - Deployment details for the Stage 1 property inspection on 26-Apr-23 via email.
		June 29, 2023 - Deployment details for the Stage 2 archaeological Assessment on 07-Jul-23 via email.

	July 25, 2023 – Requested that further communications be sent to consultwithcaldwell.ca and confirmed interest in participating in archeological investigation via email.	July 17, 2023 – Notice of 2nd PIC sent via email
	July 31, 2023 – Expressed interest in reviewing EA report and confirmed that agreements would be forwarded via email.	July 30, 2023 – Sent signed agreements from town via email.
	August 9, 2023 – Received signed agreements from CFN dated July 31, 2023 via email.	
		August 31, 2023 – Sent Draft report for Stage 1 and Stage 2 AA via email.
	September 15, 2023 – Jenna Meidment followed up to say that they had not yet received the AA report and that the report needed to be uploaded to the consultation portal at consultwithcaldwell.ca.	September 15, 2023 – CIMA+ responded to apologize and that the report went sent to Zack Hamm, but that it would be uploaded to the portal.
		September 18, 2023 – Confirmed that the AA report had been uploaded to the portal
	September 21, 2023 – Stated that the technical review agreement still needs to be signed by the town prior to the review of the report via email.	September 19, 2023 – Inquiry as to status of report made via email.
	September 26, 2023 – Confirmed that was the agreement in question and that it had been signed. Apologized for the confusion and stated that the report should be reviewed by early next week.	September 21, 2023 – Inquired if the previously sent report was the one in question.
		October 6, 2023 – Inquiry as to status of report made via phone.
		November 23, 2023 – Notice of Completion sent via mail and email where applicable.
Métis Nation of Ontario		August 11, 2021 - Notice of Commencement via mail
	November 22, 2021 - Requested a map of the study area and that any future requests be submitted to consultations@metisnations.org	November 21, 2022 - Request for input to Cultural Heritage Assessment via email
		February 3, 2023 - Invitation to participate in Archaeological Investigation via email

		March 10, 2023 – Follow up invitation to participate in archeological investigation via email.
		March 20, 2023 – Notice of PIC via email
		April 20, 2023 - Deployment details for the Stage 1 property inspection on 26-Apr-23 via email.
		June 29, 2023 - Deployment details for the Stage 2 archaeological Assessment on 07-Jul-23 via email.
		July 17, 2023 – Notice of 2nd PIC sent via email
		August 31, 2023 – Sent Draft report for Stage 1 and Stage 2 AA
	September 22, 2023 – Laura Desaulniers replied to say that the report has been sent to Region 9 consultations and that they have not yet provided any questions or comments.	September 19, 2023 – Inquiry as to status of report made via email.
		September 25, 2023 – ARA thanked Laura for her help.
		November 23, 2023 – Notice of Completion sent via mail and email where applicable.
Munsee-Delaware Nation	N/A	February 15, 2023 – Invitation to participate in Archeological Investigation via email
		March 10, 2023 - Invitation to participate in Archaeological Investigation via email
		March 20, 2023 – Notice of PIC via email
		February 14, 2023 - Request for input to Cultural Heritage Assessment via email

		April 20, 2023 - Deployment details for the Stage 1 property inspection on 26-Apr-23 via email.
		June 29, 2023 - Deployment details for the Stage 2 archaeological Assessment on 07-Jul-23 via email.
		July 17, 2023 – Notice of 2nd PIC sent via email
		August 31, 2023 – Sent Draft report for Stage 1 and Stage 2 AA via email.
		September 19, 2023 – Inquiry as to status of report made via email.
		September 26, 2023 – Inquiry as to status of report made via phone. S. Phillip answered and stated that MDN had no questions or comments.
		November 23, 2023 – Notice of Completion sent via mail and email where applicable.

The MECP also recommends that a following preliminary assessment checklist be completed to identify potential Indigenous community interests and rights (Table 4). No indicators were identified.

Table 3: Indigenous Community Interests and Rights Checklist

Question	Yes	No	Notes
Are you aware of concerns from Indigenous communities about your project or a similar project in the area? The types of concerns can range from interested inquiries to environmental complaints, and even to land use concerns. You should consider whether the interest represents on-going, acute and/or widespread concern.			
Is your project occurring on Crown land, or is it close to a water body? Might it change access to either?			

Question	Yes	No	Notes
Is the project located in an open or forested area where hunting or trapping could take place?			
Does the project involve the clearing of forested land?			
Is the project located away from developed, urban areas?			
Is your project close to, or adjacent to, an existing reserve? Projects in areas near reserves may be of interest to the Indigenous communities living there.			
Will the project affect Indigenous peoples' ability to access areas of significance to them?			
Is the area subject to a land claim? Information about land claims filed in Ontario is available from the Ministry of Aboriginal Affairs; information about land claims filed with the federal government is available from Aboriginal Affairs and Northern Development Canada.			
Does the project have the potential to impact any archaeological sites?			

5 Agency Correspondence Records

Correspondence with all Agency stakeholders was tracked throughout the project. A detailed correspondence log is provided in Table 5 below, followed by transcripts for each correspondence record.

Table 4: Project Correspondence Log

Stakeholder	Stakeholder Correspondence	Project Team Correspondence
Environment Canada		August 11, 2021 – Notice of Commencement sent via email
		March 20, 2023 – Notice of PIC sent via email
	July 20, 2023 – Response to PIC 2 with information regarding MNRF and authorities.	July 17, 2023 – Notice of 2nd PIC sent via email
		November 23, 2023 – Notice of Completion sent via mail and email where applicable.
Canadian Transportation Agency - Rail, Air and Marine Disputes Directorate		August 11, 2021 – Notice of Commencement sent via email
		March 20, 2023 – Notice of PIC sent via email
		July 17, 2023 – Notice of 2nd PIC sent via email
		November 23, 2023 – Notice of Completion sent via mail and email where applicable.
Transport Canada Marine Safety		August 11, 2021 – Notice of Commencement sent via email
		March 20, 2023 – Notice of PIC sent via email
		July 17, 2023 – Notice of 2nd PIC sent via email
		November 23, 2023 – Notice of Completion sent via mail and email where applicable.
Navigation Canada		August 11, 2021 – Notice of Commencement sent via email
		March 20, 2023 – Notice of PIC sent via email
		July 17, 2023 – Notice of 2nd PIC sent via email
		November 23, 2023 – Notice of Completion sent via mail and email where applicable.
Ministry of Environment, Conservation, and Parks - Sarnia District Office		August 11, 2021 – Notice of Commencement sent via email
		March 20, 2023 – Notice of PIC sent via email
		July 17, 2023 – Notice of 2nd PIC sent via email
		November 23, 2023 – Notice of Completion sent via mail and email where applicable.
Ministry of Northern Development, Mines, Natural Resources and Forestry Aylmer District		August 11, 2021 – Notice of Commencement sent via email
		March 20, 2023 – Notice of PIC sent via email
		July 17, 2023 – Notice of 2nd PIC sent via email
		November 23, 2023 – Notice of Completion sent via mail and email where applicable.
Federal Economic Development Agency for Southern Ontario		August 11, 2021 – Notice of Commencement sent via email
		March 20, 2023 – Notice of PIC sent via email
		July 17, 2023 – Notice of 2nd PIC sent via email
		November 23, 2023 – Notice of Completion sent via mail and email where applicable.
Fisheries and Oceans Canada		August 11, 2021 – Notice of Commencement sent via email
		March 20, 2023 – Notice of PIC sent via email

Stakeholder	Stakeholder Correspondence	Project Team Correspondence
		July 17, 2023 – Notice of 2nd PIC sent via email
		November 23, 2023 – Notice of Completion sent via mail and email where applicable.
Indigenous Services Canada		August 11, 2021 – Notice of Commencement sent via email
		March 20, 2023 – Notice of PIC sent via email
		July 17, 2023 – Notice of 2nd PIC sent via email
		November 23, 2023 – Notice of Completion sent via mail and email where applicable.
Department of Indigenous and Northern Affairs		August 11, 2021 – Notice of Commencement sent via email
		March 20, 2023 – Notice of PIC sent via email
		July 17, 2023 – Notice of 2nd PIC sent via email
		November 23, 2023 – Notice of Completion sent via mail and email where applicable.
Ministry of Heritage, Sport, Tourism and Culture Industries Culture Services Unit	April 19, 2023 – Response to PIC Notice via email	August 11, 2021 – Notice of Commencement sent via email
		March 20, 2023 – Notice of PIC sent via email
		July 17, 2023 – Notice of 2nd PIC sent via email
		November 23, 2023 – Notice of Completion sent via mail and email where applicable.
Ministry of Citizenship and Multiculturalism – Archaeology Program Unit	January 5, 2023 – Review and entry into the Ontario Public Register of Archaeological Reports via email	August 11, 2021 – Notice of Commencement sent via email
		March 20, 2023 – Notice of PIC sent via email
		July 17, 2023 – Notice of 2nd PIC sent via email
		November 23, 2023 – Notice of Completion sent via mail and email where applicable.
Ministry of Municipal Affairs and Housing - Housing and Municipal Affairs Department		August 11, 2021 – Notice of Commencement sent via email
		March 20, 2023 – Notice of PIC sent via email
		July 17, 2023 – Notice of 2nd PIC sent via email
		November 23, 2023 – Notice of Completion sent via mail and email where applicable.
Ministry of Natural Resources and Forestry	July 20, 2023 – Response to PIC Notice via email.	July 17, 2023 – Notice of 2nd PIC sent via email
St. Clair Region Conservation Authority	January 31, 2023 – Consultation meeting regarding proposed intake replacement	August 11, 2021 – Notice of Commencement sent via email
		March 20, 2023 – Notice of PIC sent via email
		July 17, 2023 – Notice of 2nd PIC sent via email
		November 23, 2023 – Notice of Completion sent via mail and email where applicable.
Canadian Transportation Agency Rail, Air and Marine Disputes Directorate		August 11, 2021 – Notice of Commencement sent via email
		March 20, 2023 – Notice of PIC sent via email
		July 17, 2023 – Notice of 2nd PIC sent via email
		November 23, 2023 – Notice of Completion sent via mail and email where applicable.
Infrastructure Ontario	April 5, 2022 – Provided information regarding Federal Environmental and/or Impact Assessment Requirements and Consultation Obligations with Indigenous Peoples via email	August 11, 2021 – Notice of Commencement sent via email
		March 20, 2023 – Notice of PIC sent via email
		July 17, 2023 – Notice of 2nd PIC sent via email
		November 23, 2023 – Notice of Completion sent via mail and email where applicable.

Stakeholder	Stakeholder Correspondence	Project Team Correspondence
Lambton County		August 11, 2021 – Notice of Commencement sent via email
		March 20, 2023 – Notice of PIC sent via email
		July 17, 2023 – Notice of 2nd PIC sent via email
		November 23, 2023 – Notice of Completion sent via mail and email where applicable.
City of Sarnia		August 11, 2021 – Notice of Commencement sent via email
		March 20, 2023 – Notice of PIC sent via email
		July 17, 2023 – Notice of 2nd PIC sent via email
		November 23, 2023 – Notice of Completion sent via mail and email where applicable.
Town of Petrolia		August 11, 2021 – Notice of Commencement sent via email
		March 20, 2023 – Notice of PIC sent via email
		July 17, 2023 – Notice of 2nd PIC sent via email
		November 23, 2023 – Notice of Completion sent via mail and email where applicable.
Upper Thames River Conservation Authority	February 13, 2023 – Consultation meeting regarding Source Water Protection	August 11, 2021 – Notice of Commencement sent via email
	February 13, 2023 – Provided the protocol package for Source Water Protection under the Clean Water Act, 2006 via email	February 13, 2023 – Inquired via email if additional modelling would be required for design Alternatives
	February 15, 2023 – Response to modelling requirements inquiry via email	March 20, 2023 – Notice of PIC sent via email
	February 17, 2023 – Confirmed via email that further modelling for IPZ-2 and EBA wouldn't be required	July 17, 2023 – Notice of 2nd PIC sent via email
		November 23, 2023 – Notice of Completion sent via mail and email where applicable.

CIMA CANADA INC.
900-101 Frederick Street
Kitchener, ON N2H 6R2
T 519 772-2299 F 519 772-2298
cima.ca

A-1

Appendix A-1: Public Notices

Municipal Class Environmental Assessment
Notice of Study Commencement

Bright's Grove Water Treatment Plant (City of Sarnia)

Raw Water Intake Replacement

The Town of Petrolia is initiating a Class Environmental Assessment (EA) study to address current operational concerns associated with the existing Bright's Grove Water Treatment Plant (WTP) raw water intake. The Bright's Grove WTP is located in the City of Sarnia, approximately 20 km from the Town of Petrolia, and supplies potable water to the Town of Petrolia and other service area municipalities including the Townships of Enniskillen and Dawn-Euphemia, and the Village of Oil Springs. The existing intake for the WTP was constructed in 1944 and is approaching the end of its useful service life. A plan is required to rehabilitate or replace the existing intake structure to ensure a safe, secure, and reliable long-term source of raw water to the plant.

The Class EA study is being conducted according to the requirements of a Schedule 'B' project under the Municipal Class Environmental Assessment Planning Process (October 2000, as amended in 2007, 2011 & 2015). The study will identify and evaluate replacement intake alternatives. The adjacent map covers the approximate limits of the study area. The preferred solution will be selected to minimize technical, community, natural environmental and economic impacts.

Public consultation is an integral component of the Class EA process, and we value your input during the planning process. If you wish to be placed on the mailing list to receive notices and information, or, you wish to provide comments at any time during the process you can do so by contacting:

Mike Thompson
Director of Operations
Town of Petrolia
411 Greenfield Street, P.O. Box 1270
Petrolia, ON N0N 1R0
519-882-2350 Ext. 235
mthompson@town.petrolia.on.ca

Stuart Winchester, P. Eng
Project Manager
CIMA+
900 – 101 Frederick Street
Kitchener, ON N2H 6R2
519-772-2299 Ext. 6202
stuart.winchester@cima.ca

Personal information collected or submitted in writing at public meetings will be collected, used, and disclosed by Town staff in accordance with the Municipal Freedom of Information and Protection of Privacy Act (MFIPPA). The written submissions including names, contact information and reports of public meetings will be made available. Questions should be referred to the Town's project manager.

This notice was first issued on August 11, 2021.

Notice of Public Information Centre

Town of Petrolia
Bright's Grove Intake Replacement EA

What is this study all about?

The Town of Petrolia (Town) is undertaking an Environmental Assessment (EA) for a new intake at the Bright's Grove Water Treatment Plant (WTP). The existing raw intake from Lake Huron originally installed in 1944 is approaching the end of its useful service life. The Project will increase access to safe drinking water by restoring the capacity of the existing treatment plant to its rated capacity of 12,000 m^3/d.

Join us for our Public Information Centre!

Public and review agency consultation is a key element in the Environmental Assessment process. The Town will be holding an in-person Public Information Centre (PIC) to introduce the study, provide background information and context and the preliminary preferred alternatives. The PIC will be a drop-in style open house format. Members of the project team will be available to answer your questions and receive your feedback.

Date: April 4th, 2023
Time: 2:00 p.m. to 5:00 p.m.
Location: Victoria Hall, Main Lobby, 411 Greenfield Street, Petrolia, ON N0N 1R0

Do you want to be involved?

Contact the project team members below if you have questions or comments, wish to obtain more information on the project, or would like to be included on the Project Contact List. We are interested in hearing from you about this project.

Mike Thompson
Director of Operations
Town of Petrolia
411 Greenfield Street
Petrolia, ON N0N 1R0
Phone: 519-638-3313
E-mail: mthompson@petrolia.ca

Adam Moore, P.Eng.
Project Engineer
CIMA+
101 Frederick Street, Suite 900
Kitchener, ON N2H 6R2
Phone: 519-772-2299
E-mail: adam.moore@cima.ca

All comments and information received from individuals, stakeholder groups and agencies regarding this project are being collected in accordance with the *Municipal Freedom of Information and Protection of Privacy Act*. With the exception of personal information, all comments will become part of the public record. This Notice first issued March 20, 2023.

Notice of Public Information Centre

Town of Petrolia
Bright's Grove Intake Replacement EA

What is this study all about?

The Town of Petrolia (Town) is undertaking an Environmental Assessment (EA) for a new intake at the Bright's Grove Water Treatment Plant (WTP). The existing raw intake from Lake Huron originally installed in 1944 is approaching the end of its useful service life. The Project will increase access to safe drinking water by restoring the capacity of the existing treatment plant to its rated capacity of 12,000 m^3/d.

Join us for our Public Information Centre!

Public and review agency consultation is a key element in the Environmental Assessment process. The Town will be holding an in-person Public Information Centre (PIC) to introduce the study, provide background information and context and the preliminary preferred alternatives. The PIC will be a drop-in style open house format. Members of the project team will be available to answer your questions and receive your feedback.

Date: July 26th, 2023
Time: 2:00 p.m. to 4:00 p.m.
Location: Bright's Grove WTP Meeting Room, 2701 Old Lakeshore Road in the City of Sarnia

Do you want to be involved?

Contact the project team members below if you have questions or comments, wish to obtain more information on the project, or would like to be included on the Project Contact List. We are interested in hearing from you about this project.

Mike Thompson
Director of Operations
Town of Petrolia
411 Greenfield Street
Petrolia, ON N0N 1R0
Phone: 519-638-3313
E-mail: mthompson@petrolia.ca

Adam Moore, P.Eng.
Project Engineer
CIMA+
101 Frederick Street, Suite 900
Kitchener, ON N2H 6R2
Phone: 519-772-2299
E-mail: adam.moore@cima.ca

All comments and information received from individuals, stakeholder groups and agencies regarding this project are being collected in accordance with the *Municipal Freedom of Information and Protection of Privacy Act*. With the exception of personal information, all comments will become part of the public record. This Notice first issued July 17, 2023.

Notice of Public Information Centre

Town of Petrolia
Bright's Grove WTP Intake Replacement EA

The Town of Petrolia (Town) is undertaking an Environmental Assessment (EA) Study for a new intake at the Bright's Grove Water Treatment Plant (WTP). The existing raw intake from Lake Huron originally installed in 1944 is approaching the end of its useful service life. The Project will increase access to safe drinking water by restoring the capacity of the existing treatment plant to its rated capacity of 12,000 m^3/d.

The Town is hosting a Public Information Centre (PIC) on Tuesday April 4th, 2023 from 2:00 p.m. to 5:00 p.m. at Victoria Hall, Main Lobby. The purpose of the PIC will be to introduce the study, provide background information and context and the preliminary preferred alternatives. The PIC will be a drop-in style open house format. Members of the project team will be available to answer your questions and receive your feedback.

We are interested in hearing from you about this project. Please contact either of the project team members below if you have questions or comments, wish to obtain more information on the project, or would like to be included on the Project Contact List.

Mike Thompson
Director of Operations
Town of Petrolia
411 Greenfield Street
Petrolia, ON N0N 1R0
Phone: 519-882-2350 ext. 235
E-mail: mthompson@petrolia.ca

Adam Moore, P.Eng.
Project Engineer
CIMA+
101 Frederick Street, Suite
Kitchener, ON N2H 6R2
Phone: 519-772-2299
E-mail: adam.moore@cima.ca

All comments and information received from individuals, stakeholder groups and agencies regarding this project are being collected in accordance with the *Municipal Freedom of Information and Protection of Privacy Act*. With the exception of personal information, all comments will become part of the public record.

Webpage Content

Bright's Grove WTP Intake Replacement Environmental Assessment

What is this study all about?

The Town of Petrolia (Town) is undertaking an Environmental Assessment (EA) for the new intake at the Bright's Grove Water Treatment Plant (WTP). The existing raw intake from Lake Huron originally installed in 1944 is approaching the end of its useful service life. The Project will increase access to safe drinking water by restoring the capacity of the existing treatment plant to its rated capacity of 12,000 m^3/d.

How is this study being done?

This study is proceeding in accordance with the requirements of the Municipal Class EA process (October 2000, amended in 2015), which is an approved process under the Ontario Environmental Assessment Act. This study will fulfill the requirements for a Schedule B project.

Join us for our Public Information Centre!

Public and review agency consultation is a key element in the Environmental Assessment process. The Town will be holding an in-person Public Information Centre (PIC) to introduce the study, provide background information and context and the preliminary preferred water and wastewater servicing strategies. The PIC will be a drop-in style open house format. Members of the project team will be available to answer your questions and receive your feedback.

Date: Tuesday April 4th, 2023
Time: 2:00 p.m. to 5:00 p.m.
Location: Victoria Hall, Main Lobby, 411 Greenfield Street, Petrolia, ON N0N 1R0

Social Media Blasts

For Day March 21st (2 weeks before PIC)

The Town of Petrolia is holding an in-person Public Information Centre on April 4th from 2:00 p.m. to 5:00 p.m. at Victoria Hall! Check out the project webpage for more information.

INSERT WEBPAGE LINK (if required)

For Day March 28th (1 week before PIC)

Are you interested in learning about the Bright's Grove Intake Replacement EA study for the Town of Petrolia? Join us on April 4th at the Public Information Centre at Victoria Hall to learn more and provide feedback!

For Day April 3rd (day before PIC)

We want to meet you! The Public Information Centre for the Bright's Grove Intake Replacement EA study is tomorrow at Victoria Hall. Be sure to come by and learn more about the project

(From left to right) Petrolia Mayor Brad Loosley, Sarnia-Lambton MPP Bob Bailey, Dawn-Euphemia Mayor Al Broad and Enniskillen Township Mayor Kevin Marriott celebrate a funding commitment for a new intake pipeline in Lake Huron at the Petrolia Water Treatment Plant in Bright's Grove. April 27, 2022 Photo by Melanie Irwin

SARNIA | NEWS

EA Study for new Lake Huron intake pipeline to be discussed

BY MELANIE IRWIN

JULY 26, 2023 - 6:05AM

An open house is planned for Wednesday afternoon to discuss the replacement of the existing raw intake from Lake Huron to the Petrolia Water Treatment Plant (WTP) in Bright's Grove.

The project will increase access to safe drinking water by restoring the capacity of the existing treatment plant to its rated capacity of 12,000 m3/d.

The EA Study will be introduced, background information will be provided, and preliminary preferred alternatives will be shared.

Residents are invited to drop in to the WTP meeting room, located at 2701 Old Lakeshore Rd., between 2 p.m. and 4 p.m.

Members of the project team will be available to answer questions and receive feedback.

Almost $12 million in infrastructure funding from the federal and provincial government was secured for the $16.2 million project in April 2022.

Petrolia, Enniskillen, Dawn-Euphemia, and Oil Springs collaborated on the joint application.

Engineers previously told Sarnia News Today the 24-inch pipeline will travel out 600 metres into the lake and include improvements to combat ice blockages.

Notice of Completion

Town of Petrolia

Bright's Grove WTP Intake Replacement

What is this study all about?

The Town of Petrolia has completed a Class Environmental Assessment (EA) study to address current operational concerns associated with the existing Bright's Grove Water Treatment Plant (WTP) raw water intake. The Bright's Grove WTP is located in the City of Sarnia, approximately 20 km from the Town of Petrolia, and supplies potable water to the Town of Petrolia and other service area municipalities including the Townships of Enniskillen and Dawn-Euphemia, and the Village of Oil Springs. The existing intake for the WTP was constructed in 1944 and is approaching the end of its useful service life. A plan is required to rehabilitate or replace the existing intake structure to ensure a safe, secure, and reliable long-term source of raw water to the plant.

How is this study being done?

The Class EA study was conducted according to the requirements of a Schedule 'B' project under the Municipal Class Environmental Assessment Planning Process (October 2000, as amended in 2007, 2011 & 2015). The study identified and evaluated replacement intake alternatives. The preferred solution was selected to minimize technical, community, natural environmental and economic impacts.

The Municipal Class EA Project File Report is available for review on the Town's web site, and at the following location: https://town.petrolia.on.ca/planning-development/brights-grove-wtp/

Town of Petrolia Municipal Office
Operations Department
411 Greenfield Street
Petrolia, Ontario, N0N 1R0
Monday – Friday, 9:00 am to 4:00 pm
P: (519) 882-2350

Interested persons should provide written comment to the municipality on the proposed Class EA Project File Report within 30 calendar days from the date of this Notice. Comment should be directed to the Director of Operations at the Town.

If concerns arise regarding this Class EA which cannot be resolved in discussion with the municipality, a person or party may request that the Minister of the Environment make an order for the project to comply with Section 16 of the Environmental Assessment Act (referred to as a Section 16 Order), which addresses individual EAs. Requests must be received by the Minister at the address below within 30 calendar days of this Notice. A copy of the request must also be sent to the Town Director of Operations. If there is no request received by December 23, 2023, the identified projects will proceed to design, and construction as presented in the planning documentation.

Minister of the Environment
135 St. Clair Avenue, 10th Floor,
Toronto, Ont. M4V 1P5

This Notice was issued November 23, 2023.

A-2

Appendix A-2: Public Information Centre Materials

Town of PETROLIA

you'll be surprised!

Welcome

Bright's Grove Intake Replacement
Municipal Environmental Assessment

Public Information Centre
April 4th, 2023

CIMA+

Welcome!

Town of PETROLIA
you'll be surprised!

Bright's Grove Water Treatment Plant Intake Replacement

Municipal Class Environmental Assessment Study

1

Please Sign in

Meeting is a "Drop-in" format.

2

Review Display Materials

Our representatives will be pleased to discuss the study with you, or any questions or concerns that you may have.

3

Complete a Comment Sheet

Drop off your completed Comment Sheet in the Box tonight or return it to the contact people shown on the Comment Sheet by **April 30, 2023.**

CIMA+

Why are we here?

Town of PETROLIA
you'll be surprised!

Your feedback is important to this Class Environmental Assessment Study!

Please review the Public Information Centre presentation to learn about the process, the activities completed to date, and the **Preliminary Preferred Solution being recommended.**

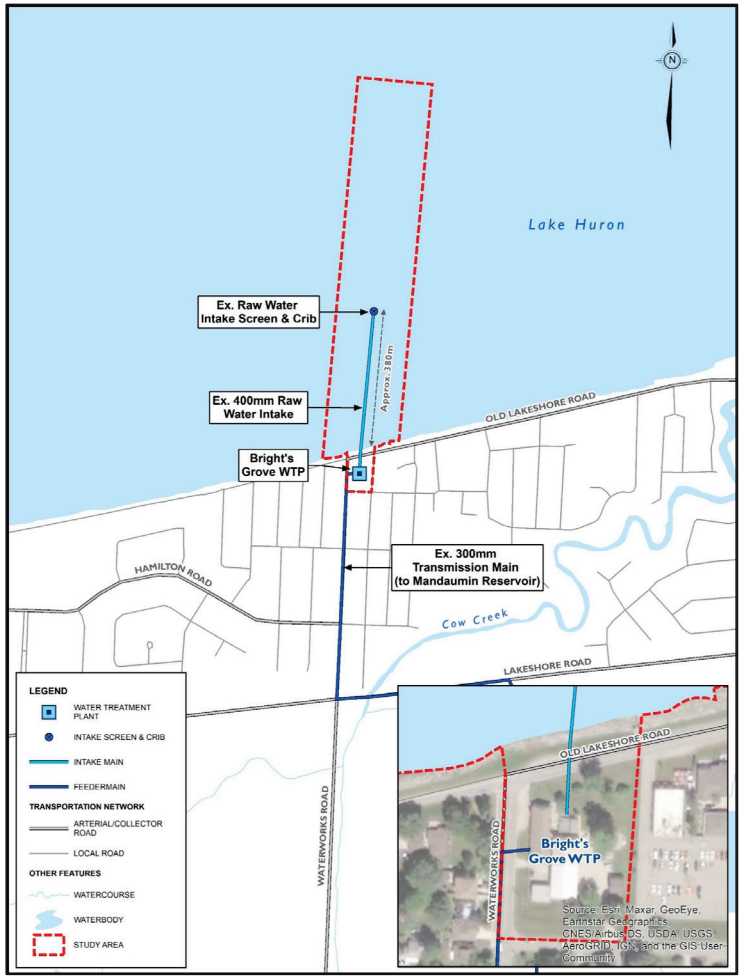
Your opinion is important to us! Members of the project team are available to answer questions via email or telephone.

Please complete a **Comment Sheet** after reviewing the materials.

CIMA+

Project Background

- The Bright's Grove Water Treatment Plant located at 2701 Old Lakeshore Road provides high-quality drinking water to the Petrolia Drinking Water System. The Petrolia Drinking Water System provides service to residents and businesses in the Town of Petrolia, as well as in the Village of Oil Springs and the Townships of Enniskillen and Dawn-Euphemia.
- The raw water quality at the existing intake location has historically been good, with periods of high turbidity experienced during storm events.
- Due to the relatively shallow depth of the intake, the intake has experienced blockage of the intake due to frazil ice.



Project Background (continued)

- Existing intake pipe:
  - Installed in 1944 to replace the original intake pipeline constructed in 1896.
  - Extends approximately 400m into Lake Huron.
  - 400mm diameter cast iron pipe.
  - Equipped with an intake screen to allow water flow into the pipe and crib structure to protect the screen.
  - Recently retrofitted with zebra mussel and frazil ice control systems.
- **Intake pipe is at the end of its useful life.** Its current condition results in hydraulic capacity limitations, maintenance concerns resulting in risk of failure.
- Expected capital costs are $16.2Million.

Photos taken of intake screen, pipe cut-out section, zebra mussel infestation, pipeline crack near the shoreline.

Purpose of the Study

- To identify a preferred water supply source to ensure a secure and reliable source of raw water to the Petrolia Water Treatment Plant and to address current maintenance concerns with the existing intake pipe; and,
- To recommend a preferred solution that ensures a safe and reliable source of water for the Petrolia Drinking Water System, while minimizing impacts on the natural and socio-cultural environments, and with regards to technical and financial implications.

Municipal Class Environmental Assessment Study - Process and Timeline

Town of PETROLIA
you'll be surprised!

PROBLEM OR OPPORTUNITY

- Review available information / data
- Identify Problem / Opportunity Statement

NOTICE OF COMMENCEMENT
August 19, 2021

EXPLORE THE OPTIONS

- Consider ways to address existing concerns
- Identify potential impacts
- Evaluate options and select the recommended **Preliminary Preferred Solution**

PUBLIC INFORMATION CENTRE
April 2023

We are here!

DOCUMENTING THE PROCESS

- **Prepare a report** and satisfy the documentation requirements of the Class Environmental Assessment process
- Make report available for public review

NOTICE OF COMPLETION
Spring 2023

IMPLEMENTING THE RECOMMENDATIONS

- Complete detailed design of the recommended solution
- Initiate construction

2023/2024

INTAKE PROJECT COMPLETION

- Complete construction of intake and pump station
- Distribute treated water to the Town of Petrolia

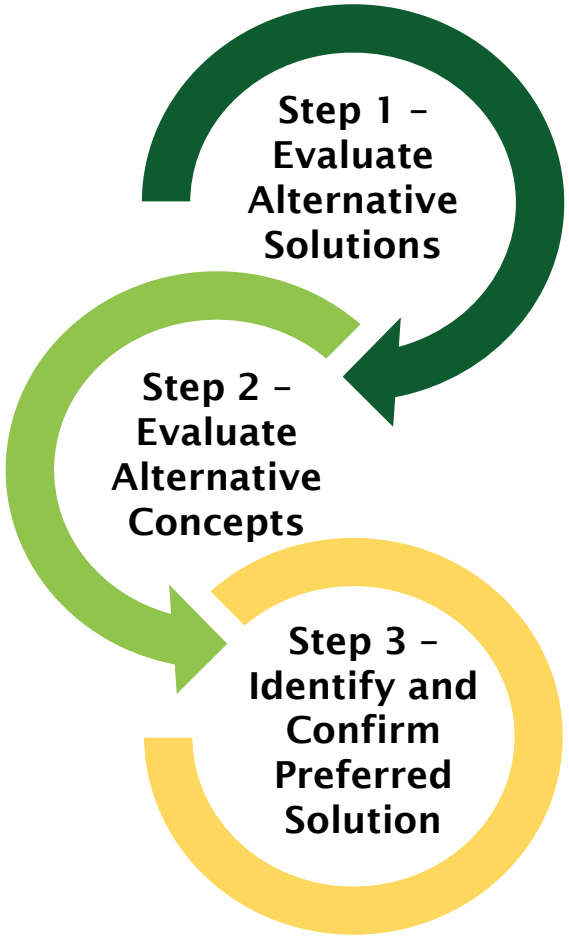
2026/2027

CIMA+

Environmental Assessment Phase 1– Problem/Opportunity Statement

A preferred raw water supply solution is required to ensure a secure and reliable source of raw water for the Town of Petrolia Drinking Water System to address current concerns associated with the capacity and condition of the existing intake

Selecting the Preferred Solution – The Process



- Alternatives were screened based on ability to meet:
  - Capacity requirements
  - Water quality standards, objectives and guidelines for the plant, and
  - Maximize existing infrastructure, compatibility with existing processes, and constructability simplicity
- **Replacing the Existing Intake was selected as the Preliminary Preferred Alternative Solution.**

- **Alternative concepts** for replacing the existing intake were developed.
- Options were assessed based on evaluation criteria, shown in next panel.
- The option with the overall best score is being **recommended as the Preliminary Preferred Water Supply Solution**.

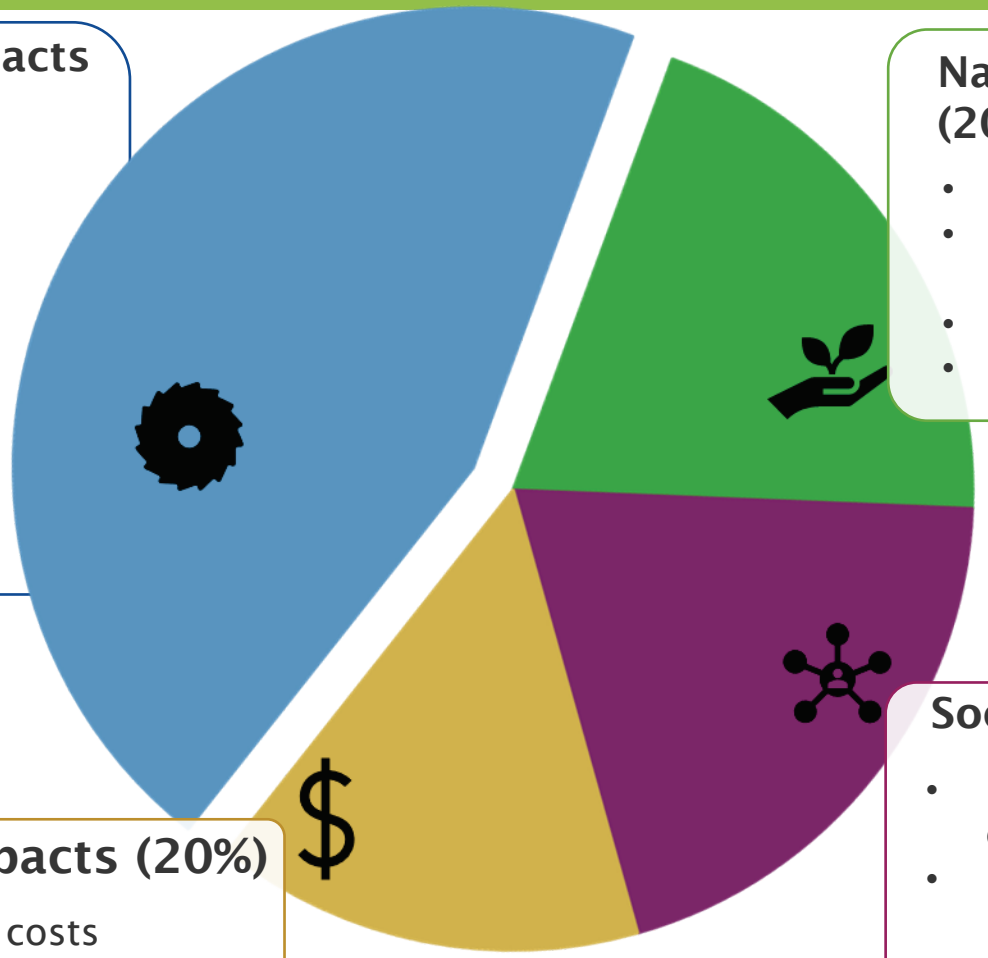
- Feedback from the public and stakeholders is being requested.
- The preferred solution will be confirmed with input from the public and review agencies.

Evaluating the Alternative Concepts – Evaluation Criteria

Town of PETROLIA
you'll be surprised!

Technical and Operational Impacts (45%)

- Raw water quality
- Vulnerability to contaminants
- Constructability issues
- Operation and maintenance complexity
- Construction duration, staging opportunities
- Approvals
- Land acquisition



Natural Environmental Impacts (20%)

- Natural habitat, terrestrial, aquatic, etc.
- Archaeological and cultural heritage features
- Vulnerability to climate changes
- Source water protection

Financial Impacts (20%)

- Construction costs

Socio-Cultural Impacts (15%)

- Public and staff health and safety concerns
- Impacts / disruption to residents and local users

CIMA+

Alternative Solutions Considered and Screening Results

Town of PETROLIA
you'll be surprised!

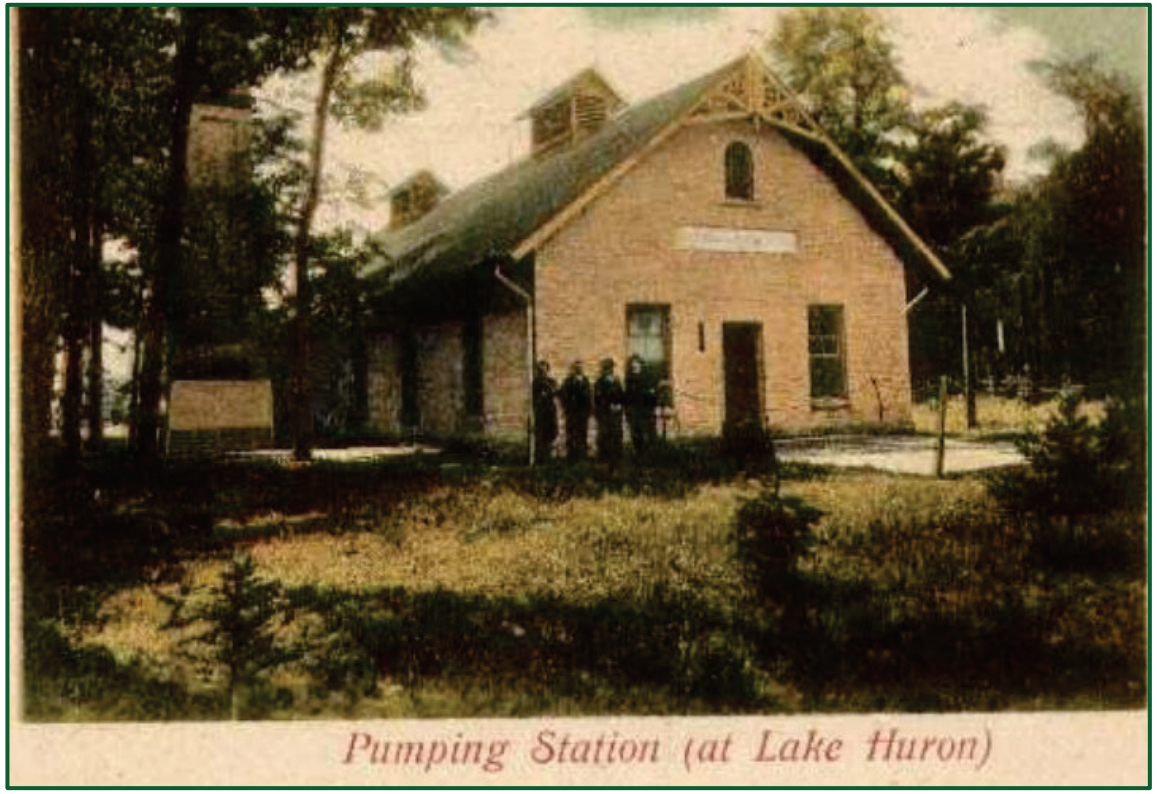
Alternative Solutions	Screening Observations	Recommendation
1 - DO NOTHING	• No improvements to the existing intake pipe. • This alternative does not address the concerns identified with the intake pipe.	**Not recommended**
2 - LIMIT COMMUNITY GROWTH	• No additional growth in the serviced area. • This alternative does not address the concerns identified with the intake pipe.	**Not recommended**
3 - IMPLEMENT WATER CONSERVATION MEASURES	• This alternative does not address the concerns identified with the existing intake pipe.	**Not recommended**
4 - OBTAIN RAW WATER FROM ANOTHER SOURCE	• Extend raw water supply from a neighboring municipality into Petrolia. • Major capital expenditure with new work and upgrades. • This alternative does not address the concerns identified with the intake pipe.	**Not recommended**
5 - REFURBISH EXISTING INTAKE	• Physical measures would be implemented to try to restore existing intake pipe. • Questionable integrity of retrofitted pipe. Challenges to allow continuous operation of existing plant during construction.	**Not recommended**
6 - REPLACE EXISTING INTAKE	• New intake pipe and intake crib would be installed. • This alternative addresses concerns identified with the intake pipe.	**Recommended for further consideration**

CIMA+

Existing Conditions – Cultural Heritage

Built and Cultural Heritage Resources

- The existing Petrolia Water Treatment Plant (2701 Old Lakeshore Road) was identified as a building with heritage value
- The identified heritage value of the property is confined to the original 1896 pumping station located at the corner of property
- The scope of the proposed work poses no direct impact of the identified heritage value

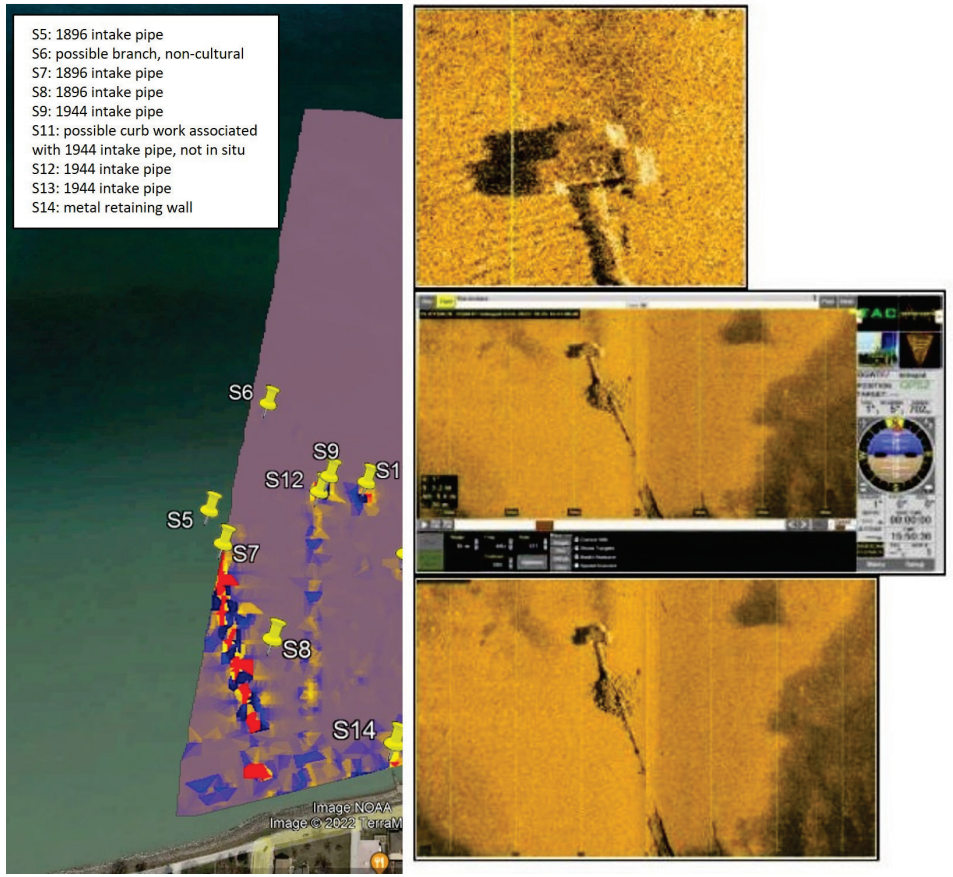


Updated colorized historic image of 'Petrolia Water Works' - Cultural Heritage Screening Report - PHC Group (2022) – Town of Petrolia

Existing Conditions – Archaeological Study

Archaeological Marine Findings

- Through snorkeling investigations 30m off the coast the existing intake pipes were inspected
- From the investigations it was found that an intake pipe from 1896 still exists and the new intake will not impact it
- The 1944 intake pipe is considered “modern” archaeological artifact and will provide no significant archaeological information

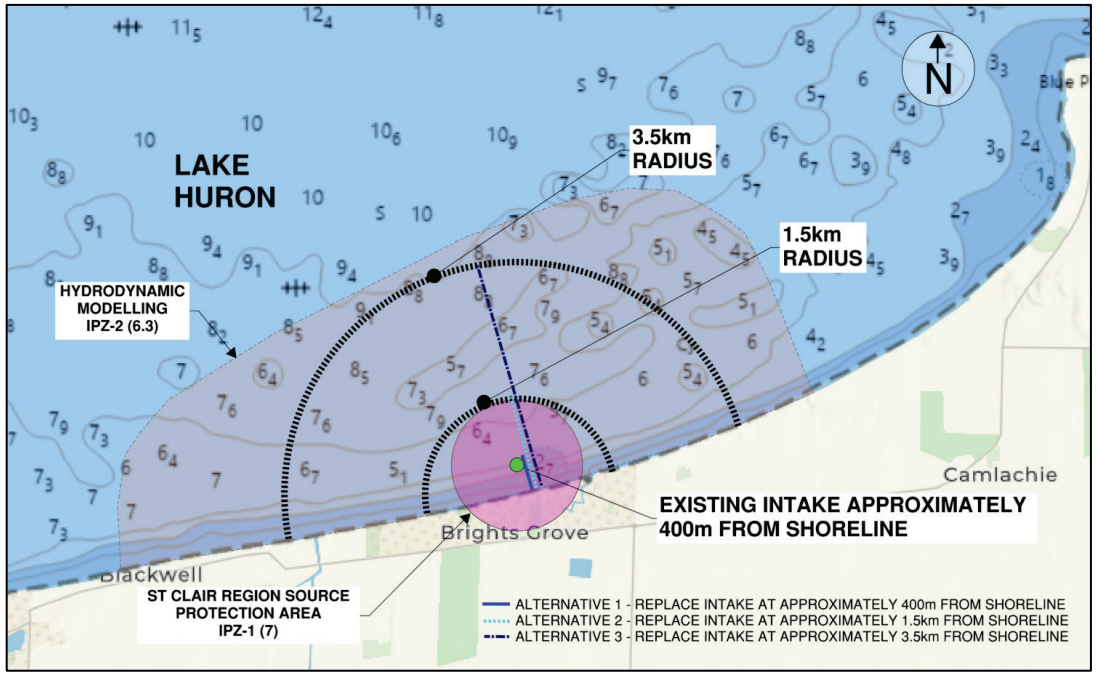


Existing Intake Pipes - Marine Archaeological Report - ARA Group. (2022). Town of Petrolia.

Alternative Intake Locations

- Preliminary Preferred Water Supply Solution **– Replace Existing Intake**
- **Three (3) alternative locations for the intake replacement**

Alternative	Description
1	Similar location as existing, approximate length of 0.4km, depth over intake 3.0m at historic low lake level
2	Extend to 1.5km length and increase depth over intake to 7.0m at historic low lake level
3	Extend to 3.5km length and increase depth over intake to 8.0m at historic low lake level



Potential Intake Lengths and Depths

Assessment of Alternative – Intake Locations

Town of PETROLIA
you'll be surprised!

Alternative Locations	Advantages	Disadvantages
Length – 0.4km, depth 3.0m	• Historically good quality raw water • No significant impact to Source Protection Plan • Lowest Capital Cost	• Minimum cover over proposed intake, highest risk of frazil ice blockage and risk of surface ice impacts to intake screen.
Length – 1.5km, depth 7.0m	• Additional depth of water over intake will reduce risk of frazil ice blockage • Potential reduction in high turbidity in raw water due to storm events • Increased depth will reduce risk of surface ice impacts to intake screen and crib	• Will require an update to Source Protection Plan which will delay implementation and may impact proposed developments in Sarnia • Greater impact to Navigable Waters • Higher Capital Cost for intake replacement
Length – 3.5km, depth 8.0m	• Same as above	• Will require an update to Source Protection Plan which will delay implementation and may impact proposed developments in Sarnia • Greatest impact to Navigable Waters • Highest Capital Cost for intake replacement

CIMA+

Evaluation of Alternative Design Concepts for Intake

Town of PETROLIA
you'll be surprised!

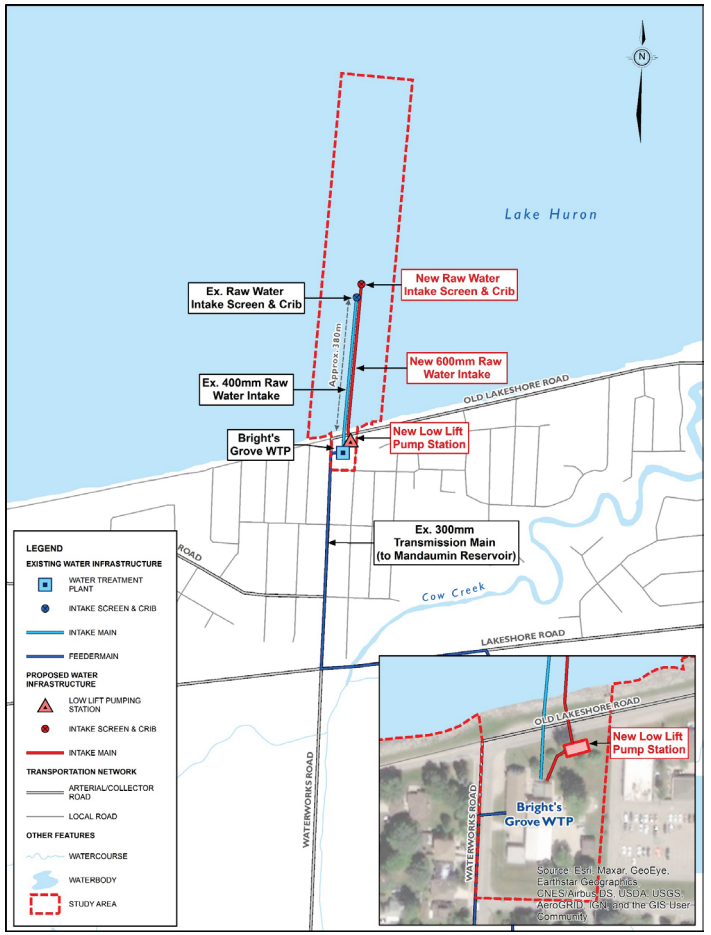
No.	Alternative Design	Advantages	Disadvantages
1	Retrofit as Closed System using existing low-lift pumping station	• Utilizes existing infrastructure and minimizes the need for major retrofitting of existing low-lift pumping station • Easy to adapt to a future pre-treatment addition	• Challenges to maintain continuous operation of water treatment plant during construction • Inflexible for future upgrades • Complex excavation support system necessary to protect existing Heritage structure
2	Retrofit as Open System using existing low-lift pump station	• Similar to Option 1; however, new submersible pumps required to replace existing low-lift pumps	• Challenges to maintain continuous operation of water treatment plant during construction • Complex excavation support system necessary to protect existing Heritage structure
3	Closed System with new low-lift pumping station	• Minimizes need for water treatment plant shut-downs • Flexibility for future improvements	• Larger footprint for low-lift pump station to accommodate below-grade pump room. • Potential need for superstructure over low-lift pumping station which would result in a visual impact for residents on Bright Street.
4	Open System with new low-lift pumping station	• Smaller footprint compared to Concept 3 • Minimizes need for water treatment plant shut-downs • Potential to provide some pre-treatment in wet-well	• Higher Capital Cost compared to Concept 1 and 2 • Limited opportunity for future capacity expansion

CIMA+

Preliminary Preferred Solution

- **New Intake operating as an Open system with a new low-lift pumping station**. The new intake will extend approximately the same distance, approximately 400m from the shoreline.

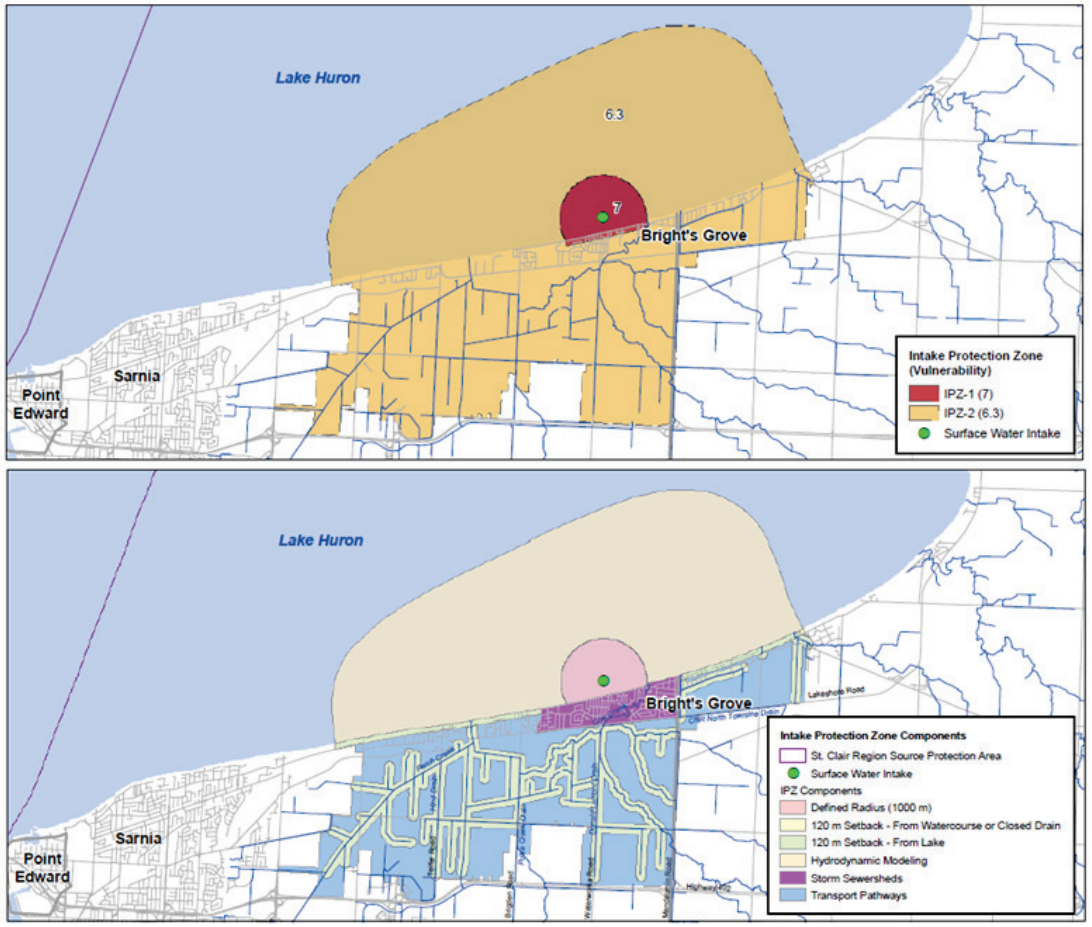
- **Key advantages:**
  - An **Open System** is the preferred solution to be both cost-effective and have the capacity for growing demand
  - **Maintaining current depth and location** of the intake pipe is the preferred option due to small cost-to-benefit ratio of extending the intake
  - **Long-term impacts on adjacent property are eliminated** by confining in-land works within existing site limits. **No land acquisition required.**
  - In-land works **minimize construction challenges** for the connection to a new low-lift pumping station.
  - Staging opportunities to **minimize interruptions to operation and protection of existing intake pipe while construction is taking place.**
  - New intake will include **Zebra Mussel and Frazil Ice Control** systems to prevent frazil ice blockages and Zebra Mussel infestation



Proposed and Existing Intake Alignment and Length

Source Water Protection Update

- Intake Protection Zones represent vulnerable areas around source water intakes:
  - IPZ-1 – most vulnerable area immediately surrounding the intake. Represented by a typical distance from the intake (1 km radius).
  - IPZ-2 – larger area of concern. Modelled based on enough time to allow an operator to respond to a water quality event at the intake.
  - Intake Protection Zones will be re-assessed to ensure there is no major changes to any drainage patterns or new Transport Pathways



Source Water Protection Zone and Components, Map 4.3 Petrolia Intake Protection Zone (IPZ) St. Clair Region Source Protection Area Assessment Report, 2010

Overview of Mitigation Measures

Town of PETROLIA
you'll be surprised!

Natural Environment

- Implement setbacks and erosion and sediment control measures.
- Minimize vegetation and tree removals through design. Apply timing window for tree clearing activities.
- Avoid construction within Species at Risk habitat or outside breeding windows. Additional screening for Species at Risk.
- All activities to comply with Endangered Species Act.
- Use previously disturbed areas for construction laydown and staging to the extent possible.

Technical and Operational

- Phased-implementation approach for the protection and continued operation of the existing intake.
- Appropriate standard construction techniques and mitigation measures will be implemented.
- Bathymetric survey has been completed to confirm the approximate location of new intake.
- Confirm delineation of Intake Protection Zones.

Socio-Cultural Environment

- All construction will adhere to strict safety guidelines.
- Temporary measures will be undertaken during construction to minimize noise, dust and vibration impacts.
- In-water works will comply with the Canadian Navigable Waters Act to ensure no interference with navigation.
- On-shore construction to be confined within the water treatment plant property limits or the adjacent shoreline with minimal interference to the neighboring residents.
- Notification to adjacent property owners prior to construction.

Cultural Heritage

- Completion of a Cultural Heritage Impact Assessment.

CIMA+

Typical Marine Construction Equipment

Town of PETROLIA
you'll be surprised!

Excavation of marine trench with floating dredging equipment

Installation of intake pipeline with ballast to prevent pipeline from floating

Onshore installation of intake pipeline

CIMA+

Thank you for Participating! Please Stay Engaged

After the virtual Public Information Centre, the project team will:

- Review and consider input received during the virtual Public Information Centre
- Confirm the recommended water supply solution
- Prepare Class Environmental Assessment Report
- Issue Notice of Study Completion
- File Class Environmental Assessment Report on the public record for public review

Stay Involved!

Please complete the **Online Comment Form** available on the webpage by **April 30, 2023**.

Project Information

- For more information about this project, please visit our webpage:

  town.petrolia.on.ca/planning-development/brights-grove-wtp/

- Should you have any questions or comments at any time during the project, please contact:

Mike Thompson
Town of Petrolia
Director of Operations
mthompson@petrolia.ca

Adam Moore
CIMA+
Project Engineer
adam.moore@cima.ca

Town of PETROLIA

you'll be surprised!

Thank You!

We appreciate your time and interest in this project

CIMA+

Town of PETROLIA

you'll be surprised!

Welcome

Bright's Grove Intake Replacement
Municipal Environmental Assessment

Public Information Centre
July 26th, 2023

CIMA+

Welcome!

Town of PETROLIA
you'll be surprised!

Bright's Grove Water Treatment Plant Intake Replacement

Municipal Class Environmental Assessment Study

1

Please Sign in

Meeting is a "Drop-in" format.

2

Review Display Materials

Our representatives will be pleased to discuss the study with you, or any questions or concerns that you may have.

3

Complete a Comment Sheet

Drop off your completed Comment Sheet in the Box tonight or return it to the contact people shown on the Comment Sheet by **August 9, 2023.**

CIMA+

Why are we here?

Town of PETROLIA
you'll be surprised!

Your feedback is important to this Class Environmental Assessment Study!

Please review the Public Information Centre presentation to learn about the process, the activities completed to date, and the **Preliminary Preferred Solution being recommended.**

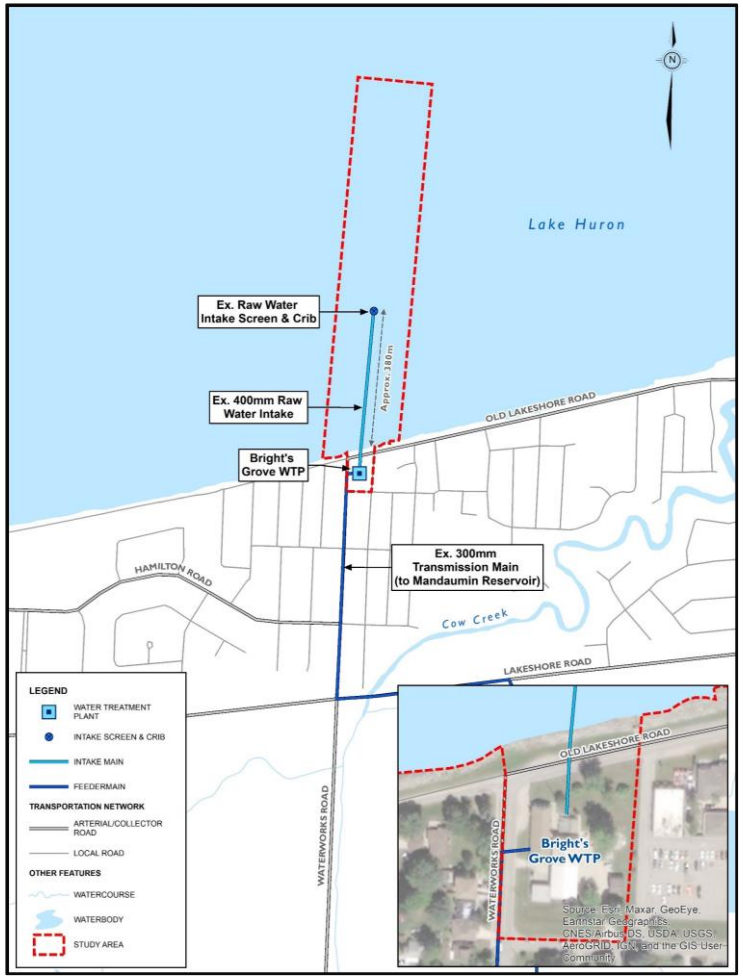
Your opinion is important to us! Members of the project team are available to answer questions via email or telephone.

Please complete a **Comment Sheet** after reviewing the materials.

CIMA+

Project Background

- The Bright's Grove Water Treatment Plant located at 2701 Old Lakeshore Road provides high-quality drinking water to the Petrolia Drinking Water System. The Petrolia Drinking Water System provides service to residents and businesses in the Town of Petrolia, as well as in the Village of Oil Springs and the Townships of Enniskillen and Dawn-Euphemia.
- The raw water quality at the existing intake location has historically been good, with periods of high turbidity experienced during storm events.
- Due to the relatively shallow depth of the intake, the intake has experienced blockage of the intake due to frazil ice.



Project Background (continued)

- Existing intake pipe:
  - Installed in 1944 to replace the original intake pipeline constructed in 1896.
  - Extends approximately 400m into Lake Huron.
  - 400mm diameter cast iron pipe.
  - Equipped with an intake screen to allow water flow into the pipe and crib structure to protect the screen.
  - Recently retrofitted with zebra mussel and frazil ice control systems.
- **Intake pipe is at the end of its useful life.** Its current condition results in hydraulic capacity limitations, maintenance concerns resulting in risk of failure.
- Expected capital costs are $16.2Million.

Photos taken of intake screen, pipe cut-out section, zebra mussel infestation, pipeline crack near the shoreline.

Purpose of the Study

- To identify a preferred water supply source to ensure a secure and reliable source of raw water to the Petrolia Water Treatment Plant and to address current maintenance concerns with the existing intake pipe; and,
- To recommend a preferred solution that ensures a safe and reliable source of water for the Petrolia Drinking Water System, while minimizing impacts on the natural and socio-cultural environments, and with regards to technical and financial implications.

Municipal Class Environmental Assessment Study - Process and Timeline

Town of PETROLIA
you'll be surprised!

PROBLEM OR OPPORTUNITY

- Review available information / data
- Identify Problem / Opportunity Statement

NOTICE OF COMMENCEMENT

August 19, 2021

EXPLORE THE OPTIONS

- Consider ways to address existing concerns
- Identify potential impacts
- Evaluate options and select the recommended **Preliminary Preferred Solution**

PUBLIC INFORMATION CENTRE

We are here!

DOCUMENTING THE PROCESS

- **Prepare a report** and satisfy the documentation requirements of the Class Environmental Assessment process
- Make report available for public review

NOTICE OF COMPLETION

Summer 2023

IMPLEMENTING THE RECOMMENDATIONS

- Complete detailed design of the recommended solution
- Initiate construction

2023/2024

INTAKE PROJECT COMPLETION

- Complete construction of intake and pump station
- Distribute treated water to the Town of Petrolia

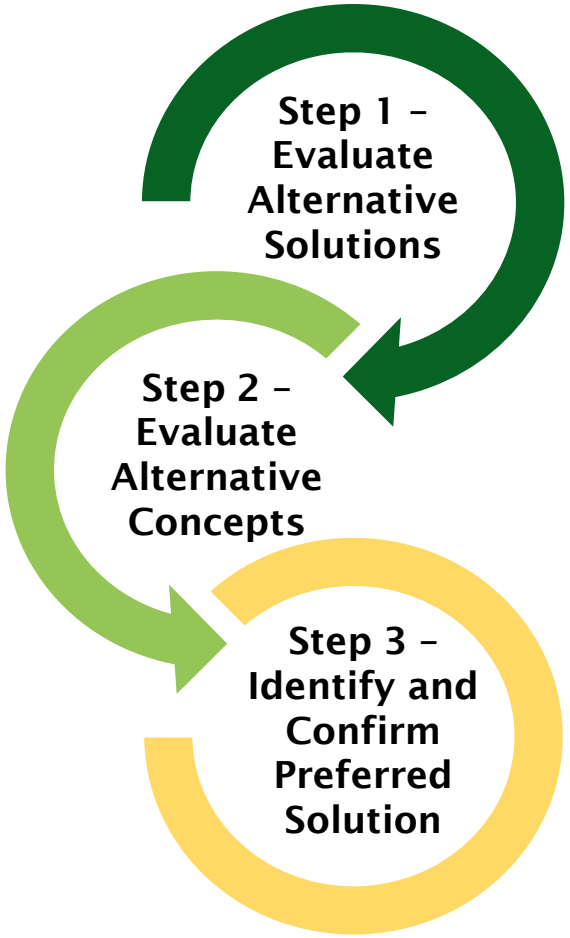
2026/2027

CIMA+

Environmental Assessment Phase 1 – Problem/Opportunity Statement

A preferred raw water supply solution is required to ensure a secure and reliable source of raw water for the Town of Petrolia Drinking Water System to address current concerns associated with the capacity and condition of the existing intake

Selecting the Preferred Solution – The Process



- Alternatives were screened based on ability to meet:
  - Capacity requirements
  - Water quality standards, objectives and guidelines for the plant, and
  - Maximize existing infrastructure, compatibility with existing processes, and constructability simplicity
- **Replacing the Existing Intake was selected as the Preliminary Preferred Alternative Solution.**

- **Alternative concepts** for replacing the existing intake were developed.
- Options were assessed based on evaluation criteria, shown in next panel.
- The option with the overall best score is being **recommended as the Preliminary Preferred Water Supply Solution**.

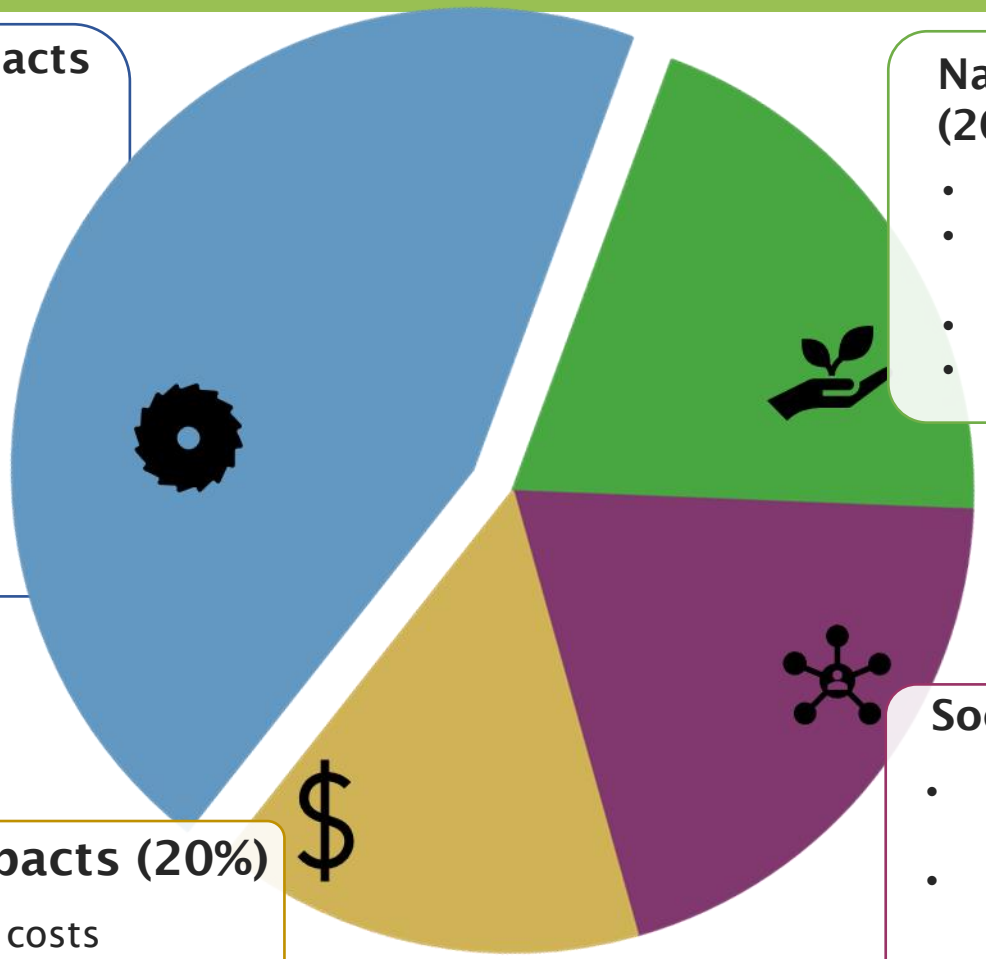
- Feedback from the public and stakeholders is being requested.
- The preferred solution will be confirmed with input from the public and review agencies.

Evaluating the Alternative Concepts – Evaluation Criteria

Town of PETROLIA
you'll be surprised!

Technical and Operational Impacts (45%)

- Raw water quality
- Vulnerability to contaminants
- Constructability issues
- Operation and maintenance complexity
- Construction duration, staging opportunities
- Approvals
- Land acquisition



Natural Environmental Impacts (20%)

- Natural habitat, terrestrial, aquatic, etc.
- Archaeological and cultural heritage features
- Vulnerability to climate changes
- Source water protection

Financial Impacts (20%)

- Construction costs

Socio-Cultural Impacts (15%)

- Public and staff health and safety concerns
- Impacts / disruption to residents and local users

CIMA+

Alternative Solutions Considered and Screening Results

Town of PETROLIA
you'll be surprised!

Alternative Solutions	Screening Observations	Recommendation
1 - DO NOTHING	• No improvements to the existing intake pipe. • This alternative does not address the concerns identified with the intake pipe.	**Not recommended**
2 - LIMIT COMMUNITY GROWTH	• No additional growth in the serviced area. • This alternative does not address the concerns identified with the intake pipe.	**Not recommended**
3 - IMPLEMENT WATER CONSERVATION MEASURES	• This alternative does not address the concerns identified with the existing intake pipe.	**Not recommended**
4 - OBTAIN RAW WATER FROM ANOTHER SOURCE	• Extend raw water supply from a neighboring municipality into Petrolia. • Major capital expenditure with new work and upgrades. • This alternative does not address the concerns identified with the intake pipe.	**Not recommended**
5 - REFURBISH EXISTING INTAKE	• Physical measures would be implemented to try to restore existing intake pipe. • Questionable integrity of retrofitted pipe. Challenges to allow continuous operation of existing plant during construction.	**Not recommended**
6 - REPLACE EXISTING INTAKE	• New intake pipe and intake crib would be installed. • This alternative addresses concerns identified with the intake pipe.	**Recommended for further consideration**

CIMA+

Existing Conditions – Cultural Heritage

Built and Cultural Heritage Resources

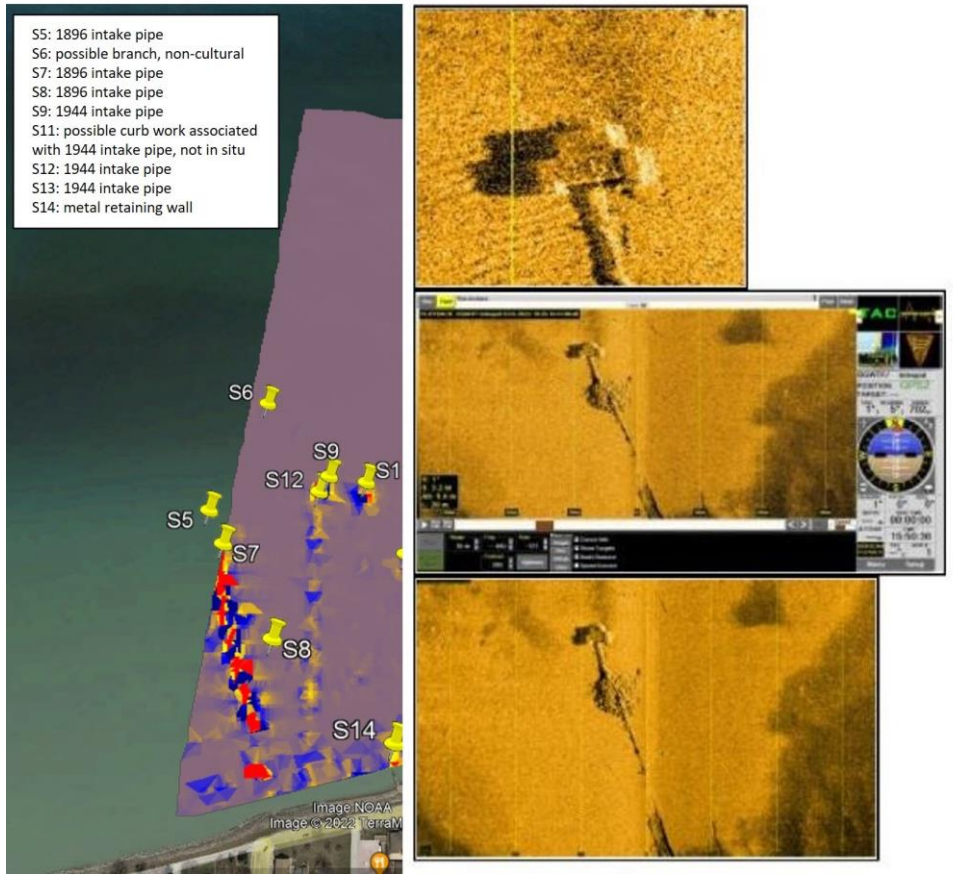
- The existing Petrolia Water Treatment Plant (2701 Old Lakeshore Road) was identified as a building with heritage value
- The identified heritage value of the property is confined to the original 1896 pumping station located at the corner of property
- The scope of the proposed work poses no direct impact of the identified heritage value

Updated colorized historic image of 'Petrolia Water Works' - Cultural Heritage Screening Report - PHC Group (2022) – Town of Petrolia

Existing Conditions – Archaeological Study

Archaeological Marine Findings

- Through snorkeling investigations 30m off the coast the existing intake pipes were inspected
- From the investigations it was found that an intake pipe from 1896 still exists and the new intake will not impact it
- The 1944 intake pipe is considered “modern” archaeological artifact and will provide no significant archaeological information

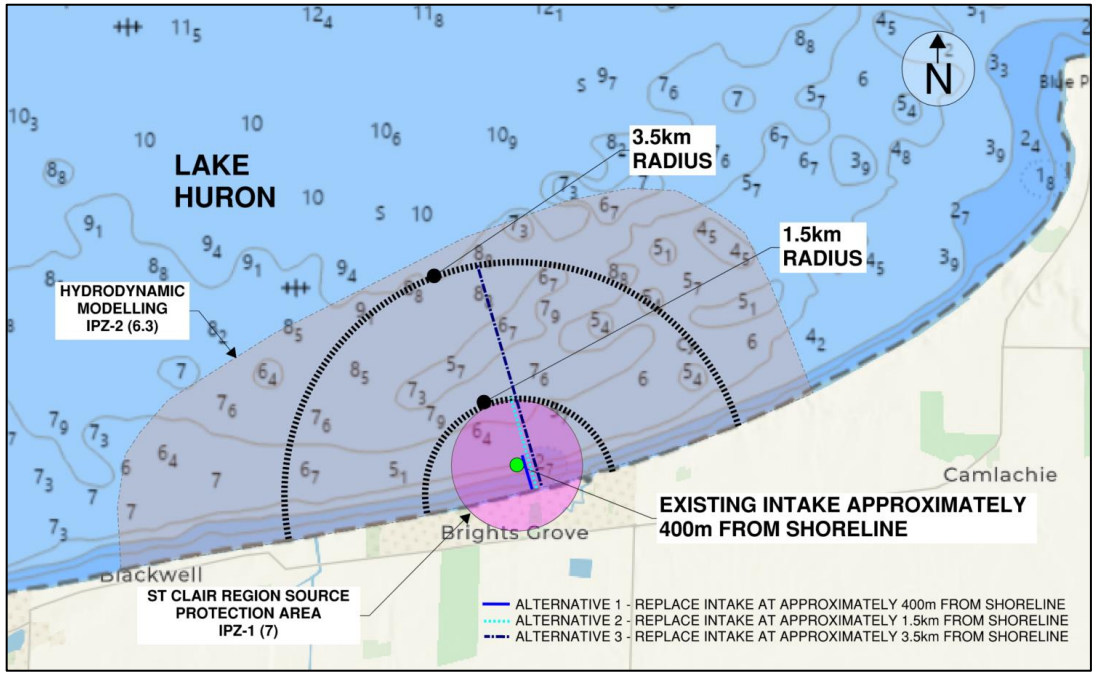


Existing Intake Pipes - Marine Archaeological Report - ARA Group. (2022). Town of Petrolia.

Alternative Intake Locations

- Preliminary Preferred Water Supply Solution **– Replace Existing Intake**
- **Three (3) alternative locations for the intake replacement**

Alternative	Description
1	Similar location as existing, approximate length of 0.4km, depth over intake 3.0m at historic low lake level
2	Extend to 1.5km length and increase depth over intake to 7.0m at historic low lake level
3	Extend to 3.5km length and increase depth over intake to 8.0m at historic low lake level



Potential Intake Lengths and Depths

Assessment of Alternative – Intake Locations

Alternative Locations	Advantages	Disadvantages
Length – 0.4km, depth 3.0m	• Historically good quality raw water • No significant impact to Source Protection Plan • Lowest Capital Cost	• Minimum cover over proposed intake, highest risk of frazil ice blockage and risk of surface ice impacts to intake screen.
Length – 1.5km, depth 7.0m	• Additional depth of water over intake will reduce risk of frazil ice blockage • Potential reduction in high turbidity in raw water due to storm events • Increased depth will reduce risk of surface ice impacts to intake screen and crib	• Will require an update to Source Protection Plan which will delay implementation and may impact proposed developments in Sarnia • Greater impact to Navigable Waters • Higher Capital Cost for intake replacement
Length – 3.5km, depth 8.0m	• Same as above	• Will require an update to Source Protection Plan which will delay implementation and may impact proposed developments in Sarnia • Greatest impact to Navigable Waters • Highest Capital Cost for intake replacement

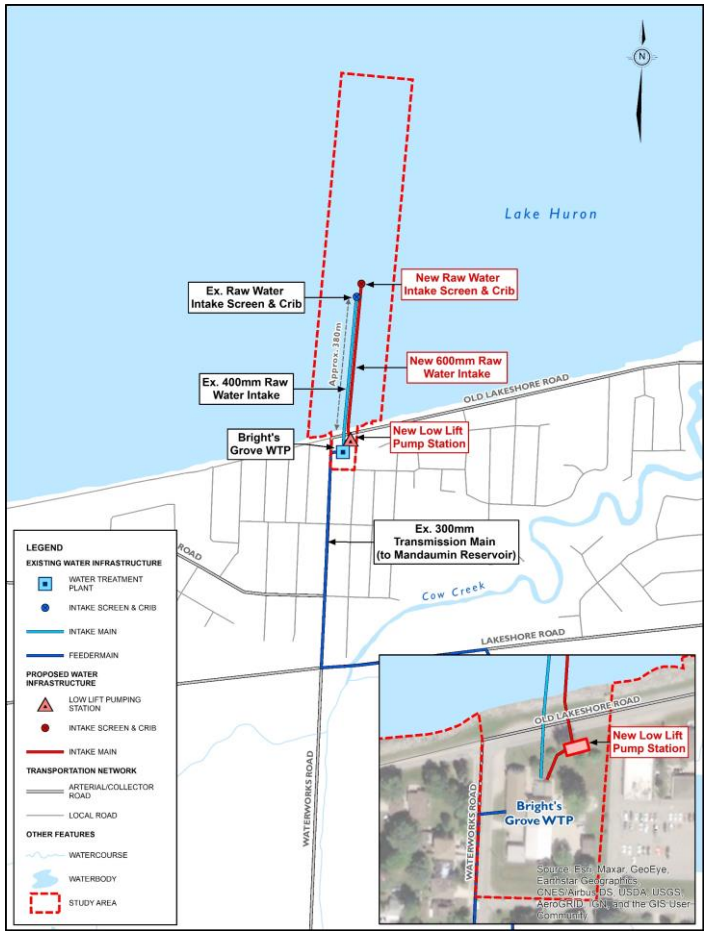
Evaluation of Alternative Design Concepts for Intake

No.	Alternative Design	Advantages	Disadvantages
1	Retrofit as Closed System using existing low-lift pumping station	• Utilizes existing infrastructure and minimizes the need for major retrofitting of existing low-lift pumping station • Easy to adapt to a future pre-treatment addition	• Challenges to maintain continuous operation of water treatment plant during construction • Inflexible for future upgrades • Complex excavation support system necessary to protect existing Heritage structure
2	Retrofit as Open System using existing low-lift pump station	• Similar to Option 1; however, new submersible pumps required to replace existing low-lift pumps	• Challenges to maintain continuous operation of water treatment plant during construction • Complex excavation support system necessary to protect existing Heritage structure
3	Closed System with new low-lift pumping station	• Minimizes need for water treatment plant shut-downs • Flexibility for future improvements	• Larger footprint for low-lift pump station to accommodate below-grade pump room. • Potential need for superstructure over low-lift pumping station which would result in a visual impact for residents on Bright Street.
4	Open System with new low-lift pumping station	• Smaller footprint compared to Concept 3 • Minimizes need for water treatment plant shut-downs • Potential to provide some pre-treatment in wet-well	• Higher Capital Cost compared to Concept 1 and 2 • Limited opportunity for future capacity expansion

Preliminary Preferred Solution

- **New Intake operating as an Open system with a new low-lift pumping station**. The new intake will extend approximately the same distance, approximately 400m from the shoreline.

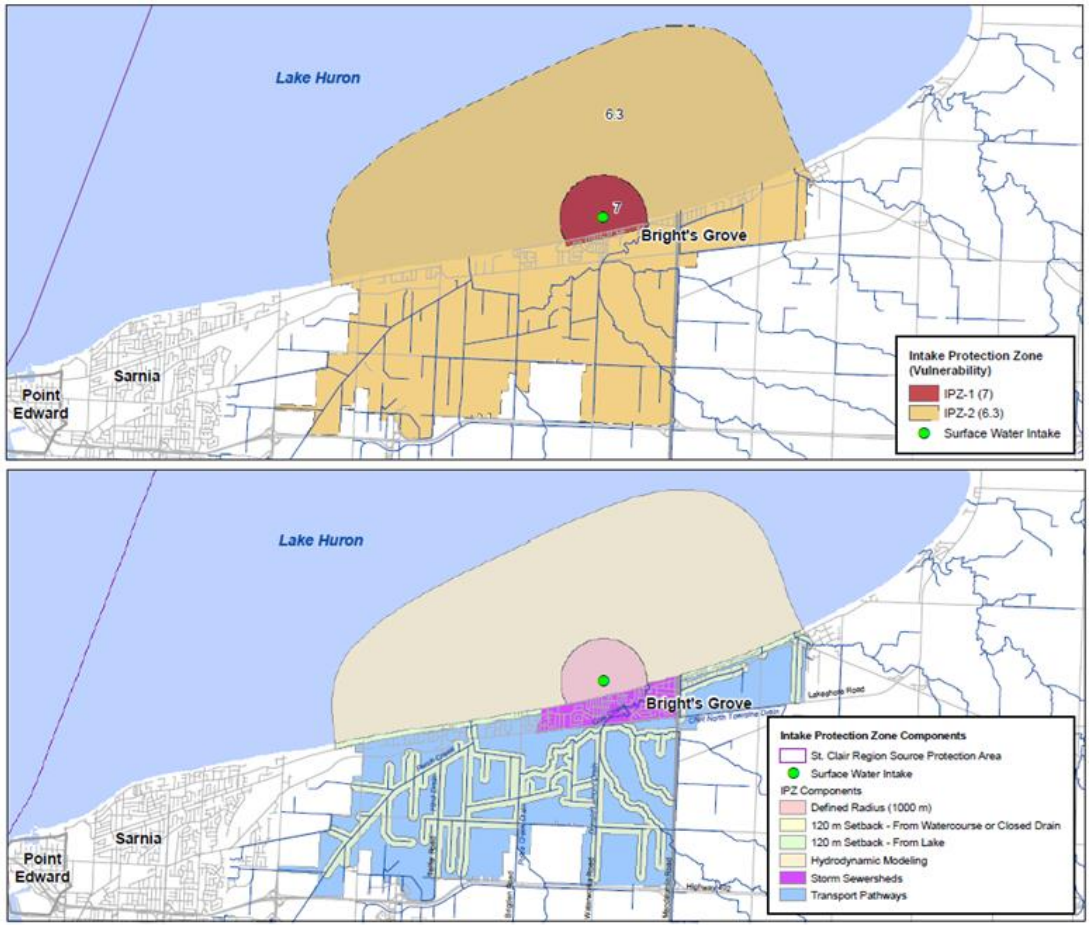
- **Key advantages:**
  - An **Open System** is the preferred solution to be both cost-effective and have the capacity for growing demand
  - **Maintaining current depth and location** of the intake pipe is the preferred option due to small cost-to-benefit ratio of extending the intake
  - **Long-term impacts on adjacent property are eliminated** by confining in-land works within existing site limits. **No land acquisition required.**
  - In-land works **minimize construction challenges** for the connection to a new low-lift pumping station.
  - Staging opportunities to **minimize interruptions to operation and protection of existing intake pipe while construction is taking place.**
  - New intake will include **Zebra Mussel and Frazil Ice Control** systems to prevent frazil ice blockages and Zebra Mussel infestation



Proposed and Existing Intake Alignment and Length

Source Water Protection Update

- Intake Protection Zones represent vulnerable areas around source water intakes:
  - IPZ-1 – most vulnerable area immediately surrounding the intake. Represented by a typical distance from the intake (1 km radius).
  - IPZ-2 – larger area of concern. Modelled based on enough time to allow an operator to respond to a water quality event at the intake.
  - Intake Protection Zones will be re-assessed to ensure there is no major changes to any drainage patterns or new Transport Pathways



Source Water Protection Zone and Components, Map 4.3 Petrolia Intake Protection Zone (IPZ) St. Clair Region Source Protection Area Assessment Report, 2010

Overview of Mitigation Measures

Town of PETROLIA
you'll be surprised!

Natural Environment

- Implement setbacks and erosion and sediment control measures.
- Minimize vegetation and tree removals through design. Apply timing window for tree clearing activities.
- Avoid construction within Species at Risk habitat or outside breeding windows. Additional screening for Species at Risk.
- All activities to comply with Endangered Species Act.
- Use previously disturbed areas for construction laydown and staging to the extent possible.

Technical and Operational

- Phased-implementation approach for the protection and continued operation of the existing intake.
- Appropriate standard construction techniques and mitigation measures will be implemented.
- Bathymetric survey has been completed to confirm the approximate location of new intake.
- Confirm delineation of Intake Protection Zones.

Socio-Cultural Environment

- All construction will adhere to strict safety guidelines.
- Temporary measures will be undertaken during construction to minimize noise, dust and vibration impacts.
- In-water works will comply with the Canadian Navigable Waters Act to ensure no interference with navigation.
- On-shore construction to be confined within the water treatment plant property limits or the adjacent shoreline with minimal interference to the neighboring residents.
- Notification to adjacent property owners prior to construction.

Cultural Heritage

- Completion of a Cultural Heritage Impact Assessment.

CIMA+

Typical Marine Construction Equipment

Excavation of marine trench with floating dredging equipment

Installation of intake pipeline with ballast to prevent pipeline from floating

Onshore installation of intake pipeline

Thank you for Participating! Please Stay Engaged

After the virtual Public Information Centre, the project team will:

- Review and consider input received during the virtual Public Information Centre
- Confirm the recommended water supply solution
- Prepare Class Environmental Assessment Report
- Issue Notice of Study Completion
- File Class Environmental Assessment Report on the public record for public review

Stay Involved!

Please complete the **Online Comment Form** available on the webpage by **August 9, 2023**.

Project Information

- For more information about this project, please visit our webpage:

  town.petrolia.on.ca/planning-development/brights-grove-wtp/

- Should you have any questions or comments at any time during the project, please contact:

Mike Thompson
Town of Petrolia
Director of Operations
mthompson@petrolia.ca

Adam Moore
CIMA+
Project Engineer
adam.moore@cima.ca

Town of PETROLIA

you'll be surprised!

Thank You!

We appreciate your time and interest in this project

CIMA+

A-3

Appendix A-3: Public Correspondence

Agency/Organization	Title	First Name	Last Name	Position	Email	Address
Canadian Transportation Agency Rail, Air and Marine Disputes Directorate	Mr.	Luc	Fortin	Senior Environmental Officer		15 Eddy Street Gatineau, QC, K1A 0N9
Canadian Transportation Agency Rail, Air and Marine Disputes Directorate					info@otc-cta.gc.ca	16 Eddy Street Gatineau, QC, K1A 0N9
Environment and Climate Change Canada		Sandro	Leonardelli	Manager, EA Section	sandro.leonardelli@ec.gc.ca	4905 Dufferin Street Toronto, Ontario, M3H 5T4
Fisheries and Oceans Canada	Mr.	Brent	Valere	Senior Fisheries Protection Program Biologist		867 Lakeshore Road Burlington, Ontario, L2R 4A6
Fisheries and Oceans Canada		Dale	Nicholson	Regional Director Ecosystems Management		867 Lakeshore Road Burlington, Ontario, L2R 4A6
Fisheries and Oceans Canada Southern Ontario District Office					info@dfo-mpo.gc.ca	868 Lakeshore Road Burlington, Ontario, L2R 4A6
Indigenous Services Canada					infopubs@sac-isc.gc.ca	655 Bay Street, Suite 700, 8th Floor
Department of Indigenous and Northern Affairs		Cheyenne	Loon	Senior Environmental Advisor	cheyenne.loon@ec.gc.ca	25 St. Clair Ave. East, 8th Floor Toronto, Ontario, M4T 1M2
Department of Indigenous and Northern Affairs		Shannon	Doyle	Regional Manager	shannon.doyle@sac-isc.gc.ca	26 St. Clair Ave. East, 8th Floor Toronto, Ontario, M4T 1M2
Department of Indigenous and Northern Affairs		John	Schmied	Sr. Information Officer	john.schmied@sac-isc.gc.ca	27 St. Clair Ave. East, 8th Floor Toronto, Ontario, M4T 1M2
Department of Indigenous and Northern Affairs		Monique	Forget	Senior Claims Analyst		10 Wellington St., 16th Floor Gatineau, QC, K1A 0H4
Department of Indigenous and Northern Affairs		Pauline	Haarmeyer	Senior Land Negotiations Officer	pauline.haarmeyer@sac-isc.gc.ca	655 Bay Street, Suite 700, 8th Floor Toronto, Ontario, M5G 2K4
Federal Economic Development Agency for Southern Ontario		Alex	Sirianni	Acting Manager, Program Delivery	alex.sirianni@FedDevOntario.gc.ca	151 Yonge Street, 3rd floor Toronto, Ontario, M5C 2W7
Transport Canada Marine Safety	Ms.	Sue	MacDonald-Simcox	Navigable Waters Protection Officer		100 Front Street Sarnia, Ontario, N7T 2M4

Agency/Organization	Title	First Name	Last Name	Position	Email	Address
Transport Canada Ontario Region Environment and Engineering				Environemental Assessment Coordinator		101 Front Street Sarnia, Ontario, N7T 2M4
Navigation Canada		Neil	Wilson	President and Chief Executive Officer		77 Metcalfe St, P.O. Box 3411 Ottawa, Ontario, K1P 5L6
Ministry of Environment, Conservation, and Parks Sarnia District Office		Sean	Morrison	Director	sean.morrison@ontario.ca	1094 London Rd. Sarnia ON N7S 1P1
Ministry of Northern Development, Mines, Natural Resources and Forestry Aylmer District				Director	MNRF.Ayl@ontario.ca	615 John St N, Aylmer, Ontario N5H 2S8
Ministry of Heritage, Sport, Tourism and Culture Industries Culture Services Unit		Dan	Minkin	Heritage Planner		401 Bay St, Suite 1700 Toronto ON M7A 0A7
Ministry of Heritage, Sport, Tourism and Culture Industries Culture Services Unit		Joseph	Harvey	Heritage Planner	joseph.harvey@ontario.ca	401 Bay St, Suite 1700 Toronto ON M7A 0A7
Ministry of Heritage, Sport, Tourism and Culture Industries Archaeology Program Unit		Andrea	Williams	Archaeology Review Officer	Andrea.Williams@ontario.ca	401 Bay St, Suite 1700 Toronto ON M7A 0A7
Ministry of Municipal Affairs and Housing Housing and Municipal Affairs Department		Alex	Earthy	Senior Advisor	Alex.Earthy@ontario.ca	777 Bay St, 2nd Floor Toronto ON M7A 2J3
Infrastructure Ontario		Lisa	Myslicki	Environmental Advisor	lisa.myslicki@infrastructureontario.ca	1 Dundas St W, Suite 200 Toronto ON M5G 2L5
Lambton County		Ken	Melanson	Manager, Planning and Development Services	sent notification through Lampton website	789 Broadway Street, Box 3000 Wyoming ON N0N 1T0
City of Sarnia		Chris	Carter	CAO	chris.carter@sarnia.ca	255 Christina Street North Sarnia, ON N7T 7N2
Town of Petrolia	Mr.	Richard	Charlebois	CAO	rcharlebois@petrolia.ca	441 Greenfield Street Petrolia, ON N0N 1R0
Aamjiwnaang First Nation		Chris	Plain	Chief	cobrien@aamjwnaang.ca	Aamjiwnaang Administration Office 978 Tashmoo Ave. Sarnia, ON N7T 7H5

Agency/Organization	Title	First Name	Last Name	Position	Email	Address
Aamjiwnaang First Nation		Wanda	Maness	TTMS	ttms.maness@gmail.com	Aamjiwnaang Administration Office 978 Tashmoo Ave. Sarnia, ON N7T 7H5
Chippewas of the Thames First Nation		Jacqueline	French	Chief		319 Chippewa Road Muncey, ON N0L 1Y0
Chippewas of the Thames First Nation		Myeengun	Henry	Chief	consultation@cottfn.com	320 Chippewa Road Muncey, ON N0L 1Y0
Chippewas of the Thames First Nation	Ms.	Fallon	Burch	Consultation Coordinator	fburch@cottfn.com	321 Chippewa Road Muncey, ON N0L 1Y0
Oneida Nation of the Thames		Jessica	Hill	Chief	jessica.hill@oneida.on.ca	2212 Elm Ave Southwold, ON N0L 2G0
Oneida Nation of the Thames		Todd	Cornelius		todd.cornelius@oneida.on.ca	2212 Elm Ave Southwold, ON N0L 2G0
Delaware Nation		Denise	Stonefish	Chief	chief@munsee.ca	14760 School House Line, R.R.#3 Thamesville, ON N0P 2K0
Bkejwanong Territory (Walpole Island)		Janet	Macbeth	Chief	janet.macbeth@wifn.org	117 Tahgahoning Road, R.R. #3 Wallaceburg, ON N8A 4K9
Bkejwanong Territory (Walpole Island)		Norma	Altiman	Chief	norma.altiman@wifn.org	117 Tahgahoning Road, R.R. #3 Wallaceburg, ON N8A 4K9
Assembly of First Nations		RoseAnne	Archibald	Regional Chief	ORCEA@coo.org	117 Tahgahoning Road, R.R. #3 Toronto, ON M5A 1T7
Assembly of First Nations				Executive assistant to Chief	slickers@afm.ca	117 Tahgahoning Road, R.R. #3 Toronto, ON M5A 1T7
Chippewas of Kettle and Stony Point First Nation		Jason	Henry	Chief	consultation@kettlepoint.org	Kettle & Stony Point Band Office 6247 Indian Lane Kettle & Stony Point First Nation, ON N0N 1J1
Great Lakes Métis Council		Peter	Coture	President		380 9th Street East Owen Sound, ON N4K 1P1

Agency/Organization	Title	First Name	Last Name	Position	Email	Address
Great Lakes Métis Council		Ethan	Roy	Consultation Advisor - Land, Resources and Consultation Branch	ethanr@metisnation.org	136 John St Sault Ste. Marie, ON P6A 1P1
Caldwell First Nation		Mary	Duckworth	Chief	ChiefMaryDuckworth@caldwellfirstnation.ca	14 Orange Street Leamington, ON N8H 1P5
Caldwell First Nation		Zack	Hamm	Consultation coordinator	ecd.manager@caldwellfirstnation.ca	15 Orange Street Leamington, ON N8H 1P5
Métis Nation of Ontario		Mark	Knell	Manager, Environmental Assessments and Regulatory Issues	MarkK@metisnation.org	311-75 Sherbourne Street Toronto, ON M5A 2P9
Métis Nation of Ontario		Mark	Knell	Manager, Environmental Assessments and Regulatory Issues	consultations@metisnation.org	311-75 Sherbourne Street Toronto, ON M5A 2P10
Métis Nation of Ontario		Ethan	Roy	Consultation Advisor	consultations@metisnation.org	136 John St Sault Ste. Marie, ON P6A 1P1
Métis Nation of Ontario		Laura	Desaulniers	Environmental Advisor	Laurad@metisnation.org	226 May St. S Thunder Bay, ON P7E 1B4
Munsee-Delaware Nation		Roger	Thomas	Chief	chief@munsee.ca	Jubilee Rd, RR 1 Muncey ON N0L 1Y0
St. Clair Region Conservation Authority	Mr.	Jeff	Vlasman	Environmental Planner	jvlasman@scrca.on.ca	205 Mill Pond Cres. Strathroy, Ontario, N7G 3P9
St. Clair Region Conservation Authority	Ms.	Melissa	Deisley		mdeisley@scrca.on.ca	206 Mill Pond Cres. Strathroy, Ontario, N7G 3P9

Charlotte Creron

From: Mike Thompson <mthompson@petrolia.ca>
Sent: April 24, 2023 3:26 PM
To: Adam Moore; Stuart Winchester
Cc: Mandi Pearson
Subject: FW: Bright's Grove Intake Replacement - comments out of the 4th April Meeting
Attachments: Water intake line replacement town.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

EXTERNAL EMAIL

Hi,

Andy Hart attended the public meeting and had a couple questions and comments.

Please have a look and respond.

Thanks,
Mike

Mike Thompson (he/him)
Director of Operations

Town of Petrolia
411 Greenfield Street, Petrolia, ON, N0N 1R0

Phone (519)882-2350 Ext. 235 Fax: (519)882-3733

www.town.petrolia.on.ca www.visitpetrolia.ca

From: Andy Hart <theharts0@outlook.com>
Sent: Monday, April 24, 2023 9:52 AM
To: Mike Thompson <mthompson@petrolia.ca>
Cc: Rick Charlebois <rcharlebois@petrolia.ca>; Andy Hart <theharts0@outlook.com>
Subject: Bright's Grove Intake Replacement - comments out of the 4th April Meeting

Hi Mike,

Please find attached notes / comments drawn from my own water system experience

I imagine most points are already covered. There was a lot to absorb at the meeting.

- From a shore based problem mitigation standpoint, the further the inlet extends into the lake the better. While even another 100 metres is worth doing, 500m further would be better.
- This inlet line fits into the system as a whole. There is no spare. What would we do, say, if the line was unavailable for a month or longer?

I'd be pleased to be shown around the pumping station to better understand normal operation and problem management.

Best regards,

Andy

A-4

Appendix A-4: Agency Consultation

Charlotte Creron

From: Adam Moore
Sent: July 24, 2023 8:53 AM
To: Southern Region Planning Inbox (MNRF)
Cc: Stuart Winchester; Mike Thompson (Petrolia)
Subject: RE: Bright's Grove WTP Intake Replacement EA - Notice of PIC
Attachments: 2023-07-20_MNRF_Response_PIC.pdf; T0001646A-Response to MNRF-e01-AODA.pdf

Hi Catherine,

Thank you for reaching out regarding the Bright's Grove WTP Intake Replacement project. We will keep you informed if any MNRF interests are identified or need further technical assistance.

Regards,

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater
M 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

From: Southern Region Planning Inbox (MNRF) <SR.Planning@ontario.ca>
Sent: Thursday, July 20, 2023 10:43 AM
To: Adam Moore <Adam.Moore@cima.ca>
Subject: RE: Bright's Grove WTP Intake Replacement EA - Notice of PIC

EXTERNAL EMAIL

Hello Adam,

Thank you for circulating this notice to MNRF. Attached are sources of MNRF information for you to review including a link where you can find locations of petroleum wells. There is also information about MNRF authorities.

Please let me know if you have any questions about this.

Thanks,
Catherine

From: Adam Moore <Adam.Moore@cima.ca>
Sent: July 17, 2023 8:57 AM
To: Adam Moore <Adam.Moore@cima.ca>
Cc: Mike Thompson (Petrolia) <mthompson@petrolia.ca>; Mandi Pearson (Town of Petrolia) <mpearson@petrolia.ca>; Rick Charlebois (Petrolia) <rcharlebois@petrolia.ca>; Stuart Winchester <stuart.winchester@cima.ca>
Subject: Bright's Grove WTP Intake Replacement EA - Notice of PIC

Good morning,

The Town of Petrolia is holding an in-person **Public Information Centre** (PIC) for the Bright's Grove Water Treatment Plant (WTP) Intake Replacement Environmental Assessment. The PIC will introduce the study, provide background information and context as well as the preliminary preferred alternative for the intake. Further details about the PIC and how to provide comments are included in the attached Notice.

If you have any questions or feedback, please do not hesitate to contact us by responding to this email.

Thank you,

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater
M 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

Engineering for **people**

Ministry of Citizenship and Multiculturalism

Heritage Planning Unit
Heritage Branch
Citizenship, Inclusion and Heritage Division
5th Flr, 400 University Ave
Tel.: 613.242.3743

Ministère des Affaires civiques et du Multiculturalisme

Unité de la planification relative au patrimoine
Direction du patrimoine
Division des affaires civiques, de l'inclusion et du patrimoine
Tél.: 613.242.3743

April 12, 2023 VIA EMAIL ONLY

Mike Thompson
Director of Operations
Town of Petrolia
411 Greenfield Street
Petrolia, ON N0N 1R0
mthompson@petrolia.ca

MCM File	**:**	**0017970**
Proponent	**:**	**Town of Petrolia**
Subject	**:**	**Municipal Class EA – Schedule B - Notice of Public Information Centre**
Project	**:**	**Bright's Grove Intake Replacement EA**
Location	**:**	**Town of Petrolia**

Dear Mike Thompson:

Thank you for providing the Ministry of Citizenship and Multiculturalism (MCM) with the Notice for the above-referenced project.

MCM'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 Town of Petrolia (Town) is undertaking an Environmental Assessment (EA) for a new intake at the Bright's Grove Water Treatment Plant (WTP). The existing raw intake from Lake Huron originally installed in 1944 is approaching the end of its useful service life. The Project will increase access to safe drinking water by restoring the capacity of the existing treatment plant to its rated capacity of 12,000 m3. This study is proceeding in accordance with the requirements of the Municipal Class EA process (October 2000, amended in 2015), which is an approved process under the Ontario *Environmental Assessment Act*. This study will fulfill the requirements for a Schedule B project.

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
This EA project may impact archaeological resources and should be screened using the Ministry's *Criteria for Evaluating Archaeological Potential* and *Criteria for Evaluating Marine Archaeological Potential* to determine if an archaeological assessment is needed. MCM archaeological sites data are available at *archaeology@ontario.ca*.

If the EA project area exhibits archaeological potential, then an archaeological assessment (AA) shall be undertaken by an archaeologist licenced under the *Ontario Heritage Act (OHA)*, who is responsible for submitting the report directly to MCM for review.

Built Heritage Resources and Cultural Heritage Landscapes
The Ministry's *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.

If there is potential for built heritage resources and/or cultural heritage landscapes on the property or within the project area, a Cultural Heritage Evaluation Report (CHER) should be undertaken by a qualified person to determine the cultural heritage value or interest of the property (or project area). If the property (or project area) is determined to be of cultural heritage value or interest and alterations or development is proposed, MCM recommends that a Heritage Impact Assessment (HIA), prepared by a qualified consultant, be completed to assess potential project impacts. Please send the HIA to MCM for review and comment and make it available to local organizations or individuals who have expressed interest in review.

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 MCM whether any technical cultural heritage studies will be completed for this EA project, and provide them to MCM before issuing a Notice of Completion or commencing any work on the site. 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.

Please note that the responsibility for administration of the *Ontario Heritage Act* and matters related to cultural heritage have been transferred from the Ministry of Tourism, Culture and Sport (MTCS) to the Ministry of Citizenship and Multiculturalism (MCM). Individual staff roles and contact information remain unchanged. Please continue to send any notices, report and/or documentation to both Karla Barboza and myself.

- Karla Barboza, Team Lead - Heritage | Heritage Planning Unit (Citizenship and Multiculturalism) | 416-660-1027 | karla.barboza@ontario.ca
- Joseph Harvey, Heritage Planner | Heritage Planning Unit (Citizenship and Multiculturalism) | 613-242-3743 | joseph.harvey@ontario.ca

Thank you for consulting MCM 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,

Joseph Harvey
Heritage Planner
Heritage Planning Unit
joseph.harvey@Ontario.ca

Copied to: Adam Moore, Project Engineer, Town of Petrolia CIMA+

Ministry of Citizenship and Multiculturalism
Archaeology Program Unit
Heritage Branch
Citizenship, Inclusion and Heritage Division
5th Floor, 400 University Ave.
Toronto, ON, M7A 2R9
Tel: (437) 339-9197
Email: andrea.williams@ontario.ca

Ministère des Affaires civiques et du Multiculturalisme
Unité des programmes archéologique
Direction du patrimoine
Division de la citoyenneté, de l'inclusion et du patrimoine
5e étage, 400 ave. University
Toronto, ON, M7A 2R9
Tél: (437) 339-9197
Email: andrea.williams@ontario.ca

Ontario

January 5, 2023

Scarlett Janusas
Scarlett Janusas Archaeology Inc.
janusasscarlett@gmail.com

RE: Review and entry into the Ontario Public Register of Archaeological Reports: Marine archaeological assessment report entitled, "*Marine Archaeological Assessment Bright's Grove Water Intake Design Class EA, Offshore of Part of Lot 9, Concession 9, AKA Front Concession, Geographic Township of Sarnia, Town of Petrolia (Bright's Grove), City of Sarnia, County of Lambton*", Dated December 2, 2022, Filed on December 12, 2022, Licence number 2022-19.

Dear Ms. Janusas:

This office has reviewed 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.* This review has been carried out in order to determine whether the licensed marine archaeologist met the terms and conditions of their licence and whether the archaeological fieldwork and report recommendations are consistent with the conservation, protection and preservation of the cultural heritage of Ontario.

The report documents the assessment of the study area as shown in **Figure 1** of the report and recommends the following:

"Based on the marine archaeological background research and the field survey, the following is recommended:

- The original water intake pipe still exists (in places), and it was constructed in 1896. It is unlikely to be impacted by the new rebuild of the water intake system. There is, therefore, no additional archaeological mitigation recommended;
- The existing water intake system was constructed in 1944 and is not considered historically or archaeologically significant. There are no recommendations regarding this intake system;
- There were no cultural resources located in the Study Area, other than those associated with the two pipelines noted above, and, therefore, no additional archaeological mitigation is recommended for the remainder of the study area; and
- Compliance legislation must be adhered to in the event of discovery of deeply buried cultural material or features."

*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 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 if additional artifacts or archaeological sites are identified or the report is otherwise found to be inaccurate, incomplete, misleading or fraudulent.

Based on the information in the report, the ministry is satisfied that the fieldwork and reporting for the archaeological assessment is consistent with the terms and conditions for a marine archaeological licence. This report will be entered into the Ontario Public Register of Archaeological Reports. Please note that the ministry makes no representation or warranty as to the completeness, accuracy or quality of reports in the register.

Please feel free to contact me if you have any questions.

Sincerely,

Andrea K. Williams

Andrea Williams
Archaeology Review Officer/Marine Archaeology Licensing and Information

c. Adam Moore, CIMA Canada Inc.
Mike Thompson, Town of Petrolia

*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 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 if additional artifacts or archaeological sites are identified or the report is otherwise found to be inaccurate, incomplete, misleading or fraudulent.

Protocol for Implementing Regulatory Requirements under the Clean Water Act

July 2022

Purpose

The Protocol for Implementing Regulatory Requirements under the *Safe Drinking Water Act, 2002,* O. Reg. 205/18, and *Clean Water Act, 2006,* S.48 (1.1)(b), O. Reg. 287/07, provides a local framework to support municipalities and source protection authorities (SPA) in the Thames-Sydenham and Region Source Protection Region in incorporating source water protection planning into the municipal residential drinking water supply process. There are three SPAs within the region: Lower Thames SPA, St. Clair SPA, and Upper Thames SPA. The Upper Thames SPA is the lead SPA.

Background

The *Safe Drinking Water Act, 2002* and the *Clean Water Act, 2006* were amended to ensure that source water protection planning is incorporated at an early stage in the municipal residential drinking water supply process.

Effective July 1, 2018, the new amendments require that system owners ensure that work to assess the vulnerability of a new or expanding drinking water systems is completed and accepted by the SPA before the owner can apply for a drinking water works permit/license, and that the water not be provided to the public until the updated source protection plan that protects the system is approved. The SPA must provide a notice to the drinking water system owner stating that the SPA is satisfied that the technical work has been completed for the purposes of identifying updates to the source protection plan that are anticipated to be necessary and the timing to submit any proposed updates to the Ministry of the Environment, Conservation and Parks (MECP).

Implementing the Regulations in the Thames-Sydenham and Region

To help with the implementation of these new requirements, a Thames-Sydenham and Region Protocol has been developed. This protocol was initially created by the Lake Erie Region Implementation Working Group. The Protocol provides a local framework linking source water protection work to the Municipal Class Environmental Assessment and drinking water works permit/license process. The Protocol is comprised of three components:

1. **Flow Diagram Outlining Process for Implementing Regulatory Requirements:** Outlines the general process to integrate new or altered drinking water systems into the source protection plan from a municipal system owner and SPA perspective (**Appendix A**);
2. **Class Environmental Assessment and Source Protection Planning Matrix:** Describes potential project categories for new or altered municipal drinking water systems and how each category fits into the source protection planning process (**Appendix B**); and
3. **Source Protection Authority Notice of Updates to Source Protection Plan (template):** To be used by the SPA of the source protection area in which the system is or will be located to provide notice to the system owner pursuant to subsection 48(1.1) of Ontario Regulation 287/07 under the *Clean Water Act, 2006.* The notice is administrative in nature (does not approve or assess the merit of technical work) and provides written confirmation

that the SPA is satisfied that technical work is complete for the purpose of identifying a list of anticipated revisions, and a timeline for incorporating those revisions into an update of the source protection plan (**Appendix C**).

Roles and Responsibilities

Following are clarifications of roles and responsibilities (see Appendix A: Flow Diagram Outlining Process for Implementing Regulatory Requirements):

- Step 3: Early planning – System owner contacts the SPA to initiate early discussions on the owner's intent to create or alter a system. The SPA will be invited to participate in the early planning and technical discussions.
- Step 4: Notice from owner – System owner provides "written notice of intent" to apply for a drinking water works permit/license by submitting Thames-Sydenham Source Protection Region's online Application for a S.34 Source Protection Plan Update. The SPA receives notification that the online application and been completed.
- Step 6: Source protection work and early engagement – System owner submits electronic completed draft technical work to the SPA. The SPA engages the MECP in the evaluation of the draft work. System owner to contact the SPA for submission requirements for technical work (i.e., data and report format, database template).
- Step 7: Notice from SPA – Final work submitted to the SPA. The SPA technical staff reviews technical work to ensure it is complete as per the regulation. If the work is complete, the SPA technical staff provides a notice to be issued by the SPA to the system owner.

Contact

Please contact Julie Welker, Source Protection Coordinator, Thames-Sydenham and Region (welkerj@thamesriver.on.ca or 519-451-2800 ext. 255).

Appendix A: Flow Diagram Outlining Process for Implementing Regulatory Requirements

Process for Implementing Regulatory Requirements under the *Clean Water Act, 2006,* S.48 (1.1)(b) of O. Reg. 287/07

1. **Municipal intention:** Municipal residential drinking water system owner (system owner) establishes intent to create or alter a system and identifies Municipal Class Environmental Assessment (EA) Planning and Design Process (A, A+, B, or C).

2. **Category confirmation:** System owner conducts preliminary technical work (if applicable) to confirm municipal well/intake alteration category.

3. **Early planning:** Upper Thames SPA leads discussion with municipal residential drinking water system owner to discuss the owner's intent to establish or alter a system and reviews the contents of the Thames-Sydenham Source Protection Region's online application for a s.34 Source Protection Plan Update.

4. **Notice from owner (287/07, S.48 1.1):** System owner provides written notice of intent to apply for permit/licence by submitting the Thames-Sydenham Source Protection Region's online application for a s.34 Source Protection Plan Update.

5. **Source protection and Environmental Assessment work:** System owner conducts technical EA and source protection work (mapping, vulnerability, threats assessment).

6. **Submission of source protection work and early engagement:** Draft technical work completed and submitted to the Upper Thames SPA, if applicable. The SPA engages the MECP in the evaluation of the draft work.

7. **Notice from SPA (287/07, S.48 1.1b):** Final technical work, updated assessment report data, and summary statistics to accompany final technical work submitted to the Upper Thames SPA, if applicable. Upper Thames SPA checks the technical work and, if complete, recommends a notice to the owner stating that the work is complete. Owner can then apply for a drinking water works permit/licence.

8. **SPP update(s) required:** Upper Thames SPA, local SPA, and Source Protection Committee (SPC) agree on updates required.

9. **SPP update:** SPC updates the SPP and incorporates the new drinking water system technical work. Update process includes pre-consultation period with affected implementing bodies followed by, at a minimum, 35-day public consultation period. Estimated minimum four-month timeframe from completion of the updated plan to submission of the revised updated plan to the Ministry.

10. **SPP submission:** Updated SPP submitted to the Ministry for review and approval.

11. **Provision of water:** SPP is approved. The system owner can supply water to the public upon approval.

Appendix B: Class Environmental Assessment (EA) and Source Protection Planning Matrix

Class Environmental Assessment (EA) and Source Protection Planning Matrix: Protocol for Implementing Regulatory Requirements under the Clean Water Act, 2006, S.48 (1.1)(b) of O. Reg. 287/07

	Category #	Municipal Supply Well / Intake Categories	Class EA Schedule	Technical Work required to Confirm Category	Technical Work for AR (modeling)	Changes to AR	Changes to Time of Travel	Notice Required	Content of Notice	Type of Update*	Clean Water Act Public Consultation Required	Comment
New Supply Well	**1a**	Direct replacement well (same depth, same Capture Zone Delineation Rate, same property/no new threats)	A	No	No	Minor	No	Yes	Satisfied that work is complete (existing WHPA provides protection for new well)	S.34 or S.36	Formal 35-day public consultation period for AR and SPP	Only WHPA-A shift, update type dependent on magnitude of change to WHPAs. Work may not alter the vulnerable area scoring, affected properties and threats. In this situation the Source Protection Plan update can be made at a later date, i.e., the system owner can provide water to the public before the updated plan is approved by the Province. The SPA notice would indicate that plan updates are not necessary at this time.
	1b	Direct replacement well (same depth, same Capture Zone Delineation Rate, different property/new threats)	A	No	No	Minor	No	Yes	Satisfied that work is complete (existing WHPA provides protection for new well)	S.34 or S.36	Formal 35-day public consultation period for AR and SPP + property owner notification	Only WHPA-A shift
	2	Direct replacement well (same depth, decreased Capture Zone Delineation Rate, same property)	A	No	Yes	Minor	Yes	Yes	Satisfied that work is complete (existing WHPA provides protection for new well)	S.34 or S.36	Formal 35-day public consultation period for AR and SPP + property owner notification	Smaller WHPAs, update options (s.34/36) a matter of timing and priorities.
	3	Direct replacement well (same depth, increased Capture Zone Delineation Rate)	A	No	Yes	Minor/Major	Yes	Yes	Satisfied that work is complete (new technical work)	S.34	Formal 35-day public consultation period for AR and SPP + property owner notification or property owner notification + public open house	Larger WHPAs
	4a	New well, existing water supply system (back-up capacity); close proximity (same Capture Zone Delineation Rate, same property/no new threats)	A	No	No	Minor	No	Yes	Satisfied that work is complete (existing WHPA provides protection for new well)	S.34 or S.36	Formal 35-day public consultation period for AR and SPP	Assumes backup well is same or less Capture Zone Delineation Rate and within defined WHPA, new WHPA-A added, type of update dependent on magnitude of change to WHPAs. Work may not alter the vulnerable area scoring, affected properties and threats. In this situation, the Source Protection Plan update can be made at a later date, i.e., the system owner can provide water to the public before the updated plan is approved by the Province. The SPA notice would indicate that plan updates are not necessary at this time.
	4b	New well, existing water supply system (back-up capacity); close proximity (same Capture Zone Delineation Rate, different property/new threats)	A	No	No	Minor	No	Yes	Satisfied that work is complete (existing WHPA provides protection for new well)	S.34 or S.36	Formal 35-day public consultation period for AR and SPP + property owner notification	
	5	New well, existing water supply system; new location	B	No	Yes	Major	Yes (new)	Yes	Satisfied that work is complete (new technical work)	S.34	Formal 35-day public consultation period for AR and SPP + property owner notification or property owner notification + public open house	New WHPA
	6	New well system at new location	C	No	Yes	Major	Yes (new)	Yes	Satisfied that work is complete (new technical work)	S.34	Formal 35-day public consultation period for AR and SPP + property owner notification or property owner notification + public open house	New WHPA
Existing Supply Well	**7**	Increase in capacity at existing well	B	No	Yes	Minor	Yes	Yes	Satisfied that work is complete (new technical work)	S.34	Formal 35-day public consultation period for AR and SPP + property owner notification	Larger WHPAs
	8	Installation of liner or casing in existing well (no substantive change where water coming from)	A	No	No	No	No	Yes	Satisfied that work is complete (existing WHPA provides protection for new well)	N/A	No	
	9	Installation of liner or casing in existing well (substantive change where water coming from)	A	Yes	Yes	Minor	Yes	Yes	Satisfied that work is complete (new technical work)	S.34 or S.36	Formal 35-day public consultation period for AR and SPP + property owner notification	Update type dependent on magnitude of change to WHPAs.

	Category #	Municipal Supply Well / Intake Categories	Class EA Schedule	Technical Work required to Confirm Category	Technical Work for AR (modeling)	Changes to AR	Changes to Time of Travel	Notice Required	Content of Notice	Type of Update*	Clean Water Act Public Consultation Required	Comment
	10	Deepening existing well (no substantive change where water coming from)	A/B	Yes	No	No	No	Yes	Satisfied that work is complete (existing WHPA provides protection for new well)	N/A	No	Assume same aquifer, no change in Capture Zone Delineation Rate.
	11	Deepening existing well (substantive change where water coming from)	A/B	Yes	Yes	Minor	Yes	Yes	Satisfied that work is complete (new technical work)	S.34 or S.36	Formal 35-day public consultation period for AR and SPP + property owner notification	Update type dependent on magnitude of change to WHPAs.
	12	Addition of treatment systems to supply wells	A/B	No	No	No	No	Yes	Satisfied that work is complete (existing WHPA provides protection)	N/A	No	
	13	Well decommissioning	N/A	No	No	Minor	N/A	No	N/A	S.51	N/A	Council resolution not required to remove the well from the plan as per O.Reg. S.51.
New Intake	**14**	New intake at new location (existing system)	B	No	Yes	Major	Yes (new)	Yes	Satisfied that work is complete (new technical work)	S.34	Formal 35-day public consultation period for AR and SPP + property owner notification or property owner notification + public open house	New IPZ
	15	New intake at new location (new system)	C	No	Yes	Major	Yes (new)	Yes	Satisfied that work is complete (new technical work)	S.34	Formal 35-day public consultation period for AR and SPP + property owner notification or property owner notification + public open house	New IPZ
Existing Intake	**16**	Any infrastructure to current intake	A/B	Yes	No	No	No	Yes	Satisfied that work is complete (existing IPZ provides protection for new well)	N/A	No	
	17	Intake decommissioning	N/A	No	No	Minor	N/A	No	N/A	S.51	N/A	Council resolution not required to remove the intake from the plan as per O.Reg. S.51.

*Type of Update:

- Section 34: Initiated by the SPA, major revisions, requires Minister approval
- Section 36: Top-down (ordered by the Minister), major/minor revisions, requires Minister approval
- Section 51: Administrative, in-house, does not require Minister approval

Appendix C: Source Protection Authority Notice of Updates to Source Protection Plan (Template)

NOTICE OF UPDATES TO SOURCE PROTECTION PLAN (pursuant to Section 48 (1.1)(b) of Ontario Regulation 287/07)

Existing or planned municipal drinking water system ("system"):

_____

Name of owner of existing or planned municipal drinking water system ("owner"):

_____

Applicable Source Protection Area (SPA):

_____

The [insert name of Source Protection Authority] is the Source Protection Authority for the Source Protection Area under the *Clean Water Act, 2006*.

The [insert name of Source Protection Authority] has received written notice from the owner about an intended application under the *Safe Drinking Water Act, 2002* for an existing or planned system that is located within the Source Protection Area.

The [insert name of Source Protection Authority] is satisfied that technical work required pursuant to subsection 48(1.1) of Ontario Regulation 287/07 under the *Clean Water Act, 2006* is completed for the purposes of identifying anticipated updates to the source protection plan for the Source Protection Area.

The [insert name of Source Protection Authority] anticipates the updates set out in Schedule A of this notice will be required as a result of the intended application. The list of anticipated updates in Schedule A is provisional and will undergo consultations with stakeholders and the source protection committee. All updates must be approved by the Ministry of the Environment, Conservation and Parks and are subject to change after this notice is issued. The timing for approval of the updates by the Ministry of Environment, Conservation and Parks is not within the control of the Source Protection Authority. The Schedule A also indicates updates that have been completed.

All actions by [insert name of Source Protection Authority] for the purposes of this notice are undertaken as the Source Protection Authority for the above noted Source Protection Area and are subject to the *Clean Water Act, 2006*. This notice does not exempt the Owner from obtaining the required licence or permit to operate the System under the *Safe Drinking Water Act, 2002.*

Issued by:

_____ _____

Name, Title Date

SPA-YEAR-

Schedule A – List of Anticipated and Completed Updates to Source Protection Plan

No.	Section of Source Protection Plan / Assessment Report	Brief Description of Potential and Completed Update	Estimated Timing to Submit Proposed Update to Ministry of the Environment, Conservation and Parks

Ministry of Citizenship and Multiculturalism

Heritage Planning Unit
Heritage Branch
Citizenship, Inclusion and Heritage Division
5th Flr, 400 University Ave
Tel.: 613.242.3743

Ministère des Affaires civiques et du Multiculturalisme

Unité de la planification relative au patrimoine
Direction du patrimoine
Division des affaires civiques, de l'inclusion et du patrimoine
Tél.: 613.242.3743

April 12, 2023 VIA EMAIL ONLY

Mike Thompson
Director of Operations
Town of Petrolia
411 Greenfield Street
Petrolia, ON N0N 1R0
mthompson@petrolia.ca

MCM File	**:**	**0017970**
Proponent	**:**	**Town of Petrolia**
Subject	**:**	**Municipal Class EA – Schedule B - Notice of Public Information Centre**
Project	**:**	**Bright's Grove Intake Replacement EA**
Location	**:**	**Town of Petrolia**

Dear Mike Thompson:

Thank you for providing the Ministry of Citizenship and Multiculturalism (MCM) with the Notice for the above-referenced project.

MCM'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 Town of Petrolia (Town) is undertaking an Environmental Assessment (EA) for a new intake at the Bright's Grove Water Treatment Plant (WTP). The existing raw intake from Lake Huron originally installed in 1944 is approaching the end of its useful service life. The Project will increase access to safe drinking water by restoring the capacity of the existing treatment plant to its rated capacity of 12,000 m3. This study is proceeding in accordance with the requirements of the Municipal Class EA process (October 2000, amended in 2015), which is an approved process under the Ontario *Environmental Assessment Act*. This study will fulfill the requirements for a Schedule B project.

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
This EA project may impact archaeological resources and should be screened using the Ministry's *Criteria for Evaluating Archaeological Potential* and *Criteria for Evaluating Marine Archaeological Potential* to determine if an archaeological assessment is needed. MCM archaeological sites data are available at *archaeology@ontario.ca*.

If the EA project area exhibits archaeological potential, then an archaeological assessment (AA) shall be undertaken by an archaeologist licenced under the *Ontario Heritage Act (OHA)*, who is responsible for submitting the report directly to MCM for review.

Built Heritage Resources and Cultural Heritage Landscapes
The Ministry's *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.

If there is potential for built heritage resources and/or cultural heritage landscapes on the property or within the project area, a Cultural Heritage Evaluation Report (CHER) should be undertaken by a qualified person to determine the cultural heritage value or interest of the property (or project area). If the property (or project area) is determined to be of cultural heritage value or interest and alterations or development is proposed, MCM recommends that a Heritage Impact Assessment (HIA), prepared by a qualified consultant, be completed to assess potential project impacts. Please send the HIA to MCM for review and comment and make it available to local organizations or individuals who have expressed interest in review.

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 MCM whether any technical cultural heritage studies will be completed for this EA project, and provide them to MCM before issuing a Notice of Completion or commencing any work on the site. 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.

Please note that the responsibility for administration of the *Ontario Heritage Act* and matters related to cultural heritage have been transferred from the Ministry of Tourism, Culture and Sport (MTCS) to the Ministry of Citizenship and Multiculturalism (MCM). Individual staff roles and contact information remain unchanged. Please continue to send any notices, report and/or documentation to both Karla Barboza and myself.

- Karla Barboza, Team Lead - Heritage | Heritage Planning Unit (Citizenship and Multiculturalism) | 416-660-1027 | karla.barboza@ontario.ca
- Joseph Harvey, Heritage Planner | Heritage Planning Unit (Citizenship and Multiculturalism) | 613-242-3743 | joseph.harvey@ontario.ca

Thank you for consulting MCM 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,

Joseph Harvey
Heritage Planner
Heritage Planning Unit
joseph.harvey@Ontario.ca

Copied to: Adam Moore, Project Engineer, Town of Petrolia CIMA+

A-5

Appendix A-5: First Nations Consultation

Owner: Town of Petrolia
Project Name: Bright's Grove Water Treatment Plant Intake Replacement
Project No.:

CIMA+ Project No.: T001646A
File: 050
Updated: November 22, 2023

COMMUNICATIONS LOG

Indigenous Community	Indigenous Community Contact Details	Date	From	To	Medium (eg. email, letter, phone call)	Communication Description	Nature of Concern(s)
Aamjiwnaang First Nation	Chris Plain, Chief Wanda Maness - TTMS E: ttms.maness@gmail.com Cathleen O'Brien - TTMS E: cobrien@aamjiwnaang.ca Aamjiwnaang Administration Office 978 Tashmoo Ave. Sarnia, ON N7T 7H5	August 11, 2021	CIMA+	Chris Plain	mail	Notice of Commencement	Initial Notice of Project
Aamjiwnaang First Nation	Chris Plain, Chief Wanda Maness - TTMS E: ttms.maness@gmail.com Cathleen O'Brien - TTMS E: cobrien@aamjiwnaang.ca Aamjiwnaang Administration Office 978 Tashmoo Ave. Sarnia, ON N7T 7H5	October 13, 2022	ARA	Wanda Maness, Cathleen O'Brien	email	Invitation to participate in Archaeological Investigation	Archaeological Impacts
Aamjiwnaang First Nation	Chris Plain, Chief Wanda Maness - TTMS E: ttms.maness@gmail.com Cathleen O'Brien - TTMS E: cobrien@aamjiwnaang.ca Aamjiwnaang Administration Office 978 Tashmoo Ave. Sarnia, ON N7T 7H5	October 20, 2022	ARA	Wanda Maness, Cathleen O'Brien	email	Updated dates for Marine Assessment	Archaeological Impacts
Aamjiwnaang First Nation	Chris Plain, Chief Wanda Maness - TTMS E: ttms.maness@gmail.com Cathleen O'Brien - TTMS E: cobrien@aamjiwnaang.ca Aamjiwnaang Administration Office 978 Tashmoo Ave. Sarnia, ON N7T 7H5	November 7, 2022	ARA	Wanda Maness, Cathleen O'Brien	email	Follow up invitation to participate in Archaeological Investigation	Archaeological Impacts
Aamjiwnaang First Nation	Chris Plain, Chief Wanda Maness - TTMS E: ttms.maness@gmail.com Cathleen O'Brien - TTMS E: cobrien@aamjiwnaang.ca Aamjiwnaang Administration Office 978 Tashmoo Ave. Sarnia, ON N7T 7H5	November 12, 2022	Parslow Heritage Consultancy Inc. (PHCI)	Chris Plain	email	Request for input to Cultural Heritage Assessment	Cutural Heritage Impacts
Aamjiwnaang First Nation	Chris Plain, Chief Wanda Maness - TTMS E: ttms.maness@gmail.com Cathleen O'Brien - TTMS E: cobrien@aamjiwnaang.ca Aamjiwnaang Administration Office 978 Tashmoo Ave. Sarnia, ON N7T 7H5	April 20, 2023	ARA	Wanda Maness, Cathleen O'Brien	email	Deployment details for the Stage 1 property inspection on 26-Apr-23	Archaeological Impacts
Aamjiwnaang First Nation	Chris Plain, Chief Wanda Maness - TTMS E: ttms.maness@gmail.com Cathleen O'Brien - TTMS E: cobrien@aamjiwnaang.ca Aamjiwnaang Administration Office 978 Tashmoo Ave. Sarnia, ON N7T 7H5	March 20, 2023	CIMA+	Wanda Maness, Cathleen O'Brien	email	Notice of PIC	Notice of Public Information Centre
Aamjiwnaang First Nation	Chris Plain, Chief Wanda Maness - TTMS E: ttms.maness@gmail.com Cathleen O'Brien - TTMS E: cobrien@aamjiwnaang.ca Aamjiwnaang Administration Office 978 Tashmoo Ave. Sarnia, ON N7T 7H5	June 29, 2023	ARA	Wanda Maness, Cathleen O'Brien	email	Deployment details for the Stage 2 archaeological Assessment on 07-Jul-23	Archaeological Impacts
Aamjiwnaang First Nation	Chris Plain, Chief Wanda Maness - TTMS E: ttms.maness@gmail.com Cathleen O'Brien - TTMS E: cobrien@aamjiwnaang.ca Aamjiwnaang Administration Office 978 Tashmoo Ave. Sarnia, ON N7T 7H5	July 17, 2023	CIMA+	Wanda Maness, Cathleen O'Brien	email	Notice of PIC 2	Notice of Public Information Centre
Aamjiwnaang First Nation	Chris Plain, Chief Wanda Maness - TTMS E: ttms.maness@gmail.com Cathleen O'Brien - TTMS E: cobrien@aamjiwnaang.ca Aamjiwnaang Administration Office 978 Tashmoo Ave. Sarnia, ON N7T 7H5	August 31, 2023	ARA	Wanda Maness, Cathleen O'Brien	email	Draft Report for Stage 1 and Stage 2 AA	Archaeological Impacts
Aamjiwnaang First Nation	Chris Plain, Chief Wanda Maness - TTMS E: ttms.maness@gmail.com Cathleen O'Brien - TTMS E: cobrien@aamjiwnaang.ca Aamjiwnaang Administration Office 978 Tashmoo Ave. Sarnia, ON N7T 7H5	August 31, 2023	Wanda Maness	ARA	email	Confirming that the report is satisfactory	Archaeological Impacts
Aamjiwnaang First Nation	Chris Plain, Chief Wanda Maness - TTMS E: ttms.maness@gmail.com Cathleen O'Brien - TTMS E: cobrien@aamjiwnaang.ca Aamjiwnaang Administration Office 978 Tashmoo Ave. Sarnia, ON N7T 7H5	November 23, 2023	CIMA+	Wanda Maness, Cathleen O'Brien	mail and email	Notice of Completion	Final Notice of Project
Chippewas of the Thames First Nation	Jacqueline French, Chief 320 Chippewa Road Muncey, ON N0L 1Y0	November 21, 2022	Parslow Heritage Consultancy Inc. (PHCI)	COTTFN	email	Request for input to Cultural Heritage Assessment	Cutural Heritage Impacts
Chippewas of the Thames First Nation	Henry Myeengun, Chief 320 Chippewa Road Muncey, ON N0L 1Y0	August 11, 2021	CIMA+	Henry Myeengun	mail	Notice of Commencement	Initial Notice of Project
Chippewas of the Thames First Nation	Henry Myeengun, Chief 320 Chippewa Road Muncey, ON N0L 1Y1	November 21, 2022	PHCI	COTTFN	email (returned back)	Request for input to Cultural Heritage Assessment	Cutural Heritage Impacts

Owner: Town of Petrolia
Project Name: Bright's Grove Water Treatment Plant Intake Replacement
Project No.:

CIMA+ Project No.: T001646A
File: 050
Updated: November 22, 2023

COMMUNICATIONS LOG

Indigenous Community	Indigenous Community Contact Details	Date	From	To	Medium (eg. email, letter, phone call)	Communication Description	Nature of Concern(s)
Chippewas of the Thames First Nation	Fallon Burch, Consultation Coordinator 320 Chippewa Road Muncey, ON N0L 1Y0 P: (519) 289-5555 x 251 E: consultation@cottfn.com	August 11, 2021	CIMA+	Fallon Burch	mail	Notice of Commencement	Initial Notice of Project
Chippewas of the Thames First Nation	Fallon Burch, Consultation Coordinator 320 Chippewa Road Muncey, ON N0L 1Y0 P: (519) 289-5555 x 251 E: consultation@cottfn.com	September 10, 2021	COTTFN	Town of Petrolia	email	Identified no concerns with this Project	Response to Notice of Commencement
Chippewas of the Thames First Nation	Fallon Burch, Consultation Coordinator 320 Chippewa Road Muncey, ON N0L 1Y0 P: (519) 289-5555 x 251 E: consultation@cottfn.com	September 11, 2021	COTTFN	Town of Petrolia	email	Requested notification and an invitation to participate in Archeaolgical Investigation	Response to Notice of Commencement
Chippewas of the Thames First Nation	Fallon Burch, Consultation Coordinator 320 Chippewa Road Muncey, ON N0L 1Y0 P: (519) 289-5555 x 251 E: consultation@cottfn.com	September 12, 2021	COTTFN	Town of Petrolia	email	Submitted invoice No. 0163	Response to Notice of Commencement
Chippewas of the Thames First Nation	Fallon Burch, Consultation Coordinator 320 Chippewa Road Muncey, ON N0L 1Y0 P: (519) 289-5555 x 251 E: consultation@cottfn.com	October 13, 2022	ARA	Carolyn Albert, F Burch	email	Invitation to Participate in archaeological Investigation	Archaeological Impacts
Chippewas of the Thames First Nation	Fallon Burch, Consultation Coordinator 320 Chippewa Road Muncey, ON N0L 1Y0 P: (519) 289-5555 x 251 E: consultation@cottfn.com	November 7, 2022	ARA	Carolyn Albert, F Burch	email	Follow up Invitation to Participate in archaeological Investigation	Archaeological Impacts
Chippewas of the Thames First Nation	Fallon Burch, Consultation Coordinator 320 Chippewa Road Muncey, ON N0L 1Y0 P: (519) 289-5555 x 251 E: consultation@cottfn.com	November 7, 2022	COTTFN	ARA	email	Confirmed interest in project and sent an Archeology Field Liasion Agreement	Archaeological Impacts
Chippewas of the Thames First Nation	Fallon Burch, Consultation Coordinator 320 Chippewa Road Muncey, ON N0L 1Y0 P: (519) 289-5555 x 251 E: consultation@cottfn.com	November 21, 2022	Parslow Heritage Consultancy Inc. (PHCI)	COTTFN	email	Request for input to Cultural Heritage Assessment	Cutural Heritage Impacts
Chippewas of the Thames First Nation	Fallon Burch, Consultation Coordinator 320 Chippewa Road Muncey, ON N0L 1Y0 P: (519) 289-5555 x 251 E: consultation@cottfn.com	December 7, 2022	Town of Petrolia	COTTFN	email	Submission of Archaeology Field Liaison Agreement	Request for execution of Agreement
Chippewas of the Thames First Nation	Fallon Burch, Consultation Coordinator 320 Chippewa Road Muncey, ON N0L 1Y0 P: (519) 289-5555 x 251 E: consultation@cottfn.com	April 20, 2023	ARA	Fallon Burch	email	Deployment details for the Stage 1 property inspection on 26-Apr-23	Archaeological Impacts
Chippewas of the Thames First Nation	Fallon Burch, Consultation Coordinator 320 Chippewa Road Muncey, ON N0L 1Y0 P: (519) 289-5555 x 251 E: consultation@cottfn.com	April 26, 2023	COTTFN	ARA	email	Notified ARA that the client had not yet executed the COTTFN participation agreement as required before fieldwork.	Archaeological Impacts
Chippewas of the Thames First Nation	Fallon Burch, Consultation Coordinator 320 Chippewa Road Muncey, ON N0L 1Y0 P: (519) 289-5555 x 251 E: consultation@cottfn.com	April 26, 2023	ARA	Fallon Burch	email/phone	Apologized for miscommunication in the completion of the agreement and explained that the inspection had proceeded as scheduled. Requested the draft report for review in lieu of on-site participation.	Archaeological Impacts
Chippewas of the Thames First Nation	Fallon Burch, Consultation Coordinator 320 Chippewa Road Muncey, ON N0L 1Y0 P: (519) 289-5555 x 251 E: consultation@cottfn.com	March 20, 2023	CIMA+	Fallon Burch and Carolyn Albert	email	Notice of PIC	Notice of Public Information Centre
Chippewas of the Thames First Nation	Fallon Burch, Consultation Coordinator 320 Chippewa Road Muncey, ON N0L 1Y0 P: (519) 289-5555 x 251 E: consultation@cottfn.com	June 29, 2023	ARA	Fallon Burch	email	Deployment details for the Stage 2 archaeological Assessment on 07-Jul-23	Archaeological Impacts
Chippewas of the Thames First Nation	Fallon Burch, Consultation Coordinator 320 Chippewa Road Muncey, ON N0L 1Y0 P: (519) 289-5555 x 251 E: consultation@cottfn.com	July 17, 2023	CIMA+	Fallon Burch and Carolyn Albert	email	Notice of PIC 2	Notice of Public Information Centre
Chippewas of the Thames First Nation	Fallon Burch, Consultation Coordinator 320 Chippewa Road Muncey, ON N0L 1Y0 P: (519) 289-5555 x 251 E: consultation@cottfn.com	July 17, 2023	Fallon Burch	CIMA+	email	Fallon Burch Inquired if the PIC information would be posted on the Town's website	Public Information Centre Inquiry
Chippewas of the Thames First Nation	Fallon Burch, Consultation Coordinator 320 Chippewa Road Muncey, ON N0L 1Y0 P: (519) 289-5555 x 251 E: consultation@cottfn.com	July 17, 2023	CIMA+	Fallon Burch	email	Confirmed that PIC material and comment forms will be posted.	Public Information Centre Inquiry
Chippewas of the Thames First Nation	Fallon Burch, Consultation Coordinator 320 Chippewa Road Muncey, ON N0L 1Y0 P: (519) 289-5555 x 251 E: consultation@cottfn.com	August 24, 2023	Fallon Burch	CIMA+	email	Confirmed they had no further questions or concerns regarding the PIC 2 materials that had been posted	Public Information Centre Inquiry
Chippewas of the Thames First Nation	Fallon Burch, Consultation Coordinator 320 Chippewa Road Muncey, ON N0L 1Y0 P: (519) 289-5555 x 251 E: consultation@cottfn.com	August 31, 2023	ARA	Fallon Burch	email	Draft Report for Stage 1 and Stage 2 AA	Archaeological Impacts
Chippewas of the Thames First Nation	Fallon Burch, Consultation Coordinator 320 Chippewa Road Muncey, ON N0L 1Y0 P: (519) 289-5555 x 251 E: consultation@cottfn.com	September 8, 2023	Fallon Burch	ARA	email	Stating they have no questions or concerns with the draft report for Stage 1 and Stage 2 AA	Archaeological Impacts
Chippewas of the Thames First Nation	Fallon Burch, Consultation Coordinator 320 Chippewa Road Muncey, ON N0L 1Y0 P: (519) 289-5555 x 251 E: consultation@cottfn.com	September 11, 2023	ARA	Fallon Burch	email	Thanked Fallon.	Archaeological Impacts
Chippewas of the Thames First Nation	Fallon Burch, Consultation Coordinator 320 Chippewa Road Muncey, ON N0L 1Y0 P: (519) 289-5555 x 251 E: consultation@cottfn.com	November 23, 2023	CIMA+	Fallon Burch	mail and email	Notice of Completion	Final Notice of Project
Oneida Nation of the Thames	Jessica Hill, Chief 2212 Elm Ave Southwold, ON N0L 2G0 E: jessica.hill@oneida.on.ca E:environment@oneida.on.ca	August 11, 2021	CIMA+	Jessica Hill	mail	Notice of Commencement	Initial Notice of Project

Owner: Town of Petrolia
Project Name: Bright's Grove Water Treatment Plant Intake Replacement
Project No.:

CIMA+ Project No.: T001646A
File: 050
Updated: November 22, 2023

COMMUNICATIONS LOG

Indigenous Community	Indigenous Community Contact Details	Date	From	To	Medium (eg. email, letter, phone call)	Communication Description	Nature of Concern(s)
Oneida Nation of the Thames	Jessica Hill, Chief 2212 Elm Ave Southwold, ON N0L 2G0 E: jessica.hill@oneida.on.ca E:environment@oneida.on.ca	November 21, 2022	Parslow Heritage Consultancy Inc. (PHCI)	Jessica Hill	email (returned back)	Request for input to Cultural Heritage Assessment	Cutural Heritage Impacts
Oneida Nation of the Thames	Jessica Hill, Chief 2212 Elm Ave Southwold, ON N0L 2G0 E: jessica.hill@oneida.on.ca E:environment@oneida.on.ca	February 3, 2023	ARA	Jessica Hill	email	Invitation to Participate in archaeological Investigation	Archaeological Impacts
Oneida Nation of the Thames	Jessica Hill, Chief 2212 Elm Ave Southwold, ON N0L 2G0 E: jessica.hill@oneida.on.ca E:environment@oneida.on.ca	March 10, 2023	ARA	Jessica Hill	email	Follow up invitation to participate in archaeological Investigation	Archaeological Impacts
Oneida Nation of the Thames	Jessica Hill, Chief 2212 Elm Ave Southwold, ON N0L 2G0 E: jessica.hill@oneida.on.ca E:environment@oneida.on.ca	March 20, 2023	CIMA+	Jessica Hill	email	Notice of PIC	Notice of Public Information Centre
Oneida Nation of the Thames	Jessica Hill, Chief 2212 Elm Ave Southwold, ON N0L 2G0 E: jessica.hill@oneida.on.ca E:environment@oneida.on.ca	April 20, 2023	ARA	Jessica Hill	email	Deployment details for Stage 1 property inspection on 26-Apr-23.	Archaeological Impacts
Oneida Nation of the Thames	Jessica Hill, Chief 2212 Elm Ave Southwold, ON N0L 2G0 E: jessica.hill@oneida.on.ca E:environment@oneida.on.ca	June 29, 2023	ARA	Jessica Hill	email	Deployment details for the Stage 2 archaeological Assessment on 07-Jul-23	Archaeological Impacts
Oneida Nation of the Thames	Jessica Hill, Chief 2212 Elm Ave Southwold, ON N0L 2G0 E: jessica.hill@oneida.on.ca E:environment@oneida.on.ca	July 17, 2023	CIMA+	Jessica Hill	email	Notice of PIC 2	Notice of Public Information Centre
Oneida Nation of the Thames	Jessica Hill, Chief 2212 Elm Ave Southwold, ON N0L 2G0 E: jessica.hill@oneida.on.ca E:environment@oneida.on.ca	August 31, 2023	ARA	Jessica Hill	email	Draft Report for Stage 1 and Stage 2 AA	Archaeological Impacts
Oneida Nation of the Thames	Jessica Hill, Chief 2212 Elm Ave Southwold, ON N0L 2G0 E: jessica.hill@oneida.on.ca E:environment@oneida.on.ca	September 19, 2023	ARA	Jessica Hill	email	Inquiry as to status of report made.	Archaeological Impacts
Oneida Nation of the Thames	Jessica Hill, Chief 2212 Elm Ave Southwold, ON N0L 2G0 E: jessica.hill@oneida.on.ca E:environment@oneida.on.ca	September 19, 2023	ARA	Jessica Hill	phone	Inquiry as to status of report made. No answer; voicemail left.	Archaeological Impacts
Oneida Nation of the Thames	Jessica Hill, Chief 2212 Elm Ave Southwold, ON N0L 2G0 E: jessica.hill@oneida.on.ca E:environment@oneida.on.ca	November 23, 2023	CIMA+	Jessica Hill	mail and email	Notice of Completion	Final Notice of Project
Delaware Nation	Denise Stonefish, Chief 14760 School House Line, R.R.#3 Thamesville, ON N0P 2K0 E:Director.operations@delawarenation.on.ca	August 11, 2021	CIMA+	Denise Stonefish	mail	Notice of Commencement	Initial Notice of Project
Delaware Nation	Denise Stonefish, Chief 14760 School House Line, R.R.#3 Thamesville, ON N0P 2K0 E:Director.operations@delawarenation.on.ca	November 21, 2022	Parslow Heritage Consultancy Inc. (PHCI)	Denise Stonefish	email	Request for input to Cultural Heritage Assessment	Cutural Heritage Impacts
Delaware Nation	Denise Stonefish, Chief 14760 School House Line, R.R.#3 Thamesville, ON N0P 2K0 E:Director.operations@delawarenation.on.ca	February 3, 2023	ARA	Denise Stonefish	email	Invitation to Participate in archaeological Investigation	Archaeological Impacts
Delaware Nation	Denise Stonefish, Chief 14760 School House Line, R.R.#3 Thamesville, ON N0P 2K0 E:Director.operations@delawarenation.on.ca	March 10, 2023	ARA	Denise Stonefish	email	Follow up invitation to participate in archaeological investigation.	Archaeological Impacts
Delaware Nation	Denise Stonefish, Chief 14760 School House Line, R.R.#3 Thamesville, ON N0P 2K0 E:Director.operations@delawarenation.on.ca	March 20, 2023	CIMA+	Denise Stonefish	email	Notice of PIC	Notice of Public Information Centre
Delaware Nation	Denise Stonefish, Chief 14760 School House Line, R.R.#3 Thamesville, ON N0P 2K0 E:Director.operations@delawarenation.on.ca	April 20, 2023	ARA	Denise Stonefish	email	Deployment details for Stage 1 property inspection on 26-Apr-23.	Archaeological Impacts
Delaware Nation	Denise Stonefish, Chief 14760 School House Line, R.R.#3 Thamesville, ON N0P 2K0 E:Director.operations@delawarenation.on.ca	June 29, 2023	ARA	Denis Stonefish	email	Deployment details for the Stage 2 archaeological Assessment on 07-Jul-23	Archaeological Impacts
Delaware Nation	Denise Stonefish, Chief 14760 School House Line, R.R.#3 Thamesville, ON N0P 2K0 E:Director.operations@delawarenation.on.ca	July 17, 2023	CIMA+	Denise Stonefish	email	Notice of PIC 2	Notice of Public Information Centre
Delaware Nation	Denise Stonefish, Chief 14760 School House Line, R.R.#3 Thamesville, ON N0P 2K0 E:Director.operations@delawarenation.on.ca	August 31, 2023	ARA	Denise Stonefish	email	Draft Report for Stage 1 and Stage 2 AA	Archaeological Impacts
Delaware Nation	Denise Stonefish, Chief 14760 School House Line, R.R.#3 Thamesville, ON N0P 2K0 E:Director.operations@delawarenation.on.ca	September 19, 2023	ARA	Denise Stonefish	email	Inquiry as to status of report review made.	Archaeological Impacts
Delaware Nation	Denise Stonefish, Chief 14760 School House Line, R.R.#3 Thamesville, ON N0P 2K0 E:Director.operations@delawarenation.on.ca	September 26, 2023	ARA	Denise Stonefish	phone	Inquiry as to status of report review made. ARA was directed to resubmit the report to the attention of Chief J. Logan	Archaeological Impacts
Delaware Nation	Denise Stonefish, Chief 14760 School House Line, R.R.#3 Thamesville, ON N0P 2K0 E:Director.operations@delawarenation.on.ca	November 23, 2023	CIMA+	Denise Stonefish	mail and email	Notice of Completion	Final Notice of Project
Bkejwanong Territory (Walpole Island)	Daniel Muskokomon, Chief Janet Macbeth : janet.macbeth@wifn.org; Norma Altiman E: norma.altiman@wifn.org 117 Tahgahoning Road, R.R. #3 Wallaceburg, ON N8A 4K9	August 11, 2021	CIMA+	Daniel Muskokomon	mail	Notice of Commencement	Initial Notice of Project
Bkejwanong Territory (Walpole Island)	Daniel Muskokomon, Chief Janet Macbeth : janet.macbeth@wifn.org; Norma Altiman E: norma.altiman@wifn.org 117 Tahgahoning Road, R.R. #3 Wallaceburg, ON N8A 4K10	October 13, 2022	ARA	Janet Macbeth, Norma Altiman	email	Invitation to participate in marine assessment of Archaeological Investigation	Archaeological Impacts

Owner: Town of Petrolia
Project Name: Bright's Grove Water Treatment Plant Intake Replacement
Project No.:

CIMA+ Project No.: T001646A
File: 050
Updated: November 22, 2023

COMMUNICATIONS LOG

Indigenous Community	Indigenous Community Contact Details	Date	From	To	Medium (eg. email, letter, phone call)	Communication Description	Nature of Concern(s)
Bkejwanong Territory (Walpole Island)	Daniel Muskokomon, Chief Janet Macbeth : janet.macbeth@wifn.org; Norma Altiman E: norma.altiman@wifn.org 117 Tahgahoning Road, R.R. #3 Wallaceburg, ON N8A 4K11	November 7, 2022	ARA	Janet Macbeth, Norma Altiman	email	Follow up invitation to participate Archaeological Investigation	Archaeological Impacts
Bkejwanong Territory (Walpole Island)	Daniel Muskokomon, Chief Janet Macbeth : janet.macbeth@wifn.org; Norma Altiman E: norma.altiman@wifn.org 117 Tahgahoning Road, R.R. #3 Wallaceburg, ON N8A 4K12	November 21, 2022	Parslow Heritage Consultancy Inc. (PHCI)	Daniel Muskokomon	email	Request for input to Cultural Heritage Assessment	Cutural Heritage Impacts
Bkejwanong Territory (Walpole Island)	Daniel Muskokomon, Chief Janet Macbeth : janet.macbeth@wifn.org; Norma Altiman E: norma.altiman@wifn.org 117 Tahgahoning Road, R.R. #3 Wallaceburg, ON N8A 4K13	March 10, 2023	ARA	Janet Macbeth, Norma Altiman	email	Follow up invitation to participate in Archaeological Investigation.	Archaeological Impacts
Bkejwanong Territory (Walpole Island)	Daniel Muskokomon, Chief Janet Macbeth : janet.macbeth@wifn.org; Norma Altiman E: norma.altiman@wifn.org 117 Tahgahoning Road, R.R. #3 Wallaceburg, ON N8A 4K14	April 20, 2023	ARA	Janet Macbeth, Norma Altiman	email	Deployment details circulated for the Stage 1 property inspection on 26-Apr-23.	Archaeological Impacts
Bkejwanong Territory (Walpole Island)	Daniel Muskokomon, Chief Janet Macbeth : janet.macbeth@wifn.org; Norma Altiman E: norma.altiman@wifn.org 117 Tahgahoning Road, R.R. #3 Wallaceburg, ON N8A 4K15	June 29, 2023	ARA	Janet Macbeth, Norma Altiman	email	Deployment details circulated for the Stage 2 archaeological assessment on 07-Jul-23.	Archaeological Impacts
Bkejwanong Territory (Walpole Island)	Daniel Muskokomon, Chief Janet Macbeth : janet.macbeth@wifn.org; Norma Altiman E: norma.altiman@wifn.org 117 Tahgahoning Road, R.R. #3 Wallaceburg, ON N8A 4K16	March 20, 2023	CIMA+	Janet Macbeth, Norma Altiman	email	Notice of PIC	Notice of Public Information Centre
Bkejwanong Territory (Walpole Island)	Daniel Muskokomon, Chief Janet Macbeth : janet.macbeth@wifn.org; Norma Altiman E: norma.altiman@wifn.org 117 Tahgahoning Road, R.R. #3 Wallaceburg, ON N8A 4K17	July 17, 2023	CIMA+	Janet Macbeth, Norma Altiman	email	Notice of Archaeological Fieldwork	Archaeological Impacts
Bkejwanong Territory (Walpole Island)	Daniel Muskokomon, Chief Janet Macbeth : janet.macbeth@wifn.org; Norma Altiman E: norma.altiman@wifn.org 117 Tahgahoning Road, R.R. #3 Wallaceburg, ON N8A 4K18	August 31, 2023	ARA	Janet Macbeth, Norma Altiman	email	Draft Report for Stage 1 and Stage 2 AA	Archaeological Impacts
Bkejwanong Territory (Walpole Island)	Daniel Muskokomon, Chief Janet Macbeth : janet.macbeth@wifn.org; Norma Altiman E: norma.altiman@wifn.org 117 Tahgahoning Road, R.R. #3 Wallaceburg, ON N8A 4K19	September 19, 2023	ARA	Janet Macbeth, Norma Altiman	email	Inquiry as to status of report review made.	Archaeological Impacts
Bkejwanong Territory (Walpole Island)	Daniel Muskokomon, Chief Janet Macbeth : janet.macbeth@wifn.org; Norma Altiman E: norma.altiman@wifn.org 117 Tahgahoning Road, R.R. #3 Wallaceburg, ON N8A 4K20	September 26, 2023	ARA	Janet Macbeth	phone	Inquiry as to status of report review made. No answers; no option to leave voicemail.	Archaeological Impacts
Bkejwanong Territory (Walpole Island)	Daniel Muskokomon, Chief Janet Macbeth : janet.macbeth@wifn.org; Norma Altiman E: norma.altiman@wifn.org 117 Tahgahoning Road, R.R. #3 Wallaceburg, ON N8A 4K21	November 23, 2023	CIMA+	Janet Macbeth, Norma Altiman	mail and email	Notice of Completion	Final Notice of Project
Assembly of First Nations	Roseanne Archibald, Regional Chief 117 Tahgahoning Road, R.R. #3 Toronto, ON M5A 1T7 P: (416) 597-1266 E: ORCEA@coo.org E: slickers@afm.ca (Executive assistant to Chief Archibald)	August 11, 2021	CIMA+	Roseanne Archibald	mail	Notice of Commencement	Initial Notice of Project
Assembly of First Nations	Roseanne Archibald, Regional Chief 117 Tahgahoning Road, R.R. #3 Toronto, ON M5A 1T7 P: (416) 597-1266 E: ORCEA@coo.org E: slickers@afm.ca (Executive assistant to Chief Archibald)	October 13, 2022	ARA	Roseanne Archibald	email	Invitation to participate in Archaeological Investigation	Archaeological Impacts
Assembly of First Nations	Roseanne Archibald, Regional Chief 117 Tahgahoning Road, R.R. #3 Toronto, ON M5A 1T7 P: (416) 597-1266 E: ORCEA@coo.org E: slickers@afm.ca (Executive assistant to Chief Archibald)	February 8, 2023	ARA	Roseanne Archibald	email	Project introduction and invitation to participate circulated.	Archaeological Impacts
Assembly of First Nations	Roseanne Archibald, Regional Chief 117 Tahgahoning Road, R.R. #3 Toronto, ON M5A 1T7 P: (416) 597-1266 E: ORCEA@coo.org E: slickers@afm.ca (Executive assistant to Chief Archibald)	March 10, 2023	ARA	Roseanne Archibald	email	Follow up to project notification notification and inivitation to Participate	Archaeological Impacts
Assembly of First Nations	Roseanne Archibald, Regional Chief 117 Tahgahoning Road, R.R. #3 Toronto, ON M5A 1T7 P: (416) 597-1266 E: ORCEA@coo.org E: slickers@afm.ca (Executive assistant to Chief Archibald)	March 20, 2023	CIMA+	Roseanne Archibald	email	Notice of PIC	Notice of Public Information Centre

Owner: Town of Petrolia
Project Name: Bright's Grove Water Treatment Plant Intake Replacement
Project No.:

CIMA+ Project No.: T001646A
File: 050
Updated: November 22, 2023

COMMUNICATIONS LOG

Indigenous Community	Indigenous Community Contact Details	Date	From	To	Medium (eg. email, letter, phone call)	Communication Description	Nature of Concern(s)
Assembly of First Nations	Roseanne Archibald, Regional Chief 117 Tahgahoning Road, R.R. #3 Toronto, ON M5A 1T7 P: (416) 597-1266 E: ORCEA@coo.org E: slickers@afm.ca (Executive assistant to Chief Archibald)	November 21, 2022	Parslow Heritage Consultancy Inc. (PHCI)	Roseanne Archibald	email	Request for input to Cultural Heritage Assessment	Cutural Heritage Impacts
Assembly of First Nations	Roseanne Archibald, Regional Chief 117 Tahgahoning Road, R.R. #3 Toronto, ON M5A 1T7 P: (416) 597-1266 E: ORCEA@coo.org E: slickers@afm.ca (Executive assistant to Chief Archibald)	April 20, 2023	ARA	Roseanne Archibald	email	Deployment details circulated for the Stage 1 property inspection on 26-Apr-23.	Archaeological Impacts
Assembly of First Nations	Roseanne Archibald, Regional Chief 117 Tahgahoning Road, R.R. #3 Toronto, ON M5A 1T7 P: (416) 597-1266 E: ORCEA@coo.org E: slickers@afm.ca (Executive assistant to Chief Archibald)	June 29, 2023	ARA	Roseanne Archibald	email	Deployment details circulated for the Stage 2 archaeological assessment on 07-Jul-23.	Archaeological Impacts
Assembly of First Nations	Roseanne Archibald, Regional Chief 117 Tahgahoning Road, R.R. #3 Toronto, ON M5A 1T7 P: (416) 597-1266 E: ORCEA@coo.org E: slickers@afm.ca (Executive assistant to Chief Archibald)	July 17, 2023	CIMA+	Roseanne Archibald	email	Notice of PIC 2	Notice of Public Information Centre
Assembly of First Nations	Roseanne Archibald, Regional Chief 117 Tahgahoning Road, R.R. #3 Toronto, ON M5A 1T7 P: (416) 597-1266 E: ORCEA@coo.org E: slickers@afm.ca (Executive assistant to Chief Archibald)	August 31, 2023	ARA	Roseanne Archibald	email	Draft Report for Stage 1 and Stage 2 AA	Archaeological Impacts
Assembly of First Nations	Roseanne Archibald, Regional Chief 117 Tahgahoning Road, R.R. #3 Toronto, ON M5A 1T7 P: (416) 597-1266 E: ORCEA@coo.org E: slickers@afm.ca (Executive assistant to Chief Archibald)	September 19, 2023	ARA	Roseanne Archibald	email	Inquiry as to status of report review made.	Archaeological Impacts
Assembly of First Nations	Roseanne Archibald, Regional Chief 117 Tahgahoning Road, R.R. #3 Toronto, ON M5A 1T7 P: (416) 597-1266 E: ORCEA@coo.org E: slickers@afm.ca (Executive assistant to Chief Archibald)	November 23, 2023	CIMA+	Roseanne Archibald	mail and email	Notice of Completion	Final Notice of Project
Chippewas of Kettle and Stony Point First Nation	Jason Henry, Chief Kettle & Stony Point Band Office 6247 Indian Lane Kettle & Stony Point First Nation, ON N0N 1J1 E: consultation@kettlepoint.org	August 11, 2021	CIMA+	Jason Henry	mail	Notice of Commencement	Initial Notice of Project
Chippewas of Kettle and Stony Point First Nation	Jason Henry, Chief Kettle & Stony Point Band Office 6247 Indian Lane Kettle & Stony Point First Nation, ON N0N 1J1 E: consultation@kettlepoint.org	October 13, 2022	ARA	Jason Henry	email	Invitation to participate in Archaeological Investigation	Archaeological Impacts
Chippewas of Kettle and Stony Point First Nation	Jason Henry, Chief Kettle & Stony Point Band Office 6247 Indian Lane Kettle & Stony Point First Nation, ON N0N 1J1 E: consultation@kettlepoint.org	November 7, 2023	ARA	Jason Henry	email	Follow up invitationto participate in Archaeological Investigation	Archaeological Impacts
Chippewas of Kettle and Stony Point First Nation	Jason Henry, Chief Kettle & Stony Point Band Office 6247 Indian Lane Kettle & Stony Point First Nation, ON N0N 1J1 E: consultation@kettlepoint.org	November 21, 2022	Parslow Heritage Consultancy Inc. (PHCI)	Jason Henry	email	Request for input to Cultural Heritage Assessment	Cutural Heritage Impacts
Chippewas of Kettle and Stony Point First Nation	Jason Henry, Chief Kettle & Stony Point Band Office 6247 Indian Lane Kettle & Stony Point First Nation, ON N0N 1J1 E: consultation@kettlepoint.org	March 10, 2023	ARA	Jason Henry	email	Follow up invitation to participate in Archaeological Investigation	Archaeological Impacts
Chippewas of Kettle and Stony Point First Nation	Jason Henry, Chief Kettle & Stony Point Band Office 6247 Indian Lane Kettle & Stony Point First Nation, ON N0N 1J1 E: consultation@kettlepoint.org	March 20, 2023	CIMA+	Jason Henry	email	Notice of PIC	Notice of Public Information Centre
Chippewas of Kettle and Stony Point First Nation	Jason Henry, Chief Kettle & Stony Point Band Office 6247 Indian Lane Kettle & Stony Point First Nation, ON N0N 1J1 E: consultation@kettlepoint.org	March 27, 2023	Jason Henry	ARA	email	Confirmed interest in project.	Archaeological Impacts
Chippewas of Kettle and Stony Point First Nation	Jason Henry, Chief Kettle & Stony Point Band Office 6247 Indian Lane Kettle & Stony Point First Nation, ON N0N 1J1 E: consultation@kettlepoint.org	April 20, 2023	ARA	Jason Henry	email	Deployment detailed for the Stage 1 property inspection on 26-Apr-23	Archaeological Impacts
Chippewas of Kettle and Stony Point First Nation	Jason Henry, Chief Kettle & Stony Point Band Office 6247 Indian Lane Kettle & Stony Point First Nation, ON N0N 1J1 E: consultation@kettlepoint.org	June 29, 2023	ARA	Jason Henry	email	Deployment details circulated for the Stage 2 archaeological assessment on 07-Jul-23.	Archaeological Impacts
Chippewas of Kettle and Stony Point First Nation	Jason Henry, Chief Kettle & Stony Point Band Office 6247 Indian Lane Kettle & Stony Point First Nation, ON N0N 1J1 E: consultation@kettlepoint.org	July 17, 2023	CIMA+	Jason Henry	email	Notice of PIC 2	Notice of Public Information Centre
Chippewas of Kettle and Stony Point First Nation	Jason Henry, Chief Kettle & Stony Point Band Office 6247 Indian Lane Kettle & Stony Point First Nation, ON N0N 1J1 E: consultation@kettlepoint.org	August 31, 2023	ARA	Jason Henry	email	Draft Report for Stage 1 and Stage 2 AA	Archaeological Impacts

Owner: Town of Petrolia
Project Name: Bright's Grove Water Treatment Plant Intake Replacement
Project No.:

CIMA+ Project No.: T001646A
File: 050
Updated: November 22, 2023

COMMUNICATIONS LOG

Indigenous Community	Indigenous Community Contact Details	Date	From	To	Medium (eg. email, letter, phone call)	Communication Description	Nature of Concern(s)
Chippewas of Kettle and Stony Point First Nation	Jason Henry, Chief Kettle & Stony Point Band Office 6247 Indian Lane Kettle & Stony Point First Nation, ON N0N 1J1 E: consultation@kettlepoint.org	September 19, 2023	ARA	Jason Henry	email	Inquiry as to status of report review made.	Archaeological Impacts
Chippewas of Kettle and Stony Point First Nation	Jason Henry, Chief Kettle & Stony Point Band Office 6247 Indian Lane Kettle & Stony Point First Nation, ON N0N 1J1 E: consultation@kettlepoint.org	September 26, 2023	ARA	Jason Henry	phone	Inquiry as to status of report review made. R. Lukascs stated that comments would be provided shortly.	Archaeological Impacts
Chippewas of Kettle and Stony Point First Nation	Jason Henry, Chief Kettle & Stony Point Band Office 6247 Indian Lane Kettle & Stony Point First Nation, ON N0N 1J1 E: consultation@kettlepoint.org	September 29, 2023	R. Lukas	ARA	email	Stated that the report had been reviewed at that they agreed with the reccomendations made	Archaeological Impacts
Chippewas of Kettle and Stony Point First Nation	Jason Henry, Chief Kettle & Stony Point Band Office 6247 Indian Lane Kettle & Stony Point First Nation, ON N0N 1J1 E: consultation@kettlepoint.org	November 23, 2023	CIMA+	Jason Henry	mail and email	Notice of Completion	Final Notice of Project
Great Lakes Métis Council	Peter Coture, President 380 9th Street East Owen Sound, ON N4K 1P1	August 11, 2021	CIMA+	Peter Coture	mail	Notice of Commencement	Initial Notice of Project
Great Lakes Métis Council	Peter Coture, President 380 9th Street East Owen Sound, ON N4K 1P2	November 21, 2022	Parslow Heritage Consultancy Inc. (PHCI)	Peter Coture	email	Cultural Heritage Screening	Submitted a request for infomration regarding built heritage and cultural heritage resources within or adjacent to the study area
Great Lakes Métis Council	Ethan Roy, Consultation Advisor Lands, Resources and Consuultations (LRC) Branch Metis Nation of Ontario Sault Ste Marie, Ontario P: (705) 527-3612 E: ethanr@metisnation.org	November 22, 2022	Ethan Roy	PHCI	email	requested a Map of the Study Area	Ensuring that the request goes to the correct consultations committee
Great Lakes Métis Council	Ethan Roy, Consultation Advisor Lands, Resources and Consuultations (LRC) Branch Metis Nation of Ontario Sault Ste Marie, Ontario P: (705) 527-3612 E: ethanr@metisnation.org					Asked that future requestes be submitted to consultations@metisnations.org	
Great Lakes Métis Council	Ethan Roy, Consultation Advisor Lands, Resources and Consuultations (LRC) Branch Metis Nation of Ontario Sault Ste Marie, Ontario P: (705) 527-3612 E: ethanr@metisnation.org	November 23, 2022	PHCI	Ethan Roy	email	Provided a map of the Study Area	Response to request
Great Lakes Métis Council	Ethan Roy, Consultation Advisor Lands, Resources and Consuultations (LRC) Branch Metis Nation of Ontario Sault Ste Marie, Ontario P: (705) 527-3612 E: ethanr@metisnation.org	October 13, 2022	ARA	Ethan Roy	email	Invitation to participate in Archaeological Investigation	Archaeological Impacts
Great Lakes Métis Council	Ethan Roy, Consultation Advisor Lands, Resources and Consuultations (LRC) Branch Metis Nation of Ontario Sault Ste Marie, Ontario P: (705) 527-3612 E: ethanr@metisnation.org	November 22, 2022	PHCI	Ethan Roy	email	Request for input to Cultural Heritage Assessment	Cutural Heritage Impacts
Great Lakes Métis Council	Ethan Roy, Consultation Advisor Lands, Resources and Consuultations (LRC) Branch Metis Nation of Ontario Sault Ste Marie, Ontario P: (705) 527-3612 E: ethanr@metisnation.org	March 20, 2023	CIMA+	Ethan Roy	email	Notice of PIC	Notice of Public Information Centre
Great Lakes Métis Council	Ethan Roy, Consultation Advisor Lands, Resources and Consuultations (LRC) Branch Metis Nation of Ontario Sault Ste Marie, Ontario P: (705) 527-3612 E: ethanr@metisnation.org	July 17, 2023	CIMA+	Ethan Roy	email	Notice of PIC 2	Notice of Public Information Centre
Great Lakes Métis Council	Ethan Roy, Consultation Advisor Lands, Resources and Consuultations (LRC) Branch Metis Nation of Ontario Sault Ste Marie, Ontario P: (705) 527-3612 E: ethanr@metisnation.org	August 31, 2023	ARA	Ethan Roy	email	Draft Report for Stage 1 and Stage 2 AA	Archaeological Impacts
Great Lakes Métis Council	Ethan Roy, Consultation Advisor Lands, Resources and Consuultations (LRC) Branch Metis Nation of Ontario Sault Ste Marie, Ontario P: (705) 527-3612 E: ethanr@metisnation.org	September 19, 2023	ARA	Ethan Roy	email	Following up to check in on the statuts of the report. Requested comments by September 22, 2023 or to let ARA know if more time was needed.	Archaeological Impacts
Great Lakes Métis Council	Ethan Roy, Consultation Advisor Lands, Resources and Consuultations (LRC) Branch Metis Nation of Ontario Sault Ste Marie, Ontario P: (705) 527-3612 E: ethanr@metisnation.org	November 23, 2023	CIMA+	Ethan Roy	mail and email	Notice of Completion	Final Notice of Project
Caldwell First Nation	Mary Duckworth, Chief 14 Orange Street Leamington, ON N8H 1P5 P: E: chief@caldwellfirstnation.ca ChiefMaryDuckworth@caldwellfirstnation.ca, ecd.manager@caldwellfirstnation.ca, ecc@caldwellfirstnation.ca	August 11, 2021	CIMA+	Mary Duckworth	mail	Notice of Commencement	Initial Notice of Project
Caldwell First Nation		November 21, 2022	PHCI	Mary Duckworth	email (returned back) ChiefMaryDuckworth@caldwellfirstnation.ca	Request for input to Cultural Heritage Assessment	Cutural Heritage Impacts
Caldwell First Nation		March 20, 2023	CIMA+	Mary Duckworth	email	Notice of PIC	Notice of Public Information Centre
Caldwell First Nation		February 3, 2023	ARA	Mary Duckworth	email	Project introduction and invitation to participate.	Archaeological Impacts
Caldwell First Nation	Zack Hamm Environment and Consultation Department Manager E: ecd.manager@caldwellfirstnation.ca	February 8, 2023	Zack Hamm	ARA	email	Confirmed participation of CFN in assessment	Archaeological Impacts

Owner: Town of Petrolia
Project Name: Bright's Grove Water Treatment Plant Intake Replacement
Project No.:

CIMA+ Project No.: T001646A
File: 050
Updated: November 22, 2023

COMMUNICATIONS LOG

Indigenous Community	Indigenous Community Contact Details	Date	From	To	Medium (eg. email, letter, phone call)	Communication Description	Nature of Concern(s)
Caldwell First Nation	Zack Hamm Environment and Consultation Department Manager E: ecd.manager@caldwellfirstnation.ca	February 21, 2023	ARA	Zack Hamm	email	Sent agreements for CFN's participation in the Stage 1 archaeological Assessment	Archaeological Impacts
Caldwell First Nation	Zack Hamm Environment and Consultation Department Manager E: ecd.manager@caldwellfirstnation.ca	March 8, 2023	Zack Hamm	ARA	email	Received signed agreements from Zack. Agreement dated Feb. 28, 2023	Archaeological Impacts
Caldwell First Nation	Zack Hamm Environment and Consultation Department Manager E: ecd.manager@caldwellfirstnation.ca	April 20, 2023	ARA	Mary Duckworth	email	Deployment details circulated for Stage 1 property inspection on 26-Apr-23	Archaeological Impacts
Caldwell First Nation	Zack Hamm Environment and Consultation Department Manager E: ecd.manager@caldwellfirstnation.ca	June 29, 2023	ARA	Mary Duckworth	email	Deployment details circulated for Stage 2 archaeological Assessment on 07-Jul-23	Archaeological Impacts
Caldwell First Nation	Zack Hamm Environment and Consultation Department Manager E: ecd.manager@caldwellfirstnation.ca	July 17, 2023	CIMA+	Mary Duckworth	email	Notice of PIC 2	Notice of Public Information Centre
Caldwell First Nation	Zack Hamm Environment and Consultation Department Manager E: ecd.manager@caldwellfirstnation.ca	July 25, 2023	Zack Hamm	Town of Petrolia	email	Requested that further communications be sent to consultwithcaldwell.ca and confirmed interest in participating in archaeological investigation	Archaeological Impacts
Caldwell First Nation	Zack Hamm Environment and Consultation Department Manager E: ecd.manager@caldwellfirstnation.ca	July 30, 2023	CIMA+	Zack Hamm	email	Sent signed agreements from town	Archaeological Impacts
Caldwell First Nation	Zack Hamm Environment and Consultation Department Manager E: ecd.manager@caldwellfirstnation.ca	July 31st	Zack Hamm	CIMA+	email	Expressing interest in reviewing the EA report and confirming that agreements would be forwarded	Archaeological Impacts
Caldwell First Nation	Zack Hamm Environment and Consultation Department Manager E: ecd.manager@caldwellfirstnation.ca	August 9, 2023	Zack Hamm	CIMA+	email	Sent signed Agreements from CFN. Agreements dated July 31st	Archaeological Impacts
Caldwell First Nation	Zack Hamm Environment and Consultation Department Manager E: ecd.manager@caldwellfirstnation.ca	August 31, 2023	ARA	Zack Hamm	email	Sent draft stage 1 and 2 AA report. Notice provided receive comments regarding the draft report by September 15, 2023, prior to our submission to the MCM.	Archaeological Impacts
Caldwell First Nation	Zack Hamm Environment and Consultation Department Manager E: ecd.manager@caldwellfirstnation.ca	September 19, 2023	ARA	Consultations@metisnation.org	email	Inquiry as to status of report review made.	Archaeological Impacts
Caldwell First Nation	Zack Hamm Environment and Consultation Department Manager E: ecd.manager@caldwellfirstnation.ca	September 21, 2023	Zack Hamm	ARA	email	Stated that the technical review agreement needs to be signed prior to review of the report.	Archaeological Impacts
Caldwell First Nation	Zack Hamm Environment and Consultation Department Manager E: ecd.manager@caldwellfirstnation.ca	September 21, 2023	CIMA+	Zack Hamm	emai	Inquired if the previously sent signed agreement was the one in question.	Archaeological Impacts
Caldwell First Nation	Zack Hamm Environment and Consultation Department Manager E: ecd.manager@caldwellfirstnation.ca	September 26, 2023	Zack Hamm	CIMA+	email	Confirmed that was the agreement in question and that it had been signed. Apologized for the confusion and stated that the report should be reviewed by early next week.	Archaeological Impacts
Caldwell First Nation	Zack Hamm Environment and Consultation Department Manager E: ecd.manager@caldwellfirstnation.ca	October 6, 2023	CIMA+	Zack Hamm	phone	Inquiry as to status of report review made.	Archaeological Impacts
Caldwell First Nation	Zack Hamm Environment and Consultation Department Manager E: ecd.manager@caldwellfirstnation.ca	November 23, 2023	CIMA+	Zack Hamm	mail and email	Notice of Completion	Final Notice of Project
Métis Nation of Ontario	Mark Knell, Manager of Environemntal Assessment and Regulatory Issues 311-75 Sherbourne Street Toronto, ON M5A 2P9 P: (416) 977-9881 E: MarkK@metisnation.org	August 11, 2021	CIMA+	Mark Knell	mail	Notice of Commencement	Initial Notice of Project
Métis Nation of Ontario	Mark Knell, Manager of Environemntal Assessment and Regulatory Issues 311-75 Sherbourne Street Toronto, ON M5A 2P9 P: (416) 977-9881 E: MarkK@metisnation.org	November 21, 2022	PHCI	Mark Knell	email	Request for input to Cultural Heritage Assessment	Cutural Heritage Impacts
Métis Nation of Ontario	Mark Knell, Manager of Environemntal Assessment and Regulatory Issues 311-75 Sherbourne Street Toronto, ON M5A 2P9 P: (416) 977-9881 E: MarkK@metisnation.org	November 22, 2022	Ethan Roy	PHCI	email	requested a Map of the Study Area	Ensuring that the request goes to the correct consultations committee
Métis Nation of Ontario	Ethan Roy Regions 4 & 7 Consultations Advisor Sault Ste. Marie Office Phone: (705) 527-3612 Email: consultations@metisnation.org					Asked that future requestes be submitted to consultations@metisnations.org	
Métis Nation of Ontario	Ethan Roy Regions 4 & 7 Consultations Advisor Sault Ste. Marie Office Phone: (705) 527-3612 Email: consultations@metisnation.org	February 3, 2023	ARA	Ethan Roy	email	Invitation to participate in archaeological Investigation	Archaeological Impacts
Métis Nation of Ontario	Ethan Roy Regions 4 & 7 Consultations Advisor Sault Ste. Marie Office Phone: (705) 527-3612 Email: consultations@metisnation.org	March 10, 2023	ARA	Ethan Roy	email	Follow up invitation to participate to participate in Archaeological Investigation	Archaeological Impacts
Métis Nation of Ontario	Ethan Roy Regions 4 & 7 Consultations Advisor Sault Ste. Marie Office Phone: (705) 527-3612 Email: consultations@metisnation.org	March 20, 2023	CIMA+	Ethan Roy	email	Notice of PIC	Notice of Public Information Center
Métis Nation of Ontario	Ethan Roy Regions 4 & 7 Consultations Advisor Sault Ste. Marie Office Phone: (705) 527-3612 Email: consultations@metisnation.org	April 20, 2023	ARA	Ethan Roy	email	Deployment details circulated for Stage 1 property inspection on 26-Apr-23	Archaeological Impacts
Métis Nation of Ontario	Ethan Roy Regions 4 & 7 Consultations Advisor Sault Ste. Marie Office Phone: (705) 527-3612 Email: consultations@metisnation.org	June 29, 2023	ARA	Ethan Roy	email	Deployment details circulated for Stage 2 archaeological Assessment on 07-Jul-23	Archaeological Impacts

Owner: Town of Petrolia
Project Name: Bright's Grove Water Treatment Plant Intake Replacement
Project No.:

CIMA+ Project No.: T001646A
File: 050
Updated: November 22, 2023

COMMUNICATIONS LOG

Indigenous Community	Indigenous Community Contact Details	Date	From	To	Medium (eg. email, letter, phone call)	Communication Description	Nature of Concern(s)
Métis Nation of Ontario	Ethan Roy Regions 4 & 7 Consultations Advisor Sault Ste. Marie Office Phone: (705) 527-3612 Email: consultations@metisnation.org	July 17, 2023	CIMA+	Ethan Roy	email	Notice of PIC 2	Notice of Public Inofmration Center
Métis Nation of Ontario	Ethan Roy Regions 4 & 7 Consultations Advisor Sault Ste. Marie Office Phone: (705) 527-3612 Email: consultations@metisnation.org	November 21, 2022	PHCI	Ethan Roy	email	Request for input to Cultural Heritage Assessment	Cutural Heritage Impacts
Métis Nation of Ontario	Ethan Roy Regions 4 & 7 Consultations Advisor Sault Ste. Marie Office Phone: (705) 527-3612 Email: consultations@metisnation.org	August 31, 2023	ARA	Consultations@metisnation.org	email	Draft Report for Stage 1 and Stage 2 AA	Archaeological Impacts
Métis Nation of Ontario	Laura Desaulniers Environmental Advisor Land, Resources & Consultation Branch Metis Nation of Ontario Email: LauraD@metisnation.org and consultations@metisnation.org	September 19, 2023	ARA	Consultations@metisnation.org	email	Following up to check in on the statuts of the report. Requested comments by September 22, 2023 or to let ARA know if more time was needed.	Archaeological Impacts
Métis Nation of Ontario	Laura Desaulniers Environmental Advisor Land, Resources & Consultation Branch Metis Nation of Ontario Email: LauraD@metisnation.org and consultations@metisnation.org	September 22, 2023	Laura Desaulniers	ARA	email	Stated that draft report was sent to the Region 9 Consultations committee and that they have not yet provided questions or comments.	Archaeological Impacts
Métis Nation of Ontario	Laura Desaulniers Environmental Advisor Land, Resources & Consultation Branch Metis Nation of Ontario Email: LauraD@metisnation.org and consultations@metisnation.org	September 25, 2023	ARA	Laura Desaulniers	email	Thanked Laura.	Archaeological Impacts
Métis Nation of Ontario	Laura Desaulniers Environmental Advisor Land, Resources & Consultation Branch Metis Nation of Ontario Email: LauraD@metisnation.org and consultations@metisnation.org	November 23, 2023	CIMA+	Ethan Roy and Laura Desaulniers	mail and email	Notice of Completion	Final Notice of Project
Munsee-Delaware Nation	Roger Thomas - Chief 289 Jubilee Rd, RR 1 Muncey, ON N0L 1Y0 Email: chief@munsee.ca, reception@munsee.ca, consultation@munsee.ca	February 15, 2023	ARA	Roger Thomas	email	Invitation to participate in Archaeological Investigation	Archaeological Impacts
Munsee-Delaware Nation	Roger Thomas - Chief 289 Jubilee Rd, RR 1 Muncey, ON N0L 1Y0 Email: chief@munsee.ca, reception@munsee.ca, consultation@munsee.ca	March 10, 2023	ARA	Roger Thomas	email	Follow up invitation to participate in Archaeological Investigation	Archaeological Impacts
Munsee-Delaware Nation	Roger Thomas - Chief 289 Jubilee Rd, RR 1 Muncey, ON N0L 1Y0 Email: chief@munsee.ca, reception@munsee.ca, consultation@munsee.ca	March 20, 2023	ARA	Roger Thomas	email	Notice of PIC	Notice of Public Information Center
Munsee-Delaware Nation	Roger Thomas - Chief 289 Jubilee Rd, RR 1 Muncey, ON N0L 1Y0 Email: chief@munsee.ca, reception@munsee.ca, consultation@munsee.ca	February 14, 2023	PHCI	Roger Thomas	email	Request for input to Cultural Heritage Assessment via email	
Munsee-Delaware Nation	Roger Thomas - Chief 289 Jubilee Rd, RR 1 Muncey, ON N0L 1Y0 Email: chief@munsee.ca, reception@munsee.ca, consultation@munsee.ca	April 20, 2023	ARA	Roger Thomas	email	Deployment details circulated for Stage 1 property inspection on 26-Apr-23	Archaeological Impacts
Munsee-Delaware Nation	Roger Thomas - Chief 289 Jubilee Rd, RR 1 Muncey, ON N0L 1Y0 Email: chief@munsee.ca, reception@munsee.ca, consultation@munsee.ca	June 29, 2023	ARA	Roger Thomas	email	Deployment details circulated for Stage 2 archaeological Assessment on 07-Jul-23	Archaeological Impacts
Munsee-Delaware Nation	Roger Thomas - Chief 289 Jubilee Rd, RR 1 Muncey, ON N0L 1Y0 Email: chief@munsee.ca, reception@munsee.ca, consultation@munsee.ca	July 17, 2023	CIMA+	Roger Thomas	email	Notice of PIC 2	Notice of Public Inofmration Center
Munsee-Delaware Nation	Roger Thomas - Chief 289 Jubilee Rd, RR 1 Muncey, ON N0L 1Y0 Email: chief@munsee.ca, reception@munsee.ca, consultation@munsee.ca	August 31, 2023	ARA	Roger Thomas	email	Draft Report for Stage 1 and Stage 2 AA	Archaeological Impacts
Munsee-Delaware Nation	Roger Thomas - Chief 289 Jubilee Rd, RR 1 Muncey, ON N0L 1Y0 Email: chief@munsee.ca, reception@munsee.ca, consultation@munsee.ca	September 19, 2023	ARA	Roger Thomas	email	Inquiry as to status of report review made.	Archaeological Impacts
Munsee-Delaware Nation	Roger Thomas - Chief 289 Jubilee Rd, RR 1 Muncey, ON N0L 1Y0 Email: chief@munsee.ca, reception@munsee.ca, consultation@munsee.ca	September 26, 2023	ARA	Roger Thomas	phone	Inquiry as to status of report review made. S. Phillip answered and stated that MDN had no questions or comments.	Archaeological Impacts
Munsee-Delaware Nation	Roger Thomas - Chief 289 Jubilee Rd, RR 1 Muncey, ON N0L 1Y0 Email: chief@munsee.ca, reception@munsee.ca, consultation@munsee.ca	November 23, 2023	CIMA+	Roger Thomas	mail and email	Notice of Completion	Final Notice of Project

Appendix A-5: First Nation Consultation
Aamjiwnaang First Nation

Charlotte Creron

From: sarah.clarke@araheritage.ca
Sent: October 13, 2022 7:22 AM
To: 'Wanda Maness'; cobrien@aamjiwnaang.ca
Cc: Adam Moore; alexis.dunlop@araheritage.ca; chiara.williamson@araheritage.ca; 'Victoria Cafik'
Subject: ARA Project Notification - Stage 1 and Marine Assessment Bright's Grove WTP - AFN
Attachments: ARA Project Notification - Stage - Brights Grove St. 1 and Marine - AFN.pdf

EXTERNAL EMAIL

Good morning,

Archaeological Research Associates Ltd. (ARA) has been contracted by CIMA+ for a Stage 1 archaeological assessment and marine archaeological assessment to be conducted for Bright's Grove Water Treatment Plant New Intake project. Please see the attached letter for project specifics. In order to begin the deployment process, we would like to confirm your interest in participating in the project and how you would like to be engaged by **October 26, 2022**. Agreements for this project will be signed with our client and can be sent to Adam Moore at Adam.Moore@cima.ca. Please confirm your interest in participating with Sarah Clarke at sarah.clarke@araheritage.ca. We look forward to hearing from you.

Kind regards,
Sarah

Sarah Clarke, BA, CAHP
Team Lead, Research
Team Member, Indigenous Engagement and Accommodation
219-900 Guelph Street, Kitchener, ON N2H 5Z6
P 519.804.2291 ext. 182 | E sarah.clarke@araheritage.ca
www.araheritage.ca

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

ARA
ARCHAEOLOGY | HERITAGE | OUTREACH | CONSERVATION

Charlotte Creron

From: sarah.clarke@araheritage.ca
Sent: October 20, 2022 11:36 AM
To: 'Wanda Maness'; cobrien@aamjiwnaang.ca
Cc: Adam Moore; alexis.dunlop@araheritage.ca; chiara.williamson@araheritage.ca; 'Victoria Cafik'
Subject: RE: ARA Project Notification - Stage 1 and Marine Assessment Bright's Grove WTP - AFN

EXTERNAL EMAIL

Good morning,

Due to the deteriorating weather conditions it will be necessary to conduct the marine assessment portion of this project this **Sunday October 23, 2022**. The marine archaeologist, Scarlett Janusas, will be onsite at 8am to set up her equipment and she let me know that the assessment will begin at 10 as her set up with take two hours. Scarlett will meet liaisons on the shore prior to beginning the assessment. Due to insurance regulations, Scarlett will not be able to have liaisons join her on her vessel, but liaisons are welcome to go into the water in their own boat or can watch from the shore. Scarlett will also circulate an update regarding the results of the assessment to engaged communities following the assessment prior to the circulation of the draft report. Please do not hesitate to contact me with any questions you may have.

Kind regards,
Sarah

Sarah Clarke, BA, CAHP
Team Lead, Research
Team Member, Indigenous Engagement and Accommodation
219-900 Guelph Street, Kitchener, ON N2H 5Z6
P 519.804.2291 ext. 182 | E sarah.clarke@araheritage.ca
www.araheritage.ca

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: sarah.clarke@araheritage.ca <sarah.clarke@araheritage.ca>
Sent: October 13, 2022 7:22 AM
To: 'Wanda Maness' <ttms.maness@gmail.com>; 'cobrien@aamjiwnaang.ca' <cobrien@aamjiwnaang.ca>
Cc: 'Adam.Moore@cima.ca' <Adam.Moore@cima.ca>; 'alexis.dunlop@araheritage.ca' <alexis.dunlop@araheritage.ca>; 'chiara.williamson@araheritage.ca' <chiara.williamson@araheritage.ca>; 'Victoria Cafik' <victoria.cafik@araheritage.ca>
Subject: ARA Project Notification - Stage 1 and Marine Assessment Bright's Grove WTP - AFN

Good morning,

Archaeological Research Associates Ltd. (ARA) has been contracted by CIMA+ for a Stage 1 archaeological assessment and marine archaeological assessment to be conducted for Bright's Grove Water Treatment Plant New Intake project. Please see the attached letter for project specifics. In order to begin the deployment process, we would like to confirm your interest in participating in the project and how you would like to be engaged by **October 26, 2022**.

Agreements for this project will be signed with our client and can be sent to Adam Moore at Adam.Moore@cima.ca. Please confirm your interest in participating with Sarah Clarke at sarah.clarke@araheritage.ca. We look forward to hearing from you.

Kind regards,
Sarah

Sarah Clarke, BA, CAHP
Team Lead, Research
Team Member, Indigenous Engagement and Accommodation
219-900 Guelph Street, Kitchener, ON N2H 5Z6
P 519.804.2291 ext. 182 | E sarah.clarke@araheritage.ca
www.araheritage.ca

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

ARA
ARCHAEOLOGY | HERITAGE | OUTREACH | CONSERVATION

Charlotte Creron

From: megan.devries@araheritage.ca
Sent: April 20, 2023 2:08 PM
To: 'Wanda Maness'; cobrien@aamjiwnaang.ca
Cc: Adam Moore; alexis.dunlop@araheritage.ca; chiara.williamson@araheritage.ca; janet.gardner@araheritage.ca
Subject: ARA Deployment - Stage 1 Bright's Grove WTP - April 26 2023 - AFN

EXTERNAL EMAIL

Good afternoon,

ARA has scheduled fieldwork for Bright's Grove WTP for Wednesday, April 26. Please find the deployment details below and let me know if you have any questions or concerns. If you are able to let me know the name and number of the representative who will be participating in the fieldwork, that would be greatly appreciated.

ARA Project Number: 2022-0378
Project Name: Bright's Grove WTP Intake EA
Stage of Work: Stage 1
Fieldwork Start Date: April 26, 2023
Fieldwork Duration: 1 day
Meeting Time: 9:30am
Meeting Location: Ontario Clean Water Agency in Bright's Grove (https://www.google.com/maps/place/Ontario+Clean+Water+Agency/@43.0334698,-82.2525253,70m/data=!3m1!1e3!4m6!3m5!1s0x882587a05fd8099b:0x9a601561e7d163b3!8m2!3d43.0334047!4d-82.2521961!16s%2Fg%2F11b5wkh0rp)
Field Director: Janet Gardner (519-636-5095)
Size of Field Crew: 1 field director
PPE Required: CSA-approved safety boots, high-visibility safety vest

If agreements still need to be executed for this project, please contact Adam Moore at adam.moore@cima.ca.

Sincerely.
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARA
ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

Charlotte Creron

From: Charlotte Creron
Sent: August 31, 2023 3:19 PM
To: Charlotte Creron
Subject: FW: ARA Report Review - St 1-2 Bright's Grove WTP - AFN
Attachments: image001.png

From: Wanda Maness <ttms.maness@gmail.com>
Sent: Thursday, August 31, 2023 12:16 PM
To: megan.devries@araheritage.ca
Cc: cobrien@aamjiwnaang.ca; alexis.dunlop@araheritage.ca; Kait Kenel <kait.kenel@araheritage.ca>; Adam Moore <Adam.Moore@cima.ca>
Subject: Re: ARA Report Review - St 1-2 Bright's Grove WTP - AFN

EXTERNAL EMAIL

Looks good to me.

On Thu, Aug 31, 2023 at 9:06 AM <megan.devries@araheritage.ca> wrote:

> Good morning!
>
> Please find attached the draft report and supplementary documentation for your review entitled:
>
> *Stage 1 and 2 Archaeological Assessment*
>
> *Bright's Grove Water Treatment Plant New Intake*
>
> *City of Sarnia*
>
> *Part of Lot 9, Concession 9 AKA Front Concession*
>
> *Geographic Township of Sarnia*
>
> *Lambton County, Ontario*
>
> ARA Project #2022-0378

We are hoping to receive your comments regarding the draft report by September 15, 2023, prior to our submission to the MCM. Please advise if this timeframe is not achievable for your review.

Thank you,

Megan.

Megan DeVries, M.A. (she/her)

Indigenous Engagement Specialist

Archaeological Research Associates Ltd.

Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9

Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5

C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

Appendix A-5: First Nation Consultation Assembly of First Nations

Charlotte Creron

From: megan.devries@araheritage.ca
Sent: March 10, 2023 12:03 PM
To: slickers@afn.ca
Cc: Adam Moore; alexis.dunlop@araheritage.ca; sarah.clarke@araheritage.ca; chiara.williamson@araheritage.ca
Subject: RE: RE: ARA Project Notification - Stage 1 and Marine Assessment Bright's Grove WTP - AOFN

EXTERNAL EMAIL

Good morning,

I am writing to follow up and provide an update on the Bright's Grove WTP project about which Sarah Clarke had previously sent a notification.

ARA completed in the marine assessment in October 2022. The Stage 1 property inspection will take place this spring when conditions allow. We would like to confirm your interest in participating in this project. Any necessary agreements to facilitate your participation in this project can be sent to Adam Moore at Adam.Moore@cima.ca.

All the best,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
219-900 Guelph Street, Kitchener, ON N2H 5Z6
P 519.804.2291 x180 | E megan.devries@araheritage.ca
www.araheritage.ca
@ArchResearch **@ARAHeritage**

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: sarah.clarke@araheritage.ca <sarah.clarke@araheritage.ca>
Sent: March 10, 2023 11:16 AM
To: megan.devries@araheritage.ca
Subject: FW: RE: ARA Project Notification - Stage 1 and Marine Assessment Bright's Grove WTP - AOFN

Sarah Clarke, BA, CAHP
Team Lead, Research
Team Member, Indigenous Engagement and Accommodation
219-900 Guelph Street, Kitchener, ON N2H 5Z6
P 519.804.2291 ext. 182 | E sarah.clarke@araheritage.ca
www.araheritage.ca

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: sarah.clarke@araheritage.ca <sarah.clarke@araheritage.ca>
Sent: February 8, 2023 2:10 PM
To: 'slickers@afn.ca' <slickers@afn.ca>
Cc: 'Adam.Moore@cima.ca' <Adam.Moore@cima.ca>; 'alexis.dunlop@araheritage.ca' <alexis.dunlop@araheritage.ca>; 'chiara.williamson@araheritage.ca' <chiara.williamson@araheritage.ca>; 'Stuart Winchester' <stuart.winchester@cima.ca>
Subject: RE: ARA Project Notification - Stage 1 and Marine Assessment Bright's Grove WTP - AOFN

Good afternoon,

Archaeological Research Associates Ltd. (ARA) has been contracted by CIMA+ for a Stage 1 archaeological assessment and marine archaeological assessment to be conducted for Bright's Grove Water Treatment Plant New Intake project. The marine component assessment component of the project was completed in October 2022. Please see the attached letter for project specifics. In order to begin the deployment process, we would like to confirm your interest in participating in the project and how you would like to be engaged by **February 17, 2023**. Agreements for this project will be signed with our client and can be sent to Adam Moore at Adam.Moore@cima.ca. Please confirm your interest in participating with Sarah Clarke at sarah.clarke@araheritage.ca. We look forward to hearing from you.

Kind regards,
Sarah

Sarah Clarke, BA, CAHP
Team Lead, Research
Team Member, Indigenous Engagement and Accommodation
219-900 Guelph Street, Kitchener, ON N2H 5Z6
P 519.804.2291 ext. 182 | E sarah.clarke@araheritage.ca
www.araheritage.ca

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

ARA
ARCHAEOLOGY | HERITAGE | OUTREACH | CONSERVATION

Charlotte Creron

From: megan.devries@araheritage.ca
Sent: April 20, 2023 2:08 PM
To: slickers@afn.ca
Cc: Adam Moore; alexis.dunlop@araheritage.ca; chiara.williamson@araheritage.ca; janet.gardner@araheritage.ca
Subject: ARA Deployment - Stage 1 Bright's Grove WTP - April 26 2023 - AOFN

EXTERNAL EMAIL

Good afternoon,

ARA has scheduled fieldwork for Bright's Grove WTP for Wednesday, April 26. Please find the deployment details below and let me know if you have any questions or concerns. If you are able to let me know the name and number of the representative who will be participating in the fieldwork, that would be greatly appreciated.

ARA Project Number: 2022-0378
Project Name: Bright's Grove WTP Intake EA
Stage of Work: Stage 1
Fieldwork Start Date: April 26, 2023
Fieldwork Duration: 1 day
Meeting Time: 9:30am
Meeting Location: Ontario Clean Water Agency in Bright's Grove (https://www.google.com/maps/place/Ontario+Clean+Water+Agency/@43.0334698,-82.2525253,70m/data=!3m1!1e3!4m6!3m5!1s0x882587a05fd8099b:0x9a601561e7d163b3!8m2!3d43.0334047!4d-82.2521961!16s%2Fg%2F11b5wkh0rp)
Field Director: Janet Gardner (519-636-5095)
Size of Field Crew: 1 field director
PPE Required: CSA-approved safety boots, high-visibility safety vest

If agreements still need to be executed for this project, please contact Adam Moore at adam.moore@cima.ca.

Sincerely.
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARA
ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

Charlotte Creron

From: megan.devries@araheritage.ca
Sent: September 19, 2023 12:51 PM
To: slickers@afn.ca
Cc: alexis.dunlop@araheritage.ca; 'Kait Kenel'; Adam Moore
Subject: RE: ARA Report Review - St 1-2 Bright's Grove WTP - AOFN

EXTERNAL EMAIL

Good afternoon,

I am writing to check in on the status of this report review. Would it be possible to get your comments by Friday, September 22? Please let me know if you need more time to complete the review.

Thank you!
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: Thursday, August 31, 2023 9:07 AM
To: 'slickers@afn.ca' <slickers@afn.ca>
Cc: 'alexis.dunlop@araheritage.ca' <alexis.dunlop@araheritage.ca>; 'Kait Kenel' <kait.kenel@araheritage.ca>; 'Adam Moore' <Adam.Moore@cima.ca>
Subject: ARA Report Review - St 1-2 Bright's Grove WTP - AOFN

Good morning!

Please find attached the draft report and supplementary documentation for your review entitled:

Stage 1 and 2 Archaeological Assessment
Bright's Grove Water Treatment Plant New Intake
City of Sarnia
Part of Lot 9, Concession 9 AKA Front Concession

Geographic Township of Sarnia
Lambton County, Ontario

ARA Project #2022-0378

We are hoping to receive your comments regarding the draft report by September 15, 2023, prior to our submission to the MCM. Please advise if this timeframe is not achievable for your review.

Thank you,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

Appendix A-5: First Nation Consultation

Caldwell First Nation

Charlotte Creron

From: sarah.clarke@araheritage.ca
Sent: March 8, 2023 11:07 AM
To: Adam Moore
Cc: Stuart Winchester; megan.devries@araheritage.ca; chiara.williamson@araheritage.ca; alexis.dunlop@araheritage.ca
Subject: FW: FW: ARA Project Notification - Stage 1 and Marine Assessment Bright's Grove WTP - CFN
Attachments: TRA Brights Grove Stg 1 AA and Marine Assessment-signed.pdf; FPA Bright's Grove Stg 1 AA and Marine Assessment-signed.pdf

Follow Up Flag: Follow up
Flag Status: Completed

EXTERNAL EMAIL

Good morning Adam,

Caldwell First Nation sent us the signed agreement for this project, attached.

Kind regards,
Sarah

Sarah Clarke, BA, CAHP
Team Lead, Research
Team Member, Indigenous Engagement and Accommodation
219-900 Guelph Street, Kitchener, ON N2H 5Z6
P 519.804.2291 ext. 182 | E sarah.clarke@araheritage.ca
www.araheritage.ca

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: Zack Hamm <ecd.manager@caldwellfirstnation.ca>
Sent: March 8, 2023 10:16 AM
To: sarah.clarke@araheritage.ca
Cc: chiara.williamson@araheritage.ca; alexis.dunlop@araheritage.ca; Michelle McCormack <ecc@caldwellfirstnation.ca>
Subject: Re: FW: ARA Project Notification - Stage 1 and Marine Assessment Bright's Grove WTP - CFN

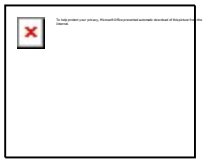
Find attached signed agreements. Thanks Sarah.

Best,

Zack Hamm

Environment and Consultation Department Manager

Environment and Consultation Department (ECD)



Caldwell First Nation

14 Orange Street

Leamington | ON | N8H 1P5

Phone: 226-936-2940

ecd.manager@caldwellfirstnation.ca

On Fri, Mar 3, 2023 at 9:47 AM <sarah.clarke@araheritage.ca> wrote:

> Thank you Zack!
>
> Happy Friday!
>
> Sarah
>
> **Sarah Clarke, BA, CAHP**
> **Team Lead, Research**
>
> **Team Member, Indigenous Engagement and Accommodation**
> 219-900 Guelph Street, Kitchener, ON N2H 5Z6
> P 519.804.2291 ext. 182 | E sarah.clarke@araheritage.ca
> www.araheritage.ca

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: Zack Hamm <ecd.manager@caldwellfirstnation.ca>
Sent: March 3, 2023 8:49 AM
To: sarah.clarke@araheritage.ca
Cc: chiara.williamson@araheritage.ca; alexis.dunlop@araheritage.ca; Michelle McCormack <ecc@caldwellfirstnation.ca>
Subject: Re: FW: ARA Project Notification - Stage 1 and Marine Assessment Bright's Grove WTP - CFN

Thanks Sarah,

I've forwarded these for signing. Looking forward to it.

Best,

Zack Hamm

Environment and Consultation Department Manager

Environment and Consultation Department (ECD)

Caldwell First Nation

14 Orange Street

Leamington | ON | N8H 1P5

Phone: 226-936-2940

ecd.manager@caldwellfirstnation.ca

On Tue, Feb 21, 2023 at 9:18 PM <sarah.clarke@araheritage.ca> wrote:

Good evening Zack,

Please find attached the agreements for the Bright's Grove project attached. Our client has filled out the contact information and has requested that Caldwell First Nation have the agreement signed and returned. They will then sign and return the fully executed agreement to you. Please let me know if you have any questions. We look forward to working with Caldwell First Nation on this project.

Kind regards,

Sarah

Sarah Clarke, BA, CAHP
Team Lead, Research

Team Member, Indigenous Engagement and Accommodation
219-900 Guelph Street, Kitchener, ON N2H 5Z6
P 519.804.2291 ext. 182 | E sarah.clarke@araheritage.ca
www.araheritage.ca

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: Zack Hamm <ecd.manager@caldwellfirstnation.ca>
Sent: February 8, 2023 10:16 AM
To: sarah.clarke@araheritage.ca
Cc: Jenna Morrison <etow@caldwellfirstnation.ca>; Adam.Moore@cima.ca; alexis.dunlop@araheritage.ca; chiara.williamson@araheritage.ca; Michelle McCormack <ecc@caldwellfirstnation.ca>
Subject: Re: ARA Project Notification - Stage 1 and Marine Assessment Bright's Grove WTP - CFN

Good morning Sarah,

I hope your New Year is going very well so far! I appreciate the invitation. CFN will participate through field work participation and through technical review of project-related documents. This includes sending a representative along on site visits. If necessary, we may insist on community engagement to be funded by the proponent depending on project parameters and finds. Please find attached our standardized agreements. Feel free to escalate them to your signing authorities (Adam Moore), return, and I'll do the same on our end.

Best,

Zack Hamm

Environment and Consultation Department Manager

Environment and Consultation Department (ECD)

Caldwell First Nation

14 Orange Street

Leamington | ON | N8H 1P5

Phone: 226-936-2940

ecd.manager@caldwellfirstnation.ca

On Fri, Feb 3, 2023 at 12:11 PM <sarah.clarke@araheritage.ca> wrote:

Good afternoon,

Archaeological Research Associates Ltd. (ARA) has been contracted by CIMA+ for a Stage 1 archaeological assessment and marine archaeological assessment to be conducted for Bright's Grove Water Treatment Plant New Intake project. The marine component assessment component of the project was completed in October 2022. Please see the attached letter for project specifics. In order to begin the deployment process, we would like to confirm your interest in participating in the project and how you would like to be engaged by **February 17, 2023**. Agreements for this project will be signed with our client and can be sent to Adam Moore at Adam.Moore@cima.ca. Please confirm your interest in participating with Sarah Clarke at sarah.clarke@araheritage.ca. We look forward to hearing from you.

Kind regards,

Sarah

Sarah Clarke, BA, CAHP
Team Lead, Research

Team Member, Indigenous Engagement and Accommodation
219-900 Guelph Street, Kitchener, ON N2H 5Z6
P 519.804.2291 ext. 182 | E sarah.clarke@araheritage.ca
www.araheritage.ca

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

ARA
ARCHAEOLOGY | HERITAGE | OUTREACH | CONSERVATION

Charlotte Creron

From: megan.devries@araheritage.ca
Sent: April 20, 2023 2:08 PM
To: ecd.manager@caldwellfirstnation.ca; ecc@caldwellfirstnation.ca
Cc: Adam Moore; alexis.dunlop@araheritage.ca; chiara.williamson@araheritage.ca; janet.gardner@araheritage.ca
Subject: ARA Deployment - Stage 1 Bright's Grove WTP - April 26 2023 - CFN

EXTERNAL EMAIL

Good afternoon,

ARA has scheduled fieldwork for Bright's Grove WTP for Wednesday, April 26. Please find the deployment details below and let me know if you have any questions or concerns. If you are able to let me know the name and number of the representative who will be participating in the fieldwork, that would be greatly appreciated.

ARA Project Number: 2022-0378
Project Name: Bright's Grove WTP Intake EA
Stage of Work: Stage 1
Fieldwork Start Date: April 26, 2023
Fieldwork Duration: 1 day
Meeting Time: 9:30am
Meeting Location: Ontario Clean Water Agency in Bright's Grove (https://www.google.com/maps/place/Ontario+Clean+Water+Agency/@43.0334698,-82.2525253,70m/data=!3m1!1e3!4m6!3m5!1s0x882587a05fd8099b:0x9a601561e7d163b3!8m2!3d43.0334047!4d-82.2521961!16s%2Fg%2F11b5wkh0rp)
Field Director: Janet Gardner (519-636-5095)
Size of Field Crew: 1 field director
PPE Required: CSA-approved safety boots, high-visibility safety vest

If agreements still need to be executed for this project, please contact Adam Moore at adam.moore@cima.ca.

Sincerely.
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARA
ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

Charlotte Creron

From: Charlotte Creron
Sent: August 31, 2023 3:22 PM
To: Charlotte Creron
Subject: FW: CFN interest in Bright's Grove Intake Replacement EA

Follow Up Flag: Follow up
Flag Status: Flagged

From: Zack Hamm <ecd.manager@caldwellfirstnation.ca>
Sent: Monday, July 31, 2023 2:00 PM
To: Adam Moore <Adam.Moore@cima.ca>
Cc: Mike Thompson <mthompson@petrolia.ca>; Stuart Winchester <stuart.winchester@cima.ca>; ecc@caldwellfirstnation.ca; landguardian@caldwellfirstnation.ca
Subject: Re: CFN interest in Bright's Grove Intake Replacement EA

EXTERNAL EMAIL

Thanks Adam,

We'll be happy to review the report as part of the overall review of the EA. If there is any environmental fieldwork, please give us a heads up so we can arrange for deployment as well. I'll forward these agreements for signing.

Best,

Zack Hamm

Environment and Consultation Department Manager

Environment and Consultation Department (ECD)

Caldwell First Nation

14 Orange Street

Leamington | ON | N8H 1P5

Phone: 226-936-2940

ecd.manager@caldwellfirstnation.ca

On Sun, Jul 30, 2023 at 9:56 PM Adam Moore <Adam.Moore@cima.ca> wrote:

> Hi Zack,
>
> Please see the attached signed agreements. Please note, the fieldwork for the archeological assessment is completed and we can send along a copy of the final report, if interested.
>
> **ADAM MOORE,** M.A.Sc., P.Eng.
> Project Engineer / Infrastructure – Water and Wastewater
> **M** 519-830-7015
> 900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA
>
> 
>
>
> 
>
>
>
>
> **From:** Zack Hamm <ecd.manager@caldwellfirstnation.ca>
> **Sent:** Tuesday, July 25, 2023 1:19 PM
> **To:** Mike Thompson <mthompson@petrolia.ca>
> **Cc:** Michelle McCormack <ecc@caldwellfirstnation.ca>; Jenna Maidment <landguardian@caldwellfirstnation.ca>
> **Subject:** CFN interest in Bright's Grove Intake Replacement EA
>
> Good afternoon Mike,

Chief Duckworth recently forwarded your email to me regarding your PIC on the Bright's Grove WTP EA. We require proponents to upload engagement requests and notifications to consultwithcaldwell.ca in order to follow protocol and help us manage volumes. The Chief does not typically respond directly to technical items. Our Department is the first point of contact before escalating to Leadership or the community.

We are interested in participating in and reviewing your EA. I've attached some standard templates we use for archaeology and environmental fieldwork; please review them, modify according to your project, and send them back for approval. We can begin examining your materials from that point on, and therefore avoid causing delays.

Best,

Zack Hamm

Environment and Consultation Department Manager

Environment and Consultation Department (ECD)

Caldwell First Nation

14 Orange Street

Leamington | ON | N8H 1P5

Phone: 226-936-2940

ecd.manager@caldwellfirstnation.ca

Charlotte Creron

From: Charlotte Creron
Sent: August 31, 2023 3:22 PM
To: Charlotte Creron
Subject: FW: CFN interest in Bright's Grove Intake Replacement EA
Attachments: FPA Brights Grove Intake Replacement EA 2023-07-31-signed.pdf; TRA Brights Grove Intake Replacement EA 2023-07-31-signed.pdf

---

From: Zack Hamm <ecd.manager@caldwellfirstnation.ca>
Sent: Wednesday, August 9, 2023 9:19 AM
To: Adam Moore <Adam.Moore@cima.ca>
Cc: Mike Thompson <mthompson@petrolia.ca>; Stuart Winchester <stuart.winchester@cima.ca>; ecc@caldwellfirstnation.ca; landguardian@caldwellfirstnation.ca
Subject: Re: CFN interest in Bright's Grove Intake Replacement EA

EXTERNAL EMAIL

Good morning Adam,

Please see the signed agreements for your records.

Best,

Zack Hamm

Environment and Consultation Department Manager

Environment and Consultation Department (ECD)

Caldwell First Nation

14 Orange Street

Leamington | ON | N8H 1P5

Phone: 226-936-2940

ecd.manager@caldwellfirstnation.ca

On Sun, Jul 30, 2023 at 9:56 PM Adam Moore <Adam.Moore@cima.ca> wrote:

> Hi Zack,
>
> Please see the attached signed agreements. Please note, the fieldwork for the archeological assessment is completed and we can send along a copy of the final report, if interested.
>
> **ADAM MOORE,** M.A.Sc., P.Eng.
> Project Engineer / Infrastructure – Water and Wastewater
> **M** 519-830-7015
> 900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA
>
> 
>
> 
>
> 
>
>
> ---
>
>
>
> ---
>
> **From:** Zack Hamm <ecd.manager@caldwellfirstnation.ca>
> **Sent:** Tuesday, July 25, 2023 1:19 PM
> **To:** Mike Thompson <mthompson@petrolia.ca>
> **Cc:** Michelle McCormack <ecc@caldwellfirstnation.ca>; Jenna Maidment <landguardian@caldwellfirstnation.ca>
> **Subject:** CFN interest in Bright's Grove Intake Replacement EA
>
> Good afternoon Mike,
>
> Chief Duckworth recently forwarded your email to me regarding your PIC on the Bright's Grove WTP EA. We require proponents to upload engagement requests and notifications to consultwithcaldwell.ca in order to follow protocol and

help us manage volumes. The Chief does not typically respond directly to technical items. Our Department is the first point of contact before escalating to Leadership or the community.

We are interested in participating in and reviewing your EA. I've attached some standard templates we use for archaeology and environmental fieldwork; please review them, modify according to your project, and send them back for approval. We can begin examining your materials from that point on, and therefore avoid causing delays.

Best,

Zack Hamm

Environment and Consultation Department Manager

Environment and Consultation Department (ECD)

Caldwell First Nation

14 Orange Street

Leamington | ON | N8H 1P5

Phone: 226-936-2940

ecd.manager@caldwellfirstnation.ca

Charlotte Creron

From: Charlotte Creron
Sent: September 21, 2023 11:22 AM
To: Charlotte Creron
Subject: FW: CFN interest in Bright's Grove Intake Replacement EA

From: Adam Moore <Adam.Moore@cima.ca>
Sent: Monday, September 18, 2023 8:38 AM
To: Jenna Maidment <landguardian@caldwellfirstnation.ca>
Cc: ecd.manager@caldwellfirstnation.ca; Mike Thompson <mthompson@petrolia.ca>; Stuart Winchester <stuart.winchester@cima.ca>; ecc@caldwellfirstnation.ca; megan.devries@araheritage.ca; alexis.dunlop@araheritage.ca; Charlotte Creron <Charlotte.Creron@cima.ca>
Subject: RE: CFN interest in Bright's Grove Intake Replacement EA

Hi Jenna,

The draft archaeological reports have been uploaded to the CFN consultation portal.

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater
M 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

Engineering for people

From: Adam Moore
Sent: Friday, September 15, 2023 4:04 PM
To: Jenna Maidment <landguardian@caldwellfirstnation.ca>
Cc: ecd.manager@caldwellfirstnation.ca; Mike Thompson <mthompson@petrolia.ca>; Stuart Winchester <stuart.winchester@cima.ca>; ecc@caldwellfirstnation.ca; megan.devries@araheritage.ca; alexis.dunlop@araheritage.ca
Subject: RE: CFN interest in Bright's Grove Intake Replacement EA

Hi Jenna,

Apologies, from our records, it looks like the Archaeological Report was sent to Zack. Attached is the email with the draft report for reference.
We will submit the report to the consultation portal below.

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater

M 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

Engineering for people

30 YEARS

KINCENTRIC Best Employer CANADA 2019

From: Jenna Maidment <landguardian@caldwellfirstnation.ca>
Sent: Friday, September 15, 2023 3:47 PM
To: Adam Moore <Adam.Moore@cima.ca>
Cc: ecd.manager@caldwellfirstnation.ca; Mike Thompson <mthompson@petrolia.ca>; Stuart Winchester <stuart.winchester@cima.ca>; ecc@caldwellfirstnation.ca
Subject: Re: CFN interest in Bright's Grove Intake Replacement EA

EXTERNAL EMAIL

Hi Adam,

Zack and I have recently revisited the current status of this project on our end, realising that we have not received the completed Archeology Assessment report.

The AA report must be uploaded through our consultation portal at consultwithcaldwell.ca for our department to be able to review the documents. The same process applies for the EA once it is completed.

Miigwech,

Jenna Maidment *(she/her)*

Land Guardian *- Environment and Consultation Coordinator*

Environment and Consultation Department (ECD)

Caldwell First Nation

14 Orange Street

Leamington | ON | N8H 1P5

Phone: +1 226-936-1093

landguardian@caldwellfirstnation.ca

On Sun, Jul 30, 2023 at 9:56 PM Adam Moore <Adam.Moore@cima.ca> wrote:

> Hi Zack,
>
> Please see the attached signed agreements. Please note, the fieldwork for the archeological assessment is completed and we can send along a copy of the final report, if interested.
>
> **ADAM MOORE,** M.A.Sc., P.Eng.
> Project Engineer / Infrastructure – Water and Wastewater
> **M** 519-830-7015
> 900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA
>
> ---
>
>
>
> ---
>
> **From:** Zack Hamm <ecd.manager@caldwellfirstnation.ca>
> **Sent:** Tuesday, July 25, 2023 1:19 PM
> **To:** Mike Thompson <mthompson@petrolia.ca>
> **Cc:** Michelle McCormack <ecc@caldwellfirstnation.ca>; Jenna Maidment <landguardian@caldwellfirstnation.ca>
> **Subject:** CFN interest in Bright's Grove Intake Replacement EA
>
> Good afternoon Mike,
>
> Chief Duckworth recently forwarded your email to me regarding your PIC on the Bright's Grove WTP EA. We require proponents to upload engagement requests and notifications to consultwithcaldwell.ca in order to follow protocol and

help us manage volumes. The Chief does not typically respond directly to technical items. Our Department is the first point of contact before escalating to Leadership or the community.

We are interested in participating in and reviewing your EA. I've attached some standard templates we use for archaeology and environmental fieldwork; please review them, modify according to your project, and send them back for approval. We can begin examining your materials from that point on, and therefore avoid causing delays.

Best,

Zack Hamm

Environment and Consultation Department Manager

Environment and Consultation Department (ECD)

Caldwell First Nation

14 Orange Street

Leamington | ON | N8H 1P5

Phone: 226-936-2940

ecd.manager@caldwellfirstnation.ca

Charlotte Creron

From: Charlotte Creron
Sent: September 21, 2023 11:22 AM
To: Charlotte Creron
Subject: FW: ARA Report Review - St 1-2 Bright's Grove WTP - CFN
Attachments: image001.png

From: Adam Moore <Adam.Moore@cima.ca>
Sent: Thursday, September 21, 2023 8:26 AM
To: Charlotte Creron <Charlotte.Creron@cima.ca>
Subject: FW: ARA Report Review - St 1-2 Bright's Grove WTP - CFN

From: Zack Hamm <ecd.manager@caldwellfirstnation.ca>
Sent: Wednesday, September 20, 2023 2:47 PM
To: megan.devries@araheritage.ca
Cc: alexis.dunlop@araheritage.ca; Kait Kenel <kait.kenel@araheritage.ca>; Adam Moore <Adam.Moore@cima.ca>; Michael McMaster <ecd.assistant@caldwellfirstnation.ca>
Subject: Re: ARA Report Review - St 1-2 Bright's Grove WTP - CFN

EXTERNAL EMAIL

Thanks Megan,

We are still sorting out the TR Agreement for this project, which we must do before reviewing it, so please feel free to check in intermittently.

Best,

Zack Hamm

Environment and Consultation Department Manager

Environment and Consultation Department (ECD)

Caldwell First Nation

14 Orange Street

Leamington | ON | N8H 1P5

Phone: 226-936-2940

ecd.manager@caldwellfirstnation.ca

On Thu, Aug 31, 2023 at 9:06 AM <megan.devries@araheritage.ca> wrote:

> Good morning!
>
> Please find attached the draft report and supplementary documentation for your review entitled:
>
> *Stage 1 and 2 Archaeological Assessment*
>
> *Bright's Grove Water Treatment Plant New Intake*
>
> *City of Sarnia*
>
> *Part of Lot 9, Concession 9 AKA Front Concession*
>
> *Geographic Township of Sarnia*
>
> *Lambton County, Ontario*
>
> ARA Project #2022-0378
>
> We are hoping to receive your comments regarding the draft report by September 15, 2023, prior to our submission to the MCM. Please advise if this timeframe is not achievable for your review.
>
> Thank you,
>
> Megan.

Megan DeVries, M.A. (she/her)

Indigenous Engagement Specialist

Archaeological Research Associates Ltd.

Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9

Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5

C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

Charlotte Creron

From: megan.devries@araheritage.ca
Sent: September 19, 2023 12:51 PM
To: 'Zack Hamm'; landguardian@caldwellfirstnation.ca
Cc: alexis.dunlop@araheritage.ca; 'Kait Kenel'; Adam Moore
Subject: RE: ARA Report Review - St 1-2 Bright's Grove WTP - CFN
Attachments: RE: CFN interest in Bright's Grove Intake Replacement EA

EXTERNAL EMAIL

Good afternoon,

I am writing to check in on the status of this report review. Would it be possible to get your comments by Friday, September 22? I see that the report was recently provided through the consultation portal (attached communication), so please do let me know if you need more time.

Thank you!
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: Thursday, August 31, 2023 9:07 AM
To: 'Zack Hamm' <ecd.manager@caldwellfirstnation.ca>
Cc: 'alexis.dunlop@araheritage.ca' <alexis.dunlop@araheritage.ca>; 'Kait Kenel' <kait.kenel@araheritage.ca>; 'Adam Moore' <Adam.Moore@cima.ca>
Subject: ARA Report Review - St 1-2 Bright's Grove WTP - CFN

Good morning!

Please find attached the draft report and supplementary documentation for your review entitled:

Stage 1 and 2 Archaeological Assessment
Bright's Grove Water Treatment Plant New Intake

City of Sarnia
Part of Lot 9, Concession 9 AKA Front Concession
Geographic Township of Sarnia
Lambton County, Ontario

ARA Project #2022-0378

We are hoping to receive your comments regarding the draft report by September 15, 2023, prior to our submission to the MCM. Please advise if this timeframe is not achievable for your review.

Thank you,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

Appendix A-5: First Nation Consultation
Chippewas of Kettle and Stony Point First Nation

Charlotte Creron

From: megan.devries@araheritage.ca
Sent: March 10, 2023 11:58 AM
To: 'Consultation'
Cc: Adam Moore; alexis.dunlop@araheritage.ca; sarah.clarke@araheritage.ca; chiara.williamson@araheritage.ca
Subject: RE: ARA Project Notification - Stage 1 and Marine Assessment Bright's Grove WTP - CKSPFN

EXTERNAL EMAIL

Good morning,

I am writing to follow up and provide an update on the Bright's Grove WTP project about which Sarah Clarke had previously sent a notification.

ARA completed in the marine assessment in October 2022. The Stage 1 property inspection will take place this spring when conditions allow. We would like to confirm your interest in participating in this project. Any necessary agreements to facilitate your participation in this project will be executed by Adam Moore at Adam.Moore@cima.ca.

All the best,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
219-900 Guelph Street, Kitchener, ON N2H 5Z6
P 519.804.2291 x180 | E megan.devries@araheritage.ca
www.araheritage.ca
@ArchResearch **@ARAHeritage**

ARA
ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: sarah.clarke@araheritage.ca <sarah.clarke@araheritage.ca>
Sent: November 7, 2022 11:45 AM
To: 'Consultation' <consultation@kettlepoint.org>
Cc: 'Adam.Moore@cima.ca' <Adam.Moore@cima.ca>; 'alexis.dunlop@araheritage.ca' <alexis.dunlop@araheritage.ca>; 'chiara.williamson@araheritage.ca' <chiara.williamson@araheritage.ca>; 'Victoria Cafik' <victoria.cafik@araheritage.ca>
Subject: RE: ARA Project Notification - Stage 1 and Marine Assessment Bright's Grove WTP - CKSPFN

Good morning,

I am writing to follow up about the Bright's Grove WTP project below. The marine assessment component of this project has been completed, however we will be scheduling the Stage 2 terrestrial component of the assessment before appropriate conditions are lost. We would like to confirm your interest in participating in the project and have agreements signed with our client as soon as possible.

Kind regards,
Sarah

Sarah Clarke, BA, CAHP
Team Lead, Research
Team Member, Indigenous Engagement and Accommodation
219-900 Guelph Street, Kitchener, ON N2H 5Z6
P 519.804.2291 ext. 182 | E sarah.clarke@araheritage.ca
www.araheritage.ca

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: sarah.clarke@araheritage.ca <sarah.clarke@araheritage.ca>
Sent: October 20, 2022 11:36 AM
To: 'Consultation' <consultation@kettlepoint.org>
Cc: 'Adam.Moore@cima.ca' <Adam.Moore@cima.ca>; 'alexis.dunlop@araheritage.ca' <alexis.dunlop@araheritage.ca>; 'chiara.williamson@araheritage.ca' <chiara.williamson@araheritage.ca>; 'Victoria Cafik' <victoria.cafik@araheritage.ca>
Subject: RE: ARA Project Notification - Stage 1 and Marine Assessment Bright's Grove WTP - CKSPFN

Good morning,

Due to the deteriorating weather conditions it will be necessary to conduct the marine assessment portion of this project this **Sunday October 23, 2022**. The marine archaeologist, Scarlett Janusas, will be onsite at 8am to set up her equipment and she let me know that the assessment will begin at 10 as her set up with take two hours. Scarlett will meet liaisons on the shore prior to beginning the assessment. Due to insurance regulations, Scarlett will not be able to have liaisons join her on her vessel, but liaisons are welcome to go into the water in their own boat or can watch from the shore. Scarlett will also circulate an update regarding the results of the assessment to engaged communities following the assessment prior to the circulation of the draft report. Please do not hesitate to contact me with any questions you may have.

Kind regards,
Sarah

Sarah Clarke, BA, CAHP
Team Lead, Research
Team Member, Indigenous Engagement and Accommodation
219-900 Guelph Street, Kitchener, ON N2H 5Z6
P 519.804.2291 ext. 182 | E sarah.clarke@araheritage.ca
www.araheritage.ca

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: sarah.clarke@araheritage.ca <sarah.clarke@araheritage.ca>
Sent: October 13, 2022 7:22 AM

To: 'valerie.george@kettlepoint.org' <valerie.george@kettlepoint.org>
Cc: 'Adam.Moore@cima.ca' <Adam.Moore@cima.ca>; 'alexis.dunlop@araheritage.ca' <alexis.dunlop@araheritage.ca>; 'chiara.williamson@araheritage.ca' <chiara.williamson@araheritage.ca>; 'Victoria Cafik' <victoria.cafik@araheritage.ca>
Subject: ARA Project Notification - Stage 1 and Marine Assessment Bright's Grove WTP - CKSPFN

Good morning,

Archaeological Research Associates Ltd. (ARA) has been contracted by CIMA+ for a Stage 1 archaeological assessment and marine archaeological assessment to be conducted for Bright's Grove Water Treatment Plant New Intake project. Please see the attached letter for project specifics. In order to begin the deployment process, we would like to confirm your interest in participating in the project and how you would like to be engaged by **October 26, 2022**. Agreements for this project will be signed with our client and can be sent to Adam Moore at Adam.Moore@cima.ca. Please confirm your interest in participating with Sarah Clarke at sarah.clarke@araheritage.ca. We look forward to hearing from you.

Kind regards,
Sarah

Sarah Clarke, BA, CAHP
Team Lead, Research
Team Member, Indigenous Engagement and Accommodation
219-900 Guelph Street, Kitchener, ON N2H 5Z6
P 519.804.2291 ext. 182 | E sarah.clarke@araheritage.ca
www.araheritage.ca

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

ARA
ARCHAEOLOGY | HERITAGE | OUTREACH | CONSERVATION

Charlotte Creron

From: megan.devries@araheritage.ca
Sent: April 20, 2023 2:08 PM
To: 'Consultation'
Cc: Adam Moore; alexis.dunlop@araheritage.ca; chiara.williamson@araheritage.ca; janet.gardner@araheritage.ca
Subject: ARA Deployment - Stage 1 Bright's Grove WTP - April 26 2023 - CKSPFN

EXTERNAL EMAIL

Good afternoon,

ARA has scheduled fieldwork for Bright's Grove WTP for Wednesday, April 26. Please find the deployment details below and let me know if you have any questions or concerns. If you are able to let me know the name and number of the representative who will be participating in the fieldwork, that would be greatly appreciated.

ARA Project Number: 2022-0378
Project Name: Bright's Grove WTP Intake EA
Stage of Work: Stage 1
Fieldwork Start Date: April 26, 2023
Fieldwork Duration: 1 day
Meeting Time: 9:30am
Meeting Location: Ontario Clean Water Agency in Bright's Grove (https://www.google.com/maps/place/Ontario+Clean+Water+Agency/@43.0334698,-82.2525253,70m/data=!3m1!1e3!4m6!3m5!1s0x882587a05fd8099b:0x9a601561e7d163b3!8m2!3d43.0334047!4d-82.2521961!16s%2Fg%2F11b5wkh0rp)
Field Director: Janet Gardner (519-636-5095)
Size of Field Crew: 1 field director
PPE Required: CSA-approved safety boots, high-visibility safety vest

If agreements still need to be executed for this project, please contact Adam Moore at adam.moore@cima.ca.

Sincerely.
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARA
ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

Charlotte Creron

From: Charlotte Creron
Sent: October 6, 2023 3:59 PM
To: Charlotte Creron
Subject: FW: ARA Report Review - St 1-2 Bright's Grove WTP - CKSPFN Report comments

Follow Up Flag: Follow up
Flag Status: Flagged

From: Consultation <Consultation@kettlepoint.org>
Sent: Friday, September 29, 2023 4:54 PM
To: megan.devries@araheritage.ca
Cc: alexis.dunlop@araheritage.ca; 'Kait Kenel' <kait.kenel@araheritage.ca>; Adam Moore <Adam.Moore@cima.ca>
Subject: Re: ARA Report Review - St 1-2 Bright's Grove WTP - CKSPFN

EXTERNAL EMAIL

Hello Megan,

CKSPFN Consultation has reviewed the noted report. Following review, our position is in agreement with the recommendations outlined in your report. The area does not contain archaeological potential and should not proceed to further land-based assessments.

Miigwetch,
CKSPFN Consultation

From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Date: Tuesday, September 26, 2023 at 12:54 PM
To: Consultation <Consultation@kettlepoint.org>
Cc: alexis.dunlop@araheritage.ca <alexis.dunlop@araheritage.ca>, 'Kait Kenel' <kait.kenel@araheritage.ca>, 'Adam Moore' <Adam.Moore@cima.ca>
Subject: RE: ARA Report Review - St 1-2 Bright's Grove WTP - CKSPFN

Hello Rob!

Thank you for speaking with me this afternoon! We are looking to file the report on October 6, so would appreciate any comments that you can provide before that time. Please let us know if that is feasible for you.

Kind regards,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9

Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: Tuesday, September 19, 2023 12:51 PM
To: 'Consultation' <Consultation@kettlepoint.org>
Cc: 'alexis.dunlop@araheritage.ca' <alexis.dunlop@araheritage.ca>; 'Kait Kenel' <kait.kenel@araheritage.ca>; 'Adam Moore' <Adam.Moore@cima.ca>
Subject: RE: ARA Report Review - St 1-2 Bright's Grove WTP - CKSPFN

Good afternoon,

I am writing to check in on the status of this report review. Would it be possible to get your comments by Friday, September 22? Please let me know if you need more time to complete the review.

Thank you!
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: Thursday, August 31, 2023 9:07 AM
To: 'Consultation' <Consultation@kettlepoint.org>
Cc: 'alexis.dunlop@araheritage.ca' <alexis.dunlop@araheritage.ca>; 'Kait Kenel' <kait.kenel@araheritage.ca>; 'Adam Moore' <Adam.Moore@cima.ca>
Subject: ARA Report Review - St 1-2 Bright's Grove WTP - CKSPFN

Good morning!

Please find attached the draft report and supplementary documentation for your review entitled:

Stage 1 and 2 Archaeological Assessment
Bright's Grove Water Treatment Plant New Intake
City of Sarnia
Part of Lot 9, Concession 9 AKA Front Concession
Geographic Township of Sarnia
Lambton County, Ontario

ARA Project #2022-0378

We are hoping to receive your comments regarding the draft report by September 15, 2023, prior to our submission to the MCM. Please advise if this timeframe is not achievable for your review.

Thank you,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

Appendix A-5: First Nation Consultation
Chippewas of the Thames First Nation

Charlotte Creron

From: sarah.clarke@araheritage.ca
Sent: November 8, 2022 1:07 PM
To: Adam Moore
Cc: 'Fallon Burch'
Subject: RE: ARA Project Notification - Stage 1 and Marine Assessement - COTTFN

Follow Up Flag: Follow up
Flag Status: Completed

EXTERNAL EMAIL

Hi Adam,

That's great, thank you! Once the agreement has been executed by you and Chippewas of the Thames First Nation, could a copy of the signed agreement be sent to me for ARA's files?

Kind regards,
Sarah

Sarah Clarke, BA, CAHP
Team Lead, Research
Team Member, Indigenous Engagement and Accommodation
219-900 Guelph Street, Kitchener, ON N2H 5Z6
P 519.804.2291 ext. 182 | E sarah.clarke@araheritage.ca
www.araheritage.ca

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: Adam Moore <Adam.Moore@cima.ca>
Sent: November 8, 2022 7:26 AM
To: sarah.clarke@araheritage.ca
Cc: 'Fallon Burch' <fburch@cottfn.com>
Subject: RE: ARA Project Notification - Stage 1 and Marine Assessement - COTTFN

No questions or comments from my end.

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater

T 519-772-2299 ext. 6209 **M** 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

From: sarah.clarke@araheritage.ca <sarah.clarke@araheritage.ca>
Sent: November 7, 2022 2:57 PM
To: Adam Moore <Adam.Moore@cima.ca>
Cc: 'Fallon Burch' <fburch@cottfn.com>
Subject: FW: ARA Project Notification - Stage 1 and Marine Assessement - COTTFN

EXTERNAL EMAIL

Good afternoon Adam,

Please find attached an agreement from Chippewas of the Thames First Nation for participation in the Stage 1 assessment for signing. Please let me or Fallon Burch (at COTTFN) know if you have any questions about the agreement.

Kind regards,
Sarah

Sarah Clarke, BA, CAHP
Team Lead, Research
Team Member, Indigenous Engagement and Accommodation
219-900 Guelph Street, Kitchener, ON N2H 5Z6
P 519.804.2291 ext. 182 | E sarah.clarke@araheritage.ca
www.araheritage.ca

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: Fallon Burch <fburch@cottfn.com>
Sent: November 7, 2022 1:23 PM
To: sarah.clarke@araheritage.ca; Consultation <consultation@cottfn.com>
Cc: Adam.Moore@cima.ca; alexis.dunlop@araheritage.ca; chiara.williamson@araheritage.ca; 'Victoria Cafik' <victoria.cafik@araheritage.ca>; Carolyn Albert <calbert@cottfn.com>
Subject: RE: ARA Project Notification - Stage 1 and Marine Assessement - COTTFN

Good afternoon,

Thank you for the invitation to participate. I have attached the agreement for you to fill out and sign, if you have any questions, please feel free to contact me.

Thank you,

Fallon Burch

Fallon Burch
Consultation Coordinator
Chippewas of the Thames First Nation
Email: fburch@cottfn.com
519-289-5555 Ex: 251
320 Chippewa Road, Muncey, Ontario

Visit us online at cottfn.com

From: sarah.clarke@araheritage.ca <sarah.clarke@araheritage.ca>
Sent: November 7, 2022 11:50 AM
To: Fallon Burch <fburch@cottfn.com>; Consultation <consultation@cottfn.com>
Cc: Adam.Moore@cima.ca; alexis.dunlop@araheritage.ca; chiara.williamson@araheritage.ca; 'Victoria Cafik' <victoria.cafik@araheritage.ca>
Subject: ARA Project Notification - Stage 1 and Marine Assessement - COTTFN

Good morning,

I am writing to follow up about the Bright's Grove WTP project below. The marine assessment component of this project has been completed, however we will be scheduling the Stage 1 terrestrial component of the assessment before appropriate conditions are lost. We would like to confirm your interest in participating in the project and have agreements signed with our client as soon as possible.

Kind regards,
Sarah

Sarah Clarke, BA, CAHP
Team Lead, Research
Team Member, Indigenous Engagement and Accommodation
219-900 Guelph Street, Kitchener, ON N2H 5Z6
P 519.804.2291 ext. 182 | E sarah.clarke@araheritage.ca
www.araheritage.ca

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

ARCHAEOLOGY | HERITAGE | OUTREACH | CONSERVATION

Good morning,

Archaeological Research Associates Ltd. (ARA) has been contracted by CIMA+ for a Stage 1 archaeological assessment and marine archaeological assessment to be conducted for Bright's Grove Water Treatment Plant New Intake project. Please see the attached letter for project specifics. In order to begin the deployment process, we would like to confirm your interest in participating in the project and how you would like to be engaged by **October 26, 2022**. Agreements for this project will be signed with our client and can be sent to Adam Moore at Adam.Moore@cima.ca. Please confirm your interest in participating with Sarah Clarke at sarah.clarke@araheritage.ca. We look forward to hearing from you.

Kind regards,
Sarah

Charlotte Creron

From: Fallon Burch <fburch@cottfn.com>
Sent: April 26, 2023 3:49 PM
To: megan.devries@araheritage.ca; Adam Moore
Cc: alexis.dunlop@araheritage.ca; Carolyn Albert; chiara.williamson@araheritage.ca; janet.gardner@araheritage.ca
Subject: RE: ARA Deployment - Stage 1 Bright's Grove WTP - April 26 2023 - COTTFN

EXTERNAL EMAIL

Hi Megan,

Thank you for reaching out to me today, I appreciate the open communication. I look forward to receiving the report or updates as they become available. I have not received a copy of the executed agreement.

Thanks,

Fallon

Fallon Burch
Consultation Coordinator
Chippewas of the Thames First Nation
Email: fburch@cottfn.com
519-289-5555 Ex: 251
320 Chippewa Road, Muncey, Ontario

Visit us online at cottfn.com

From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: Wednesday, April 26, 2023 2:49 PM
To: Fallon Burch <fburch@cottfn.com>; Adam.Moore@cima.ca
Cc: alexis.dunlop@araheritage.ca; Carolyn Albert <calbert@cottfn.com>; chiara.williamson@araheritage.ca; janet.gardner@araheritage.ca
Subject: RE: ARA Deployment - Stage 1 Bright's Grove WTP - April 26 2023 - COTTFN

Hi Fallon

Thank you for speaking with me today. I want to apologize again for the miscommunication regarding fieldwork scheduling and agreement execution. As I mentioned during our conversation, ARA did complete the Stage 1 property inspection today. We will be happy to share the draft report with you for review and feedback when it is available. If you

have any specific questions now or at that time about the results of the property inspection or anything else relating to the archaeology of this project, we would be pleased to discuss them!

I note that the agreement that you provided has been executed, but please let me know if you have not yet received it.

Thank you for your time!
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: Fallon Burch <fburch@cottfn.com>
Sent: Wednesday, April 26, 2023 10:28 AM
To: megan.devries@araheritage.ca; Adam.Moore@cima.ca
Cc: alexis.dunlop@araheritage.ca; Carolyn Albert <calbert@cottfn.com>; chiara.williamson@araheritage.ca; janet.gardner@araheritage.ca
Subject: RE: ARA Deployment - Stage 1 Bright's Grove WTP - April 26 2023 - COTTFN

Hi Megan,

Prior to us scheduling an Archaeology Field Liaison, we require the agreement to be signed by both the consultant/proponent and COTTFN.

As per section:

10.2 *The Proponent/Consultant will provide fieldwork notification at least 48 hours prior to the scheduled start time to allow sufficient time for COTTFN to coordinate AFLs. For fieldwork beginning on a Monday, fieldwork notification must be received by 12pm on the previous Thursday. If insufficient time is given to schedule an AFL, COTTFN expects the Proponent/Consultant to reschedule the fieldwork to allow for COTTFN's participation.*

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

Thank you,

Fallon

Fallon Burch
Consultation Coordinator
Chippewas of the Thames First Nation
Email: fburch@cottfn.com
519-289-5555 Ex: 251
320 Chippewa Road, Muncey, Ontario

Visit us online at cottfn.com

From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: Tuesday, April 25, 2023 3:43 PM
To: Fallon Burch <fburch@cottfn.com>; Adam.Moore@cima.ca
Cc: alexis.dunlop@araheritage.ca; Carolyn Albert <calbert@cottfn.com>; chiara.williamson@araheritage.ca; janet.gardner@araheritage.ca
Subject: RE: ARA Deployment - Stage 1 Bright's Grove WTP - April 26 2023 - COTTFN

Hi Fallon,

We've just received confirmation from CIMA that the signed agreement will be available shortly, but it may not come through tonight. Do you have any concerns if we proceed with work tomorrow as planned and do you have someone scheduled to join us?

Thanks for your understanding!
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: Fallon Burch <fburch@cottfn.com>
Sent: Thursday, April 20, 2023 3:47 PM
To: megan.devries@araheritage.ca; Adam.Moore@cima.ca
Cc: alexis.dunlop@araheritage.ca; Carolyn Albert <calbert@cottfn.com>; chiara.williamson@araheritage.ca;

janet.gardner@araheritage.ca
Subject: RE: ARA Deployment - Stage 1 Bright's Grove WTP - April 26 2023 - COTTFN

Good afternoon,

Thank you for providing the details for the scheduled Fieldwork for Bright's Grove WTP. Please find attached a copy of the agreement for your review and signature.

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

Thank you,

Fallon

Fallon Burch
Consultation Coordinator
Chippewas of the Thames First Nation
Email: fburch@cottfn.com
519-289-5555 Ex: 251
320 Chippewa Road, Muncey, Ontario

Visit us online at cottfn.com

From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: Thursday, April 20, 2023 2:08 PM
To: Fallon Burch <fburch@cottfn.com>; Carolyn Albert <calbert@cottfn.com>
Cc: Adam.Moore@cima.ca; alexis.dunlop@araheritage.ca; chiara.williamson@araheritage.ca; janet.gardner@araheritage.ca
Subject: ARA Deployment - Stage 1 Bright's Grove WTP - April 26 2023 - COTTFN

Good afternoon,

ARA has scheduled fieldwork for Bright's Grove WTP for Wednesday, April 26. Please find the deployment details below and let me know if you have any questions or concerns. If you are able to let me know the name and number of the representative who will be participating in the fieldwork, that would be greatly appreciated.

ARA Project Number: 2022-0378
Project Name: Bright's Grove WTP Intake EA
Stage of Work: Stage 1
Fieldwork Start Date: April 26, 2023
Fieldwork Duration: 1 day
Meeting Time: 9:30am
Meeting Location: Ontario Clean Water Agency in Bright's Grove (https://www.google.com/maps/place/Ontario+Clean+Water+Agency/@43.0334698,-

82.2525253,70m/data=!3m1!1e3!4m6!3m5!1s0x882587a05fd8099b:0x9a601561e7d163b3!8m2!3d43.0334047!4d-82.2521961!16s%2Fg%2F11b5wkh0rp)
Field Director: Janet Gardner (519-636-5095)
Size of Field Crew: 1 field director
PPE Required: CSA-approved safety boots, high-visibility safety vest

If agreements still need to be executed for this project, please contact Adam Moore at adam.moore@cima.ca.

Sincerely.
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

Charlotte Creron

From: Charlotte Creron
Sent: September 8, 2023 3:48 PM
To: Charlotte Creron
Subject: FW: ARA Report Review - St 1-2 Bright's Grove WTP - COTTFN

Follow Up Flag: Follow up
Flag Status: Completed

From: Fallon Burch <fburch@cottfn.com>
Sent: Friday, September 8, 2023 3:36 PM
To: megan.devries@araheritage.ca; Jennifer Mills <jmills@cottfn.com>; Carolyn Albert <calbert@cottfn.com>
Cc: alexis.dunlop@araheritage.ca; 'Kait Kenel' <kait.kenel@araheritage.ca>; Adam Moore <Adam.Moore@cima.ca>
Subject: RE: ARA Report Review - St 1-2 Bright's Grove WTP - COTTFN

EXTERNAL EMAIL

Good afternoon Megan,

Thank you for the opportunity to review the Stage 1-2 Bright's Grove WTP. I have no comments or concerns.

Fallon

Fallon Burch
Consultation Coordinator
Chippewas of the Thames First Nation
Email: fburch@cottfn.com
519-289-5555 Ex: 251
320 Chippewa Road, Muncey, Ontario

Visit us online at cottfn.com

From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: Thursday, August 31, 2023 9:07 AM
To: Fallon Burch <fburch@cottfn.com>; Jennifer Mills <jmills@cottfn.com>; Carolyn Albert <calbert@cottfn.com>
Cc: alexis.dunlop@araheritage.ca; 'Kait Kenel' <kait.kenel@araheritage.ca>; 'Adam Moore' <Adam.Moore@cima.ca>
Subject: ARA Report Review - St 1-2 Bright's Grove WTP - COTTFN

Good morning!

Please find attached the draft report and supplementary documentation for your review entitled:

Stage 1 and 2 Archaeological Assessment
Bright's Grove Water Treatment Plant New Intake
City of Sarnia
Part of Lot 9, Concession 9 AKA Front Concession
Geographic Township of Sarnia
Lambton County, Ontario

ARA Project #2022-0378

We are hoping to receive your comments regarding the draft report by September 15, 2023, prior to our submission to the MCM. Please advise if this timeframe is not achievable for your review.

Thank you,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

Charlotte Creron

From: Charlotte Creron
Sent: August 31, 2023 3:25 PM
To: Charlotte Creron
Subject: FW: Bright's Grove WTP Intake Replacement EA - Notice of PIC

Follow Up Flag: Follow up
Flag Status: Flagged

From: Adam Moore
Sent: Monday, July 17, 2023 11:45 AM
To: Fallon Burch <fburch@cottfn.com>
Cc: Mike Thompson (Petrolia) <mthompson@petrolia.ca>; Mandi Pearson (Town of Petrolia) <mpearson@petrolia.ca>; Rick Charlebois (Petrolia) <rcharlebois@petrolia.ca>; Stuart Winchester <stuart.winchester@cima.ca>
Subject: RE: Bright's Grove WTP Intake Replacement EA - Notice of PIC

Hi Fallon,

Yes, this information is currently posted on the Town's website but will be updated to note the PIC taking place in Bright's Grove. The presentation material and comment forms are also posted. Please see the link below.

https://town.petrolia.on.ca/planning-development/brights-grove-wtp/

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater
M 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

Engineering for people

From: Fallon Burch <fburch@cottfn.com>
Sent: Monday, July 17, 2023 9:56 AM
To: Adam Moore <Adam.Moore@cima.ca>
Cc: Mike Thompson (Petrolia) <mthompson@petrolia.ca>; Mandi Pearson (Town of Petrolia) <mpearson@petrolia.ca>; Rick Charlebois (Petrolia) <rcharlebois@petrolia.ca>; Stuart Winchester <stuart.winchester@cima.ca>
Subject: RE: Bright's Grove WTP Intake Replacement EA - Notice of PIC

EXTERNAL EMAIL

Hi Adam,

Thank you for the PIC information. Unfortunately, due to vacation schedules, we may not have a rep available. Will this information be shared on the town's website?

Fallon

Fallon Burch
Consultation Coordinator
Chippewas of the Thames First Nation
Email: fburch@cottfn.com
519-289-5555 Ex: 251
320 Chippewa Road, Muncey, Ontario

Visit us online at cottfn.com

From: Adam Moore <Adam.Moore@cima.ca>
Sent: Monday, July 17, 2023 8:57 AM
To: Adam Moore <Adam.Moore@cima.ca>
Cc: Mike Thompson (Petrolia) <mthompson@petrolia.ca>; Mandi Pearson (Town of Petrolia) <mpearson@petrolia.ca>; Rick Charlebois (Petrolia) <rcharlebois@petrolia.ca>; Stuart Winchester <stuart.winchester@cima.ca>
Subject: Bright's Grove WTP Intake Replacement EA - Notice of PIC

Good morning,

The Town of Petrolia is holding an in-person **Public Information Centre** (PIC) for the Bright's Grove Water Treatment Plant (WTP) Intake Replacement Environmental Assessment. The PIC will introduce the study, provide background information and context as well as the preliminary preferred alternative for the intake. Further details about the PIC and how to provide comments are included in the attached Notice.

If you have any questions or feedback, please do not hesitate to contact us by responding to this email.

Thank you,

ADAM MOORE, M.A.Sc., P.Eng.
Project Engineer / Infrastructure – Water and Wastewater
M 519-830-7015
900–101 Frederick Street, Kitchener, ON N2H 6R2 CANADA

Appendix A-5: First Nation Consultation

Delaware Nation

Charlotte Creron

From: megan.devries@araheritage.ca
Sent: April 20, 2023 2:08 PM
To: Director.operations@delawarenation.on.ca
Cc: Adam Moore; alexis.dunlop@araheritage.ca; chiara.williamson@araheritage.ca; janet.gardner@araheritage.ca
Subject: ARA Deployment - Stage 1 Bright's Grove WTP - April 26 2023 - DNM

EXTERNAL EMAIL

Good afternoon,

ARA has scheduled fieldwork for Bright's Grove WTP for Wednesday, April 26. Please find the deployment details below and let me know if you have any questions or concerns. If you are able to let me know the name and number of the representative who will be participating in the fieldwork, that would be greatly appreciated.

ARA Project Number: 2022-0378
Project Name: Bright's Grove WTP Intake EA
Stage of Work: Stage 1
Fieldwork Start Date: April 26, 2023
Fieldwork Duration: 1 day
Meeting Time: 9:30am
Meeting Location: Ontario Clean Water Agency in Bright's Grove (https://www.google.com/maps/place/Ontario+Clean+Water+Agency/@43.0334698,-82.2525253,70m/data=!3m1!1e3!4m6!3m5!1s0x882587a05fd8099b:0x9a601561e7d163b3!8m2!3d43.0334047!4d-82.2521961!16s%2Fg%2F11b5wkh0rp)
Field Director: Janet Gardner (519-636-5095)
Size of Field Crew: 1 field director
PPE Required: CSA-approved safety boots, high-visibility safety vest

If agreements still need to be executed for this project, please contact Adam Moore at adam.moore@cima.ca.

Sincerely.
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARA
ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

Charlotte Creron

From: megan.devries@araheritage.ca
Sent: September 19, 2023 12:51 PM
To: Director.operations@delawarenation.on.ca
Cc: alexis.dunlop@araheritage.ca; 'Kait Kenel'; Adam Moore
Subject: RE: ARA Report Review - St 1-2 Bright's Grove WTP - DNM

EXTERNAL EMAIL

Good afternoon,

I am writing to check in on the status of this report review. Would it be possible to get your comments by Friday, September 22? Please let me know if you need more time to complete the review.

Thank you!
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: Thursday, August 31, 2023 9:07 AM
To: 'Director.operations@delawarenation.on.ca' <Director.operations@delawarenation.on.ca>
Cc: 'alexis.dunlop@araheritage.ca' <alexis.dunlop@araheritage.ca>; 'Kait Kenel' <kait.kenel@araheritage.ca>; 'Adam Moore' <Adam.Moore@cima.ca>
Subject: ARA Report Review - St 1-2 Bright's Grove WTP - DNM

Good morning!

Please find attached the draft report and supplementary documentation for your review entitled:

Stage 1 and 2 Archaeological Assessment
Bright's Grove Water Treatment Plant New Intake
City of Sarnia
Part of Lot 9, Concession 9 AKA Front Concession

Geographic Township of Sarnia
Lambton County, Ontario

ARA Project #2022-0378

We are hoping to receive your comments regarding the draft report by September 15, 2023, prior to our submission to the MCM. Please advise if this timeframe is not achievable for your review.

Thank you,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

Appendix A-5: First Nation Consultation

Munsee-Delaware Nation

Charlotte Creron

From: megan.devries@araheritage.ca
Sent: March 10, 2023 12:02 PM
To: consultation@munsee.ca
Cc: Adam Moore; alexis.dunlop@araheritage.ca; sarah.clarke@araheritage.ca; chiara.williamson@araheritage.ca
Subject: RE: ARA Project Notification - Stage 1 and Marine Assessment Bright's Grove WTP - MDN

EXTERNAL EMAIL

Good morning,

I am writing to follow up and provide an update on the Bright's Grove WTP project about which Sarah Clarke had previously sent a notification.

ARA completed in the marine assessment in October 2022. The Stage 1 property inspection will take place this spring when conditions allow. We would like to confirm your interest in participating in this project. Any necessary agreements to facilitate your participation in this project can be sent to Adam Moore at Adam.Moore@cima.ca.

All the best,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
219-900 Guelph Street, Kitchener, ON N2H 5Z6
P 519.804.2291 x180 | E megan.devries@araheritage.ca
www.araheritage.ca
@ArchResearch **@ARAHeritage**

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: sarah.clarke@araheritage.ca <sarah.clarke@araheritage.ca>
Sent: February 15, 2023 8:39 AM
To: 'consultation@munsee.ca' <consultation@munsee.ca>
Cc: 'Adam Moore' <Adam.Moore@cima.ca>; 'alexis.dunlop@araheritage.ca' <alexis.dunlop@araheritage.ca>; 'chiara.williamson@araheritage.ca' <chiara.williamson@araheritage.ca>
Subject: ARA Project Notification - Stage 1 and Marine Assessment Bright's Grove WTP - MDN

Good morning,

Archaeological Research Associates Ltd. (ARA) has been contracted by CIMA+ for a Stage 1 archaeological assessment and marine archaeological assessment to be conducted for Bright's Grove Water Treatment Plant New Intake project. The marine component assessment component of the project was completed in October 2022. Please see the attached letter for project specifics. In order to begin the deployment process, we would like to confirm your interest in participating in the project and how you would like to be engaged by **February 27, 2023**. Agreements for this project will be signed with our client and can be sent to Adam Moore at Adam.Moore@cima.ca. Please confirm your interest in participating with Sarah Clarke at sarah.clarke@araheritage.ca. We look forward to hearing from you.

Kind regards,
Sarah

Sarah Clarke, BA, CAHP
Team Lead, Research
Team Member, Indigenous Engagement and Accommodation
219-900 Guelph Street, Kitchener, ON N2H 5Z6
P 519.804.2291 ext. 182 | E sarah.clarke@araheritage.ca
www.araheritage.ca

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

ARA
ARCHAEOLOGY | HERITAGE | OUTREACH | CONSERVATION

Charlotte Creron

From: megan.devries@araheritage.ca
Sent: April 20, 2023 2:08 PM
To: consultation@munsee.ca
Cc: Adam Moore; alexis.dunlop@araheritage.ca; chiara.williamson@araheritage.ca; janet.gardner@araheritage.ca
Subject: ARA Deployment - Stage 1 Bright's Grove WTP - April 26 2023 - MDN

EXTERNAL EMAIL

Good afternoon,

ARA has scheduled fieldwork for Bright's Grove WTP for Wednesday, April 26. Please find the deployment details below and let me know if you have any questions or concerns. If you are able to let me know the name and number of the representative who will be participating in the fieldwork, that would be greatly appreciated.

ARA Project Number: 2022-0378
Project Name: Bright's Grove WTP Intake EA
Stage of Work: Stage 1
Fieldwork Start Date: April 26, 2023
Fieldwork Duration: 1 day
Meeting Time: 9:30am
Meeting Location: Ontario Clean Water Agency in Bright's Grove (https://www.google.com/maps/place/Ontario+Clean+Water+Agency/@43.0334698,-82.2525253,70m/data=!3m1!1e3!4m6!3m5!1s0x882587a05fd8099b:0x9a601561e7d163b3!8m2!3d43.0334047!4d-82.2521961!16s%2Fg%2F11b5wkh0rp)
Field Director: Janet Gardner (519-636-5095)
Size of Field Crew: 1 field director
PPE Required: CSA-approved safety boots, high-visibility safety vest

If agreements still need to be executed for this project, please contact Adam Moore at adam.moore@cima.ca.

Sincerely.
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARA
ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

Charlotte Creron

From: Jamie Lemon <jlemon@phcgroup.ca>
Sent: February 14, 2023 3:25 PM
To: chief@munsee.ca
Subject: Cultural Heritage Screening - Bright's Grove WTP
Attachments: Bright's Grove WTP Study Area.pdf

Good afternoon,

PHC has been retained by CIMA+ to undertake a Cultural Heritage Screening Report in support of the Class Environmental Assessment for the Bright's Grove Water Treatment Plant New Intake.

The Bright's Grove WTP, located 2701 Old Lakeshore Road in the Bright's Grove area of the City of Sarnia, is supplied by raw water from Lake Huron. The existing treatment facility is a conventional surface water treatment plant with a current rated capacity of 12 MLD. The Bright's Grove WTP intake pipe, constructed in 1944, is a 400mm cast iron pipe extending approximately 400m into Lake Huron. The existing intake has reached the end of its service life, and replacement of the existing intake pipe and associated crib structure is required. The Cultural Heritage Screening is to be limited to the onshore area (approximately 6,700 m2) of the study area (see attached).

The purpose of this undertaking is to complete a Cultural Heritage Screening and associated Report in accordance with the Ontario Heritage Act and the Ministry of Citizenship and Multiculturalism (formerly Ministry of Tourism, Culture and Sport) *Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes* (2016). The main objectives of the Cultural Heritage Screening are to gather information about the potential presence and significance of cultural heritage resources within and/or vicinity of the project study area and determine if further field investigation will be required.

We are contacting you to inquire if you have any information regarding built heritage and cultural heritage resources within or adjacent to the study area. We respectfully request any response be provided by February 28, 2023.

Please let me know if there are any questions related to the Cultural Heritage Screening Report.

Thank you,

Jamie

Jamie Lemon, MA
Senior Archaeologist/Project Manager
jlemon@phcgroup.ca
226-230-0607

PHC is pleased to support a 4-day work week. Our core hours are Monday to Thursday, 8am – 5pm.

Parslow Heritage Consultancy Inc.
www.phcgroup.ca


Health and Safety
Excellence program
Member
wsib
ONTARIO
2022

Appendix A-5: First Nation Consultation
Métis Nation of Ontario

Charlotte Creron

From: megan.devries@araheritage.ca
Sent: March 10, 2023 12:00 PM
To: consultations@metisnation.org
Cc: Adam Moore; alexis.dunlop@araheritage.ca; sarah.clarke@araheritage.ca; chiara.williamson@araheritage.ca
Subject: RE: ARA Project Notification - Stage 1 and Marine Assessment Bright's Grove WTP - MNO

EXTERNAL EMAIL

Good morning,

I am writing to follow up and provide an update on the Bright's Grove WTP project about which Sarah Clarke had previously sent a notification.

ARA completed in the marine assessment in October 2022. The Stage 1 property inspection will take place this spring when conditions allow. We would like to confirm your interest in participating in this project. Any necessary agreements to facilitate your participation in this project can be sent to Adam Moore at Adam.Moore@cima.ca.

All the best,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
219-900 Guelph Street, Kitchener, ON N2H 5Z6
P 519.804.2291 x180 | E megan.devries@araheritage.ca
www.araheritage.ca
@ArchResearch **@ARAHeritage**

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: sarah.clarke@araheritage.ca <sarah.clarke@araheritage.ca>
Sent: March 10, 2023 11:17 AM
To: megan.devries@araheritage.ca
Subject: FW: ARA Project Notification - Stage 1 and Marine Assessment Bright's Grove WTP - MNO

Sarah Clarke, BA, CAHP
Team Lead, Research
Team Member, Indigenous Engagement and Accommodation
219-900 Guelph Street, Kitchener, ON N2H 5Z6
P 519.804.2291 ext. 182 | E sarah.clarke@araheritage.ca
www.araheritage.ca

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: sarah.clarke@araheritage.ca <sarah.clarke@araheritage.ca>
Sent: February 3, 2023 12:15 PM
To: 'consultations@metisnation.org' <consultations@metisnation.org>
Cc: 'Adam.Moore@cima.ca' <Adam.Moore@cima.ca>; 'alexis.dunlop@araheritage.ca' <alexis.dunlop@araheritage.ca>; 'chiara.williamson@araheritage.ca' <chiara.williamson@araheritage.ca>
Subject: ARA Project Notification - Stage 1 and Marine Assessment Bright's Grove WTP - MNO

Good afternoon,

Archaeological Research Associates Ltd. (ARA) has been contracted by CIMA+ for a Stage 1 archaeological assessment and marine archaeological assessment to be conducted for Bright's Grove Water Treatment Plant New Intake project. The marine component assessment component of the project was completed in October 2022. Please see the attached letter for project specifics. In order to begin the deployment process, we would like to confirm your interest in participating in the project and how you would like to be engaged by **February 17, 2023**. Agreements for this project will be signed with our client and can be sent to Adam Moore at Adam.Moore@cima.ca. Please confirm your interest in participating with Sarah Clarke at sarah.clarke@araheritage.ca. We look forward to hearing from you.

Kind regards,
Sarah

Sarah Clarke, BA, CAHP
Team Lead, Research
Team Member, Indigenous Engagement and Accommodation
219-900 Guelph Street, Kitchener, ON N2H 5Z6
P 519.804.2291 ext. 182 | E sarah.clarke@araheritage.ca
www.araheritage.ca

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

ARA
ARCHAEOLOGY | HERITAGE | OUTREACH | CONSERVATION

Charlotte Creron

From: megan.devries@araheritage.ca
Sent: April 20, 2023 2:08 PM
To: consultations@metisnation.org
Cc: Adam Moore; alexis.dunlop@araheritage.ca; chiara.williamson@araheritage.ca; janet.gardner@araheritage.ca
Subject: ARA Deployment - Stage 1 Bright's Grove WTP - April 26 2023 - MNO

EXTERNAL EMAIL

Good afternoon,

ARA has scheduled fieldwork for Bright's Grove WTP for Wednesday, April 26. Please find the deployment details below and let me know if you have any questions or concerns. If you are able to let me know the name and number of the representative who will be participating in the fieldwork, that would be greatly appreciated.

ARA Project Number: 2022-0378
Project Name: Bright's Grove WTP Intake EA
Stage of Work: Stage 1
Fieldwork Start Date: April 26, 2023
Fieldwork Duration: 1 day
Meeting Time: 9:30am
Meeting Location: Ontario Clean Water Agency in Bright's Grove (https://www.google.com/maps/place/Ontario+Clean+Water+Agency/@43.0334698,-82.2525253,70m/data=!3m1!1e3!4m6!3m5!1s0x882587a05fd8099b:0x9a601561e7d163b3!8m2!3d43.0334047!4d-82.2521961!16s%2Fg%2F11b5wkh0rp)
Field Director: Janet Gardner (519-636-5095)
Size of Field Crew: 1 field director
PPE Required: CSA-approved safety boots, high-visibility safety vest

If agreements still need to be executed for this project, please contact Adam Moore at adam.moore@cima.ca.

Sincerely.
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARA
ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

Charlotte Creron

From: Charlotte Creron
Sent: September 25, 2023 9:50 AM
To: Charlotte Creron
Subject: FW: ARA Report Review - St 1-2 Bright's Grove WTP - MNO

From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: Monday, September 25, 2023 9:16 AM
To: 'Laura Desaulniers' <LauraD@metisnation.org>
Cc: alexis.dunlop@araheritage.ca; 'Kait Kenel' <kait.kenel@araheritage.ca>; Adam Moore <Adam.Moore@cima.ca>
Subject: RE: ARA Report Review - St 1-2 Bright's Grove WTP - MNO

EXTERNAL EMAIL

Thank you, Laura!

Have a great week!
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: Laura Desaulniers <LauraD@metisnation.org>
Sent: Friday, September 22, 2023 1:54 PM
To: megan.devries@araheritage.ca
Subject: RE: ARA Report Review - St 1-2 Bright's Grove WTP - MNO

Hi Megan,

This draft report was sent to the Region 9 Consultation committee, at this time they have not provided any questions or comments.

Laura Desaulniers (she/her)

Environmental Advisor | Konsèyé dlanvirawnman
Lands, Resources & Consultations (LRC) Branch
Métis Nation of Ontario
Thunder Bay, ON
E: LauraD@metisnation.org
C: 807-375-0208
W: www.metisnation.org
Mon-Fri 7:30 am – 3:30 pm EST

From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: September 19, 2023 12:51 PM
To: Consultations <Consultations@metisnation.org>
Cc: alexis.dunlop@araheritage.ca; 'Kait Kenel' <kait.kenel@araheritage.ca>; 'Adam Moore' <Adam.Moore@cima.ca>
Subject: RE: ARA Report Review - St 1-2 Bright's Grove WTP - MNO

Good afternoon,

I am writing to check in on the status of this report review. Would it be possible to get your comments by Friday, September 22? Please let me know if you need more time to complete the review.

Thank you!
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: Thursday, August 31, 2023 9:07 AM
To: 'consultations@metisnation.org' <consultations@metisnation.org>
Cc: 'alexis.dunlop@araheritage.ca' <alexis.dunlop@araheritage.ca>; 'Kait Kenel' <kait.kenel@araheritage.ca>; 'Adam Moore' <Adam.Moore@cima.ca>
Subject: ARA Report Review - St 1-2 Bright's Grove WTP - MNO

Good morning!

Please find attached the draft report and supplementary documentation for your review entitled:

Stage 1 and 2 Archaeological Assessment
Bright's Grove Water Treatment Plant New Intake
City of Sarnia
Part of Lot 9, Concession 9 AKA Front Concession
Geographic Township of Sarnia
Lambton County, Ontario

ARA Project #2022-0378

We are hoping to receive your comments regarding the draft report by September 15, 2023, prior to our submission to the MCM. Please advise if this timeframe is not achievable for your review.

Thank you,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

Charlotte Creron

From: Jamie Lemon <jlemon@phcgroup.ca>
Sent: November 22, 2022 10:12 AM
To: Ethan Roy
Subject: RE: Cultural Heritage Screening - Bright's Grove WTP
Attachments: Bright's Grove WTP Study Area.pdf

Good morning Ethan,

Our communications list included Indigenous communities that are being consulted as part of the Class EA (the list was provided to us). Thank you for ensuring our email reaches the correct consultation committee. A map of the study area is attached and our original email is below.

PHC has been retained by CIMA+ to undertake a Cultural Heritage Screening Report in support of the Class Environmental Assessment for the Bright's Grove Water Treatment Plant New Intake.

The Bright's Grove WTP, located 2701 Old Lakeshore Road in the Bright's Grove area of the City of Sarnia, is supplied by raw water from Lake Huron. The existing treatment facility is a conventional surface water treatment plant with a current rated capacity of 12 MLD. The Bright's Grove WTP intake pipe, constructed in 1944, is a 400mm cast iron pipe extending approximately 400m into Lake Huron. The existing intake has reached the end of its service life, and replacement of the existing intake pipe and associated crib structure is required. The Cultural Heritage Screening is to be limited to the onshore area (approximately 6,700 m2) of the study area (see attached).

The purpose of this undertaking is to complete a Cultural Heritage Screening and associated Report in accordance with the Ontario Heritage Act and the Ministry of Citizenship and Multiculturalism (formerly Ministry of Tourism, Culture and Sport) *Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes* (2016). The main objectives of the Cultural Heritage Screening are to gather information about the potential presence and significance of cultural heritage resources within and/or vicinity of the project study area and determine if further field investigation will be required.

We are contacting you to inquire if you have any information regarding built heritage and cultural heritage resources within or adjacent to the study area. We respectfully request any response be provided by November 25, 2022.

Please let me know if there are any questions related to the Cultural Heritage Screening Report.

Thank you,

Jamie

Jamie Lemon, MA
Senior Archaeologist/Project Manager
jlemon@phcgroup.ca
226-230-0607

PHC is pleased to support a 4-day work week. Our core hours are Monday to Thursday, 8am – 5pm.

Parslow Heritage Consultancy Inc.
www.phcgroup.ca

From: Ethan Roy <EthanR@metisnation.org>
Sent: November 22, 2022 9:50 AM
To: Jamie Lemon <jlemon@phcgroup.ca>
Subject: RE: Cultural Heritage Screening - Bright's Grove WTP

Good morning,

I am writing to you this morning to request a map of the location and screening scope for the Cultural Heritage Screening Report in support of the Class Environmental Assessment for the Bright's Grove Water Treatment Plant New Intake.

In your notification you indicated that the project was in the City of Sarnia, but I am just trying to make sure that it reaches the correct consultations committee at the Métis Nation of Ontario. It appears you originally emailed President Peter Coture at the Great Lakes Métis Council, but Sarnia would fall outside his council borders.

Additionally, providing notifications of projects to the following email insure that that they are read and properly tracked: consultations@metisnation.org.

Thanks,

Ethan Roy (he/him)
Consultation Advisor
Lands, Resources, and Consultations (LRC) Branch
Métis Nation of Ontario
Sault Ste. Marie, ON, Canada
Email: ethanr@metisnation.org
Phone: (705) 527 3612
www.metisnation.org

Appendix A-5: First Nation Consultation
Oneida Nation of the Thames

Charlotte Creron

From: megan.devries@araheritage.ca
Sent: April 20, 2023 2:07 PM
To: environment@oneida.on.ca
Cc: Adam Moore; alexis.dunlop@araheritage.ca; chiara.williamson@araheritage.ca; janet.gardner@araheritage.ca
Subject: ARA Deployment - Stage 1 Bright's Grove WTP - April 26 2023 - OOTTFN

EXTERNAL EMAIL

Good afternoon,

ARA has scheduled fieldwork for Bright's Grove WTP for Wednesday, April 26. Please find the deployment details below and let me know if you have any questions or concerns. If you are able to let me know the name and number of the representative who will be participating in the fieldwork, that would be greatly appreciated.

ARA Project Number: 2022-0378
Project Name: Bright's Grove WTP Intake EA
Stage of Work: Stage 1
Fieldwork Start Date: April 26, 2023
Fieldwork Duration: 1 day
Meeting Time: 9:30am
Meeting Location: Ontario Clean Water Agency in Bright's Grove (https://www.google.com/maps/place/Ontario+Clean+Water+Agency/@43.0334698,-82.2525253,70m/data=!3m1!1e3!4m6!3m5!1s0x882587a05fd8099b:0x9a601561e7d163b3!8m2!3d43.0334047!4d-82.2521961!16s%2Fg%2F11b5wkh0rp)
Field Director: Janet Gardner (519-636-5095)
Size of Field Crew: 1 field director
PPE Required: CSA-approved safety boots, high-visibility safety vest

If agreements still need to be executed for this project, please contact Adam Moore at adam.moore@cima.ca.

Sincerely.
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARA
ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

Charlotte Creron

From: megan.devries@araheritage.ca
Sent: September 19, 2023 12:51 PM
To: environment@oneida.on.ca
Cc: alexis.dunlop@araheritage.ca; 'Kait Kenel'; Adam Moore
Subject: RE: ARA Report Review - St 1-2 Bright's Grove WTP - ONOTT

EXTERNAL EMAIL

Good afternoon,

I am writing to check in on the status of this report review. Would it be possible to get your comments by Friday, September 22? Please let me know if you need more time to complete the review.

Thank you!
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: Thursday, August 31, 2023 9:07 AM
To: 'environment@oneida.on.ca' <environment@oneida.on.ca>
Cc: 'alexis.dunlop@araheritage.ca' <alexis.dunlop@araheritage.ca>; 'Kait Kenel' <kait.kenel@araheritage.ca>; 'Adam Moore' <Adam.Moore@cima.ca>
Subject: ARA Report Review - St 1-2 Bright's Grove WTP - ONOTT

Good morning!

Please find attached the draft report and supplementary documentation for your review entitled:

Stage 1 and 2 Archaeological Assessment
Bright's Grove Water Treatment Plant New Intake
City of Sarnia
Part of Lot 9, Concession 9 AKA Front Concession

Geographic Township of Sarnia
Lambton County, Ontario

ARA Project #2022-0378

We are hoping to receive your comments regarding the draft report by September 15, 2023, prior to our submission to the MCM. Please advise if this timeframe is not achievable for your review.

Thank you,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

Appendix A-5: First Nation Consultation
Walpole Island First Nation

Charlotte Creron

From: megan.devries@araheritage.ca
Sent: March 10, 2023 12:02 PM
To: janet.macbeth@wifn.org; norma.altiman@wifn.org
Cc: Adam Moore; alexis.dunlop@araheritage.ca; sarah.clarke@araheritage.ca; chiara.williamson@araheritage.ca
Subject: RE: ARA Project Notification - Stage 1 and Marine Assessment Bright's Grove WTP - WIFN

EXTERNAL EMAIL

Good morning,

I am writing to follow up and provide an update on the Bright's Grove WTP project about which Sarah Clarke had previously sent a notification.

ARA completed in the marine assessment in October 2022. The Stage 1 property inspection will take place this spring when conditions allow. We would like to confirm your interest in participating in this project. Any necessary agreements to facilitate your participation in this project can be sent to Adam Moore at Adam.Moore@cima.ca.

All the best,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
219-900 Guelph Street, Kitchener, ON N2H 5Z6
P 519.804.2291 x180 | E megan.devries@araheritage.ca
www.araheritage.ca
@ArchResearch **@ARAHeritage**

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: sarah.clarke@araheritage.ca <sarah.clarke@araheritage.ca>
Sent: November 7, 2022 11:45 AM
To: 'janet.macbeth@wifn.org' <janet.macbeth@wifn.org>; 'norma.altiman@wifn.org' <norma.altiman@wifn.org>
Cc: 'Adam.Moore@cima.ca' <Adam.Moore@cima.ca>; 'alexis.dunlop@araheritage.ca' <alexis.dunlop@araheritage.ca>; 'chiara.williamson@araheritage.ca' <chiara.williamson@araheritage.ca>; 'Victoria Cafik' <victoria.cafik@araheritage.ca>
Subject: RE: ARA Project Notification - Stage 1 and Marine Assessment Bright's Grove WTP - WIFN

Good morning,

I am writing to follow up about the Bright's Grove WTP project below. The marine assessment component of this project has been completed, however we will be scheduling the Stage 2 terrestrial component of the assessment before appropriate conditions are lost. We would like to confirm your interest in participating in the project and have agreements signed with our client as soon as possible.

Kind regards,
Sarah

Sarah Clarke, BA, CAHP
Team Lead, Research
Team Member, Indigenous Engagement and Accommodation
219-900 Guelph Street, Kitchener, ON N2H 5Z6
P 519.804.2291 ext. 182 | E sarah.clarke@araheritage.ca
www.araheritage.ca

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: sarah.clarke@araheritage.ca <sarah.clarke@araheritage.ca>
Sent: October 20, 2022 11:36 AM
To: 'janet.macbeth@wifn.org' <janet.macbeth@wifn.org>; 'norma.altiman@wifn.org' <norma.altiman@wifn.org>
Cc: 'Adam.Moore@cima.ca' <Adam.Moore@cima.ca>; 'alexis.dunlop@araheritage.ca' <alexis.dunlop@araheritage.ca>; 'chiara.williamson@araheritage.ca' <chiara.williamson@araheritage.ca>; 'Victoria Cafik' <victoria.cafik@araheritage.ca>
Subject: RE: ARA Project Notification - Stage 1 and Marine Assessment Bright's Grove WTP - WIFN

Good morning,

Due to the deteriorating weather conditions it will be necessary to conduct the marine assessment portion of this project this **Sunday October 23, 2022**. The marine archaeologist, Scarlett Janusas, will be onsite at 8am to set up her equipment and she let me know that the assessment will begin at 10 as her set up with take two hours. Scarlett will meet liaisons on the shore prior to beginning the assessment. Due to insurance regulations, Scarlett will not be able to have liaisons join her on her vessel, but liaisons are welcome to go into the water in their own boat or can watch from the shore. Scarlett will also circulate an update regarding the results of the assessment to engaged communities following the assessment prior to the circulation of the draft report. Please do not hesitate to contact me with any questions you may have.

Kind regards,
Sarah

Sarah Clarke, BA, CAHP
Team Lead, Research
Team Member, Indigenous Engagement and Accommodation
219-900 Guelph Street, Kitchener, ON N2H 5Z6
P 519.804.2291 ext. 182 | E sarah.clarke@araheritage.ca
www.araheritage.ca

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: sarah.clarke@araheritage.ca <sarah.clarke@araheritage.ca>
Sent: October 13, 2022 7:23 AM
To: 'janet.macbeth@wifn.org' <janet.macbeth@wifn.org>; 'norma.altiman@wifn.org' <norma.altiman@wifn.org>

Cc: 'Adam.Moore@cima.ca' <Adam.Moore@cima.ca>; 'alexis.dunlop@araheritage.ca' <alexis.dunlop@araheritage.ca>; 'chiara.williamson@araheritage.ca' <chiara.williamson@araheritage.ca>; 'Victoria Cafik' <victoria.cafik@araheritage.ca>
Subject: ARA Project Notification - Stage 1 and Marine Assessment Bright's Grove WTP - WIFN

Good morning,

Archaeological Research Associates Ltd. (ARA) has been contracted by CIMA+ for a Stage 1 archaeological assessment and marine archaeological assessment to be conducted for Bright's Grove Water Treatment Plant New Intake project. Please see the attached letter for project specifics. In order to begin the deployment process, we would like to confirm your interest in participating in the project and how you would like to be engaged by **October 26, 2022**. Agreements for this project will be signed with our client and can be sent to Adam Moore at Adam.Moore@cima.ca. Please confirm your interest in participating with Sarah Clarke at sarah.clarke@araheritage.ca. We look forward to hearing from you.

Kind regards,
Sarah

Sarah Clarke, BA, CAHP
Team Lead, Research
Team Member, Indigenous Engagement and Accommodation
219-900 Guelph Street, Kitchener, ON N2H 5Z6
P 519.804.2291 ext. 182 | E sarah.clarke@araheritage.ca
www.araheritage.ca

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

ARA
ARCHAEOLOGY | HERITAGE | OUTREACH | CONSERVATION

Charlotte Creron

From: megan.devries@araheritage.ca
Sent: April 20, 2023 2:07 PM
To: janet.macbeth@wifn.org; norma.altiman@wifn.org
Cc: Adam Moore; alexis.dunlop@araheritage.ca; chiara.williamson@araheritage.ca; janet.gardner@araheritage.ca
Subject: ARA Deployment - Stage 1 Bright's Grove WTP - April 26 2023 - WIFN

EXTERNAL EMAIL

Good afternoon,

ARA has scheduled fieldwork for Bright's Grove WTP for Wednesday, April 26. Please find the deployment details below and let me know if you have any questions or concerns. If you are able to let me know the name and number of the representative who will be participating in the fieldwork, that would be greatly appreciated.

ARA Project Number: 2022-0378
Project Name: Bright's Grove WTP Intake EA
Stage of Work: Stage 1
Fieldwork Start Date: April 26, 2023
Fieldwork Duration: 1 day
Meeting Time: 9:30am
Meeting Location: Ontario Clean Water Agency in Bright's Grove (https://www.google.com/maps/place/Ontario+Clean+Water+Agency/@43.0334698,-82.2525253,70m/data=!3m1!1e3!4m6!3m5!1s0x882587a05fd8099b:0x9a601561e7d163b3!8m2!3d43.0334047!4d-82.2521961!16s%2Fg%2F11b5wkh0rp)
Field Director: Janet Gardner (519-636-5095)
Size of Field Crew: 1 field director
PPE Required: CSA-approved safety boots, high-visibility safety vest

If agreements still need to be executed for this project, please contact Adam Moore at adam.moore@cima.ca.

Sincerely.
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARA
ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

Charlotte Creron

From: Charlotte Creron
Sent: August 31, 2023 3:07 PM
To: Charlotte Creron
Subject: FW: ARA Report Review - St 1-2 Bright's Grove WTP - WIFN
Attachments: St 1-2 - Bright's Grove WTP RE (Draft 17-08-23).pdf

---

From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: Thursday, August 31, 2023 9:07 AM
To: janet.macbeth@wifn.org
Cc: alexis.dunlop@araheritage.ca; 'Kait Kenel' <kait.kenel@araheritage.ca>; Adam Moore <Adam.Moore@cima.ca>
Subject: ARA Report Review - St 1-2 Bright's Grove WTP - WIFN

EXTERNAL EMAIL

Good morning!

Please find attached the draft report and supplementary documentation for your review entitled:

Stage 1 and 2 Archaeological Assessment
Bright's Grove Water Treatment Plant New Intake
City of Sarnia
Part of Lot 9, Concession 9 AKA Front Concession
Geographic Township of Sarnia
Lambton County, Ontario

ARA Project #2022-0378

We are hoping to receive your comments regarding the draft report by September 15, 2023, prior to our submission to the MCM. Please advise if this timeframe is not achievable for your review.

Thank you,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARA
ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

B

Appendix B: Cultural Heritage Screening Report

PROJECT REFERENCE: 2022-0158

January 17, 2023

WWW.PHCGROUP.CA

Parslow Heritage Consultancy Inc.
883 St. Clair Ave. West, Toronto, ON, M6C 1C4

Corporation of the Town of Petrolia
Mike Thompson, Director of Public Works
mthompson@petrolia.ca

Cultural Heritage Screening Report - Brights Grove Water Treatment Plant New Intake Class Environmental Assessment, Town of Petrolia, Ontario

Introduction

Parslow Heritage Consultancy Inc. (PHC Inc.) was retained by CIMA+ to prepare a Cultural Heritage Screening Report (CHSR) in advance of the Brights Grove Water Treatment Plant (WTP) Intake Replacement Project, as required for a Class Environmental Assessment. The Brights Grove Water Treatment Plant is located at 2701 Old Lakeshore Road, Brights Grove, Part Lot 9, Concession 9, Geographic Township of Sarnia, Lambton County, now City of Sarnia, Ontario (Appendix A). The assessment area subject to this CHSR is 1.2 acres in size and contains the current Brights Grove Water WTP. The CHSR also took into account the potential for heritage resources to all immediately adjacent properties.

The Bright's Grove WTP, located 2701 Old Lakeshore Road in the Bright's Grove area of the City of Sarnia, is supplied by raw water from Lake Huron. The existing treatment facility is a conventional surface water treatment plant with a current rated capacity of 12 MLD. The Bright's Grove WTP intake pipe, constructed in 1944, is a 400mm cast iron pipe extending approximately 400m into Lake Huron. The existing intake has reached the end of its service life, and replacement of the existing intake pipe and associated crib structure is required. The CHSR is to be limited to the onshore area (approximately 6,700 m2) of the Project Area.

The purpose of this undertaking is to complete a Cultural Heritage Screening and associated Report in accordance with the Ontario Heritage Act and the Ministry of Citizenship and Multiculturalism's (formerly Ministry of Tourism, Culture and Sport) *Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes* (2016) (the Checklist). The main objectives of the CHSR are to gather information about the potential presence and

significance of cultural heritage resources within and/or vicinity of the Project Area and determine if further field investigation will be required.

Various sources of information were consulted to assist with completion of the checklist and to assess the heritage potential of adjacent properties. These sources of information include:

- Historic atlas' and maps
- Aerial imagery
- Internet sources
- Municipal heritage registers (City of Sarnia)
- provincial heritage sources (MCM & OHT)

Checklist Results

The Checklist (Appendix B), attached as part of this CHSR, has three parts: screening for known cultural heritage resources; screening for potential heritage resources; and, other considerations, such as Indigenous Land use.

Screening for Known Cultural Heritage Resources

In reviewing the municipal heritage register for the City of Sarnia, it was determined that 2701 Old Lakeshore Road is a Listed heritage property and included on the City of Sarnia's Heritage Register. None of the adjacent properties are included on City of Sarnia's Heritage Register.

Screening for Potential Heritage Resources

During review of available data for the Project Area for potential heritage resources, it was determined the Project Area is:

- not the subject of a municipal, provincial or federal commemorative or interpretive plaque,
- not adjacent to a known burial site and/or cemetery; and,
- not in, or near, a Canadian Heritage River watershed.

A desktop review using Google Streetview was used to assess whether the Project Area contained any additional structures or features that may be of cultural heritage value or interest. With the exception of the original 'Listed' 1896 'Petrolea Water Works' the Project Area contains no other features of cultural heritage value or interest.

The Project Area is separated from all adjacent properties by way of paved roads: Waterworks Road to the west, Bright Street to the south, and an unnamed parking egress to the east. The properties adjacent to the Project Area are comprised of a mix of residential and commercial

properties; it is the opinion of PHC that further heritage investigation into these properties is not required as part of the Class EA, given the nature of the proposed upgrades (water intake pipe).

The scope of the proposed project is confined to the existing property limits of 2701 Old Lakeshore Road and poses no potential for direct impacts to any adjacent properties.

According to the Cultural Heritage Checklist:

> *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*

2701 Old Lakeshore Road is a listed property included on the City of Sarnia's Heritage Register (Appendix C). The heritage Listing for 2701 Old Lakeshore Road identifies the original 1896 pump station as being "important in establishing or maintaining the dominant character of the area" and identifies the exterior façade as the basis for its inclusion on the city heritage register.

Indigenous Land Use

In reviewing the criteria to consider other information in determining cultural heritage value or interest, it is acknowledged the Project Area is of interest to numerous Indigenous communities (see below). An archaeological assessment is being undertaken as part of the Class EA process.

Figure 1: Undated colorized historic image of 'Petrolea Water Works', image from Petroliaheritage.com

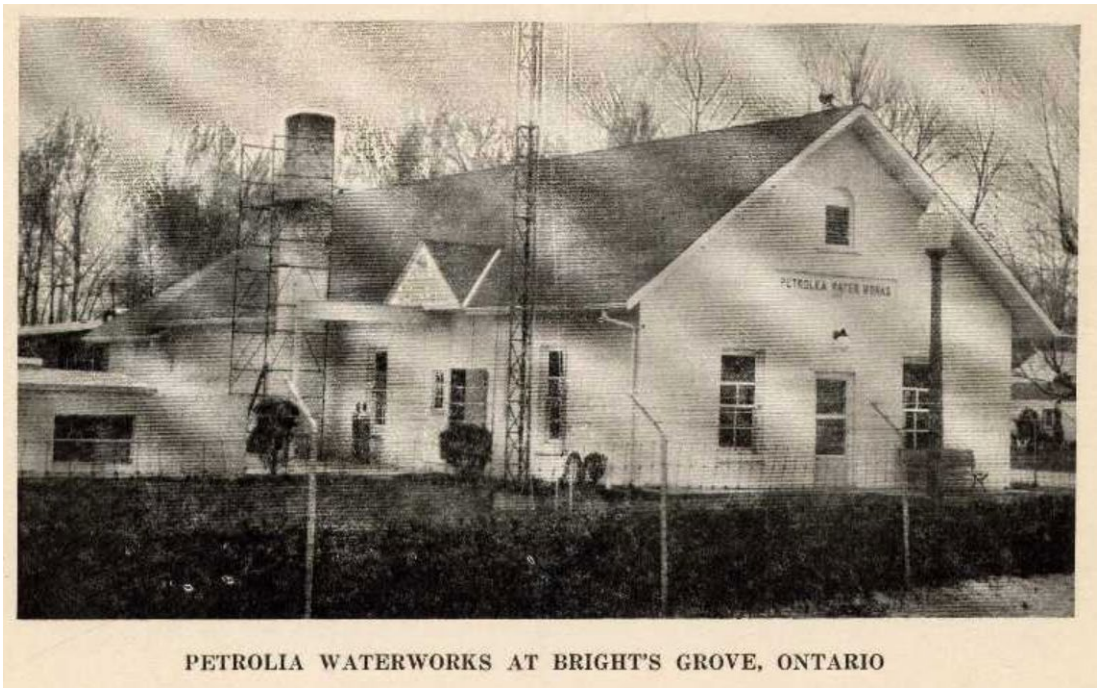


Figure 2: Undated historic image of 'Petrolea Water Works', image from Petroliaheritage.com

Figure 3: Contemporary view of 'Petrolea Water Works'. North façade with original 'Petrolea Water Works' signage. Image courtesy of Google Earth Street View.

Figure 4: Contemporary view of 'Petrolea Water Works'. Northwest exposure. Image courtesy of Google Earth Street View.

Community Consultation

Consultation was undertaken with the City of Sarnia and Indigenous communities who may have an interest in the CHSR.

Max Williams, Planner II and Secretary of the Sarnia Heritage Committee at the City of Sarnia, was contacted to notify the City of PHC's forthcoming CHSR, and to confirm the status of the Project Area on the City of Sarnia's heritage register; it was confirmed by the City the structure at 2701 Old Lakeshore Road is a Listed structure on the register.

The following Indigenous communities were contacted and invited to provided information to inform the CHSR:

- Aamjiwnaang First Nation
- Assembly of First Nations, Regional Chief
- Bkejwanong Territory (Walpole Island)
- Caldwell First Nation
- Chippewas of Kettle and Stony Point First Nation
- Chippewas of the Thames First Nation
- Delaware Nation
- Great Lakes Métis Council
- Métis Nation of Ontario
- Oneida of the Thames First Nation

Indigenous communities were provided with information regarding the CHSR on 21 November 2022; at the time of this report submittal no response has been received.

Summary and Preliminary Comments on Potential Impacts

Based on the results of the CHSR, primarily the Checklist in Appendix B, it is determined that 2701 Old Lakeshore Road is a Listed property and that the identified heritage value of the property is confined to the original 1896 pumping station located at the corner of Old Lakeshore Road and Waterworks Road.

The scope of the proposed work poses no direct impact to the identified heritage value of 2701 Old Lakeshore Road.

Based on evaluation of 2701 Old Lakeshore Road against the 'Cultural Heritage Checklist', a Cultural Heritage Evaluation Report (CHER) is recommended for the property. Given that the heritage value of the property has already been established by the Listing criteria of the City of Sarnia's Heritage Register, and the proposed work is being undertaken while maintaining the

functionality of the existing infrastructure, the proposed work poses no direct impact to the identified heritage value of the property.

Recommendations

1. Given the current inclusion of 2701 Old Lakeshore Road on the City of Sarnia's heritage register, the cultural heritage value or interest (CHVI) of the structure has been established; the Listing report in Appendix C should be accepted in lieu of a CHER.
2. It is acknowledged that in keeping with the Cultural Heritage Checklist (Appendix B), a Heritage Impact Assessment (HIA) should be recommended to identify potential impacts to a structure with CHVI; given the proposed upgrades involved a new intake pipe in Lake Huron, while maintaining the operation of existing infrastructure, it is recommended that Recommendations 5 through 7 of the CHSR be considered in lieu of a HIA.
3. It is acknowledged that in keeping with the Cultural Heritage Checklist (Appendix B), a Heritage Impact Assessment (HIA) should be recommended to identify potential impacts to a structure with CHVI. It is understood the Town may consider undertaking select repairs to components of the structure identified in 2014 (Appendix D) as requiring repair or replacement as part of the current contract to install a new intake pipe; potential repairs include, but are not limited to, foundation repairs, roof replacement, and stucco repair. The plant would remain operation during any proposed repairs. It is recommended that Recommendations 5 through 7 of the CHSR be considered in lieu of a HIA, provided that no alteration to the roofline is made and materials are replaced, as necessary, in kind. As a further measure, the Town may consider undertaking a Conservation Plan prior to any alterations to identified heritage attributes of the 1896 pumping station (Appendix C).
4. It is acknowledged that consideration is being given to the installation of a raw-water pre-treatment system within the 1896 pumping station structure; it is understood that should a raw-water pre-treatment system be installed the exterior of the structure will not be impacted. It is recommended that Recommendations 5 through 6 of the CHSR be considered in lieu of a HIA.
5. Related to recommendations 2 and 3, the limits of the original 1896 pumping station be illustrated on all construction schematics and formal 'no-go' instructions be issued to all site personnel.
6. The Project Area be subject to a pre-construction vibration assessment, and subsequent vibration monitoring of the 1896 pumping station, as necessary.
7. Should future work on the Project Area require alteration to the exterior of the 1896 pumping station, a HIA be undertaken at that time.

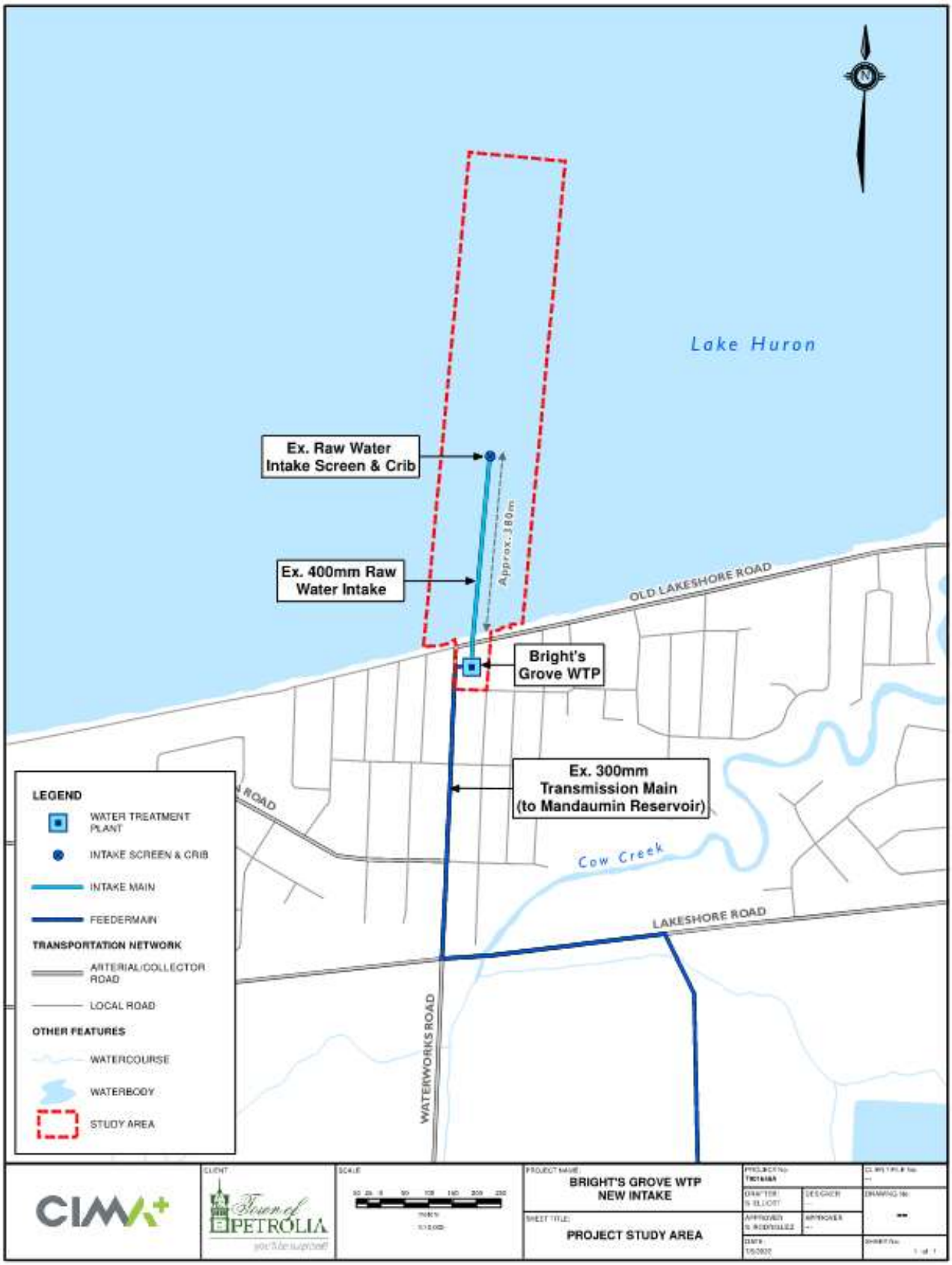
Sincerely,

Chris Lemon B.Sc., Dip Heritage, CAHP,

Cultural Heritage Specialist

Appendix A

Study Area


Lake Huron
Ex. Raw Water Intake Screen & Crib
Approx. 380m
Ex. 400mm Raw Water Intake
OLD LAKESHORE ROAD
Bright's Grove WTP
Ex. 300mm Transmission Main (to Mandaumin Reservoir)
Cow Creek
LAKESHORE ROAD
WATERWORKS ROAD
LEGEND
WATER TREATMENT PLANT
INTAKE SCREEN & CRIB
INTAKE MAIN
FEEDERMAIN
TRANSPORTATION NETWORK
ARTERIAL/COLLECTOR ROAD
LOCAL ROAD
OTHER FEATURES
WATERCOURSE
WATERBODY
STUDY AREA
CLIENT
Town of PETROLIA
PROJECT NAME
BRIGHT'S GROVE WTP NEW INTAKE
SHEET TITLE:
PROJECT STUDY AREA

Appendix B

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.

Project or Property Name

Brights Grove WTP New Intake Class EA

Project or Property Location (upper and lower or single tier municipality)

2701 Old Lakeshore Road, Brights Grove, Ontario

Proponent Name

CIMA+

Proponent Contact Information

Stuart Winchester, stuart.winchester@cima.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)

---

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)

---

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

---

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

---

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

Petrolia Waterworks
Heritaae Listina

2701 LAKESHORE ROAD
(PETROLIA WATERWORKS)

Legal Description:	Concession 9, West Part Lot 9
Roll Number:	3829 100 011 001 0000
Year Built:	1896
Original Owner:	Town of Petrolia
Present Owner:	Petrolia Public Utilities Commision
Architects:	Unknown

2701 LAKESHORE ROAD
(PETROLIA WATERWORKS)

DESCRIPTION
This single storey building has a medium gable roof. The roof material is asphalt shingles and the exterior walls are painted brick. The eaves are plain metal. The windows have plain wood openings and brick sills. The entrance door is also plain and is close enough to the ground that it has no stairs leading to it.

ARCHITECTURAL MERIT
The simplicity of this building is what makes it visually pleasing. The windows are all plain and are the same style and size. The roof is also plain with one continuous long medium gable.

HISTORICAL SIGNIFICANCE
A water filtration section to filter the intake water from Lake Huron was added in 1983-1984.

ENVIRONMENT
This building is important in establishing or maintaining the dominant character of the area. It is conspicuous or familiar in the context of the neighbourhood.

INTEGRITY
This building is in good solid condition. There do not appear to have been any major alterations that would threaten the character of the building. Overall, many of the original design materials and the character remains in tact.

USABILITY
This building was built for and continued to be used with the purpose of water filtration.

CONCLUSION
This building should be considered significant based on architectural grounds. It has features such as the medium gable roof and plain windows. This building is important in establishing or maintaining the dominant character of the area.

Appendix D

Condition Assessment

Town of Petrolia

CONDITION ASSESSMENT OF BRIGHT'S GROVE WTP PETROLIA, ONTARIO

Partners in excellence

236 Victoria Street North, Suite 301
Kitchener, Ontario
N2H 5C8
Canada
Phone: (519) 772-2299
Fax: (519) 772-2298
www.cima.ca

March 12, 2014

T000161A

TABLE OF CONTENTS

LIST OF TABLES

APPENDICES

1. INTRODUCTION

1.1 BACKGROUND

The Petrolia Water Treatment Plant (WTP) is located in the City of Sarnia at Bright's Grove, approximately 20 km from the Town of Petrolia. The municipal street address of the plant is 2701 Old Lakeshore Road, Bright's Grove.

The plant currently supplies potable water to the Town of Petrolia and other service area municipalities including the Township of Enniskillen, Village of Oil Springs and the Township of Dawn-Euphemia. The plant also supplies water to portions of Brooke-Alvinston, Sarnia, St. Clair and Plympton-Wyoming. The total population presently served by the Petrolia WTP is reported at approximately 10,000 persons.

The Petrolia WTP is currently owned by the Town of Petrolia and operated by the Ontario Clean Water Agency (OCWA), on behalf of the Town. The plant provides treatment for water drawn from Lake Huron. Originally constructed in 1896, the plant has undergone an expansion and a major retrofit/upgrade in 1984 and 2005. The most recent 2005 upgrades included the installation of a membrane filtration system and associated chemical feeding equipment, new low lift pumps, retrofits of the intake piping and clearwell, and upgrades to the waste process handling systems.

The maximum permitted water taking for the plant, as per existing Permit To Take Water (PTTW) Number 5412-6RNNF5 is 15.6 ML/d; however, the current rated capacity of the plant is 13.4ML/D as per the existing Municipal Drinking Water License Number 034-101 Issue Number 3.

An application for renewal was issued by the Town on February 19, 2013 and Issue No. 4 was received June 27, 2013.

The water treatment system at the Petrolia WTP comprises membrane filtration for particulate removal and chlorination for disinfection. Treated water is also fluoridated prior to entering the distribution system.

A general site plan of the facility is included in Figure 1 below.

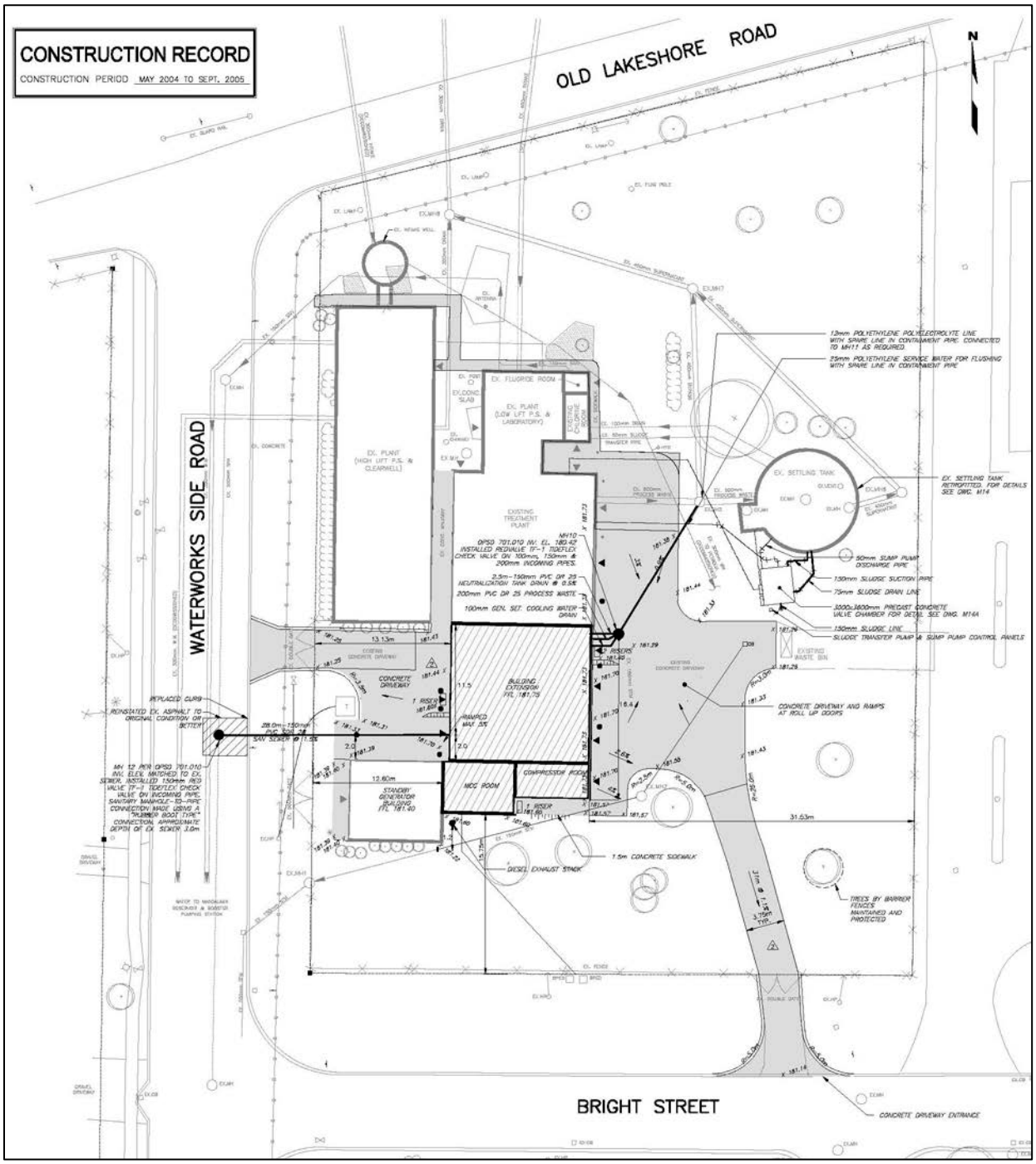


Figure 1 Petrolia Water Treatment Plant – Site Plan

1.2 PURPOSE OF REPORT

The purpose of this report is to present the results of a condition assessment of the accessible portions of the existing plant. The condition assessment included visual inspections by each discipline including process, structural, architectural, mechanical, electrical, HVAC, SCADA, site, and health and safety. Based on this evaluation, recommended upgrades, repairs and maintenance items for the plant are presented.

2. METHODOLOGY

The condition assessment of the Petrolia WTP involved the completion of the following activities:

- Review of existing background documentation, including:
  - Contract Drawings, dated Sept. 1985
  - Construction Detail Drawings, dated May 1986
  - Construction Record Drawings dated Sept 2005
  - MOE inspection reports dated 2011, and 2012
  - Operations data and manuals
- Physical condition inspection:

The visual inspection of the plant was completed on July 10, 2013. The inspection was restricted to visible sections of the plant and did not include confined spaces, interiors of tanks, inaccessible roof structures, or comprehensive equipment or process testing. This report covers the first phase of inspection which included a visual inspection of accessible areas throughout the plant and identifying priorities. Additional testing, inspections in confined space areas, or any further testing on specific equipment or processes, if necessary, will be identified for follow up inspections.

OCWA operations personnel were present with CIMA during the inspection to provide background information and insight. Data on each component was documented, and digital photographs were taken. The inspections were completed by the following CIMA discipline leads and specialized consultants:

- Process, Mechanical, and Site Civil Works – Eric Tuson
- Structural, Architectural, and Health and Safety – Rebecca Pringlemeir and Vanessa Nickel
- Electrical, SCADA, and HVAC – Brian Sudic
- Pat McGrenere, Senior Technical Advisor
- Harrie Van Dyke, Construction Services Sub Consultant

Information collected from the background documentation and the site inspections was reviewed to identify deficiencies, priorities and estimated capital costs. The deficiencies were assessed against the following standards and guidelines:

- MOE Design Guidelines for Drinking Water Systems, 2008
- Occupational Health and Safety Act (OHSA)
- Ontario Building Code (OBC)
- TSSA Standards
- AWWA Standards
- NSF/ANSI Standard 61: Drinking Water System Components – Health Effects

Recommended maintenance items, upgrades and rehabilitation items, including cost estimates and prioritization, are included in Section 4.0.

3. CONDITION ASSESSMENT AND UPGRADE RECOMMENDATIONS

The following sections summarize the current conditions of the existing Petrolia WTP based on a physical visual inspection of all accessible portions of the plant and a review of background documentation.

The information provided in the following sections has been grouped by discipline. Specific data for each component was documented in the condition assessment forms including photos, included in Appendix 1.

3.1 PROCESS/MECHANICAL

The following sections provide a summary of the major observations and recommendations for each of the main treatment processes assessed during this exercise at the Petrolia WTP.

3.1.1 Raw Water Intake

3.1.1.1 Description

Raw water flows from Lake Huron through the 400 mm diameter cast iron intake pipe installed in 1944. Just prior to the 2005 plant upgrades, a new intake screen complete with new concrete supporting block and connecting elbow was installed on the existing intake pipe. The new screen is made of a nickel copper alloy material, expected to prevent zebra mussel attachment to the intake screen structure. Additional zebra mussel control for the intake pipe itself, such as chlorination at the raw water intake screen is not provided. An air burst system at the screen to maintain screen cleanliness has not been provided.

3.1.1.2 Observations and Recommendations

Visual observations of the raw water intake system were not completed as part of this exercise. However, operational staff indicated that small zebra mussel shells have passed through the intake screen (or from zebra mussels inside the intake pipe itself), as well as the automatic strainers, resulting the cutting of some membrane fibres.

We have confirmed with the manufacturer that the intake screen is a nickel copper alloy with a slot velocity of 60 mm/s (0.2 ft/sec). The current operations manual indicates otherwise for the screen and should be corrected.

Operations staff have indicated recently that frazil ice is an occasional concern. Various methods of controlling frazil ice accumulation on the screen should be investigated to establish the most cost effective way or ways of mitigating this possible problem. Options include:

- Plant flow and pump control
- an air line back to the intake screen (i.e. a hydroburst system), or
- back flushing the intake pipe with either the raw or treated water.

Pumping raw water back through the intake pipe to push the frazil ice off the intake screen may be the most expedient solution at this time. This can be achieved by removing the two blind flanges on the intake and pump suction line located in the old wet well and connecting the LLP discharge line to the suction line with appropriate valves. Thus, the old wet well could be flooded periodically and the water used to back flush the intake in the winter.

Consideration should be given to providing a zebra mussel chlorination system for the intake pipe itself, tied to low lift pump operation. The chlorination system would address zebra mussel larva getting past the intake screen and growing within the intake pipe.

The intake is inspected on an annual basis with the exception of 2013 due to weather constraints. The intake pipe should be inspected to look for zebra mussels inside the pipe. The intake was reportedly last cleaned in 2004. A written procedure for cleaning of the intake should be developed.

3.1.2 Low Lift Pumping

3.1.2.1 Description

The existing low lift pumping station consists of 3 identical Goulds centrifugal pumps, each with a capacity of 9.75 ML/d at 52.5 m head, and equipped with Variable Frequency Drives (VFDs). All three pumps, installed during the most recent plant upgrade in 2005, feed the membrane filtration system downstream.

Flow measurement of the pumped raw water is provided by a magnetic flow meter, at the low lift pump discharge header, to record daily water usage and to assist the addition of chlorine. Chlorine injection points are installed on the low lift suction headers to provide the means for pre-chlorination.

Each of the low lift pumps discharge assembly is equipped with a check valve and a butterfly valve for pump protection from back pressures surges during pump shutdown and for isolation purposes during maintenance. The three low lift pumps discharge into a common 350 mm diameter discharge header that feeds the membrane system downstream.

3.1.2.2 Observations and Recommendations

The low lift pumps did not have visible plate data and there was some observed rusting on the surface of the pumps. The suction pipes and valves also showed signs of surface rust.

No apparent vibration issues were noticed on the low lift pumps at the time of the inspection. However, operational personnel noted recent vibration and pulsing concerns with Low Lift Pump No.2. Pump maintenance is suggested.

The low lift pumps and associated piping and instrumentation appear to be working adequately; however, painting and maintenance is recommended.

The pneumatic control valves on the discharge side of the pumps have been non-operational since a shutdown in 2007, which reportedly resulted from a discharge pump valve seizing. The original pneumatic system was put in place to control surge flow to the filters on start-up of each pump. The pumps are designed to start against a closed butterfly valve which will open to 5% at pump start then slowly open to 100%. As the duty low lift pump is controlled by VFD this maybe a redundant system to protect the filter system at pump start and stop. The valves are presently left open. The pneumatic system should be repaired and put back into operation, as a maintenance item.

A minor seepage leak through the link-seal at the piping into the clearwell in the raw water flowmeter room was observed. Visual observations indicate that this leak is not affecting process or treated water quality. It is recommended the link-seal is replaced, since the adjustment presented in CIMA's letter of July 30, 2013 was unsuccessful.

A leak into the low lift pump area was observed near the ceiling on the east wall at the location of a structural support beam and endplate which is bolted to the wall. Visual observations indicate that this leak is not affecting process or treated water quality. The recommended solution was presented in CIMA's letter of July 30, 2013 and is complete.

Consideration should be given to developing a program for preventative maintenance on the low lift pumps.

3.1.3 Membrane Filtration

3.1.3.1 Description

The Pall Membrane Filtration system has a rated capacity of 13.4 ML/D at 1oC, and is comprised of 3 trains or racks, with 76 modules per rack. Each module contains over 6,000 hollow fibres made of polyvinylidene fluoride (PVDF) and have an outside diameter of 1.4 mm and an inside diameter of 0.7mm.

Two 19.5 ML/d, 0.38 mm mesh size 300 mm (12") automatic strainers are provided upstream of the membranes to stop large particles from entering and damaging the membrane filtration system.

Two Goulds horizontal centrifugal reverse filtration pumps are provided to backwash the membranes. Each pump has a capacity of 5.4 ML/d at 22 m head. Both pumps were installed as part of the new membrane filtration system during the 2005 plant upgrade.

Two rotary screw type air compressors and a receiving tank is provided for air scour, membrane integrity testing and valve actuation. Each compressor has been supplied with a refrigerated air dryer unit, a condensing unit, refrigerant evaporator, mechanical separator, automatic condensate discharge valve, pre-filter and after-filter. Dryers are equipped with filters to remove oil carryover, oil aerosols and other particulate matter.

3.1.3.2 Observations and Recommendations

Following source water high turbidity events, the filter discharge header becomes plugged with silt along the bottom of the filters. Operations personnel have, with the Towns' concurrence, installed manual flushing valves at each bank of filters to assist in alleviating this problem.

The filter plugging problem is the result of high turbidity levels of 500 to 600 NTU in the source water during storm events, which is due to the location and depth of the existing intake. The current SCADA system only allows for a control range just above 200 NTU. The operations staff in the short term initiated a procedure to reduce the impact to the filters during these high turbidity events by shutting the plant down through the SCADA system when the raw water NTU reaches a pre-set high level.

Operations staff report that zebra mussel shells bypassing the automatic strainers have been experienced in the past. The shells or part shells have been known to cut through the membrane fiber causing turbidity breakthrough resulting in an intensive labour issue to isolate each damage fiber. Operations staff have added a Teflon gasket within the existing strainers in an attempt to alleviate zebra mussels getting past the strainers through to the membranes. The strainers are reportedly equipped with a lock nut assembly to reduce the space between the strainer and the housing. The manufacturer should be consulted to assist with the situation, or failing resolution, it may be possible to replace the existing strainers with more efficient strainers. A chlorination system for the intake discussed in Section 3.1.1.2 would improve the situation, and would mitigate the formation of zebra mussels inside the intake pipe.

Both reverse filtration pumps appear to be in excellent condition. Regular maintenance as per the manufacturer is recommended.

Both air compressors appear to be in good operating condition. Regular maintenance as per the manufacturer is recommended. Recertification of the pressure tanks may be required. Recommend regular inspection by qualified personal.

All other piping and valves associated with the membrane filtration system seems to be in good condition and well maintained. Regular maintenance as per the manufacturer is recommended.

The air release valve on train #1 has been replaced with an ARI valve, and the operations manual should be updated.

3.1.4 Chemical Systems

3.1.4.1 Description

There are a number of chemicals used at the Petrolia WTP to assist the membrane filtration process, and to provide for fluoridation. These chemicals include; sodium hypochlorite, citric acid, sodium hydroxide, sodium bisulphite, fluorosilicate acid. In addition, three chlorinators (chlorine gas) are used to provide pre-chlorination, primary disinfection and touch-up chlorination.

Each chemical system consists of one storage tank and two chemical feed pumps. Some chemical systems are also equipped with a transfer pump to transfer the chemical from the concentrated chemical totes to the day tanks. Chemical storage tanks and their respective feed systems are installed within separate containment areas for retention of spills.

3.1.4.2 Observations and Recommendations

All chemical storage tanks appear to be in good condition. Regular maintenance as per the manufacturer is recommended.

All chemical feed pumps appear to be in good condition. The sodium hydroxide piping has been recently replaced with new piping. Regular maintenance as per the manufacturer is recommended.

The chlorine gas system appears to be in good condition.

The majority of the instrumentation associated with the chemical feed systems is obsolete and should be replaced. Instrumentation replacement is recommended as required, upon failures or with any potential chemical feed system upgrades. Continuing with regular maintenance as per the manufacturer is recommended.

3.1.5 Clearwell

3.1.5.1 Description

The clearwell is used to provide the necessary chlorine contact time to satisfy the disinfection requirements. The clearwell has baffle curtain walls to improve hydraulics and provide the necessary contact time. Chlorine is added to the membrane filter effluent at the point where the filtered water is introduced in the clearwell.

The clearwell is equipped with vent pipes to prevent damaging pressures and/or vacuum conditions from developing in the underground cells as the water level rises and falls. A hatch and access ladder provide access to the clearwell for cleaning and maintenance. The clearwell overflows to the lake.

3.1.5.2 Observations and Recommendations

The clearwell was not drained for inspection. The baffle walls in the clearwell, installed as part of the 2005 plant upgrades, appear to be in good condition.

3.1.6 High Lift Pumping

3.1.6.1 Description

The finished water from the clearwell is directed to a 300 mm diameter suction header. The suction header contains a gate valve to isolate the clearwell. The suction header supplies 3 high lift pumps with 200 mm diameter connections and associated 200 mm butterfly valve to isolate each pump at the suction.

- High Lift Pump No.1 is an ITT horizontal centrifugal pump with a capacity of 63 L/s at 61 m head. The pump is equipped with a soft starter, so it normally operates at constant speed.

- High Lift Pump No.2 is an Allis Chalmer horizontal centrifugal pump with a capacity of 70 L/s at 76 m head. The pump is equipped with a soft starter, so it normally operates at constant speed. The pump motor was replaced in 2013 with a 125 HP motor.
- High Lift Pump No.3 is an Allis Chalmer horizontal centrifugal pump with a capacity of 126 L/s at 91 m head. The pump is equipped with a variable frequency drive and is operated as the nominal duty pump.

Each of the high lift pumps discharge assembly is equipped with a tilted disc check valve and a butterfly valve for pump protection from back pressures surges during pump shutdown and for isolation purposes during maintenance.

The three high lift pumps discharge into a common 300 mm diameter discharge header that eventually discharges into the distribution system and the Mandaumin Reservoir and Booster Station, which is 8 km away, via an interconnected system of discharge headers.

3.1.6.2 Observations and Recommendations

The condition of all piping below the grating area in the high lift pumping station appears to be corroded, possibly severely since it was not replaced in the 2005 upgrades. The visual inspection was limited, since the grating was not removed. Non-destructive tests are recommended to confirm the extent of corrosion. Alternatively, the piping should be replaced.

The discharge header includes a control valve that could not be identified at the time of inspection. The valve set points appear to be corroded in place. The valve is likely either a pressure reducing and/or pressure sustaining valve. The valve predates all files reviewed on site at the time of inspection. It is recommended that the valve be serviced and identified by a control valve supplier through the current maintenance programme.

The sump pump below the grating area in the high lift pumping station appears to be in poor condition and should be replaced under the current maintenance programme.

The instrumentation in the high lift pumping station is in good condition.

3.1.7 Residuals Management System

3.1.7.1 Description

The residuals management system consists of a settling tank for storage of the settling of wastewater generated throughout the plant, a sludge transfer pump and a polymer feed system used to speed up the settling process in the settling tank before being transferred to outside sludge truck haulage for disposal to the Petrolia Water Pollution Control Plant.

The settling tank is 9.1 m in diameter with a working depth of approximately 5.2 m. The draft tube is 1.5m in diameter and the effective settling area is 52.1 m2.

The sludge transfer pump is a dry pit submersible pump installed in a pre-cast manhole, on the south side of the settling tank. The pump is a KSB pump with a capacity of 78 m^3/hour at 7.2 m head. The pump is used to transfer the settled sludge to the sludge loading station for sludge truck loading.

3.1.7.2 Observations and Recommendations

Operations staff has implemented reduced polymer dosages with the aim of minimizing sludge removal issues. Another alternative could be to install a mixing pump to keep the solids suspended for longer time.

The sludge transfer pump appears to be in good condition; however, maintenance on the pump is recommended at this point.

The polymer feeds system appears to be in good condition. Regular maintenance as per the manufacturer is recommended.

3.2 STRUCTURAL AND ARCHITECTURAL

The structural condition assessment, highlighting deficiencies of each building and room is summarized in the following sections. Details of deficiencies and corresponding condition grading are compiled in the Condition Assessment Forms, in Appendix 1, including photos taken during inspection.

3.2.1 High Lift Pump Station and Clearwell

The existing plant building to the west of the plant consists of the High Lift PS, Intake Well, Clearwell, and some office space, originally built in 1896. The building has a triple brick superstructure with a wood framed roof and asphalt shingles. The substructure is composed of a cast in place concrete foundation, slab and equipment supports, and triple brick walls. The floor on the ground floor is wood construction supporting catwalks and an office space. To the south end of the building there is the clear well which is a partially below grade cast in place concrete tank enclosed under the wood roof. To the north is the original intake well that is not in use. The original intake well is a circular cast in place tank with brick walls and a concrete roof.

The roof shingles are near the end of their life and should be replaced. The condition of the sheeting and wood roof structure was not visible during the inspection, but should be reviewed prior to replacing the shingles.

The exterior of the building is parged and painted brick partially obscured by ivy. Much of the stucco is spalling, and some of the brick is softened with age. On the north face at the roof line there are structural cracks that will need to be repaired and some cracking around the windows that should be repointed.

The doors and windows are of wood construction and need to be cleaned and repainted. There is one window pane that needs to be replaced. The monorail is showing signs of rust and needs to be repainted. As a maintenance item the monorail system should be certified annually.

Inside the building the ground floor wood framing has been altered many times over the ages, especially under the office structure. Distress of the wood structure was not noted however based on the condition of the framing it is recommended that any future alterations include a review by a structural engineer. The handrail around the walkways is not to code and should be replaced.

The pump room in the basement has some leaking and seepage entering through the wall, and some corrosion of the grating. The wall should be repaired through injection. There are also some general housekeeping items where pipes require recoating, minor rusting or grating needs recoating, and concrete rouble in the pipe chases should be cleaned out, and abandoned equipment bases should be removed.

The clear well is a concrete and masonry structure with new checkered plate walkways in the crawl space above the water level. Across the top of the tanks there are several tension rods that have signs of rust. These rods should be cleaned and coated. The door to the clear well needs replacement of hardware due to corrosion. There are some pipe penetrations into the lower levels of the clear well that are leaking. The pipes are sealed using link seal, and efforts to tighten the bolts have failed to arrest the leakage. These seals should be replaced during the next shut down of the clear well in unison with other repairs and inspections.

The original intake structure is a circular below grade concrete and masonry structure. This structure has an access floor on the lower level of the station with openings into the intake well. The well has been abandoned after the intake pipe was closed. The well still however has some water in the bottom of the tank, and some issue with code compliance around the openings. The guard rails around the opening are too short and the access is currently provided by a temporary ladder that is not securely tied off. It is recommended to decommission the intake well or to restrict access to the room. Decommissioning of the well will include filling of the well with sand and casting new concrete in the floor openings.

3.2.2 Lowlift Pump Station and Laboratory

The existing plant consists of the Low Lift PS, Raw Meter Room, Boiler Room, Control Room, Fluoride Room, Chlorine Room, a Lab, and some office space, originally built in 1896. The floor elevations of the rooms in this building vary; the fluoride room is at ground level, the lab, kitchen, control room, are all partially below grade, the boiler room, and raw meter room, are below grade and accessible through a tunnel jointing the low lift and high lift pumping stations. The low lift PS is in the second level below grade, accessible by ships ladder.

The building is composed of cast-in-place concrete slabs, cast-in-place concrete walls up to grade level, and brick walls above grade level, a built-up tar lower roof, and a tar and gravel upper roof.

The Low Lift PS located in the second basement level has some leaks in the walls. One of the leaks was addressed as a safety issue due to the visible mineral formations on the wall below a structural steel beam anchor plate. This location appears to be leakage from a decommissioned pipe and the leakage appears to have been ongoing since 2005. Other leaks in these foundation walls also exist with similar rust staining on the walls. The leaks have caused slippery and unsafe conditions in the work area, and eventually can cause damage to the foundation wall.

The raw meter room in the basement and extends under the exterior walkway. This roof slab is a cast-in-place concrete ceiling with spalling on main beam and in 20 locations on ceiling. There is a manhole cover in existing roof slab with exposed rebar and spalling concrete. All of these spalls, and exposed rebar should be repaired in the near future.

The raw meter room floor has missing floor drain covers some steel supports for grating that show signs of rust and have approximately 5% section loss, and clogged sump full of sediment. The floor coating is past its useful life and should be replaced. The stair in this space has handrail that does not continue to the top of the stair and is not constructed to code.

The boiler room located in the lower level is in fair condition except for a wooden door with a rusted frame. The boiler room should be all non-combustible construction; the wood door should be replaced with a steel door to suit code restrictions.

The control room, kitchen and laboratory are in fair condition with some damage to finishes. There is some water damage to ceiling finishes and dry wall at the laboratory. There is missing trim over the air-conditioner in the kitchen and wall fan in the hallway that can allow rodents into the facility.

The fluoride room is in fair condition, but the drywall is in poor condition with failure at the floor level possibly due to moisture. Chemical containment under hydrofluosilicic acid is not coated, and bins are stored on steel grating. It is recommended to protect the containment with a coating.

The roof levels of this building are readily accessible by means of a concrete stairway; however these roof levels are not protected with any handrail or other barrier. It is recommended that a safety chain be placed across the stair with a warning that fall protection is required for access to the roof. This lower roof has a valley where the water pools and leaks into the building over the laboratory. There is no visible roof drain in this area. It is recommended that a roof drain be installed, or the roof insulation be placed to provide positive drainage during the next roof replacement. The upper roof has gravel ballast, and a gravel retention system at the edges. The retention system is not allowing water to flow easily into the roof gutters, and the gutters are clogged with gravel. It is recommended to install gutter guards to eaves on upper roof this roof system be replaced with a membrane so that gravel ballast is not required.

3.2.3 Chemical Building

The chemical building was rebuilt in 2005 on an existing foundation. The new building is a pre-engineered steel building with insulated steel cladding. The building includes several types of lateral restraint including portal frames, tie rods and block infill walls. Housed in the building are chemical feed tanks and associated piping and secondary containment.

The majority of the steel superstructure is in good condition, with the exception of minor areas of rust on tie rods, and on overhead and roll up door frames and hardware. Rusted areas should be cleaned and recoated. The man door leading to the exterior on the north side of the building has corroded hardware that should be replaced.

The concrete slab and foundation system has minor cracking that is normal for this application, and no other major deficiencies.

The containment coatings in the chemical containment areas have paint failures at the tank expansion joints. These failures have been noted by operations and are planned to be repaired under a maintenance contract. The neutralization tank containment is undersized, but the containment area is connected to a larger tank below the floor that was not accessible. The coatings in the neutralization containment area have failed due to chemical attack and should be recoated.

The monorail system in the building is supported independently on the pre-engineered building, and is supported on a combination of perimeter block walls and steel frame. The frame connection to the block wall was not blocked or grouted in tight at the time of construction. This beam should be grouted in tight to add lateral resistance to the connection. As a maintenance item the monorail should be certified annually.

There are two exterior man doors on the west wall that have their threshold well above the finished grade. These doors can be a hazard if used to exit in an emergency. Stairs would be required on the exterior to service these doors however the space between the buildings does not allow this. It is recommended that these doors be marked with warning signs form the interior and be blocked from use.

3.2.4 Filter Building, MCC Room and Compressor Room

The Filtration Room, the MCC Room, and the Compressor Room, were all built in 2005. The building is all one storey pre-engineered steel structure with concrete block shear walls between the portal frames. The building is supported on strip footings, and a structural slab with column piers above the floor level. The building has a lean-too structure on the south end at the MCC room. The entrances to the building are supplied by single man doors and large overhead and rollup doors on the east side. The interior of the building in the filter room is clear span with a sump area on the west side.

The main structural items in the buildings did not have noticeable defects. The doors had some issues however. The man door on the west side had a birds nest above the door indicating that there is a space between the door frame and the cladding. This space should be sealed. The roll up door on the west elevation has a bee hive between the door frame and building. The roll up door on the east side had rust on the door frame and mechanism; this should be cleaned and painted. The exterior door in the MCC room had oil leaking from the closure mechanism. This mechanism should be replaced.

3.2.5 Generator Building

The generator building was originally a load bearing block building, and in the upgrades in 2005 the building updated to house the new generator. The building was given a new steel roof, insulation and steel cladding that matches the style of the filter building. The building is all one storey at grade level. The building is made up of a cast-in-place concrete floor slab supported on strip footings, load bearing block walls clad in acoustical paneling on the inside and insulated steel cladding on the outside. The building has a double door on the west side, and an entrance to the MCC room on the east side.

There was no noted damage to the cladding or the structure during this inspection.

On the exterior of the building it was also noted that there is very little clearance between the exhaust ducting and the soffit of the building. The building is made of non-combustible construction, so there is no limiting distance required at this location. There is also a fuel filling station on the south side of the building. This station has a precast stair to the fill port. The stair requires a handrail by the Ontario Building Code because it is over 600 mm above grade. It is recommended that a hand rail be added to this stair.

3.2.6 Garage

The garage building was built sometime after the construction in 2005. The building is a standalone one storey building at grade level. The building is a pre-engineered steel building on a concrete slab with steel cladding. The foundation system appears to be a strip footing, with slab on grade, and secondary containment below the floor for chemical storage. The chemicals stored in this building at the time of inspection were 50% citric acid, and 25% sodium hydroxide in totes. The chemical totes were stored on galvanized steel grating over a secondary containment sump.

The building, floor and foundation appeared to be in good condition, however both the floor and the secondary containment were uncoated concrete, and the grating was galvanized steel. It is recommended that both the grating and the concrete should be coated to increase their chemical resistance in the event of a leak, and leak detection systems be added to the containment area so that leaks can be cleaned up in timely fashion.

3.2.7 Settling Tank and Valve Chamber

The settling tank area consists of the settling tank and the valve chamber for the settling tank. It was originally built in 1983 and the valve chamber was added in 2005. The settling tank and valve chamber are both below grade with lids visible at grade level. The settling tank is a confined space and was not entered at the time of the inspection.

The settling tank is a cast-in-place concrete cylindrical tank with a lid made of hollowcore panels and concrete topping, and includes an aluminum access hatch. The concrete topping has cracked at the precast panel joints, and parging covering the ends of the hollow core has spalled. Parging on the remained of the exterior of the tank has also deteriorated. The ladder into the tank is aluminum and has wires on it causing a safety hazard for entrants.

The valve chamber is a precast concrete chamber on a cast-in-place concrete floor slab with sump. The interior walls and ceiling of the chamber have been insulated with ridged insulation, and are not visible. The sump in the floor of the chamber was full of water and the pump was not running. The access to the chamber is provided by a ladder and access hatch. The hatch and ladder are in good condition however there are no hand holds at the top of the ladder. On the roof of the chamber there is an exhaust vent hood which has failing paint. The gasket between the precast roof and walls is deteriorated.

It is recommended to maintain the parging on the exposed edges of these chambers, to remove wiring from the access ladder to the settling tank, to install two "ladder-ups" to the chamber ladder, and to repair the sump pump. In addition the gasket and seal around the roof slab needs to be replaced or resealed.

3.3 HEALTH AND SAFETY

The Petrolia WTP was inspected for general conformance to OHSA. Many building elements that can pose health and safety hazards are regulated under OBC or other standards and guidelines. These elements are not included in this section.

Based on the health and safety condition assessment, the following upgrade and maintenance work is recommended:

- Install eyewash station in south end of membrane filtration room.
- The fluoride building is missing signage on the door and a wall is deteriorating by the door.

3.4 ELECTRICAL

The Petrolia WTP consists of a treatment building, and a High Lift & Low Lift pumping building. The main service entrance for the treatment plant is located in the MCC room of the treatment building. The electrical service entrance and distribution equipment located in the MCC room provide power to all of the process systems located at the treatment plant.

The water treatment plant was upgraded/expanded in 2005. The 2005 treatment plant upgrades included the expansion of the existing treatment building, a new treatment room, MCC electrical room, and compressor room. Existing buildings, including the High Lift / Low Lift Building and the original treatment building were provided with new electrical distribution as part of the treatment plant expansion.

The electrical power servicing the treatment plant facility consists of 600VAC, 3 phase and 120/208VAC distribution. The primary distribution equipment at the treatment plant includes the following 600V, 3 phase equipment: Pad mounted 750kVA 600V utility transformer, 600V 3 phase MCC, 600V to 120/208V step down transformers. The general power and lighting is provided by the 120/208VAC lighting panels. The majority of the electrical distribution system is new and was installed during the 2005 treatment plant upgrades. Some original 120/208/240V electrical distribution was installed prior to the 2005 treatment plant upgrades.

3.4.1 Service Entrance

The main service entrance consists of a 600V, 3 phase supply that originates from the utility pad mounded transformer located adjacent to the generator building. The pad mounted transformer primary power fed from an adjacent hydro pole that is equipped with high voltage fused cutouts. An outdoor utility revenue meter is located on the exterior wall of the existing compressor room. The main utility service transformer is rated 750 kVA, 27.6kV to 600V, 3 phase. The main high voltage service pole and pad mounted transformer are in good condition. The 600V, 3 phase secondary supply from the main transformer is fed via underground cables to the MCC service entrance breaker located in Electrical room. The secondary 600V service conductors from the transformer to the MCC service entrance were installed during the 2005 treatment plant upgrades.

3.4.2 MCC and Distribution

The treatment plant 600V normal power distribution is provided by the 600V Eaton / Cutler Hammer MCC rated at 1000A. The MCC is equipped with 600V breaker feeders and motor starters to service the treatment plant electrical loads. The MCC is located in a dedicated electrical room in the treatment process building. The electrical room includes wall mounted 600V, and 120/208VAC electrical distribution panels. The MCC is equipped with a main service entrance breaker that is rated 800A. Local digital power metering for the distribution system is located in the Automatic Transfer Switch (ATS). In the event of a utility/normal power failure, the ATS will automatically start the emergency standby generator located in the same room and transfer all MCC electrical loads to the emergency power source.

The normal utility service entrance power transitions from the MCC service entrance breaker to the ATS that is located in the adjacent generator room/building. The ATS provides normal or emergency power to the 600V MCC electrical loads located in the electrical room. The existing digital power metering unit that is located in the ATS enclosure has a defective LCD display. The current loading at the treatment plant could not be confirmed based on the defective digital metering display. The digital meter should be repaired or replaced.

The existing 600V, 3 phase MCC is in good condition, and likely has an additional 10 to 15 years of remaining service life. The MCC includes solid state motor starting equipment, including soft starters and variable frequency drives (VFD's) that will have a shorter service life in the order of 10 years due to higher failure rates of electronic components and product obsolescence.

Typical electrical maintenance of the MCC and 600V distribution will ensure the reliable operation of the system. Solid state motor starters (Soft Starters and VFD's) should be periodically examined by the original manufacturer.

It would be beneficial to perform a basic infrared scan of the MCC (interior) and major distribution panels/starter to identify any potential hidden problems related to breakers, starters or faulty cable terminations such that they may be corrected prior to failure.

3.4.3 Emergency generation

The treatment facility is equipped with an emergency (diesel) generator to supply power in the event of a utility power failure. The generator is connected to the electrical distribution system via the automatic transfer switch. The generator system is equipped with a fuel oil system, including two 1100 l day tanks, supply/return and vent piping. The generator jacket water cooling is based on engine mounted heat exchanger and potable water. The generator room is provided with a ventilation system for combustion air and cooling to mitigate heat rejection. The generator is load tested on an annual basis and is in good condition.

3.4.4 General Electrical Distribution

The general electrical power distribution at the Petrolia WTP consists of power conductors in Rigid PVC and Electrical Metal Tubing. The majority of the electrical distribution at the treatment plant was installed during the 2005 upgrades. The distribution installed during the upgrades consists of Rigid PVC conduit and power conductors in cable trays that are in good condition. Local disconnects and junction boxes that were installed as part of the 2005 upgrades are also in good condition. Local disconnects that are located in humid/corrosive environments, including the treatment room, chemical area, High Lift and Low Lift rooms should be examined, based and exercised (open/closed) as part of regular maintenance to ensure reliable operation of the equipment.

The electrical distribution system includes 2 – 600V, 3 phase distribution panels designated LPB and LPD, and 4 – 120/208VAC distribution lighting panels designated LPA, LPC, LPAA and LPBB. The respective distribution panels service the general power requirements for the treatment facility including lighting loads, receptacles, controls systems, fans, electric heaters and various process equipment. The majority of the distribution panels were installed during the 2005 upgrades and are in good condition. Existing lighting panel LPAA was installed prior to the 2005 upgrades and is also in good condition. The main 600V service entrance is equipped with general surge protection device. The integrity of the distribution system could be improved by installing an additional surge protection device on LPC that supplies power to sensitive control systems, PLC control panels and related instrumentation.

Older sections of the treatment facility, that were in service prior to the 2005 upgrades, include electrical distribution that has been in service for over 20 years. The areas that have older electrical distribution include the High Lift and Low Lift pumping station areas. The older electrical distribution consists of EMT raceways and standard steel junction boxes and fittings. The older electrical distribution is not suited for wet/humid environments and is in poor condition. The EMT type distribution should be replaced during the next upgrade of the treatment facility.

The treatment facility includes ground/bonding conductors that are located in the existing High Lift pumping station (lower level southwest corner of the high lift room). The grounding conductors consist of stranded soft drawing bare copper. The grounding system includes mechanical bolt type connectors that are oxidized. Existing connectors should be cleaned as required to improve conductivity. The existing grounding system should be tested as part of regular maintenance to confirm good ground continuity.

3.4.5 Lighting

The Petrolia WTP is equipped with existing 120VAC light fixtures that service the following applications:

- Outdoor Fixtures

- Indoor Gasketed (Wet Locations)
- Indoor Non-Gasketed

The lighting on the exterior of the treatment plant buildings consist of 120VAC wall pack high pressure sodium fixtures. The existing wall pack lighting has been in service since the treatment plant upgrades in 2005 and are in good condition. Some wall pack fixtures have lenses that are discolored due to dust/debris, and should be cleaned during future regular maintenance or lamp replacement.

The majority of the indoor process areas, including the chemical room, filter room, high lift, and low lift areas are equipped with typical 4' – T8, 2-32W type fluorescent fixtures with gasketed NEMA 4X lenses for wet/damp environments. The NEMA 4X fluorescent fixtures were installed during the 2005 treatment plant upgrade and are in good condition.

The large process areas including the filter room and the chemical room are equipped with high bay, 250 W, 120VAC gasketed light fixtures. The lights are ceiling mounted to provide illumination over a wide area for the respective process rooms. The high bay fixtures are in good condition. The perimeter of the process rooms also include wall mounted T8, 2-32W type fluorescent fixtures with NEMA 4X gasketed lenses that are in good condition.

The treatment plant is equipped with emergency lighting systems that consist of DC battery units and multiple DC emergency lighting heads distributed throughout the facility. The majority of the emergency lighting was installed in 2005 and is in good condition. Some older DC lighting heads are installed in the Low/High Lift areas that should be replaced with new vapor tight heads during the next treatment plant upgrades.

The Low Lift and High Lift Building include incandescent light fixtures that were installed prior to the 2005 treatment plant expansion. The existing incandescent fixtures are typical open style, not rated for wet areas. The existing fixtures and related electrical distribution and light switches have been in service for over 25 years and should be replaced with vapor tight high efficiency light fixtures during the next treatment plant upgrades.

The exterior door of the High Lift PS building is not equipped with an illuminated exit sign. An exit sign should be installed in accordance with code.

3.4.6 General Building Services

The treatment facility is equipped with a security system, and smoke/heat detectors in the respective equipment rooms. The security system main control panel is located in the electrical room. The security system monitors the door status contacts on the respective exterior perimeter doors. The smoke detectors and security system are in good condition.

3.5 SCADA

The existing control system at the treatment plant consists of the following main components:

- ICP-01 – Master PLC Control Panel
- ICP-02 – High Lift PLC Control Panel
- ICP – PAL Microfilter PLC Control Panel
- Master SCADA Node – HMI Computer
- View SCADA Node – HMI Computer
- PAL HMI Control Panel Mount Computer

- AquaTrend (HACH) Process Trending Computer

3.5.1 Control Panels

The PLC automation system hardware is based on the Allen Bradley (Rockwell) Control Logix platform. ICP-01, ICP-02 and the PAL control panel are all equipped with Control Logix PLCs. ICP-01/02 includes process control input/output (I/O) for process pumping and process instrumentation. The PAL control panel includes I/O specific to the control and status monitoring of the microfilter system. The three PLC control panels are in good condition.

The ICP-02 control panel is located in High Lift Pumping Station. The control panel houses the PLC processor, auto dialer and a radio modem. The auto dialer is connected to the ICP-02 PLC process via a serial communication link. The radio modem provides a SCADA communication link to the Mandaumin Booster Pumping Station and the Petrolia Water Tower. The Radio Communications hardware was upgraded in 2013 to new Ethernet Based radio modems at the treatment plant, Mandaumin and the Water Tower to improve the data communications performance between the respective locations. (Note: the PLC processors at the Tower and Booster Station were also upgraded with Ethernet Communications). The ICP-02 control panel is located in a humid environment, and a disposable control panel desiccant "puck" should be installed in the interior of the panel to reduce the humidity levels in the panel. The panel is equipped with a dedicated Uninterruptable Power Supply (UPS). The UPS system should be tested on a bi-annual basis to confirm that it is functioning normally.

ICP-01 and the PAL control panel are located in the electrical room. The panels are in good condition. Each panel is equipped with a dedicated Uninterruptable Power Supply (UPS). The UPS system should be tested on a bi-annual basis to confirm that it is functioning normally. ICP-01 is equipped with an auto dialer that is connected to the ICP-01 PLC process via a serial communication link.

3.5.2 SCADA Computers

The Master, View and PAL SCADA computers include Wonderware HMI software for the operation, monitoring and trending of the treatment process. The process system control and status monitoring functions are available via the respective three SCADA computers. The PAL SCADA computer is based on a panel mount PC computer that is installed in the PAL control panel door. The View node SCADA computer is located in the lab office area. The Master SCADA computer node is located in the office of the HLPS.

The Master and the PAL SCADA computers include independent historical trending. Each computer independently polls the respective PLC for process data related to the historical trending function. The Master SCADA computer is equipped with additional software for the purpose of providing reports. The reporting feature generates weekly and monthly reports on demand. The reports are formatted to provide process performance data, including max/min values for submission to the MOE. The reports are generated via a Microsoft Access custom reporting macro. The process data for the reporting application polls process data from the respective PLC process via dynamic data exchange protocol that is independent of the Wonderware trending and data collection. The MS Access poll process data is stored in the static memory of the PLC processor. The PLC memory is capable of storing up to seven days of treatment process data that is based on 5 minute resolution. In the event that the Wonderware Data collection software fails, the PLC will continue to independently sample and store process data for up to seven days.

The Wonderware SCADA software stores process data related to the trending feature on the local computer hard drive. The Master SCADA computer is equipped with a secondary reporting feature that is called "D-Bug". The D-Bug feature is a custom macro that allows the operator to extract 5-minute interval process data from the Wonderware trending database on an on- demand basis. The macro will create a "CSV" file that consists of process signal for any time interval. The process signals and time interval can be selected by the operator. A CSV manual report is typically generated by the operations staff annually and is submitted to the MOE.

The SCADA system is also equipped with an independent process trending computer. The computer is equipped with AquaTrend (HACH) Trending Software that directly monitors the treatment process analyzers. The AquaTrend computer is directly connected to the process analyzers via a proprietary serial communications link. The AquaTrend software samples and stores all of the process analyzers data on the computer hard drive based on 5-minute sampling intervals. The process signals and data resolution that is collected by the AquaTrend computer is consistent with and redundant to the process data that is collected by the Master Wonderware SCADA computer.

During the inspection of the treatment facility, the operations staff noted the following anomalies related to the SCADA system and process automation:

- The Treatment Plant PLC communicates with the Mandaumin Booster Station PLC to facilitate automatic filling of the Mandaumin Reservoir via the treatment plant high lift pumps. The filling process requires that the booster station PLC open an inlet valve to allow water to flow into the reservoir. The operations staff noted that periodically, when the HLP is called to start, the Mandaumin reservoir inlet valve does not open in time, causing a high pressure condition at the treatment plant and subsequent shutdown of the HLP. This item may be related to a lag in communications between the Treatment Plant PLC and the Booster Station PLC. The item could be corrected through minor logic modifications. Note: Further to plant site inspection the communications telemetry system was upgraded from a licence Radio modem system to cellular data modems. The cellular data modems have been in operation since November 2013. The cellular modems have provided reliable and improved communications between the treatment plant and the remote locations including the tower and the Mandaumin Booster Pumping Station. The condition related to the shutdown of the HLP is no longer occurring. This condition was likely eliminated as a result of the improved communications performance. The original condition was likely being caused by the valve/actuator becoming stuck under high pressure conditions. The valve/actuator should be able to operate under all pressure conditions. In the fall of 2013 the Town directed OCWA to investigate the valve/actuator to confirm if there are any mechanical issues preventing the actuated valve from operating correctly under all pressure conditions.

- The SCADA system is equipped with two auto dialers that are connected to the respective ICP-01/02 PLCs. The auto dialers communicate with the PLCs and dial out to operations staff to report alarms that occur on the SCADA system. The operations staff have noted that there are frequent nuisance dial out alarms that are unrelated to any alarm event that is displayed on the SCADA system computers. In order to eliminate the nuisance dial outs, the specific alarm channels in the dialers that are causing the nuisance events should be disabled.

- Scaling for specific process analog signals that are displayed in the Wonderware "Trending" screens were showing "0", which prevents the operators from reading the value of the historical trending data. Further to the plant inspection the SCADA maintenance service provider (Genivar/WSP) corrected the scaling issue such that the values may be accurately read from the screen.

- Some nuisance alarm TAGS were noted by operations staff since moving to the new Master SCADA computer that appear on the alarm pop up screen. E.G. "E-Stop Alarm". Further to the plant inspection the SCADA maintenance service provider (Genivar/WSP) has corrected the nuisance tag issue.

- The PAL SCADA computer includes independent historical trending. The PAL computer independently trends process data and stores it on its local hard drive. Since the inspection, operations staff have reported that the PAL SCADA computer will stop trending periodically. It has been determined that the over the course of months of data trending and collection, the local hard drive is filled to capacity. It is necessary to periodically remove/transfer the data from the PAL hard drive to an alternate storage location. A standard operating procedure should be developed to perform this task on a regular basis.

After the July 10th plant inspection an email summary of the SCADA system discussions was prepared. The email correspondence is attached to the condition assessment report.

3.5.3 SCADA Network

SCADA system network is based on Ethernet communications. The existing PLC automation and SCADA computers are all connected to a common Ethernet local area network. The treatment plant is equipped with CAT5e copper communications cables that are installed in the various locations in the plant to facilitate the Ethernet commutations network. The CAT5e communications cable links were tested in 2013 by a communications testing services company (Van Communications) and no performance issues were noted on the respective CAT5e cable links.

The network includes an unmanaged Ethernet switch that is located in the High Lift Pumping Station (HLPS) office and a second unmanaged Ethernet switch that is located in the existing lab office area. The network is equipped with an internet ISP connection that is located at the HLPS office. The network includes a VPN Router that acts as a firewall for the SCADA networks and provides dynamic IPs to the respective devices connected to the network. The VPN router also facilitates remote access by the SCADA integration maintenance provider (Genivar). The virtual private network (VPN) connection allows the SCADA integration service provider to remotely perform minor maintenance.

The radio modem located in ICP-02 was upgraded in 2013 to include an Ethernet communications link. The radio modem is directly connected to the local treatment plant Ethernet SCADA LAN. The radio modem provides a wireless communications link from the treatment plant PLCs to the Booster Station and Water Tower. After the installation of the new radio modems, further periodic nuisance communications failures were noted by operations staff. The nature of the failures could not be determined by the radio installer or OCWA IT staff. In November of 2013 the radio telemetry system was replaced by a cellular modem communications system. The communications system has provide reliable and improved performance since the installation in 2013. Based on available information and site investigations a SCADA architecture was developed by CIMA. The architecture is included in the appendix of this report.

3.5.4 SCADA General Improvements

In 2013, the town of Petrolia initiated the following improvements to the SCADA System:

- The existing SCADA Mater HMI Computer was replaced. A new SCADA HMI PC was installed with updated Wonderware SCADA Software. The SCADA application, including reporting, is identical to the previous SCADA computer application. The purpose of the upgrade was to replace the existing PC hardware and software to improve the performance of the SCADA system and to eliminate issues related to a loss of communications between the Master SCADA computer and the PLC automation hardware.

- The PLC processors at the Water Tower and the Mandaumin Booster Station were upgraded with processors that are equipped with Ethernet communications to improve the reliability and performance of the SCADA system.

- The radio modems located at the treatment plant, water tower and the booster station were upgraded to improve the performance of the SCADA system communications. The new radio modems are equipped with Ethernet communications. The radio modems have since been upgraded/replaced with cellular communications modems.

Further to the treatment plant inspection, the above noted upgrades have been completed and the SCADA System is operational.

The following additional SCADA upgrades are recommended to further improve the reliability and integrity of the SCADA System and data gathering:

- The Master SCADA computer is currently used by operations staff for primary process control, trending and reporting. The process trending data that is used to generate the treatment plant reports (including the D-Bug feature) is stored on the local hard drive of the Master SCADA computer. Consideration should be given to adding an independent network storage hard drive to the SCADA system such that critical trending data base files may be stored in a separate location in the event of a catastrophic failure of the SCADA master computer hard drive. A network hard drive may be added to the existing SCADA Ethernet LAN that could be accessible to all SCADA computers. A backup image of the respective SCADA computers should also be stored on the independent network drive.

- The Master SCADA computer produces weekly and monthly reports on demand based on the MS Access Report. Once the reports are generated by the operations staff they have the ability to print them on a local printer. The SCADA Computer application should be modified such that it includes the ability to print the Reports to a PDF format, such that the individual reports may be saved to the hard drive for future reference. A new SOP could be implemented to have operations staff save PDF copies of the weekly and monthly reports to network hard drive.

- The treatment plant SCADA local area network (LAN) consists of hard wired CAT5 cabling to various locations in the treatment plant, to connect the respective PLC and SCADA computers to the Ethernet network. The central point of the network is located in the HLPS office that includes the ISP modem and VPN router. Ethernet Cables are routed from the HLPS office to the respective areas of the plant, including the lab office and electrical room to connect the various PCs and PLCs to the SCADA LAN. Some of the areas in the plant include additional Ethernet switches to accommodate the connection of more than one device to the network, as there are limited Ethernet cable links servicing the plant. Additional Ethernet cables should be installed from the HLPS office to the respective utilization points in the treatment plant such that all miscellaneous unmanaged Ethernet switches may be eliminated. Elimination of the miscellaneous switches will improve the integrity and traffic on the SCADA LAN.

- The central location for the Ethernet SCADA network is located in the High Lift Pumping Station office. The Ethernet SCADA LAN wiring originates from the HLPS office and radiates out to various locations in the treatment plant to service the SCADA PLC and HMI computers. Currently all the Ethernet CAT5e wiring is loose in the HLPS office, and terminates to the main Ethernet switch. The Ethernet CAT5e wiring should be terminated to a dedicated patch panel to house all the Ethernet field connections, and the primary communications equipment including the ISP modem, VPN router and the network switch.

3.6 HVAC

The building HVAC is provided with general exhaust fan ventilation and gas fired industrial radiant unit heaters. The building is equipped with louvered openings to facilitate fresh air intake and exhaust air. The laboratory area is equipped with a through wall heating cooling unit to maintain space temperature.

3.6.1 High/Low Lift Area

The High/Low lift area is provided with industrial electric unit heaters rated 7.5 kW, 600V. The High Lift area is equipped with ceiling fans for general ventilation, air circulation. The heaters are in good condition. The existing building is equipped with louvered openings for passive ventilation and no ventilation fans. A dedicated ventilation fan should be provided during the next treatment plant expansion.

3.6.2 Lab Area

The laboratory area includes an electric through wall heating/cooling unit to maintain the space temperature. The heating/cooling unit is currently not functional and should be repaired or replaced.

3.6.3 Filter & Chemical Room

The filter and chemical equipment rooms are equipped with gas fired ceiling mounted radiant heaters. Ventilation is provided by exhaust fans and intake air damper openings that operate based on local thermostat control. The radiant heaters and ventilation are in good condition.

3.6.4 Compressor Room

The compressor room is provided with an industrial electric unit heaters rated 7.5 kW, 600V. Ventilation is provided by an exhaust fan and intake air damper opening that operates based on local thermostat control. The electric unit heater and ventilation fan are in good condition.

3.7 SITE

The Petrolia WTP site is enclosed by three roads; Old Lakeshore Road to the north, Waterworks Side Road to the west, and Bright Street to the south. The property is adjacent to a private business and parking lot to the east. A fence with barbed wire surrounds the site, with a swing gate at the main entrance from Bright Street and the secondary entrance from Waterworks Side Road. The driveway and parking areas are paved. The landscaping consists of grass and several mature trees.

There is minor rust on the main gate which should be cleaned and recoated as general maintenance. The fence surrounding the site is 6' high with 1' of barbed wire, which is a sufficient deterrent to unauthorized access. The walkway pavements around the plant are in fair condition however there is vegetation growth in the joints which should be removed. The landscaping and drainage at the site appears to be generally in good condition.

4. CAPITAL COST ESTIMATION AND PRIORITIZATION

Table 1 Capital Cost Estimate and Prioritization

Discipline	Estimated Capital Cost
Immediate	
Process	$90,000
Electrical	$32,500
Structural	$122,500
Immediate Repairs Sub-Total	
High Priority Repairs – 0 to 1 Year	
Process	$160,000
Electrical	$4,400
Structural	$2,700
High Priority Repairs Sub-Total	**$167,100**
Moderate Priority Repairs – 1 to 5 Years	
Process	$122,000
Electrical	$28,500
Structural	$137,200
Moderate Priority Repairs Sub-Total	**$287,700**
Low Priority Repairs – 5 to 10 years	
Process	-
Electrical	-
Structural	$9,000
Low Priority Repairs Sub-Total	**$9,000**
Sub-Total Bright's Grove WTP	**$586,300**
Contingency – 20%	$117,260
Total Bright's Grove WTP	**$703,560**

APPENDIX 1

CONDITION ASSESSMENT FORMS

PETROLIA BRIGHT'S GROVE WTP CONDITION ASSESSMENT

PROCESS AREA: Chemical Building

DISCIPLINE: STRUCTURAL

INSPECTED BY: A.R.Pringlemeir / V.Nickel **INSPECTION DATE:** July 10th, 2013

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

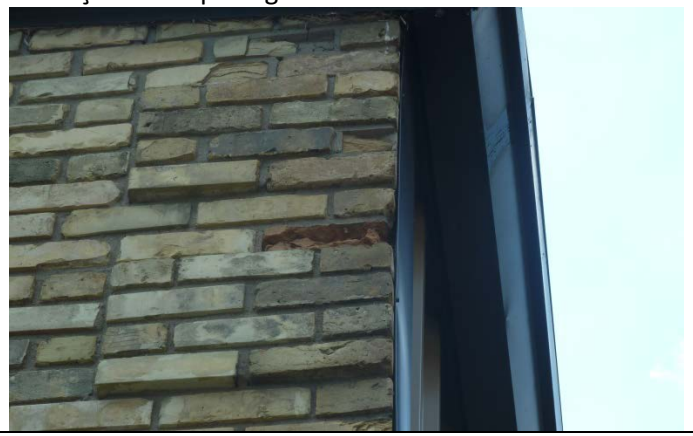
GENERAL DESCRIPTION:
Pre-engineered steel bldg. with block infill walls, steel tie rod bracing, and steel cladding. Cast in place foundation and structural slab floor with secondary chemical containment. Roll up and overhead doors on east side.

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Man Door (interior)	Steel with window, north elevation	• Rusted hardware 	4	

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Steel Structure	Pre-engineered portal frame,	• Painted and galvanized; no visible defects  • Minor rust on bracing (tie rods)	3	
monorail	Steel mono rail	• Support beams seated on block wall, block not tight to beam on sides. 	3	
Chemical Containment	Concrete Coated Concrete FRP Grating Support	• Paint cracked at expansion joint. Operator informed us that it is already to be fixed under maintenance contract	3 4	

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
		 • Containment coatings have failed in places 		

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Neutralization Tank Containment	Coated Concrete Tank below with open grate	• Containment area not large enough but containment is provided by second tank below the floor, tank was not entered.  • Coatings in containment failed • Concrete in tank has chemical attack due to leak according to the operators	4	
Window Well	Interior wall	• Fills with water periodically due to roof leak	4	
Flashing	Exterior metal flashing	• Flashing at northeast corner is coming loose at top due to spalled brick	3	

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
brick	North wall is Original brick facade	• The brick on the upper east and west corners of the façade are spalling. 		
Man-doors	Two man-doors, at Chemical Building on west elevation	• Both doors are 0.5m off the ground and have no stair access; there is no room for stair access. 	4	

General Comments:

PETROLIA BRIGHT'S GROVE WTP CONDITION ASSESSMENT

PROCESS AREA: High Lift P.S. and Clearwell

DISCIPLINE: STRUCTURAL

INSPECTED BY: A.R.Pringlemeir / V.Nickel **INSPECTION DATE:** July 10th, 2013

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

GENERAL DESCRIPTION:

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Roof	Asphalt shingle hip roof with wood rafters	• Near end of life • Ivy at eaves blocking drainage 	4	
Exterior Cladding	Stucco brick with ivy	• Stucco is spalling behind ivy	4	

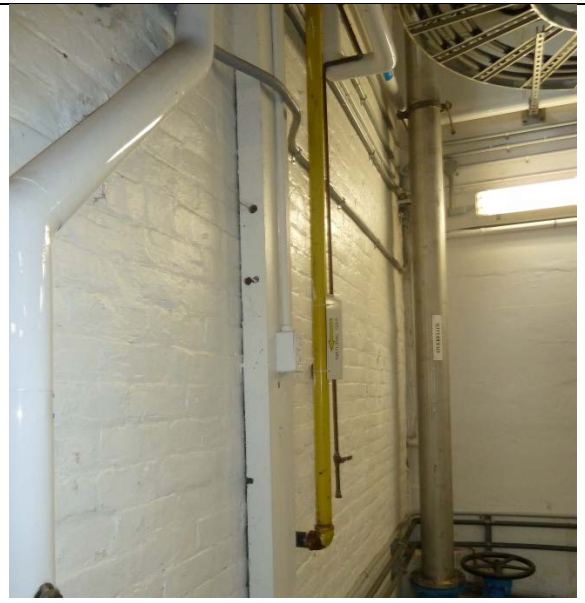
MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
		 • Previous repairs made and are cracking  • 10% of stucco is failing • Original stucco to cover brick; brick issues are not visible • 1mm wide cracks diagonal at windows on north elevation		

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
		 Structural cracks at roof line on north face 		
Chimney	Brick	• Good condition; redone this past year	5	
Gutter	Painted aluminum	• Intact but plugged; sitting water in gutter	5	

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Door	Steel double door with wood panelling	• Hinges and lock are in reasonable condition • Wood veneer needs refurbishment and paint  • Security bars on window in door	3	
Monorail	3 Ton capacity	• Some rust visible; paint required • Supports not visible 	2	
Walls	Triple brick	•	2	
Windows	Original wood and stained glass	• One pain broken • Paint is peeling, wood needs repainting	3	

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Handrail	Painted steel	• Height of handrail is approximately 90cm which is too low and not to code 	5	
Floors at ground level	Wood with tile	•	2	

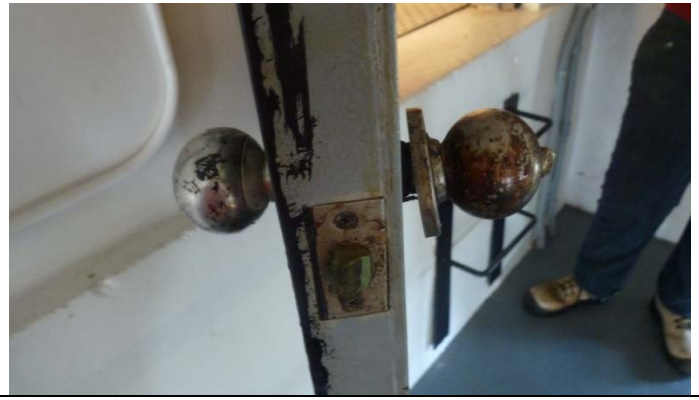
MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Office	Wood construction	• Wood needs paint • Supporting wood trusses have many sections cut out; but distress in the remaining wood was not noted. Any further revisions to this wood construction will require design by a structural engineer. 	3	
Basement	Concrete floors with grating panels over pipe recesses. Walls are triple brick and concrete.	• Concrete in fair condition • Rubble in floor of pipe recesses • Grating painted steel with minor rust • Steel supports – midspan has minor rust requiring paint • Beam support is wood corbel with many holes in it . no signs or distress were noted at this time.		

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
		 • Groundwater leaking in pipe chase wall • West wall – major crack and general moisture problem on brick wall • Flowing water at base of west wall		

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
		 • Standing water in southwest corner at abandoned steel support. Remove to allow water to drain.		

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
		 • Pipe leaking on south wall. No rust evident. One or two link seals are being used. 		
Clearwell	Concrete tank , top of tank is a crawl space with grating	• Aluminum checker plate new in 2008	1	

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
	covers, walls and ceiling are insulated. Tank has PVC curtains baffles.	 • Ceiling covered in insulation; not visible • Top 300mm of PVC curtain baffles visible • New concrete block on north wall in good condition • Other walls are insulated and not visible • Tension rods visible over tank and cast into concrete lip at top of baffles. Some rust on rods to be cleaned and inspected.	3	

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
		 • Access door is half-sized, rusted hardware, not lockable 		
Intake well (Storage	Buried structure with painted brick and cast in	• Intake well is not used as the intake pipe has collapsed.	4	

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Room)	place concrete tank, and concrete slab above water level used for equipment storage.	• Painted metal grating is rusting  5 • Handrail over pit is not correct height according to code • 2' of water in the well • Well is circular, cast-in-place with previous repairs • Temporary ladder is not tied off • Superstructure is painted brick		

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
				

General Comments:

PETROLIA BRIGHT'S GROVE WTP CONDITION ASSESSMENT

PROCESS AREA: Compressor Room

DISCIPLINE: STRUCTURAL

INSPECTED BY: A.R.Pringlemeir / V.Nickel **INSPECTION DATE:** July 10th, 2013

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

GENERAL DESCRIPTION:
Cast in Place structural concrete slab supported on strip footings. Two interior walls are block wall partitions. Two exterior walls are part of the pre-engineered building with steel cladding.

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Rollup door	Roll up door on east side	• Good 	2	
Floor	Cast-in-place concrete	• Minor cracking	2	

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Ceiling	Steel Clad	• OK 	2	
Walls	Steel Clad Concrete Block	• OK	2	

General Comments:

PETROLIA BRIGHT'S GROVE WTP CONDITION ASSESSMENT

PROCESS AREA: Filtration Room

DISCIPLINE: STRUCTURAL

INSPECTED BY: A.R.Pringlemeir / V.Nickel **INSPECTION DATE:** July 10th, 2013

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

GENERAL DESCRIPTION:
Cast in place concrete slab. Pre-engineered steel building with portal frame, steel cladding walls and ceiling. Insulated. Concrete block shear walls, portal frame at overhead doors.

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Steel Structure	Pre-engineered portal frame at large doors	• Paint is in good condition; no damage evident	2	
Floor	Concrete with drain	• Minor shrinkage cracks	2	
Floor Grating	Aluminum with aluminum beams	• Good condition 	2	

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Rollup Doors	Roll-up doors, East Elevation	• Minor rust on frame and hardware 	3	
Rollup Door	Roll-up door, West Elevation	• Exterior door on the west side, has wasp nest between door frame and cladding. 	3	
Eyewash		• No eyewash station on the south side	4	

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Equipment Pads and Pipe Supports	Concrete Pads Steel Post Supports Steel Frame Painted Steel Frame Galvanized	• Good	2	
Exterior Mandoor	West elevation	• Nests above door frame between frame and underside of cladding 	3	

General Comments:

PETROLIA BRIGHT'S GROVE WTP CONDITION ASSESSMENT

PROCESS AREA: Garage

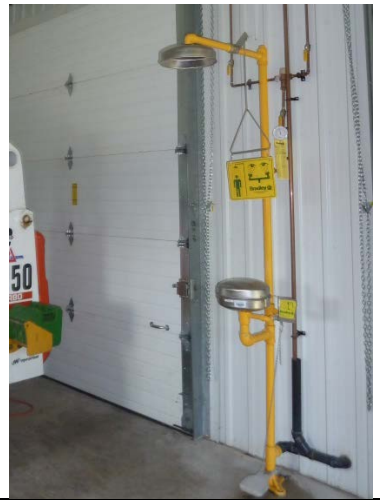
DISCIPLINE: STRUCTURAL

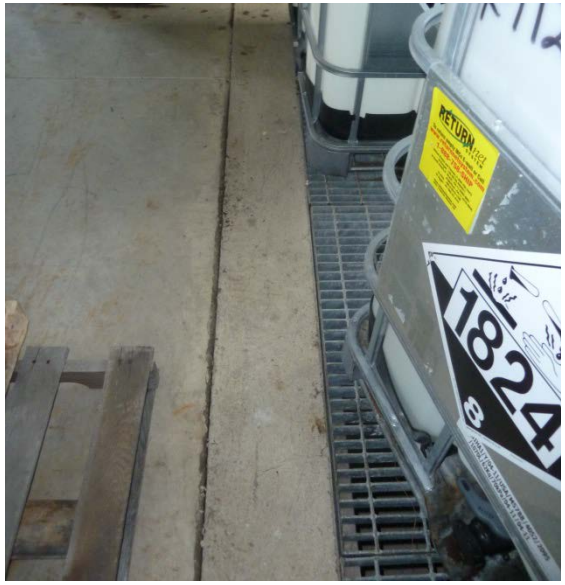
INSPECTED BY: A.R.Pringlemeir / V.Nickel **INSPECTION DATE:** July 10th, 2013

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

GENERAL DESCRIPTION:
Pre-engineered steel building on cast in place concrete slab with steel cladding. One man door and two rollup doors.

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Man-door	Steel door with lock	• OK	2	
Roll up Doors		• OK 	2	

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Eyewash Station	One station	• OK 	2	
Windows	Three windows, one each on the south, east, and north elevations	• No security bars on the exterior 	2	

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Floor	Uncoated cast-in-place concrete	• Expansion joints open  • No protective coatings	3	
Secondary containment	Cast-in-place concrete containment below floor with galvanized metal grating flush with floor	• Grating and support angles OK • Containment is not coated despite Sodium Hydroxide solution (25%) and Citric Acid solution (50%) being stored on grating	4	

General Comments:

PETROLIA BRIGHT'S GROVE WTP CONDITION ASSESSMENT

PROCESS AREA: Generator Building

DISCIPLINE: STRUCTURAL

INSPECTED BY: A.R.Pringlemeir / V.Nickel **INSPECTION DATE:** July 10th, 2013

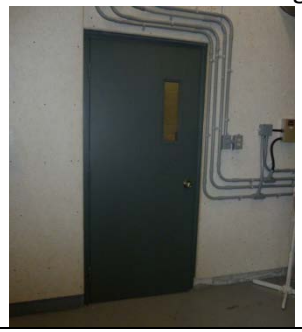
CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

GENERAL DESCRIPTION:

Steel clad building. Concrete strip foundations. Load bearing block walls. Steel roof. Interior of building clad in acoustic paneling.

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Exterior	Steel cladding and roof	• No visible defects 	2	

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Exhaust Stack	Diesel Exhaust Stack bolted to concrete base	• Very little clearance to soffit for exhaust piping. • A pipe is running under the soffit – is the soffit non-combustible? 		
Interior Walls	Clad in soundproof material	• Not visible	-	

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Floor	Painted concrete	• Minor cracking 	2	
Ceiling	Clad in soundproof material	• Not visible	-	
Containment	Diesel containment made of concrete curb with coating	• Coating appears to be intact as far as was visible	2	
Door	Man door	• Internal door leading to electrical room 	3	

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Stair	Precast concrete stairs on exterior at diesel fill port	• No handrail; not to code 	4	

General Comments:

PETROLIA BRIGHT'S GROVE WTP CONDITION ASSESSMENT

PROCESS AREA: Low Lift P.S., Lab, Fluoride Room, etc.

DISCIPLINE: STRUCTURAL

INSPECTED BY: A.R.Pringlemeir / V.Nickel **INSPECTION DATE:** July 10th, 2013

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

GENERAL DESCRIPTION:
Yellow brick clad building, partially below grade. Substructure is cast in place concrete slabs walls and foundation slab. Superstructure is triple brick. Flat tar and gravel roof accessible by stair.

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Low Lift Pump room	Pump room in second level below grade. Access by ships ladder.	• Leak in south wall at floor support beam. Leak has been ongoing since 2005 based on discussions with operations. Rust and minerals have built up on wall, and there is concern over the reliability of the anchors supporting the floor beam. 	5	

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
		Leak in north wall at beam support location and a floor sump location. 		
Basement Walls	Cast-in-place concrete	• Minor leaks • Leaks on west wall at pipe penetration	3	

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
				
Raw Meter Room		• Manhole cover in existing roof slab; exposed rebar and spalling concrete 	5	

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
		• Cast-in-place concrete ceiling has spalling on main beam and in 20 locations on ceiling   • Grating in good condition, slightly higher than concrete at edges causing tripping hazard		

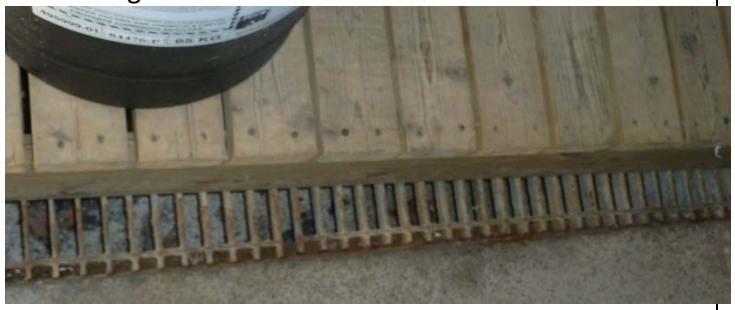
MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
		 • Old wood door frame, door not used • Steel support for grating at stair is rusting; 5% section loss • Stair rebar exposed and rusting below grating  • Handrail does not continue to top of steps and is not to code		

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
		 • Missing cover for floor drain  • Process drain in floor covered with rusted steel plate (3"x14"). Sump is 8" deep. Sediment 4" deep. Drain pipe clogged; water 6" deep. Alignment of sump lines up with rust in well wall. Basement stain – rebar exposed at bottom below grating.		

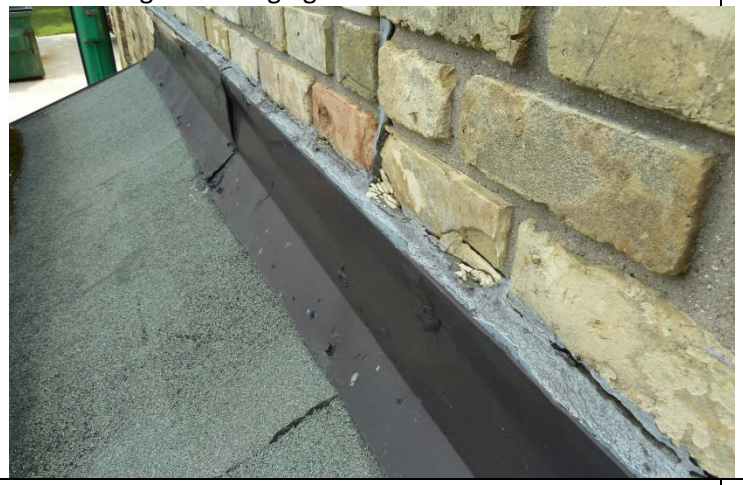
MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
		 • Floor coating is worn and needs replacement 		
???	Opening Cover	• Good	3	
Boiler Room	Custom wood door	• Door is in fair condition • Frame is rusted • Should door be Fire-Rated (natural gas inside, fire-rated room?)		

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
				
Control Room	Dry wall and tile	• Structure is not visible • Closet – holes in floor and drywall • Kitchen – air conditioner has missing trim at top. Tile, counter and sink faucet are OK. • Hall fan has rodent screen but no bug screen. Rodent screen is too small for opening. 	3	
Lab	Drywall, drop ceiling, tile	• Sinks and drains are in good condition	4	

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
	floor	• Roof leak has caused damage to ceiling and drywall 		
Fluoride Room	Small room accessible from exterior door only	• Block wall is OK • Painted drywall around bottom of door frame has failed and broken off	2 5 4 4	

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
		 • Grating has rusted  • Hydrofluosilicic Acid is being stored on grating		
Exterior Brick	Yellow brick	• Recently fixed	2	
Stairs to Roof	Concrete	• No handrail		

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
		 • Roof area should have handrails all around or have access restricted by barrier. 		
Lower Roof	Built-up tar with metal flashing	• Water pools in valley; no drain visible	5 3	

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
		 • Flashing sealant aging 		
Upper	Tar and gravel	• Gravel stop holds water on the roof, and does not	5	

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Roof		hold back the gravel • Gutter continuously clogging due to gravel 		

General Comments:

PETROLIA BRIGHT'S GROVE WTP CONDITION ASSESSMENT

PROCESS AREA: Electrical Room

DISCIPLINE: STRUCTURAL

INSPECTED BY: A.R.Pringlemeir / V.Nickel **INSPECTION DATE:** July 10th, 2013

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

GENERAL DESCRIPTION:
Combination of two types of construction. This room has two exterior walls that are load bearing concrete block, and two walls that are block partition walls. The south end of this room has a roof structure that is supported ont eh block wall and steel frame, the north side of this room is supported on a steel portal frame. The floor is cast in place concrete supported on a strip footing. There are 3 man doors in this room connecting the generator bldg., filter bldg., and to the exterior.

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Man door	Exterior Steel door with panic hardware and closure	• Closure is leaking oil 	4	
Walls	Painted concrete block	• Walls are largely obscured by equipment, no major defects noted.	2	

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Floor	Concrete floor and equipment pads	• No major defects noted. 	2	
Exterior	Steel Cladding	• No major defects noted.	2	

General Comments:

PETROLIA BRIGHT'S GROVE WTP CONDITION ASSESSMENT

PROCESS AREA: Settling Tank

DISCIPLINE: STRUCTURAL

INSPECTED BY: A.R.Pringlemeir / V.Nickel **INSPECTION DATE:** July 10th, 2013

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

GENERAL DESCRIPTION:
Buried, cast-in-place cylindrical tank with hollow core lid at grade.

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Lid	Concrete topping on hollow core slab	• Concrete cracked on surface at 1m c/c in the North-South direction at location of hollow core joints  • Hollow core filled at perimeter, parging coming off	3	

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
		 • Deteriorating parging on visible exterior • Interior concrete was not visible		
Hatch	Aluminum with drain channel, lock, stay-open arm	• Good condition 	2	

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Ladder	Aluminum	• Wire on ladder are a safety concern  • Tripod required for entry	2	
Vent Hood	Painted	• Paint is chipping and has failed needs to be repainted 	4	

General Comments:

PETROLIA BRIGHT'S GROVE WTP CONDITION ASSESSMENT

PROCESS AREA: Site

DISCIPLINE: STRUCTURAL

INSPECTED BY: A.R.Pringlemeir / V.Nickel **INSPECTION DATE:** July 10th, 2013

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

GENERAL DESCRIPTION:

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Entrance Gate	Located at south side of lot, Galvanized Steel, Pad lock	• Minor rust on swing gate 		
Fence	Surrounds perimeter of lot	• 6' chain-link fence, with 1' of barbed wire; not high enough to keep people out 		

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Walkway	Concrete	• Expansion joints have vegetation growth		
Pavement	Concrete with expansion joints	• Joints at building vegetation 	3	

General Comments:

PETROLIA BRIGHT'S GROVE WTP CONDITION ASSESSMENT

PROCESS AREA: Valve Chamber

DISCIPLINE: STRUCTURAL

INSPECTED BY: A.R.Pringlemeir / V.Nickel **INSPECTION DATE:** July 10th, 2013

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

GENERAL DESCRIPTION:
3000mmx3600mm buried precast concrete chamber with valve stems and hatch visible at top.

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Lid	Precast concrete	• Sealant gasket is worn  • Corner of tank is chipped (not critical)	2	

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
		 • Ceiling not visible due to interior insulation		
Walls	Precast concrete, insulated	• Not visible due to interior insulation	-	
Floor	Cast-in-place with sump	• Sump was full of water, floats for pump not running 	2	

MAJOR EQUIPMENT				
Element	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Hatch	Aluminum with lock	• Good condition 	2	
Ladder	Aluminum	• Two ladder ups required for safety 	2	

General Comments:

PETROLIA WATER TREATMENT PLANT CONDITION ASSESSMENT

PROCESS AREA: LOW LIFT PUMPING STATION

DISCIPLINE: PROCESS/MECHANICAL

INSPECTED BY: E Tuson **INSPECTION DATE:** July 10, 2013

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

GENERAL DESCRIPTION:

The low lift pumping station consists of 3 (1 or 2 duty, and one standby) vertical split case centrifugal pumps equipped with VFDs. The LLPs pump water from the lake level and up to the treatment plant operational level so as to provide enough head of water for proper operation of the membrane filter process. The LLPs are operated and controlled by the SCADA based on input by the operator, the clearwell level and scheduled event cycles such as membrane cleaning and integrity tests. LLP firm capacity is 19.5 ML/d.

Flow measurement of the pumped raw water is provided by a magnetic flowmeter at the low lift discharge header. Two chlorine injection points are installed on the low lift suction headers to provide pre-chlorination. The intake pipe is directly piped into the low lift suction header. All pumps, pipes, valves and fittings associated with the low lift pumps were replaced and installed during the last plant upgrades in 2005.

MAJOR EQUIPMENT

Equipment/ Item	Tag Number	Description	Observations/Recommendations	Condition Grading	Picture ID

PETROLIA WATER TREATMENT PLANT CONDITION ASSESSMENT

PROCESS AREA: LOW LIFT PUMPING STATION

DISCIPLINE: PROCESS/MECHANICAL

INSPECTED BY: E Tuson **INSPECTION DATE:** July 10, 2013

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

Low Lift Pumps: LLP No.1 LLP No.2 LLP No.3	OMM Section B.20	Capacity =9.75 ML/D Head = 52.5 m Pump Manufacturer= GOULDS Pump Model =3410,6X8-13.4 Motor Manufacturer =BOLDOR Motor Model =18E117X356	Name plates missing. Recommend secure from manufacturer. 	3	3323

PETROLIA WATER TREATMENT PLANT CONDITION ASSESSMENT

PROCESS AREA: LOW LIFT PUMPING STATION

DISCIPLINE: PROCESS/MECHANICAL

INSPECTED BY: E Tuson **INSPECTION DATE:** July 10, 2013

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

Pneumatic valve control	OMM Section B.20	Pneumatic control on LLP discharge to prevent surge at filter on pump start up.	Pneumatic Control valve not working on all 3 pumps discharge. Recommend system be put back in service.  Vibration issue on Pump #2 to be address by OCWA	5	3324

PETROLIA WATER TREATMENT PLANT CONDITION ASSESSMENT

PROCESS AREA: LOW LIFT PUMPING STATION

DISCIPLINE: PROCESS/MECHANICAL

INSPECTED BY: E Tuson **INSPECTION DATE:** July 10, 2013

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

Discharge Piping and Valves		Suction piping and valves	Shows service rust. Paint maintenance required 	3	3328
Wet Well	OMM	Concrete structure/tank that used to separate the intake pipe from the low lift pumps	The old wet well is currently not in use as the intake pipe is currently connected directly into the low lift pump suction header	/	/

PETROLIA WATER TREATMENT PLANT CONDITION ASSESSMENT

PROCESS AREA: LOW LIFT PUMPING STATION

DISCIPLINE: PROCESS/MECHANICAL

INSPECTED BY: E Tuson **INSPECTION DATE:** July 10, 2013

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

Instrumen-tation	OMM	See Electrical Section			

General Comments:

There is no zebra mussel or frazil ice control on the intake screen or low lift pump system. Recommend chlorine system for zebra mussel control and a method to back flush the intake for frazil ice control.

PETROLIA WATER TREATMENT PLANT CONDITION ASSESSMENT

PROCESS AREA: MEMBRANE FILTRATION PROCESS

DISCIPLINE: PROCESS/MECHANICAL

INSPECTED BY: E Tuson **INSPECTION DATE:** July 10, 2013

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

GENERAL DESCRIPTION:
The membrane filtration system is comprised of 3 trains or racks, for a total of 228 modules in all 3 trains. Filtration occurs through an outside to inside flow path. The membrane filtration system and associated equipment was installed in 2005 and further upgraded to its maximum capacity.

MAJOR EQUIPMENT					
Equipment / Item	**Tag Number**	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**

PETROLIA WATER TREATMENT PLANT CONDITION ASSESSMENT

PROCESS AREA: MEMBRANE FILTRATION PROCESS

DISCIPLINE: PROCESS/MECHANICAL

INSPECTED BY: E Tuson **INSPECTION DATE:** July 10, 2013

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

MAJOR EQUIPMENT					
Equipment / Item	**Tag Number**	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Membrane Filter Trains: Filter No.1 Filter No.2 Filter No.3	OMM Section C.10	Paul Membrane Micro filtration system having a rated capacity of 13.4 ML/D at 1^{o}C	Filter system was expanded after installation in 2005 to double its capacity 	1	3344

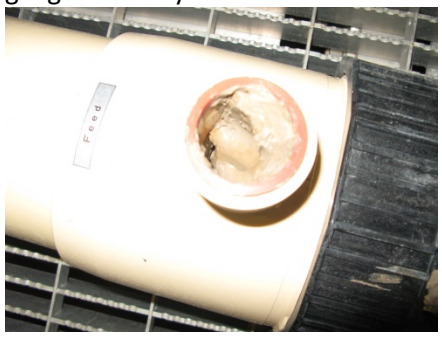
PETROLIA WATER TREATMENT PLANT CONDITION ASSESSMENT

PROCESS AREA: MEMBRANE FILTRATION PROCESS

DISCIPLINE: PROCESS/MECHANICAL

INSPECTED BY: E Tuson **INSPECTION DATE:** July 10, 2013

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

MAJOR EQUIPMENT					
Equipment / Item	**Tag Number**	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
	OMM Section C.10	Observation Port at bottom of filter plugged with silt	Discharge header becomes plugged with silt during high turbidity  Operation staff installed flush valves at end of each train to remove plugging and set SCADA system to shut plant down at set high turbidity.	4 1	3347

PETROLIA WATER TREATMENT PLANT CONDITION ASSESSMENT

PROCESS AREA: MEMBRANE FILTRATION PROCESS

DISCIPLINE: PROCESS/MECHANICAL

INSPECTED BY: E Tuson **INSPECTION DATE:** July 10, 2013

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

MAJOR EQUIPMENT					
Equipment / Item	**Tag Number**	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Automatic Strainers: Strainer No.1 Strainer No.2	OMM section B.30	Capacity = 19.5ML/D Manufacturer = S.P. Kinney Model =A Mesh Size =0.38mm	Screen allowed zebra mussel shells to pass resulting in the shells cutting the membrane  Operation staff installed a Teflon gasket but it failed to prevent passing of the shells.	3	3350

PETROLIA WATER TREATMENT PLANT CONDITION ASSESSMENT

PROCESS AREA: MEMBRANE FILTRATION PROCESS

DISCIPLINE: PROCESS/MECHANICAL

INSPECTED BY: E Tuson **INSPECTION DATE:** July 10, 2013

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

MAJOR EQUIPMENT					
Equipment / Item	**Tag Number**	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Reverse Filtration Pumps: Pump No.1 Pump No.2	OMM Section INFO-P12	Capacity =5.2ML/D Head =20m Pump Manufacturer=G&L Pumps Pump Model =Cent. Horiz.	Well maintained 	1	3349

PETROLIA WATER TREATMENT PLANT CONDITION ASSESSMENT

PROCESS AREA: MEMBRANE FILTRATION PROCESS

DISCIPLINE: PROCESS/MECHANICAL

INSPECTED BY: E Tuson **INSPECTION DATE:** July 10, 2013

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

MAJOR EQUIPMENT					
Equipment / Item	**Tag Number**	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Air Compressors: Compressor No.1 Compressor No.2	OMM Section INFO P-114	Capacity =131.8m3/hr Head =20m Manufacturer= Atlas Copce Model =Rotary screw Motor Model =20hp,575v,3p	Well maintained  	2	3352

PETROLIA WATER TREATMENT PLANT CONDITION ASSESSMENT

PROCESS AREA: MEMBRANE FILTRATION PROCESS

DISCIPLINE: PROCESS/MECHANICAL

INSPECTED BY: E Tuson **INSPECTION DATE:** July 10, 2013

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

MAJOR EQUIPMENT					
Equipment / Item	**Tag Number**	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Pressure tank	OMM Section INFO P-114		Consider recertifying pressure tank 	2	3353

PETROLIA WATER TREATMENT PLANT CONDITION ASSESSMENT

PROCESS AREA: MEMBRANE FILTRATION PROCESS

DISCIPLINE: PROCESS/MECHANICAL

INSPECTED BY: E Tuson **INSPECTION DATE:** July 10, 2013

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

MAJOR EQUIPMENT					
Equipment / Item	**Tag Number**	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Discharge Piping and Valves	OMM	Good shape	Requires Regular Maintenance	2	/
Instrumentation	OMM G.60	Mostly obsolete	Appears to be functioning well, recommend replacement of obsolete controls on an ongoing bases as required.	3	/

General Comments:

For turbidity control – recommend new system be installed as existing system reads only up to 214 NTU. On high turbidity days (storms) turbidity reaches 500 to 600 NTU. Rating 5 Operations staff have set the SCADA system to shut down the plant at a predetermined set point to prevent damage to the filters.

PETROLIA WATER TREATMENT PLANT CONDITION ASSESSMENT

PROCESS AREA: CHEMICAL FEEDING SYSTEMS

DISCIPLINE: PROCESS/MECHANICAL

INSPECTED BY: E Tuson **INSPECTION DATE:** July 10, 2013

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

GENERAL DESCRIPTION:
A number of chemical feeding systems are used to assist the membrane filters and to provide for fluoridation.

MAJOR EQUIPMENT					
Equipment / Item	**Tag Number**	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Storage Tanks: • Sodium hypochlorite • Citric acid • Sodium hydroxide • Sodium bisulphite • Acid CIP Storage • Caustic CIP Storage • Neutralization • Fluorosilic Acid	OMM F.50 F.70 F.60 F.20 F.30	As per the noted sections in the Operations and Maintenance Manual (OMM)	All chemical storage tanks appear to be good order and well maintained	2	/

PETROLIA WATER TREATMENT PLANT CONDITION ASSESSMENT

PROCESS AREA: CHEMICAL FEEDING SYSTEMS

DISCIPLINE: PROCESS/MECHANICAL

INSPECTED BY: E Tuson **INSPECTION DATE:** July 10, 2013

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

MAJOR EQUIPMENT					
Equipment / Item	**Tag Number**	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Feed Pumps: • Sodium hypochlorite • Citric acid • Sodium Hydroxide • Sodium bisulphite • Caustic Transfer • Acid Transfer • Fluorosilic Acid • Polymer	OMM F.50 F.70 F.60 F.20 F.10 F.30	As per the noted sections in the Operations & maintenance Manual (OMM)	All systems appear to be in good shape and well maintained. The Sodium Hypochlorite piping has recently been replace as part of the ongoing maintenance programme	1 1	/ /

PETROLIA WATER TREATMENT PLANT CONDITION ASSESSMENT

PROCESS AREA: CHEMICAL FEEDING SYSTEMS

DISCIPLINE: PROCESS/MECHANICAL

INSPECTED BY: E Tuson **INSPECTION DATE:** July 10, 2013

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

MAJOR EQUIPMENT					
Equipment / Item	**Tag Number**	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Instrumentation	OMM G.60	Reference Electrical Section	Appears to be functioning well , recommend replacement on an ongoing bases as required.	3-4	/

General Comments:

PETROLIA WATER TREATMENT PLANT CONDITION ASSESSMENT

PROCESS AREA: CHLORINATION SYSTEMS

DISCIPLINE: PROCESS/MECHANICAL

INSPECTED BY: _____ **INSPECTION DATE:** _____

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

GENERAL DESCRIPTION:
Three chlorinators (chlorine gas) are used to provide for pre-chlorination at the low lift pumps common section header, primary disinfection at the clearwell inlet piping and touch-up chlorination at the high lift pumps common suction header. One of the chlorinators serves as a back-up for the primary disinfection chlorinator. Chlorinator No.1 and a number of solenoid valves were installed during the last plant upgrades in 2005.

MAJOR EQUIPMENT					
Equipment/Item	**Tag Number**	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Chlorine gas cylinders	OMM Section F.40	3-V10K Gas wall mounted chlorinators	All chlorinators were functioning for their intended purpose	3	/

PETROLIA WATER TREATMENT PLANT CONDITION ASSESSMENT

PROCESS AREA: CHLORINATION SYSTEMS

DISCIPLINE: PROCESS/MECHANICAL

INSPECTED BY: _____ **INSPECTION DATE:** _____

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

MAJOR EQUIPMENT					
Equipment/Item	**Tag Number**	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Clearwell	OMM Section F.40	Large concrete thank 10x8.75x5.5m 3- small tanks 1.8x1.8x5.5m Capacity= 720m3	Unable to inspect tanks at this time. Baffle walls installed in 2005 appear to be in good condition 	3-4	/

PETROLIA WATER TREATMENT PLANT CONDITION ASSESSMENT

PROCESS AREA: CHLORINATION SYSTEMS

DISCIPLINE: PROCESS/MECHANICAL

INSPECTED BY: _____ **INSPECTION DATE:** _____

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

MAJOR EQUIPMENT					
Equipment/Item	**Tag Number**	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Instrumentation		Reference Electrical Section			

General Comments:

PETROLIA WATER TREATMENT PLANT CONDITION ASSESSMENT

PROCESS AREA: HIGH LIFT PUMPING STATION

DISCIPLINE: PROCESS/MECHANICAL

INSPECTED BY: E Tuson **INSPECTION DATE:** July 10, 2013

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

GENERAL DESCRIPTION:
The high lift pumping station consists of 3 (1 or 2 duty, and one standby) horizontal centrifugal pumps. HLPs No.1 and No.2 are equipped with soft starters while HLP No.2 is equipped with VFD. The HLPs pump water from the clearwell into the distribution system and to the Mandaumin Reservoir, which is 8 km away, via interconnected system of discharge headers. The HLPs operated automatically and are controlled by the level of the Mandaumin Reservoir. HLP firm capacity is 9.8 ML/d.
Flow measurement of the finished water is provided by an ultrasonic flowmeter on the discharge header.

MAJOR EQUIPMENT					
Equipment / Item	**Tag Number**	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**

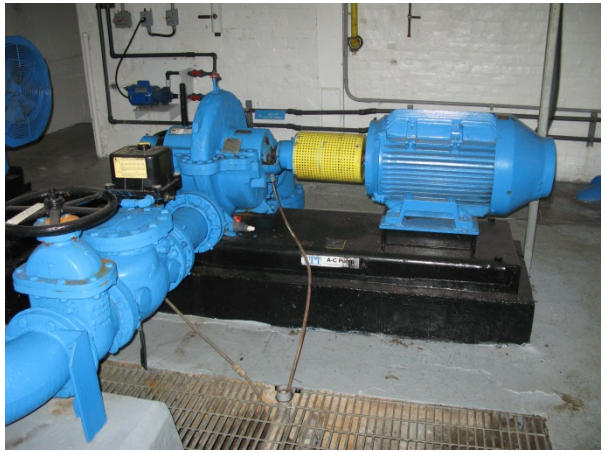
PETROLIA WATER TREATMENT PLANT CONDITION ASSESSMENT

PROCESS AREA: HIGH LIFT PUMPING STATION

DISCIPLINE: PROCESS/MECHANICAL

INSPECTED BY: E Tuson **INSPECTION DATE:** July 10, 2013

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

MAJOR EQUIPMENT					
Equipment / Item	**Tag Number**	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
High Lift Pumps: HLP No.1 HLP No.2 HLP No.3	OMM Section D.20	HLP No.1 Capacity =67 l/s Head = 91m Pump Manufacturer= ITT Pump Model =Horiz .Cent. HLP No. 2 Capacity= 70 l/s Head= 76m Manufacture= Allis Chalmers Pump Model=Horiz. Cent. HLP No.3 Capacity= 126 l/s Head=91m Manufacture= Allis Chalmers Pump model Horiz. Cent.	The pumps appeared to be operating for their intended purpose HLP No.2 motor was replaced with a 125Hp motor in 2013.  HLP No. 1	3 3	3367

PETROLIA WATER TREATMENT PLANT CONDITION ASSESSMENT

PROCESS AREA: HIGH LIFT PUMPING STATION

DISCIPLINE: PROCESS/MECHANICAL

INSPECTED BY: E Tuson **INSPECTION DATE:** July 10, 2013

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

MAJOR EQUIPMENT					
Equipment / Item	**Tag Number**	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
High Lift Pump	OMM Section D.20	HLP No. 2		3	3372

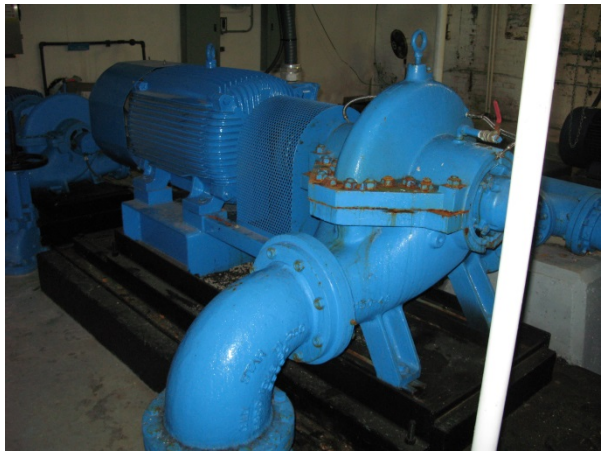
PETROLIA WATER TREATMENT PLANT CONDITION ASSESSMENT

PROCESS AREA: HIGH LIFT PUMPING STATION

DISCIPLINE: PROCESS/MECHANICAL

INSPECTED BY: E Tuson **INSPECTION DATE:** July 10, 2013

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

MAJOR EQUIPMENT					
Equipment / Item	**Tag Number**	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
High Lift Pump	OMM Section D.20	HLP No. 3		3	3375

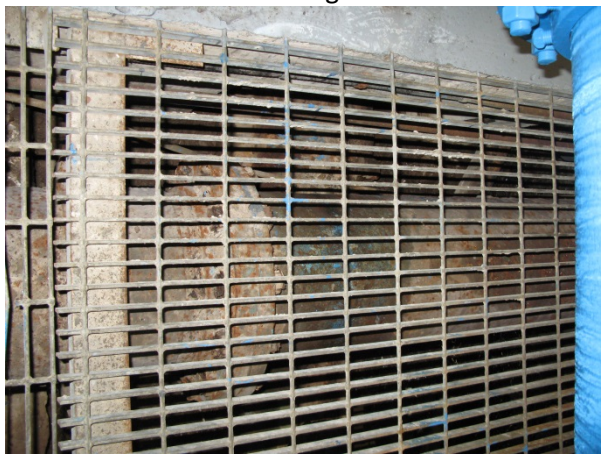
PETROLIA WATER TREATMENT PLANT CONDITION ASSESSMENT

PROCESS AREA: HIGH LIFT PUMPING STATION

DISCIPLINE: PROCESS/MECHANICAL

INSPECTED BY: E Tuson **INSPECTION DATE:** July 10, 2013

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

MAJOR EQUIPMENT					
Equipment / Item	**Tag Number**	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Discharge Piping and Valves			All piping below the grating appear to be corroded Non-destructive testing is recommended 	4	3374

PETROLIA WATER TREATMENT PLANT CONDITION ASSESSMENT

PROCESS AREA: HIGH LIFT PUMPING STATION

DISCIPLINE: PROCESS/MECHANICAL

INSPECTED BY: E Tuson **INSPECTION DATE:** July 10, 2013

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

MAJOR EQUIPMENT					
Equipment / Item	**Tag Number**	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Instrumen-tation		Reference Electrical section of this report			

General Comments:

1) Sump pump below the grating in the HLP room appears to be in poor condition and should be replaced under an ongoing maintenance programme. Graded 4

2) The discharge header has a control valve with corroded set points. Recommend having the valve serviced by a control supplier. Graded 4

PETROLIA WATER TREATMENT PLANT CONDITION ASSESSMENT

PROCESS AREA: HIGH LIFT PUMPING STATION

DISCIPLINE: PROCESS/MECHANICAL

INSPECTED BY: E Tuson **INSPECTION DATE:** July 10, 2013

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

GENERAL DESCRIPTION:
Wastes from the treatment plant are discharged into a settling tank with a total capacity of 197 m3. From the clarifier, the supernatant is discharged through a 450 mm sewer to Lake Huron, while the sludge is pumped periodically and transported by tankers to the sewage treatment plant. The sanitary sewer onsite conveys the plant sanitary wastewater (floor drains, analyzers, etc.) to the existing sanitary sewer on Waterworks Side Road.

MAJOR EQUIPMENT					
Equipment / Item	**Tag Number**	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Settling Tank	OMM Section E.10	9.1m Dia. concrete tank with a working depth of 5.2m Capacity= 271m3	Its reported that the operation staff have reduced the polymer feed to minimize sludge transfer difficulties. Consideration could be given to installing a mixing pump if chemical reduction proves to be unsuccessful	3 3	

PETROLIA WATER TREATMENT PLANT CONDITION ASSESSMENT

PROCESS AREA: HIGH LIFT PUMPING STATION

DISCIPLINE: PROCESS/MECHANICAL

INSPECTED BY: E Tuson **INSPECTION DATE:** July 10, 2013

CONDITION GRADING SYSTEM: 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = POOR 5 = FAILED

MAJOR EQUIPMENT					
Equipment / Item	**Tag Number**	**Description**	**Observations/Recommendations**	**Condition Grading**	**Picture ID**
Sludge Transfer Pump	OMM	Capacity = 78m3/hr Head = 7.2m Pump Manufacturer= KSB Pump Model =KRT-80-251/46 Motor Model =6.5np 575v,3p	The sludge transfer pump appears to be in good condition however preventive maintenance is recommended.	3	/
Polymer Feed System	OMM Section F.30	Diaphragm pump LMI-3.8l/hr @ 100kpa	Pump operating as intended. Well maintained	1	/

General Comments:

Bright's Grove WTP Condition Assessment Form

Discipline: Electrical Date: July 10th, 2013

Location **Bright's Grove WTP (Petrolia)**

Condition Grading System: 1 = Excellent, 2 = Good, 3 = Fair, 4 = Poor, 5 = Failed

Item No./ Asset Tag	Asset Description	Observations	Condition Grading
T1	Hydro Transformer (Pad Mount) 750 kVA 600V, 3 phase secondary	Pad mount tamper proof transformer is in good condition. Primary hydro supply is by provided by Blue Water Power.	2

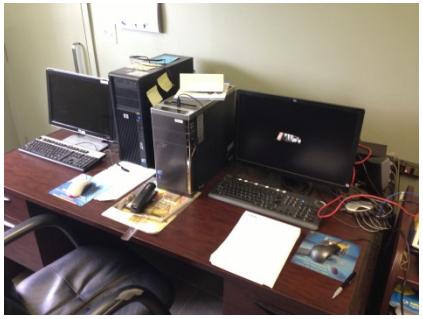
7880 Keele Street, Suite 201
Vaughan, ON L4K 4G7
Canada www.cima.ca

Phone: (905) 695-1005
Fax : (905) 695-0525

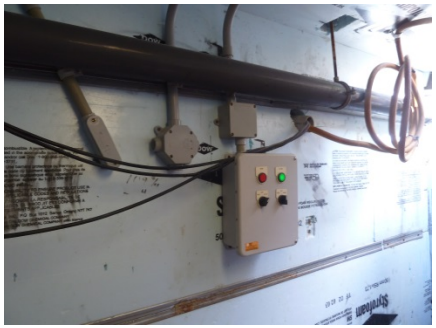
MCC	Main Service Entrance and MCC Eaton, 600V, 3 phase, 1000A horizontal bus	The main service entrance and MCC switchgear are in good condition. The MCC includes multiple motor starters including VFD's that are equipped with ventilation fans. The interior of the respective MCC starter cells should be inspected annually and vacuumed to suit any dust/debris that enters via the ventilation openings. 	2
ATS	Automatic Transfer Switch 600V, 3 phase 800A	The automatic transfer switch (ATS) is in good condition. The ATS is equipped with a digital power meter. The existing LCD display on the power meter unit is defective. The meter should be service to replace/repair the meter display.	2

LPB LPD	Distribution panel boards LPB- 600V, 3 phase 18 – 3p, Breakers LPD- 600V, 3 phase – 8 – 3P Breaker	The distribution panel boards are in good condition. 	2
LPA LPC	Distribution panel boards LPA - 120/208V, 3 phase 60 Circuit LPC - 120/208V, 3 phase 60 Circuit	The lighting panel boards are in good condition. Lighting Panel Board Provides power to automation equipment and instruments. The integrity of the distribution system could be improved with the installation of a surge protection device on the panel. 	2

ICP-01, ICP-02 , PAL Main ICP	PLC Control Panels, Microfilter Valve Rack Panels,	The existing PLC control panels are in good condition. ICP-01, and the PAL main control panels are located a temperature controlled room (I.e. the MCC room) ICP-02 is located in the existing High Lift Pumping Station Room. The existing High lift pumping station room is subject to high humidity. The ICP-02 should be equipped with an disposable desiccant absorption product, to reduce the humidity in the panel. The product is inexpensive and typically replaced every 1 to 2 years. 	2
	Instrumentation (FIT, LIT, AIT, PIT, etc.)	Instrumentation is in good condition 	2

	SCADA System HMI	The SCADA system master HMI computer was recently upgraded and is in good condition. The SCADA system includes an older View Node computer located in the Lab area that is equipped with Windows XP and Version 9 Wonderware HMI software (The recently upgraded computer consists of Windows 7 and Wonderware version 10.6) It may be necessary to replace the existing View Node computer hardware (and OS) to improve the integrity of the view node application. The PAL control panel is equipped with an Allen Bradley panel mount PC computer. The PAL SCADA HIM computer is in good condition The LAB room is equipped with a proprietary computer that is dedicated to monitoring and trending of the treatment plant (HACH) analyzers. The manufacturer should be contacted to inspect the system, and to comment on the status. 	2
Gen Rm MCC Rm Comp Rm PAL Rm Chem Rm	General 120/240VAC Distribution, Disconnects, switches, junction boxes	The electrical power distribution consists of conductors in rigid PVC conduit raceways. The power distribution is in condition.	2

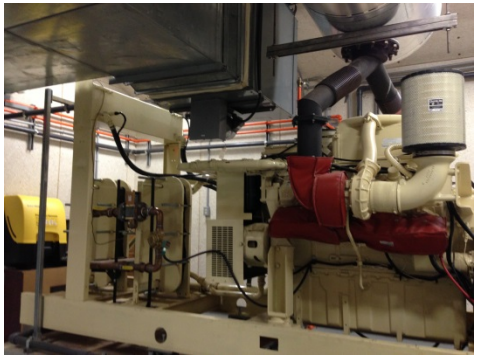
HLPS LLPS	(**New Installations**) General 120/240VAC Distribution, Disconnects, switches, junction boxes, cable trays	The electrical power distribution consists of a mix of old and new power distribution. New power distribution is installed in rigid PVC conduit raceways and is in good condition. Power conductors include TECK 90 cables in cable trays to service large motor loads that are in good condition. New junction boxes, distribution panels, and disconnect switches are in good condition There are some loose bonding conductors in cable tray that services the pump motor power distribution that should be terminated and confirm ground continuity to building ground. 	2

HLPS LLPS	(**Old Installations**) General 120/240VAC Distribution, switches, junction boxes	The electrical original/old power distribution consists of EMT conduit, and general NEMA 1 type metal junction boxes and receptacles. Original electrical power distribution is in fair to poor condition and it should be replaced during the next capital upgrades at the facility. 	4
	Valve Chamber General 120/240V power distribution	The power distribution in the valve chamber consists of rigid PVC conduit, and PVC junction boxes. The electrical distribution in the valve chamber is in good condition. 	2

	Interior Lighting Gen Rm MCC Rm Comp Rm PAL Rm Chem Rm LLP/HLP Rm	Lighting that was installed as part of the treatment plant expansion is in good condition The lighting consists of 2-32W T8 Florescent gasketed fixtures form most areas that are in good condition. Florescent fixtures are installed on perimeter walls and ceilings 250 W Metal Halide, High Bay fixtures are installed in the Chemical and PAL rooms that are in good condition 	2
	Interior Lighting (Original) Low Lift and High Lift	Some existing incandescent lighting is still in service in the original structures including the High Lift and Low Lift areas. The existing incandescent lighting should be replaced with energy efficient florescent or LED type.	3

	Exterior Lighting	The majority of the exterior lighting consists of high pressure sodium (HPS), 100W, 120V light fixtures. Some of the HPS fixtures glass lenses appear to have dust/debris accumulations. The lenses should be cleaned as required during regular maintenance intervals or lamp servicing. The exterior lighting also includes old incandescent fixtures. The incandescent bulbs should be replaced with energy efficient fluorescent or LED type. Fixtures that have been in service for over 25 – 30 years should be replaced. 	2

	Heating/Cooling and ventilation systems Gen Rm MCC Rm Comp Rm PAL Rm Chem Rm LLP/HLP Rm	Industrial Electric Unit heaters are provided for the heating of the Generator Room, Compressor Room, Low Lift and High Lift Area. The existing unit heaters are in good condition Gas radiant heating units are provided for the PAL process room and the chemical room. The gas fired unit heaters are in good condition. The MCC room and Gas Compressor rooms include cooling units that are in good condition. The Generator room, Compressor room, PAL filter room and Chemical room are equipped with ventilation exhaust fans that are in good condition. 	2
	Heating/Cooling and Ventilation Lab Room	The existing Lab room area is equipped with a through wall heating cooling unit. The existing unit is not functional and should be repaired or replaced	4

	Emergency Power System (Engine, Tank, Ventilation, Exhaust, Piping, etc.)	The Emergency Power generation system is in good condition. According to operations staff, annual electrical load testing is performed by a third party testing company 	2

General Notes:

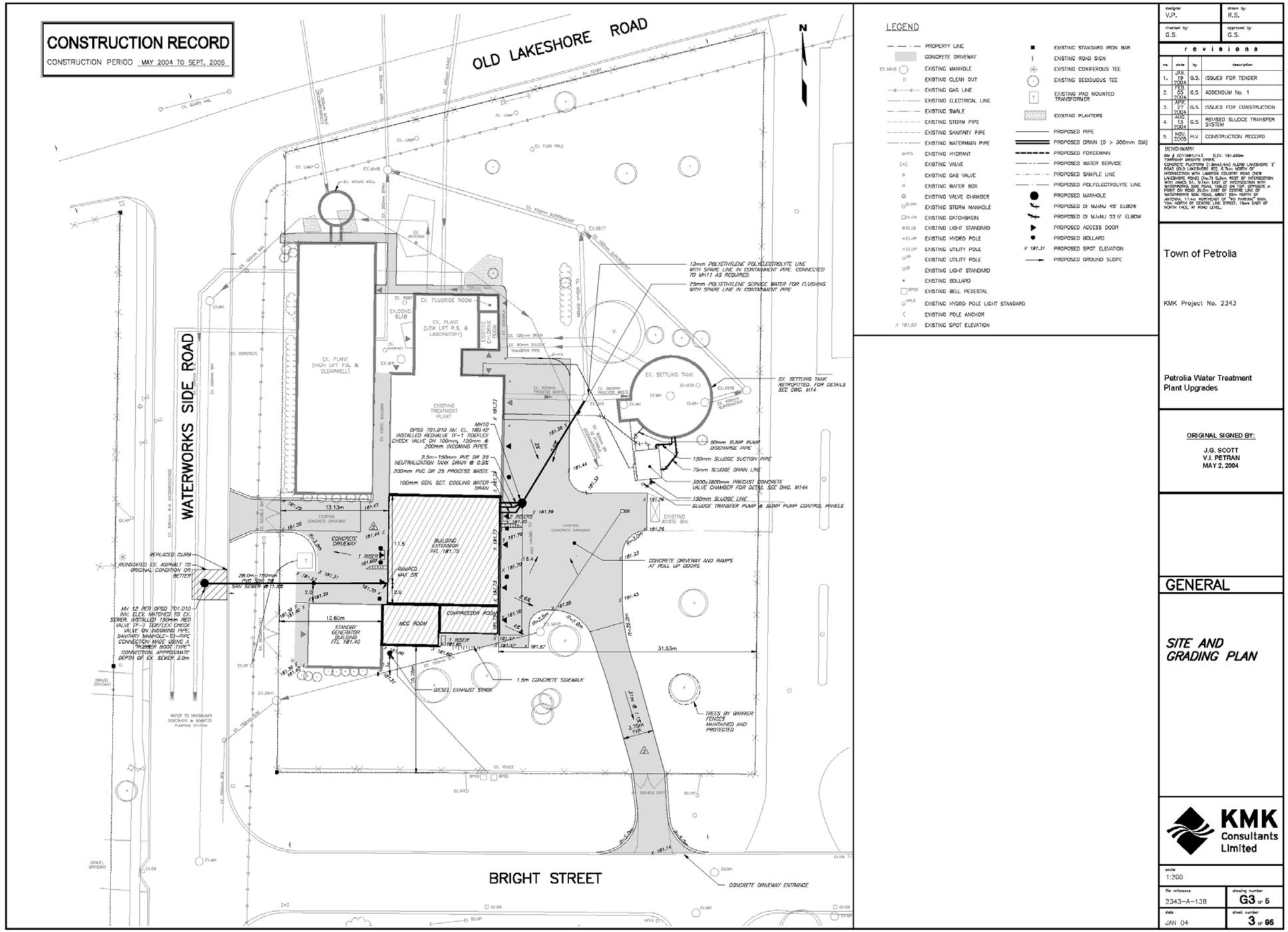
The Electrical Distribution and control systems are generally in good condition. There is some existing electrical distribution and lighting infrastructure, located in the HLP/LLP building installed prior to the expansion of the treatment plant that is in fair to poor condition, including EMT conduit, junction boxes and incandescent lighting. The older power and lighting infrastructure should be replaced during the next major upgrades at the treatment plant.

APPENDIX 2

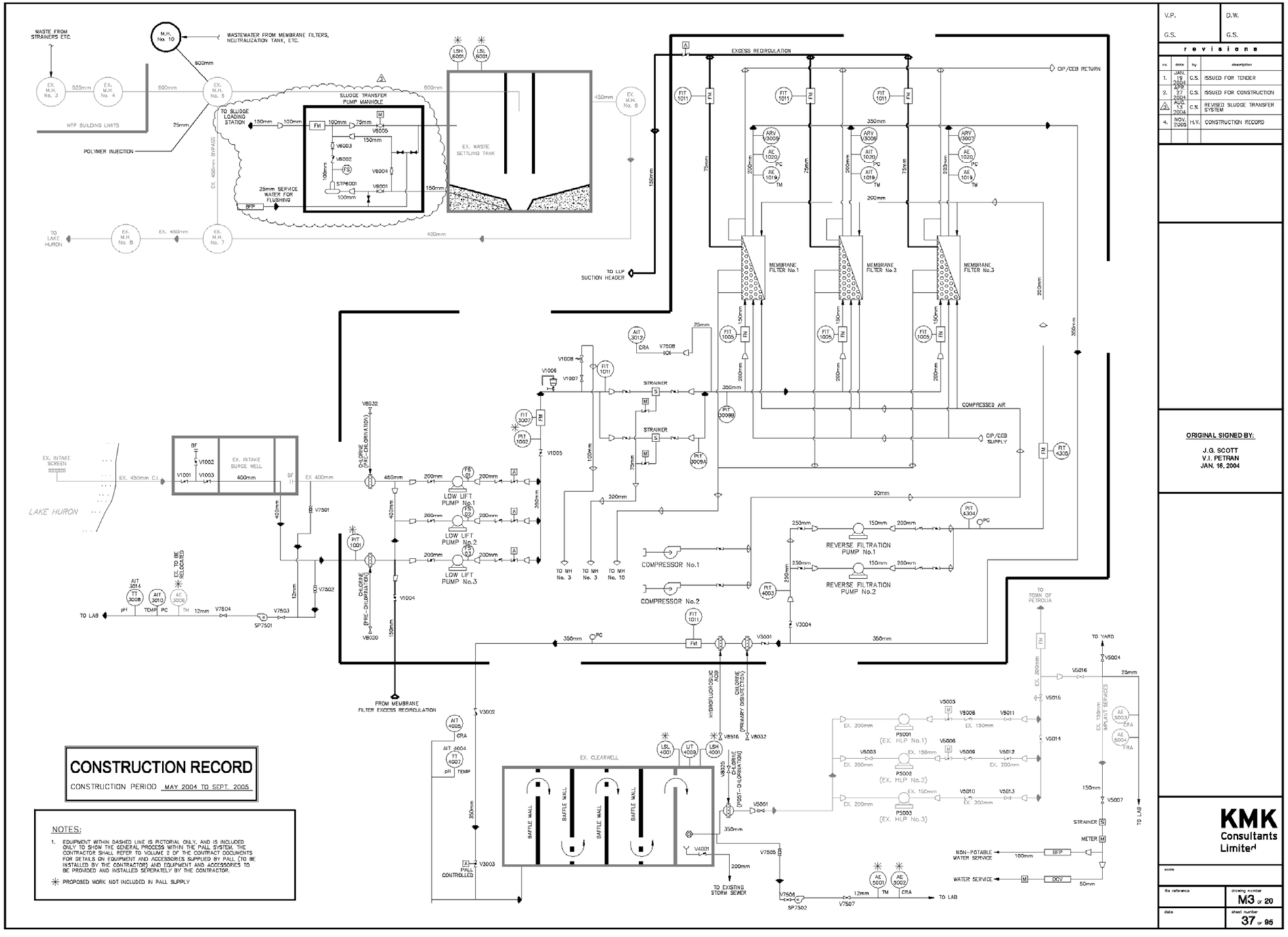
DRAWINGS

PETROLIA WATER TREATMENT PLANT CONDITION ASSESSMENT

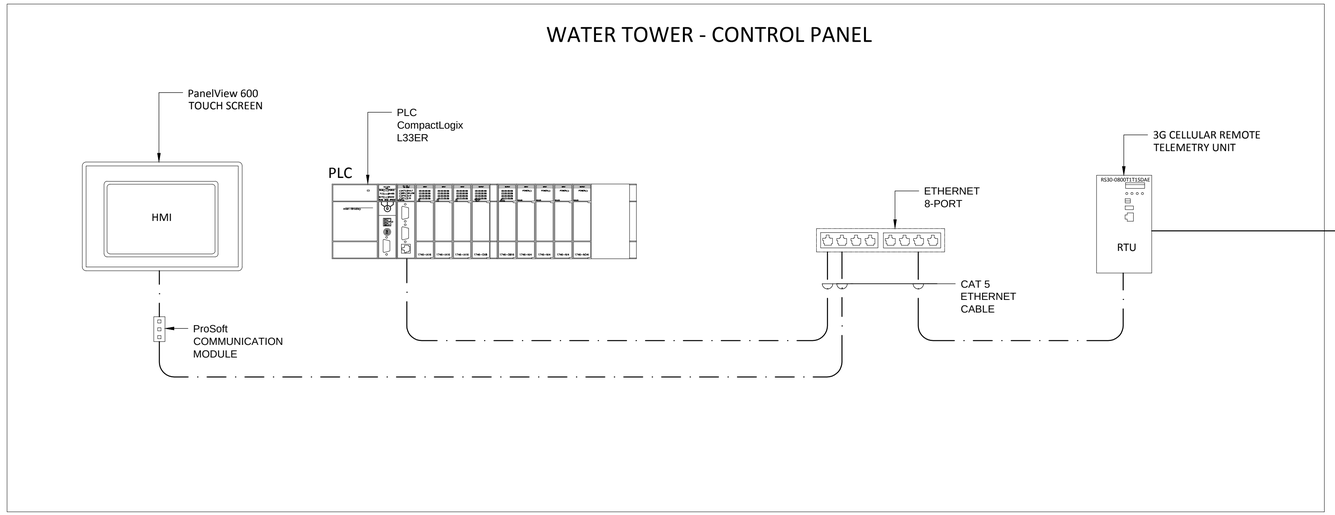
SITE AND GRADING PLAN



SITE AND GRADING PLAN



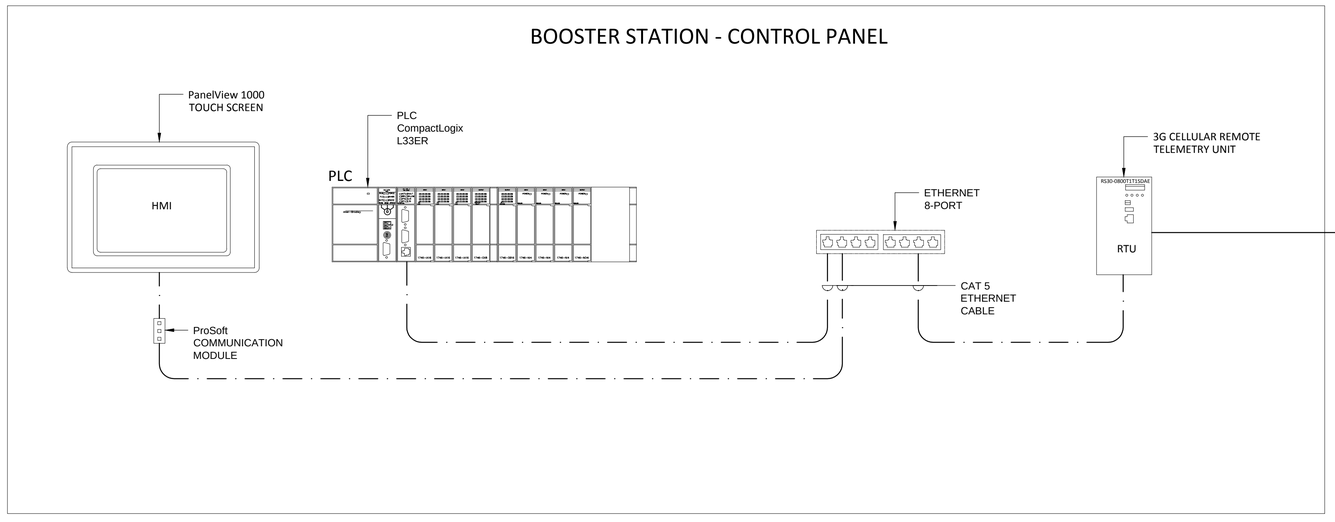
WATER TOWER



ABBREVIATION:

PLC	PROGRAMMABLE LOGIC CONTROLLER
HMI	HUMAN-MACHINE INTERFACE

MANDAUMIN BOOSTER STATION



KEY PLAN:

BENCHMARK:

CLIENT: TOWN OF PETROLIA

PROJECT NAME:

PRELIMINARY DRAWINGS

STAMPS:

DESIGNED BY

APPROVED BY

No.	Date	Description	By

SHEET TITLE:

SCADA SYSTEM ARCHITECTURE 1
WATER TOWER AND MANDAUMIN
BOOSTER STATION

DISCIPLINE: ELECTRICAL

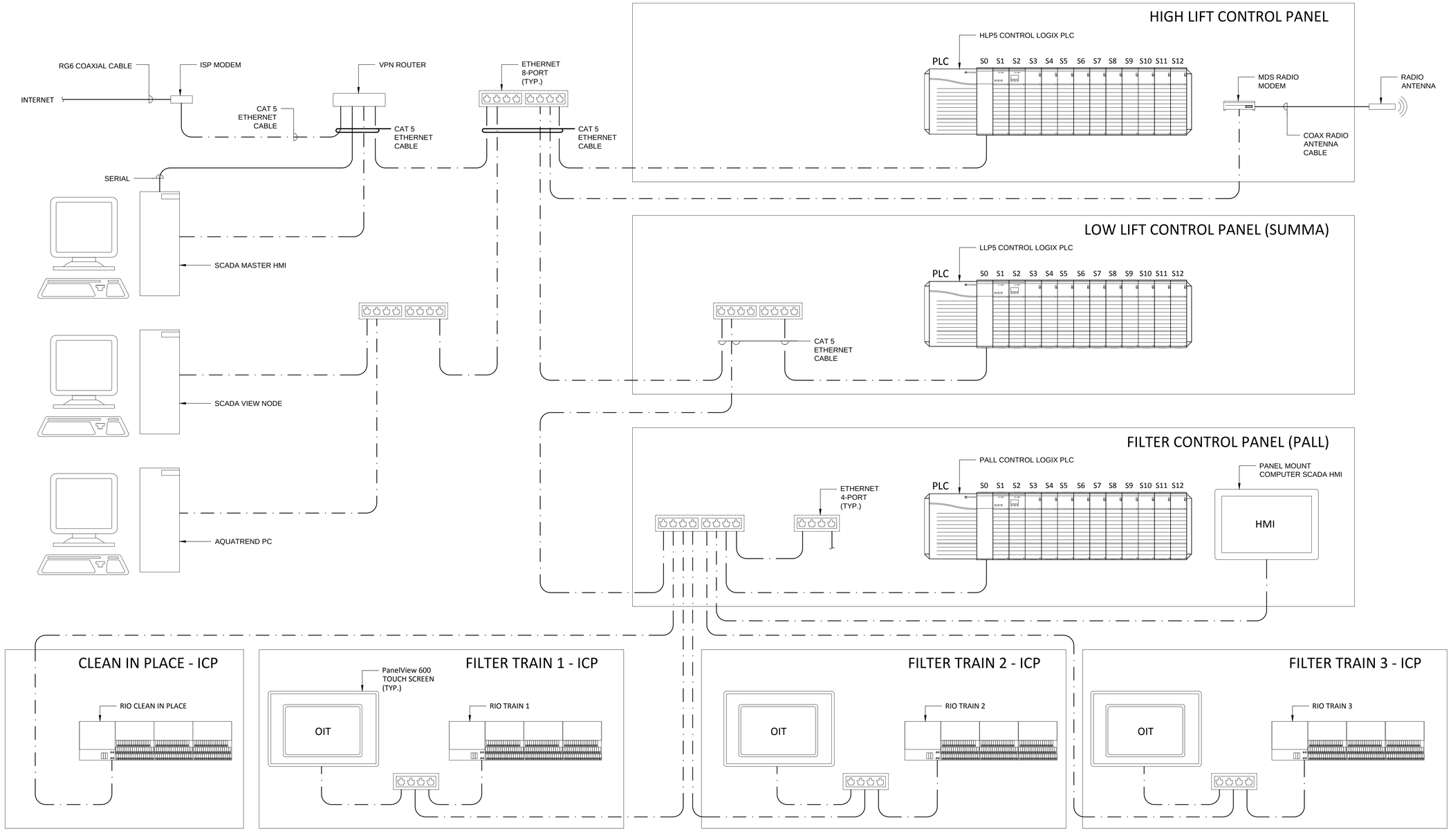
SCALE:

HORIZONTAL : AS INDICATED

VERTICAL :

PROJECT No: T000019A		CLIENT File No:
DRAFTER: PY	DESIGNER: BS	DRAWING No: E01
APROVER: BS	APROVER: BS	
DATE: 09/11/2012		SHEET No: - of XX

WATER PLANT



ABBREVIATION:

PLC	PROGRAMMABLE LOGIC CONTROLLER
HMI	HUMAN-MACHINE INTERFACE
OIT	OPERATOR INTERFACE TERMINAL
RIO	REMOTE INPUT AND OUTPUT MODULES
VPN	VIRTUAL PRIVATE NETWORK
ISP	INTERNET SERVICE PROVIDER
SCADA	SUPERVISORY CONTROL AND DATA ACQUISITION

KEY PLAN:

BENCHMARK:

CIMA

CLIENT:

TOWN OF PETROLIA

PROJECT NAME:

PRELIMINARY DRAWINGS

STAMPS:

DESIGNED BY

APPROVED BY

No.	Date	Description	By

SHEET TITLE:

SCADA SYSTEM ARCHITECTURE 2
WATER PLANT

DISCIPLINE:

ELECTRICAL

SCALE:

HORIZONTAL : AS INDICATED

VERTICAL :

PROJECT No: T000019A		CLIENT File No:
DRAFTER: PY	DESIGNER: BS	DRAWING No: E02
APPROVER: BS	APPROVER: BS	
DATE: 09/11/2012		SHEET No: - of XX

APPENDIX 3

EMAIL

Eric Tuson

From: Brian Sudic
Sent: July-11-13 1:27 PM
To: Clive Barry (CBarry@ocwa.com); Mandi Pearson <mpearson@town.petrolia.on.ca> (mpearson@town.petrolia.on.ca); Joe Adams
Cc: Tom Montgomery; Eric Tuson; John Cole (John.Cole@genivar.com); Tom Langstaff (Tom.Langstaff@genivar.com)
Subject: Petrolia Site Visit

Hi All

Further to the site visit yesterday by CIMA & Genivar to the Petrolia WTP, we had a good discussions with Operations staff in assessing the current status of the SCADA system. The following is a general summary of the current Status of the SCADA upgrades:

- The new Master SCADA computer was reviewed by OCWA operations, CIMA and Genivar. The general consensus is that the new Master SCADA computer is fully functional, including the De-Bug Data Gathering feature and the MS Access automatic Daily, Monthly, and Annual reporting feature.

- OCWA operations staff indicated that they will report any anomalies related to the new SCADA master computer, that they observe during the course of operating the plant.

- The "D-Bug" historical data gathering feature is now located on Chemical SCADA screen and on the Building Services SCADA screen.

- Available historical data was restored to the Master SCADA computer. The extent of the available historical data, dates back to August of 2012.

- Minor deficiencies related to the new Master Computer will be corrected by Genivar, including the following:

    - Scaling for specific process analog signals that are displayed in the Wonderware "Trending" screens are showing "0", which prevents the operators from reading the value of the historical trending data. Genivar will correct the scaling of the affected signals such that they values may be accurately read from the screen.
    - Some nuisance alarm TAGS were noted by operations staff since moving to the new Master SCADA computer that appear on the alarm pop up screen. E.G. "E-Stop Alarm". Nuisance alarms that are identified by OCWA staff will be eliminated by Genivar.

- **LAB SCADA View Node Computer** - Re-Connection of the existing LAB SCADA View node computer to the new Master Computer is incomplete. During the upgrade works yesterday, Genivar noted a problem with the operating System of the existing LAB View Node Computer. (Note: The purpose of the LAB View Node SCADA computer is to provide the operations staff with access to the Same SCADA screens that appear on the Master SCADA computer located in the High Lift Building. Genivar has removed the computer from site, and will continue to work on re-establishing the SCADA Application in their offices. Once the computer is functional, Genivar will return the computer to the Treatment Plant and put it back into operation.

- Installation of the new PLC processors at Mandaumin and the Tower are incomplete. Genivar performed an inspection of the Mandaumin and Tower locations in preparation for the upgrades. Genivar indicated that they will be returning to site in the next 2 weeks to perform the PLC upgrades.

- OCWA operations indicated that they have installed a new OCWA PC computer in the High Lift Pumping Station Office. The new OCWA PC also includes a dedicated Internet Service, that is independent from the existing SCADA system network and internet service.

- **AquaTrend** - The LAB area is equipped with 2 – PC Computers. One computer is the SCADA system view node used for Treatment Plant operation. The second computer is dedicated to running a proprietary software system that is dedicated to monitoring and trending all of the treatment plant process system analyzers including Turbidity, Chlorine Residual, and PH signals. The second computer is designated as the "AquaTrend" computer. The software that is installed on the computer is provide by HACH instruments. The purpose of the software is to gather continuous historical data, from the analyzers, based on a 1 minute sample interval. The computer hard drive was examined during the site visit. The hard drive contained daily reports, based on 1 minutes data samples from 2005 to 2011. The files are stored as a *.CSV file, that is similar to the D-Bug historical data. The historical data that was collected was independent of and redundant to the historical process data that is collected by the SCADA system Master Computer. When the 2011 data was examined it was noted that only 3 months of data was collected (i.e. Jan, Feb and March). OCWA operations staff indicated that they would contact the previous OCWA operations manager to get further clarification on how the AquaTrend software functions such that they may continue to use the system as backup data gathering or as a comparison to the SCADA Computer Data.

- **Historical Data Trending Summary** – During the site visit it was confirmed that there are 4 independent methods of trending and gathering historical process data at the treatment plant. The methods are as follows: 1 – SCADA data trending via the Wonderware SCADA software, 2 – MS Access, daily, monthly and yearly reports, 3 – AquaTrend data trending, 4 – PAL Computer
  - Method No.1 – The SCADA system trends data at a 5 min interval based Wonderware Historical Trending application. The same data is used by the D-Bug feature to extract historical process data into CSV files that are provided to the MOE.
  - Method No.2 – The MS Access (Daily, Monthly, Yearly) reporting system poles separate Process Data that is collected and stored in the Master PLC processor. The data that is collected in the Master PLC is based on 5 min resolution for 7 days of operation. In the event that the Master SCADA computer is not functional, the PLC will continue to store 7 days of data. (Note: Genivar will elaborate on how the data is stored on the computer and if it is accessible based on the 5 min intervals)
  - Method No.3 – The AquaTrend system independently monitors and trends all of the plant process analyzer data, that is collected based a 1 min resolution for each day.
  - Method No.4 – The PAL Control Panel Mounted computer was recently configured by Genivar to independently trend process data directly from the PLC SCADA system (the PAL computer no longer relies on the SCADA master computer for trended data)

Moving forward we had good discussions with Operations Staff and Genivar on methods that may help with data collection and integrity, including the following ideas:

- Currently OCWA uses the D-Bug Feature to collect 1 year of 5 min interval process data to submit to the MOE. Through the click of a software button, the operator is able to generate an Excel/CSV file that contains process data for any time span (e.g. 1 day, 1 week, 6 months etc). I would be feasible for operators to generate a monthly data file (or any other shorter term) that could be saved, emailed, stored, etc, such that there would always be monthly data available (similar to how the AquaTrend system stores monthly data.)

- The MS Access (daily, monthly, annual reports) are currently produced and viewed in the Access Software. It may be possible to print the reports to a PDF file, such that there is a permanent record of the report available. Genivar will comment on the feasibility of producing PDF reports.

- A network based hard drive storage unit could be integrated into the plant SCADA LAN to allow for storage of collected data and reports, including D-Bug files, PDF (daily, monthly, yearly) reports.

I will follow up with Genivar in the coming weeks to ensure that the above action items are addressed

Thanks
Brian

Brian Sudic, P.Eng.
Manager, Electrical Engineering
Water and Wastewater

CIMA+
Partners in excellence
7880 Keele Street, Suite 201
Vaughan, Ontario, L4K 4G7
CANADA

Tel. Office: 905 695-1005
Cell. : 416 230-4569
Fax : 905 695-0525

APPENDIX 4

COST ESTIMATE BREAKDOWN

APPENDIX 4 - COST BREAKDOWN

DISCIPLINE	LOCATION	EQUIPMENT/ASSETS	OBSERVATION	RECOMMENDATIONS	TIME FRAME	COST ESTIMATE
Process	LL PS/Intake	Intake	Frazil ice or zebra mussel control on the intake pipe or screen	Install at time of Intake replacement	1-5 yr	To be determined
		Intake	interim frazil ice measures	modifications to allow LL pumps to backflush intake pipe	immediate	$50,000
		Intake	interim zebra mussel chlorination	addition of Cl2 system to intake pipe	immediate	$25,000
	LL Pump Station	Low Lift Pumps & Equip.	Name Plates Missing	Secure from manufacture	0-1	Under maintenance
		Pneumatic Control Valves	Out of service on all discharge valves	Put back in service	0-1	Under maintenance
		Piping	Needs paint touch up	Paint maintenance	Ongoing	Under maintenance
		Pump #2	Reported Vibration	Operation staff to pursue	0-1	Under maintenance
		Link seal leaks	minor seepage through link seals	drain clearwell and replace	0-1	$10,000
	Filtration Room	Membrane Filtration	Filters suffer from high turbidity	Interim: continue to use new flush valves	At intake replacement	To be determined
				Upgrade turbidity monitoring/control system	immediate	$10,000
	Filtration Room	Automatic Strainers	Allows passing of Zebra Mussel shells	Refurbish/replace screens as alternate to intake Cl2 system	0-1	$150,000
	Chemical Systems	Controls	Instrumentation is obsolete	Replace as required	Ongoing	Under maintenance
	HL Pump Room	Piping below grating	Appears to be corroded - possibly severely	Non-destructive test suggested	1-5 yrs.	$10,000
				Possible piping replacement	TBD	$100,000
		Sump pump below grate	In poor condition	Replace /upgrade	1-5 yrs.	2,000
		High Lift header	Unidentified Control Valve	Requires service by C.V. supplier	immediate	$5,000
	Residual Management.	Sludge disposal	Thickening problems	Add circulation pump only if required	1-5 yrs.	$10,000
	SUB-TOTAL - PROCESS					**$372,000**
Electrical	All areas	Local disconnects	Located in humid/moist environments	Inspect and exercise disconnects as part of regular maintenance	Maintenance	
		Instrument control panels (ICP's)	ICP's are equipped with UPS backup power systems	The UPS units should be tested on a bi-annual basis to confirm that they are functioning normally	Maintenance	
	Main Electrical Room	Distribution panels	No dedicated surge protection on panels that supply sensitive equipment	Provide additional surge protection device on LCP	1 to 5 Years	$4,500
	High/Low Lift PS	Original electrical infrastructure,	Conduit that was installed prior to the last major upgrade. The older electrical distribution is not suited for wet/humid environments and is in poor condition.	The EMT type distribution should be replaced during the next upgrade of the treatment facility	1 to 5 Years	$8,000
		Main ground/bonding conductors	Located in the existing High Lift pumping station (lower level southwest corner of the high lift room). Mechanical bolt type ground connectors are oxidized.	The existing grounding system should be tested as part of regular maintenance to confirm good ground continuity	Maintenance	
		Original DC Emergency Lightir	Existing DC emergency lighting should be replaced with new vapor tight heads during the next treatment plant upgrades		1 to 5 Years	$4,000
		Existing entrance/exit door to t	Install an exit sign		0 to 1 years	$1,200
		The ICP-02 control panel is loc	Provide a disposable control panel type desiccant “puck” in the interior of the panel to reduce the humidity levels in the panel		Maintenance	
	Exterior Building	Wall pack fixtures	Some have lenses that are discolored due to dust/debris. Some lamps may not be functional	Fixtures should be cleaned during future regular maintenance or lamp replacement	Maintenance	

APPENDIX 4 - COST BREAKDOWN

DISCIPLINE	LOCATION	EQUIPMENT/ASSETS	OBSERVATION	RECOMMENDATIONS	TIME FRAME	COST ESTIMATE
Electrical (Cont'd)	Main Electrical Room	PAL HMI panel mount SCADA computer	Computer hard drive periodically fills to capacity based on storage of historical trending data. media	Data should be periodically removed/transferred to an alternate storage	Maintenance	
		SCADA Master Computer	Includes a custom macro that allows the operator to extract 5-minute interval process data from the Wonderware trending database on an on- demand basis. The macro will create a "CSV" file that consists of process signal for any time interval. The process signals and time interval can be selected by the operator. The CSV files are created in addition to the standard formatted performance reports that are produced on a regular basis.	The CSV file of the relevant process data is currently generated by operations staff on an annual basis, for submission to the MOE. To increase the reliability/integrity of the data collection/storage, the CSV file of relevant instrumentation data, should be generated on a monthly or bi-weekly basis as a standard operating procedure.	Maintenance	
		Analyzer PC Computer (AquaTrend)	The SCADA system is also equipped with an independent process trending computer. The computer is equipped with AquaTrend (HACH) Trending Software that directly monitors the treatment process analyzers. The computer generates 5-minute sampling intervals similar to the Master SCADA computer trending in the form of a CSV file	The CSV data that is generated by the AquaTrend system should be collected and stored as a backup to the Master SCADA computer. An SOP should be created to collect/store the data.	Maintenance	
		Auto Dialers	The SCADA system is equipped with two auto dialers that are connected to the respective ICP-01/02 PLCs. The auto dialers communicate with the PLCs and dial out to operations staff to report alarms that occur on the SCADA system. The operations staff have noted that there are frequent nuisance dial out alarms that are unrelated to any alarm event that is displayed on the SCADA system computers.	Nuisance alarms produced by the Autodialers should be investigated and eliminated. Dialers should be interrogated to confirm what specific channels are responsible for the nuisance alarms and disable the channels as required. Critical alarms that are currently required to be dialed out by the respective alarm dialers should be tested and verified. Each alarm channel has a voice message that indicates the specific nature of the alarm.	Maintenance	
		Data Storage	Data is collected and stored by the various computer applications including the PAL SCADA computer, SCADA Master computer and the AquaTrend computer. The data is stored on the respective local hard drives	To improve the integrity of the data collection/storage, a network hard drive should be added to the existing SCADA Ethernet LAN that could be accessible to all SCADA computers. The network storage device should be used to backup relevant process trending data, required for reporting. A backup image of the respective SCADA computers should also be stored on the independent network drive. An SOP should be developed for periodic archiving of data.	0 to 1 year	$3,200
		SCADA Ethernet Local Network	The treatment plant SCADA local area network (LAN) consists of hard wired CAT5 cabling to various locations in the treatment plant, to connect the respective PLC and SCADA computers to the Ethernet network. The central point of the network is located in the HLPS office that includes the ISP modem and VPN router. Ethernet Cables are routed from the HLPS office to the respective areas of the plant, including the lab office and electrical room to connect the various PCs and PLCs to the SCADA LAN. Some of the areas in the plant include additional Ethernet switches to accommodate the connection of more than one device to the network, as there are limited Ethernet cable links servicing the plant	Additional Ethernet cables should be installed from the HLPS office to the respective utilization points in the treatment plant such that all miscellaneous unmanaged Ethernet switches may be eliminated. Elimination of the miscellaneous switches will improve the integrity and traffic on the SCADA LAN	1 to 5 Years	$12,000
	SUB-TOTAL - ELECTRICAL					**$32,900**

APPENDIX 4 - COST BREAKDOWN

DISCIPLINE	LOCATION	EQUIPMENT/ASSETS	OBSERVATION	RECOMMENDATIONS	TIME FRAME	COST ESTIMATE
Structural / Architectural	Highlift PS and Clearwell	Asphalt Shingle Hip Roof	Roofing near end of life	Replace shingle roof and any rotting sheeting.	1-5 years	$15,000
		Exterior Cladding	Stucco is spalling behind the ivy, cracks at windows and roof line.	Remove ivy, repoint, repair stucco, paint	1-5 years	$15,000
		Wood door and trim	Wood on the door and windows is in poor condition,	Sand down old coatings, clean, repair and repaint.	1-5 years	$1,000
		3 Ton Monorail	Some rust visible, certification not found.	Paint monorail. Update lifting mechanism certification, post capacity.	immediate	$5,000
		Windows	One pane is broken,	Replace window pane.	1-5 years	$1,000
		Handrail	Height of handrail is not to code.	Replace handrail with new handrail that meets OBC requirements.	immediate	$10,000
		Office – Wood Structure	Wood coatings deteriorated	clean and paint	1-5 years	$5,000
			Supporting wood beams have many sections cut out	perform design check prior to any future modifications to system.	1-5 years	
		Basement	Pipe chase has rubble in floor recesses, groundwater seepage, and isolated areas of rust on pipe supports.	clear out rubble from pipe chases, inject cracks, and paint pipe supports.	5-10 years	
			West wall has a major crack and general moisture problem on brick wall and active leak at base	West wall to be injected with epoxy to stop leaks. CIMA was informed that a contract is already underway for this fix.	1-5 years	
			Standing water in southwest corner at abandoned steel support.	Remove steel support to allow water to drain.	0-1 year	$500
			Pipe leaking on south wall	repair pipe leak during next scheduled shut own of the clear well.	1-5 years	$2,000
		Clearwell	Clear well was operational and therefore was not entered.	Complete a structural inspection of the interior of the clear well during the next shut down.	1-5 years	$5,000
			Door is half-sized with rusted hardware, not lockable, door blocks hallway when open	Replace clearwell access door with lockable door that opens to the right, using stainless steel hardware. Install a door stop on the wall to protect the wall from damage.	1-5 years	$2,000
			Tension rods installed above the water level have some evidence of rust.	Clean and inspect clearwell tension rods, repair and paint as necessary.	1-5 years	$8,000
		Abandoned intake well	Painted metal grating is rusting	decommission intake well	1-5 years	$30,000
			Handrails over pit are not to code, and Temporary ladder is not tied off	restrict access.	immediate	$500
	Low Lift PS and Laboratory		leak in lowlift pump area walls at structural steel anchorage. Large mineral formations on walls.	One area has been repaired where anchorage damaged an abandoned pipe. Opposite side is leakage from process drain and groundwater. Investigate and repair leak in wall by injection.	1-5 years	$10,000
		Basement	Spalling of concrete ceiling	Chip out and repair areas of spalling concrete	1-5 years	$10,000
			Steel support for grating at stair is rusting; 5% section loss	Replace steel support for grating with aluminum or FRP angle in raw meter room.	1-5 years	$5,000
			Handrail does not continue to top of steps and is not to code	Replace handrail on stairs	immediate	$5,000
			Missing cover for floor drain	Replace missing cover for floor drain in raw meter room.	immediate	$500
			Process drain in floor covered with rusted steel plate (3"x14")is clogged	Unclog process drain in raw meter room. Install strainer to prevent future clogging and replace cover	immediate	$500
			Floor coating is worn and needs replacement	Clean and recoat floors in raw meter room.	immediate	$5,000
			boiler room door frame is rusted, and door is combustible.	Replace frame and door to boiler room with a fire-rated hollow metal door.	immediate	$1,500
		Control Room and Lab	Drywall damage due to roof leaks	Cut out damaged drywall, patch and paint. Coordinate with repair of roof.	1-5 years	$1,500
			Incomplete trim, rodent screens and bug screens on fans and air conditioner	Replace missing trim and screens	0-1 years	$200
		Fluoride Room	Hydrofluosilicic Acid is stored on grating which is rusting, drywall is damaged.	Repair damaged drywall in Fluoride room. Replace grating in Fluoride room so metal is compatible with Acid.	5-10 years	$3,000
		Lower Roof	roof is accessible by stair, there is no barrier at roof edge.	Install handrail at roof edge, or restrict access to roof area.	immediate	$2,000
			Roof is leaking into laboratory, water pools in valley; no roof drain is visible, Flashing sealant has failed	replace roofing complete with new flashing and roof drain.	1-5 years	$5,000
		Upper Roof	Tar and gravel roof has gravel retainer that retains water, and gutter is clogged with gravel.	Replace roof system	1-5 years	$5,000

APPENDIX 4 - COST BREAKDOWN

DISCIPLINE	LOCATION	EQUIPMENT/ASSETS	OBSERVATION	RECOMMENDATIONS	TIME FRAME	COST ESTIMATE
Structural / Architectural (Cont'd)	Chemical Building	Man-door (North Elevation)	Door on the North elevation has rusted hardware.	Replace hardware on north door with stainless steel hardware.	1-5 years	$500
		Man-doors (West Elevation)	Both doors are 0.5m off the ground and have no stair access or barrier.	Install a barrier to doors on west elevation and appropriate safety signage.	immediate	$500
		Rollup Doors	Minor corrosion on rails and hardware	Paint rails and hardware of rollup doors.	1-5 years	$500
		Steel Structure	Minor rust on bracing (tie rods)	Clean and paint	1-5 years	$200
		Secondary Containment	Coatings are cracked at expansion joint in concrete.	cut back coating and repair with joint sealant.	immediate	$500
			The containment tank for the neutralization tank is not visible and was not inspected	inspect containment tank	1-5 years	$3,000
			Containment walls at the neutralization tank has failed coatings	Clean containment walls and floor, and recoat.	1-5 years	$5,000
		Flashing	Flashing at northeast corner is coming loose at top due to spalled brick	Repair spalled brick and flashing at northeast corner.	1-5 years	$1,000
	Filter Building, MCC Room and Compressor Room	Doors	door frames are not sealed and bird and insect nests are in the wall cavity	flash and seal frames.	1-5 years	$500
			roll up doors have rust of frame and hardware	clean and paint frame and hardware	1-5 years	$500
			Nests above door frame between and underside of cladding	Remove bird's nest from above door frame and seal opening.	1-5 years	$500
			Mandoor (East Elevation of MCC Rm), Closure is leaking oil	replace door hardware.	1-5 years	$1,000
	Generator Building	Exhaust Stack/Soffit	Generator exhaust exits the building under the soffit and has very little clearance.	Review soffit construction to ensure it is non combustible, and provide minimum clearance to combustible materials as required.	0-1 years	$2,000
		Stair	Precast concrete stairs at diesel fill station do not have handrail; not to code	Install handrail on precast stairs at diesel fill station according to OBC.	immediate	$1,500
	Garage	Floor	Expansion joints in uncoated concrete are open	Seal expansion joints in concrete.	1-5 years	$1,000
		Secondary Containment	Containment is not coated despite Sodium Hydroxide solution (25%) and Citric Acid solution (50%) being stored on grating	Coat containment area and grating with chemically resistant coating.	1-5 years	$2,000
	Settling Tank and Valve Chamber	Settling Tank	Concrete cracked on surface of the cover at 1m c/c in the North-South direction at location of hollow core joints, parging missing at edges of slab.	seal joints in parging, parge edges of planks.	5-10 years	$5,000
			Ladder is obstructed by wires	remove wires from ladder rungs.	immediate	$0
			Paint on the vent hood has failed	Clean and repaint vent hood	1-5 years	$1,000
		Valve Chamber	Precast cover gasket is worn	Replace sealant gasket around chamber lid.	5-10 years	$1,000
		Chamber Floor	Sump was full of water, sump pump not running	repair sump pump	1-5 years	
	SUB-TOTAL - STRUCTURAL - ARCHITECTURAL					**$181,400**
Subtotal - Bright's Grove WTP						**$586,300**
Contingency Allowance - 20%						**$117,260**
Total - Bright's Grove WTP						**$703,560**

C

Appendix C: Stage 1 & 2 Archaeological Assessment Reports

ARCHAEOLOGY | HERITAGE | OUTREACH | CONSERVATION

Stage 1 and 2 Archaeological Assessments
Bright's Grove Water Treatment Plant New Intake
City of Sarnia
Part of Lot 9, Concession 9 AKA Front Concession
Geographic Township of Sarnia
Lambton County, Ontario

Prepared for
CIMA Canada Inc.
900-101 Frederick Street
Kitchener, ON N2H 6R2
Phone (519) 772-2299

Licensed under
P.J. Racher
MCM Licence #P007
PIF #P007-1429-2022 (Stage 1)
and #P007-1511-2023 (Stage 2)
ARA File #2022-0378

13/10/2023

Original Report

EXECUTIVE SUMMARY

Under a contract awarded in September 2022, Archaeological Research Associates Ltd. carried out Stage 1 and 2 assessments of lands with the potential to be impacted by the replacement of the Bright's Grove Water Treatment Plant (WTP) intake structure in the City of Sarnia, Lambton County, Ontario. The existing treatment facility is a conventional surface water treatment plant with a current rated capacity of 12 million litres per day. The intake pipe, constructed in 1944, is a 400 mm cast iron pipe extending approximately 400 m into Lake Huron. The existing intake has reached the end of its service life, and replacement of the existing intake pipe and associated crib structure is required. The assessments were carried out as part of a Municipal Class Environmental Assessment in accordance with the *Environmental Assessment Act*. This report documents the background research and fieldwork involved in the investigation and presents conclusions and recommendations pertaining to archaeological concerns.

The Stage 1 assessment was conducted in April 2023 under Project Information Form (PIF) #P007-1429-2022, whereas the Stage 2 assessment was carried out in July 2023 under PIF #P007-1511-2023. The investigation encompassed the entire study area. Legal permission to enter and conduct all necessary fieldwork activities within the assessed lands was granted by the property owner. At the time of assessment, the study area consisted of the existing WTP, parts of Old Lakeshore Road and Waterworks Road, grassed areas, part of the armour stone shoreline and part of Lake Huron.

The Stage 1 assessment determined that the study area comprised a mixture of areas of archaeological potential, areas of no archaeological potential and areas previously subject to marine assessment. The Stage 2 assessment did not result in the identification of any archaeological materials. It is recommended that no further land-based assessment be required within the study area.

TABLE OF CONTENTS

IMAGES

MAPS

TABLES

ABBREVIATIONS

ARA – Archaeological Research Associates Ltd.
MCM – Ministry of Citizenship and Multiculturalism
PIF – Project Information Form
S&Gs – Standards and Guidelines for Consultant Archaeologists
WTP – Water Treatment Plant

PERSONNEL

Project Director: P.J. Racher (#P007)
Operations Manager: C.E. Gohm (#R187)
Project Archaeologist: A. Dunlop (#P1146)
Field Director: J. Gardner (#P1020)
Field Technician: S. Bergen
Cartographer: M. Johnson
Report Writer: L. Zepf (#P1033)
Editor: C.J. Gohm

ENGAGED GROUPS

Assembly of First Nations
Contact: S. Lickers
Field Representative: None

Caldwell First Nation
Contact: Z. Hamm
Field Representative: None

Chippewas of Kettle & Stony Point First Nation
Contact: R. Lukacs
Field Representative: None

Chippewas of the Thames First Nation
Contacts: C. Albert, F. Burch
Field Representative: None

Delaware Nation at Moraviantown
Contacts: Chief J. Logan, K. Snake
Field Representative: None

Métis Nation of Ontario
Contacts: General Consultations, L. Desaulniers
Field Representative: None

Munsee Delaware Nation
Contacts: D. Antone, S. Phillips
Field Representative: None

Oneida Nation of the Thames
Contacts: A. Chrisjohn, B. Doxtator
Field Representative: None

Tri-Tribal Monitoring Services
Aamjiwnaang First Nation
Contacts: W. Maness, C. O'Brien
Field Representative: None

Walpole Island First Nation
Contacts: N. Altiman, J. MacBeth
Field Representative: None

1.0 PROJECT CONTEXT

1.1 Development Context

Under a contract awarded in September 2022, Archaeological Research Associates Ltd. (ARA) carried out Stage 1 and 2 assessments of lands with the potential to be impacted by the replacement of the Bright's Grove Water Treatment Plant (WTP) intake structure in the City of Sarnia, Lambton County, Ontario. The existing treatment facility is a conventional surface water treatment plant with a current rated capacity of 12 million litres per day. The intake pipe, constructed in 1944, is a 400 mm cast iron pipe extending approximately 400 m into Lake Huron. The existing intake has reached the end of its service life, and replacement of the existing intake pipe and associated crib structure is required. The assessments were carried out as part of a Municipal Class Environmental Assessment in accordance with the *Environmental Assessment Act*. This report documents the background research and fieldwork involved in the investigation and presents conclusions and recommendations pertaining to archaeological concerns.

The study area consists of an irregularly shaped parcel of terrestrial and marine environments with a total area of 20.73 ha (Map 1). The terrestrial portion of the study area is generally bounded by Lake Huron to the north, a driveway to the east, Bright Street to the south and residential properties to the west, whereas the marine portion extends northerly into Lake Huron. In legal terms, the terrestrial portion falls on part of Lot 9, Concession 9 AKA Front Concession in the Geographic Township of Sarnia, Lambton County. The Crown obtained these lands from certain Anishinaabeg peoples as part of the Huron Tract Purchase (Treaty 29) in 1827.

The Stage 1 assessment was conducted in April 2023 under Project Information Form (PIF) #P007-1429-2022, whereas the Stage 2 assessment was carried out in July 2023 under PIF #P007-1511-2023. The investigation encompassed the entire study area. Legal permission to enter and conduct all necessary fieldwork activities within the assessed lands was granted by the property owner. As set out in Section 1.0 and Section 2.0 of the 2011 *Standards and Guidelines for Consultant Archaeologists* (*S&Gs*), the investigation was carried out to achieve the following objectives:

- Provide information about geography, history and current land conditions;
- Determine whether any previous archaeological fieldwork has been completed;
- Evaluate in detail the study area's archaeological potential;
- Document all archaeological resources within the study area;
- Determine whether there are sites requiring further assessment; and
- Recommend appropriate strategies for Stage 3 assessment, if necessary.

The Ministry of Citizenship and Multiculturalism (MCM) is asked to review the results and recommendations presented herein and enter the report into the Ontario Public Register of Archaeological Reports. A Record of Indigenous Engagement is included in the project report package in accordance with the requirements set out in Section 7.6.2 of the 2011 *S&Gs*.

1.2 Historical Context

After a century of archaeological work in southern Ontario, scholarly understanding of the historical usage of the area has become very well-developed. With occupation beginning in the Palaeo period approximately 11,000 years ago, the greater vicinity of the study area comprises a complex chronology of Indigenous and Euro-Canadian histories. Section 1.2.1 summarizes the region's settlement history, whereas Section 1.2.2 documents past and present land uses. One previous archaeological report containing relevant background information was obtained during the research component of the study. This report is summarized in Section 1.3.3, and the reference (including title, author and PIF number) appears in Section 8.0.

1.2.1 Settlement History

1.2.1.1 Pre-Contact

The Pre-Contact history of the region is lengthy and rich, and a variety of Indigenous groups inhabited the landscape. Archaeologists generally divide this vibrant history into three main periods: Palaeo, Archaic and Woodland. Each of these periods comprise a range of discrete sub-periods characterized by identifiable trends in material culture and settlement patterns, which are used to interpret past lifeways. The principal characteristics of these sub-periods are summarized in Table 1.

Table 1: Pre-Contact Settlement History
(Wright 1972; Ellis and Ferris 1990; Warrick 2000; Munson and Jamieson 2013; St. John and Ferris 2019)

Sub-Period	Timeframe	Characteristics
Early Palaeo	9000–8400 BC	Gainey, Barnes and Crowfield traditions; Small bands; Mobile hunters and gatherers; Utilization of seasonal resources and large territories; Fluted points
Late Palaeo	8400–7500 BC	Holcombe, Hi-Lo and Lanceolate biface traditions; Continuing mobility; Campsite/Way-Station sites; Smaller territories are utilized; Non-fluted points
Early Archaic	7500–6000 BC	Side-Notched, Corner-Notched (Nettling, Thebes) and Bifurcate traditions; Growing diversity of stone tool types; Heavy woodworking tools appear (e.g., ground stone axes and chisels)
Middle Archaic	6000–2500 BC	Stemmed (Kirk, Stanly/Neville), Brewerton Side- and Corner-Notched traditions; Reliance on local resources; Populations increasing; More ritual activities; Fully ground and polished tools; Net-sinkers common; Earliest copper tools
Late Archaic	2500–900 BC	Narrow Point (Lamoka), Broad Point (Genesee) and Small Point (Crawford Knoll) traditions; Less mobility; Use of fish-weirs; True cemeteries appear; Stone pipes emerge; Long-distance trade (marine shells and galena)
Early Woodland	900–400 BC	Meadowood tradition; Crude cord-roughened ceramics emerge; Meadowood cache blades and side-notched points; Bands of up to 35 people
Middle Woodland	400 BC–AD 600	Couture tradition; Bears some resemblance to contemporary cultures in Ohio and Michigan; Ceramics characterized by small coil-made vessels with coarse cording decoration; Utilized lakeshore environments during warmer months and spent fall and winter further inland at hunting and trapping grounds
Middle/Late Woodland Transition	AD 600–800/900	Western Basin Tradition (Riviere au Vase Phase); Developed out of Couture tradition; Thinner vessels due to replacement of coiling techniques with paddle and anvil methods; Population subsisted on seasonally-abundant resources; Possessed a fair degree of mobility
Late Woodland (Early)	AD 800/900–1200	Western Basin Tradition (Younge Phase); Continuous development of ceramic styles and trends; Diffuse subsistence strategies, utilizing all available resources in a region and supplemented by some agriculture; Seasonal pattern of warm season agglomerations and cold weather dispersed camp occupations

Sub-Period	Timeframe	Characteristics
Late Woodland (Middle)	AD 1200–1400	Western Basin Tradition (Springwells Phase); Decorative motifs continue but also dramatic appearance of new innovations in ceramic design; Significant regional interaction; Subsistence and settlement patterns shift; Warm weather villages emerge with longhouses and palisades (likely related to an increased emphasis on maize horticulture)
Late Woodland (Late)	AD 1400–1550/1600	Western Basin Tradition (Wolf Phase); Ceramics develop from elaborately decorated forms of the Springwells-Wolf transition; Appearance of Parker Festooned vessels; Subsistence and settlement patterns poorly understood due to a lack of excavated sites; Potentially linked to the establishment of a 'frontier zone' with the Pre-Contact Neutral to the east and the westward realignment of Western Basin peoples

1.2.1.2 Post-Contact

The arrival of European explorers and traders at the beginning of the 17th century triggered widespread shifts in Indigenous lifeways and set the stage for the ensuing Euro-Canadian settlement process. Documentation for this period is abundant, ranging from the first sketches of Upper Canada and the written accounts of early explorers to detailed township maps and lengthy histories. The Post-Contact period can be effectively discussed in terms of major historical events, and the principal characteristics associated with these events are summarized in Table 2.

Table 2: Post-Contact Settlement History
(Smith 1846; Sutherland Bros 1864; Coyne 1895; Johnston 1925; Lauriston 1949; Lajeunesse 1960; Phelps 1973; Ellis and Ferris 1990; Surtees 1994; AO 2023)

Historical Event	Timeframe	Characteristics
Early Exploration	Early 17th century	Brûlé explores southern Ontario in 1610/11; Champlain travels through in 1613 and 1615/1616, making contact with a number of Indigenous groups (including the Algonquin, Huron-Wendat and other First Nations); *Les gens de Feu* (the Fire Nation, likely referring to the Mascouten/Western Basin Tradition) documented in the southwest; European trade goods become increasingly common and begin to put pressure on traditional industries
Increased Contact and Conflict	Mid- to late 17th century	Conflicts between various First Nations during the Beaver Wars result in numerous population shifts; European explorers continue to document the area, and many Indigenous groups trade directly with the French and English; 'The Great Peace of Montreal' treaty established between roughly 39 different First Nations and New France in 1701
Fur Trade Development	Early to mid-18th century	Growth and spread of the fur trade; Peace between the French and English with the Treaty of Utrecht in 1713; Ethnogenesis of the Métis; Hostilities between French and British lead to the Seven Years' War in 1754; French surrender in 1760
British Control	Mid- to late 18th century	*Royal Proclamation* of 1763 recognizes the title of the First Nations to the land; Numerous treaties subsequently arranged by the Crown; First land cession under the new protocols is the Seneca surrender of the west side of the Niagara River in 1764; The Niagara Purchase (Treaty 381) in 1781 included this area
Loyalist Influx	Late 18th century	United Empire Loyalist influx after the American Revolutionary War (1775–1783); British develop interior communication routes and acquire additional lands; McKee Purchase (Treaty 2) completed in 1790; *Constitutional Act* of 1791 creates Upper and Lower Canada
County Development	Late 18th to early 19th century	Nominally became part of Kent County in 1792; Land cessions included the Sombra Township Purchase (Treaty 7) in 1796; the Long Woods Purchase (Treaty 21) in 1819 and the Huron Tract Purchase (Treaty 29) in 1827; Townships of Dawn, Sombra, St. Clair (Sarnia and Moore) and Zone (Euphemia) added to Kent County in 1821; Northeastern townships added in 1834; Lambton County created after the abolition of the district system in 1849

Historical Event	Timeframe	Characteristics
Township Formation	Late 18th to early 19th century	Surveyed by R. Mount in 1829; Prior to 1833, most of the settlers on the east bank of the St. Clair River were French-Canadian squatters; La Forge was likely the first settler, who located near 'The Rapids' on the south limits of what became Port Sarnia ca. 1807 and brought his family after the War of 1812; After the cession in 1827, the government built schools, churches and houses on reserve lands; First influx of settlers occurred in 1832/33, including Lt. Vidal, G. Durand, P. McGlashan and M. Cameron; Cameron purchased the La Forge homestead, surveyed it into town lots and created a lumbering industry; The settlement was named Port Sarnia during the first town meeting in 1836
Township Development	Mid-19th to early 20th century	Township population reached 610 by 1846, and Port Sarnia had 420 inhabitants; A total of 4,265 ha had been taken up, with 553 ha under cultivation; The population of the reserve was roughly 700 at that time; Traversed by the London & Port Sarnia Railway (1858), Grand Trunk Railway (1859) and Sarnia Street Railway (1875); St. Clair tunnel between Sarnia and Port Huron opened in 1891; Principal settlements at Point Edward and Sarnia, with smaller communities at Bunyan, Cole's Corners, Oban, Perche and Vyner; Population was 2,583 in 1921

1.2.2 Past and Present Land Use

1.2.2.1 Overview

During Pre-Contact and Early Contact times, the vicinity of the study area would have comprised a mixture of coniferous trees, deciduous trees and open areas. Indigenous communities actively utilized the land and its resources well into Post-Contact times, and they would have managed the landscape to varying degrees (e.g., establishing clearings for campsites, plant cultivation, etc.). During the early 19th century, Euro-Canadian settlers arrived in the area and began to clear the forests for agricultural and settlement purposes. The study area was located west of the historical limits of Perche. The land use at the time of assessment can be classified as infrastructural.

1.2.2.2 Bright's Grove

Bright's Grove began as a social commune named Maxwell that was established by English settlers in the early 1800s. The cooperative community was founded by Henry Jones, who was a follower of Robert Owens, a Welsh socialist. The communal log house burned down in 1834, and the enterprise was eventually abandoned. The area subsequently became known as Perche, which had a post office and railway station. Eventually, the community was named Bright's Grove after the area's first postmaster, J. Bright, who later became the first operator of the Petrolia Water Works (Kula 2015). By the early 1900s, Bright's Grove was a well-known seasonal destination.

1.2.2.3 Petrolia Water Works

The Petrolia Water Works in Bright's Grove was established ca. 1897 to provide clean water for the community of Petrolia roughly 18 km to the southeast. As the groundwater in the Petrolia area had become polluted with salt water due to oil drilling and Bear Creek was polluted with oil, an alternative water source was needed. A right-of-way through farmland was acquired after a vote in January 1896, and the pipeline between the two communities was completed in December 1896 (after which Waterworks Road was named). Pump houses were constructed along the line, with the main station at Bright's Grove (Evans and St. Amand 2016:441–442; Petrolia Heritage 2023).

1.2.2.4 Mapping and Imagery Analysis

In order to gain a general understanding of the study area's past land uses, one patent plan, one historical settlement map, two topographic maps and one aerial image were examined during the research component of the study. Specifically, the following resources were consulted:

- *Sarnia* Patent Plan (No Date) (AO 2023);
- The *Lambton Supplement in Illustrated Atlas of Dominion of Canada* (1880) (MU 2001);
- Topographic maps from 1911 and 1928 (OCUL 2023); and
- An aerial image from 1954 (U of T 2023).

The limits of the study area are shown on georeferenced versions of the consulted historical resources in Map 2–Map 5.

The *Sarnia* Patent Plan (No Date) was initiated on a copy of an original survey plan and updated with patent information until the records were transferred to the Archives of Ontario. This plan identifies Samuel Street as the patentee for Lot 9, Concession 9 (Map 2). The plan shows the road allowance that became Waterworks Road and depicts Cow Creek to the southeast. The *Lambton Supplement in Illustrated Atlas of Dominion of Canada* (1880) does not identify any residents within Lot 9, Concession 9, and no structures are shown in the immediate area (Map 3). Old Lakeshore Road and Waterworks Road appear, as does the Perche post office to the east.

The topographic map from 1911 indicates that the Petrolia Water System's engine house was located near the southeastern corner of the study area along Waterworks Road (Map 4). No other buildings appear nearby, and the surrounding lands are shown as mainly wooded. Old Lakeshore Road had been metalled by this time, whereas Waterworks Road remained unmetalled. Perch Station is visible to the south, which was established along the Grand Trunk Railway just west of Waterworks Road in 1863 (Evans and St. Amand 2016:78). By 1928, the surrounding area had become much more built-up, with numerous houses along Old Lakeshore Road (Map 4). The engine house appears within the study area (labelled as Petrolia Water Works). The aerial image from 1954 largely confirms this land use pattern, though the poor resolution does not allow for the identification of individual structures within the terrestrial portion of the study area (Map 5).

1.3 Archaeological Context

The Stage 1 assessment (property inspection) was conducted on April 26, 2023 under PIF #P007-1429-2022, whereas the Stage 2 assessment was carried out on July 7, 2023 under PIF #P007-1511-2023. ARA utilized an Apple iPhone 13 with a built-in GPS/GNSS receiver during the investigation (UTM17/NAD83). The limits of the study area were confirmed using project-specific GIS data translated into GPS points for reference in the field, in combination with aerial imagery showing physical features in relation to the subject lands.

The archaeological context of any given study area must be informed by 1) the condition of the property as found (Section 1.3.1), 2) a summary of registered or known archaeological sites located within a minimum 1 km radius (Section 1.3.2) and 3) descriptions of previous archaeological fieldwork carried out within the limits of, or immediately adjacent to the property (Section 1.3.3).

1.3.1 Condition of the Property

The study area lies within the deciduous forest, which is the southernmost forest region in Ontario and is dominated by agricultural and urban areas. This region is characterized by scattered woodlots in areas unsuitable for agriculture, and the forest generally has the greatest diversity of tree species while at the same time having the lowest proportion of cover. It has most of the trees and shrubs found in the Great Lakes–St. Lawrence forest and also contains black walnut, butternut, tulip, magnolia, black gum, many types of oaks, hickories, sassafras and red bud (MNRF 2023).

In terms of local physiography, the subject lands fall within the Huron Fringe. This region consists of a narrow strip of land extending along the southern and eastern shores of Lake Huron (from Sarnia to Tobermory). It comprises the wave-cut terraces of Lake Algonquin and Lake Nipissing and contains boulders, gravel bars and sand dunes. Between Bright's Grove and Point Edward, the Huron Fringe includes sandy beaches along the shore protecting a marshy lagoon. There was once a shallow lake in this lagoon, but it was emptied by a drainage canal. The Blackwell marsh and the flats around are underlain by marl or marly silt and clay (Chapman and Putnam 1984:161–162).

According to the Ontario Soil Survey, the study area consists of Brady sandy loam. This Grey Brown Podzolic soil developed on well sorted sandy outwash and is characterized by a gently sloping topography and imperfect drainage qualities (Matthews et al. 1957).

The subject lands fall within the Cow and Perch Creeks drainage basin, which is under the jurisdiction of the St. Clair Region Conservation Authority (SCRCA 2023). Specifically, the study area is traversed by Lake Huron and is located 500 m northwest of Cow Creek.

At the time of assessment, the study area consisted of the existing WTP, parts of Old Lakeshore Road and Waterworks Road, grassed areas, part of the armour stone shoreline and part of Lake Huron. Soil conditions were ideal for the activities conducted. No unusual physical features were encountered that affected fieldwork strategy decisions or the identification of artifacts or cultural features (e.g., dense root mats, boulders, rubble, etc.).

1.3.2 Registered or Known Archaeological Sites

The Ontario Archaeological Sites Database and the Ontario Public Register of Archaeological Reports were consulted to determine whether any registered or known archaeological resources occur within a 1 km radius of the study area. The available search facility returned three registered sites located within at least a 1 km radius (the facility returns sites in a rectangular area, rather than a radius, potentially resulting in results beyond the specified distance). No unregistered sites were identified within a 1 km radius of the study area. The sites are summarized in Table 3.

Table 3: Registered or Known Archaeological Sites

Borden No. / ID No.	Site Name / Identifier	Time Period	Affinity	Site Type	Distance from Study Area
AgHn-9	Cow Creek 1	Woodland, Middle, Woodland, Late, Post-Contact	Indigenous, Euro-Canadian	Unknown, camp/campsite, homestead	300 m–1 km
AgHn-10	Cow Creek 2	Pre-Contact	Indigenous	Camp/campsite	300 m–1 km
AgHn-11	Cow Creek 3	Woodland, Late, Post-Contact	Indigenous, Euro-Canadian	Unknown, camp/campsite, hamlet	300 m–1 km

None of these previously identified sites are located within or immediately adjacent to the subject lands; accordingly, they have no potential to traverse the study area. The sites represent distant archaeological resources located over 300 m away.

1.3.3 Previous Archaeological Work

Reports documenting assessments conducted within the subject lands and assessments that resulted in the discovery of sites within adjacent lands were sought during the research component of the study. In order to ensure that all relevant past work was identified, an investigation was launched to identify reports involving assessments within 50 m of the study area. The investigation determined that there is one available report documenting previous archaeological fieldwork within the specified distance. The relevant results and recommendations are summarized below as required by Section 7.5.8 Standards 4–5 of the 2011 *S&Gs*.

1.3.3.1 Bright's Grove Water Intake (Marine)

The marine assessment for the subject project was conducted in October 2022 under Licence #2022-019 (ARA 2023). The assessed area comprised the marine portion of the study area. The investigation resulted in the identification of parts of the original water intake system from 1896 and the existing water intake system from 1944. Much of the 1896 and 1944 intake systems were buried, although portions had been exposed through wave and ice action. No other cultural resources were encountered. As it was unlikely that the original intake pipe would be impacted by the rebuild of the water intake system, no additional archaeological mitigation was recommended. The existing water intake system was found to be neither historically nor archaeologically significant. No further marine assessment was recommended (ARA 2023:26).

2.0 STAGE 1 BACKGROUND STUDY

2.1 Background

The Stage 1 assessment involved background research to document the geography, history, previous archaeological fieldwork and current land condition of the study area. This desktop examination included research from archival sources, archaeological publications and online databases. It also included the analysis of a variety of historical maps and aerial imagery. The results of the research conducted for the background study are summarized below.

With occupation beginning approximately 11,000 years ago, the greater vicinity of the study area comprises a complex chronology of Pre-Contact and Post-Contact histories (Section 1.2.1). Artifacts associated with Palaeo, Archaic, Woodland and Early Contact traditions are well-attested in Lambton County, and Euro-Canadian archaeological sites dating to pre-1900 and post-1900 contexts are likewise common. The presence of three previously identified sites in the surrounding area demonstrates the desirability of this locality for early settlement (Section 1.3.2). The investigation confirmed that these sites do not extend into the subject lands. Background research identified one area of previous assessment within the study area (Section 1.3.3).

The natural environment of the study area would have been attractive to both Indigenous and Euro-Canadian populations as a result of proximity to Lake Huron. The soils would have been acceptable for agriculture when the drainage was artificially improved, and the diverse local vegetation would also have encouraged settlement throughout Ontario's lengthy history. Euro-Canadian populations would have been particularly drawn to the nearby historical thoroughfares as well as the overall recreational potential of the beachfront.

In summary, the background study included an up-to-date listing of sites from the Ontario Archaeological Sites Database (within at least a 1 km radius), the consideration of previous local archaeological fieldwork (within at least a 50 m radius), the analysis of historical maps (at the most detailed scale available) and the study of aerial imagery. ARA therefore confirms that the standards for background research set out in Section 1.1 of the 2011 *S&Gs* were met.

2.2 Field Methods (Property Inspection)

In order to gain first-hand knowledge of the geography, topography and current condition of the study area, a property inspection was conducted on April 26, 2023. Environmental conditions were acceptable during the inspection, with overcast skies, diffuse lighting and a temperature of 3 °C. ARA therefore confirms that fieldwork was carried out under weather and lighting conditions that met the requirements set out in Section 1.2 Standard 2 of the 2011 *S&Gs*.

The study area was subjected to random spot-checking, starting in the northeast and proceeding in a roughly counterclockwise manner. The inspection confirmed that all surficial features of archaeological potential were present where they were previously identified and did not result in the identification of any additional features of archaeological potential not visible on mapping (e.g., relic water channels, patches of well-drained soils, etc.). The findings from the property inspection were refined and improved over the course of the subsequent Stage 2 survey.

The investigation determined that parts of the study area were disturbed by past construction activities. No natural features (e.g., sloped lands, permanently wet lands, overgrown vegetation, heavier soils than expected, etc.) that would affect assessment strategies were identified. The historical Petrolia Water Works structure in the northwest was observed, but no other significant built features (e.g., landscapes, plaques, monuments, cemeteries, etc.) were encountered.

2.3 Analysis and Conclusions

In addition to relevant historical sources and the results of past archaeological assessments, the archaeological potential of a property can be assessed using its soils, hydrology and landforms as considerations. Section 1.3.1 of the 2011 *S&Gs* recognizes the following features or characteristics as indicators of archaeological potential: previously identified sites, water sources (past and present), elevated topography, pockets of well-drained sandy soil, distinctive land formations, resource areas, areas of Euro-Canadian settlement, early transportation routes, listed or designated properties, historic landmarks or sites, and areas that local histories or informants have identified with possible sites, events, activities or occupations.

The Stage 1 assessment resulted in the identification of several features of archaeological potential in the vicinity of the study area (Map 6). The closest and most relevant indicators of archaeological potential (i.e., those that would affect survey interval requirements) include one primary water source (Lake Huron) and two historical roadways (Old Lakeshore Road and Waterworks Road). Background research did not identify any features indicating that the study area had potential for deeply buried archaeological resources.

Although proximity to a feature of archaeological potential is a significant factor in the potential modelling process, current land conditions must also be considered. Section 1.3.2 of the 2011 *S&Gs* emphasizes that 1) quarrying, 2) major landscaping involving grading below topsoil, 3) building footprints and 4) sewage/infrastructure development can result in the removal of archaeological potential, and Section 2.1 states that 1) permanently wet areas, 2) exposed bedrock and 3) steep slopes (> 20°) in areas unlikely to contain pictographs or petroglyphs can also be evaluated as having no or low archaeological potential. Areas previously assessed and not recommended for further work also require no further assessment.

The marine portion of the study area was previously assessed and was not recommended for additional archaeological mitigation. ARA's visual inspection, coupled with the analysis of historical sources and digital environmental data, resulted in the identification of numerous areas of no archaeological potential within the terrestrial portion. Specifically, deep land alterations have resulted in the removal of archaeological potential from the building footprints, subsurface infrastructure and driveways within the extant WTP facility, the adjacent roadway platforms and ditched areas, buried utilities and the heavily modified armour stone shoreline (Image 1–Image 2). These areas had clearly been impacted by past earth-moving/construction activities, resulting in the disturbance of the original soils to a significant depth and severe damage to the integrity of any archaeological resources. The subject part of Lake Huron was observed, but archaeological potential modelling for marine contexts is beyond the purview of any land-based assessment.

The remainder of the study area had potential for Indigenous and Euro-Canadian archaeological materials or required test pit survey to confirm disturbance. The areas of archaeological potential consisted of grassed lands to either side of Old Lakeshore Road. It seemed likely that these areas were previously impacted, but this could not be verified based on the inspection alone. Accordingly, these lands were categorized as areas of archaeological potential and required empirical testing to confirm that archaeological potential had been removed.

3.0 STAGE 2 PROPERTY ASSESSMENT

3.1 Field Methods

The Stage 2 assessment involved a combination of visual inspection and test pit survey to confirm disturbance. Environmental conditions were ideal during the investigation, permitting good visibility of land features and providing an increased chance of finding evidence of archaeological resources. Specifically, the assessment was conducted under sunny skies with bright lighting and a temperature of 22 °C on July 7, 2023. ARA therefore confirms that fieldwork was carried out under weather and lighting conditions that met or exceeded the requirements set out in Section 1.2 Standard 2 and Section 2.1 Standard 3 of the 2011 *S&Gs*.

The test pit survey method was utilized to complete the assessment of the grassed lands to either side of Old Lakeshore Road because ploughing was not possible or viable. The initial test pits revealed evidence of extensive disturbance, and survey at a maximum interval of 5 m was not warranted. A combination of visual inspection and test pit survey was utilized to confirm the extent of disturbance in accordance with Section 2.1.8 of the 2011 *S&Gs*. Using this method, ARA crewmembers hand excavated small regular test pits with a minimum diameter of 30 cm at no prescribed interval. Test pits were excavated according to professional judgement to verify that these areas had been completely disturbed by previous land alterations (Image 3–Image 4).

As required by Section 2.1.2 Standard 4 of the 2011 *S&Gs*, test pits were excavated to within 1 m of all built structures or until test pits exhibited evidence of ground disturbance. Each test pit was excavated into at least the first 5 cm of subsoil (or to a sufficient depth to confirm deep disturbance if subsoil was not preserved), and the resultant pits were examined for stratigraphy, potential features and/or evidence of fill. Test pits north of the roadway typically contained dark brown loam fill with gravel inclusions over medium grey clay fill with large rock inclusions. Subsoil was not identified in this area. To the south, the stratigraphic sequence generally consisted of the same dark brown loam fill layer over medium grey sandy clay fill with modern debris and stone inclusions over light brown sand subsoil. All soils were screened through mesh with an aperture of no greater than 6 mm and examined for archaeological resources. No locations of archaeological materials were encountered during the test pit survey. The test pits were backfilled upon completion.

The utilized field methods are presented in Map 7–Map 8. The study area is depicted as a layer in these maps. A breakdown of field methods appears in Table 4.

Table 4: Field Methods

Category	Breakdown
Pedestrian survey at an interval of 5 m	0.00% (0.00 ha)
Test pit survey at an interval of 5 m	0.00% (0.00 ha)
Test pit survey at an interval of 10 m	0.00% (0.00 ha)
Test pit survey at a modified interval due to physical constraint	0.00% (0.00 ha)
Combination of visual inspection and test pit survey to confirm disturbance	1.00% (0.21 ha)
Not assessed due to physical constraint	0.00% (0.00 ha)
Not assessed due to permanently wet areas	0.00% (0.00 ha)
Not assessed due to exposed bedrock	0.00% (0.00 ha)
Not assessed due to sloped areas	0.00% (0.00 ha)

Category	Breakdown
Not assessed due to disturbed areas	3.21% (0.66 ha)
Previously subject to marine assessment	95.79% (19.86 ha)
Total	100.00% (20.73 ha)

3.2 Record of Finds

The investigation did not result in the discovery of any archaeological materials. An inventory of the documentary record generated in the field is presented in Table 5.

Table 5: Documentary Record

Category	Total	Nature	Location
Field notes	5	Digital	205 Cannon Street East, Hamilton
Maps	4	Digital	205 Cannon Street East, Hamilton
Photographs	31	Digital	205 Cannon Street East, Hamilton

3.3 Analysis and Conclusions

No archaeological sites were identified within the assessed lands.

4.0 RECOMMENDATIONS

The Stage 1 assessment determined that the study area comprised a mixture of areas of archaeological potential, areas of no archaeological potential and areas previously subject to marine assessment. The Stage 2 assessment did not result in the identification of any archaeological materials. It is recommended that no further land-based assessment be required within the study area.

5.0 ADVICE ON COMPLIANCE WITH LEGISLATION

Section 7.5.9 of the 2011 *S&Gs* requires that the following information be provided for the benefit of the proponent and approval authority in the land use planning and development process:

- This report is submitted to the Minister of Citizenship and Multiculturalism as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological fieldwork and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the MCM, a letter will be issued by the ministry stating that there are no further concerns with regard to alterations to archaeological sites by the proposed development.
- It is an offence under Sections 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed archaeological fieldwork on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeology Reports referred to in Section 65.1 of the *Ontario Heritage Act*.
- Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48 (1) of the *Ontario Heritage Act*.
- The *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33 requires that any person discovering human remains must notify the police or coroner and the Registrar at the Ministry of Public and Business Service Delivery.

6.0 IMAGES

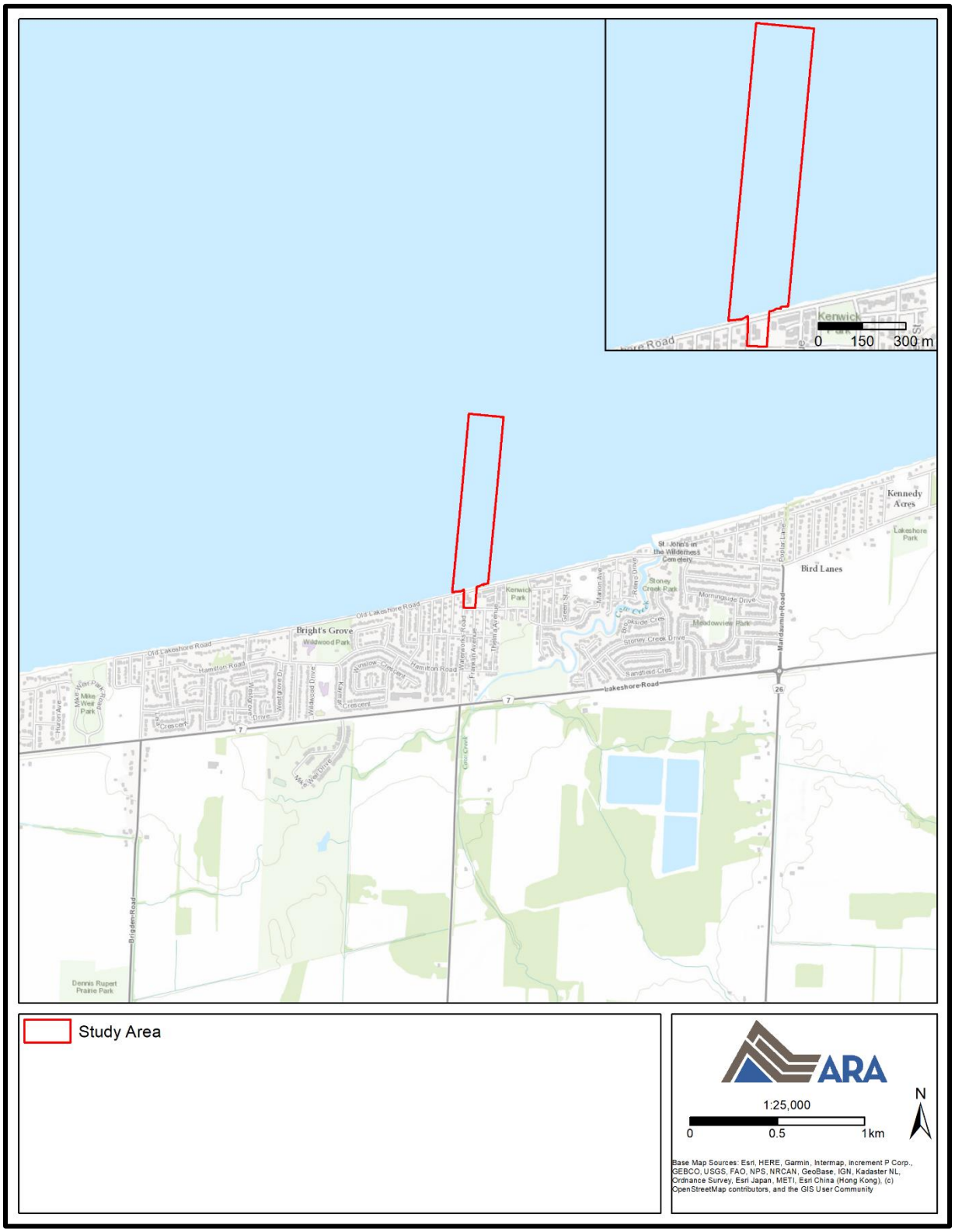
Image 1: Disturbed Lands
(April 26, 2023; Facing Northeast)

Image 2: Disturbed Lands
(April 26, 2023; Facing South)

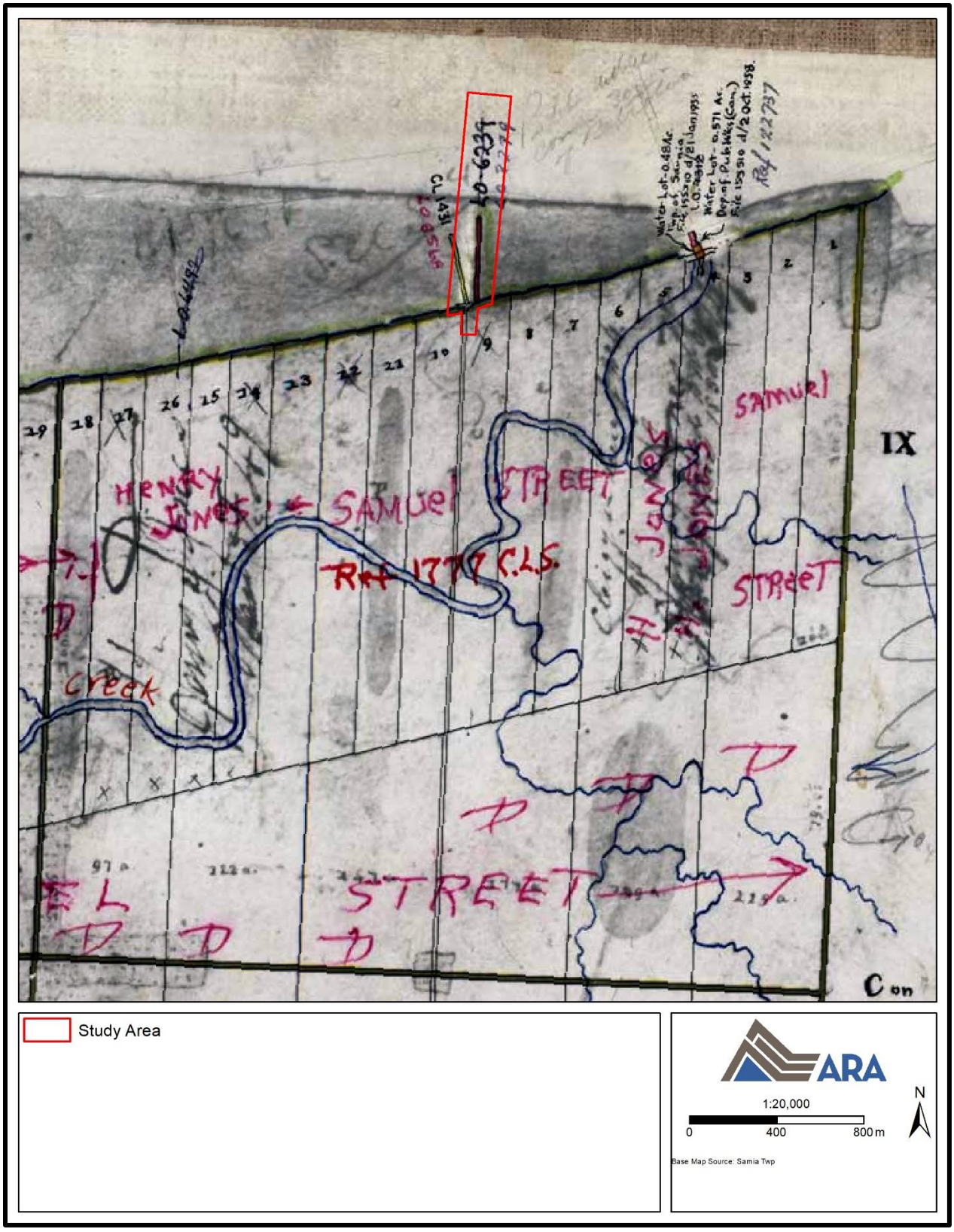
Image 3: Combination Survey
(July 7, 2023; Facing Southwest)

Image 4: Combination Survey
(July 7, 2023; Facing Southwest)

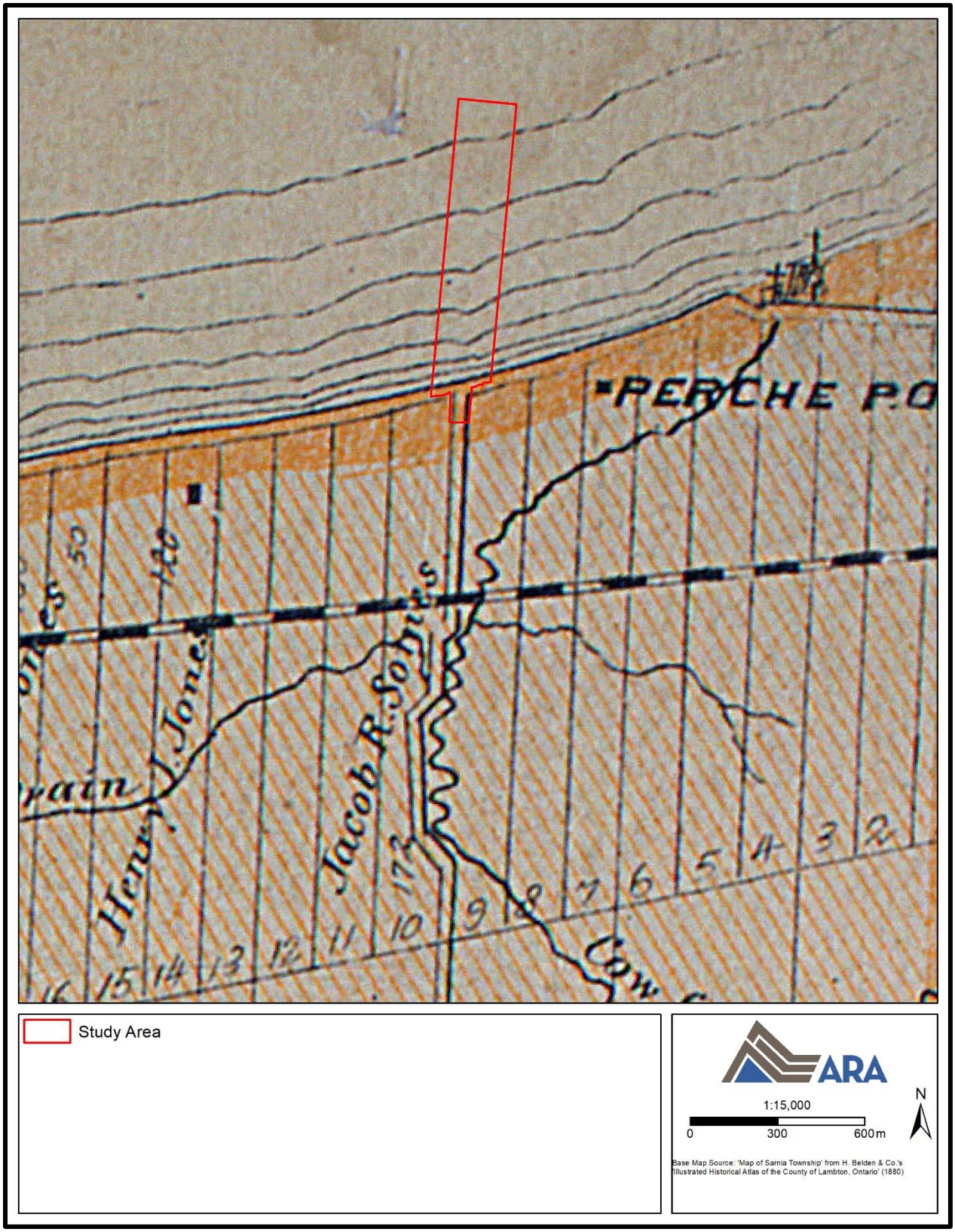
7.0 MAPS



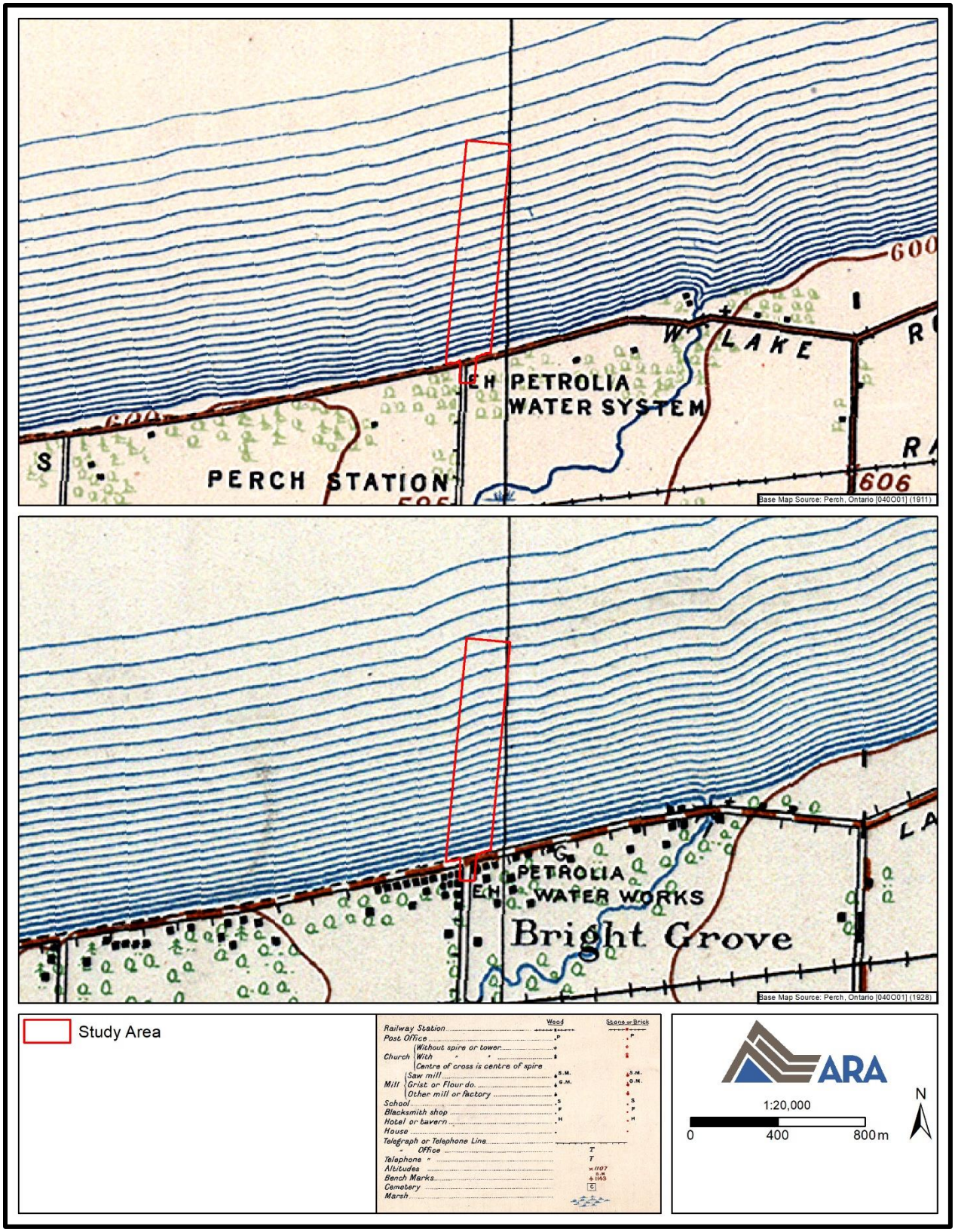
Map 1: Location of the Study Area
(Produced under licence using ArcGIS® software by Esri, © Esri)



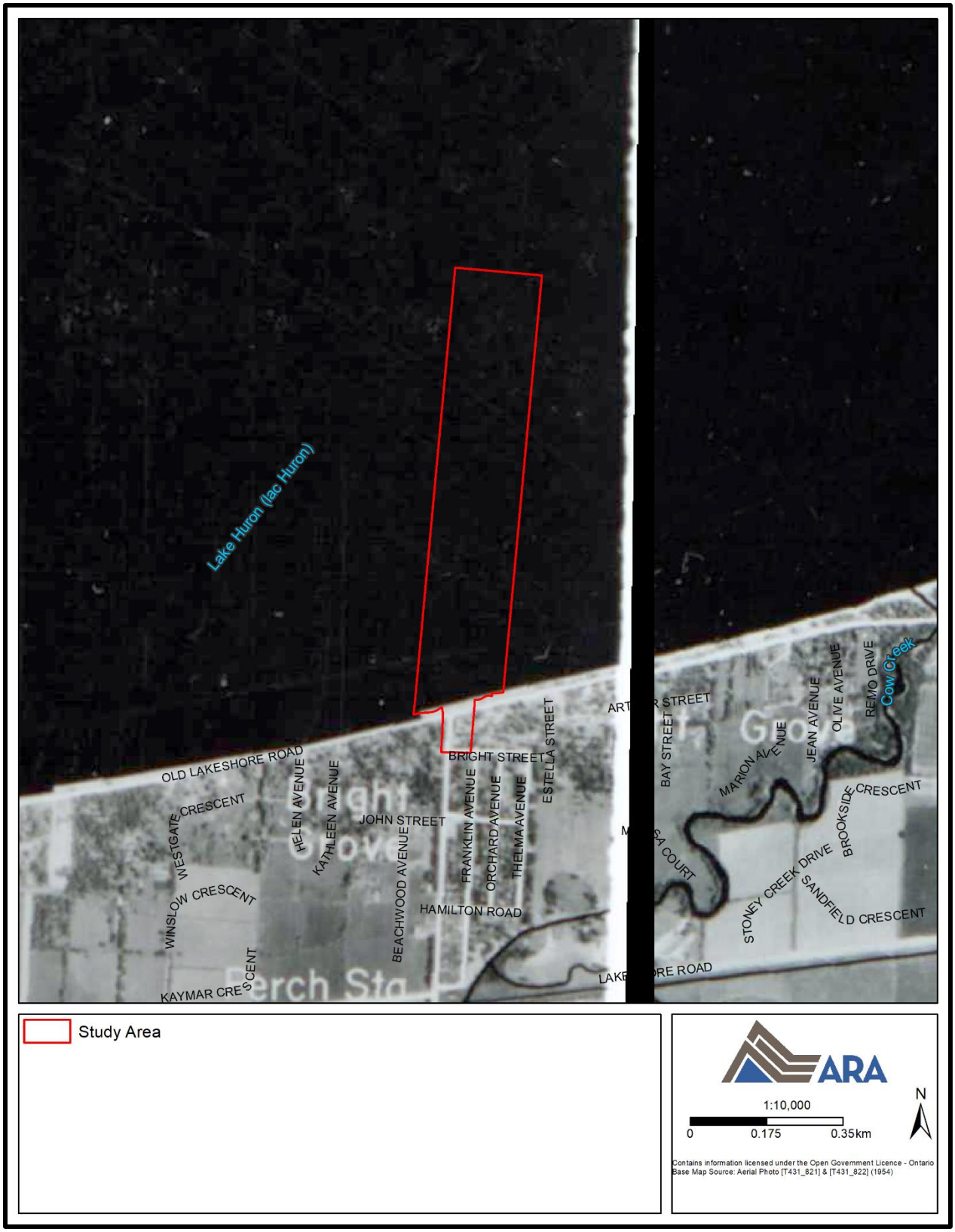
Map 2: *Sarnia* Patent Plan (No Date)
(Produced under licence using ArcGIS® software by Esri, © Esri; AO 2023)



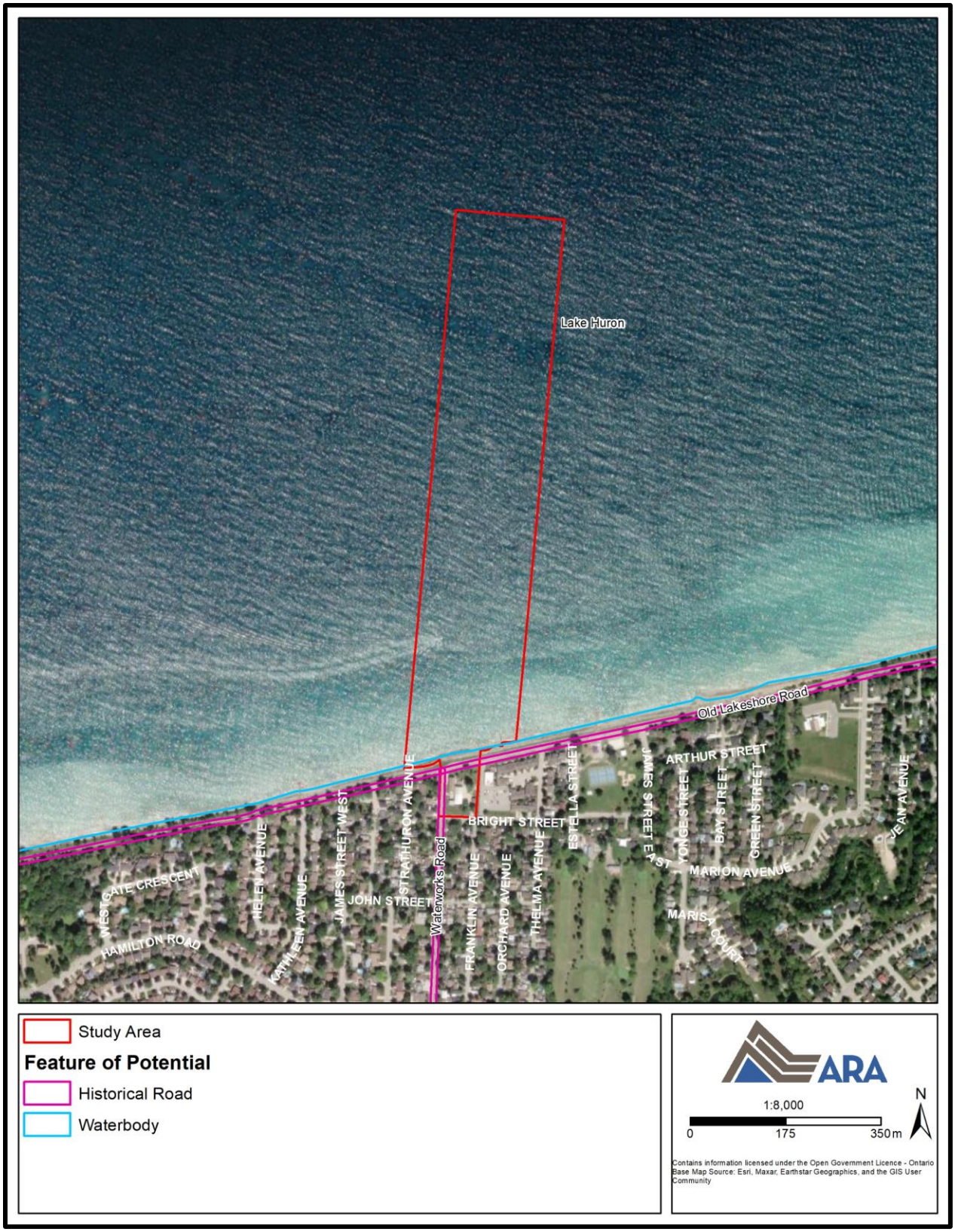
Map 3: *Lambton Supplement in Illustrated Atlas of Dominion of Canada* (1880)
(Produced under licence using ArcGIS® software by Esri, © Esri, MU 2001)



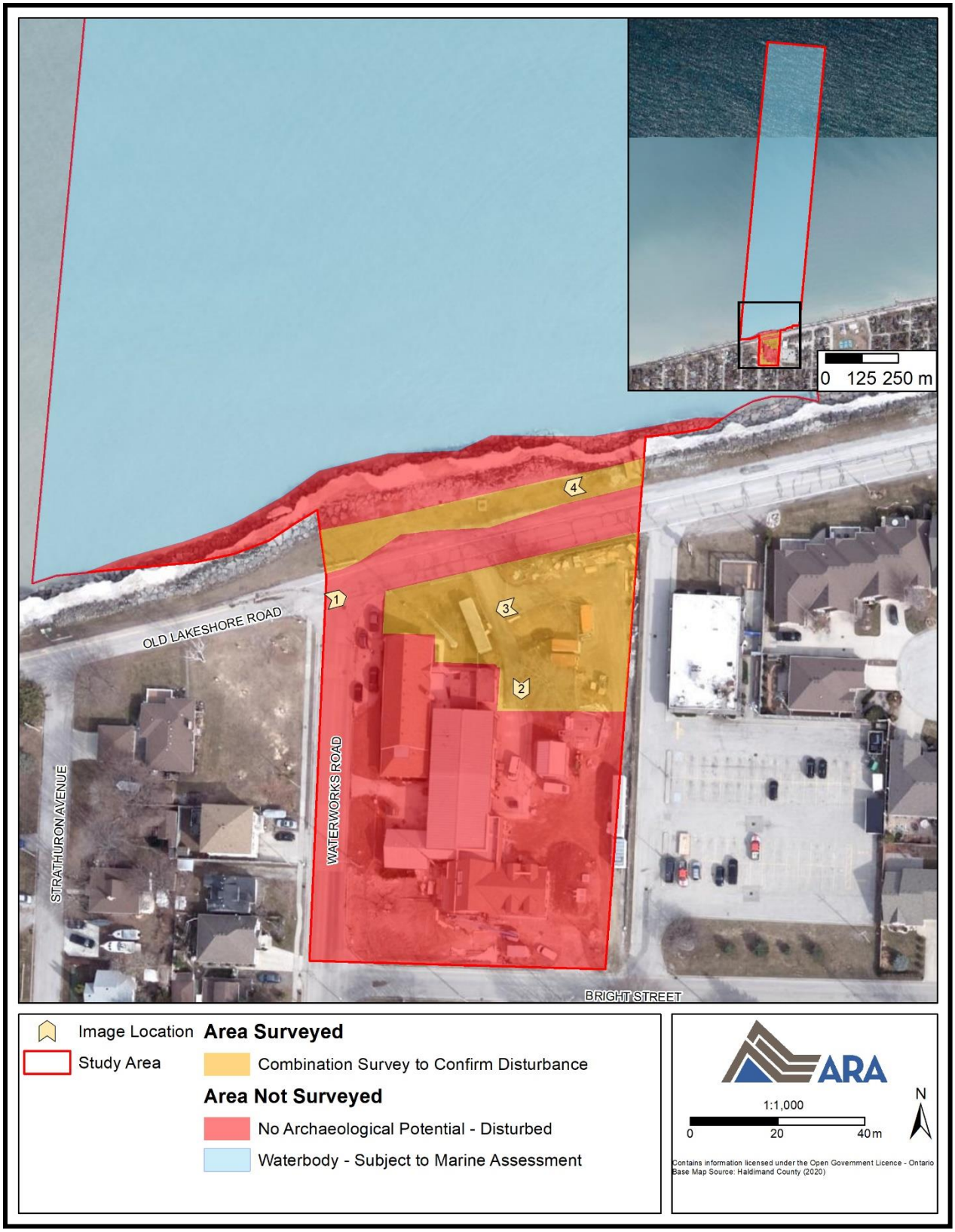
Map 4: Topographic Maps (1911 and 1928)
(Produced under licence using ArcGIS® software by Esri, © Esri; OCUL 2023)



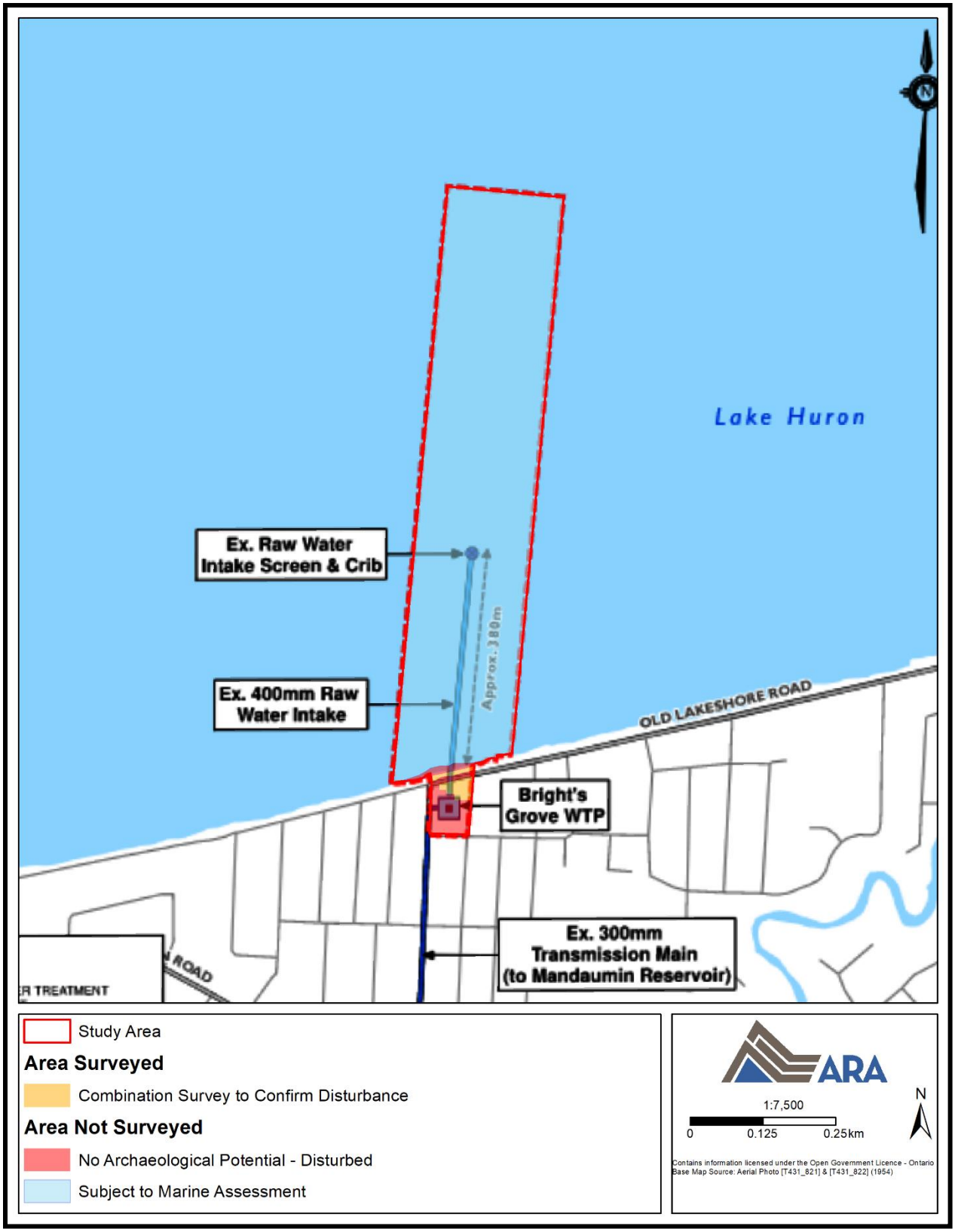
Map 5: Aerial Image (1954)
(Produced under licence using ArcGIS® software by Esri, © Esri; U of T 2023)



Map 6: Features of Potential
(Produced under licence using ArcGIS® software by Esri, © Esri)



Map 7: Field Methods (Aerial Image)
(Produced under licence using ArcGIS® software by Esri, © Esri)



Map 8: Field Methods (Development Plan)
(Produced under licence using ArcGIS® software by Esri, © Esri)

8.0 BIBLIOGRAPHY AND SOURCES

Archaeological Research Associates (ARA)
2023 *Marine Archaeological Assessment, Bright's Grove Water Intake Design Class EA, Offshore of Part of Lot 9, Concession 9, AKA Front Concession, Geographic Township of Sarnia, Bright's Grove, Town of Petrolia, County of Lambton.* Licence #2022-019. ARA.

Archives of Ontario (AO)
2023 *Access our Collections*. Accessed online at: http://www.archives.gov.on.ca/en/access/our_collection.aspx.

Chapman, L.J., and D.F. Putnam
1984 *The Physiography of Southern Ontario, 3rd Edition*. Toronto: Ontario Geological Survey, Special Volume 2.

Coyne, J. H.
1895 *The Country of the Neutrals (As Far as Comprised in the County of Elgin): From Champlain to Talbot*. St. Thomas: Times Print.

Ellis, C.J., and N. Ferris (editors)
1990 *The Archaeology of Southern Ontario to A.D. 1650*. Occasional Publication of the London Chapter, OAS Number 5. London: Ontario Archaeological Society Inc.

Evans, R., and T. St. Amand
2016 *Streets of Sarnia Project: What's in a (Street) Name*. County of Lambton – Cultural Services Division. Accessed online at: https://issuu.com/lclibrary/docs/city-of-sarnia-streets-project-november-14.

Johnston, A.J.
1925 *Lambton County Names and Places.* Sarnia: Lambton County Council.

Kula, T.
2015 Origins and Proper Spelling of Bright's Grove. *The Sarnia Observer*, 29 July. Sarnia. Accessed online at: https://www.sarniahistoricalsociety.com/story/origins-and-proper-spelling-of-brights-grove/.

Lajeunesse, E.J.
1960 *The Windsor Border Region: Canada's Southernmost Frontier*. Toronto: The Champlain Society.

Lauriston, V.
1949 *Lambton County's Hundred Years, 1849–1949***.** Sarnia: Haines Frontier Printing.

McGill University (MU)
2001 *The Canadian County Atlas Digital Project*. Accessed online at: http://digital.library.mcgill.ca/countyatlas/default.htm.

Matthews, B.C., N.R. Richards, and R.E. Wicklund
1957 *Soil Survey of Lambton County*. Report No. 22 of the Ontario Soil Survey. Guelph: Ontario Agricultural College and the Experimental Farms Service.

Ministry of Natural Resources and Forestry (MNRF)
2023 *Forest Regions*. Accessed online at: https://www.ontario.ca/page/forest-regions.

Munson, M.K., and S.M. Jamieson (editors)
2013 *Before Ontario: The Archaeology of a Province*. Kingston: McGill-Queen's University Press.

Petrolia Heritage
2023 *The Oldest Water Plant*. Accessed online at: http://www.petroliaheritage.com/Theoldestwater.html.

Phelps, E.
1973 *Belden's Illustrated Historical Atlas of the County of Lambton, Ontario, 1880*. Sarnia: E. Phelps.

St. Clair Region Conservation Authority (SCRCA)
2023 *2018 Watershed Report Cards.* Accessed online at: https://www.scrca.on.ca/about-us/2018-watershed-report-cards/.

St. John, A., and N. Ferris
2019 Unravelling Identities on Archaeological Borderlands: Late Woodland Western Basin and Ontario Iroquoian Traditions in the Lower Great Lakes Region. *The Canadian Geographer* 63(1):43–56.

Smith, W.H.
1846 *Smith's Canadian Gazetteer: Comprising Statistical and General Information Respecting all Parts of the Upper Province, or Canada West*. Toronto: H. & W. Rowsell.

Surtees, R.J.
1994 Land Cessions, 1763–1830. In *Aboriginal Ontario: Historical Perspectives on the First Nations*, edited by E.S. Rogers and D.B. Smith, pp. 92–121. Toronto: Dundurn Press.

Sutherland Bros.
1864 *County of Lambton Gazetteer and General Business Directory for 1864-5*. Ingersoll: Sutherland Bros.

University of Toronto (U of T)
2023 *Map & Data Library.* Accessed online at: https://mdl.library.utoronto.ca/.

Warrick, G.
2000 The Precontact Iroquoian Occupation of Southern Ontario. *Journal of World Prehistory* 14(4):415–456.

Wright, J.V.
1972 *Ontario Prehistory: An Eleven-Thousand-Year Archaeological Outline*. Archaeological Survey of Canada, National Museum of Man. Ottawa: National Museums of Canada.

ARCHAEOLOGY | HERITAGE | OUTREACH | CONSERVATION

Stage 1 and 2 Archaeological Assessments
Bright's Grove Water Treatment Plant New Intake
City of Sarnia
Part of Lot 9, Concession 9 AKA Front Concession
Geographic Township of Sarnia
Lambton County, Ontario

Prepared for
CIMA Canada Inc.
900-101 Frederick Street
Kitchener, ON N2H 6R2
Phone (519) 772-2299

Licensed under
P.J. Racher
MCM Licence #P007
PIF #P007-1429-2022 (Stage 1)
and #P007-1511-2023 (Stage 2)
ARA File #2022-0378

13/10/2023

Record of Indigenous Engagement

TABLE OF CONTENTS

ROIE TABLES

ROIE APPENDICES

1.0 RECORD OF INDIGENOUS ENGAGEMENT

1.1 Summary of Events

The identification of Indigenous engagement contacts was based on knowledge about treaty areas and traditional territories. Subsequent to approval from the proponent, the following groups were contacted to determine whether they had an interest in participating in the project:

- Assembly of First Nations (AOFN);
- Caldwell First Nation (CFN);
- Chippewas of Kettle & Stony Point First Nation (CKSPFN);
- Chippewas of the Thames First Nation (COTTFN);
- Delaware Nation at Moraviantown (DNM), also known as Eelünaapéewi Lahkéewiit;
- Métis Nation of Ontario (MNO);
- Munsee Delaware Nation (MDN);
- Oneida Nation of the Thames (ONOTT);
- Tri-Tribal Monitoring Services (TTMS) on behalf of the Aamjiwnaang First Nation (AFN); and
- Walpole Island First Nation (WIFN).

Archaeological Research Associates Ltd. (ARA) engaged with interested groups over the course of the investigation. In keeping with the requirements set out in Section 7.6.2 of the 2011 *Standards and Guidelines for Consultant Archaeologists*, a description of ARA's involvement in the process is summarized below. The 2011 *Engaging Aboriginal Communities in Archaeology* draft technical bulletin was also consulted for guidance.

ARA's involvement in the engagement process consisted of the circulation of an invitation to participate, conversations with the coordinators regarding the scheduling of fieldwork and the distribution of the draft report for review and comment. A summary of engagement events appears in RoIE Table 1. No representatives participated in the investigation. Emails documenting critical information arising from the engagement process that affected fieldwork decisions, documentation, recommendations and/or the licensee's ability to comply with the conditions of their licence are reproduced in RoIE Appendix A–RoIE Appendix D.

RoIE Table 1: Summary of Engagement Events

Group	Date	Engagement Event	Nature
AOFN *Contact:* *S. Lickers*	08-Feb-23	Project introduction and invitation to participate circulated.	Email
	10-Mar-23	Follow up to project notification and invitation to participate sent.	Email
	20-Apr-23	Deployment details circulated for the Stage 1 property inspection on 26-Apr-23.	Email
	29-Jun-23	Deployment details circulated for the Stage 2 archaeological assessment on 07-Jul-23.	Email
	31-Aug-23	Circulation of the draft report for review and comment.	Email
	19-Sept-23	Inquiry as to status of report review made.	Email
	-	No comments received.	-

Group	Date	Engagement Event	Nature
CFN *Contact: Z. Hamm*	03-Feb-23	Project introduction and invitation to participate circulated.	Email
	08-Feb-23	Z. Hamm confirmed CFN's interest in the project.	Email
	20-Apr-23	Deployment details circulated for the Stage 1 property inspection on 26-Apr-23.	Email
	29-Jun-23	Deployment details circulated for the Stage 2 archaeological assessment on 07-Jul-23.	Email
	31-Aug-23	Circulation of the draft report for review and comment.	Email
	19-Sept-23	Inquiry as to status of report review made. Z. Hamm confirmed that CFN would try to provide a review shortly.	Email
	26-Sept-23	Inquiry as to status of report review made.	Email
	06-Oct-23	Inquiry as to status of report review made.	Phone
	-	No comments received.	-
CKSPFN *Contact: R. Lukacs*	13-Oct-22	Project introduction and invitation to participate circulated.	Email
	07-Nov-22	Follow up to project notification and invitation to participate sent.	Email
	10-Mar-23	Follow up to project notification and invitation to participate sent.	Email
	27-Mar-23	R. Lukacs confirmed CKSPFN's interest in the project.	Email
	20-Apr-23	Deployment details circulated for the Stage 1 property inspection on 26-Apr-23.	Email
	29-Jun-23	Deployment details circulated for the Stage 2 archaeological assessment on 07-Jul-23.	Email
	31-Aug-23	Circulation of the draft report for review and comment.	Email
	19-Sept-23	Inquiry as to status of report review made.	Email
	26-Sept-23	Inquiry as to status of report review made. R. Lukacs confirmed that CKSPFN would try to provide comments shortly.	Phone
	29-Sept-23	R. Lukacs replied that CKSPFN had reviewed the report and had no questions or comments.	Email
COTTFN *Contacts: C. Albert, F. Burch*	13-Oct-22	Project introduction and invitation to participate circulated.	Email
	07-Nov-22	Follow up to project notification and invitation to participate sent. F. Burch confirmed COTTFN's interest in the project.	Email
	20-Apr-23	Deployment details circulated for the Stage 1 property inspection on 26-Apr-23.	Email
	26-Apr-23	F. Burch notified ARA that the client had not yet executed the COTTFN participation agreement as required prior to fieldwork. M. DeVries apologized to F. Burch and explained that the Stage 1 property inspection had proceeded as scheduled. F. Burch requested the draft report for review in lieu of on-site participation.	Email/Phone
	29-Jun-23	Deployment details circulated for the Stage 2 archaeological assessment on 07-Jul-23.	Email
	31-Aug-23	Circulation of the draft report for review and comment.	Email
	08-Sep-23	F. Burch replied that COTTFN had reviewed the report and had no questions or comments.	Emali
DNM *Contacts: Chief J. Logan, K. Snake*	03-Feb-23	Project introduction and invitation to participate circulated.	Email
	10-Mar-23	Follow up to project notification and invitation to participate sent.	Email
	20-Apr-23	Deployment details circulated for the Stage 1 property inspection on 26-Apr-23.	Email
	29-Jun-23	Deployment details circulated for the Stage 2 archaeological assessment on 07-Jul-23.	Email
	31-Aug-23	Circulation of the draft report for review and comment.	Email
	19-Sept-23	Inquiry as to status of report review made.	Email
	26-Sept-23	Inquiry as to status of report review made. ARA was directed to resubmit the report to the attention of Chief J. Logan.	Phone
	-	No comments received.	-

Group	Date	Engagement Event	Nature
MNO *Contact: General Consultations, L. Desaulniers*	03-Feb-23	Project introduction and invitation to participate circulated.	Email
	10-Mar-23	Follow up to project notification and invitation to participate sent.	Email
	20-Apr-23	Deployment details circulated for the Stage 1 property inspection on 26-Apr-23.	Email
	29-Jun-23	Deployment details circulated for the Stage 2 archaeological assessment on 07-Jul-23.	Email
	31-Aug-23	Circulation of the draft report for review and comment.	Email
	19-Sept-23	Inquiry as to status of report review made.	Email
	22-Sept-23	L. Desaulniers replied that the Region 9 Consultation Committee had received the report but had not provided questions or comments in response.	Email
MDN *Contacts: D. Antone, S. Phillips*	15-Feb-23	Project introduction and invitation to participate circulated.	Email
	10-Mar-23	Follow up to project notification and invitation to participate sent.	Email
	20-Apr-23	Deployment details circulated for the Stage 1 property inspection on 26-Apr-23.	Email
	29-Jun-23	Deployment details circulated for the Stage 2 archaeological assessment on 07-Jul-23.	Email
	31-Aug-23	Circulation of the draft report for review and comment.	Email
	19-Sept-23	Inquiry as to status of report review made.	Email
	26-Sept-23	Inquiry as to status of report review made. S. Phillips replied that MDN had no questions or comments.	Phone
	-	No comments received.	-
ONOTT *Contacts: A. Chrisjohn, B. Doxtator*	03-Feb-23	Project introduction and invitation to participate circulated.	Email
	10-Mar-23	Follow up to project notification and invitation to participate sent.	Email
	20-Apr-23	Deployment details circulated for the Stage 1 property inspection on 26-Apr-23.	Email
	29-Jun-23	Deployment details circulated for the Stage 2 archaeological assessment on 07-Jul-23.	Email
	31-Aug-23	Circulation of the draft report for review and comment.	Email
	19-Sept-23	Inquiry as to status of report review made.	Email
	26-Sept-23	Inquiry as to status of report review made. No answer; voicemail left.	Phone
	-	No comments received.	-
TTMS on behalf of AFN *Contacts: W. Maness, C. O'Brien*	13-Oct-22	Project introduction and invitation to participate circulated.	Email
	07-Nov-22	Follow up to project notification and invitation to participate sent. W. Maness confirmed AFN's interest in the project.	Email
	20-Apr-23	Deployment details circulated for the Stage 1 property inspection on 26-Apr-23.	Email
	29-Jun-23	Deployment details circulated for the Stage 2 archaeological assessment on 07-Jul-23.	Email
	31-Aug-23	Circulation of the draft report for review and comment. W. Maness replied that TTMS had reviewed the report and had no questions or comments.	Email

Group	Date	Engagement Event	Nature
WIFN *Contacts:* *N. Altima,* *J. MacBeth*	13-Oct-22	Project introduction and invitation to participate circulated.	Email
	07-Nov-22	Follow up to project notification and invitation to participate sent.	Email
	10-Mar-23	Follow up to project notification and invitation to participate sent.	Email
	20-Apr-23	Deployment details circulated for the Stage 1 property inspection on 26-Apr-23.	Email
	29-Jun-23	Deployment details circulated for the Stage 2 archaeological assessment on 07-Jul-23.	Email
	31-Aug-23	Circulation of the draft report for review and comment.	Email
	19-Sept-23	Inquiry as to status of report review made.	Email
	26-Sept-23	Inquiry as to status of report review made. No answer; no option to leave voicemail.	Phone
	-	No comments received.	-

ROIE APPENDICES

RoIE Appendix A: CKSPFN Correspondence

megan.devries@araheritage.ca

From: Consultation <Consultation@kettlepoint.org>
Sent: September 29, 2023 4:54 PM
To: megan.devries@araheritage.ca
Cc: alexis.dunlop@araheritage.ca; 'Kait Kenel'; 'Adam Moore'
Subject: Re: ARA Report Review - St 1-2 Bright's Grove WTP - CKSPFN

Hello Megan,

CKSPFN Consultation has reviewed the noted report. Following review, our position is in agreement with the recommendations outlined in your report. The area does not contain archaeological potential and should not proceed to further land-based assessments.

Miigwetch,
CKSPFN Consultation

From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Date: Tuesday, September 26, 2023 at 12:54 PM
To: Consultation <Consultation@kettlepoint.org>
Cc: alexis.dunlop@araheritage.ca <alexis.dunlop@araheritage.ca>, 'Kait Kenel' <kait.kenel@araheritage.ca>, 'Adam Moore' <Adam.Moore@cima.ca>
Subject: RE: ARA Report Review - St 1-2 Bright's Grove WTP - CKSPFN

Hello Rob!

Thank you for speaking with me this afternoon! We are looking to file the report on October 6, so would appreciate any comments that you can provide before that time. Please let us know if that is feasible for you.

Kind regards,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

1

From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: Tuesday, September 19, 2023 12:51 PM
To: 'Consultation' <Consultation@kettlepoint.org>
Cc: 'alexis.dunlop@araheritage.ca' <alexis.dunlop@araheritage.ca>; 'Kait Kenel' <kait.kenel@araheritage.ca>; 'Adam Moore' <Adam.Moore@cima.ca>
Subject: RE: ARA Report Review - St 1-2 Bright's Grove WTP - CKSPFN

Good afternoon,

I am writing to check in on the status of this report review. Would it be possible to get your comments by Friday, September 22? Please let me know if you need more time to complete the review.

Thank you!
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: Thursday, August 31, 2023 9:07 AM
To: 'Consultation' <Consultation@kettlepoint.org>
Cc: 'alexis.dunlop@araheritage.ca' <alexis.dunlop@araheritage.ca>; 'Kait Kenel' <kait.kenel@araheritage.ca>; 'Adam Moore' <Adam.Moore@cima.ca>
Subject: ARA Report Review - St 1-2 Bright's Grove WTP - CKSPFN

Good morning!

Please find attached the draft report and supplementary documentation for your review entitled:

Stage 1 and 2 Archaeological Assessment
Bright's Grove Water Treatment Plant New Intake
City of Sarnia
Part of Lot 9, Concession 9 AKA Front Concession
Geographic Township of Sarnia
Lambton County, Ontario

ARA Project #2022-0378

2

We are hoping to receive your comments regarding the draft report by September 15, 2023, prior to our submission to the MCM. Please advise if this timeframe is not achievable for your review.

Thank you,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

3

RoIE Appendix B: COTTFN Correspondence

megan.devries@araheritage.ca

From: Fallon Burch <fburch@cottfn.com>
Sent: September 8, 2023 3:36 PM
To: megan.devries@araheritage.ca; Jennifer Mills; Carolyn Albert
Cc: alexis.dunlop@araheritage.ca; 'Kait Kenel'; 'Adam Moore'
Subject: RE: ARA Report Review - St 1-2 Bright's Grove WTP - COTTFN

Good afternoon Megan,

Thank you for the opportunity to review the Stage 1-2 Bright's Grove WTP. I have no comments or concerns.

Fallon

COTTFN

Fallon Burch
Consultation Coordinator
Chippewas of the Thames First Nation
Email: fburch@cottfn.com
519-289-5555 Ex: 251
320 Chippewa Road, Muncey, Ontario

Visit us online at cottfn.com

From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: Thursday, August 31, 2023 9:07 AM
To: Fallon Burch <fburch@cottfn.com>; Jennifer Mills <jmills@cottfn.com>; Carolyn Albert <calbert@cottfn.com>
Cc: alexis.dunlop@araheritage.ca; 'Kait Kenel' <kait.kenel@araheritage.ca>; 'Adam Moore' <Adam.Moore@cima.ca>
Subject: ARA Report Review - St 1-2 Bright's Grove WTP - COTTFN

Good morning!

Please find attached the draft report and supplementary documentation for your review entitled:

Stage 1 and 2 Archaeological Assessment
Bright's Grove Water Treatment Plant New Intake
City of Sarnia
Part of Lot 9, Concession 9 AKA Front Concession
Geographic Township of Sarnia
Lambton County, Ontario

ARA Project #2022-0378

1

We are hoping to receive your comments regarding the draft report by September 15, 2023, prior to our submission to the MCM. Please advise if this timeframe is not achievable for your review.

Thank you,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

2

megan.devries@araheritage.ca

From: Fallon Burch <fburch@cottfn.com>
Sent: April 26, 2023 3:49 PM
To: megan.devries@araheritage.ca; Adam.Moore@cima.ca
Cc: alexis.dunlop@araheritage.ca; Carolyn Albert; chiara.williamson@araheritage.ca; janet.gardner@araheritage.ca
Subject: RE: ARA Deployment - Stage 1 Bright's Grove WTP - April 26 2023 - COTTFN

Hi Megan,

Thank you for reaching out to me today, I appreciate the open communication. I look forward to receiving the report or updates as they become available. I have not received a copy of the executed agreement.

Thanks,

Fallon

COTTFN

Fallon Burch
Consultation Coordinator
Chippewas of the Thames First Nation
Email: fburch@cottfn.com
519-289-5555 Ex: 251
320 Chippewa Road, Muncey, Ontario

Visit us online at cottfn.com

From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: Wednesday, April 26, 2023 2:49 PM
To: Fallon Burch <fburch@cottfn.com>; Adam.Moore@cima.ca
Cc: alexis.dunlop@araheritage.ca; Carolyn Albert <calbert@cottfn.com>; chiara.williamson@araheritage.ca; janet.gardner@araheritage.ca
Subject: RE: ARA Deployment - Stage 1 Bright's Grove WTP - April 26 2023 - COTTFN

Hi Fallon

Thank you for speaking with me today. I want to apologize again for the miscommunication regarding fieldwork scheduling and agreement execution. As I mentioned during our conversation, ARA did complete the Stage 1 property inspection today. We will be happy to share the draft report with you for review and feedback when it is available. If you have any specific questions now or at that time about the results of the property inspection or anything else relating to the archaeology of this project, we would be pleased to discuss them!

I note that the agreement that you provided has been executed, but please let me know if you have not yet received it.

1

Thank you for your time!
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: Fallon Burch <fburch@cottfn.com>
Sent: Wednesday, April 26, 2023 10:28 AM
To: megan.devries@araheritage.ca; Adam.Moore@cima.ca
Cc: alexis.dunlop@araheritage.ca; Carolyn Albert <calbert@cottfn.com>; chiara.williamson@araheritage.ca; janet.gardner@araheritage.ca
Subject: RE: ARA Deployment - Stage 1 Bright's Grove WTP - April 26 2023 - COTTFN

Hi Megan,

Prior to us scheduling an Archaeology Field Liaison, we require the agreement to be signed by both the consultant/proponent and COTTFN.

As per section:

10.2 *The Proponent/Consultant will provide fieldwork notification at least 48 hours prior to the scheduled start time to allow sufficient time for COTTFN to coordinate AFLs. For fieldwork beginning on a Monday, fieldwork notification must be received by 12pm on the previous Thursday. If insufficient time is given to schedule an AFL, COTTFN expects the Proponent/Consultant to reschedule the fieldwork to allow for COTTFN's participation.*

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

Thank you,

Fallon

2

Fallon Burch
Consultation Coordinator
Chippewas of the Thames First Nation
Email: fburch@cottfn.com
519-289-5555 Ex: 251
320 Chippewa Road, Muncey, Ontario

Visit us online at cottfn.com

From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: Tuesday, April 25, 2023 3:43 PM
To: Fallon Burch <fburch@cottfn.com>; Adam.Moore@cima.ca
Cc: alexis.dunlop@araheritage.ca; Carolyn Albert <calbert@cottfn.com>; chiara.williamson@araheritage.ca; janet.gardner@araheritage.ca
Subject: RE: ARA Deployment - Stage 1 Bright's Grove WTP - April 26 2023 - COTTFN

Hi Fallon,

We've just received confirmation from CIMA that the signed agreement will be available shortly, but it may not come through tonight. Do you have any concerns if we proceed with work tomorrow as planned and do you have someone scheduled to join us?

Thanks for your understanding!
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: Fallon Burch <fburch@cottfn.com>
Sent: Thursday, April 20, 2023 3:47 PM
To: megan.devries@araheritage.ca; Adam.Moore@cima.ca
Cc: alexis.dunlop@araheritage.ca; Carolyn Albert <calbert@cottfn.com>; chiara.williamson@araheritage.ca;

3

janet.gardner@araheritage.ca
Subject: RE: ARA Deployment - Stage 1 Bright's Grove WTP - April 26 2023 - COTTFN

Good afternoon,

Thank you for providing the details for the scheduled Fieldwork for Bright's Grove WTP. Please find attached a copy of the agreement for your review and signature.

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

Thank you,

Fallon

Fallon Burch
Consultation Coordinator
Chippewas of the Thames First Nation
Email: fburch@cottfn.com
519-289-5555 Ex: 251
320 Chippewa Road, Muncey, Ontario

Visit us online at cottfn.com

From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: Thursday, April 20, 2023 2:08 PM
To: Fallon Burch <fburch@cottfn.com>; Carolyn Albert <calbert@cottfn.com>
Cc: Adam.Moore@cima.ca; alexis.dunlop@araheritage.ca; chiara.williamson@araheritage.ca; janet.gardner@araheritage.ca
Subject: ARA Deployment - Stage 1 Bright's Grove WTP - April 26 2023 - COTTFN

Good afternoon,

ARA has scheduled fieldwork for Bright's Grove WTP for Wednesday, April 26. Please find the deployment details below and let me know if you have any questions or concerns. If you are able to let me know the name and number of the representative who will be participating in the fieldwork, that would be greatly appreciated.

ARA Project Number: 2022-0378
Project Name: Bright's Grove WTP Intake EA
Stage of Work: Stage 1
Fieldwork Start Date: April 26, 2023
Fieldwork Duration: 1 day
Meeting Time: 9:30am
Meeting Location: Ontario Clean Water Agency in Bright's Grove (https://www.google.com/maps/place/Ontario+Clean+Water+Agency/@43.0334698,-

4

82.2525253,70m/data=!3m1!1e3!4m6!3m5!1s0x882587a05fd8099b:0x9a601561e7d163b3!8m2!3d43.0334047!4d-82.2521961!16s%2Fg%2F11b5wkh0rp)
Field Director: Janet Gardner (519-636-5095)
Size of Field Crew: 1 field director
PPE Required: CSA-approved safety boots, high-visibility safety vest

If agreements still need to be executed for this project, please contact Adam Moore at adam.moore@cima.ca.

Sincerely.
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

5

RoIE Appendix C: MNO Correspondence

megan.devries@araheritage.ca

From: Laura Desaulniers <LauraD@metisnation.org>
Sent: September 22, 2023 1:54 PM
To: megan.devries@araheritage.ca
Subject: RE: ARA Report Review - St 1-2 Bright's Grove WTP - MNO

Hi Megan,

This draft report was sent to the Region 9 Consultation committee, at this time they have not provided any questions or comments.

Laura Desaulniers (she/her)
Environmental Advisor | Konsèyé dlanvirawnman
Lands, Resources & Consultations (LRC) Branch
Métis Nation of Ontario
Thunder Bay, ON
E: LauraD@metisnation.org
C: 807-375-0208
W: www.metisnation.org
Mon-Fri 7:30 am – 3:30 pm EST

From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: September 19, 2023 12:51 PM
To: Consultations <Consultations@metisnation.org>
Cc: alexis.dunlop@araheritage.ca; 'Kait Kenel' <kait.kenel@araheritage.ca>; 'Adam Moore' <Adam.Moore@cima.ca>
Subject: RE: ARA Report Review - St 1-2 Bright's Grove WTP - MNO

Good afternoon,

I am writing to check in on the status of this report review. Would it be possible to get your comments by Friday, September 22? Please let me know if you need more time to complete the review.

Thank you!
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

1

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

From: megan.devries@araheritage.ca <megan.devries@araheritage.ca>
Sent: Thursday, August 31, 2023 9:07 AM
To: 'consultations@metisnation.org' <consultations@metisnation.org>
Cc: 'alexis.dunlop@araheritage.ca' <alexis.dunlop@araheritage.ca>; 'Kait Kenel' <kait.kenel@araheritage.ca>; 'Adam Moore' <Adam.Moore@cima.ca>
Subject: ARA Report Review - St 1-2 Bright's Grove WTP - MNO

Good morning!

Please find attached the draft report and supplementary documentation for your review entitled:

Stage 1 and 2 Archaeological Assessment
Bright's Grove Water Treatment Plant New Intake
City of Sarnia
Part of Lot 9, Concession 9 AKA Front Concession
Geographic Township of Sarnia
Lambton County, Ontario

ARA Project #2022-0378

We are hoping to receive your comments regarding the draft report by September 15, 2023, prior to our submission to the MCM. Please advise if this timeframe is not achievable for your review.

Thank you,
Megan.

Megan DeVries, M.A. (she/her)
Indigenous Engagement Specialist
Archaeological Research Associates Ltd.
Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9
Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5
C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

2

RoIE Appendix D: TTMS Correspondence

megan.devries@araheritage.ca

From: Wanda Maness <ttms.maness@gmail.com>
Sent: August 31, 2023 12:16 PM
To: megan.devries@araheritage.ca
Cc: cobrien@aamjiwnaang.ca; alexis.dunlop@araheritage.ca; Kait Kenel; Adam Moore
Subject: Re: ARA Report Review - St 1-2 Bright's Grove WTP - AFN
Attachments: image001.png

Looks good to me.

On Thu, Aug 31, 2023 at 9:06 AM <megan.devries@araheritage.ca> wrote:

> Good morning!
>
> Please find attached the draft report and supplementary documentation for your review entitled:
>
> *Stage 1 and 2 Archaeological Assessment*
>
> *Bright's Grove Water Treatment Plant New Intake*
>
> *City of Sarnia*
>
> *Part of Lot 9, Concession 9 AKA Front Concession*
>
> *Geographic Township of Sarnia*
>
> *Lambton County, Ontario*
>
> ARA Project #2022-0378
>
> We are hoping to receive your comments regarding the draft report by September 15, 2023, prior to our submission to the MCM. Please advise if this timeframe is not achievable for your review.
>
> Thank you,
>
> Megan.

1

Megan DeVries, M.A. (she/her)

Indigenous Engagement Specialist

Archaeological Research Associates Ltd.

Hamilton Office: 205 Cannon St East, Hamilton, ON L8L 2A9

Kitchener Office: 465 Maple Ave – Unit 9, Kitchener, ON N2H 6N5

C 519.573.6546 | E megan.devries@araheritage.ca | www.araheritage.ca

Privileged to work within the treaty lands and traditional territories of the Indigenous peoples of Turtle Island.

2

Ministry of Citizenship and Multiculturalism (MCM)

Archaeology Program Unit
Heritage Branch
Citizenship, Inclusion and Heritage Division
5th Floor, 400 University Ave.
Toronto ON M7A 2R9
Tel.: (705) 571-0035
Email: Teresa.Tremblay@ontario.ca

Ministère des Affaires civiques et du Multiculturalisme (MCM)

Unité des programme d'archéologie
Direction du patrimoine
Division de la citoyenneté, de l'inclusion et du patrimoine
5e étage, 400 ave. University
Toronto ON M7A 2R9
Tél. : (705) 571-0035
Email: Teresa.Tremblay@ontario.ca

Oct 14, 2023

Paul Racher (P007)
Archaeological Research Associates Ltd.
205 Cannon Hamilton ON L8L 2A9

RE: Entry into the Ontario Public Register of Archaeological Reports: Archaeological Assessment Report Entitled, "Stage 1 and 2 Archaeological Assessments, Bright's Grove Water Treatment Plant New Intake, City of Sarnia, Part of Lot 9, Concession 9 AKA Front Concession, Geographic Township of Sarnia, Lambton County, Ontario", Dated Oct 13, 2023, Filed with MCM Toronto Office on N/A, MCM Project Information Form Number P007-1429-2022, P007-1511-2023, MCM File Number 0017970

Dear Mr. Racher:

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
Adam Moore,CIMA+
Mike Thompson,Town of Petrolia

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.*

D

Appendix D: Marine Archaeological Assessment Report

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Marine Archaeological Assessment
Bright's Grove Water Intake Design Class EA
Offshore of Part of Lot 9, Concession 9, AKA Front Concession
Geographic Township of Sarnia
Bright's Grove, Town of Petrolia
County of Lambton

Prepared for
Adam Moore
CIMA Canada Inc.
900-101 Frederick Street
Kitchener, ON N2H 6R2
Tel: (519) 772-2299 ext. 6209 | Cell: (519) 830-7015
Email: Adam.Moore@cima.ca

Licensed under
S. Janusas
Licence #2022-019
ARA File #2022-0378

01/14/2023

Original Report

EXECUTIVE SUMMARY

CIMA Canada Inc. (CIMA+) retained the services of Archaeological Research Associates Ltd. (ARA) on behalf of the Town of Petrolia to conduct a marine archaeological assessment of the proposed replacement/extension of the water intake for the Bright's Grove water treatment plant, Town of Petrolia. The study area lies in Lake Huron west of the land location of part of Lot 9, Concession 9, aka Broken Front Concession, in the Geographic Township of Sarnia, Lambton County. The study area consisted of an area of approximately 19 hectares. Archaeological work was conducted under marine archaeological licence 2022-19 issued to Scarlett Janusas.

The marine archaeological assessment consisted of background research, a field assessment using snorkelers in nearshore areas in shallow waters, and a combined side scan and magnetometer survey. Visibility exceeded two metres.

The field visit conducted in October of 2022 under good weather and observation conditions. The nearshore shallow areas were investigated by conducting snorkel survey across the width of the study area out to approximately 30 metres from the shoreline. The remaining area was investigated with an autonomous underwater vehicle (AUV) equipped with side scan sonar and magnetometer. Indigenous engagement was conducted by ARA inviting interested communities in the area to attend the field investigation. There were no monitors present during the investigation and no communities provided any archaeological concerns to ARA.

The shoreline had been heavily modified and infilled with armour stone. An existing metal retaining wall and associated armour stone extended vertically into the lake marking the existing water intake pipeline. The snorkel survey detected the remains of the old water intake pipe and infrastructure, as did the magnetometer and side scan sonar survey. There was only one unidentified structural piece, measuring approximately 15 metres by 7 metres, located near the existing water intake pipe, and the sidescan image suggests that it is associated crib work used to secure the intake end. It is not in situ but is located east of the 1944 water intake system.

The date of the existing water intake system and infrastructure is 1944. The date of the additional water intake, which angles to the northwest, is 1896. Much of both the 1896 and 1944 water intake systems are buried. Portions have been exposed through wave and ice action.

Based on the marine archaeological background research, snorkel survey, sidescan and magnetometer survey, the following is recommended:

- The original water intake pipe still exists (in places), and it was constructed in 1896. It is unlikely to be impacted by the new rebuild of the water intake system. There is, therefore, no additional archaeological mitigation recommended;
- The existing water intake system was constructed in 1944 and is not considered historically or archaeologically significant. There are no recommendations regarding this intake system;
- There were no cultural resources located in the Study Area, other than those associated with the two pipelines noted above, and, therefore, no additional archaeological mitigation is recommended for the remainder of the study area; and

- Compliance legislation must be adhered to in the event of discovery of deeply buried cultural material or features.

TABLE OF CONTENTS

FIGURES

IMAGES

PERSONNEL

Project Manager: S. Janusas (#P027)
Principal Archaeologist: S. Janusas
Graphics: J. Garrington, S. Janusas
Historic Researchers: P. Folkes, S. Janusas
Field Crew: J. Garrington, S. Janusas, A. MacDonald (#R1187)
Report Writer: S. Janusas
Editor: D. Worby (#R1190)

1.0 PROJECT CONTEXT

1.1 Development Context

CIMA Canada Inc. (CIMA+) retained the services of Archaeological Research Associates (ARA) on behalf of the Town of Petrolia (Bright's Grove) to conduct a marine archaeological assessment of the project to replace the existing Bright's Grove Water Treatment (WTP) Intake Structure as part of the Class EA Study and conceptual design of the new intake.

"The Bright's Grove WTP, located [at] 2701 Old Lakeshore Road in the Bright's Grove area of the City of Sarnia [Town of Petrolia], is supplied by raw water from Lake Huron. The existing treatment facility is a conventional surface water treatment plant with a current rated capacity of 12 MLD. The Bright's Grove WTP intake pipe, constructed in 1944, is a 400 mm cast iron pipe extending approximately 400m into Lake Huron. The existing intake has reached the end of its service life, and replacement of the existing intake pipe and associated crib structure is required" (Town of Petrolia 2022 RPF document).

As part of this project, a marine archaeological assessment was required to evaluate the potential for marine archaeological resources in the area, to conduct a shallow water near shore snorkel survey, and to conduct a side scan and magnetometer survey of the remaining area to search to possible archaeological resources. The marine archaeological assessment included a search for cultural resources that included both Indigenous and Euro-Canadian chronologies.

Figure 1: Location of the Study Area (CIMA+)
illustrates the location of the Study Area and Figure 2: Water Intake Plan
illustrates the concept plan for the new water intake system.

Figure 1: Location of the Study Area (CIMA+)

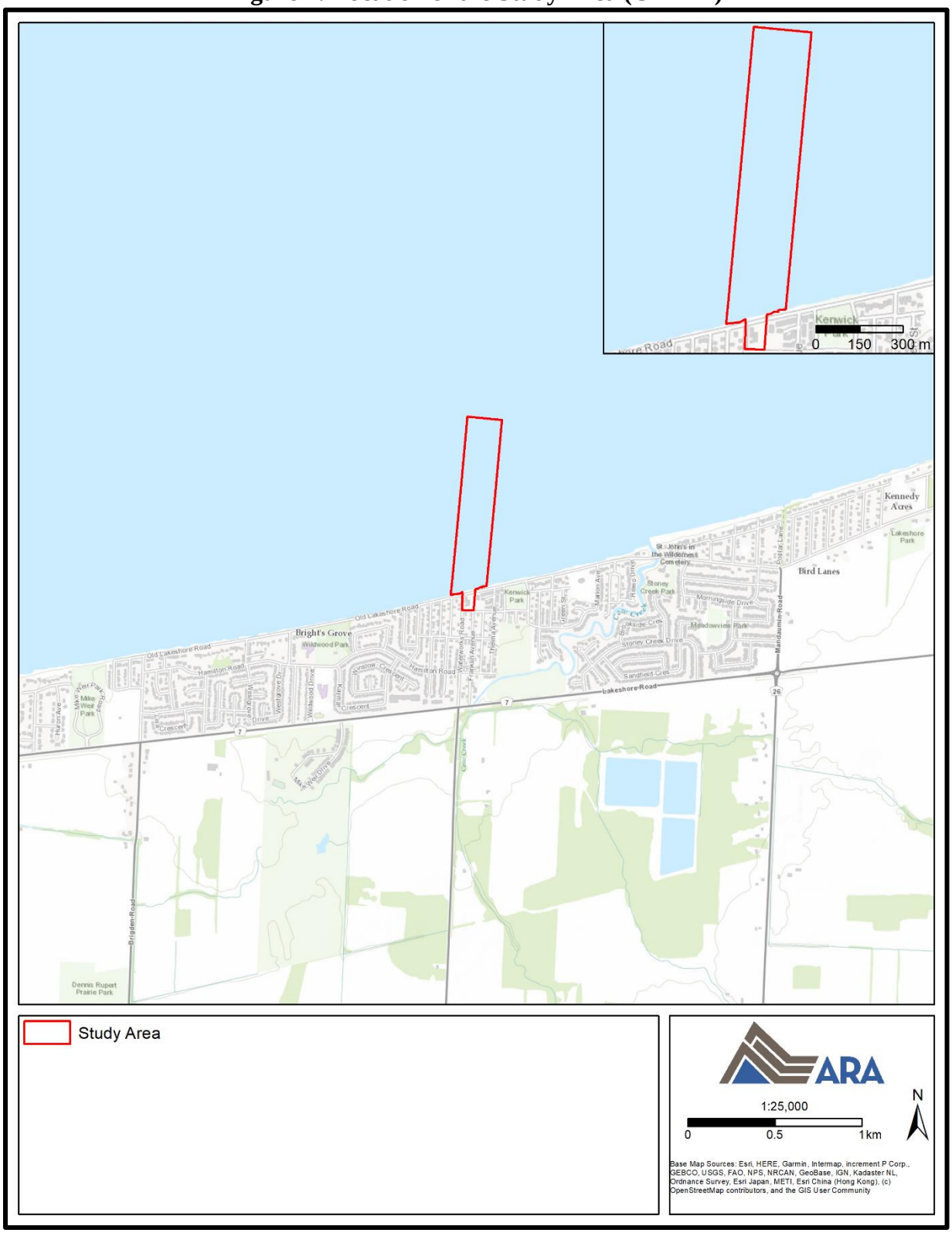
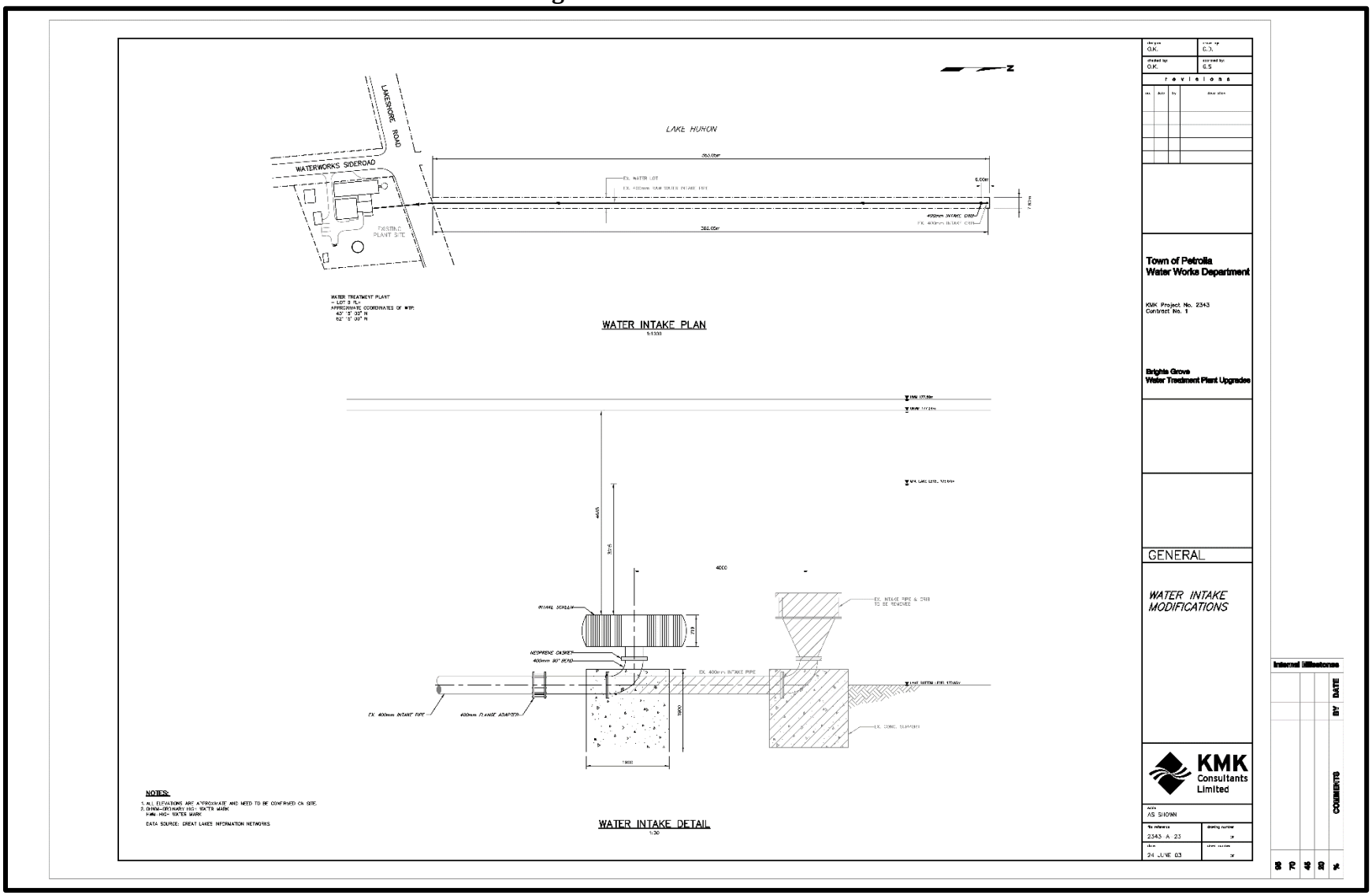


Figure 2: Water Intake Plan



1.2 Current Environment

The Study Area consists of an area of approximately 19 hectares in area. The shoreline of the Study Area measures approximately 160 m and the Study Area extends out approximately 383 m into Lake Huron. The shoreline is highly modified to prevent erosion and is lined with armour stone. The first approximate 53 metres of shoreline, from the west end has the armour stone extending 13 metres from the top of the bank to the in water edge. The remaining 107 metres is lined with a width of armour stone of between 7.5 to 8 metres. In this latter section, there is a thin strip of sandy beach, but it is unlikely that any of the original shoreline exists, except under the armour stone (Figure 3).

Figure 3: Armour stone along Shoreline of Study Area

There is one area marking the current water intake area at the shoreline delineated by sheet metal and armour stone extending out into the lake for a distance of 19.36 metres from the edge of the armour stone (Figure 4).

In addition, there are several sewer drains that empty into the lake along the Study Area shoreline. The snorkel survey, visual observations and observations from boat and results of side scan survey indicate a sandy bottom with occasional stones closer to shore, and only one large rock in the most northern portion of the Study Area.

Figure 4: Metal Sheet Wall at Existing Intake

1.3 Indigenous Engagement

ARA undertook Indigenous engagement. Indigenous communities were invited to participate/monitor and/or provide information for the project, but all Indigenous communities contacted declined active participation in the project.

1.4 Rationale for Fieldwork Strategy

The marine archaeological survey consisted of a snorkel survey along the shallow waters of the shoreline as observation conditions exceeded 2 metres in visibility and the side scan sonar and magnetometer were limited in shallow water depths. The remaining areas were subject to investigation using sidescan sonar and magnetometer survey.

No test pitting was conducted along the existing shoreline as this was not representative of the original shoreline, now buried under armour stone.

2.0 BACKGROUND RESEARCH

2.1 Marine Heritage Potential

The following research has been used to evaluate the potential for possible marine archaeological resources, both Indigenous and Euro-Canadian.

2.2 Meaning of Water for Indigenous Communities

The following, from the Assembly of First Nations, demonstrates the importance of water for Indigenous communities (https://www.afn.ca/honoring-water/):

> *Water is the most life sustaining gift on Mother Earth and is the interconnection between all living beings. Water sustains us, flows between us, within us, and replenished us. Water is the blood of Mother Earth and, as such, cleanses not only herself, but all living things. Water comes in many forms and all are needed for the health of Mother Earth and for our health. The sacred water element teaches us that we can have great strength to transform even the tallest mountain while being soft, pliable, and flexible. Water gives us the spiritual teaching that we too flow into the Great Ocean at the end of our life journey. Water shapes the land and gives us the great gifts of the rivers, lakes, ice, and oceans. Water is the home of many livening things that contribute to the health and well-being of everything not in the water.*
>
> *…The First Nations peoples of North America have a special relationship with water, built on our subsistence ways of life that extends back thousands of years. Our traditional activities depend on water for transportation, drinking, cleaning, purification, and provides habitat for the plants and animals we gather as medicines and foods.*

The above highlights the importance and sacredness of water that has, no doubt, been sustained for thousands of years by the Indigenous peoples. Water is in fact one of the highest potential variables for locating Indigenous sites. People needed access to potable water, and also the resources both in the water (fish, molluscs, vegetation) and adjacent to the water (marsh, wetland vegetation, fowl, animals). Water also provided a relatively easier means of travelling (than through dense forest) and enable not only interaction between nearby Indigenous people, but also allowed for the establishment of trading partners and routes. Transportation also allowed for the movement of both people and goods. And, of course, water is used for ceremonial purposes. Different points of land, sometimes a high cliff, a rapids, a point jutting out into a lake, were considered areas to be blessed prior to a voyage by watercraft, or honoring a particular event, custom or person.

In the case of the Study Area, there is a straight line of shoreline, which provides no relief in the form of an inlet, a creek or river mouth, rapids, whirlpools, etc. The Study Area shoreline has been heavily modified and infilled with armour stone as part of an erosion control effort. There is no doubt that the original shoreline, for the most part, has been buried under this armour stone and that the current shoreline is at least 5 to 10 metres distant from the original shoreline.

2.3 Registered Archaeological Sites and Previous Archaeological Assessments

There are no known registered archaeological sites within one kilometer of the study area nor any archaeological assessments within 50 metres of the Study Area.

2.4 Bright's Grove Coast

A survey of marine disaster lists, in particular the comprehensive annual compilations by the Board of Lake Underwriters and the Canada Department of Marine & Fisheries (later the Department of Transport), between 1847 and 1956, do not identify any vessels wrecked or otherwise lost in the vicinity of the Study Area. The inshore waters of the coast between the entrance of the St. Clair River and Cape Ipperwash appear to have been singularly free of shipping disasters during the heyday of steam and sail on the Great Lakes.

The Great Lakes Pilot (1921 edition: 127) describes the shore as a "low thinly wooded…sand beach...being fronted by a sand bank about 400 yards in width." And toward Harris or Blue Point, the bay was "fronted by a sand bank with 12 to 16 feet over it, having a maximum width of 1,320 yards."

Except for small craft, these coastal waters saw no commercial traffic until fishing tugs, as noted in the Pilot (1962 edition 3), began using the outlet of Perche Creek where protective breakwaters had been constructed and provided safe harbour.

Marine infrastructure in the form of docks and wharves were also unlikely to have been placed along a long open expanse of shoreline without benefit of breakwaters. The 1880 map of the area (Figure 5) does not illustrate any marine related infrastructure.

The existing water intake pipe dates to 1944. However, the field survey located an additional pipe, perhaps an earlier intake pipe that was never removed, angled slightly off the existing pipe. The majority of this pipe is buried, although some associated cribwork, anchoring the pipe, appears occasionally out of the sand.

The Town of Petrolia (Bright's Grove) had been petitioning the government since 1874 for clean potable water for their town. In 1892, the town council arranged for a private firm to provide water for the town. This effort failed due to polluted wells placed south of Wyoming and financial backing was no longer available. In 1895, the town still lacked potable water, and the situation became dire, as nearly all the residential wells were polluted, and there was a demand for at least a third of a million gallons of water a day for the refineries in the area to operate. The town engaged Willis Chapman of Toronto to resolve the water issue.

Chipman looked for four different solutions for a potable water source: 1) rock and surface wells, 2) Bear Creek, 3) the St. Clair River, and 4) Lake Huron. Petrolia ratepayers voted in favour to a bylaw to raise sufficient funds ($172,000) for a pipeline to Lake Huron and a distribution system in the town.

By March of 1896, boilers and steam engines arrived at Bright's Grove, and the pipe laying began soon after in earnest. It is this early pipeline, dating to 1896, that angles off the existing pipeline.

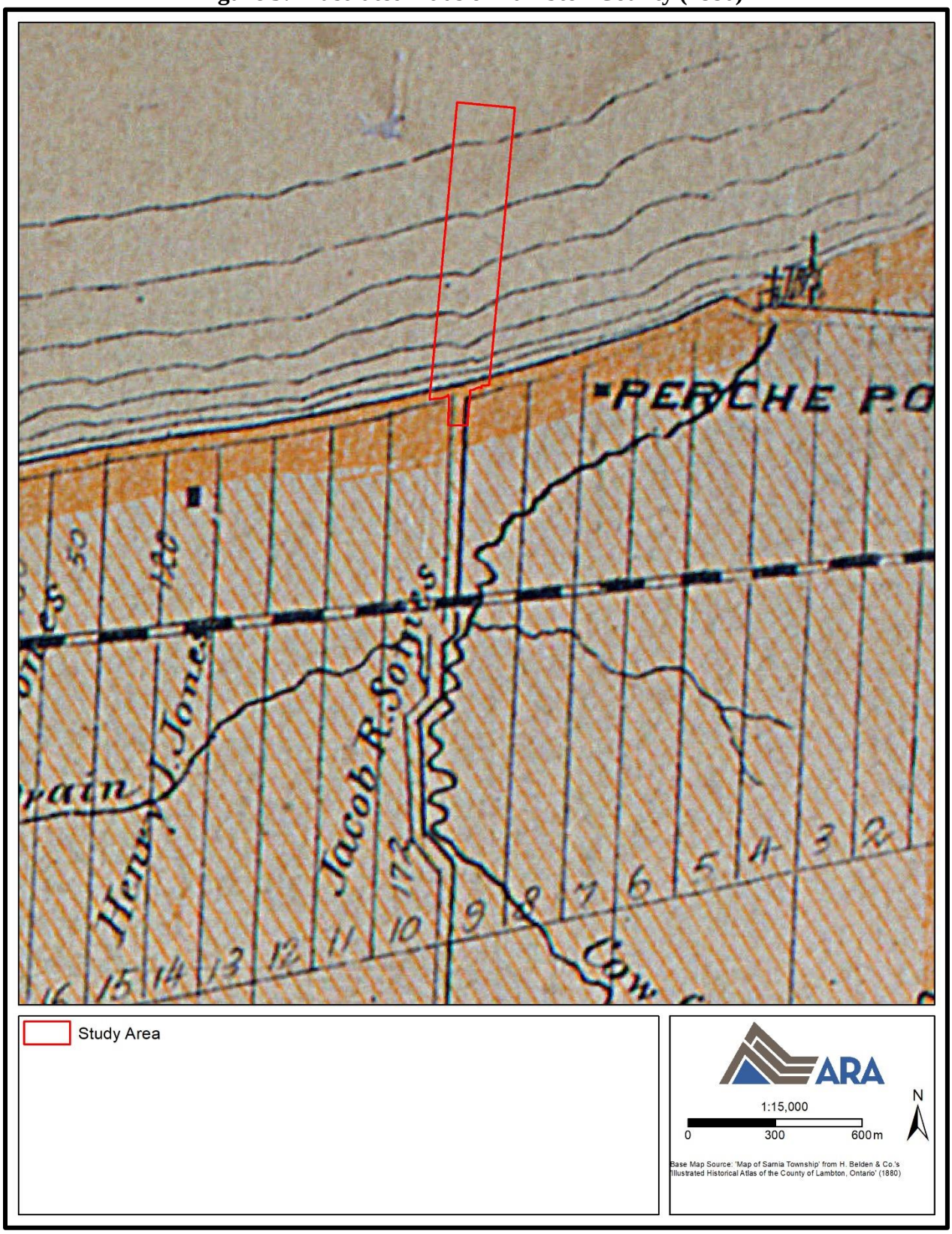
2.5 Archaeological Potential

The potential for discovery of Indigenous archaeological resources is low given the erosion control modification of the shoreline. In addition, the sand bottom is likely to have buried any possible resources, if they were present.

The potential for discovery of Euro-Canadian archaeological resources, such as marine related infrastructure (docks, wharves and piers) and/or shipwrecks is also low given the review of archival materials and the lack of any reported loss of ships in this area.

There remains, however, the potential for discovery of possible early canoe spills (either Indigenous or Euro-Canadian) as these early modes of transportation were likely to hug the shoreline. In addition, there is scope for the discovery of early crib remains associated with the early 1896 pipeline.

Figure 5: Illustrated Atlas of Lambton County (1880)



3.0 FIELD ASSESSMENT

The marine archaeological field assessment comprised a snorkel survey of the shoreline to approximately 30 metres from the shoreline, and a sidescan and magnetometer survey of the remaining areas. The archaeological marine assessment was conducted in October of 2022 under optimal survey conditions. The weather was sunny with a high of 23°C, and there was negligible wind, which provided almost flat calm water conditions.

The snorkel survey was conducted in transects (approximately 5 metre intervals) paralleling the shoreline. Observations conditions were excellent with in water visibility of more than two metres, and flat calm surface conditions (Image 1–Image 8).

The sidescan sonar and magnetometer survey were conducted by an AUV (autonomous underwater vehicle, and towed magnetometer) (Image 9–Image 10). Survey was conducted in 30 m intervals, and a chase boat (kayak) was used to ensure that the AUV remained on course. Figure 6 illustrates targets located in the side scan and magnetometer survey.

Image 1: Western Boundary of Study Area

Image 2: Facing West along armour stone from stairs leading to water

Image 3: Stairs Leading Down to Water

Image 4: Facing east from stairs to metal retaining wall-intake

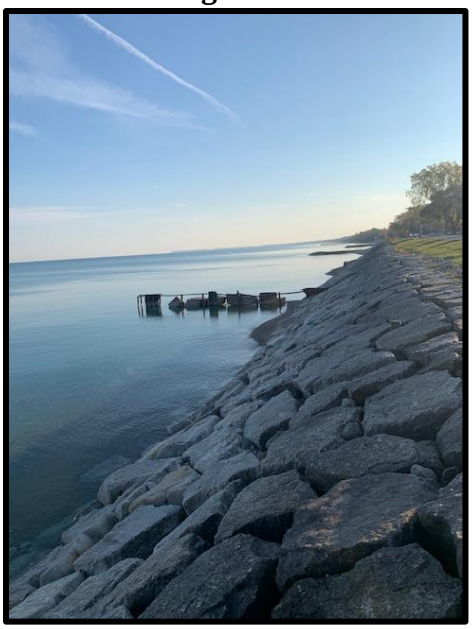


Image 5: East boundary of study area

Image 6: Facing west from eastern boundary

Image 7: Snorkel survey near intake and metal retaining wall

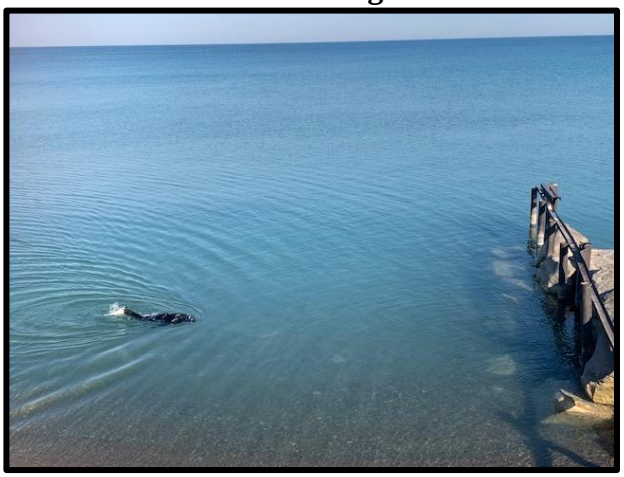


Image 8: Snorkel survey of shallow water

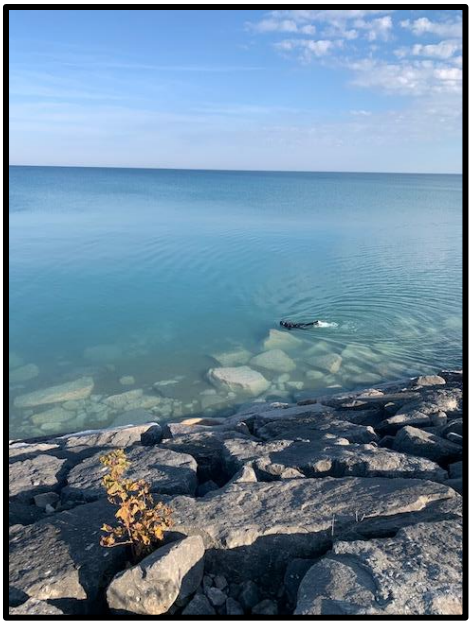


Image 9: AUV conducting sidescan and magnetometer survey

Image 10: Chase Boat and AUV

Figure 6: Target Map with Sidescan and Magnetometer Results

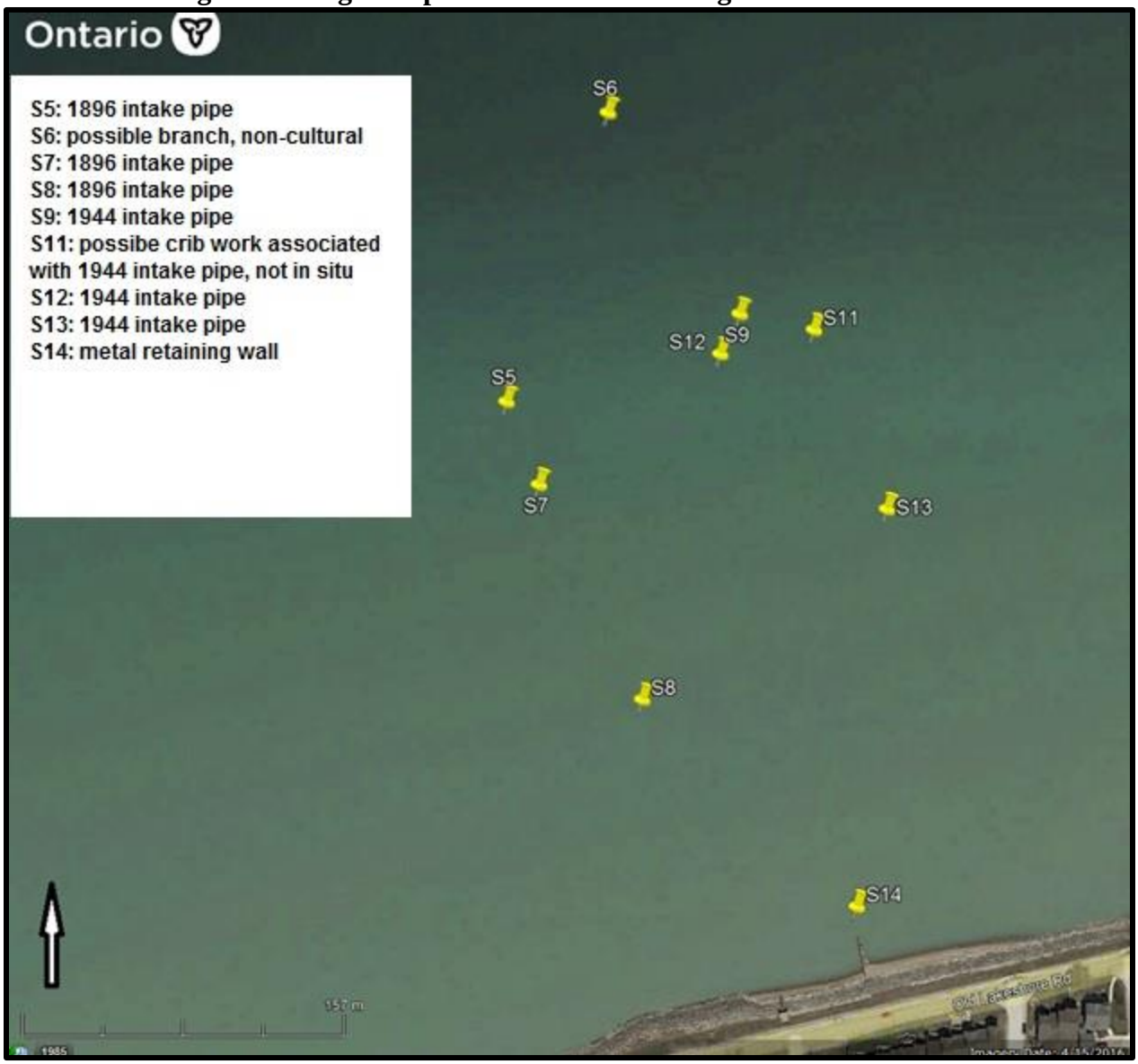


Figure 7: Magnetometer Gamma

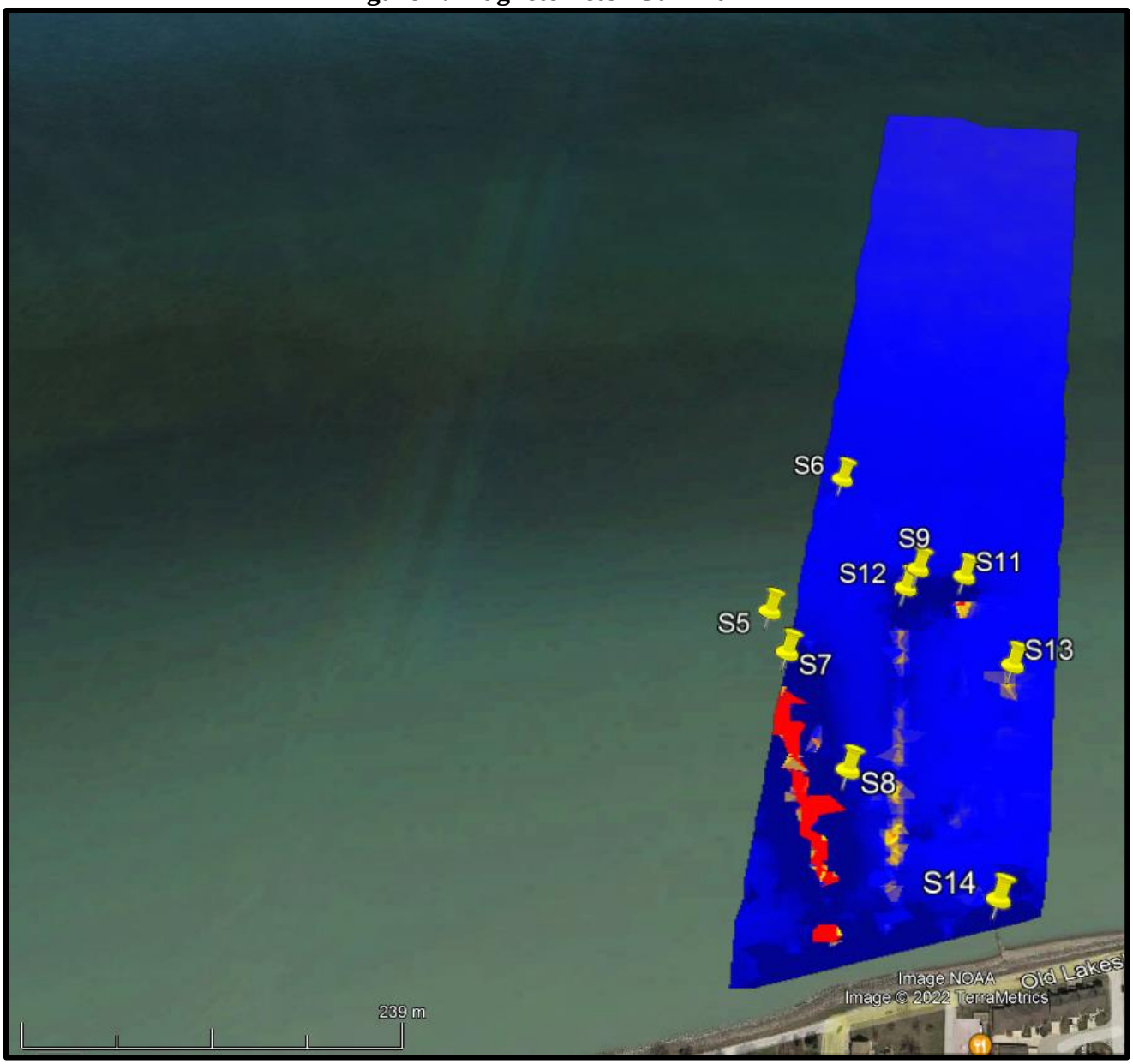


Figure 8: Magnetometer Gradient

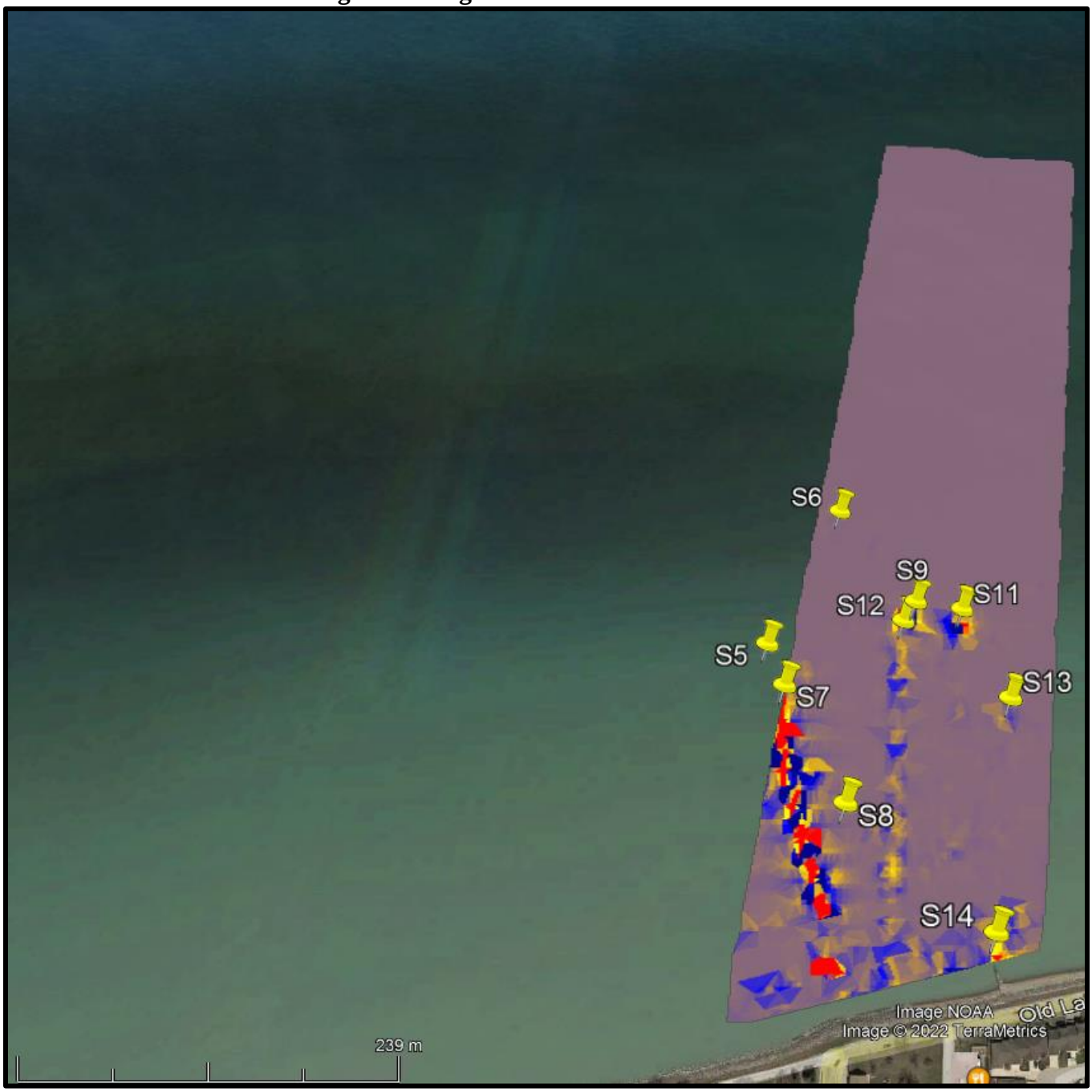


Figure 9: Target S5

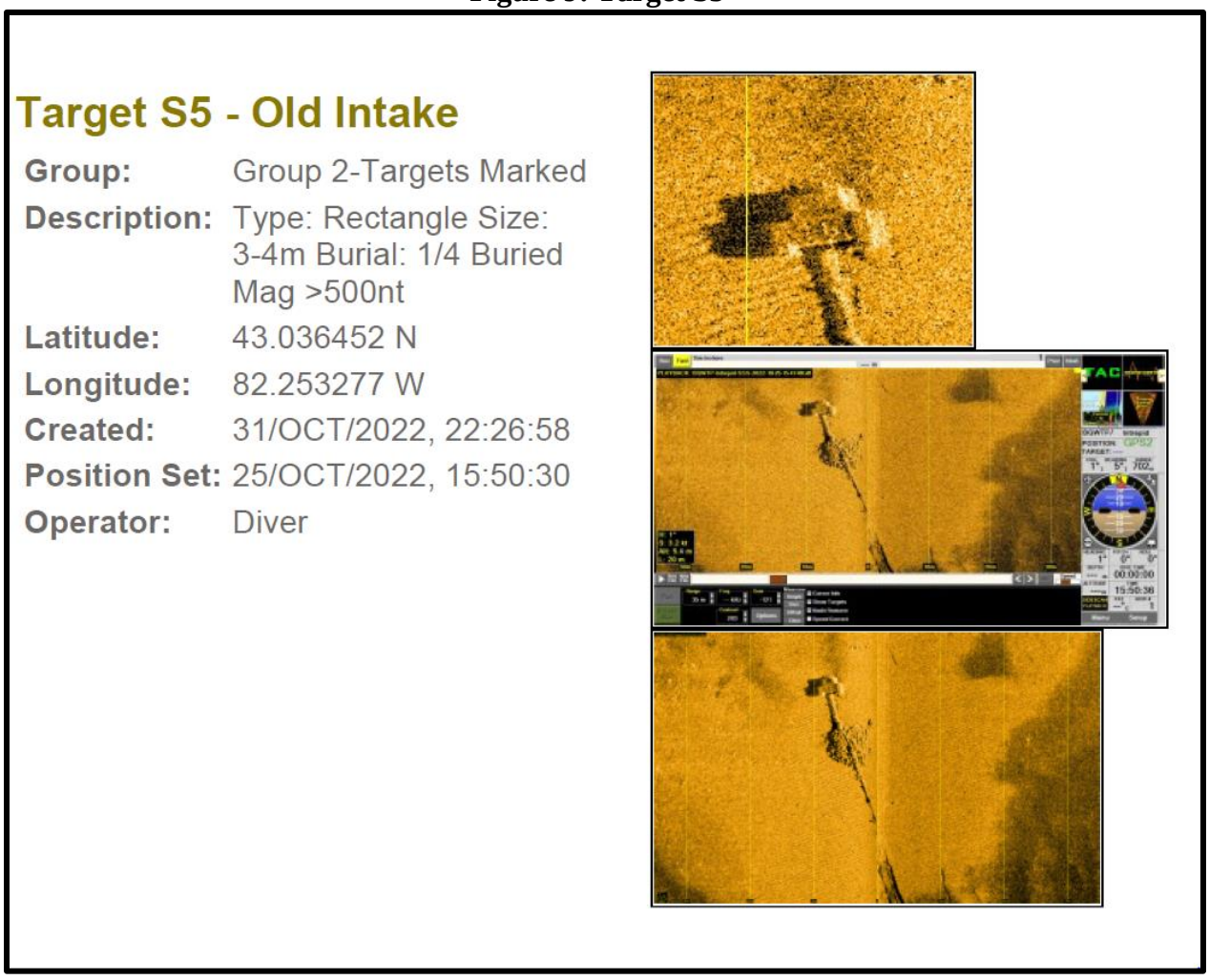


Figure 10: Target S6

Target S6 - Linear

Group:	Group 2-Targets Marked
Description:	Type: Linear Size: >10m Burial: Proud Possible Tree Trunk
Latitude:	43.037722 N
Longitude:	82.252667 W
Created:	31/OCT/2022, 22:29:12
Position Set:	25/OCT/2022, 15:51:58
Operator:	Diver

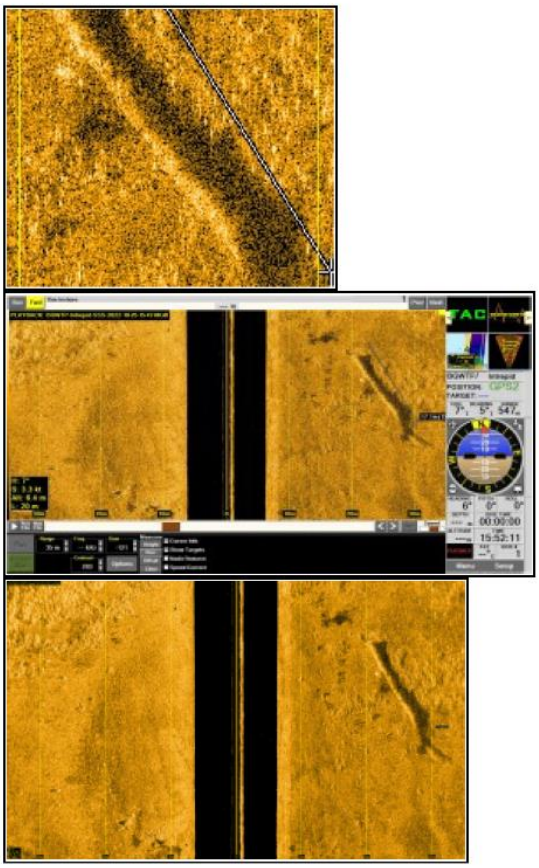


Figure 11: Target S7

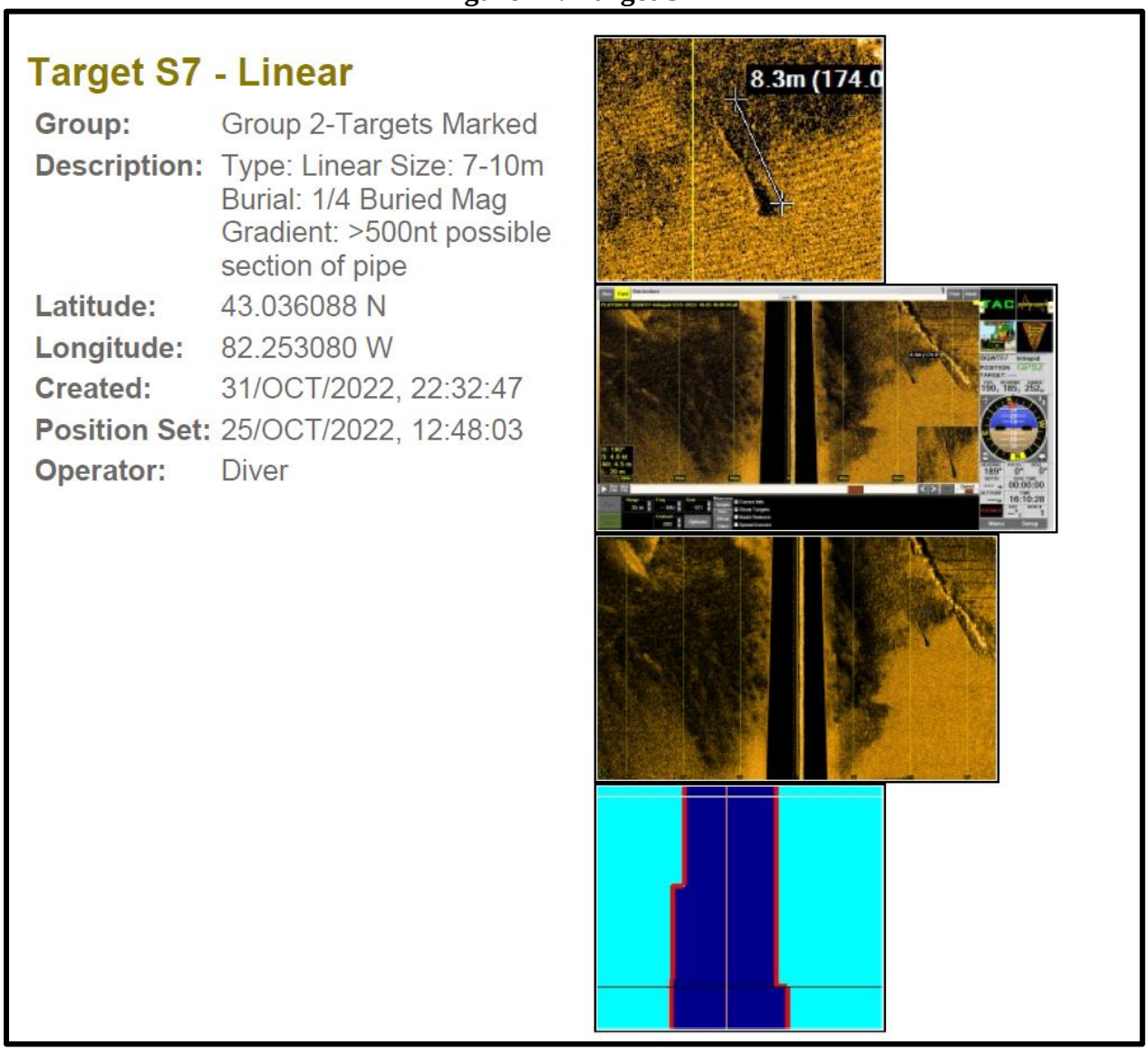


Figure 12: Target 8

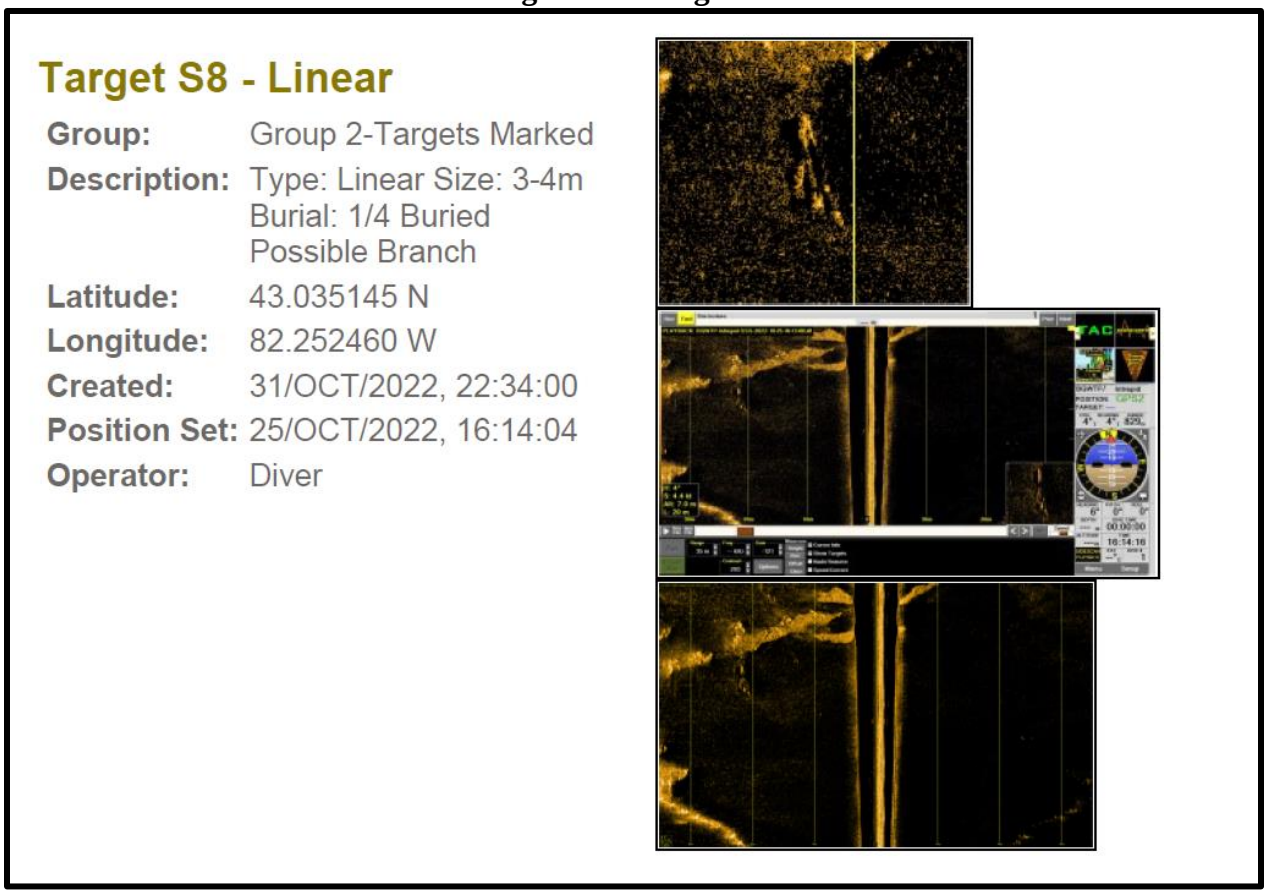


Figure 13: Target 9

Target S9 - Ex. Intake

Group:	Group 2-Targets Marked
Description:	Type: Intake Size: 3-4m Burial: Proud Existing Intake Structure
Latitude:	43.036838 N
Longitude:	82.251875 W
Created:	31/OCT/2022, 22:34:54
Position Set:	25/OCT/2022, 16:15:28
Operator:	Diver

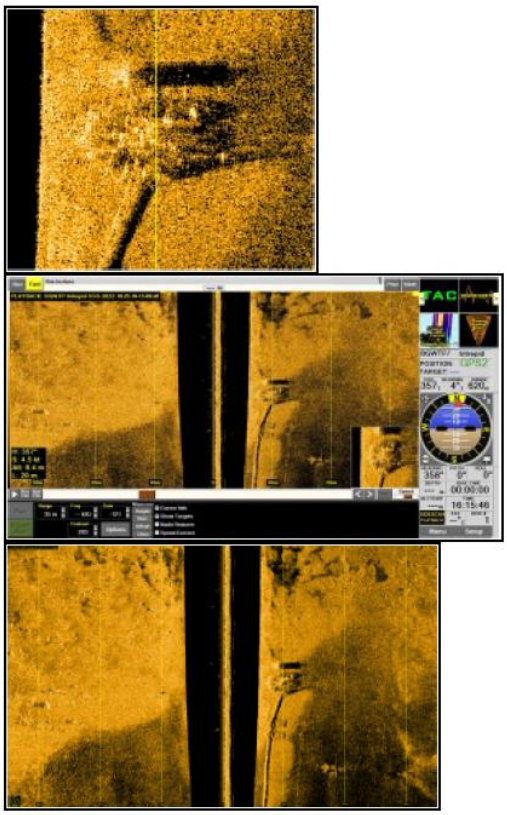


Figure 14: Target 11

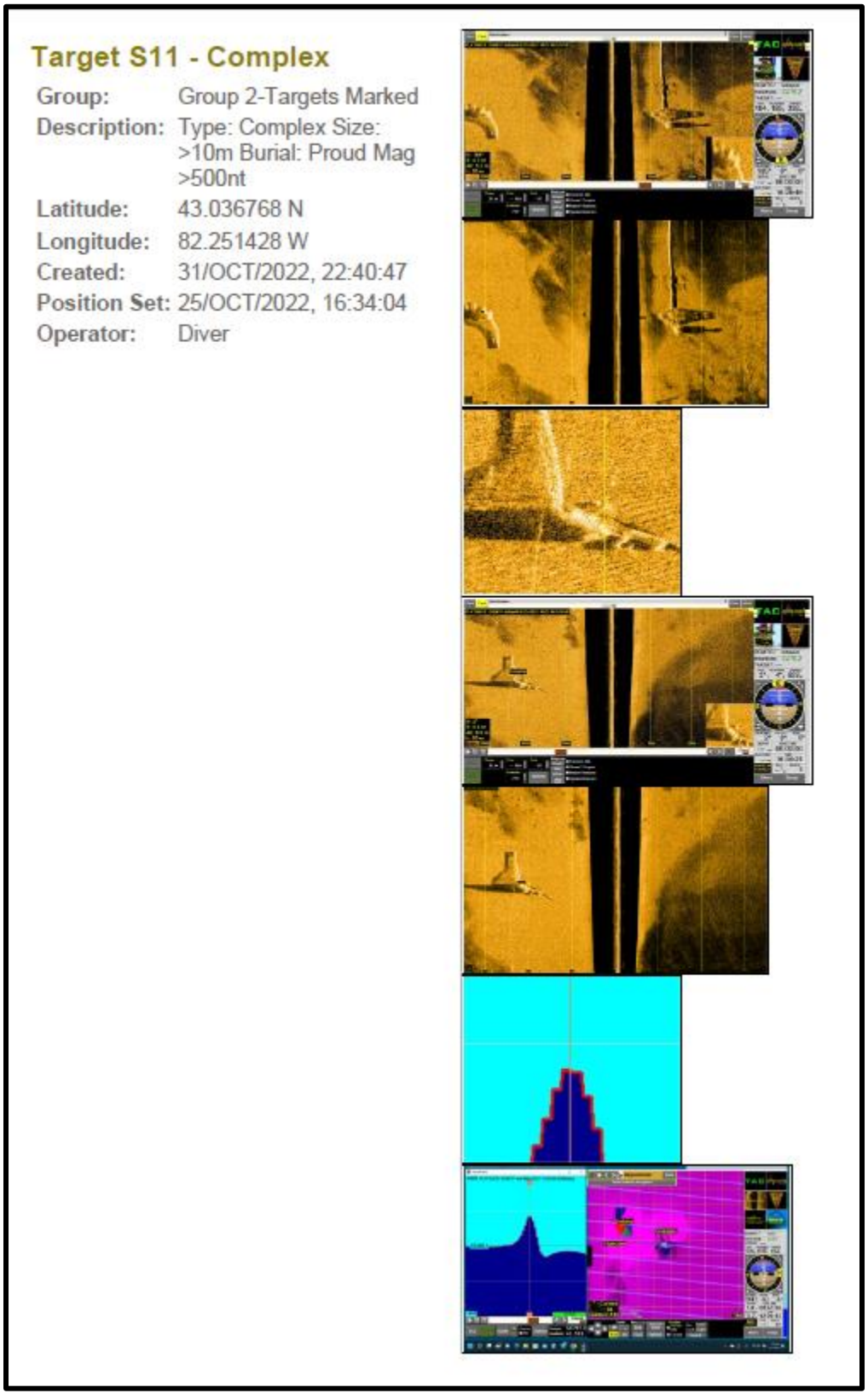


Figure 15: Target 12, 1944 Pipeline

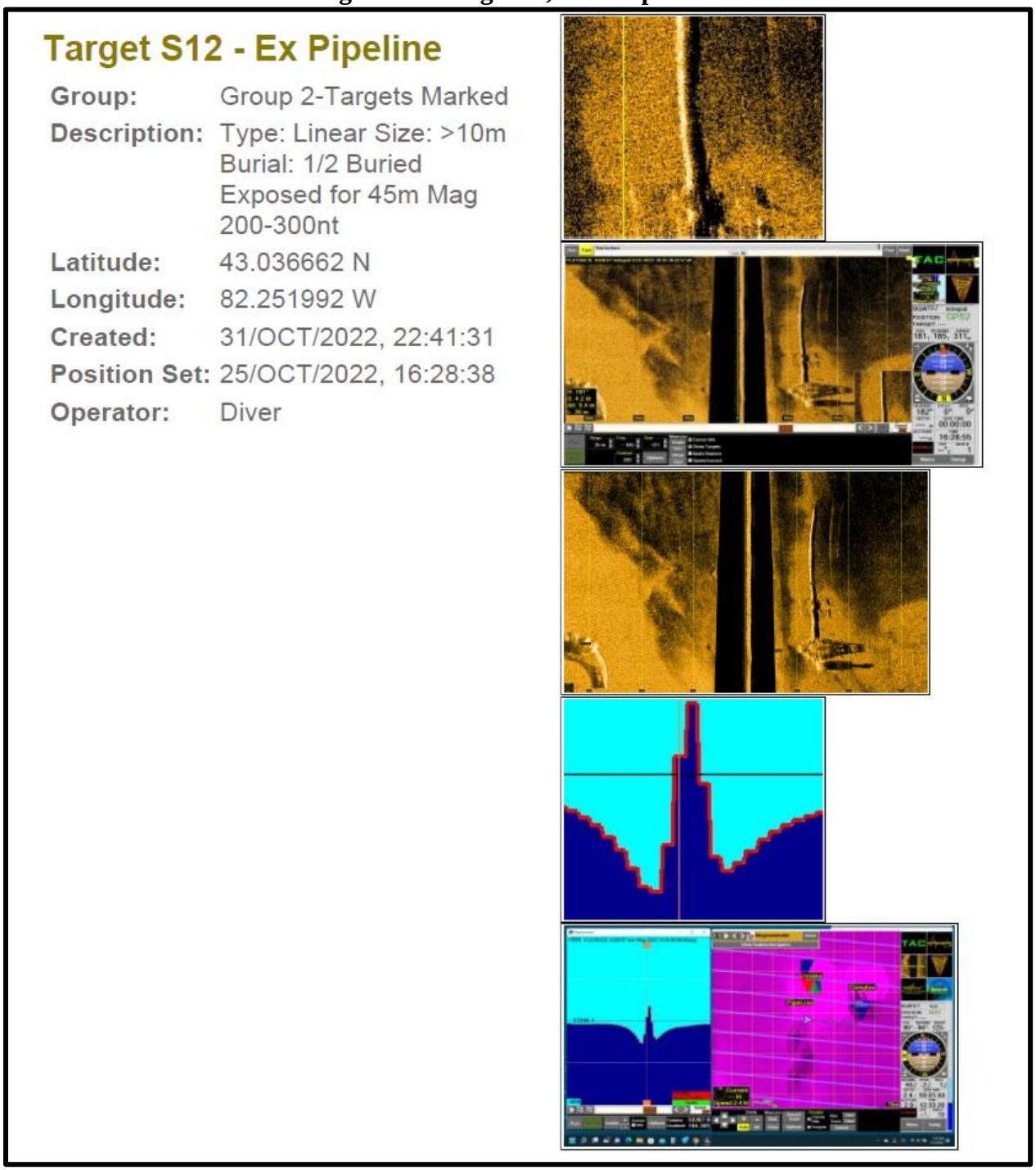


Figure 16: Target 13 - Buried Target

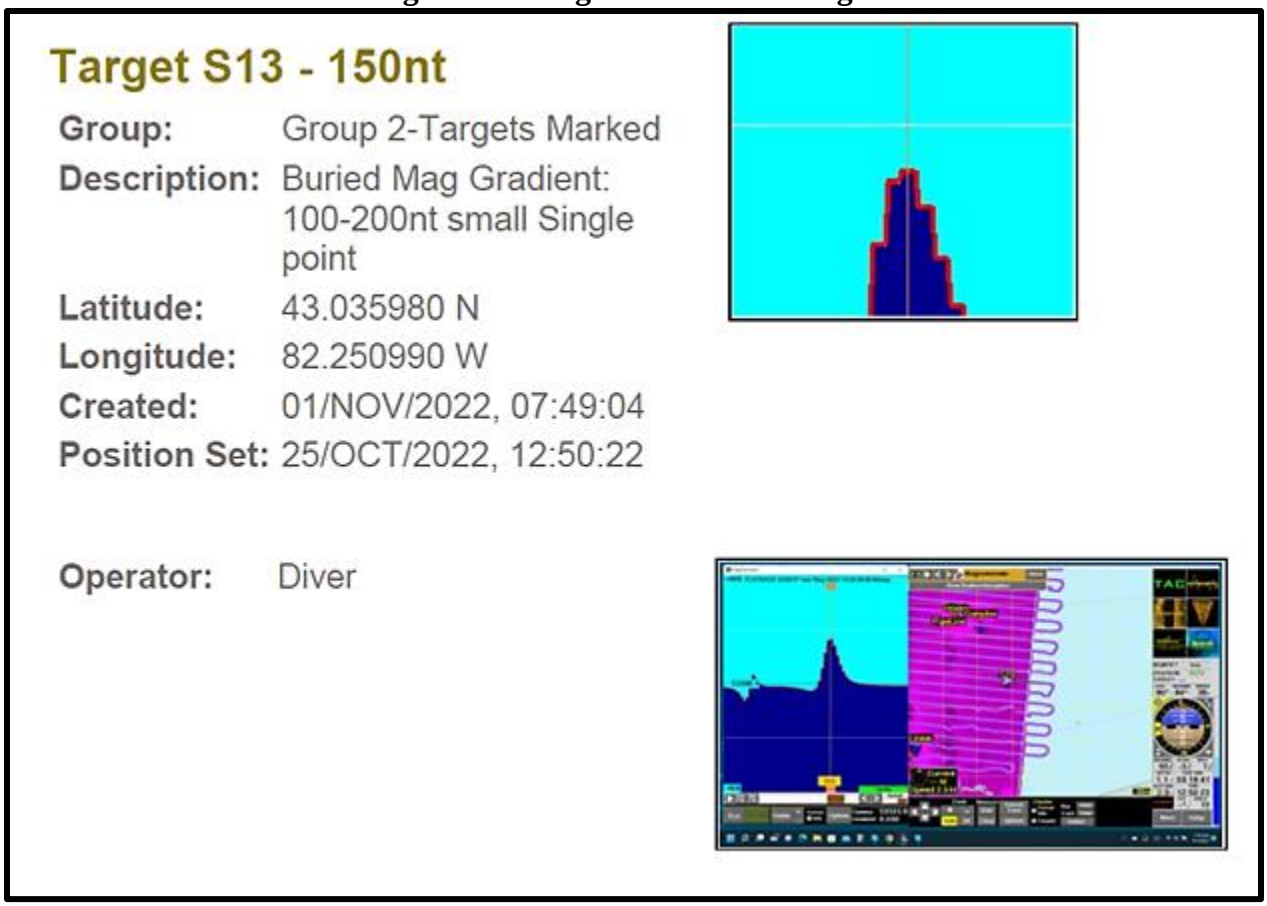


Figure 17: Target 14 Sheet Pile

4.0 ANALYSIS AND CONCLUSIONS

The snorkel survey detected some wooden cribwork (placed vertically to secure pipe) close to shore but in alignment with the earlier 1896 water intake system. No other cultural material was observed during the snorkel assessment.

The combined side scan sonar and magentomer survey detected two linear features. The first was that of the existing water intake system which dates to 1944. Angling towars the southwest were several "hits" for the older intake system which dates to 1896. The majority of the latter was buried under sand, but wave and ice action have exposesd sections of the 1896 water intake system. The same is true for the 1944 water intake system. Both water intake systems are located in an area of active sand and sediment movement, which invariable expose and rebury sections of the pipeline.

In addition, one large section of possible cribwork located near the end of the 1944 water intake system. It is not in situ, and has probably been dislodgd with ice and wave movements, and is situated to the east of the existing water intake system.

The 1896 water intake system is located away from proposed construction of the new water intake system and is not considered to be threatened by proposed new development. While of interest to the history of Petrolia water, it is doubtful and any significant information would be gleaned from additional archaeological mitigation of this feature.

The 1944 water intake system is considered "modern" and provides no significant archaeological information. No additional cultural artifacts/features were observed during the marine archaeological assessment.

5.0 RECOMMENDATIONS

Based on the marine archaeological background research and the field survey, the following is recommended:

- The original water intake pipe still exists (in places), and it was constructed in 1896. It is unlikely to be impacted by the new rebuild of the water intake system. There is, therefore, no additional archaeological mitigation recommended;
- The existing water intake system was constructed in 1944 and is not considered historically or archaeologically significant. There are no recommendations regarding this intake system;
- There were no cultural resources located in the Study Area, other than those associated with the two pipelines noted above, and, therefore, no additional archaeological mitigation is recommended for the remainder of the study area; and
- Compliance legislation must be adhered to in the event of discovery of deeply buried cultural material or features.

6.0 ADVICE ON COMPLIANCE WITH LEGISLATION

Section 7.5.9 of the 2011 *S&Gs* requires that the following information be provided for the benefit of the proponent and approval authority in the land use planning and development process:

- This report is submitted to the Minister of Citizenship and Multiculturalism as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological fieldwork and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the MCM, a letter will be issued by the ministry stating that there are no further concerns with regard to alterations to archaeological sites by the proposed development.
- It is an offence under Sections 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed archaeological fieldwork on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeology Reports referred to in Section 65.1 of the *Ontario Heritage Act*.
- Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48 (1) of the *Ontario Heritage Act*.
- Archaeological sites recommended for further archaeological fieldwork or protection remain subject to Section 48 (1) of the *Ontario Heritage Act* and may not be altered, or have artifacts removed from them, except by a person holding an archaeological licence.
- The *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33 requires that any person discovering human remains must notify the police or coroner and the Registrar at the Ministry of Public and Business Service Delivery.

7.0 BIBLIOGRAPHY AND SOURCES

Belden, H.
1880 *Illustrated Historical Atlas of the County of Lambton, Ontario.* Reprint edition, Toronto, Cummins Map Co., 1973. Contains map of "Sarnia Township"; scale 96.62 chains = 1 inch.

Canadian Hydrographic Service
1962 *Great Lakes Pilot, Lake Huron, Georgian Bay and the Canadian Shores of Lake Superior*. Volume 2, 2nd edition, Ottawa.

Chapman, L.J. and D.F. Putnam
1984 *The Physiography of Southern Ontario.* Third Edition. Ontario Geological Survey, Special Volume 2. Toronto: Ministry of Natural Resources.

Connolly, J. and M. Obie
2021 The Archaeology of Inundated Cultural Landscapes in Freshwater Lake Systems: Preliminary Insights from a Multi-Methods Study in the Kawartha Lakes Region, Ontario. *Journal of Maritime Archaeology* published online: 01 March 2021.

Davidson, R.J.
1989 "Foundations of the Land Bedrock Geology." In *The Natural History of Ontario*, edited by J.B. Theberge, pp. 36–47. Toronto: McClelland and Stewart Inc.

Du-Plat-Taylor, F.M.
1949 *The Design, Construction and Maintenance of Docks, Wharves & Piers.* Eyre & Spottiswoode, London, England.

Elford, J.T.
1969 *History of Lambton County.* Lambton County Historical Society, Sarnia.

Ellis, C.J.
2013 "Before Pottery: Paleoindian and Archaic Hunter-Gatherers." In *Before Ontario: The Archaeology of a Province*, edited by M. Munson and S. Jamieson, pp. 35–47. Montreal: McGill-Queen's University Press.

Ellis, C.J. and Brian D. Dellar
1990 "Paleo-Indians". In *The Archaeology of Southern Ontario to A.D. 1650*, edited by Chris Ellis and Neal Ferris, pp 37–63. London: Occasional Publications of the London Chapter of the Ontario Archaeological Society.

Elis C.J., I.T. Kenyon and M.W. Spence
1990 "The Archaic". In *The Archaeology of Southern Ontario to A.D. 1650*, edited by Chris Ellis and Neal Ferris, pp 65–124. London: Occasional Publications of the London Chapter of the Ontario Archaeological Society.

Fox, W.
1990 The Middle Woodland to Late Woodland Transition. In *The Archaeology of Southern Ontario to A.D. 1650*, edited by C.J. Ellis and N. Ferris, pp. 71–188. Occasional Publications of the London Chapter of the Ontario Archaeological Society, Publication No. 5. London: Ontario Archaeological Society.

Gervais, G.
2004 Champlain and Ontario (1603035). In *Champlain: The Birth of French America*, edited by Raymonde Litalien and Denis Vaugeois, pp. 180–190. Montreal: McGill-Queen's University Press.

Greene, C.
1917 *Wharves and Piers: Their Design, Construction, And Equipment*. 1st Edition. McGraw-Hill Book Company, New York.

Hart, J.P., and W. Engelbrecht
2012 Northern Iroquoian Ethnic Evolution: A Social Network Analysis. *Journal of Archaeological Method and Theory* 19 (2): 322-349.

Hill, S.M.
2017 *The Clay We Are Made Of: Haudenosaunee Land Tenure on the Grand River*. Critical Studies in Native History Series. Winnipeg: University of Manitoba Press.

Jamieson, J.B.
1990 The Archaeology of the St. Lawrence Iroquoians. In *The Archaeology of Southern Ontario to A.D. 1650*, edited by C.J. Ellis and N. Ferris, pp. 385–404. Occasional Publications of the London Chapter of the Ontario Archaeological Society, Publication No. 5. London: Ontario Archaeological Society.

Johnston, A.J. comp.
1925 *Lambton County Names and Places.* Lambton County Council, Sarnia.

Munson, M.K.
2013 A Land Before Ontario. In *Before Ontario: The Archaeology of a Province*, edited by M.K. Munson and S.M. Jamieson, pp. 21–23. McGill-Queen's Native and Northern Services. Kingston: McGill-Queen's University Press.

No Author
1896 *Sailing Directions For The Great Lakes And Connecting Waters.* Washington: Government Printing Office.
1911 *Sarnia And Point Edward Directory.* Ingersoll: Union Publishing Co.

Phillips, G.C.
1999 *Lambton, An Illustrated History of the County.* Sarnia: Cheshire Cat Press.

Public Works Department
2022 Request for Quotation for the Class Environmental Assessment Study for the Bright's Grove Water Treatment Plant New Intake. On file with ARA.

Ritchie, W.A.
1980 *The Archaeology of New York State*. Revised Edition. Harrison, N.Y.: Harbor Hill Books.

Rowe, J.S.
1972 *Forest Regions of Canada*. Ottawa: Canadian Forestry Service and the Department of Fisheries and the Environment.

Royal Commission on Aboriginal Peoples
1996 *Bridging the Cultural Divide: A Report on Aboriginal People and Criminal Justice in Canada.* Ottawa: Royal Commission on Aboriginal Peoples. Accessed online at: https://publications.gc.ca/collections/collection_2016/bcp-pco/Z1-1991-1-41-8-eng.pdf.

Scott, G.
1892 *Scott's New Coast Pilot For The Lakes.* 4th edition revised and enlarged. Detroit.

Smith, W.H.
1846 *Smith's Canadian Gazetteer.* Toronto: H. & W. Rowsell/
1851 *Canada: Past, Present and Future.* Volume II. Toronto: Thomas Maclear.

Spence, M.W., R.H. Pihl and C.R. Murphy
1990 Cultural Complexes of the Early and Middle Woodland Periods. In *The Archaeology of Southern Ontario to A.D. 1650*, edited by C.J. Ellis and N. Ferris, pp. 125–169. Occasional Publications of the London Chapter of the Ontario Archaeological Society, Publication No. 5. London: Ontario Archaeological Society.

Surtees, R.J.
1982 *Indian Land Cessions in Ontario, 1963-1862: The Evolution of a System.* Unpublished Ph.D. dissertation, Department of History, Carleton University.

Sutton, R.E.
1990 *Hidden Amidst the Hills: Middle and Late Iroquoian Occupations in the Middle Trent Valley.* Occasional Papers in Northeastern Archaeology No. 3. Dundas: Copetown Press.

Trigger, B.G.
1987 *The Children of Aataentsic: A History of the Huron People to 1660.* 2 volumes. Montreal: McGill-Queen's University Press.

United States Hydrographic Office
1921 *Great Lakes Pilot, Lake St. Clair, St. Clair River, Lake Huron, Georgian Bay.* Volume 1. Washington.

Vincent (Tsawanhonhi), N.
1824 Second part of the testimony of N. Vincent (Tsawanhonhi) before the House of Assembly of the Province of Lower-Canada. In *Appendix of the XXXIIrd Volume of the Journals of the House of Assemble of the Province of Lower-Canada, Fourth Session of the Eleventh Provincial Parliament, Appendix R.* Quebec: King's Printer.

Warrick, G.A.
2000 The Precontact Iroquoian Occupation of Southern Ontario. *Journal of World Prehistory* 14(1): 415-466.

Williamson, R.F.
2014 The Archaeological History of the Wendat to A.D. 1651: An Overview. *Ontario Archaeology* 94(1):3-64.

Winearls, J.
1991 *Mapping Upper Canada, 1780-1867: An Annotated Bibliography of Manuscript and Printed Maps.* Toronto: University of Toronto Press.

Wright, J.V.
1966 *The Ontario Iroquois Tradition.* National Museum of Canada Bulletin NO. 213. Ottawa: Department of the Secretary of State.
1972 *The Shield Archaic.* National Museum of Man Publications in Archaeology No. 3. Ottawa: National Museum of Canada.

Charts

"Lake Huron", Sheet V., Captain H.W. Bayfield, R.N., 1822. Sounding in feet. Scale: 13.75" to 1° latitude. Published by Hydrographical Office, The Admiralty, September 3, 1828.

Chart #1379. "Lake Huron", "From Surveys by H.W. Bayfield, 1823; J.G. Boulton & M.J. Stewart, 1884-99. Scale, unknown. London: The Admiralty, 1900.

Chart #3390. "Lake Huron, St. Clair River To Goderich." Surveyed by M.J. Stewart, 1901. Soundings in fathoms. Scale: 1:94,480. London: The Admiralty, May 30, 1904.

Additional Sites

Dillon, M.
2022 *A Water System in the Making.* Accessed online at: https://petroliaheritage.com/.

Ministry of Citizenship and Multiculturalism
Archaeology Program Unit
Heritage Branch
Citizenship, Inclusion and Heritage Division
5th Floor, 400 University Ave.
Toronto, ON, M7A 2R9
Tel: (437) 339-9197
Email: andrea.williams@ontario.ca

Ministère des Affaires civiques et du Multiculturalisme
Unité des programmes archéologique
Direction du patrimoine
Division de la citoyenneté, de l'inclusion et du patrimoine
5e étage, 400 ave. University
Toronto, ON, M7A 2R9
Tél: (437) 339-9197
Email: andrea.williams@ontario.ca

Ontario

January 5, 2023

Scarlett Janusas
Scarlett Janusas Archaeology Inc.
janusasscarlett@gmail.com

RE: Review and entry into the Ontario Public Register of Archaeological Reports: Marine archaeological assessment report entitled, "*Marine Archaeological Assessment Bright's Grove Water Intake Design Class EA, Offshore of Part of Lot 9, Concession 9, AKA Front Concession, Geographic Township of Sarnia, Town of Petrolia (Bright's Grove), City of Sarnia, County of Lambton*", Dated December 2, 2022, Filed on December 12, 2022, Licence number 2022-19.

Dear Ms. Janusas:

This office has reviewed 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.* This review has been carried out in order to determine whether the licensed marine archaeologist met the terms and conditions of their licence and whether the archaeological fieldwork and report recommendations are consistent with the conservation, protection and preservation of the cultural heritage of Ontario.

The report documents the assessment of the study area as shown in **Figure 1** of the report and recommends the following:

"Based on the marine archaeological background research and the field survey, the following is recommended:

- The original water intake pipe still exists (in places), and it was constructed in 1896. It is unlikely to be impacted by the new rebuild of the water intake system. There is, therefore, no additional archaeological mitigation recommended;
- The existing water intake system was constructed in 1944 and is not considered historically or archaeologically significant. There are no recommendations regarding this intake system;
- There were no cultural resources located in the Study Area, other than those associated with the two pipelines noted above, and, therefore, no additional archaeological mitigation is recommended for the remainder of the study area; and
- Compliance legislation must be adhered to in the event of discovery of deeply buried cultural material or features."

*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 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 if additional artifacts or archaeological sites are identified or the report is otherwise found to be inaccurate, incomplete, misleading or fraudulent.

Based on the information in the report, the ministry is satisfied that the fieldwork and reporting for the archaeological assessment is consistent with the terms and conditions for a marine archaeological licence. This report will be entered into the Ontario Public Register of Archaeological Reports. Please note that the ministry makes no representation or warranty as to the completeness, accuracy or quality of reports in the register.

Please feel free to contact me if you have any questions.

Sincerely,

Andrea Williams
Archaeology Review Officer/Marine Archaeology Licensing and Information

c. Adam Moore, CIMA Canada Inc.
Mike Thompson, Town of Petrolia

---

*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 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 if additional artifacts or archaeological sites are identified or the report is otherwise found to be inaccurate, incomplete, misleading or fraudulent.

E

Appendix E: Draft Geotechnical Report

ENVISION
CONSULTANTS LTD

GEOTECHNICAL INVESTIGATION – BRIGHT'S GROVE WATER TREATMENT PLANT (WTP) INTAKE STRUCTURE

2701 Old Lakeshore Road, Bright's Grove, Ontario

EnVision Project #: 23-0360
Prepared for: CIMA Canada Inc.
Date: April 14, 2023

Report Version: 00

6415 Northwest Drive
Units 37-40
Mississauga, ON L4V 1X1
envisionconsultants.ca

April 14, 2023

CIMA Canada Inc.
900-101 Frederick Street
Kitchener, Ontario N2H 6R2

Attention: Adam Moore, M.A.Sc., P.Eng., Project Engineer/Infrastructure

SUBJECT: GEOTECHNICAL INVESTIGATION – BRIGHT'S GROVE WATER TREATMENT PLANT (WTP) INTAKE STRUCTURE, 2701 OLD LAKESHORE ROAD, BRIGHT'S GROVE, ONTARIO

EnVision Consultants Ltd. is pleased to provide the enclosed draft report on Geotechnical Investigation for the upgrade of the Bright's Grove water treatment intake structure at 2701 Old Lakeshore Road, Municipality of Bright's Grove, in the City of Sarnia, Ontario.

We thank you for utilizing EnVision for this assignment. If there are any questions regarding the enclosed report, please do not hesitate to contact us.

Yours sincerely,

Draft

Tim Yu, P.Eng.
Geotechnical Project Manager
tyu@envisionconsultants.ca

QUALITY MANAGEMENT

ISSUE	FIRST ISSUE	REVISION 1	
ENVISION PROJECT NUMBER	23-0360		
PROJECT REFERENCE	Geotechnical Investigation – Bright's Grove Water Treatment Plant (WTP) Intake Structure, 2701 Old Lakeshore Road, Bright's Grove, Ontario		
VERSION NO.	00		
REMARKS	Draft Report		
PREPARED BY	Tim Yu		
SIGNATURE	DRAFT		
REVIEWED BY	Scott Peaker		
SIGNATURE	DRAFT		
DATE	April 14, 2023		

The original of this digital file will be kept by EnVision for a period of not less than 10 years. As the digital file transmitted to the intended recipient is no longer under the control of EnVision, its integrity cannot be assured. As such, EnVision does not guarantee any modifications made to this digital file subsequent to its transmission to the intended recipient.

TABLE OF CONTENTS

LIST OF TABLES *(INCLUDED WITHIN THE REPORT)*

LIST OF DRAWINGS *(ATTACHED TO THE REPORT)*

LIST OF FIGURES

LIST OF APPENDICES

1. EXECUTIVE SUMMARY

EnVision Consultants Ltd. (EnVision) was retained by CIMA Canada Inc. (the 'Client') to conduct geotechnical investigation work in connection with proposed upgrades to the Bright's Grove Water Treatment Plant (WTP) at municipal address 2701 Old Lakeshore Road, Municipality of Bright's Grove, City of Sarnia, Ontario (the 'Site').

The Site is located south of Old Lakeshore Road and east of Waterworks Sideroad. This geotechnical investigation is in support of the replacement of the existing WTP intake chamber, along with the installation of a new 600mm dia. water intake pipe from the Lake Huron shoreline, undercrossing Old Lakeshore Road and the 450mm dia. interconnection from the plant to the new chamber. Geotechnical investigation for the offshore (submerged) portion of the intake was not part of the current work scope.

Based on the currently available conceptual design drawings provided by the Client via email dated February 2nd, 2023, EnVision understands that the 600mm dia. water intake pipe will be installed at a depth of approximately 8.7m below the existing ground surface (Elev. 172.8m) beneath Old Lakeshore Road to the Lake Huron shoreline. The proposed 450mm dia. water piping, which will connect the proposed wet-well chamber to the existing water treatment building, will be installed at a depth of 3.3m below existing ground surface (Elev. 178.2m). The proposed wet-well chamber structure will be set at a depth of 9m below existing ground surface (Elev. 172.5m).

In accordance with the project Terms of Reference No. T001646A, entitled "Town of Petrolia Bright's Grove Intake Design EA request for proposal for geotechnical services", dated November 8, 2022, provided by the Client, EnVision conducted geotechnical investigation work which included the drilling of two (2) boreholes to depths ranging from 12.8 m to 17.4 m below the existing ground surface. Monitoring wells were installed within each of the boreholes upon drilling completion.

The subsurface conditions revealed in the boreholes (BH23-1 and BH23-2) generally consist of topsoil at the ground surface, overlying fill materials of variable texture, which in turn are underlain by the predominant stratum of (native) firm to very stiff silty clay glacial till.

The groundwater levels measured on March 17, 2023 within the monitoring wells installed in Boreholes BH23-1 and BH23-2 were found to be at 1.8m to 5.5m below the existing ground surface corresponding to Elev. 176.1m to 179.7m at the time of measurement. Given the low hydraulic conductivity of the soils in which the screens were set, it is likely that these groundwater level measurements do not yet represent stabilized readings.

It is anticipated that the existing undisturbed firm to very stiff glacial till deposit encountered in the boreholes will provide adequate support for both 450mm dia. and 600mm dia. water pipes and will allow the use of normal Class B type bedding. If deeper fill exists along the pipe alignments, it will need to be sub-excavated and replaced with thickened bedding granulars.

During open cut trenching, water seepage should be controllable by the use of conventional pumping from filtered collection sumps. However, more elaborate dewatering procedures such as closely spaced vacuum or eductor well points may be required if the flow from fill materials cannot be controlled by conventional in-trench pumping methods.

For temporary support of the wet well chamber shaft excavation, use of soldier piles and timber lagging might be considered, coupled with dewatering, or alternatively, use of interlocking steel sheet piles propped with wales and struts may be considered. For the proposed wet well permanent structure, a raft slab system is recommended.

PART A – GEOTECHNICAL FACTUAL DATA

2. INTRODUCTION

EnVision Consultants Ltd. (EnVision) was retained by CIMA Canada Inc. (the 'Client') to conduct geotechnical investigation work in support of the replacement of the Bright's Grove Water Treatment Plant (WTP) intake chamber wet well structure. The Site is located at municipal address 2701 Old Lakeshore Road, Municipality of Bright's Grove, City of Sarnia, Ontario (the 'Site'). A Key Plan and Borehole Location Plan are provided in Drawing No. 1.

Based on the currently available conceptual design drawings provided by the Client via email dated February 2nd, 2023, EnVision understands that the proposed water intake replacement work will consist of the installation of a new 600mm dia. water intake pipe into Lake Huron and the existing intake pipe be decommissioned in place. A new precast concrete wet-well intake chamber will be constructed near the northeast corner of the plant, south of Old Lakeshore Road. The work will also include the installation of a new 450mm dia. water intake piping from the plant building to the chamber.

EnVision was advised by the Client that the current investigation scope is limited to the onshore portion only.

We further understand the 600mm dia. water intake pipe invert will be installed at approximate Elev. 172.8m (about 8.7m below the existing ground surface) across Old Lakeshore Road and the proposed 450mm dia. Interconnection piping will be laid at a depth of 3.3m (Elev. 178.2m). The proposed wet-well chamber base will be set at a depth of approximately 9m below existing grade (Elev. 172.5m).

The objective of this geotechnical investigation was to determine the subsurface soil and groundwater conditions at the borehole locations and from the findings of these borings and associated laboratory and insitu tests, to provide geotechnical recommendations for the proposed inlet chamber structure and piping connections.

This report is presented in two parts; Part A of the report includes factual data and results of the geotechnical investigation at the borehole locations. Part B includes the interpretation of the subsurface data and provides recommendations for the inlet chamber and piping up to the Lake Huron shoreline.

This report is provided on the basis of the terms of reference presented above and on the assumption that the design will be in accordance with the applicable codes and standards. If there are any changes in the design features relevant to the geotechnical analyses, or if any questions arise concerning the geotechnical aspects of the codes and standards, EnVision should be contacted to review the design. It may then be necessary to carry out additional borings and reporting before the recommendations of this office can be relied upon.

The site investigation and recommendations follow generally accepted practice for geotechnical consultants in Ontario. The format and contents are guided by client-specific needs and economics and do not conform to generalized standards for services. Laboratory testing for the most part follows ASTM or CSA Standards or modifications of these standards that have become standard practice.

This report has been prepared for CIMA Canada Inc. and the Town of Petrolia. Third party use of this report without EnVision's consent is prohibited. The limitation conditions presented in this report form an integral part of the report and must be considered in conjunction with this report.

3. FIELD INVESTIGATION AND TESTING

3.1. FIELDWORK

The field investigation consisted of drilling two (2) boreholes, which were designated as BH23-1 and BH23-2. The boreholes were drilled to depths ranging from 12.8 m to 17.4 m below the existing ground surface. The locations of the boreholes are shown on the Borehole Location Plan (Drawing No. 1). Monitoring wells of 50mm diameter were installed in these boreholes upon drilling completion.

The as-drilled borehole locations were surveyed by EnVision personnel using differential GPS. The borehole coordinates and ground geodetic elevations at the borehole locations are summarized in Table 3-1 as well as presented in the Record of Borehole sheets in Appendix A. A summary of borehole information is also provided in Table 3-1.

Table 3-1: Summary of Borehole Information

BOREHOLE ID	GROUND SURFACE ELEVATION (m)	BOREHOLE COORDINATES UTM NAD83, ZONE 17		DEPTH OF BOREHOLE (m)	NOTE
		NORTHING (m)	EASTING (m)		
BH23-1	181.48	4765296.5	398013.6	17.37	50mm MW
BH23-2	181.64	4765319.6	398012.9	12.80	50mm MW

The field investigation work of borehole drilling was carried out on March 7 and 8, 2023, by Direct Environmental Drilling Inc. with technical supervision provided by EnVision personnel. The boreholes were drilled using a Diedrich D-50 track-mounted drill rig and were advanced through the overburden soils using nominal 203 mm outer diameter, hollow stem augers. Split spoon samples were retrieved at regular intervals with a hammer weighing 624 N and dropping 760 mm as per ASTM D1586. This sampling method recovers samples from the soil strata, and the number of blows required to drive the sampler 0.3m depth into the undisturbed soil (SPT 'N'-values) gives an indication of the compactness condition or consistency of the sampled soil material. The SPT 'N' values are indicated on the Borehole Log sheets (Refer to Appendix A).

Technical supervision of the field work was carried out by EnVision's engineering staff who arranged for the clearance of underground public and private utility locate services, supervised the sampling and in situ testing operations and logged the boreholes. The soil samples were identified in the field, placed in labelled containers and transported to EnVision's laboratory for further examination and testing.

Within the firm to stiff clayey stratum, insitu undrained shear strength measurements (intact strength and remolded) were conducted using the tapered vane apparatus in general accordance with ASTM D2573.

3.2. MONITORING WELL INSTALLATION

Monitoring wells were installed in Boreholes BH23-1 and BH23-2 upon completion of drilling. The monitoring wells were constructed using 50mm diameter environmental-grade, flush-threaded polyvinyl chloride (PVC) pipe including a screen section with a factory machined slot (10) width of 0.25mm and were completed with a PVC riser pipe. All of the pipe material and screen sections were wrapped in plastic which was removed just prior to installation to minimize the potential for contamination. The base of the monitoring well was covered with a PVC cap to prevent the influx of sediment. Clean silica supplied in bags from a commercial supplier of well sand was placed in the annular space between the pipe and the walls of the borehole. The monitoring wells were constructed in accordance with Ontario Regulation 903 (amended by O. Reg. 372/07) by extending an impermeable bentonite grout layer from approximately 0.6m above the top of the screened interval to the ground surface. The monitoring wells were completed by installing a protective well cover finished with stick-up and flush-mount casings. Well construction details are provided on the respective borehole logs presented in Appendix A.

3.3. WELL DECOMMISIONING

The monitoring wells described in Section 3.2 have not been decommissioned. The monitoring wells must be decommissioned in accordance with O. Reg. 903 (as amended) by an MECP licensed water well contractor prior to commencement of construction work.

3.4. GEOTECHNICAL LABORATORY TESTING

The laboratory testing program consisted of the measurement of the natural moisture content of all available soil samples and the results are presented on the respective borehole logs. Grain size analyses were conducted on a total of four (4) selected samples and four (4) Atterberg Limits tests were conducted on the same samples. The gradation curves and Atterberg Limits test results are presented in Appendix B and on the respective borehole log sheets in Appendix A.

4. SUBSURFACE CONDITIONS

The borehole locations are shown in Drawing No. 1. The terms used in the record of boreholes and general notes on soil descriptions are presented in Appendix A. The subsurface conditions in the boreholes are presented in the individual borehole log sheets attached in Appendix A and are summarized in the following paragraphs.

The stratigraphic boundaries shown on the borehole records are inferred from observations of drilling progress and non-continuous sampling and, therefore, represent transitions between soil types rather than exact planes of geological change. The subsurface conditions will vary beyond the borehole locations.

4.1. SOIL CONDITIONS

Borehole BH23-1 was drilled within the property of the Bright's Grove WTP and Borehole BH23-2 was drilled on the public right of way, north of road boulevard of Old Lakeshore Road. The subsurface conditions in the boreholes consisted of topsoil at the ground surface, overlying fill materials comprised of silty clay and silty sand to sandy silt, which in turn are underlain by the predominant silty clay till deposit. A more detailed description of the subsurface conditions encountered in the boreholes is provided below.

4.1.1. Topsoil

An approximately 200mm to 300mm thick layer of topsoil was encountered at the ground surface at the locations of Boreholes BH23-1 and BH23-2.

4.1.2. Fill Materials

Below topsoil, fill material was encountered in Boreholes BH23-1 and BH23-2 which extended to depths ranging from 2.3m to 3.1m below ground surface. The fill generally consisted of silty sand to sandy silt and silty clay with trace to some gravel and some organic staining.

Obstructions were encountered in Borehole BH23-2 at about 3m below existing grade. At the second attempt, this borehole was shifted 0.9m to the east and 1.4m to the south, obstructions were still encountered at the same depth of 3m below existing grade. Following the second refusal, a third attempt was made, shifting the boring an additional 1.5m east and 2.9m south. This third boring location successfully reached the proposed termination depth without encountering obstructions. It is possible that the obstructions represent buried/backfilled shoreline armour stone.

Standard Penetration Test (SPT) 'N' values measured in the cohesionless fill materials ranged from 4 to 11 blows per 0.3m of penetration, corresponding to a loose to compact state of compactness. The SPT 'N' values in the cohesive fill material were in the range of 4 to 20 blows per 0.3m of penetration, corresponding to an inferred firm to very stiff consistency.

The natural moisture contents measured in the tested samples from fill material ranged from 8 to 22%.

4.1.3. Silty Clay Glacial Till

In both Boreholes BH23-1 and BH23-2, a pervasive deposit of native silty clay glacial till was encountered below the fill materials at depths of 2.3m to 3.1m below the existing ground surface. This glacial till deposit extends beyond the terminal depth of the boreholes (i.e., > 17.4m bgs). Although there was no recovery of cobbles and/or boulders within the silty clay till samples during drilling, glacial till deposits in Southern Ontario typically contain such obstructions, and therefore they should be expected to be present.

The SPT 'N' values measured within the silty clay till ranged from 4 blows to 22 blows per 0.3 m of penetration, suggesting a firm to very stiff consistency. The moisture content measured in the tested samples of silty clay till ranged from 14 % to 24%. Undrained shear strength measured insitu by means of borehole vane shear test, indicated strengths of 59 to 92 kPa (stiff consistency), with an average of 76 kPa in the lower clay till deposit. Sensitivities were in the range of 1.4 to 7.0.

Grain size analyses were carried out on four (4) selected samples of the silty clay till. The grain size distribution test results indicated that the sample contained 1% to 2% gravel, 20% to 22% sand, 46% to 49% silt, and 27% to 33% clay size particles.

Atterberg limits testing on the same silty clay samples indicated liquid limits of about 28% to 33%, plastic limits of 15% to 16%, and a corresponding plasticity index of 13% to 17%. The results of grain size distribution and Atterberg Limits tests on the silty clay till samples are presented in Appendix B and are summarized in *Table 4-1*.

Table 4-1: Summary of Grain Size Distribution and Atterberg Limits Test on Silty Clay Till Samples

BOREHOLE NO.	SAMPLE NO.	AVERAGE SAMPLE DEPTH (m)	GRAIN SIZE DISTRIBUTION				ATTERBERG LIMITS			SOIL TYPE
			GRAVEL (%)	**SAND (%)**	**SILT (%)**	**CLAY (%)**	**LIQUID LIMIT**	**PLASTIC LIMIT**	**PLASTICITY INDEX**	
BH23-1	SS5	3.3	2	22	49	27	28	15	13	CL
BH23-1	SS10	11.0	1	20	48	31	31	16	15	CI
BH23-2	SS6	4.8	1	20	46	33	33	16	17	CI
BH23-2	SS8	8.0	1	21	47	31	30	15	15	CL

4.2. GROUNDWATER CONDITIONS

The groundwater levels measured in the monitoring wells are summarized in

Table *4-2* and are also shown in the borehole log sheets attached in Appendix A. The groundwater levels measured on March 17, 2023 in the monitoring wells installed in Boreholes BH23-1 and BH23-2 were found to be at 1.8m to 5.5m below the existing ground surface corresponding to Elev. 176.1m to 179.7m.

Table 4-2: Summary of Groundwater Levels Observed in the Monitoring Wells

BOREHOLE NO.	GROUND SURFACE ELEVATION (m)	WELL SCREEN DEPTH (m) [SCREENED STRATIGRAPHY]	DATE OF OBSERVATION	GROUNDWATER LEVEL DEPTH (m)	GROUNDWATER LEVEL ELEVATION (m)
BH23-1	181.5	3.1 – 6.1 [Silty Clay Till]	Mar. 17, 2023	1.8	179.7
BH23-2	181.6	3.1 – 9.1 [Silty Clay Till]	Mar. 17, 2023	5.5	176.1

Given the very low hydraulic conductivity of the soil in which the well screens were set, it is likely that the above listed groundwater level measurements do not yet represent stabilized readings.

It should be noted that the groundwater levels are subject to seasonal fluctuations and in response to precipitation events and should be expected to be higher during wet periods of the year. Perched water should be expected in the fill materials. Groundwater levels, may, to some extent also communicate with Lake Huron levels.

5. ANALYTICAL TESTING – CORROSIVITY PARAMETERS & WATER SOLUBLE SOIL SULPHATES

Two (2) soil samples from Boreholes BH23-1 and BH23-2, were collected and submitted to ALS Canada Ltd. (ALS) laboratories in Mississauga, Ontario for analysis of parameters used to assess corrosion potential towards buried ferrous metal and sulphate attack against buried Portland cement concrete. A summary of the results of pH, redox potential, resistivity, sulphide, conductivity, and moisture content is presented in *Table 5-1* and the Certificates of Analysis are provided in Appendix C.

Table 5-1: Summary of Corrosivity Parameters

BH NO./ SAMPLE NO.	APPROXIMATE SAMPLE DEPTH (m)	SOIL TYPE	RESISTIVITY (ohm-cm) (POINT)	pH (POINT)	REDOX POTENTIAL (mV) (POINT)	MOISTURE CONTENT (%) (POINT)	SULPHIDE (mg/kg) (POINT)	TOTAL POINTS
BH23-1 SS3	1.5 – 2.1	Silty Sand Fill	3820 (0)	7.68 (0)	242 (0)	15.6 (1)	<0.23 (0)	1
BH23-2 SS8	7.6 – 8.2	Silty Clay Till	3440 (0)	8.01 (0)	208 (0)	15.3 (2)	<0.23 (0)	2

The corrosivity results were compared to Table A.1 *(Soil-test evaluation)* of the American Water Works Association (AWWA) C105/A21.5-10 (2010) Standard to determine the total points for each corrosivity parameter. The selected soil samples recovered from Boreholes BH23-1 and BH23-2, having total scoring of 1 and 2 points, respectively, which are not considered to be usually corrosive toward gray or ductile cast iron pipe or ferrous pipe appurtenances (joint restrainers, fittings, valves, etc.). There may be other over-riding factors that govern the need for corrosion protection, such as stray currents, application of de-icing salts to the roadway, etc.

Two (2) samples noted in the above section, were also analysed for water-soluble soil sulphate content to assess the potential for degradation of buried concrete in contact with the encountered soils. The test results are summarized in *Table 5-2.*

Table 5-2: Summary of Water-Soluble Soil Sulphate Content Test Results

BH NO./ SAMPLE NO.	APPROXIMATE SAMPLE DEPTH (m) (ELEVATION) (m)	SOIL TYPE	WATER SOLUBLE SULPHATE (µg/g) [%]
BH23-1 SS3	1.5 – 2.1	Silty Sand Fill	70 [0.007%]
BH23-2 SS8	7.6 – 8.2	Silty Clay Till	125 [0.0125%]

The analytical test results for sulphate were compared to CSA A23.1 Table 3 (*Additional Requirements for Concrete Subjected to Sulphate Attack*) to assess the potential severity of sulphate attack on concrete during its service life. The sulphate concentration measured indicates the soil tested is less than 0.1 per cent, which is below the moderate degree of exposure (i.e., below the Class S3 exposure limits).

The civil design engineer should review these results to make their own determination of the appropriate exposure class and potential aggressiveness of the soils, and to ensure that all aspects of CSA A23.1 Section 4.1.1 (Durability Requirements) and the project design requirements are satisfied.

PART B –GEOTECHNICAL INTERPRETATION AND RECOMMENDATIONS

6. DISCUSSION AND RECOMMENDATIONS

In this section, the soil and groundwater conditions are interpreted as relevant to the design of the proposed works. The purpose of this section is to provide geotechnical recommendations based on the factual subsurface conditions (Part A of this report).

Recommendations provided in this report must not be construed as representing specifications or directives to prospective contractors nor as being the only suitable methods. The readers of this report are also reminded that the conditions are known only at the borehole locations and in view of the limited number of the boreholes, conditions may vary significantly between the boreholes.

EnVision recommends that as-constructed drawings of the shoreline erosion protection armour stone be obtained and reviewed by the civil designers to ensure that there are no conflicts with the proposed infrastructure or, in case conflicts do exist, that they be mitigated in the design.

6.1. OVERVIEW OF SUBSURFACE CONDITIONS

The subsurface conditions revealed in Boreholes BH23-1 and BH23-2 generally consisted of topsoil overlying fill materials which extended to 2.3m to 3.1m below the existing ground surface at the boring locations. The fill materials are underlain by native, firm to very stiff, silty clay till deposits which extend beyond the boring termination depths of 12.8m and 17.4m below the existing ground surface.

Groundwater levels measured on March 17, 2023 in the monitoring wells installed in both Boreholes BH23-1 and BH23-2 were found to be at 1.8m to 5.5m below the existing ground surface corresponding to Elev. 176.1m to 179.7m. We understand that the Lake Huron 100-Year Storm water levels in this area are approximately Elev. 178m.

Perched water should be expected, in addition to seepage from any existing utility backfill and bedding materials. For design purposes, the groundwater level shall be taken as 1m higher than the measured groundwater level in the nearest monitoring well installed within the overburden or the 100-Year Storm level, whichever is higher.

6.2. DESIGN FROST DEPTH

Foundations exposed to seasonal freezing conditions must have at least 1.2m of earth cover for frost protection purposes. Water conveyance piping is recommended to have at least 1.8m of soil cover or equivalent exterior-grade extruded rigid polystyrene insulation.

6.3. COBBLES AND BOULDERS

As mentioned previously in this report, the northerly borehole had to be relocated several times after striking buried obstructions and experiencing auger refusal at depths of about 3m below grade. It is possible that auger refusal was encountered on buried armour stone, however, this is a supposition only and test pits would be needed to state this with certainty.

There were no obvious indications of obstructions encountered in the native glacial till soil during the borehole drilling. However, glacial till deposits in Southern Ontario typically contain such obstructions. The current investigation method of borehole drilling could not determine the size and frequency of any cobbles and boulders. Cobbles are defined as rock fragments that cannot pass through a screen with 75 mm square openings and are less than 300 mm in maximum dimension. Boulders are defined as rock fragments with their maximum dimension being equal to or greater than 300mm.

6.4. WATER INTAKE PIPE INSTALLATION BY TRENCHLESS METHODS

EnVision was advised by the Client that the installation of proposed 600mm dia. water intake pipe between the new chamber and the waters edge at Lake Huron could potentially be installed using trenchless methods despite the obvious very high cost associated with this method. This is because the shoreline protection armour stone work along the lake front was only recently completed.

Based on the provided conceptual design drawing (entitled "Town of Petrolia Bright's Grove WTP Raw Water Intake") provided by the Client via email dated February 2nd, 2023, the invert of the proposed 600mm dia. intake pipe will be set at approximate Elev. 172.8m, which is about 8.7m below existing Old Lakeshore Road grade. The locations and depths of the sending and receiving shafts were not available at the time of preparation of this report, however, it is assumed that the shaft near the chamber would be not deeper than about 9.7m below the existing ground surface (Elev. 171.8m).

In the following sections, the geotechnical conditions as determined at two boring locations are reviewed as relevant to the trenchless installation of the proposed intake pipe and recommendations are given for the design. Construction-related comments in the report should not be regarded as suggestions or recommendations to contractors since the comments do not address all aspects of construction, such as scheduling, suitable types of equipment, rate of production, etc. Contractors should, therefore, evaluate the factual information presented in the appendices of the Geotechnical Investigation Report (i.e., Part A of the report.), and supplement these where it appears to be needed and should base their bid on their own interpretation of the data presented, coupled with their experience with similar projects in a similar geological environment.

6.4.1. Overview of Subsurface Conditions for Trenchless Installation

The boreholes revealed a relatively simple stratigraphy consisting of heterogeneous cohesionless sandy silt to silty sand and cohesive silty clay fill materials. It should be noted that obstructions were encountered during the drilling at the Borehole BH23-2 location (close to the shoreline) at approximately 3m below ground surface. The obstruction was suspected to be buried armour stone, forming part of the shoreline protection system. Design drawings illustrating the depth and geometry of the shoreline protection system were not available to EnVision at the time of preparation this report.

Below the fill materials, a silty clay till deposit was encountered which extends beyond the borehole termination depth of 17.4m below existing ground surface.

Based on the SPT data and insitu shear vane tests, this silty clay till in the proposed trenchless horizon is expected to have a stiff consistency. The tunnel face is expected to wholly lie in this cohesive silty clay till deposit based on the available two borings.

The silty clay classifies under the Unified Soil Classification system as being a 'low to medium plasticity clay'. Contractors will find this material to be 'sticky' in nature with propensity to adhere to casings, to cutting tools and conveyance equipment. Polymers additives may be needed to prevent the clay bore from swelling and sticking to the tooling and conveyance equipment.

All of the soils removed from the bore will have moderately high-water content. These excess soils have no geotechnical value given their high-water contents and they cannot be reused in any structural fill placement application except possibly as bank dressing on flat landscaped slopes, no steeper than 5H:1V. These soils will afford poor trafficability.

The groundwater levels in the monitoring wells indicate that groundwater level elevations to lie above the proposed trenchless horizon and in the range from Elev. 179.7m (south) to 176.1m (north) [as measured on March 17, 2023].

The characteristics and relevant properties of the main soil types are described in the previous sections of this report and reference should also be made to the individual borehole logs and the laboratory test data found in the appendices.

6.4.2. Anticipated Ground Behavior

Information available from the boreholes suggest that in the proposed zone of the trenchless bore, near elevation 172.8m, will primarily be advanced within the glacial till deposit of silty clay, some sand, trace gravel texture.

The trenchless contractor may expect the tunnel face behaviour, further to the Tunnelman's Ground Classification and Probable Working Conditions (Appendix D) to be primarily "Squeezing" to "Firm" or possibly "Bouldery". The trenchless equipment, including cutterheads and muck conveyance equipment, must be capable of dealing with the cohesive, potentially sticky, moist soil material, occasional cobbles/boulders as well. There is a possibility of encountering thin cohesionless lenses within the cohesive till that have dilatant behaviour.

6.4.3. Groundwater Control

As mentioned above, it is anticipated that the crossing will be advanced below the groundwater level. It should be noted that local perched groundwater will also be encountered in the fill materials. Discontinuous perched lenses of granular soils and existing utility bedding containing groundwater may exist within proposed tunnelling depths, which may be source of intermittent groundwater seepage, requiring appropriate management. It should be recognized that groundwater and saturated soil levels may be influenced by precipitation as well as seasonal fluctuations.

The bore horizon will mostly be confined to a low permeability cohesive till with silty clay, some sand texture in which groundwater seepage is expected to be low. Exception might occur where lenses of more pervious silt and sand are embedded within the till deposit, although flow through these layers is expected to be slow to

moderate and such lenses were not apparent in the split spoon samples. Continuous advancement of the bore though these soils is recommended in order to minimize the available time for setup of sticky clay soil around the casing and to minimize the potential for dilation and loss of stability where thicker silt seams are encountered in the face of the bore.

It is expected that the shaft excavations can be passively dewatered using filtered sumps and trash pumps set into the base of the shafts as they are dug down.

Depending on the groundwater pumping rates, permitting may be required from Ministry of Environment, Conservation and Parks (MECP). Permitting requirements as a function of dewatering rates are as follows:

- Takings of greater than 400,000 L/day at any one time for the project will require a Category 3 Permit To Take Water (PTTW);
- Takings of greater than 50,000 L/day but less than 400,000 L/day at any one time for the project will require registration as an Environmental Activity and Sector Registry (EASR); or

Takings of less than 50,000 L/day at any one time do not require a permit.

For more comments on the groundwater control, reference should be made to hydrogeological study for the site.

6.4.4. Shaft Base Stability Against Boiling/Heave

The shaft bases are assumed to be set no deeper than approximate elevation 171.8m as the shaft depth, D is expected to be 9.7m deep. At this level, the piezometric level will lie above the shaft base.

For the relatively simple stratigraphy at this site, modelled as an isotropic, homogenous deep silty clay till and using the lower bound undrained shear strength, ignoring the stiffer crust material, the shaft base stability equations of Terzaghi (1943) and Bjerrum & Eide (1956) can be applied. If the flexural strength contribution of shoring that extends below the excavation base is ignored, the factor of safety is simplified as:

$$F = (N_c C_u) / (\sigma_S + \gamma H)$$

Where :

N_c = stability number [function of the depth (D) to width (B) ratio as indicated in Figure 1]

γ = bulk soil unit weight, assume 20 kN/cum

D = depth to base of cut, assume 9.7m

C_u = undisturbed undrained shear strength, (67 kPa from in-situ shear Vane test)

B = shaft width, assume 4m

L = shaft length, assume 10m

σ_S = surcharge pressure on ground surface adjacent to shoring

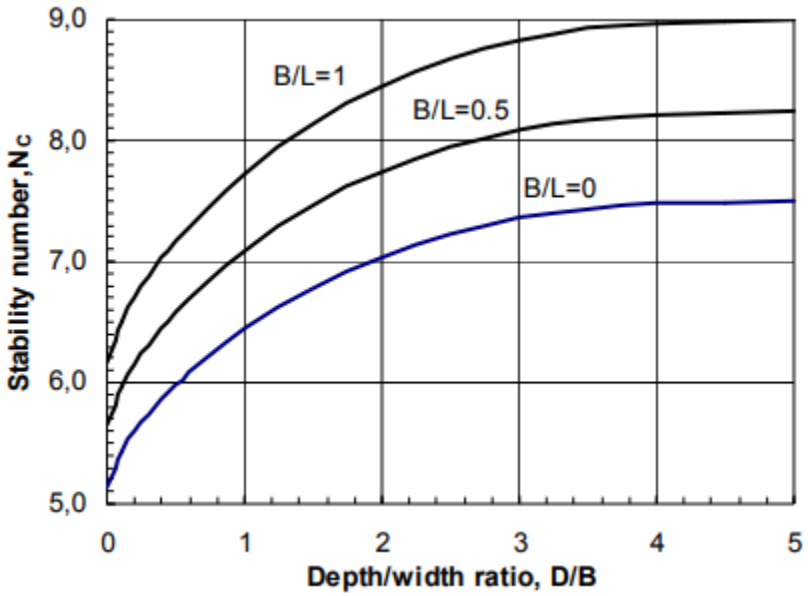


Figure 1 – Stability Number, Nc as a function of shaft dimensions and depth

For a typical shaft of say 4m by 10m B/L = 0.4, Nc ~ 7.6

Assuming a surcharge pressure of 20 kPa (to be adjusted by the shaft design-builder based on their methods and equipment):

The shaft base factor of safety is at least 2.3 and is considered satisfactory as far as basal heave in clay till is concerned.

The soils at the bases of the proposed shaft are easy to disturb. It is recommended that the shaft base should be protected by placing a 200mm deep GeoWeb cellular confinement system over a non-woven geotextile such as Terrafix 270R. The GeoWeb Should be infilled with 19mm clear limestone to OPSS1010 and then covered with the same non-woven geotexitile.

6.4.5. Alternative Trenchless Crossing Methods

Considering the ground conditions that exist at the site, the technical merit / drawbacks of various trenchless crossing alternatives are summarized in the following sections.

6.4.5.1 Modified Auger Boring

Modified Auger Boring (MAB) is conceptually similar to conventional auger boring (AB), in that is uses the same technologies as traditional Auger Boring (AB) with the addition of a more specialized steering head system. A powerful auger bore machine combined with the steering system can allow for drive lengths of up to approximately 150 metres in certain soils. The specialized steering system allows for the monitoring and adjustment to lateral deviations and also allows for the monitoring and of adjustment of pitch. The line and grade can be monitored on almost a real-time basis, this allows for minor adjustments as needed. The

steering head system is designed so the throat of this machine is reduced in size. In mixed faced conditions, MAB has the ability to control or adjust the position of the auger head within the casing which allows for adaptation to varying soil conditions. The combination of the auger bore machine and the steering head allows for the ability to control the location of the auger head within the casing and regulates the amount the auger turns. Pressure at the face can be maintained and reduce running ground. The steering system can be equipped with nozzles at the face that allow for injection of additives or stabilization agents to assist in controlling any ground loss as well as reducing frictional resistance between the pipe and the soil. The ability to deliver additives to the face has some advantages at this site in terms of dealing with stickiness in clay soils.

6.4.5.2 Auger Boring

Auger boring (AB) also referred to as "jacking and boring" is a trenchless installation technique that forms a horizontal bore from a drive to a reception shaft by means of a rotating cutting head. Helical auger flights transport the spoil back to the drive shaft inside a steel casing that is being jacked in place simultaneously as the excavation progresses. AB is typically a 2-stage process: stage 1 comprises casing installation, while stage 2 is the carrier pipe installation.

In most commonly track-type AB system, the track system, boring machine, casing, cutting head and augers are employed to install the pipe. The system critically depends on a properly constructed drive shaft which requires a stable foundation to support the tracks and adequate thrust block to transmit the horizontal jacking forces to the ground at the rear of the shaft.

AB has limited tracking and steering capability and it does not provide support to the excavation face and has no ability to deal with flowing unstable face conditions. With a special grade control steering head, the grade can be better maintained throughout the bore length. Alignment is most difficult to control and with the horizontal directional control the leading end of the steel casing can be installed with 150 mm accuracy. In general, an accuracy of 1% of the bore length is achievable in stiff cohesive soils. Adjustment and grade maintenance may be impossible in weak or dilatant soils.

Typical AB application involves underground pipe jacking of comparatively small diameters, from 0.1m to 1.4m with drive lengths of up to about 120m. AB systems have the capability of handling boulders or cobbles that are smaller than about 30% of the casing diameter. For bores greater than 900mm diameter, auger removal and personnel entry is needed to break up the boulders. Typical entry and exit bore pits are ~12m long and ~4m wide.

To reduce the risks associated with the AB method and improve the stability of the face, the following ground improvement method could be considered (the benefits achieved are highlighted in brackets):

1. Continuous 24/7 tunneling (maintain face stability, reduced adhesion/set up between casing pipe and ground). It must be emphasized that the above measures will reduce but will not eliminate all the risks.

The stiff to very stiff clayey till soils at this site are amenable to auger boring methods as long as provisions are in place to accommodate the breakup and conveyance of cobbles and boulders, should any be encountered.

6.4.5.3 Microtunelling

Microtunnelling (MT) is remotely controlled, guided pipeline installation technique that provides continuous support to the excavation face. Excavation is accomplished by a Micro Tunnel Boring Machine (MTBM). A slurry shield MTBM is generally more capable of handling wet, unstable ground conditions, and dealing with cobbles and boulders.

The amount of friction generated when the pipe is pushed into the ground is an important consideration. This friction contributes to the jacking resistance and is a major factor in determining the required capacity of the main thrust rams, and the requirements for intermediate jacking stations. The magnitude of the pipe friction depends on the pipe size and material, type of soil, its moisture content and grading, the details of the construction equipment and procedures employed. A pipe lubrication system may be introduced (usually based on bentonite and/or polymer slurry) to reduce jacking forces (the most common reduction factor is around 25%).

Due to relatively large jacking forces the design and construction of the jacking shaft are critical. The shaft floor and thrust reaction structure must be designed to withstand the weight of heavy pipe segments. Primary jacking pit is usually 5m long and 3m wide.

There is no theoretical limit to the length of individual pipe jacks although practical engineering considerations and economics may impose restrictions. Drives of several hundred metres either in a straight line or to a radius or a series of radii are achievable. The most common drive lengths range from 150 m to 300 m for slurry MTBM provided that intermediate jacking stations are launched every 75m.

The method is quite accurate and a tolerance of 25 mm on line and grade is attainable.

A large laydown area is needed for the subsoils separation support plant. The liner pipes must be designed for the earth, groundwater pressure and jacking forces.

Given the relatively short length of the proposed bore and the fact that the soils expected in the face are primarily cohesive, the use of microtunneling methods is deemed not justifiable and not cost-effective for this project.

6.4.6. Ground Movements

Invariably there is almost always some ground movement, deformation and settlement associated with tunneling regardless of the method used. With the right method, equipment, and good workmanship these movements, however, can be kept to a minimum.

At the recommended invert levels the earth cover above the primary liner (existing public road – Lakeshore Road) will be about 8.4m deep to the central axis.

The theoretical soil ground settlement induced by tunnelling can be estimated using a semi-theoretical method originally proposed by Peck (1969). In the method, the ground settlement induced by tunnelling is described by a Gaussian distribution curve as follows:

$$S_v = S_{\max} \exp\left(\frac{-x^2}{2i^2}\right)$$

where,

Sv is the vertical settlement;

$Smax$ is the maximum ground settlement on the tunnel central line;

$$S_{\max} = \frac{0.313 V_L D^2}{K z_o}$$

where,

V_L is the ground loss (ratio of ground loss volume/tunnel volume per meter length);

D is the diameter of tunnel;

K is the trough width parameter and taken as 0.5 and 0.25 for tunneling in clay and sands or gravels respectively. In this analysis, K is taken as 0.5.

$$i = K z_o$$

where,

i is the horizontal distance from the tunnel central line to the point of inflexion on the settlement trough,

Z_o is the depth of the tunnel axis,

x is the horizontal distance from the tunnel central line

Based on our preliminary analysis, assuming a bore size of about 600 mm and a maximum 2% ground loss during tunneling, the maximum settlement at ground surface above the center line of the tunnel is estimated to be approximately 1mm on the existing grade of Old Lakeshore Road.

These settlements are considered to be acceptable and a volume loss less than 2% is achievable in the anticipated soils with good workmanship.

The foregoing volume loss and estimated resulting settlements at existing road grade assume good workmanship, continuous tunneling operations and no exceptional circumstances such as churning on boulders or uncontrolled inflow of soil into the casing at the face. In such instance, significantly greater loss of ground and settlement will occur which will result in exceedance of the tolerable settlement limits.

Special attention should be given to existing nearby structures and utilities.

6.4.7. Shafts

Shafts will be used to launch and receive the tunneling equipment.

The design and construction of the temporary shaft support will be the responsibility of the contractor who must retain a specialist shoring design engineer. Shoring design must follow the requirements of the 4th Edition of the Canadian Foundation Engineering Design Manual.

The temporary shoring should be designed using the apparent earth pressure envelopes shown in Drawing 3. or sheet piling.

A surcharge load acting on the ground surface must also be added to the apparent earth pressure distribution (to be determined by contractor based on equipment proposed and proximity of equipment to shaft).

To the lateral earth pressures, hydrostatic groundwater pressure must also be added in the fill portion of the overburden and as a surcharge load above the native clay stratum. Refer to the piezometric levels indicated on the borehole logs for the groundwater elevation.

If construction is carried out during freezing temperatures the shored walls must be protected against frost penetration and the buildup of frost pressure behind the wall.

6.5. INTAKE PIPE INSTALLATION BY OPEN CUT METHODS

As an alternative installation method of the 600mm dia. water intake pipe (land portion), consideration can be given to open cutting. It is assumed that the proposed 450mm dia. water inlet will be installed using conventional open cut methods. Based on the provided conceptual design drawing (entitled "Town of Petrolia Bright's Grove WTP Raw Water Intake") provided by the Client via email dated February 2nd, 2023, the invert of the proposal 400mm dia. and 600mm dia. water intakes will lie at approximate Elev. 178.2m and Elev. 172.8m respectively, corresponding 3.3m and 8.8m below the existing ground surface. Excavations for the construction of these water pipes will primarily by through fill materials and into the underlying glacial till deposit of silty clay.

Trenching in the above noted soil types using conventional excavating equipment is feasible. The presence of obstructions such as concrete and rubble material within the surficial fill material is possible.

Anomalous trenching conditions with greater potential for wall collapse could also occur in instances where the pipe trench encroaches on existing utility trenches. Perched water might also be encountered in such cases where existing trench backfill, and bedding are intercepted by the new trench.

The anticipated generic behaviour of the soils as related to the support of the pipe and the stability of open cut excavations are summarized in Table 6-1 and is discussed in the following paragraphs.

Table 6-1: Soil Behavior in Open Cut

SOIL TYPE	PIPE SUPPORT	STABILITY DURING CONSTRUCTION IN OPEN CUT EXCAVATION	POSSIBLE MEANS OF GROUNDWATER CONTROL
EXISTING FILL	Not suitable Remove weak fill down to top of native glacial till soils and replace with compacted Gran. 'A'	Stable at 2H:1V (unstable below groundwater table)	Closely spaced vacuum well points for trenches <5m deep Closely spaced eductors for trenches >5m deep
NATIVE SILTY CLAY TILL	Satisfactory for Class B bedding	Stable at 1H:1V	Gravity drainage and pumping from filtered sumps established inside the base of trench plus the requirements noted above for the existing fill

6.5.1. Trench Stability and Dewatering

The groundwater level measured within the installed monitoring well within the WTP property (in the proximity of proposed 450mm dia. pipe alignment) was at a depth of 1.8m below the existing ground surface (approximate Elev. 179.7m) and the monitoring well installed along the proposed 600mm dia. water pipe was at a depth of 5.5m below the existing ground surface (approximate Elev. 176.1m at the time of observation. Based on the borehole information and measured groundwater levels in the monitoring wells, the anticipated excavation bases will be below the groundwater levels.

Given the low permeability nature of the native silty clay till, groundwater seepage through this deposit is expected to be low. As such, much of the water seepage should be controllable by the use of conventional pumping from collection sumps for trenches. However, more elaborate dewatering procedures such as closely spaced vacuum or eductor well points may be required if the flow from fill materials or native cohesionless deposit layers is not controlled by conventional methods. The groundwater table must be lowered to at least 1.0m below the deepest excavation base to maintain the stability of the founding bases. EnVision recommends that test pits be dug at multiple locations along the pipe alignment during the detailed design stage in order to further assess groundwater seepage and the stability of the trench walls.

EnVision has carried out a hydrogeology study at the subject site. More comments regarding the type and extent of groundwater control required will be provided in the hydrogeology report.

All excavations must be carried out in accordance with the most recent Occupational Health and Safety Act (OHSA). In accordance with OHSA, the existing fill can be classified as Type 3 Soil above the water table and as Type 4 Soil below the groundwater table. The stiff to very stiff native silty clay till deposit can be classified as Type 2 Soil. For excavations passing through multiple soil types, the side slope geometry is governed by the

highest number Soil Type designation. These are generic, broad-brush classifications and must not be used for detail design/specifications. Competent Persons employed by the Constructor must observe the nature and behaviour of excavated soils in the trenches and re-classify the OHSA Soil Type accordingly.

Reference to Drawing No. 2 indicates theoretical zones proximal to trenches and excavations at which offset distance some degree of movement of the ground can be anticipated as a consequence of trench excavation. In this respect, it should also be noted that less ground movements will be experienced outside the excavation if the sides of the excavation are properly supported by tight, braced sheeting than if the sides are unsupported. Ground movements would be further reduced if the bracings were to be pre-stressed.

6.5.2. Use of Trench Box for Trench Wall Support

Where permissible under the OSHA, contractors often elect to utilize trench boxes for temporary trench support.

While in many situations, the use of trench boxes can result in a high rate of productivity in trenching, it is not without some technical drawbacks. These include:

- Increased loss of ground relative to many other shoring methods;
- Reduced ability to compact backfill between the trench wall and trench box; and
- Potential at these sites for the weak existing clayey fill soils from adjacent utility trenches to squeeze in on the trench box making it more difficult to slide along the trench.

Ground loss, raveling and/or loosening of soils will occur when using a trench box prior to its installation and while moving the box, particularly in pre-existing fill as present at this site.

Granular courses below existing pavements are particularly susceptible and significant undermining can occur (if open cut method being used for 600mm dia. water pipe installation). It is important that the trench not be over-excavated to ensure a tight fit between the box and the trench walls. Trench boxes need to be installed expediently. When moving the box, the void space between its outer walls and the trench must be backfilled and compacted. This may require raising the box sequentially prior to sliding it laterally. If this is not done, post-construction settlements will occur along the trench walls.

Where trench boxes are used in the existing roadways, it is prudent to expect pavement structure settlement along both sides of the trench. In such cases, following backfilling of the trench, road reconstruction should include a provision for saw cutting of the asphalt and concrete road base at least 0.3m back from the trench walls, re-compaction of the upper trench backfill and then paving.

It is recommended to follow OPSD 509.010 *Pavement Reinstatement for Utility Cuts in Hot Mix Pavement* (i.e., pavement step joint detail) or the equivalent County of Lambton or City of Sarnia Standards as far as the joint between new pavement patches and existing pavement is concerned.

Where trench depths exceed 6.0m and in Type 4 Soils of any trench depth, "Engineered Support Systems" as defined under the OHSA are mandated under the OHSA.

6.5.3. Trenching Adjacent to Existing Services

In areas where the new water intake trench will impinge on existing utility trenches or pass through existing fill soils, unstable trench conditions can occur, particularly where granular backfill, clear stone, high performance backfill, or poorly compacted fill of any type are present. In such cases, raveling of the pre- existing fill and high rates of water infiltration through utility bedding can potentially occur which can, in severe cases, put the stability of the adjacent utility in jeopardy. As such, a higher standard of care in shoring is needed where the watermain trench is located closer than 0.75H to an adjacent trench, where 'H' is the depth of the deeper cut. The use of trenching boxes is poorly suited in this instance, since they do not provide adequate intimate lateral support to the sides of the cut and considerable loss of ground can occur prior to insertion of the box. Other pre-installed shoring measures are more suitable in such circumstances or the new utility should be offset a greater distance from the existing.

6.5.4. Pipe Bedding and Cover

It is anticipated that the existing undisturbed firm to very stiff glacial till deposit encountered in the boreholes will provide adequate support for both the 450mm dia. and 600mm dia. intake pipes and will allow the use of normal Class B type bedding.

The bedding should meet the standard of the current Ontario Provincial Standard Specifications (OPSS) and/or standards set by the local municipalities (i.e., County of Lambton).

The subgrade condition must be inspected and approved by qualified geotechnical personnel prior to placing bedding. If weak/soft material is encountered, it must be sub-excavated and replaced with compacted OPSS Granular "A" material.

Cover material, at least 300mm above the top of the pipe, should consist of Granular A or Granular B Type I with a maximum particle size of 25mm.

The minimum bedding thickness should be 150 mm, but this should be increased as dictated by the pipe diameter and/or aforementioned specifications.

Granular materials should be placed in maximum 200 mm thick lifts. The granular bedding and pipe cover materials should be compacted to 98% of Standard Proctor Maximum Dry Density (SPMDD) at a placement water content within 2 percent of the materials optimum. Care should be exercised when compacting the cover material on top of the pipe as well as beside them to avoid damaging them. The use of light, hand operated compaction equipment is recommended in these areas.

6.5.5. Thrust Block Bearing Resistance

An allowable (or SLS) bearing resistance of 70 kPa and factored ULS bearing resistance of 100 kPa can be used in the design of thrust blocks constructed against native soils or against engineered fill. Where firm or loose fill is encountered, the thrust blocks must be bear against a minimum of 1.0 m thick engineered fill pad. This will require re-excavation of existing fill and replacement with engineered fill placed in layers and compacted to 100% SPMDD.

For design purposes, a coefficient of friction of 0.25 may be used between the granular pipe bedding and the proposed intake pipes, assuming that the pipe bedding and its surrounding are adequately compacted in place and in intimate contact with the pipe.

6.5.6. Backfilling and Degree of Compaction

Within the roadway, backfilling of the trenches might be completed using a well-graded, compacted granular soil such as Granular 'A' and 'B' material. The use of such material, if thoroughly compacted, will reduce the post construction settlements to a negligible amount and may also expedite the compaction process. In this instance, however, frost response characteristics of non-frost susceptible granular fill and the frost susceptible native soils would be different giving rise to differential frost heave or movement. In this case it would be prudent to use as backfill the on-site excavated, naturally occurring soils to match the existing conditions within the frost zone (i.e., within 1.2 m depth) or to provide a frost taper zone (i.e., to provide a zone of taper to prevent a sudden change in frost heave characteristics to reduce the effects of frost heave).

In any case, the degree of compaction of the trench should be at least 98% of the material's Standard Proctor Maximum Dry Density (SPMDD) and the placement water content must be within 2 percent of the materials optimum water content. This value should be increased to 100% of SPMDD within 1.5 m of the road surface.

The granular pavement sub-base and base materials should be compacted to at least 100% of their respective SPMDD at a placement water content within 2% of the materials optimum and the boulevards should be compacted to 95% of their respective SPMDD. If future widenings are contemplated in boulevard areas, then the compaction specification in boulevards must be increased to 100% of SPMDD.

6.6. WET WELL

6.6.1. Foundations

Based on the current conceptual design drawings provided by the Client, it is understood that the proposed wet well is a pre-cast concrete chamber structure with several submersible pumps, which will be set at Elev. 172.5m (about 9m below existing ground surface). The proposed wet well water intake chamber structure can be supported by a raft foundation founded on the undisturbed native, stiff silty clay till at the anticipated founding level using a uniformly distributed bearing pressure of 80 kPa at SLS (Serviceability Limit State) and 120 kPa at ULS (Ultimate Limit State).

The exposed soils at the proposed wet well base level must be inspected by qualified geotechnical personnel prior to placement of a mud slab, to verify adequate base preparation measures and to confirm the design bearing pressures. Soils at founding level must consist of stiff, native silty clay till, free from organic matters, debris, boulders, soft spots, and other deleterious materials.

The SLS bearing pressure is anticipated to result in total and differential ground settlements equal to 40 and 25 mm, respectively. A preliminary SLS (unfactored) vertical Modulus of Subgrade Reaction equal to 3.5 MPa/m can be used in structural design of the proposed wet well base.

6.6.2. Uplift Pressure

The structure of proposed wet well will extend to about 9 m below the existing ground surface and the groundwater table measured in the monitoring wells (BH23-1 and BH23-2) was found to be about 1.8m to 5.5m below ground surface. The 100-Year Lake level should also be assessed as far as uplift calculations are concerned.

The wet well structure will, therefore, be subjected to hydrostatic uplift pressures. If the combination of the weight of the structure and the mobilized factored frictional resistance between the buried portion of the exterior walls and the backfill materials is insufficient to resist the uplift forces during any stage of the construction and/or during the operation of the structure, then grouted, double corrosion protected ground anchors will be required to resist buoyancy.

Friction between the exterior walls and the granular backfill materials should only be taken into account if it is absolutely certain that no excavations will be undertaken around the exterior walls any time in the future. In this case, an ultimate friction factor of 0.4 applied to the horizontal active earth pressure on the wall could be used, using a coefficient of earth pressure of 0.43 and a unit weight of 20.5 kN/m^3 above the groundwater level and 10.7 kN/m^3 below the water table can be applied.

When checking the overall stability of the structure, the design should incorporate a minimum safety factor of 1.1 when using only the dead weight of the structures. The safety factor to be used for the frictional resistance should not be less than 2.0.

It is recommended that for the design purposes, the groundwater table be assumed to be as 1.0 m above the highest groundwater level observed in the monitoring wells or the 100-Year Lake level, whichever is greater.

Post-tensioned anchor adhesion values of 45 kPa can be assumed in stiff clay till, however, these values are preliminary since the contractor's installation procedures and the soil units that the bond zones are anchored into will determine the actual soil to grout bond value. Tie back anchors must be post-grouted and double corrosion protected. All anchors must be Proof and Performance tested as indicated in CFEM, 4th edition.

6.6.3. Excavation and Groundwater Control

Excavations of overburden can be carried out with heavy hydraulic excavators. The proposed excavation depth for the wet well structure will be about 9m below the existing grade. According to the information from the monitoring wells, the groundwater level was found to be at depths ranging from 1.8m to 5.5m (Elev. 176.1m to 179.7m) below the existing grade.

Active dewatering, such as by means of closely spaced eductors, might be required to assist the excavation. For more comments on the groundwater control, reference should be made to hydrogeological study for the site. Groundwater must be lowered to at least 1m below the excavation base level.

It should be noted that the soils contain cobbles and boulders. The presence of obstructions such as concrete within the surficial fill material is also possible. Provisions must be made in the excavation contract for the removal of boulders in the till deposit and obstructions in the fill material.

All excavations must be carried out in accordance with the most recent Occupational Health and Safety Act (OHSA). In accordance with OHSA, the existing fill can be classified as Type 3 Soil above the water table and as Type 4 Soil below the groundwater table. The stiff to very stiff native silty clay till deposit can be classified as Type 2 Soil. For excavations passing through multiple soil types, the side slope geometry is governed by the highest number Soil Type designation. These are generic, broad-brush classifications and must not be used for detail design/specifications. Competent Persons employed by the Constructor must observe the nature and behaviour of excavated soils in the trenches and re-classify the OHSA Soil Type accordingly.

Reference to Drawing No. 2 indicates theoretical zones proximal to trenches and excavations at which offset distance some degree of movement of the ground can be anticipated as a consequence of trench excavation. In this respect, it should also be noted that less ground movements will be experienced outside the excavation if the sides of the excavation are properly supported by tight, braced sheeting than if the sides are unsupported. Ground movements would be further reduced if the bracings were to be pre-stressed.

6.6.4. Lateral Earth Pressures Acting on Permanent Foundation Walls

The static lateral earth pressures acting on permanent walls may be calculated from the following expression:

$$p = K(\gamma h + q)$$

where p = Lateral earth pressure in kPa acting at depth h

K = Earth pressure coefficient (at rest) for vertical walls and horizontal backfill

K = 0.45 for vertical walls and horizontal site grades

γ = Unit weight of backfill, a value of 22 kN/m^3 may be assumed

h = Depth to point of interest in metres

q = Equivalent value of surcharge on the ground surface in kPa

To the above expression, hydrostatic (groundwater) pressures must be added.

6.6.5. Temporary Shoring

Temporary excavation support system will be required for excavations where space is restricted and side slope requirements in accordance with OHSA cannot be satisfied. Soldier piles and timber lagging or interlocking steel sheet piles with an internal bracing system (e.g., wales and struts) or other systems may be considered.

The shoring system must be designed in accordance with the 4th Edition of the Canadian Foundation Engineering Manual. The surcharge loading from construction equipment, surcharges and adjacent structures must be considered. The apparent earth pressure envelopes are illustrated in Drawing No. 3.

Movement of the shoring system is inevitable. Vertical movements will result from the vertical load on the soldier piles resulting from the inclined tiebacks and inward horizontal movement results from earth and water

pressures. The magnitude of this movement can be controlled by sound construction practices, and it is anticipated that the horizontal movement will be in the range of 0.2 to 0.3%H.

To ensure that movements of the shoring are within an acceptable range, monitoring must be carried out. Vertical and horizontal targets on the soldier piles must be located and surveyed before excavation begins. Weekly readings during excavation should show that the movements will be within those predicted; if not, the monitoring results will enable directions to be given to improve the shoring. In more critical areas, such as in proximity to existing utilities or structures, the use of inclinometers to measure horizontal soil strains is also recommended.

The unfactored geotechnical parameters provided in Table 6-3 below, may be considered by the geo-structural designer/engineer for the temporary support system and the designer/engineer should select the appropriate parameters depending on the shoring stiffness and expected deflection of the wall.

Table 6-2: Unfactored Soil Parameters for Temporary Support of Excavation Design

Stratigraphic Unit	Bulk Unit Weight[1], γ (kN/m^3)	Friction Angle, ϕ' (degrees)	Shear Strength, S_u (kPa) See Note 2	Coefficient of Lateral Earth Pressure		
				At rest, K_o	Active, K_a	Passive, K_p
Existing cohesive fill	19	26	20	0.56	0.39	2.56
Existing cohesionless fill	19	28	-	0.53	0.36	2.77
Firm to Stiff Clayey Till	21.0	30	80	0.5	0.33	3.0
Very Stiff Clayey Till	21.5	32	150	0.47	0.31	3.3

Note: 1. Below the groundwater table, $\gamma_{submerged} = \gamma_{bulk} - \gamma_{water}$ should be used
Note 2 – Su is not to be used in combination with the angle of internal friction.

The lateral earth pressure coefficients provided above are calculated based on the assumption that the ground surface behind the temporary excavation support system is horizontal. Where the retained ground is sloping, the lateral earth pressure coefficients must be adjusted to account for the slope. The loading from adjacent structures and construction equipment as well as any material stockpiles within a distance defined by a 1H:1V line drawn upward and outward from the bottom of the excavation to the ground existing surface should be included as a surcharge.

The distribution of earth and groundwater pressures acting on the temporary protection system should be calculated in accordance with Section 26 of CFEM, 4th Edition.

6.7. GEOTECHNICAL QUALITY OF EXCAVATION SOIL FOR REUSE

For additional information related to reuse of excavation spoil at this site, the reader should refer to related environmental Excess Soil Management reports for this project.

As a general requirement, all backfill material should be placed in 200 to 300mm thick loose lifts and compacted to at least 98% of the SPMDD, at a placement moisture content within ±2% of the optimum. For

any roadway and utility trenches, consideration must be given to backfilling trenches with a well-graded, compacted granular soil such as OPSS 1010 Granular 'A' or Granular 'B' Type 1 material. The use of such material, if thoroughly compacted, would reduce the post construction settlements to a negligible amount and may also expedite the compaction process. In proximity to utilities or structures, the energy imparted by the compaction equipment should be scaled back and light, handheld equipment should be substituted in order not to induce compaction related damage.

The in-situ moisture content of borehole sample of the native silty clay till is likely more than its optimum water content and will likely require air drying in order to be within 2 percent of its optimum water content at time of placement, as such, this might involve double handling and staging work. Therefore, it is EnVision's opinion that reuse of excavated native soils on this project is impractical and will complicate the construction.

In any case the degree of compaction of the trench backfill should be at least 98% of the material's Standard Proctor Maximum Dry Density (SPMDD). This value should be increased to at least 100% within 1.5 m of the road surface. The granular pavement sub-base and base materials should be compacted to at least 100% of their respective SPMDD.

6.8. PAVEMENT RESTORATION

Should 600mm dia. water intake pipe be installed using open cut method, then the existing road pavement structure should be reinstated in accordance with the local municipal requirements. New granulars must match into the underside of existing to ensure unimpeded cross drainage.

The recommended pavement structures are provided in Table 6-3.

Table 6-3: Recommended Pavement Structure Thickness for Road Restoration

PAVEMENT LAYER	COMPACTION REQUIREMENTS	PAVEMENT STRUCTURE[2]
Asphaltic Concrete	95% Maximum Relative Density (MRD)	40 mm OPSS HL-3 60 mm OPSS HL-8
OPSS Granular A Base (or 20mm Crusher Run Limestone	100% SPMDD[1]	150 mm
OPSS Granular B (or 50mm Crusher Run Limestone)	100% SPMDD	400 mm but deepened to match existing sub-base[3]

Notes:

1. Denotes Standard Proctor Maximum Dry Density, ASTM-D698
2. Pavement thickness shall match with the existing, whichever it thicker.
3. Base of granular sub-base must be adjusted to match in with adjacent sub-base in order to promote cross drainage across the roadway.

6.9. MONITORING

Based on information provided by the Client, structural and architectural deficiencies were noted in the existing water treatment plant structures and a condition assessment was carried out by CIMA, documented "Condition Assessment of Bright's Grove WTP Petrolia, Ontario" dated March 12, 2014. As such, concerns of further deterioration due to proposed construction have been raised by the Client. Therefore, to ensure that movements of existing WTP structures are within an acceptable range, monitoring must be carried out. The following preliminary monitoring scheme is recommended:

- Optical survey targets affixed to existing WTP structures;
- Tiltmeters and/or EL beam sensor arrays in basement of WTP structures;
- Existing cracks should be fitted with crack monitoring devices;
- Vibration monitoring at multiple locations surrounding the project site.

A detailed monitoring plan specific to the existing WTP structures, sensitive utilities and other third party structures in the zone of influence must be prepared in advance of construction. The monitoring plan must include drawings illustrating the locations of the required settlement and deflection monitoring markers and points, appropriate trigger levels (Review/Alert), standards and accuracy required for surveys, notification list and required schedule for distribution of monitoring results. The plan should also contain an outline of likely mitigation measures as may be required for implementation if movements are detected via the monitoring program exceeding review/alert levels.

Detailed pre- and post-construction structure and utility condition surveys should be carried out within the predicted construction zone of influence.

Full time automated vibration monitoring is recommended for the WTP buildings/facades within the vibration zone of influence limits. Site-specific PPV values will need to be established to protect the WTP structures which account for their construction and condition.

7. GENERAL COMMENTS AND LIMITATIONS OF REPORT

This report is submitted with generic recommendations only and is not to be used for final design purposes. EnVision will need to revise and resubmit this report once we have been provided with plan/profile/design drawings for the project.

The comments given in this report are intended only for the guidance of design engineers. The number of boreholes required to determine the localized underground conditions between boreholes affecting construction costs, techniques, sequencing, equipment, scheduling, etc., would be much greater than has been carried out for design purposes. Contractors bidding on or undertaking the works should, in this light, decide on their own investigations, as well as their own interpretations of the factual borehole and test pit results, so that they may draw their own conclusions as to how the subsurface conditions may affect them.

This report is intended solely for the Client(s) named. The material in it reflects our best judgment in light of the information available to EnVision at the time of preparation. Unless otherwise agreed in writing by EnVision Consultants Ltd. it shall not be used to express or imply warranty as to the fitness of the property for a particular purpose. No portion of this report may be used as a separate entity, it is written to be read in its entirety.

The conclusions and recommendations given in this report are based on information determined at the test hole locations. The information contained herein in no way reflects on the environment aspects of the project, unless otherwise stated. Subsurface and groundwater conditions between and beyond the test holes may differ from those encountered at the test hole locations, and conditions may become apparent during construction, which could not be detected or anticipated at the time of the site investigation. The benchmark and elevations used in this report are primarily to establish relative elevation differences between the test hole locations and should not be used for other purposes, such as grading, excavating, planning, development, etc.

The design recommendations given in this report are applicable only to the project described in the text and then only if constructed substantially in accordance with the details stated in this report.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. EnVision Consultants Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We accept no responsibility for any decisions made or actions taken as a result of this report unless we are specifically advised of and participate in such action, in which case our responsibility will be as agreed to at that time.

We trust that the information contained in this report is satisfactory. Should you have any questions, please do not hesitate to contact this office.

7.1. SIGNATURES

Prepared by

Draft

Tim Yu, P.Eng.
Geotechnical Engineer
tyu@envisionconsultants.ca

Reviewed by

Draft

Scott Peaker, M.A.Sc., P.Eng.
Geotechnical Lead
speaker@envisionconsultants.ca

7.2. QUALIFIER

EnVision prepared this report solely for the use of the intended recipient in accordance with the professional services agreement. In the event a contract has not been executed, the parties agree that the EnVision General Terms and Conditions, which were provided prior to the preparation of this report, shall govern their business relationship.

The report is intended to be used in its entirety. No excerpts may be taken to be representative of the findings in the assessment. The conclusions presented in this report are based on work performed by trained, professional and technical staff, in accordance with their reasonable interpretation of current and accepted engineering and scientific practices at the time the work was performed.

The content and opinions contained in the report are based on the observations and/or information available to EnVision at the time of preparation, using investigation techniques and engineering analysis methods consistent with those ordinarily exercised by EnVision and other engineering/scientific practitioners working under similar conditions, and subject to the same time, financial and physical constraints applicable to this project.

EnVision disclaims any obligation to update this report if, after the date of this report, any conditions appear to differ significantly from those presented in this report; however, EnVision reserves the right to amend or supplement this report based on additional information, documentation or evidence.

EnVision makes no other representations whatsoever concerning the legal significance of its findings. The intended recipient is solely responsible for the disclosure of any information contained in this report. If a third party makes use of, relies on, or makes decisions in accordance with this report, said third party is solely responsible for such use, reliance or decisions. EnVision does not accept responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken by said third party based on this report.

EnVision has provided services to the intended recipient in accordance with the professional services agreement between the parties and in a manner consistent with that degree of care, skill and diligence normally provided by members of the same profession performing the same or comparable services in

respect of projects of a similar nature in similar circumstances. It is understood and agreed by EnVision and the recipient of this report that EnVision provides no warranty, express or implied, of any kind. Without limiting the generality of the foregoing, it is agreed and understood by EnVision and the recipient of this report that EnVision makes no representation or warranty whatsoever as to the sufficiency of its scope of work for the purpose sought by the recipient of this report.

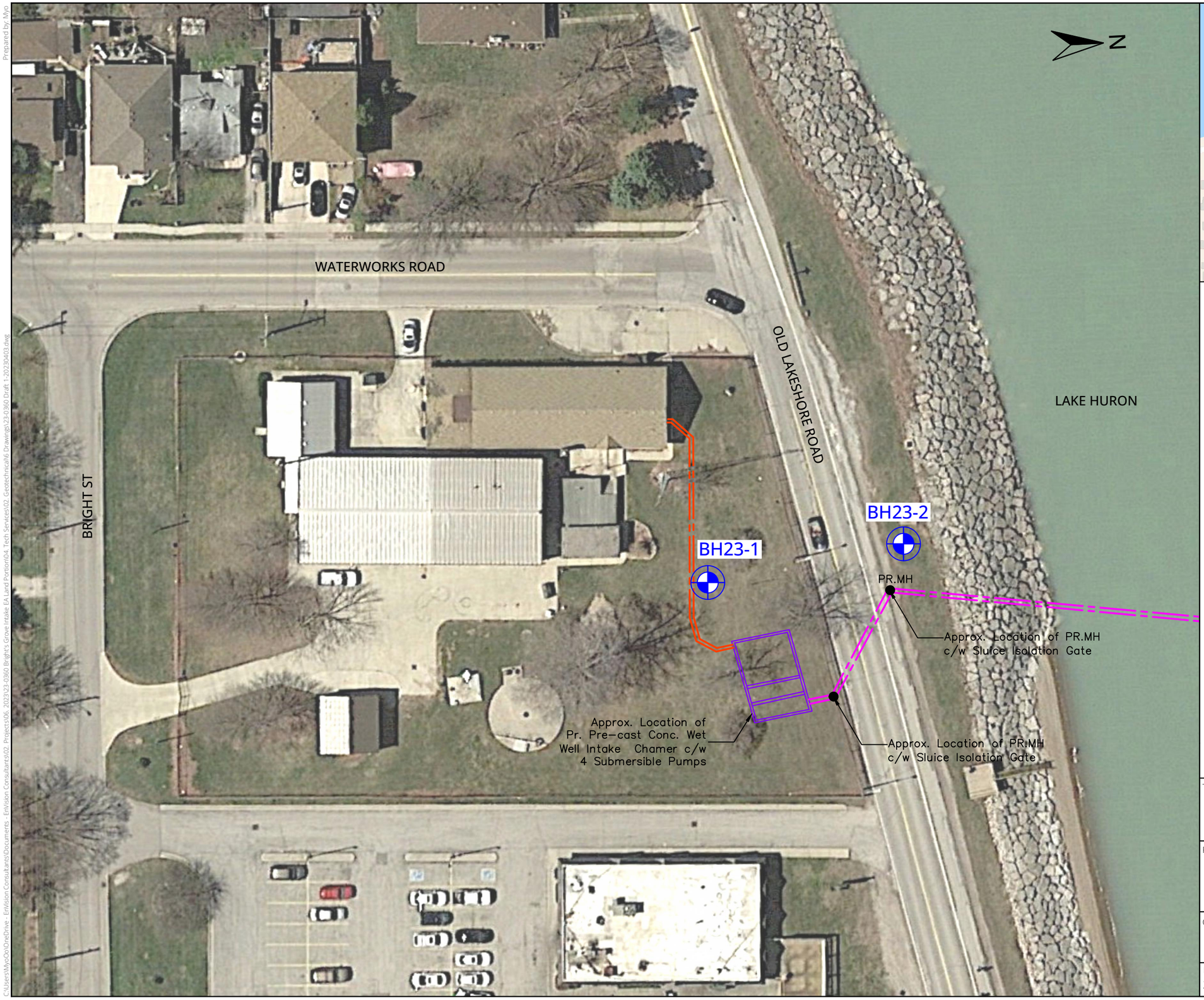
In preparing this report, EnVision has relied in good faith on information provided by others, as noted in the report. EnVision has reasonably assumed that the information provided is correct and EnVision is not responsible for the accuracy or completeness of such information.

Unless otherwise agreed in writing by EnVision, the Report shall not be used to express or imply warranty as to the suitability of the site for a particular purpose. EnVision disclaims any responsibility for consequential financial effects on transactions or property values, or requirements for follow-up actions /or costs.

This limitations statement is considered an integral part of this report.

Drawings

Drawing No. 1	Borehole Location Plan
Drawing No. 2	Risk Zones adjacent to Trench or Excavation
Drawing No. 3	Earth Pressure Distribution on Braced Excavations



KEY PLAN
N.T.S

LEGEND

- BOREHOLE WITH MONITORING WELL LOCATION
- APPROX. LOCATION OF 600MM RAW WATER INTAKE PIPE
- APPROX. LOCATION OF 450MM RAW WATER PIPE

SCALE: NOT TO SCALE

TITLE

BOREHOLE LOCATION PLAN

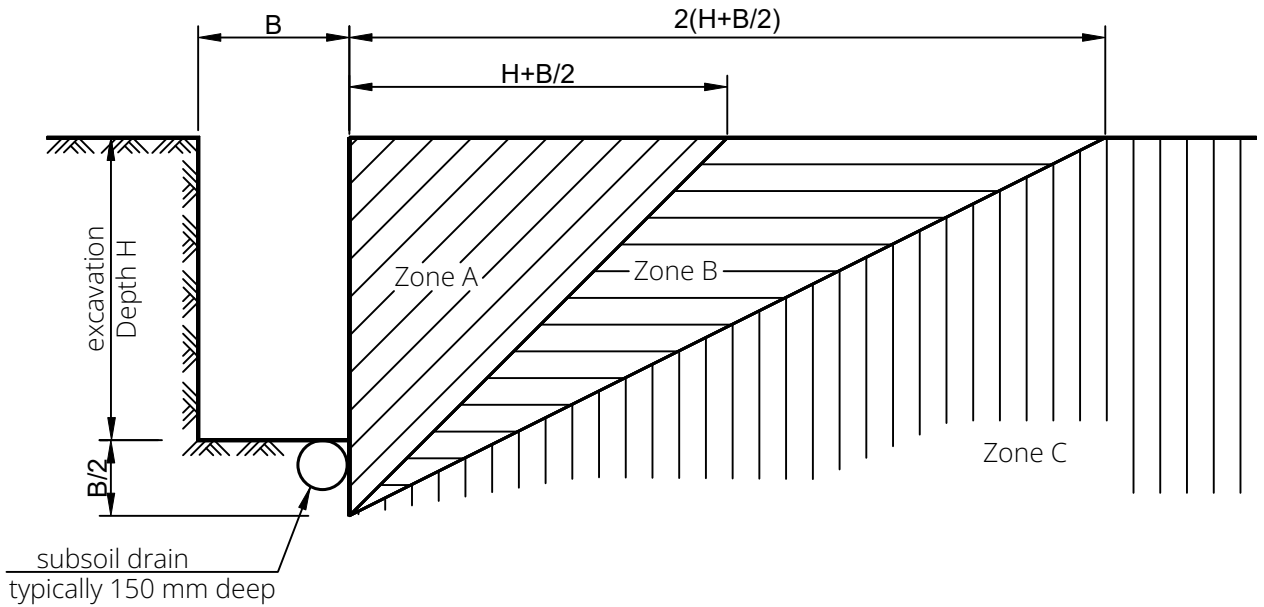
PROJECT

GEOTECHNICAL INVESTIGATION –
BRIGHT'S GROVE WATER TREATMENT PLANT (WTP)
INTAKE STRUCTURE, 2701 OLD LAKESHORE ROAD,
BRIGHT'S GROVE, ON

CLIENT

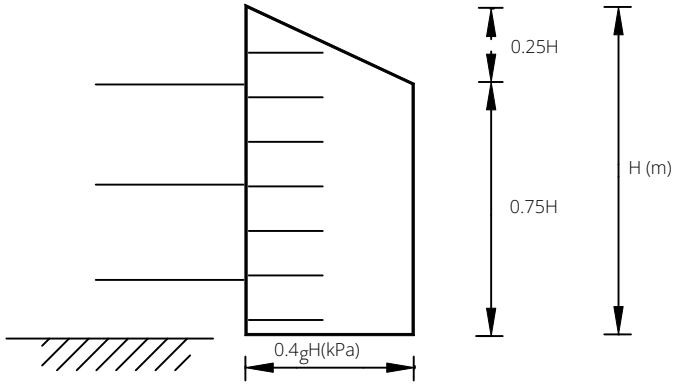
CIMA CANADA INC.

PROJECT NO.	DATE	PREPARED BY	APPROVED BY	DRAWING NO
23-0360	APRIL 2023	TY	SP	1



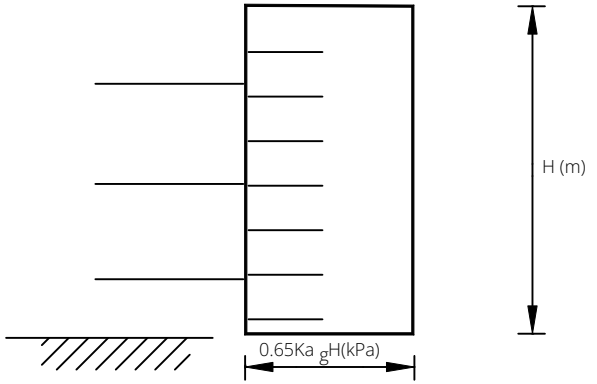
RISK ZONES (after Howe et al., 1980): Zone A is zone of long term risk, Zone B is zone of intermediate risk, Zone C is zone of no risk.

	TITLE: RISK ZONE	PROJECT: GEOTECHNICAL INVESTIGATION – BRIGHT'S GROVE WATER TREATMENT PLANT (WTP) INTAKE STRUCTURE, 2701 OLD LAKESHORE ROAD, BRIGHT'S GROVE, ON					
		CLIENT: CIMA CANADA INC.					
		PROJECT NO.: 23-0360	DATE: APRIL 2023	SCALE: N.T.S	PREPARED BY: TY	APPROVED BY: SP	DRAWING NO: 2



g = unit weight of soil = 20.5 kN/cum

IN COHESIVE CLAYS OR CLAYEY SOILS



g = unit weight of soil = 19.0 kN/m

g' = submerged unit weight of soil (i.e. below ground water level)= 9.2 kN/m

Ka = 0.36

IN LOOSE OR DISTURBED NON-COHESIVE SOILS (SANDS AND SILTS)

Notes:
1. Check system for partial excavation condition.
2. If the free water level is above the base of the excavation, the hydrostatic pressure must be added to the above pressure distribution in sands and silts.
3. If surcharge loadings are present near the excavation, these must be included in the lateral pressure calculation.

TITLE

EARTH PRESSURE DISTRIBUTION ON BRACED EXCAVATIONS

PROJECT

GEOTECHNICAL INVESTIGATION – BRIGHT'S GROVE
WATER TREATMENT PLANT (WTP) INTAKE STRUCTURE,
2701 OLD LAKESHORE ROAD,
BRIGHT'S GROVE, ON

CLIENT

CIMA CANADA INC.

PROJECT NO.	DATE	SCALE	PREPARED BY	APPROVED BY	DRAWING NO
23-0360	APRIL 2023	N.T.S	TY	SP	3

APPENDIX A:

Notes on Sample Descriptions (Drawing 1A)

Terms used in the Record of Borehole Logs (Drawing 1B)

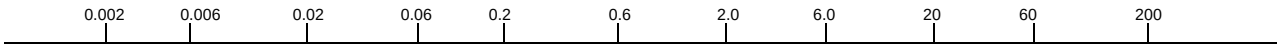
Record of Borehole Sheets

Notes On Sample Descriptions

1. All sample descriptions included in this report generally follow the Unified Soil Classification. Laboratory grain size analyses provided by EnVision also follow the same system. Different classification systems may be used by others, such as the system by the International Society for Soil Mechanics and Foundation Engineering (ISSMFE). Please note that, with the exception of those samples where a grain size analysis and/or Atterberg Limits testing have been made, all samples are classified visually. Visual classification is not sufficiently accurate to provide exact grain sizing or precise differentiation between size classification systems.

ISSMFE SOIL CLASSIFICATION

CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE		



EQUIVALENT GRAIN DIAMETER IN MILLIMETRES

CLAY (PLASTIC) TO	FINE	MEDIUM	CRS.	FINE	COARSE
SILT (NONPLASTIC)	SAND			GRAVEL	

UNIFIED SOIL CLASSIFICATION

2. Fill: Where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc., none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advise of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional preliminary geotechnical site investigation.

3. Till: The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (60 to 200 mm) or boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.

Drawing 1B

ENVISION CONSULTANTS LTD

Explanation of Terms Used in the Record of Borehole

Sample Type

AS	Auger sample
BS	Block sample
CS	Chunk sample
DO	Drive open
DS	Dimension type sample
FS	Foil sample
NR	No recovery
RC	Rock core
SC	Soil core
SS	Spoon sample
SH	Shelby tube sample
ST	Slotted tube
TO	Thin-walled, open
TP	Thin-walled, piston
WS	Wash sample

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) drive open sampler for a distance of 300 mm (12 in).

WH – Samples sinks under "weight of hammer"

Dynamic Cone Penetration Resistance, 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).

Textural Classification of Soils (ASTM D2487-10)

Classification	Particle Size
Boulders	> 300 mm
Cobbles	75 mm - 300 mm
Gravel	4.75 mm - 75 mm
Sand	0.075 mm - 4.75 mm
Silt	0.002 mm - 0.075 mm
Clay	<0.002 mm(*)

(*) Canadian Foundation Engineering Manual (4th Edition)

Coarse Grain Soil Description (50% greater than 0.075 mm)

Terminology	Proportion (*)
Trace	0-10%
Some	10-20%
Adjective (e.g. silty or sandy)	20-35%
And (e.g. sand and gravel)	> 35%

(*) Canadian Foundation Engineering Manual (4th Edition)

Soil Description

a) Cohesive Soils(*)

Consistency	Undrained Shear Strength (kPa)	SPT "N" Value
Very soft	<12	0-2
Soft	12-25	2-4
Firm	25-50	4-8
Stiff	50-100	8-15
Very stiff	100-200	15-30
Hard	>200	>30

(*) Hierarchy of Shear Strength prediction
1. Lab triaxial test
2. Field vane shear test
3. Lab. vane shear test
4. SPT "N" value
5. Pocket penetrometer

b) Cohesionless Soils

Density Index (Relative Density)	SPT "N" Value
Very loose	<4
Loose	4-10
Compact	10-30
Dense	30-50
Very dense	>50

Soil Tests

w	Water content
w_p	Plastic limit
w_l	Liquid limit
C	Consolidation (oedometer) test
CID	Consolidated isotropically drained triaxial test
CIU	consolidated isotropically undrained triaxial test with porewater pressure measurement
D_R	Relative density (specific gravity, Gs)
DS	Direct shear test
ENV	Environmental/ chemical analysis
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
U	Unconsolidated Undrained Triaxial Test
V	Field vane (LV-laboratory vane test)
γ	Unit weight

ENVISION
CONSULTANTS LTD

LOG OF BOREHOLE BH23-1

PROJECT: Geotechnical Investigations
CLIENT: CIMA Canada Inc.
PROJECT LOCATION: 2701 Old Lakeshore Road, Bright's Grove, ON.
DATUM: Geodetic
BH LOCATION: N 4765296.5 E 398013.6

Method: Hollow Stem Augers
Diameter: 203mm
Date: Mar/08/2023 to Mar/08/2023

REF. NO.: 23-0360
ENCL NO.:
ORIGINATED BY WW
COMPILED BY FL
CHECKED BY TY

SOIL PROFILE (m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	TYPE	"N" BLOWS / 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 10 20 30	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
181.48	Ground Surface										
0.00 / 181.18	**TOPSOIL:** 300mm		1	SS	5		181				
0.30	**FILL:** silty sand to sandy silt, trace gravel, trace clay, trace organics, yellow brown, moist, loose to compact.		2	SS	11		Bentonite 180				
179.19			3	SS	4	▽	W. L. 179.72 m Mar 17, 2023				
2.29	**SILTY CLAY TILL:** some sand to sandy, trace gravel, brown, moist, firm to very stiff.		4	SS	7		179 Sand				
			5	SS	19		178				2 22 49 27
							177 Screen				
			6	SS	18						wet spoon
			7	SS	7		176				
			1	VT			175	+ 3.3			
			8	SS	6		174				
	grey below 9.0m		9	SS	5		173				
							172				

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ 8=3% Strain at Failure

ENVISION-SOIL-ROCK-OCTOBER-12-2021.GLB
ENVISION SOIL LOG 2ING 23-0360.GPJ 4/9/23

LOG OF BOREHOLE BH23-1

PROJECT: Geotechnical Investigations
REF. NO.: 23-0360
CLIENT: CIMA Canada Inc.
Method: Hollow Stem Augers
ENCL NO.:
PROJECT LOCATION: 2701 Old Lakeshore Road, Bright's Grove, ON.
Diameter: 203mm
ORIGINATED BY WW
DATUM: Geodetic
Date: Mar/08/2023 to Mar/08/2023
COMPILED BY FL
BH LOCATION: N 4765296.5 E 398013.6
CHECKED BY TY

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS / 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	Continued											
	SILTY CLAY TILL: some sand to sandy, trace gravel, brown, moist, firm to very stiff.(Continued)											
			2	VT			171	1.6				
11			10	SS	4							1 20 48 31
							170					
								Bentonite				
12			3	VT				7.0				
			11	SS	7		169					
13												
							168					
14			12	SS	7							
							167					
15			4	VT				1.6				
			13	SS	8		166					
16												
							165					
17			14	SS	9							
164.11												
17.37	**END OF BOREHOLE**											

Notes:
1) A 50mm dia. monitoring well was installed upon completion, screened from 3.05m to 6.10m.

Water level measurement in well:

Date	W.L.Depth (mbgs)
March 17, 2023	1.76

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

ENVISION-SOIL-ROCK-OCTOBER-12-2021.GLB
ENVISION SOIL LOG 2.ENG 23-0360.GPJ 4/9/23

ENVISION
CONSULTANTS LTD

LOG OF BOREHOLE BH23-2

PROJECT: Geotechnical Investigations
CLIENT: CIMA Canada Inc.
PROJECT LOCATION: 2701 Old Lakeshore Road, Bright's Grove, ON.
DATUM: Geodetic
BH LOCATION: N 4765319.6 E 398012.9

Method: Hollow Stem Augers
Diameter: 203mm
Date: Mar/07/2023 to Mar/07/2023

REF. NO.: 23-0360
ENCL NO.:
ORIGINATED BY WW
COMPILED BY FL
CHECKED BY TY

SOIL PROFILE			SAMPLES												
(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS / 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
181.64 Ground Surface												
0.00 / 181.44	**TOPSOIL:** 200mm											
0.20	**FILL:** silty clay, trace sand, trace to some gravel, brown, moist, firm to very stiff.		1	SS	7		181					
			2	SS	20			Bentonite				
			3	SS	8		180					
			4	SS	4		179	Sand				
178.59												
3.05	**SILTY CLAY TILL:** some sand to sandy, trace gravel, brown, moist, firm to very stiff.		5	SS	10		178					encountered obstructions
			6	SS	22		177					1 20 46 33
						▽		W. L. 176.13 m Mar 17, 2023				
			7	SS	10			Screen				
							175					
			8	SS	8		174					1 21 47 31
							173					
	grey below 9.0m		1	VT				+ 1.5				
			9	SS	6		172					
10												

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: + 3, × 3: Numbers refer to Sensitivity; ○ 6 ε=3% Strain at Failure

LOG OF BOREHOLE BH23-2

PROJECT: Geotechnical Investigations
REF. NO.: 23-0360
CLIENT: CIMA Canada Inc.
Method: Hollow Stem Augers
ENCL NO.:
PROJECT LOCATION: 2701 Old Lakeshore Road, Bright's Grove, ON.
Diameter: 203mm
ORIGINATED BY WW
DATUM: Geodetic
Date: Mar/07/2023 to Mar/07/2023
COMPILED BY FL
BH LOCATION: N 4765319.6 E 398012.9
CHECKED BY TY

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 10 20 30	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	Continued											
	SILTY CLAY TILL: some sand to sandy, trace gravel, brown, moist, firm to very stiff.(Continued)											
			2	VT				+1.4				
11			10	SS	5		171		○			
							Bentonite					
							170					
12			3	VT				+1.4				
			11	SS	7		169		○			
168.84												
12.80	**END OF BOREHOLE**											

Notes:
1) Borehole was shifted twice to avoid underground obstructions.
2) A 50mm dia. monitoring well was installed upon completion, screened from 3.05m to 9.14m.

Water level measurement in well:

Date	W.L.Depth (mbgs)
March 17, 2023	5.51

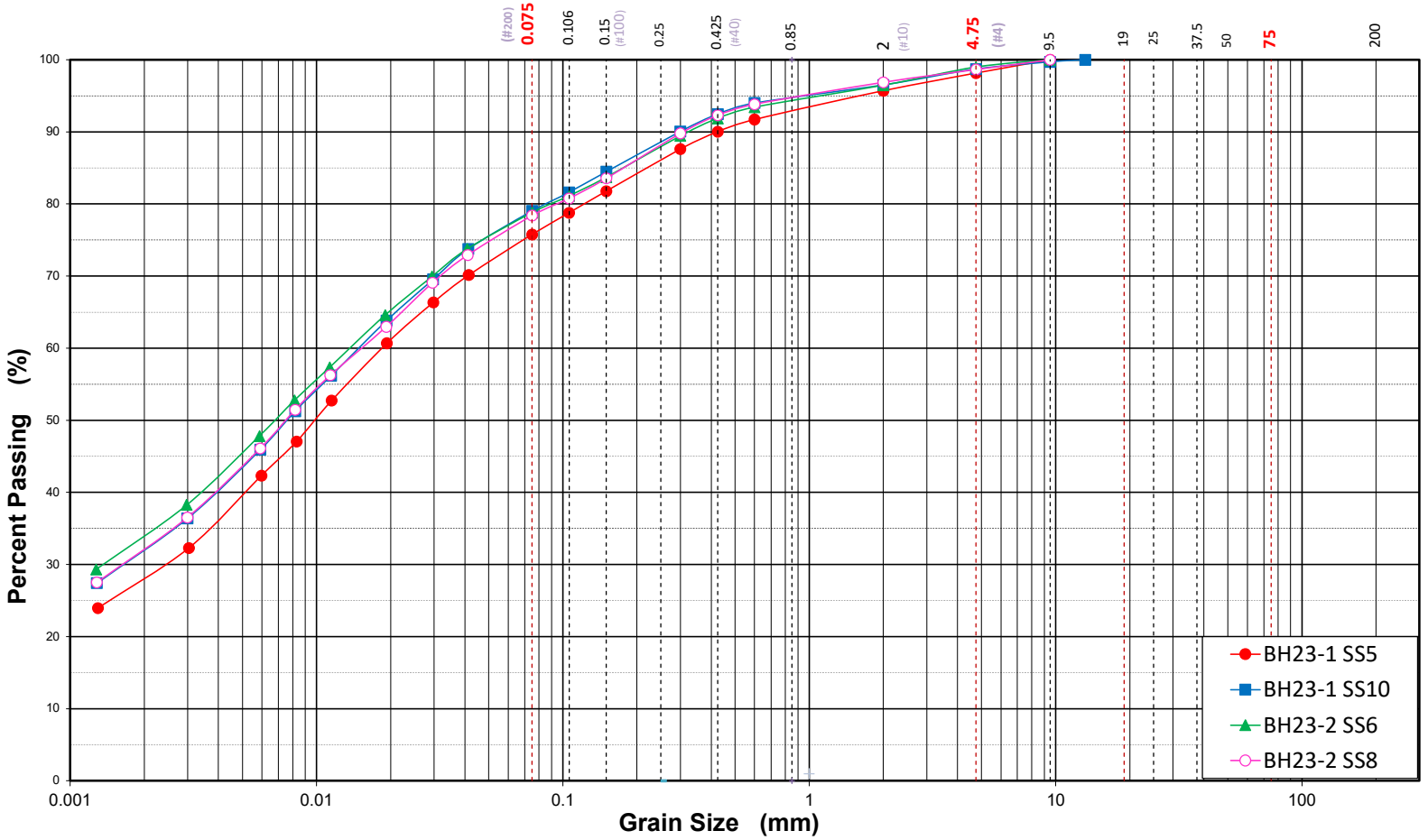
GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: $+^{3}$, $\times^{3}$: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

APPENDIX B:

Grain Size Analyses and Atterberg Limits Test Results

Particle Size Distribution (ASTM-D421/D422)

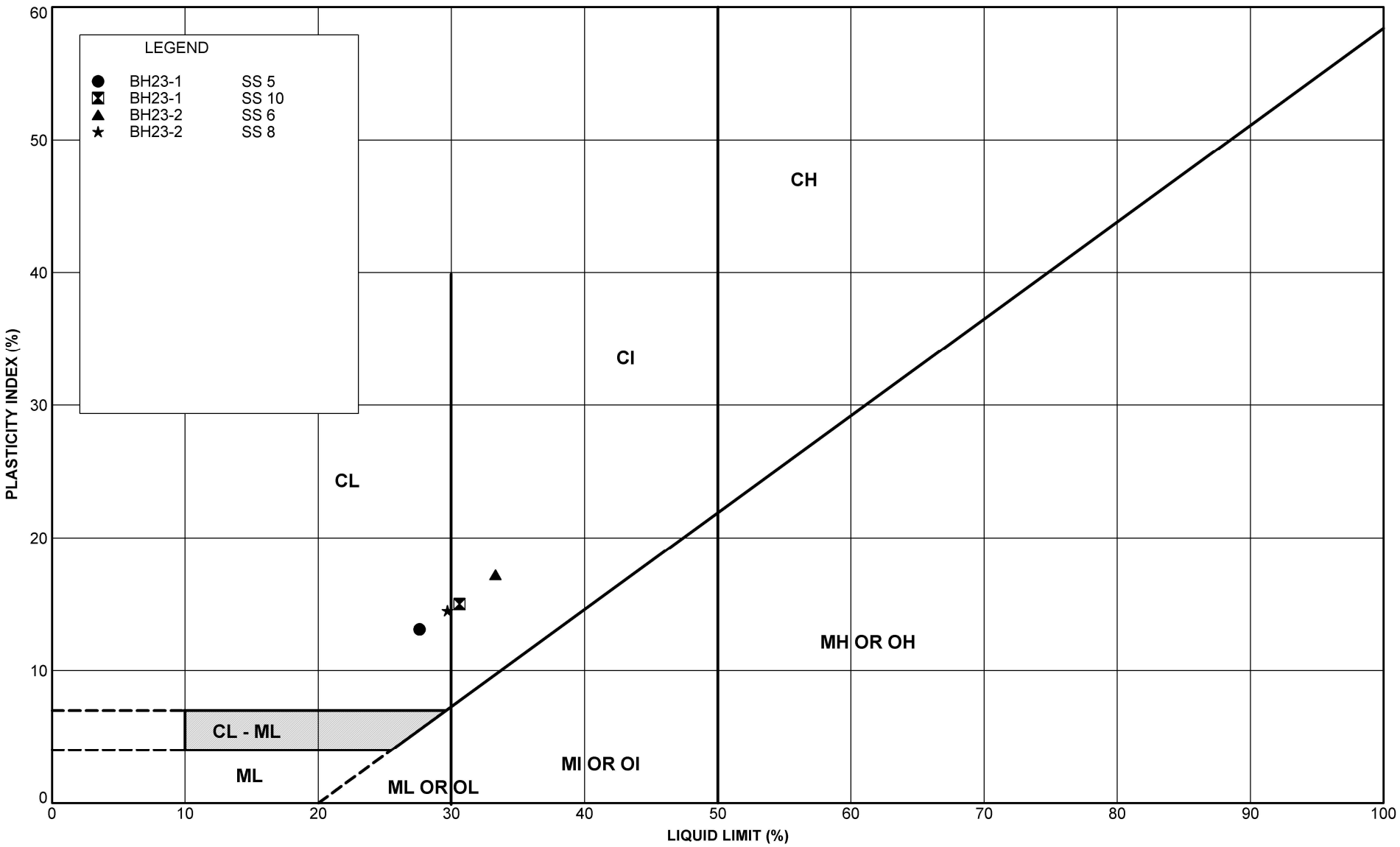


Silt and Clay		Sand			Gravel		Cobble +
Clay	Silt	Fine	Medium	Coarse	Fine	Coarse	

ENVISION CONSULTANTS LTD

GRAIN SIZE DISTRIBUTION

Figure No	1
Project No	23-0360
Date	Mar. 16/2023



ENVISION CONSULTANTS LTD

PLASTICITY CHART

FIGURE NO.	2
JOB NO.	23-0360
DATE	March 2023

APPENDIX C:

Corrosivity Certificates of Analysis

CERTIFICATE OF ANALYSIS

Work Order	: **WT2305745**	Page	: 1 of 3
Client	: **EnVision Consultants Ltd.**	Laboratory	: Waterloo - Environmental
Contact	: Tim Yu	Account Manager	: Emily Hansen
Address	: 6415 Northwest Drive MIssissauga ON Canada L4V 1X1	Address	: 60 Northland Road, Unit 1 Waterloo ON Canada N2V 2B8
Telephone	: ----	Telephone	: +1 519 886 6910
Project	: 23-0360.310	Date Samples Received	: 09-Mar-2023 10:45
PO	: ----	Date Analysis Commenced	: 12-Mar-2023
C-O-C number	: 20-1006258	Issue Date	: 16-Mar-2023 17:06
Sampler	: CLIENT		
Site	: ----		
Quote number	: 2022 Standing Offer		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Greg Pokocky	Supervisor - Inorganic	Inorganics, Waterloo, Ontario
Niral Patel		Centralized Prep, Waterloo, Ontario
Walt Kippenhuck	Team Leader - Inorganics	Inorganics, Waterloo, Ontario

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
µS/cm	microsiemens per centimetre
mg/kg	milligrams per kilogram
mV	millivolts
ohm cm	ohm centimetres (resistivity)
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Soil/Solid**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BH23-1, SS3	BH23-2, SS8	----	----	----
					Client sampling date / time	08-Mar-2023 08:46	07-Mar-2023 14:25	----	----	----
						WT2305745-001	WT2305745-002	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
Conductivity (1:2 leachate)	----	E100-L	5.00	µS/cm		262	291	----	----	----
Moisture	----	E144	0.25	%		15.6	15.3	----	----	----
Oxidation-reduction potential [ORP]	----	E125	0.10	mV		242	208	----	----	----
pH (1:2 soil:CaCl2-aq)	----	E108A	0.10	pH units		7.68	8.01	----	----	----
Resistivity	----	EC100R	100	ohm cm		3820	3440	----	----	----
Inorganics										
Sulfides, acid volatile	----	E396-L	0.20	mg/kg		<0.23	<0.23	----	----	----
Leachable Anions & Nutrients										
Chloride, soluble ion content	16887-00-6	E236.Cl	5.0	mg/kg		25.3	22.8	----	----	----
Sulfate, soluble ion content	14808-79-8	E236.SO4	20	mg/kg		70	125	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

Chain of Custody (COC) / Analytical Request Form

COC Number: 20 - 1006258

Page of

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Environmental Division
Waterloo
Work Order Reference
WT2305745

Telephone : +1 519 886 6910

Report To	Contact and company name below will appear on the final report	Reports / Recipients	Turnaround Time (TAT) Requested
Company:	EnVision Consultants Ltd.	Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)	☑ Routine [R] if received by 3pm M-F - no surcharges apply
Contact:	Tim Yu	Merge QC/QCI Reports with COA ☐ YES ☐ NO ☐ N/A	☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge mi
Phone:	437-788-7286	☐ Compare Results to Criteria on Report - provide details below if box checked	☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge m
	Company address below will appear on the final report	Select Distribution: ☐ EMAIL ☐ MAIL ☐ FAX	☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge n
Street:	6415 Northwest Dr Units 37-40	Email 1 or Fax tyu@envisionconsultants.ca	☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge m
City/Province:	Mississauga / Ontario	Email 2 www@envisionconsultants.ca	☐ Same day [E2] if received by 10am M-S - 200% rush surcharg may apply to rush requests on weekends, statutory holidays and
Postal Code:	L4V 1X1	Email 3	Date and Time Required for all E&P TATs:
Invoice To	Same as Report To ☐ YES ☐ NO	**Invoice Recipients**	For all tests with rush TATs requested,
	Copy of Invoice with Report ☐ YES ☐ NO	Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	Analy:
Company:	EnVision Consultants Ltd.	Email 1 or Fax payables@envisionconsultants.ca	
Contact:	Accounts Payables	Email 2 tyu@envisionconsultants.ca	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#
Job #:	23-0360.310	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (ALS use only):	WT2305745 KG	ALS Contact:	Sampler:

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Corrosivity with Redox	Indicate Filtered (F), Preserved (P) or Filte	SAMPLES ON HOLD	EXTENDED STORAGE REQUIR	SUSPECTED HAZARD (see notes)
	BH23-1, SS3	8-Mar-23	08:46	Soil	1	X				
	BH23-2, SS8	7-Mar-23	14:25	Soil	1	X				

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☐ NO	
Are samples for human consumption/ use? ☐ YES ☐ NO	

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☑ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C					FINAL COOLER TEMPERATURES °C				
8.8					7.3				

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Will Wu	Date: Mar 8, 2023	Time: 22:27	Received by: HK	Date: 09/03/23	Time: 10:45	Received by: LS	Date: Mar 9/23	Time: 2:30

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2026 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

SOL-022

APPENDIX D:

Tunnelman's Ground Classification and Probable Working Conditions

ENVISION
CONSULTANTS LTD

Tunnelman's Ground Classification and Probable Working Conditions

Soil Classification	Representative Soil Samples	Tunnel Working Conditions
Hard	Very hard calcareous clay; Cemented sand and gravel	Tunnel heading may be advanced without roof support.
Firm	Loess above GWT; Various calcareous clay with low plasticity	Tunnel heading may be advanced without roof support. Permanent support can be constructed before the ground will start to move.
Slow Ravelling and Fast Ravelling	Fast ravelling occurs in residual soils or in sand with clay binder below the GWT. Above the GWT, the same soils may be Slow Ravelling or even Firm.	Chunks of material may drop out of the crown or the sides some time after the ground has been exposed. In Fast Ravelling ground, the process starts within a few minutes; otherwise, it is classed as Slow Ravelling.
Squeezing	Soft or medium-soft clay	Ground slowly advances into tunnel without fracturing and without perceptible increase of water content in ground surrounding the tunnel.
Swelling	Heavily pre-compressed clays with a plasticity index greater than 30. Sedimentary formations containing layers of anhydrite.	Like squeezing ground, moves slowly into tunnel, but the movement is associated with a very considerable volume increase in the ground surrounding the tunnel.
Cohesive Running and Running	Occurs in clean, fine moist sand Occurs in clean, coarse or medium sand above the GWT	Removal of the lateral support of any surface rising at an angle of more than about 34° to the horizontal is followed by a 'run', whereby the material flows like granulated sugar until the slope angle is approx. 34°. If the 'run' is preceded by a brief period of ravelling, the ground is called Cohesive Running.
Very Soft Squeezing	Clays and silts with high plasticity indices	Ground advances rapidly into the tunnel in a plastic flow
Flowing	Below the water table in silt, sand or gravel without enough clay content to give significant cohesion and plasticity. May also occur in highly sensitive clay when such material is disturbed.	Flowing ground moves like a viscous liquid. It can invade the tunnel not only through the roof and the sides, but also through the invert. If the flow is not stopped, it will eventually completely fill the tunnel.
Bouldery	Boulder glacial till; riprap fill; some land slide deposits, some residual soils. The matrix between boulders may be gravel, sand, silt, clay and in any combination.	Problems incurred in advancing shield or in forepoling; blasting or hand mining ahead of machine may become necessary.

F

Appendix F: Draft Hydrogeological Report

ENVISION
CONSULTANTS LTD

HYDROGEOLOGICAL IMPACT ASSESSMENT REPORT

Bright's Grove Water Treatment Intake Structure, 2701 Old Lakeshore Road, Bright's Grove, ON

Project #: 23-0360
Prepared for: CIMA Canada Inc.
Date: April 11, 2023

Report Version: 01

6415 Northwest Drive
Units 37-40
Mississauga, ON L4V 1X1

envisionconsultants.ca

April 11, 2023

CIMA Canada Inc.
900-101 Frederick Street
Kitchener, Ontario N2H 6R2

Attention: Adam Moore, M.A.Sc., P.Eng., Project Engineer/Infrastructure

SUBJECT: HYDROGEOLOGICAL IMPACT ASSESSMENT REPORT, 2701 OLD LAKESHORE ROAD, BRIGHT'S GROVE, ON

EnVision Consultants Ltd. is pleased to provide the enclosed draft report on Hydrogeological Impact Assessment Report for the upgrade of Bright's Grove water treatment intake structure at 2701 Old Lakeshore Road, Municipality of Bright's Grove, in the City of Sarnia, Ontario.

We thank you for utilizing EnVision for this assignment. If there are any questions regarding the enclosed report, please do not hesitate to contact us.

Yours sincerely,

Robin Byers, P.Geo.,
Senior Hydrogeologist
rbyers@envisionconsultants.ca

QUALITY MANAGEMENT

ISSUE	FIRST ISSUE	REVISION 1	REVISION 2
PROJECT NUMBER	23-0360		
PROJECT REFERENCE	Hydrogeological Impact Assessment Report, 2701 Old Lakeshore Road, Bright's Grove, ON		
VERSION NO.	01		
REMARKS	Draft Report		
PREPARED BY	Sam Harding		
SIGNATURE	DRAFT		
REVIEWED BY	Robin Byers, P.Geo.,		
SIGNATURE	DRAFT		
DATE	April 10, 2023		

The original of this digital file will be kept by EnVision for a period of not less than 10 years. As the digital file transmitted to the intended recipient is no longer under the control of EnVision, its integrity cannot be assured. As such, EnVision does not guarantee any modifications made to this digital file subsequent to its transmission to the intended recipient

TABLE OF CONTENTS

LIST OF TABLES *(INCLUDED WITHIN THE REPORT)*

LIST OF FIGURES *(ATTACHED TO THE REPORT)*

LIST OF APPENDICES

1. INTRODUCTION

EnVision Consultants Ltd. (EnVision) was retained by CIMA Canada Inc. (the 'Client') to conduct combined geotechnical, environmental and hydrogeological investigations at the property located at 2701 Old Lakeshore Road, Bright's Grove, ON (the 'Site'). It is our understanding that this assessment has been requested to support the Class EA Study and conceptual design of a new surface water intake structure at the Town of Petrolia Bright's Grove Water Treatment Plant (WTP).

The location and orientation of the Site, together with a 500-m buffer extending from the property boundary outwards to represent the 'Hydrogeological Study Area', is presented in Figure 1. The Site partially occupies the civic address, 2701 Lakeshore Road, which is situated within the City of Sarnia, County of Lambton, Ontario. The Site is bounded by Lake Huron along the north, Waterworks Road to the west, a private laneway to the east, and Bright Street to the south. The Site also extends below Old Lakeshore Road and onto the shoreline along Lake Huron as highlighted on Figure 1.

The hydrogeological impact assessment presented herein is based upon both a desktop study of the Study Area, supplemented with a field level hydrogeological site investigation. For purposes of the following assessment, the concept of a Hydrogeological Study Area (HSA) is introduced and should be considered as the Site itself plus a buffer extending outwards of 500-m. This may differ from any establishment of a broader Study Area defined by the Municipal Class Environmental Assessment (EA) for the proposed upgrades at the Site.

1.1. OBJECTIVES AND SCOPE OF WORK

The objectives of this hydrogeological impact assessment is to characterize the geological and hydrogeological conditions at the Site and HAS to:

- Characterize and establish the Site setting from a geological and hydrogeological perspective;
- Review the soil and groundwater data to understand any constraints to the project goals;
- Provide an impact assessment related to construction dewatering activities for the proposed project (if applicable);
- Identify and provide mitigation measures related to risks to nearby groundwater resources, environmental features, private property, or other stakeholders related to the hydrogeological conditions at the Site as it pertains to the planned upgrades;
- Develop a baseline understanding of the groundwater conditions, including groundwater quality, groundwater depth, and groundwater flow across the HAS.
- Identify any potential permitting requirements for the proposed construction activities related to groundwater control.

To achieve the noted objectives outlined above, the following scope of work has been completed for the project:

- Desktop review of public information, including but not limited to online water well database maintained by the Ministry of the Environment, Conservation and Parks (MECP), geological

mapping prepared by the Ontario Geological Survey (OGS), watershed impact studies, Source Water Protection Atlas review, and other publically available information;

- Coordinated with the geotechnical field investigation to oversee the installation of a pair of monitoring wells at the Site;
- Conducted a short-term groundwater level monitoring program for the onsite monitoring wells;
- Completed single well response tests (SWRT) at each monitoring well for the evaluation of the hydraulic parameters of interest at the Site;
- Review of the geotechnical soil interpretation and lab analysis to further establish the hydrogeological conditions below the Site;
- Groundwater sampling program to establish the baseline groundwater quality from the onsite monitoring wells;
- Developed preliminary construction dewatering flow rates for excavations to provide input to the ongoing project design and to provide future water taking permitting requirements;
- Established the potential zone of influence related to groundwater control measures to guide mitigation and monitoring recommendations for construction;
- Provide an assessment of possible construction dewatering methods, discharge handling, and impacts based on a preliminary understanding of the project.
- Documented the findings from the combined desktop and field investigation in the form of the hydrogeological impact assessment report.

2. REGIONAL SETTING

2.1. PHYSIOGRAPHY

The HSA is located entirely within the Huron Fringe physiographic region as defined by Chapman and Putnam (Chapman, 2007). The Huron Fringe lies parallel to the shoreline of Lake Huron along the HSA and is bounded just south of the Site by the St. Clair Clay Plains. Figure 2 highlights the physiographic setting of the HSA and surrounding area.

The Huron Fringe exhibits as a narrow strip of land that runs along Lake Huron extending from the central Bruce Peninsula south to Sarnia. The feature is comprised of poorly defined wave-cut terraces of glacial Lake Algonquin and covered by belts of sand dunes near shore, and clay plains further inland.

2.2. GEOLOGY

2.2.1. Overburden Geology

Available geological mapping of the surficial materials (Ontario Geological Survey, 1997) indicates that the HSA is situated in an area comprised of fine-textured glaciolacustrine (shoreline to nearshore) deposits that feature sand, silt, and minor gravel. Figure 3 highlights the near Site conditions with respect to mapped surficial geological conditions.

2.2.2. Bedrock Geology

Bedrock mapping maintained by the OGS indicate that the bedrock beneath the HSA consists of shale of the Kettle Point Formation and bedrock topographical mapping indicates it to be situated more than 30 meters beneath the ground surface. Bedrock was not confirmed by the field drilling program.

2.3. HYDROGEOLOGICAL SETTING

2.3.1. Study Area Review of MECP Well Records

EnVision reviewed the online MECP Water Well Record (Ministry of Environment, Conservation and Parks, 2018) database to determine the number and reported use of water wells present within the HSA. There were no reported well records georeferenced to locations within the HSA. A larger search buffer of 1,500 m from the centre of the Site was then queried to provide context across a wider area.

The MECP WWR database indicated that there are fourteen (14) water wells within about 1,500 m of the Site. Of the well records returned in the search, five (5) of them were determined to be water supply wells, four (4) were reported as abandoned, and five (5) were classified as observation or monitoring wells. The five (5) water supply wells were all reported as being bedrock supplied wells, with casing that extended between 29.8 and 36.3 meters below ground surface. The casing depth is typically used to estimate the top of bedrock surface. Based on the nearby deep bedrock wells, the bedrock is confirmed to be primarily shale and can supply groundwater at rates that range from 2 to 10 gallons per minute.

The full results of this search have been plotted on Figure 1 and tabulated in Table A-1, Appendix A. It is noted that of the water supply records returned in the query, none of the properties lie within about 500 m of the Site and the nearby residential homes and businesses are all supplied by municipal water that is sourced from Lake Huron.

2.3.2. Hydrostratigraphy

Based on the background information, including the well record review, the following interpretation of the hydrostratigraphy is provided to provide a conceptual high-level overview of the groundwater system across the HSA.

- Overburden material extending approximately 30 m from ground that consists of fine grained lower permeable soils that is not traditionally used as a primary source of water, considered an aquitard.
  - Although not seen utilized as a source of private water, some sand and gravel formations, particularly along the shoreline, are expected that could potentially serve as low-yield aquifers, or become intersected in shallow excavations that require groundwater control (dewatering).
- Bedrock shale that has traditionally been tapped as a private water supply aquifer for domestic and commercial use.

2.3.3. Source Water Protection Policy Areas

The HSA has been reviewed for proximity to source water protection policy areas, as defined by the Clean Water Act. The Source Protection Information Atlas was accessed for the Site and surrounding area and the following details are summarized in ***Table 1***:

Table 1: Summary of Source Water Protection Policy Areas

SOURCE PROTECTION AREA:	St. Clair Region	Wellhead Protection Area:	No	Intake Protection Zone:	Yes, 1, score is 7
ISSUE CONTRIBUTING AREA:	No	Significant Groundwater Recharge Area:	Yes, score is N/A	Highly Vulnerable Aquifer:	Yes, score is 6
EVENT BASED AREA:	Yes, for stored / transported fuel/Oil spill				

Figure 5 highlights the Intake Protection Zone that is related to the surface water intake for the Town of Petrolia, and Figure 6 highlights the significant groundwater recharge area and highly vulnerable aquifer delineation.

Based on the policy area delineations at the Site, the following activities are potentially at risk of conflicting with the protection of drinking water quality and quantity:

1) Fueling and storage of fuels/oil;
2) Storage and use of road salt;
3) Dewatering and discharge of effluent from construction activities;
4) Land development activity that restricts groundwater recharge;
5) Transfer of water from one watershed to another.

2.3.4. Permit to Take Water Database Search

The MECP maintains an online database and GIS mapping service that contains all registered Permit to Take Water and Construction Dewatering Environmental Activity and Sector Registry (EASR) filings. A review of this service indicates that the following activities are currently reported for the HSA (Ministry of the Environment, 2018).

- Surface Water Taking Permit #3431-98DKSC (Reference 8161-95YQF8) for The Corporation of the Town of Petrolia water supply for takings from Lake Huron to a maximum of 15,586,000 L/day
- Surface Water Taking Permit #1184-9Z4PEC for 1565696 Ontario Ltd. for irrigation and water supply for takings from Lake Huron for operational use (golf course) to a maximum of 5,184,000 L/day

The database did not contain any historical or current groundwater taking permits for construction dewatering purposes within the HSA.

3. SITE SETTING

The Site Setting has been established based on a review of background reports, mapping, and site inspections.

3.1. TOPOGRAPHY AND DRAINAGE

The topography across the HSA is relatively flat, dipping north towards Lake Huron. The elevations at the Site range from about 181 to 182 meters above sea level. The Site is a mix of landscaped areas with hard surfaces and building cover. Site drainage is controlled by municipal storm sewers that are anticipated to direct runoff to the nearby Lake.

3.2. SURFACE WATER AND NATURAL HERITAGE FEATURES

Although there are no surface water features located on the subject property, there are several nearby, including Lake Huron, and Cow Creek, which is situated about 500 m south of the Site. Cow Creek meanders towards the east, with discharge to Lake Huron about 1,000 m directly east of the Site, along Old Lakeshore Road.

The shore of Lake Huron is directly across Old Lakeshore Road from the Site and the monthly mean water level for the month of February is reported at 176.41 meters above sea level, which is down from a January 2023 mean of 176.54 m ASL (Government of Canada, 2021).

Based on a review of the natural heritage area mapping, there are no evaluated or non-evaluated wetlands mapped within the HSA.

4. FIELD INVESTIGATION

4.1. BOREHOLE DRILLING

The EnVision geotechnical field investigation consisted of drilling two (2) boreholes (BH23-1 to BH23-2) to depths of 17.37 m to 12.80 m below the existing ground surface. The drilling work was completed by a licensed water well contractor on March 8, 2023 under the supervision of EnVision staff. Both boreholes were converted to long-term groundwater monitoring wells. Borehole log sheets and details are attached in Appendix B. The locations of each borehole and well are highlighted in Figure 7. A south-to-north cross-section that incorporates the findings from our desktop review (MECP Well Records) and the field drilling program has been prepared as Figure 8.

4.2. SOIL DESCRIPTIONS

Borehole BH23-1 was drilled within the property of the Bright's Grove WTP and Borehole BH23-2 was drilled on the public right of way, north of road boulevard of Old Lakeshore Road. The subsurface conditions in the boreholes consisted of topsoil at the ground surface, overlying fill materials comprised of silty clay and silty sand to sandy silt, which in turn are underlain by silty clay till deposit. A more detailed description of the subsurface conditions encountered in the boreholes is provided below.

4.2.1. Topsoil

An approximately 200mm to 300mm thickness of topsoil was encountered at the ground surface at the locations of Boreholes BH23-1 and BH23-2.

4.2.2. Fill Materials

Below topsoil, fill material was encountered in Boreholes BH23-1 and BH23-2 which extended to depths ranging from 2.3m to 3.1m below ground surface. The fill generally consisted of silty sand to sandy silt and silty clay with trace to some gravel and organic stains.

Obstructions were encountered in Borehole BH23-2 at about 3m below existing grade. At the second attempt, this borehole was shifted 0.9m in the east and 1.4m in the south directions, obstructions were still encountered at the same depth of 3m below existing grade. Following, third attempt, shifted borehole 1.5m in the east and 2.9m in the south directions, the borehole penetrated the overturned till reached the proposed termination depth without encountering obstructions.

The natural moisture contents measured in the tested samples from fill material ranged from 8 to 22%.

4.2.3. Silty Clay Till

In both Boreholes BH23-1 and BH23-2, a pervasive deposit of native silty clay till was encountered below fill materials at depths of 2.3m to 3.1m below the existing ground surface and this deposit extended beyond the terminal depth of the boreholes (i.e., > 17.4m bgs). Although there was no recovery of cobbles and/or boulders within the silty clay till samples during drilling, glacial till deposits in Southern Ontario typically contain such obstructions, and therefore they should be expected to be present.

4.3. MONITORING WELL INSTALLATION

Monitoring wells were installed in BH23-1, and BH23-2 upon completion of drilling to assess groundwater conditions. Each monitoring well was installed by inserting the screen and casing assembly into the borehole to the designed depth and then packing a silica sand pack filter around the screen interval. Above the sand pack, a bentonite hole plug was installed to eliminate contamination from surface along the annulus space. BH23-1, which was located within the subject property boundary was finished with a 0.73 m stick-up casing, protected by a steel monument cover. BH23-2 which was installed north of Old Lakeshore Rd., was finished with an at-grade casing protected by a flush-mount cover. Ground levels at each of the monitoring well locations were surveyed to an elevation datum and reported on the borehole logs. Well design information is presented on the individual log sheets and in the groundwater level table below.

4.4. GROUNDWATER LEVEL MONITORING AND FLOW DIRECTION

Water levels at each of the monitoring wells were measured on March 17th, 2023. A summary of the water level observations, well construction details, and other information is included in Table C-1, Appendix C.

As highlighted in Table C-1, both wells were screened across the shallow water table, with screen intervals between 3 m and 6 m (BH23-1) to 3 m and 9 m (BH23-3). Based on the March 2023 groundwater level measurements, the elevation ranges between 179.7 to 176.1 m ASL. Based on the two elevation points and nature of the subsurface materials and proximity to the lake, groundwater flow within the shallow overburden is directed north, with discharge to Lake Huron. It is noted that these observations represent a short-term dataset only. Seasonal variability and long-term lake trends can result in groundwater level increase/decrease. Variability can lead to amplitude swings of up to 1 meter. Long-term monitoring would be required to provide an assessment of these influences. March is typically a period of high groundwater conditions.

Typically, recharge of shallow groundwater comes from infiltration of precipitation locally, which is considered the primary input that controls the overburden water table across the HSA. Based on the information from two onsite overburden wells, the apparent groundwater flow within the shallow overburden is directed towards Lake Huron (north). A bedrock aquifer is inferred below the Site, based on the MECP water well record review. Recharge to this deeper groundwater system is inferred to be derived from downward seepage through the fine grained glacial till aquitard, with discharge occurring into Lake Huron.

4.5. IN-SITU SINGLE WELL RESPONSE TESTING (SWRT)

EnVision conducted confirmatory SWRTs at BH23-1, and BH23-2 on March 17, 2023. In advance of performing SWRTs, the monitoring wells were developed to remove the potential presence of fine

sediments. The development process involved purging of the monitoring wells to induce the flow of fresh formation water through the screen.

During the SWRT, a slug of water was near-instantaneously removed from the well and the response in water level was recorded. The K values for each of the tested wells were calculated from the SWRT data using Aqtesolv Software and the Bouwer-Rice solutions for confined conditions. The semi-log plots for normalized drawdown versus time are included in Appendix D. Table 2 presents a summary of the in-situ rising head test results.

Table 2: Summary of In-Situ SWRT Results

WELL ID	SCREEN DEPTH	SOIL UNIT	HYDRAULIC CONDUCTIVITY	METHOD
BH23-1	3.0 to 6.0 m	Silty clay till	1.50 X 10^{-7} m/sec	Rising head, Bouwer-Rice
BH23-2	3.0 to 9.0 m	Fill to silty clay till	1.47X10^{-7} m/sec	Rising head, Bouwer-Rice

Results from the in-situ testing provide an estimate of approximately 1.5X10^{-7} m/s for the silty clay till material adjacent to the screened interval. Published sources indicate that an organic clay/silty clay material typically exhibits hydraulic conductivity values between 5.0X10^{-9} to 1.0X10^{-7} m/s, which agrees with the testing results from the SWRT assessment.

4.6. GROUNDWATER QUALITY ASSESSMENT

To provide baseline conditions and to assess the options for discharge management during construction dewatering activities, two (2) groundwater samples were collected from BH23-1 and BH23-2. To assess the general chemistry of the groundwater, a routine comprehensive analytical package (RCAp) was collected from each monitoring well on March 17, 2023.. Prior to collection of the samples, approximately three (3) well volumes of standing groundwater were purged from each well.

The suites were collected unfiltered and placed into pre-cleaned laboratory-supplied vials and/or bottles provided with analytical test group specific preservatives, as required. Dedicated nitrile gloves were used during sample handling. The groundwater samples were submitted to an independent laboratory, Bureau Veritas Laboratories (BV), in Mississauga, Ontario, for analysis of routine parameters with comparison to the Provincial Water Quality Objectives. BV is a certified laboratory by the Canadian Association for Laboratory Accreditation Inc.

A summary of the analytical results and the laboratory Certificate of Analysis (CofA) are enclosed in Appendix E. A summary of the noted exceedances is included in Table 3 below.

Table 3: Summary of Groundwater Quality (PWQOs)

COMPARISON TO PROVINCIAL WATER QUALITY OBJECTIVES

PARAMETER	Units	Objectives (PWQO)	Results (BH23-1) RCAp	Results (BH23-2) RCAp
BORON	ug/L	200	280	210
COBALT	ug/L	0.9	0.73	2.3
COPPER	ug/L	5	4.2	11
IRON	ug/L	300	2900	3600
MOLYBDENUM	ug/L	40	44	49
URANIUM	ug/L	5	7.1	13
VANADIUM	ug/L	6	4.3	7.2

5. CONSTRUCTION DEWATERING ASSESSMENT

Water takings within the Province of Ontario are governed by the Ontario Water Resources Act (OWRA), and the Water Taking and Transfer Regulation (O.Reg. 387/04). In addition, O.Reg. 63/16 regulates water takings for temporary activities, such as construction and road work dewatering. In Ontario, construction dewatering that exceed 50,000 L/day require either a Category 3 PTTW, or registration with the MECP EASR. The proposed work may fall within the following possible categories:

- Surface water diversions without pumping (i.e. non-earth cofferdam, sheet piles, sand bags designed to provide a dry work area) are exempt and do not require permitting.
- Surface water diversions with pumping out of an excavation designed to provide a dry working area is exempt from permitting, except that best management practices listed in the regulation must be followed.
- Pumping of groundwater (construction dewatering) to maintain a dry work area, which fall under one of three scenarios:
    - Volumes of a combination of groundwater and surface water (precipitation) that is below 50,000 L/day are exempt from permitting
    - Volumes of a combination of groundwater and surface water (precipitation) that is above 50,000 L/day but below 400,000 L/day require registration as an EASR
    - Volumes of groundwater that is above 400,000 L/day will require a Category 3 PTTW.

5.1. PROJECT CONCEPTUAL OVERVIEW

Details for design are considered conceptual at this time, however it is expected that the project will involve construction of a 600mm raw water intake pipe that extends below the lakebed into Lake Huron, pre-cast concrete wet well intake chamber, and associated piping and manholes.

For purposes of providing the hydrogeological impact assessment, it is assumed that excavations below the shallow groundwater table will be carried out, and some temporary groundwater control will be required. The construction methodology is not determined, however typically the wet well will be constructed within a shored structure (sealed, or unsealed), while the raw water intake pipe will be installed by horizontal drilling technique, or laid in a v-shaped sloped open cut excavation. Connections to the treatment facility from the wet well are assumed to be constructed using traditional open-cut trenching techniques.

Based on a review of the conceptual drawings (Appendix E), the wet well is to be constructed within the subject property boundary, and will consist of a rectangular pre-cast concrete structure of unknown dimensions. The floor is estimated to be set at elevation 172.46 m ASL with the top of the 600 mm raw water intake at 173.35 m ASL. The intake pipe will extend out under the lake for an approximate run of 400 – 420 meters. Proposed manholes on either site of Old Lakeshore Drive are being considered that extend to the bottom of the wet well elevation. Approximately 40 m of 450mm raw water pipe is to be installed that connects the wet well to the treatment building with the bottom of the pipe sitting at approximately 178 m ASL.

The following dewatering assessment is provided to guide design and constructability questions, and to provide an impact assessment related to future groundwater control activities.

5.2. METHODOLOGY

5.2.1. Wet Well/Manhole Shaft Dewatering

To estimate the maximum short-term construction dewatering rate, the 'radial flow to a well in a water table aquifer' method has been selected to estimate the dewatering rates for the wet well and manhole shafts. The excavation area has been approximated as an equivalent radial well, using the flow equation summarized below:

$$Q = \frac{K(H^2 - h^2)}{0.733 \log {}^{R_0}/_{r_e}}$$

Where:

Q = Groundwater discharge (m^3/day)

H = Initial depth of water (static head) prior to dewatering

h = Elevation of water beneath excavation while pumping

K = Hydraulic Conductivity estimated from the highest approximated value from grain size relationship

r_e = effective radius of excavation, $r_e = \sqrt{\frac{ab}{\pi}}$

R_0 = Zone of influence radius, $R_0 = r_e + 3000*(H-h)*K^{0.5}$

Source: (Powers, 2007)

The analytical method above requires an estimate for the equivalent radius of influence (R_0) which is a concept that represents the radial distance away from the center of pumping in which the sum of recharge balances the volume of discharge. This area is controlled through complex interactions that involve surface topography, land cover, infiltration from precipitation and nearby reservoirs, such as lakes or rivers. An empirical relationship (Sichardt Approximation) has been developed and is used as an industry standard to provide the approximate radius of influence. In the case that the shoreline is situated at a distance that is less than the predicted radius of influence, the distance to the shoreline shall be selected.

5.2.2. Open Cut Trenching

To estimate the amount of dewatering needed to drain the area for proposed construction along open-cut sections, the Powers expression (long narrow system equation) for unconfined and confined aquifer steady-state condition, was used:

$$Q = \frac{\pi K(H^2 - h^2)}{\ln {R_0}/{r_e}} + \frac{2(xK(H^2 - h^2))}{2L}$$

Where:

Q = Groundwater discharge (m^3/day)

H = Initial depth of water (static head) prior to dewatering (m)

h = Elevation of water beneath excavation while pumping (m)

K = Hydraulic Conductivity (m/day)

r_e = effective radius of excavation (m)

R_0 =2 L = estimated radius of influence (m)

The zone of influence (ZOI) is calculated using the empirical Sichardt equation, which can be stated as:

$$R_0 = C(H - h)\sqrt{K}$$

Where:

C = Coefficient constant, assumed 3000 for a line source;

5.3. DEWATERING INPUTS AND ASSUMPTIONS

5.3.1. Wet Well and Manholes

As noted, the design details are considered conceptual at this stage and are therefore anticipated to need revision. The wet well feature is considered as a rectangular structure 20 m by 30 m and with a depth of 7 m below grade. The proposed manhole structures are considered as a circular shaft with a radius of 5 m that also extend a total of 7 m below grade.

The static groundwater level has been estimated based on the water level information collected in March of 2023. The hydraulic conductivity of the silty clay till material is assigned based on the in-situ testing conducted in the nearby monitoring wells. The water level under dewatering is assumed to be 1 m lower than the base of the bottom of each structure, or 8 m below ground surface. The excavation is anticipated to be advanced through the upper fill material into and terminating within the silty clay till material.

5.3.2. Open Cut Trenching

In order to estimate potential dewatering rates for open cut trenching below the water table, the following assumptions have been incorporated into the calculations, summarized below in Table 4.

Table 4: Summary of Open Cut Trenching Dimensions

Description	Assumption	Notes
Dimensions of the 600mm raw water intake trench	20 m by 30 m by 7 m depth	Assumed a 3:1 H:V trench, depth of 7 m, extending from the wet well to about 10 m from the shoreline.
Dimensions of the 450mm intake pipe	10 m by 40 m by 3 m depth	Assumed a 3:1 H:V trench, depth of 3m, extending from the wet well structure to the treatment building

Dewatering to below the lake water levels will be progressively more difficult with proximity to the shoreline. For the purposes of this assessment, it is assumed that surface water will be separated from the dewatering area by a suitable earthen berm, or barrier of low permeability to reduce groundwater and surface water flow to excavation area.

5.4. RESULTS OF DEWATERING ESTIMATION

Based on the assumptions outlined above, the range of possible groundwater takings has been summarized below, in Table 5. Note that these are considered conservative in nature as they have been adjusted with a suitable factor of safety. The calculation details and analysis are provided in Appendix F, Table F-1 and Table F-2.

Table 5: Summary of Predicted Dewatering Rates

AREA	STEADY STATE GROUNDWATER INFLOW (LITERS PER DAY)	ALLOWANCE FOR STORMWATER AND CONTINGENCY EVENTS (L/DAY)	MAXIMUM EXPECTED DEWATERING RATE (L/DAY
WET WELL	9,900	15,900	25,800
MANHOLES	4,800	3,200	8,000
OPEN CUT TRENCHING 600 MM INSTALLATION	24,500	12,000	36,500
OPEN CUT TRENCHING 450 MM INSTALLATION	8,200	1,600	9,800
		TOTAL	80,100

Perched water may be expected within utility backfill and bedding materials. Seepage of perched water into the excavation should also be anticipated whenever existing utility backfill and bedding maybe intercepted by the new excavation. For the design purposes, the groundwater level shall be taken as 1m

higher than the measured groundwater level in the nearest monitoring well installed within the overburden or the regional flood level, whichever is higher.

5.5. GROUNDWATER CONTROL METHODOLOGY

It is expected that groundwater control can be managed by pumping through filtered sump pumps from a gravity trench or sump pit, excavated below the excavation base. Where higher seepage rates are encountered, such as within saturated granular fill or bedding materials, additional active dewatering using shallow evenly spaced well points surrounding the excavation may be required. Alternatively, the use of sheet piling, or other cutoff techniques may be required where excavations approach the shoreline.

Trenchless methods could also be considered to further reduce the need for groundwater control in proximity to the shoreline.

5.6. CONSTRUCTION DEWATERING EASR

Based on the predicted daily water taking rates, the future construction dewatering should be managed through an Environmental Activity and Sector Registry (EASR) for short-term construction dewatering activities (O.Reg. 63/16). The EASR is to be registered by the project owner using the on-line MECP Environmental Permissions portal. The EASR process includes several conditions and technical requirements, including the following:

1) A Qualified Person must complete a "Water Taking and Discharge Plan" to guide the dewatering activity and to ensure that no unacceptable impacts to the natural environment, private property owners, or groundwater users will occur due to the activity.
2) A discharge plan must be prepared to direct the safe discharge of dewatering effluent during construction.
3) A mitigation strategy must be developed to direct response to any negative impacts to the environment, or stakeholders.

5.7. GROUNDWATER DISCHARGE MANAGEMENT

Under the EASR registration, the options available for discharge of dewatering effluent are one of the following:

1) A waste management system;
2) Sewage works operating under and Environmental Compliance Approval;
3) Municipal sanitary or storm sewer, in accordance with any municipal requirements; or
4) To land surface, with additional stringent conditions.

Typical measures for groundwater discharge during construction is to pump it to a municipal sewer, collect and haul offsite for disposal, or to treat and release to land surface. In either case, the discharge activity may be regulated by a municipal by-law, or provincial regulation. The following information

provides a summary of the two recommended options for groundwater discharge management during construction dewatering.

5.7.1. Option One – Discharge to Land

Discharge to land surface is possible, provided that the final discharge location is more than 30 m from any water body. If a discharge location is within 30 m of Lake Huron, a notification must be filed and reviewed by the MECP, with tight controls on discharge quality expected. The proximity to Lake Huron and the IPZ-1, together with tight confines on Site would make this option difficult, if not impossible.

5.7.2. Option Two – Discharge to Municipal Sewer

Discharge to the sanitary sewer is preferred, however it may require a permit from the Town of Petrolia. The discharge may also require additional criteria including quality limits, flow rate maximums, and other conditions. Based on the predicted flow rates from the temporary construction, risk of negative impacts to the sanitary sewer would be considered low.

A discharge management program would be required that conforms with the sewer use permit. Treatment of the effluent is expected to be minimal in nature, likely consisting of retention in baffled settling tanks to allow for the removal of suspended solids. Discharge sampling should be completed at regular intervals to ensure that the effluent meets the allowable limits outlined by the relevant by-law. Daily visual examination of the system would be required to confirm that no negative impacts occur.

5.7.3. Option Three – Offsite Disposal

If necessary, the dewatering effluent could be directed to onsite environmental tanks with periodic offsite haulage to a suitable liquid waste facility. Discharge management requirements would be considered low for this option, directed by the receiving facilities restrictions.

6. IMPACT ASSESSMENT

6.1. ZONE OF INFLUENCE FROM DEWATERING

The predicted zone of influence from each dewatering source has been highlighted below, in Table 6, with an inventory of potential sensitive structures that fall within the range.

Table 6: Summary of Zone of Influence Due to Dewatering

SOURCE OF DEWATERING	HEIGHT OF DRAWDOWN PREDICTED (M)	ZOI FROM EDGE OF EXCAVATION/SHAFT (M)	PRESENCE OF SENSITIVE STRUCTURE
WET WELL	7.1	8.2	Underground services along Old Lakeshore, on site structures
MANHOLES	7.1	8.2	Underground services along Old Lakeshore, on site structures, existing intake
OPEN CUT TRENCHING 600 MM INSTALLATION	8.7	9.8	Underground services along Old Lakeshore, existing intake pipe
OPEN CUT TRENCHING 450 MM INSTALLATION	5.7	6.4	Underground services along Old Lakeshore, on site structures, existing intake

6.2. IMPACTS TO GROUNDWATER USERS

All properties that surround the Site or fall within the HSA are serviced by municipal water. Groundwater well use is not expected within the zone of influence of dewatering activity and therefore the risk to the quality and quantity of nearby users is considered negligible. In addition, the planned construction activities are relatively shallow and above the bedrock aquifer system, with low expected water takings of short duration.

6.3. IMPACTS TO NEARBY STRUCTURES

Based on the predicted zone of influence provided above in Table and nature of the subsurface soil conditions, the risk to nearby structural damage caused by differential dewatering induced settlement is considered low. Settlement monitoring is always recommended when dewatering near sensitive structures.

6.4. IMPACTS TO TOWN OF PETROLIA SEWER SYSTEMS

The predicted dewatering rates are low, and expected to be insignificant when compared to the capacity of the receiving sewer system. This should be confirmed by the Town during any sewer permit application process. In addition, the dewatering effluent is expected to be of suitable quality that meets any allowable release limits. A discharge management plan will be provided that includes a summary of any discharge quality and quantity monitoring to ensure that the risk to the sewer system is negligible. The temperature of the release effluent will be closely aligned with groundwater temperatures, which ranges below 20 degrees Celsius.

6.5. CONTAMINANT MIGRATION DURING DEWATERING

As a part of the Assessment of Past Uses, completed by EnVision and dated March 8, 2023, the following observations were noted:

1) Fill materials of unknown quality were known to have been brought to the project area during construction and/or maintenance activities;
2) De-icing using compounds are applied seasonally to the project area for vehicular safety;
3) No records indicating underground storage tanks, or release of known contaminants were found for the project area.

Based on the review of the APU and public ERIS report, the risk of migration of offsite contaminants due to the temporary dewatering activities is considered low. A typical discharge monitoring program will be required during dewatering to ensure degradation of the groundwater does not occur.

7. MONITORING AND MITIGATION

7.1. CONSTRUCTION DEWATERING MONITORING

The active construction dewatering stage will require monitoring designed to assess the potential for impacts to water levels in aquifers, water quality, and ground settlement. The monitoring program should include the following components:

- Discharge volume reporting
- Groundwater level monitoring
- Discharge water quality monitoring
- Ground settlement monitoring

7.1.1. Discharge Volume Reporting

During active dewatering, the contractor will be required to document discharge pumping rates as a required condition of the EASR, with regular reporting of water taking volumes via the MECP Water Taking Reporting System. A flow meter should be supplied, and all discharged ground and storm water should be discharged through the properly field calibrated device. A non-resettable flow meter that records discharge in both instantaneous and cumulative modes is recommended. Daily recording of the discharge volumes will be required for regular reporting. The total combined daily discharge must never exceed the limits as outlined in the EASR. Additional storage measures (such as Extra tank storage or temporary settling ponds) can be used to control large rain events and reduce the instantaneous discharge/pumping rates. Further restrictions or conditions may be imposed through the enforced discharge agreement issued by the municipality.

7.1.2. Groundwater Quality Monitoring

A monitoring program should be implemented that is based on the selected discharge option. The monitoring program should consist of daily visual examination of the construction effluent for the presence of any sheen, foam, or odour. Water clarity and sediment level should also be monitored to ensure that the quality is not degrading during construction. Filters should be examined on a regular basis, and any failures to equipment should be repaired immediately. Discharge permitting may also include specific water quality testing that must be adhered to.

Impacts to water quality can be controlled using safe construction practices that eliminate the potential for waste spills and other contamination events. Refueling should be performed in designated areas away from open excavations. In the event of a spill, remedial action must be undertaken immediately by the contractor, following all MECP and provincial spill guidelines.

In addition, the migration of contaminants from off-site properties should be monitored by periodic water quality sampling from monitoring wells located along the property boundary or from the discharge outlet. This periodic sampling should be done frequently during the first month of dewatering; daily for 3 days, weekly afterwards for the first month, and consist of analysis for gasoline by-products and VOCs. If contaminant migration is noted, and based on the degrading water quality, a

treatment system may be required to ensure discharge water continues to meet the limits of the discharge agreement for the proposed receptor.

7.1.3. Ground Settlement Monitoring

As discussed previously, structures located within the ZOI may be susceptible to potential settlement or subsidence during any temporary dewatering. The following monitoring and mitigation measures are recommended:

- Consider a pre-construction condition survey for the structures located within the ZOI;
- Install monitoring devices on nearby buildings and structures, and maintain scheduled monitoring during active dewatering;
- Prepare to reduce dewatering efforts if undesirable deformation conditions present.

A geotechnical engineer should review and provide further input for ground settlement impacts.

8. CLOSING

8.1. CONCLUSIONS

Based on the information obtained through this Hydrogeological Assessment, Envision presents the following conclusions and recommendations:

- The Site pertains to the physiographic regions of Southern Ontario known as the Huron Fringe;
- The surficial material has been mapped and is comprised of fine-textured glaciolacustrine (shoreline to nearshore) deposits that feature sand, silt, and minor gravel;
- Bedrock identified as shale belonging to the Kettle Bay formation is anticipated at more than 30 m below ground surface;
- The MECP WWR database indicated that there are fourteen (14) water wells within about 1,500 m of the Site. Of the well records returned in the search, five (5) of them were determined to be water supply wells, four (4) were reported as abandoned, and five (5) were classified as observation or monitoring wells.;
- Based on the March 2023 groundwater level measurements, the elevation ranges between 179.7 to 176.1 m ASL.
- Based on in-situ single well response tests, the estimated saturated hydraulic conductivity ranges from $1.47x10^{-7}$ to $1.5\ X10^{-7}$ m/s;
- The estimated construction dewatering flow rate for the project is expected to range from **8.0 m³/day** (8,000 L/day) to **36.5 m³/day** (36,500 L/day) including the rainwater input after minor precipitation events. In total, from all sources, the maximum total daily water taking is expected to be approximately **80.1 m³/day** (80,100 L/day).
- A short-term construction dewatering EASR is recommended for temporary construction dewatering with a daily water taking limit of 400,000 L/day to provide flexibility and additional capacity for initial drainage from within excavations;
- Approval and a discharge agreement with the Town will be required to discharge dewatering effluent into the municipal sanitary/combined sewer system;

Based on the above conclusions, the following recommendations are provided:

1) All estimates provided should be revised during detailed design work as more information becomes available, including building footprint, depth of excavation, type of foundation, shoring selection, and other information;
2) A construction dewatering EASR has been recommended for groundwater control activities and will require filing by a Qualified Person and is to be supported by a Water Taking and Discharge Plan as per O.Reg. 63/16.

8.2. QUALIFICATION OF THE ASSESSORS

Robin Byers, P.Geo., B.Sc. is a Senior Hydrogeologist and is a practicing member of the Professional Geoscientists of Ontario with over 9 years of hydrogeological experience working in the Greater Toronto Area and Southern Ontario. He has experience in physical and chemical hydrogeology with foundational knowledge of well construction and design, groundwater modeling, pumping test analysis, and construction dewatering. Rob is also a qualified person as defined by O.Reg 63/16 for purposes of preparing water taking and discharge plans.

8.3. CERTIFICATION AND SIGNATURES

EnVision confirms the findings and conclusions and findings of the Hydrogeological Investigation.

Prepared by

Sam Harding, B.Sc.,
Environmental Scientist
sharding@envisionconsultants.ca

Reviewed by

Rob Byers, B.Sc., P.Geo.,
Senior Hydrogeologist
rbyers@envisionconsultants.ca

8.4. QUALIFIER

EnVision prepared this report solely for the use of the intended recipient in accordance with the professional services agreement. In the event a contract has not been executed, the parties agree that the EnVision General Terms and Conditions, which were provided prior to the preparation of this report, shall govern their business relationship.

The report is intended to be used in its entirety. No excerpts may be taken to be representative of the findings in the assessment. The conclusions presented in this report are based on work performed by trained, professional and technical staff, in accordance with their reasonable interpretation of current and accepted engineering and scientific practices at the time the work was performed.

The content and opinions contained in the report are based on the observations and/or information available to EnVision at the time of preparation, using investigation techniques and engineering analysis methods consistent with those ordinarily exercised by EnVision and other engineering/scientific practitioners working under similar conditions, and subject to the same time, financial and physical constraints applicable to this project.

EnVision disclaims any obligation to update this report if, after the date of this report, any conditions appear to differ significantly from those presented in this report; however, EnVision reserves the right to amend or supplement this report based on additional information, documentation or evidence.

EnVision makes no other representations whatsoever concerning the legal significance of its findings. The intended recipient is solely responsible for the disclosure of any information contained in this report. If a third party makes use of, relies on, or makes decisions in accordance with this report, said third party is solely responsible for such use, reliance or decisions. EnVision does not accept responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken by said third party based on this report.

EnVision has provided services to the intended recipient in accordance with the professional services agreement between the parties and in a manner consistent with that degree of care, skill and diligence normally provided by members of the same profession performing the same or comparable services in respect of projects of a similar nature in similar circumstances. It is understood and agreed by EnVision and the recipient of this report that EnVision provides no warranty, express or implied, of any kind. Without limiting the generality of the foregoing, it is agreed and understood by EnVision and the recipient of this report that EnVision makes no representation or warranty whatsoever as to the sufficiency of its scope of work for the purpose sought by the recipient of this report.

In preparing this report, EnVision has relied in good faith on information provided by others, as noted in the report. EnVision has reasonably assumed that the information provided is correct and EnVision is not responsible for the accuracy or completeness of such information.

Unless otherwise agreed in writing by EnVision, the Report shall not be used to express or imply warranty as to the suitability of the site for a particular purpose. EnVision disclaims any responsibility for consequential financial effects on transactions or property values, or requirements for follow-up actions /or costs. This limitations statement is considered an integral part of this report.

9. BIBLIOGRAPHY

Chapman, L. a. (2007). Physiography of Southern Ontario. *Miscellaneous Release*. Ontario Geological Survey - Data 228 ISBN 978-1-4249-5158-1.

Government of Canada. (2021, November). *Canadian Station Inventory - Marine Environmental Data*. Retrieved from Historical tides and water levels.: https://www.isdm-gdsi.gc.ca/isdm-gdsi/twl-mne/inventory-inventaire/index-eng.htm

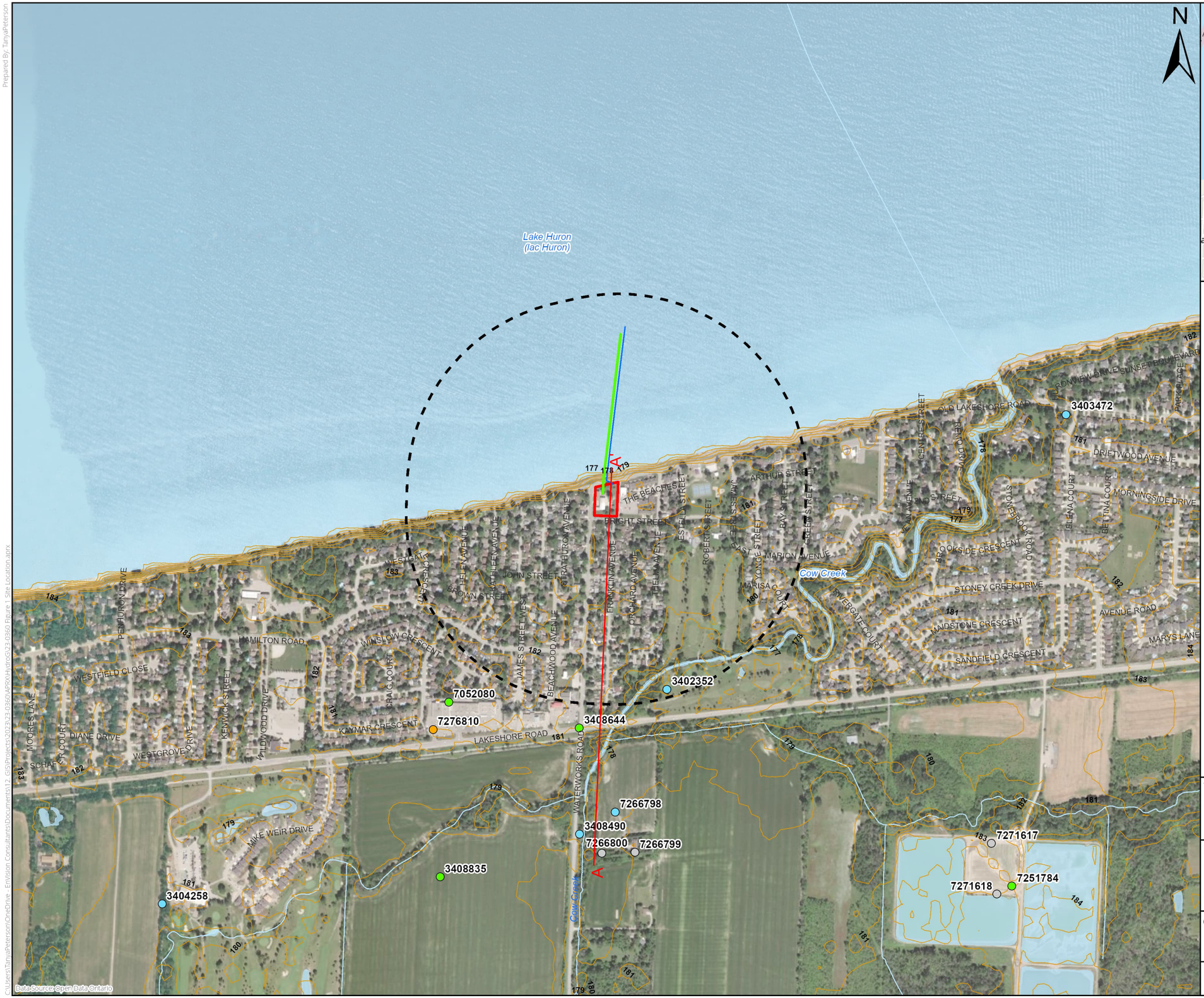
Ministry of Environment, Conservation and Parks. (2018, October 1). *Well records*. Retrieved from Ontario.ca: https://www.ontario.ca/page/well-records

Ministry of the Environment, C. a. (2018, Sep 24). *Access Environment*. Retrieved from http://www.gisapplication.lrc.gov.on.ca/AccessEnvironment/IndexAccEnv.html?viewer=AccessEnvironment.AE&locale=en-US

Ontario Geological Survey. (1997). *Quaternary geology, seamless coverage of the province of Ontario, OGS, Data Set 14.*

FIGURES

Prepared By: TanyaPeterson



LEGEND

- SITE LOCATION
- HYDROGEOLOGICAL STUDY AREA
- WATERBODY
- WATERCOURSE
- TOPOGRAPHIC CONTOURS
- EXISTING WATER INTAKE PIPE
- PROPOSED WATER INTAKE PIPE

MECP WATER WELLS

- MONITORING AND TEST HOLE
- OBSERVATION WELLS
- WATER SUPPLY
- ABANDONED

CROSS SECTION PROFILE LINE

Scale: 1:10,000

0 100 200 300 400 500 Metres

TITLE

SITE LOCATION PLAN

PROJECT

HYDROGEOLOGICAL IMPACT ASSESSMENT
BRIGHT'S GROVE WATER TREATMENT
INTAKE STRUCTURE
2701 OLD LAKESHORE RD, BRIGHTS GROVE, ONTARIO

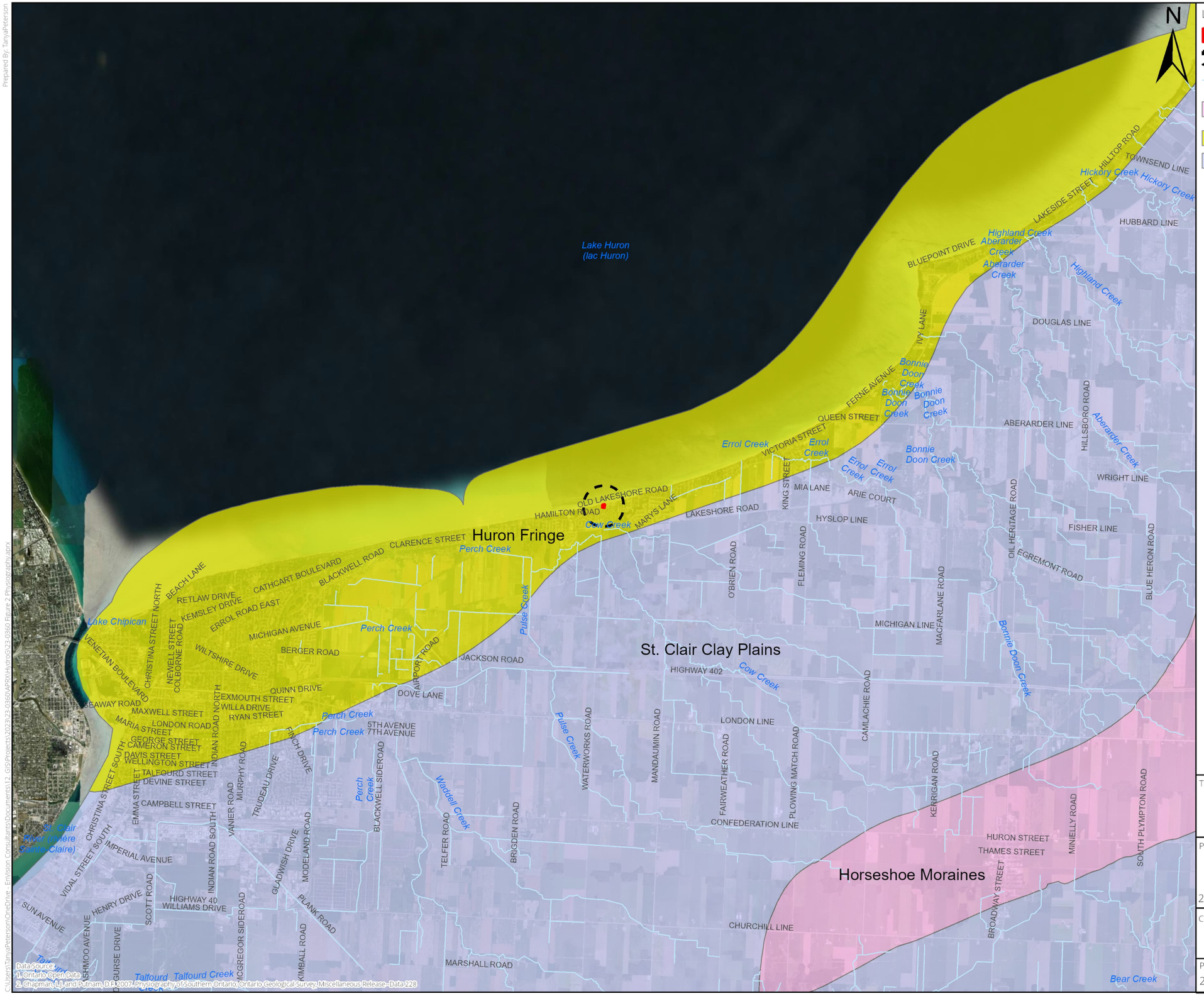
CLIENT

CIMA CANADA INC.

PROJECT NO.	DATE	PREPARED BY	APPROVED BY	FIGURE
23-0360	APRIL 2023	TP	RB	1

Data Sources: Open Data Ontario

C:\Users\TanyaPeterson\OneDrive - EnVision Consultants\Documents\12_GIS\Projects\2023\23-0360\APRX\HydroGIS 23-0360 Figure 1 Site Location.aprx



LEGEND

- SITE LOCATION
- HYDROGEOLOGICAL STUDY AREA
- WATERCOURSE
- HORSESHOE MORAINES PHYSIOGRAPHIC REGION
- HURON FRINGE PHYSIOGRAPHIC REGION
- ST. CLAIR CLAY PLAINS PHYSIOGRAPHIC REGION

Scale: 1:100,000

0 1,000 2,000 3,000 4,000 5,000 Metres

Data Source:
1. Ontario Open Data
2. Chapman, L.J. and Putnam, D.F. 2007. Physiography of Southern Ontario. Ontario Geological Survey, Miscellaneous Release–Data 228

TITLE

PHYSIOGRAPHY OF THE STUDY AREA

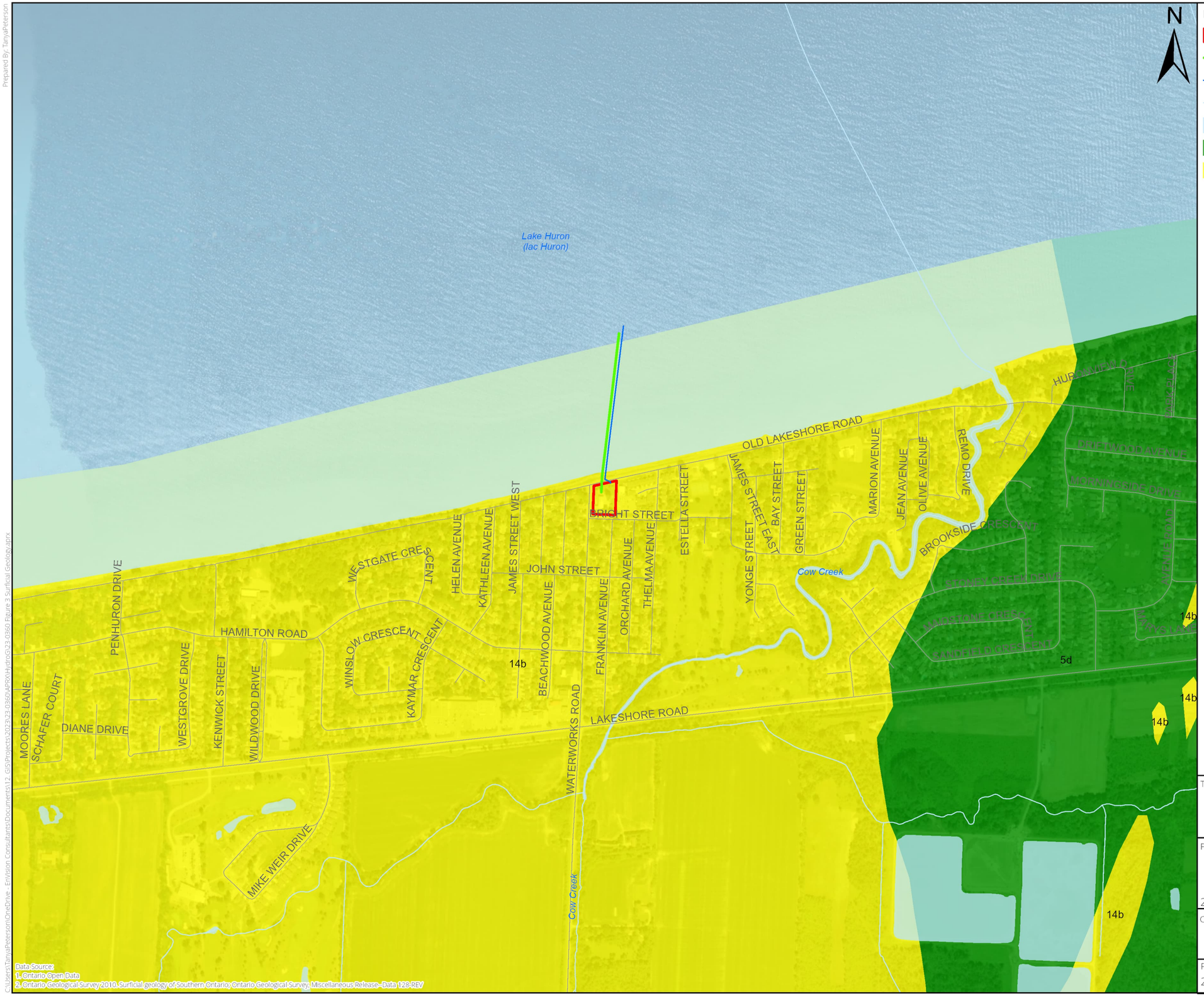
PROJECT

HYDROGEOLOGICAL IMPACT ASSESSMENT
BRIGHT'S GROVE WATER TREATMENT
INTAKE STRUCTURE
2701 OLD LAKESHORE RD, BRIGHTS GROVE, ONTARIO

CLIENT

CIMA CANADA INC.

PROJECT NO.	DATE	PREPARED BY	APPROVED BY	FIGURE
23-0360	APRIL 2023	TP	RB	2



LEGEND

- SITE LOCATION
- EXISTING WATER INTAKE PIPE
- PROPOSED WATER INTAKE PIPE
- WATERCOURSE
- WATERBODY
- 5D: GLACIOLACUSTRINE-DERIVED SILTY TO CLAYEY TILL
- 14B: LITTORAL-FORESHORE DEPOSITS

Scale: 1:10,000

0 100 200 300 400 500 Metres

Data Source:
1. Ontario Open Data
2. Ontario Geological Survey 2010. Surficial geology of Southern Ontario, Ontario Geological Survey, Miscellaneous Release--Data 128-REV

TITLE

SURFICIAL GEOLOGY OF THE STUDY AREA

PROJECT

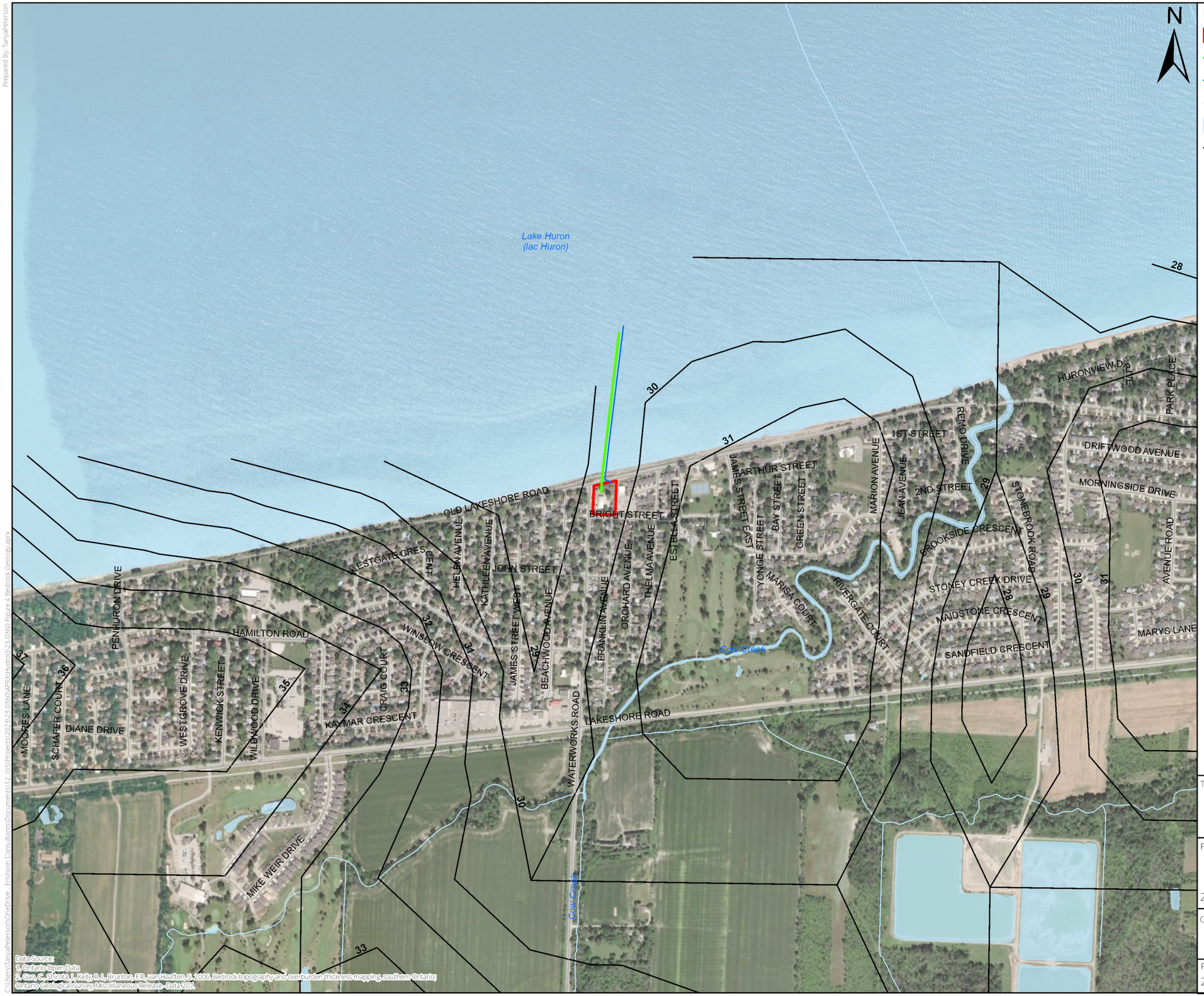
HYDROGEOLOGICAL IMPACT ASSESSMENT
BRIGHT'S GROVE WATER TREATMENT
INTAKE STRUCTURE
2701 OLD LAKESHORE RD, BRIGHTS GROVE, ONTARIO

CLIENT

CIMA CANADA INC.

PROJECT NO.	DATE	PREPARED BY	APPROVED BY	FIGURE
23-0360	APRIL 2023	TP	RB	3

Prepared By: TanyaPeterson



LEGEND

- SITE LOCATION
- EXISTING WATER INTAKE PIPE
- PROPOSED WATER INTAKE PIPE
- WATERCOURSE
- WATERBODY
- OVERBURDEN THICKNESS (m)

Scale: 1:10,000

0 100 200 300 400 500 Metres

TITLE

OVERBURDEN THICKNESS OF THE STUDY AREA

PROJECT

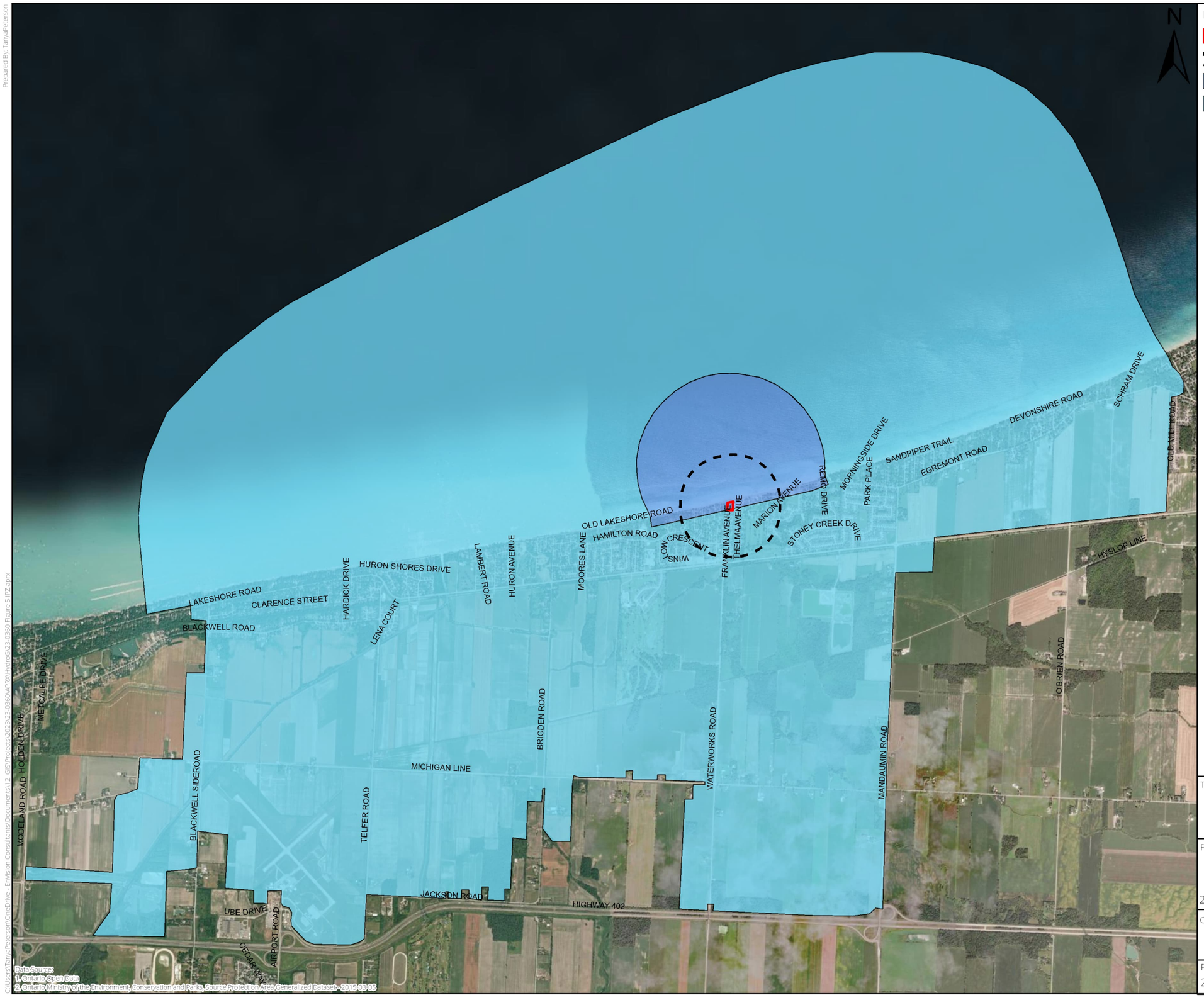
HYDROGEOLOGICAL IMPACT ASSESSMENT
BRIGHT'S GROVE WATER TREATMENT
INTAKE STRUCTURE
2701 OLD LAKESHORE RD, BRIGHTS GROVE, ONTARIO

CLIENT

CIMA CANADA INC.

PROJECT NO.	DATE	PREPARED BY	APPROVED BY	FIGURE
23-0360	APRIL 2023	TP	RB	4

C:\Users\TanyaPeterson\OneDrive - EnVision Consultants\Documents\12 GIS\Projects\2023\23.0360\APRX\Hydro\23.0360 Figure 4 Bedrock Geology.aprx



LEGEND

- SITE LOCATION
- HYDROGEOLOGICAL STUDY AREA
- INTAKE PROTECTION ZONE 1
- INTAKE PROTECTION ZONE 2

Scale: 1:40,000

0 500 1,000 1,500 2,000 Metres

TITLE

INTAKE PROTECTION ZONES

PROJECT

HYDROGEOLOGICAL IMPACT ASSESSMENT
BRIGHT'S GROVE WATER TREATMENT
INTAKE STRUCTURE
2701 OLD LAKESHORE RD, BRIGHTS GROVE, ONTARIO

CLIENT

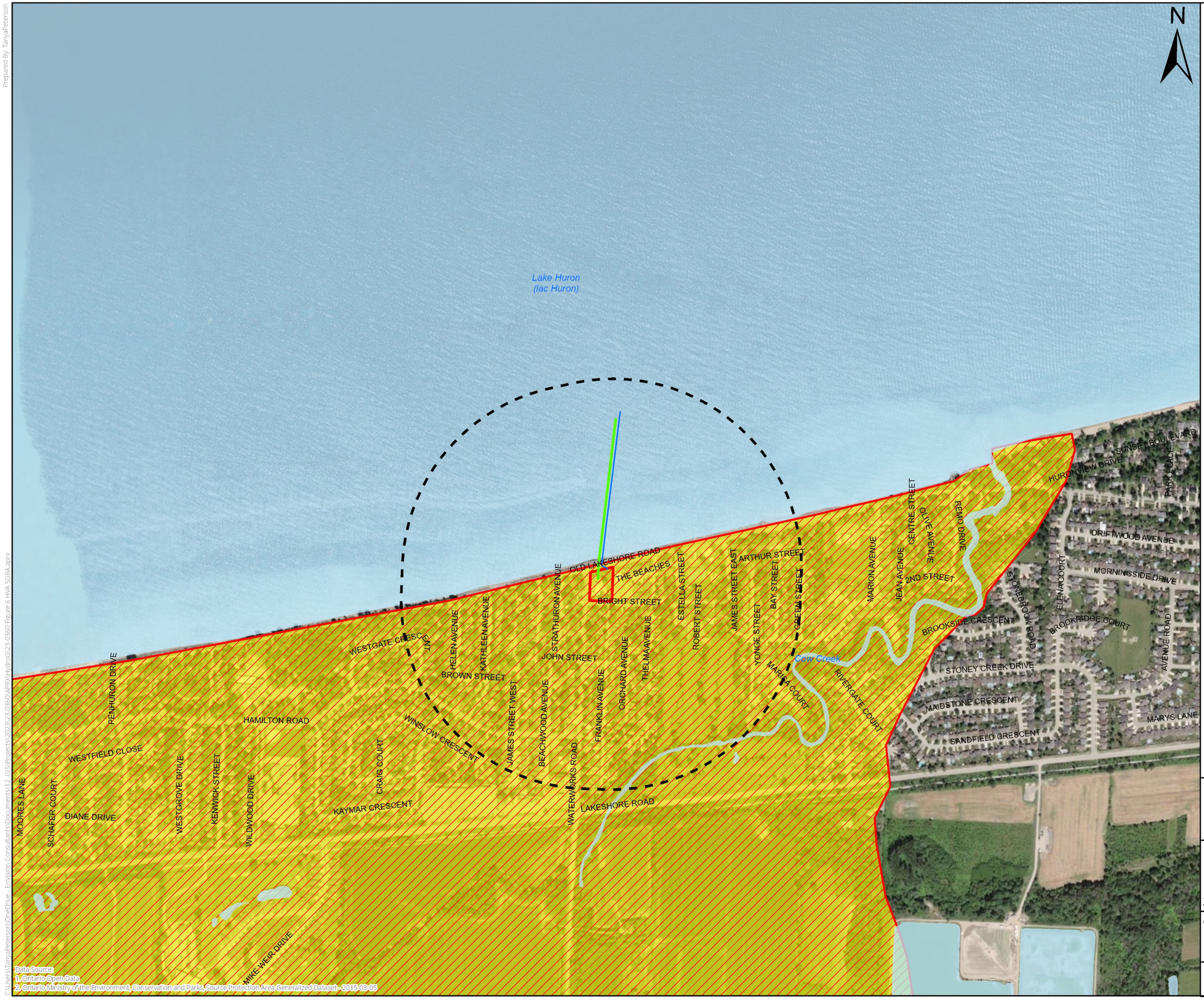
CIMA CANADA INC.

PROJECT NO.	DATE	PREPARED BY	APPROVED BY	FIGURE
23-0360	APRIL 2023	TP	RB	5

Data Source:
1. Ontario Open Data
2. Ontario Ministry of the Environment, Conservation and Parks, Source Protection Area Generalized Dataset - 2015-03-05

Prepared By: TanyaPeterson

C:\Users\TanyaPeterson\OneDrive - Envision Consultants\Documents\12. GIS\Projects\2023\23-0360\APRX\Hydro\23-0360 Figure 5 IPZ.aprx



Data Source:
1. Ontario Open Data
2. Ontario Ministry of the Environment, Conservation and Parks, Source Protection Area Generalized Dataset - 2015/03/05

C:\Users\TanyaPeterson\OneDrive - EnVision Consultants\Documents\12 GIS\Projects\2023\23-0360\APRX\Hydro\23-0360 Figure 6 HVA SGRA.aprx

LEGEND

- SITE LOCATION
- HYDROGEOLOGICAL STUDY AREA
- EXISTING WATER INTAKE PIPE
- PROPOSED WATER INTAKE PIPE
- WATERBODY
- HIGHLY VULNERABLE AQUIFER
- SIGNIFICANT GROUNDWATER RECHARGE AREA

Scale: 1:10,000

0 100 200 300 400 500 Metres

TITLE

HIGHLY VULNERABLE AQUIFERS &
SIGNIFICANT GROUNDWATER RECHARGE AREAS

PROJECT

HYDROGEOLOGICAL IMPACT ASSESSMENT
BRIGHT'S GROVE WATER TREATMENT
INTAKE STRUCTURE
2701 OLD LAKESHORE RD, BRIGHTS GROVE, ONTARIO

CLIENT

CIMA CANADA INC.

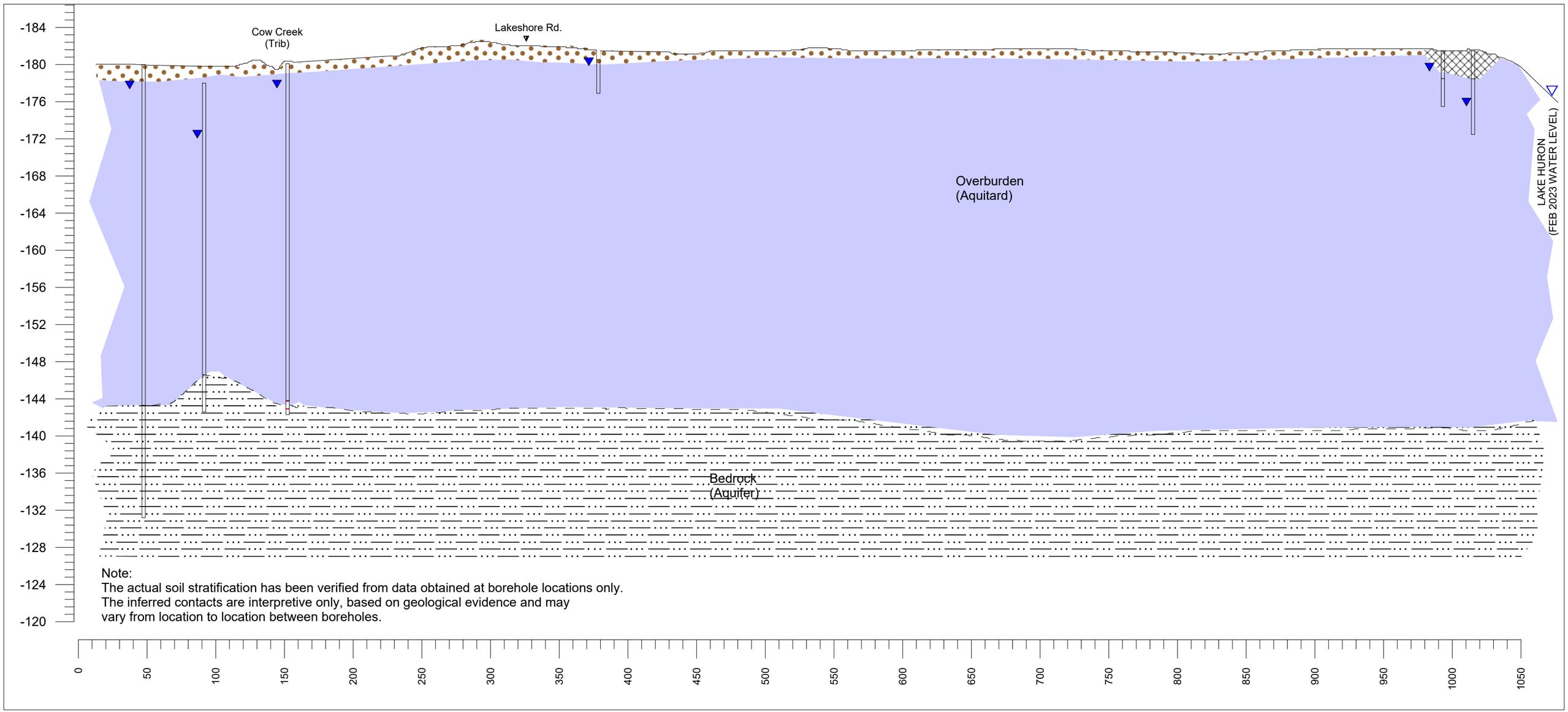
PROJECT NO.	DATE	PREPARED BY	APPROVED BY	FIGURE
23-0360	APRIL 2023	TP	RB	6

A

A'

Site Boundary

7266800 3408490 7266798 3408644 BH23-1 BH23-2



Note:
The actual soil stratification has been verified from data obtained at borehole locations only.
The inferred contacts are interpretive only, based on geological evidence and may vary from location to location between boreholes.

LEGEND

- Sand
- Clay
- Shale
- Topsoil
- Silty sand
- Gravel/Shale
- Fill
- Silty clay till
- Riser
- Screen/Open Hole
- Water Level

CLIENT: CIMA Canada Inc.

DATE: April 3, 2023

TITLE: CROSS-SECTIONAL PROFILE INTERPRETATION (A-A')
(South to North)

PROJECT:
Hydrogeological Investigation
2701 Old Lakeshore Road
Bright's Grove, ON

DRAWN BY: RB

CHECKED BY: SH

FIGURE NO: 7

DISCIPLINE: Environmental

SCALE: Scaling Depth per Inch - 10
Vertical Ex. - 7

ISSUE: 1

DATE OF: March 30, 2023

APPENDIX A:

MECP Water Well Records

MECP Water Well Records

Well Record #

3402352 — **Lot 009 Conc 09** — **SARNIA TOWNSHIP / LAMBTON**

Date 1965-11-01 (DD/MM/YYYY) — Elev (masl) — Easting 398173 — Northing 4764763

/ Domestic — Water Supply — UTM RC 5 — margin of error : 100 m - 300 m

Water Found 30.2 (mbgs) (masl) — FRESH

Casing Diameter 5 inch — Casing Material: STEEL

Top of Screen (mbgs) — Bottom of Screen (mbgs)

Screen Interval (m)

Flowing? N

SWL	19.8	(mbgs)	(masl)
Pumping WL	19.8	(mbgs)	(masl)
Pump Rate	54.6	(LPM)	2 / 0
Spec. Cap.	9,999.99	(LPM/m)	Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0			
0.6			TOPSOIL / /
3.0			HARDPAN / /
29.9		BLUE	CLAY / /
30.5		BLACK	SHALE / /

3403472 — **Lot 003 Conc 09** — **SARNIA TOWNSHIP / LAMBTON**

Date 1969-06-07 (DD/MM/YYYY) — Elev (masl) — Easting 399233 — Northing 4765493

/ Domestic — Water Supply — UTM RC 4 — margin of error : 30 m - 100 m

Water Found 32.0 (mbgs) (masl) — FRESH

Casing Diameter 4 inch — Casing Material: STEEL

Top of Screen (mbgs) — Bottom of Screen (mbgs)

Screen Interval (m)

Flowing? N

SWL	2.4	(mbgs)	(masl)
Pumping WL	15.2	(mbgs)	(masl)
Pump Rate	22.7	(LPM)	3 / 0
Spec. Cap.	1.78	(LPM/m)	Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0			
3.0			TOPSOIL / /
30.2		BLUE	CLAY / /
32.0			HARDPAN / /
32.6		BLACK	SHALE / /

3404258 — **Lot 015 Conc 09** — **SARNIA TOWNSHIP / LAMBTON**

Date 1973-06-15 (DD/MM/YYYY) — Elev (masl) — Easting 396833 — Northing 4764193

Domestic / Irrigation — Water Supply — UTM RC 4 — margin of error : 30 m - 100 m

Water Found 34.1 (mbgs) (masl) — FRESH

Casing Diameter 8 inch — Casing Material: STEEL

Top of Screen (mbgs) — Bottom of Screen (mbgs)

Screen Interval (m)

Flowing? N

SWL	4.9	(mbgs)	(masl)
Pumping WL	9.4	(mbgs)	(masl)
Pump Rate	45.5	(LPM)	10 / 0
Spec. Cap.	9.94	(LPM/m)	Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0			
0.6		BLACK	TOPSOIL / /
4.6		BROWN	HARDPAN / COARSE SAND /
33.5		BLUE	CLAY / COARSE SAND /
34.1		BLACK	GRAVEL / /
52.1		BLACK	SHALE / /

3408490 — **Lot 009 Conc 09** — **SARNIA TOWNSHIP / LAMBTON**

Date 2002-07-24 (DD/MM/YYYY) — Elev (masl) — Easting 397941 — Northing 4764378

/ Domestic — Water Supply — UTM RC 6 — margin of error : 300 m - 1 km

Water Found 31.1 (mbgs) (masl) — FRESH

Casing Diameter 6 inch — Casing Material:

Top of Screen (mbgs) — Bottom of Screen (mbgs)

Screen Interval (m)

Flowing? N

SWL	5.5	(mbgs)	(masl)
Pumping WL	17.4	(mbgs)	(masl)
Pump Rate	45.5	(LPM)	24 / 0
Spec. Cap.	3.82	(LPM/m)	Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0			
0.3		BLACK	TOPSOIL / /
2.1		BROWN	SAND / SILTY / LOOSE
31.1		GREY	CLAY / VERY / SOFT
31.7		BLACK	GRAVEL / SHALE /

Well Record #

										35.7	BLACK	SHALE /		/	
3408644	**Lot** 010	**Conc** 09			**SARNIA TOWNSHIP** / **LAMBTON**							**Flowing?**			
Date 2004-03-23	**Elev**		(masl)	**Easting** 397940		**Northing** 4764660						**SWL**	(mbgs)		(masl)
DD/MM/YYYY	/			**Observation Wells**		**UTM RC** 3	**margin of error : 10 - 30 m**					**Pumping WL**	(mbgs)		(masl)
	Water Found 1.5	(mbgs)		(masl)	**FRESH**							**Pump Rate**	(LPM)	/	
	Casing Diameter 5	cm		**Casing Material:**	**PLASTIC**				**Depth (m)**	**Elev (masl)**		**Spec. Cap.**	(LPM/m)	**Hour / Minute**	
	Top of Screen 0.9	(mbgs)	**Bottom of Screen**	4.6	(mbgs)				0.0		**Color**		**Soil Descriptions**		
	Screen Interval 3.7	(m)													
									0.6		BROWN	SAND /	GRAVEL	/	
									1.5		BROWN	SAND /	SILT	/	
									3.7		GREY	CLAY /		/	
									4.6		BROWN	CLAY /		/	
3408835	**Lot**	**Conc**			**SARNIA TOWNSHIP** / **LAMBTON**							**Flowing?**			
Date 2006-01-24	**Elev**		(masl)	**Easting** 397571		**Northing** 4764265						**SWL**	(mbgs)		(masl)
DD/MM/YYYY	/			**Observation Wells**		**UTM RC** 3	**margin of error : 10 - 30 m**					**Pumping WL**	(mbgs)		(masl)
	Water Found 0.8	(mbgs)		(masl)	**FRESH**							**Pump Rate**	(LPM)	/	
	Casing Diameter 5	cm		**Casing Material:**	**PLASTIC**				**Depth (m)**	**Elev (masl)**		**Spec. Cap.**	(LPM/m)	**Hour / Minute**	
	Top of Screen 0.7	(mbgs)	**Bottom of Screen**	3.1	(mbgs)				0.0		**Color**		**Soil Descriptions**		
	Screen Interval 2.4	(m)													
									0.1			/		/	
									0.6		BROWN	SAND /	GRAVEL	/	
									1.5		BROWN	SAND /	SILT	/	WATER-BEARING
									3.1		GREY	CLAY /	SILT	/	
7052080	**Lot**	**Conc**			**SARNIA CITY** / **LAMBTON**							**Flowing?**			
Date 2007-07-05	**Elev**		(masl)	**Easting** 397594		**Northing** 4764729						**SWL**	(mbgs)		(masl)
DD/MM/YYYY	/			**Observation Wells**		**UTM RC** 3	**margin of error : 10 - 30 m**					**Pumping WL**	(mbgs)		(masl)
	Water Found	(mbgs)		(masl)								**Pump Rate**	(LPM)	/	
	Casing Diameter 1.3	inch		**Casing Material:**	**PLASTIC**				**Depth (m)**	**Elev (masl)**		**Spec. Cap.**	(LPM/m)	**Hour / Minute**	
	Top of Screen 1.5	(mbgs)	**Bottom of Screen**	7.6	(mbgs)				0.0		**Color**		**Soil Descriptions**		
	Screen Interval 6.1	(m)													
												/		/	
7251784	**Lot**	**Conc**			**SARNIA TOWNSHIP** / **LAMBTON**							**Flowing?**			
Date 2015-09-01	**Elev**		(masl)	**Easting** 399089		**Northing** 4764240						**SWL**	(mbgs)		(masl)
DD/MM/YYYY	/ Monitoring and Te			**Observation Wells**		**UTM RC** 4	**margin of error : 30 m - 100 m**					**Pumping WL**	(mbgs)		(masl)
	Water Found	(mbgs)		(masl)								**Pump Rate**	(LPM)	/	
	Casing Diameter 4	inch		**Casing Material:**	**STEEL**				**Depth (m)**	**Elev (masl)**		**Spec. Cap.**	(LPM/m)	**Hour / Minute**	
	Top of Screen 1.5	(mbgs)	**Bottom of Screen**	3.0	(mbgs)				0.0		**Color**		**Soil Descriptions**		
	Screen Interval 1.5	(m)													
									0.3		BROWN	TOPSOIL /		/	
									3.0		BROWN	CLAY /	SILT	/	SAND
									4.6		GREY	CLAY /	SILT	/	

Well Record #

7266798 Lot Conc SARNIA TOWNSHIP / LAMBTON

Date 2016-06-07 DD/MM/YYYY | Elev (masl) | Easting 398036 | Northing 4764437 | UTM RC 4 margin of error : 30 m - 100 m

/ Domestic | Water Supply | Water Found 36.6 (mbgs) (masl) FRESH

Casing Diameter 6.3 inch | Casing Material: STEEL

Top of Screen 36.3 (mbgs) | Bottom of Screen 38.7 (mbgs)

Screen Interval 2.4 (m)

Flowing? N

SWL 2.2 (mbgs) (masl)

Pumping WL 8.2 (mbgs) (masl)

Pump Rate 36.4 (LPM) 4 / 0

Spec. Cap. 6.03 (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0			
0.9		BROWN	SAND / /
3.4		BROWN	CLAY / /
36.3		GREY	CLAY / /
37.8		BLACK	SAND / / HARD
38.7		BLACK	SHALE / / FRACTURED

7266799 Lot 009 Conc 09 SARNIA TOWNSHIP / LAMBTON

Date 2016-06-07 DD/MM/YYYY | Elev (masl) | Easting 398088 | Northing 4764330 | UTM RC 4 margin of error : 30 m - 100 m

/ | Abandoned-Other | Water Found (mbgs) (masl)

Casing Diameter | Casing Material:

Top of Screen (mbgs) | Bottom of Screen (mbgs)

Screen Interval (m)

Flowing?

SWL (mbgs) (masl)

Pumping WL (mbgs) (masl)

Pump Rate (LPM) /

Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0			
3.7		BROWN	CLAY / /
37.2		GREY	CLAY / /
48.8		BLACK	SHALE / /

7266800 Lot 001 Conc 09 SARNIA TOWNSHIP / LAMBTON

Date 2016-06-07 DD/MM/YYYY | Elev (masl) | Easting 398000 | Northing 4764328 | UTM RC 4 margin of error : 30 m - 100 m

/ Domestic | Abandoned-Other | Water Found (mbgs) (masl)

Casing Diameter | Casing Material:

Top of Screen (mbgs) | Bottom of Screen (mbgs)

Screen Interval (m)

Flowing?

SWL (mbgs) (masl)

Pumping WL (mbgs) (masl)

Pump Rate (LPM) /

Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0			
1.8		BROWN	SAND / /
3.7		BROWN	CLAY / /
36.6		GREY	CLAY / /
48.8		BLACK	SHALE / /

7271617 Lot Conc SARNIA TOWNSHIP / LAMBTON

Date 2016-08-05 DD/MM/YYYY | Elev (masl) | Easting 399035 | Northing 4764354 | UTM RC 4 margin of error : 30 m - 100 m

/ | Abandoned-Other | Water Found (mbgs) (masl)

Casing Diameter 5.1 cm | Casing Material: PLASTIC

Top of Screen (mbgs) | Bottom of Screen (mbgs)

Screen Interval (m)

Flowing?

SWL (mbgs) (masl)

Pumping WL (mbgs) (masl)

Pump Rate (LPM) /

Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0			

/ /

Well Record #

7271618 **Lot** **Conc** **SARNIA TOWNSHIP / LAMBTON**

Date 2016-08-05 (DD/MM/YYYY)

Elev / (masl) **Easting** 399049 **Northing** 4764219

Abandoned-Other **UTM RC** 4 margin of error : 30 m - 100 m

Water Found (mbgs) (masl)

Casing Diameter 5.1 inch **Casing Material:** PLASTIC

Top of Screen (mbgs) **Bottom of Screen** (mbgs)

Screen Interval (m)

Flowing?

SWL (mbgs) (masl)

Pumping WL (mbgs) (masl)

Pump Rate (LPM) /

Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0			
		/	/
		/	/
		/	/

7276810 **Lot** 011 **Conc** 09 **SARNIA TOWNSHIP / LAMBTON**

Date 2016-10-31 (DD/MM/YYYY)

Elev / (masl) **Easting** 397552 **Northing** 4764656

Monitoring and Te Monitoring and Test Hole **UTM RC** 4 margin of error : 30 m - 100 m

Water Found (mbgs) (masl)

Casing Diameter 2 inch **Casing Material:** PLASTIC

Top of Screen 1.5 (mbgs) **Bottom of Screen** 4.6 (mbgs)

Screen Interval 3.0 (m)

Flowing?

SWL (mbgs) (masl)

Pumping WL (mbgs) (masl)

Pump Rate (LPM) /

Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0			
0.2		BLACK	/ / SOFT
1.5		BROWN	FINE SAND / SILT / SOFT
4.6		GREY	CLAY / SILT / SOFT

APPENDIX B:

Borehole Logs

ENVISION CONSULTANTS LTD

LOG OF BOREHOLE BH23-1

PROJECT: Geotechnical Investigations
REF. NO.: 23-0360
CLIENT: CIMA Canada Inc.
Method: Hollow Stem Augers
ENCL NO.:
PROJECT LOCATION: 2701 Old Lakeshore Road, Bright's Grove, ON.
Diameter: 203mm
ORIGINATED BY WW
DATUM: Geodetic
Date: Mar/08/2023 to Mar/08/2023
COMPILED BY FL
BH LOCATION: N 4765296.5 E 398013.6
CHECKED BY TY

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	"N" BLOWS 0.3 m	ELEVATION
181.48	Ground Surface				
0.00 / 181.18	**TOPSOIL:** 300mm	1	SS	5	181
0.30	**FILL:** silty sand to sandy silt, trace gravel, trace clay, trace organics, yellow brown, moist, loose to compact.	2	SS	11	
					Bentonite
		3	SS	4	180
					W. L. 179.72 m Mar 17, 2023
2.29 / 179.19	**SILTY CLAY TILL:** some sand to sandy, trace gravel, brown, moist, firm to very stiff.	4	SS	7	179
					Sand
		5	SS	19	178
					177
					Screen
		6	SS	18	
					176
		7	SS	7	175
		1	VT		174
		8	SS	6	
					173
	grey below 9.0m	9	SS	5	172

DYNAMIC CONE PENETRATION RESISTANCE PLOT: 20 40 60 80 100

SHEAR STRENGTH (kPa): ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE; 20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L

WATER CONTENT (%): 10 20 30

POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
		2 22 49 27
		wet spoon

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ○ ε_f=3% Strain at Failure

ENVISION
CONSULTANTS LTD

LOG OF BOREHOLE BH23-1

PROJECT: Geotechnical Investigations
REF. NO.: 23-0360
CLIENT: CIMA Canada Inc.
Method: Hollow Stem Augers
ENCL NO.:
PROJECT LOCATION: 2701 Old Lakeshore Road, Bright's Grove, ON.
Diameter: 203mm
ORIGINATED BY WW
DATUM: Geodetic
Date: Mar/08/2023 to Mar/08/2023
COMPILED BY FL
BH LOCATION: N 4765296.5 E 398013.6
CHECKED BY TY

SOIL PROFILE			SAMPLES									
(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS / 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) 10 20 30	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	Continued											
	SILTY CLAY TILL: some sand to sandy, trace gravel, brown, moist, firm to very stiff.(Continued)											
			2	VT			171					
11			10	SS	4							1 20 48 31
							170					
12			3	VT				7.0				
			11	SS	7		169					
13												
							168					
14			12	SS	7							
							167					
15			4	VT								
			13	SS	8		166					
16												
							165					
17			14	SS	9							
164.11												
17.37	**END OF BOREHOLE**											

Notes:
1) A 50mm dia. monitoring well was installed upon completion, screened from 3.05m to 6.10m.

Water level measurement in well:

Date	W.L.Depth (mbgs)
March 17, 2023	1.76

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ○ $^{\varepsilon}$=3% Strain at Failure

ENVISION-SOIL-ROCK-OCTOBER-12-2021.GLB
ENVISION SOIL LOG 2.GPJ 23-0360.GPJ 4/9/23

ENVISION
CONSULTANTS LTD

LOG OF BOREHOLE BH23-2

PROJECT: Geotechnical Investigations
CLIENT: CIMA Canada Inc.
PROJECT LOCATION: 2701 Old Lakeshore Road, Bright's Grove, ON.
DATUM: Geodetic
BH LOCATION: N 4765319.6 E 398012.9

Method: Hollow Stem Augers
Diameter: 203mm
Date: Mar/07/2023 to Mar/07/2023

REF. NO.: 23-0360
ENCL NO.:
ORIGINATED BY WW
COMPILED BY FL
CHECKED BY TY

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
181.64	Ground Surface							
0.00 181.44	**TOPSOIL:** 200mm							
0.20	**FILL:** silty clay, trace sand, trace to some gravel, brown, moist, firm to very stiff.		1	SS	7		181	
			2	SS	20			
							Bentonite	
			3	SS	8		180	
			4	SS	4		179 Sand	
178.59								
3.05	**SILTY CLAY TILL:** some sand to sandy, trace gravel, brown, moist, firm to very stiff.		5	SS	10		178	encountered obstructions
			6	SS	22		177	1 20 46 33
							W. L. 176.13 m Mar 17, 2023	
							Screen	
			7	SS	10		175	
			8	SS	8		174	1 21 47 31
							173	
	grey below 9.0m		1	VT				
			9	SS	6		172	

SHEAR STRENGTH (kPa): ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE
DYNAMIC CONE PENETRATION RESISTANCE PLOT
PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: + 3, × 3: Numbers refer to Sensitivity ○ 3=3% Strain at Failure

LOG OF BOREHOLE BH23-2

PROJECT: Geotechnical Investigations
REF. NO.: 23-0360
CLIENT: CIMA Canada Inc.
Method: Hollow Stem Augers
ENCL NO.:
PROJECT LOCATION: 2701 Old Lakeshore Road, Bright's Grove, ON.
Diameter: 203mm
ORIGINATED BY WW
DATUM: Geodetic
Date: Mar/07/2023 to Mar/07/2023
COMPILED BY FL
BH LOCATION: N 4765319.6 E 398012.9
CHECKED BY TY

SOIL PROFILE (m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	TYPE	"N" BLOWS / 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) 10 20 30	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	Continued										
	SILTY CLAY TILL: some sand to sandy, trace gravel, brown, moist, firm to very stiff.(Continued)										
			2	VT				+ 1.4			
11			10	SS	5		171		○		
							170				
12			3	VT				+ 1.4			
			11	SS	7		169		○		
168.84											
12.80	**END OF BOREHOLE**										

Notes:
1) Borehole was shifted twice to avoid underground obstructions.
2) A 50mm dia. monitoring well was installed upon completion, screened from 3.05m to 9.14m.

Water level measurement in well:

Date	W.L.Depth (mbgs)
March 17, 2023	5.51

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES + 3, × 3: Numbers refer to Sensitivity ○ ε=3% Strain at Failure

APPENDIX C:

Groundwater Level Monitoring

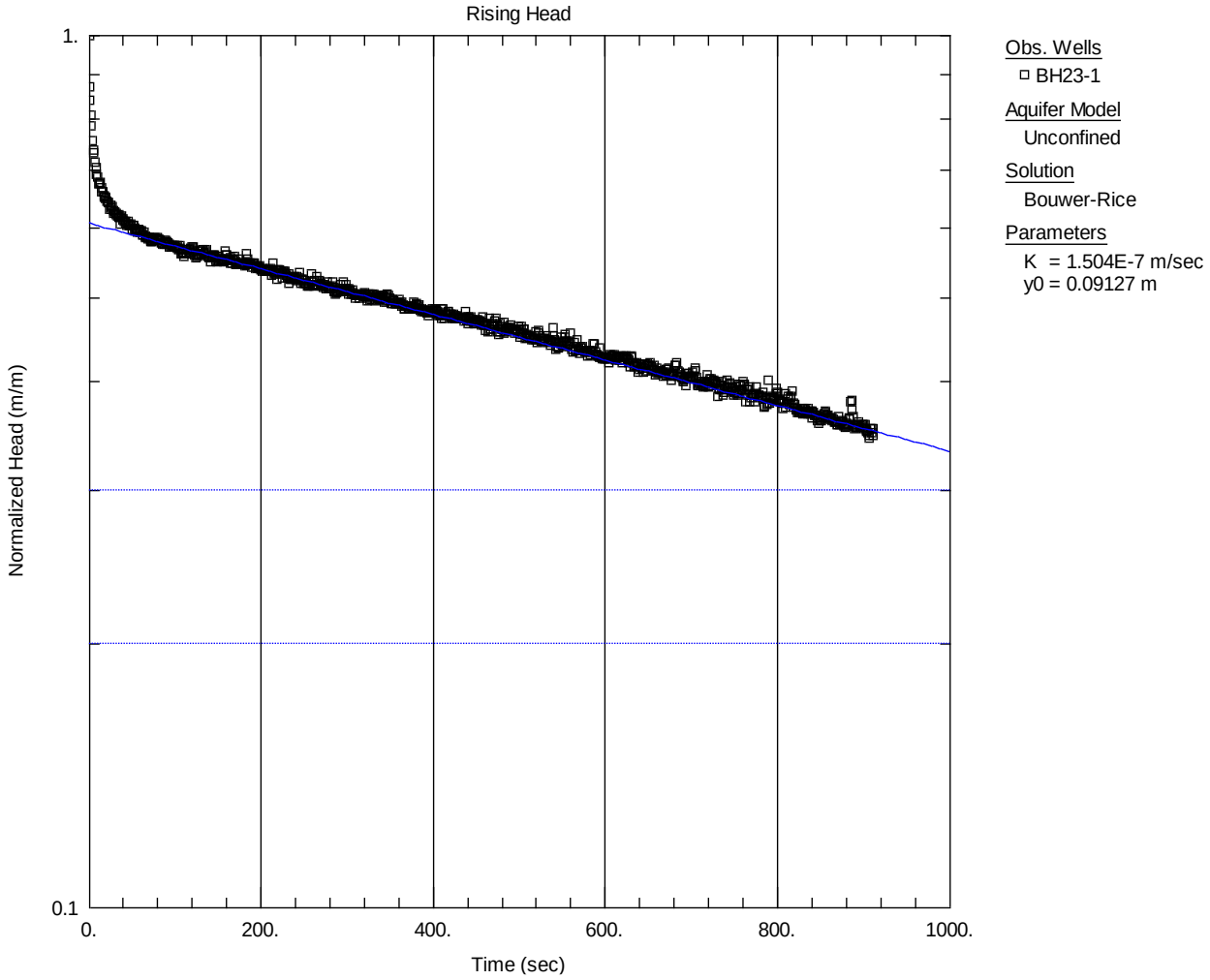
Table C-1: Groundwater Level Monitoring

Monitoring Well ID			BH23-1	BH23-2
Installed By			EnVision	EnVision
Installation Date			8-Mar-23	8-Mar-23
Well Status			Active	Active
Well Inner Diameter		(mm)	50.8	50.8
Casing Type			Monument	Flushmount
Top of Pipe Elevation		(masl)	182.26	181.6
Ground Surface Elevation		(masl)	181.48	181.64
Top of Well Screen		(mbgs)	3.05	3.00
		(masl)	178.4	178.5
Screen Length		(m)	3.05	6.10
Bottom of Screen		(mbgs)	6.1	9.1
		(masl)	175.4	172.4
17-Mar-23	Depth of GW	(mbtoc)	2.54	5.51
		(mbgs)	1.76	5.51
	GW Elevation	(masl)	179.72	176.13

APPENDIX D: *Hydraulic Conductivity Assessment*

Figure C-1: Hydraulic Conductivity Assessment, BH23-1

Single Well Response Test Analysis Report	
Project #:	23-0360
Project Location:	Bright's Grove WTP
Analysis Date:	17-Mar-23

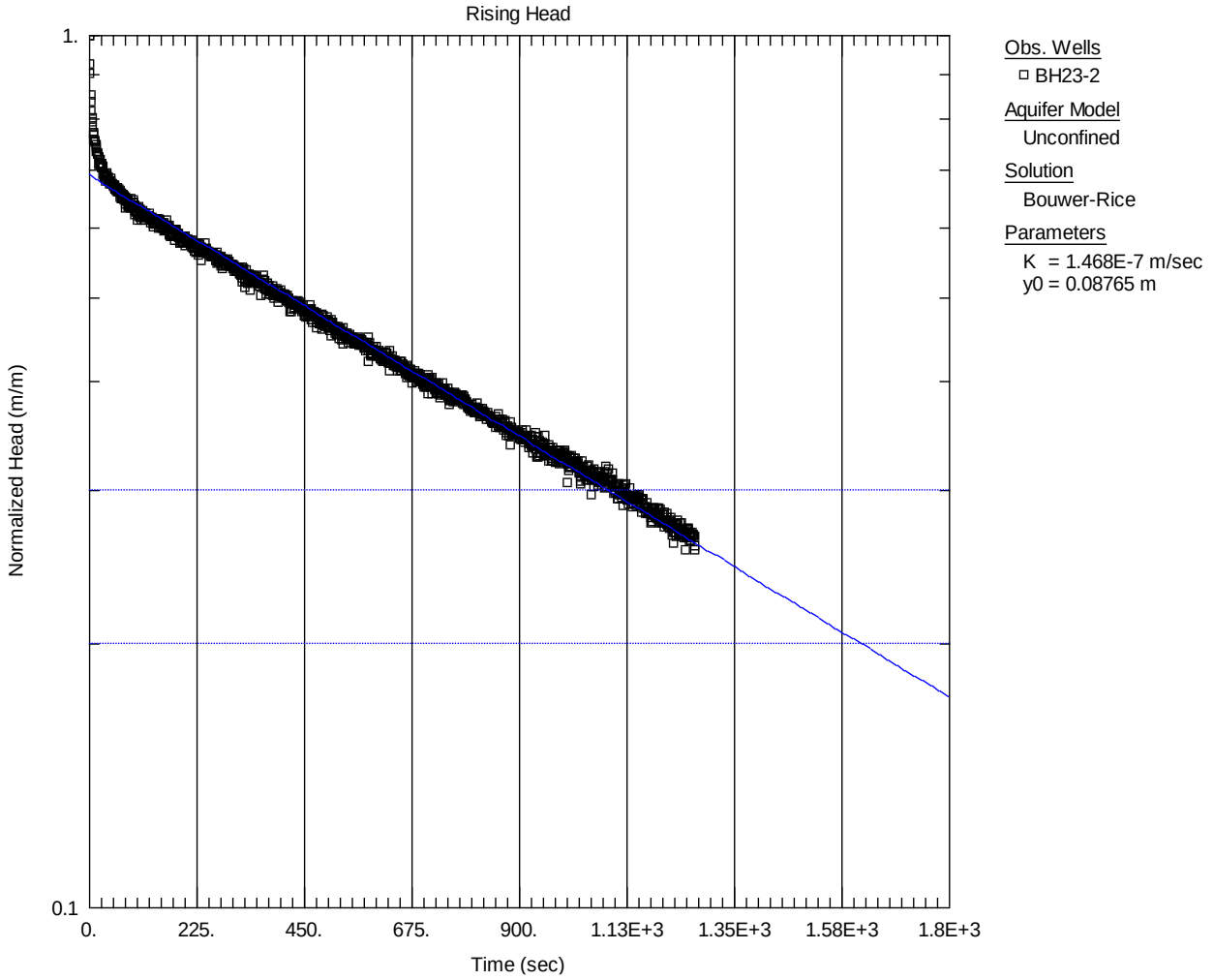


Testing Details	
Well ID:	BH23-1
Field Technician:	SH
Analysis By:	RB
Date of Analysis:	30-Mar-23

Well Details		
Top of Screen	3.0	m
Bottom of Screen	6.0	m
Diam. of well	50	mm
Static Water Level	1.76	m bgs
Formation Screened	silty clay till	

Figure C-2: Hydraulic Conductivity Assessment, BH23-2

Single Well Response Test Analysis Report	
Project #:	23-0360
Project Location:	Bright's Grove WTP
Analysis Date:	17-Mar-23



Testing Details	
Well ID:	BH23-2
Field Technician:	SH
Analysis By:	RB
Date of Analysis:	30-Mar-23

Well Details		
Top of Screen	3.0	m
Bottom of Screen	9.0	m
Diam. of well	50	mm
Static Water Level	5.51	m bgs
Formation Screened	fill to silty clay till	

APPENDIX E: *Laboratory Certificate of Analysis*

Your Project #: 23-0360
Your C.O.C. #: 910123-01-01

Attention: Sam Harding

EnVision Consultants Ltd.
40-6415 Northwest Drive
Mississauga, ON
CANADA L4V 1X1

Report Date: 2023/03/30
Report #: R7567223
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C379713
Received: 2023/03/21, 16:18

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	2	N/A	2023/03/24	CAM SOP-00448	SM 23 2320 B m
Carbonate, Bicarbonate and Hydroxide	2	N/A	2023/03/27	CAM SOP-00102	APHA 4500-CO2 D
Chloride by Automated Colourimetry	2	N/A	2023/03/24	CAM SOP-00463	SM 23 4500-Cl E m
Conductivity	2	N/A	2023/03/24	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	2	N/A	2023/03/25	CAM SOP-00446	SM 23 5310 B m
Hardness (calculated as CaCO3)	1	N/A	2023/03/24	CAM SOP 00102/00408/00447	SM 2340 B
Hardness (calculated as CaCO3)	1	N/A	2023/03/27	CAM SOP 00102/00408/00447	SM 2340 B
Metals Analysis by ICPMS (as received) (2)	1	N/A	2023/03/24	CAM SOP-00447	EPA 6020B m
Metals Analysis by ICPMS (as received) (2)	1	N/A	2023/03/27	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	2	N/A	2023/03/27		
Anion and Cation Sum	2	N/A	2023/03/27		
Total Ammonia-N	2	N/A	2023/03/24	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (3)	1	N/A	2023/03/24	CAM SOP-00440	SM 23 4500-NO3I/NO2B
Nitrate & Nitrite as Nitrogen in Water (3)	1	N/A	2023/03/27	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	2	2023/03/23	2023/03/24	CAM SOP-00413	SM 4500H+ B m
Orthophosphate	2	N/A	2023/03/24	CAM SOP-00461	SM 23 4500-P E m
Sat. pH and Langelier Index (@ 20C)	2	N/A	2023/03/27		Auto Calc
Sat. pH and Langelier Index (@ 4C)	2	N/A	2023/03/27		Auto Calc
Sulphate by Automated Turbidimetry	2	N/A	2023/03/24	CAM SOP-00464	SM 23 4500-SO42- E m
Total Dissolved Solids (TDS calc)	2	N/A	2023/03/27		Auto Calc

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Your Project #: 23-0360
Your C.O.C. #: 910123-01-01

Attention: Sam Harding

EnVision Consultants Ltd.
40-6415 Northwest Drive
Mississauga, ON
CANADA L4V 1X1

Report Date: 2023/03/30
Report #: R7567223
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C379713
Received: 2023/03/21, 16:18

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(2) Metals analysis was performed on the sample 'as received'.
(3) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Ashton Gibson, Project Manager
Email: Ashton.Gibson@bureauveritas.com
Phone# (905)817-5765

==========

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

RCAP - COMPREHENSIVE (WATER)

Bureau Veritas ID			VIQ337			VIQ338		
Sampling Date			2023/03/17 14:00			2023/03/17 11:00		
COC Number			910123-01-01			910123-01-01		
	UNITS	Criteria	BH23-2	RDL	QC Batch	BH23-1	RDL	QC Batch
Calculated Parameters								
Anion Sum	me/L	-	19.9	N/A	8567551	13.9	N/A	8567551
Bicarb. Alkalinity (calc. as CaCO3	mg/L	-	210	1.0	8565727	280	1.0	8565727
Calculated TDS	mg/L	-	1200	1.0	8564126	910	1.0	8564126
Carb. Alkalinity (calc. as CaCO3)	mg/L	-	1.5	1.0	8565727	3.1	1.0	8565727
Cation Sum	me/L	-	20.3	N/A	8567551	17.7	N/A	8567551
Hardness (CaCO3)	mg/L	-	530	1.0	8565722	320	1.0	8565722
Ion Balance (% Difference)	%	-	0.800	N/A	8567550	12.1	N/A	8567550
Langelier Index (@ 20C)	N/A	-	0.696		8565723	0.904		8565723
Langelier Index (@ 4C)	N/A	-	0.451		8565724	0.658		8565724
Saturation pH (@ 20C)	N/A	-	7.20		8565723	7.16		8565723
Saturation pH (@ 4C)	N/A	-	7.45		8565724	7.40		8565724
Inorganics								
Total Ammonia-N	mg/L	-	0.41	0.050	8570503	0.43	0.050	8570503
Conductivity	umho/cm	-	2100	1.0	8570305	1400	1.0	8570305
Dissolved Organic Carbon	mg/L	-	4.3	0.40	8570521	5.2	0.40	8570521
Orthophosphate (P)	mg/L	-	<0.010	0.010	8570214	<0.010	0.010	8570214
pH	pH	6.5:8.5	7.90		8570293	8.06		8570293
Dissolved Sulphate (SO4)	mg/L	-	280	1.0	8570220	260	1.0	8570220
Alkalinity (Total as CaCO3)	mg/L	-	210	1.0	8570303	290	1.0	8570303
Dissolved Chloride (Cl-)	mg/L	-	360	5.0	8570228	92	1.0	8570228
Nitrite (N)	mg/L	-	<0.010	0.010	8571107	0.125	0.010	8570454
Nitrate (N)	mg/L	-	<0.10	0.10	8571107	0.23	0.10	8570454
Nitrate + Nitrite (N)	mg/L	-	<0.10	0.10	8571107	0.35	0.10	8570454

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999
N/A = Not Applicable

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID			VIQ337	VIQ338		
Sampling Date			2023/03/17 14:00	2023/03/17 11:00		
COC Number			910123-01-01	910123-01-01		
	UNITS	Criteria	BH23-2	BH23-1	RDL	QC Batch
Metals						
Aluminum (Al)	ug/L	-	940	3300	4.9	8568516
Antimony (Sb)	ug/L	20	1.2	1.4	0.50	8568516
Arsenic (As)	ug/L	100	2.2	3.0	1.0	8568516
Barium (Ba)	ug/L	-	110	130	2.0	8568516
Beryllium (Be)	ug/L	11	<0.40	<0.40	0.40	8568516
Bismuth (Bi)	ug/L	-	<1.0	<1.0	1.0	8568516
Boron (B)	ug/L	200	**280**	**210**	10	8568516
Cadmium (Cd)	ug/L	0.2	<0.090	<0.090	0.090	8568516
Calcium (Ca)	ug/L	-	110000	84000	200	8568516
Chromium (Cr)	ug/L	-	<5.0	6.1	5.0	8568516
Cobalt (Co)	ug/L	0.9	0.73	**2.3**	0.50	8568516
Copper (Cu)	ug/L	5	4.2	**11**	0.90	8568516
Iron (Fe)	ug/L	300	**2900**	**3600**	100	8568516
Lead (Pb)	ug/L	5	2.4	4.6	0.50	8568516
Lithium (Li)	ug/L	-	5.4	7.7	5.0	8568516
Magnesium (Mg)	ug/L	-	61000	26000	50	8568516
Manganese (Mn)	ug/L	-	150	110	2.0	8568516
Molybdenum (Mo)	ug/L	40	**44**	**49**	0.50	8568516
Nickel (Ni)	ug/L	25	2.5	6.2	1.0	8568516
Potassium (K)	ug/L	-	9500	5100	200	8568516
Selenium (Se)	ug/L	100	<2.0	<2.0	2.0	8568516
Silicon (Si)	ug/L	-	3500	8200	50	8568516
Silver (Ag)	ug/L	0.1	<0.090	<0.090	0.090	8568516
Sodium (Na)	ug/L	-	210000	250000	100	8568516
Strontium (Sr)	ug/L	-	3100	580	1.0	8568516
Tellurium (Te)	ug/L	-	<1.0	<1.0	1.0	8568516
Thallium (Tl)	ug/L	0.3	0.075	0.090	0.050	8568516
Tin (Sn)	ug/L	-	1.4	<1.0	1.0	8568516
Titanium (Ti)	ug/L	-	13	43	5.0	8568516
Tungsten (W)	ug/L	30	<1.0	<1.0	1.0	8568516

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID			VIQ337	VIQ338		
Sampling Date			2023/03/17 14:00	2023/03/17 11:00		
COC Number			910123-01-01	910123-01-01		
	UNITS	Criteria	BH23-2	BH23-1	RDL	QC Batch
Uranium (U)	ug/L	5	**7.1**	**13**	0.10	8568516
Vanadium (V)	ug/L	6	4.3	**7.2**	0.50	8568516
Zinc (Zn)	ug/L	30	5.3	16	5.0	8568516
Zirconium (Zr)	ug/L	4	2.6	3.7	1.0	8568516

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

Bureau Veritas Job #: C379713
Report Date: 2023/03/30

EnVision Consultants Ltd.
Client Project #: 23-0360
Sampler Initials: MC

TEST SUMMARY

Bureau Veritas ID: VIQ337
Sample ID: BH23-2
Matrix: Water

Collected: 2023/03/17
Shipped:
Received: 2023/03/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	8570303	N/A	2023/03/24	Kien Tran
Carbonate, Bicarbonate and Hydroxide	CALC	8565727	N/A	2023/03/27	Automated Statchk
Chloride by Automated Colourimetry	KONE	8570228	N/A	2023/03/24	Massarat Jan
Conductivity	AT	8570305	N/A	2023/03/24	Kien Tran
Dissolved Organic Carbon (DOC)	TOCV/NDIR	8570521	N/A	2023/03/25	Gyulshen Idriz
Hardness (calculated as CaCO3)		8565722	N/A	2023/03/24	Automated Statchk
Metals Analysis by ICPMS (as received)	ICP/MS	8568516	N/A	2023/03/24	Nan Raykha
Ion Balance (% Difference)	CALC	8567550	N/A	2023/03/27	Automated Statchk
Anion and Cation Sum	CALC	8567551	N/A	2023/03/27	Automated Statchk
Total Ammonia-N	LACH/NH4	8570503	N/A	2023/03/24	Shivani Shivani
Nitrate & Nitrite as Nitrogen in Water	LACH	8571107	N/A	2023/03/24	Nimarta Singh
pH	AT	8570293	2023/03/23	2023/03/24	Kien Tran
Orthophosphate	KONE	8570214	N/A	2023/03/24	Massarat Jan
Sat. pH and Langelier Index (@ 20C)	CALC	8565723	N/A	2023/03/27	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	8565724	N/A	2023/03/27	Automated Statchk
Sulphate by Automated Turbidimetry	KONE	8570220	N/A	2023/03/24	Alina Dobreanu
Total Dissolved Solids (TDS calc)	CALC	8564126	N/A	2023/03/27	Automated Statchk

Bureau Veritas ID: VIQ338
Sample ID: BH23-1
Matrix: Water

Collected: 2023/03/17
Shipped:
Received: 2023/03/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	8570303	N/A	2023/03/24	Kien Tran
Carbonate, Bicarbonate and Hydroxide	CALC	8565727	N/A	2023/03/27	Automated Statchk
Chloride by Automated Colourimetry	KONE	8570228	N/A	2023/03/24	Massarat Jan
Conductivity	AT	8570305	N/A	2023/03/24	Kien Tran
Dissolved Organic Carbon (DOC)	TOCV/NDIR	8570521	N/A	2023/03/25	Gyulshen Idriz
Hardness (calculated as CaCO3)		8565722	N/A	2023/03/27	Automated Statchk
Metals Analysis by ICPMS (as received)	ICP/MS	8568516	N/A	2023/03/27	Nan Raykha
Ion Balance (% Difference)	CALC	8567550	N/A	2023/03/27	Automated Statchk
Anion and Cation Sum	CALC	8567551	N/A	2023/03/27	Automated Statchk
Total Ammonia-N	LACH/NH4	8570503	N/A	2023/03/24	Shivani Shivani
Nitrate & Nitrite as Nitrogen in Water	LACH	8570454	N/A	2023/03/27	Chandra Nandlal
pH	AT	8570293	2023/03/23	2023/03/24	Kien Tran
Orthophosphate	KONE	8570214	N/A	2023/03/24	Massarat Jan
Sat. pH and Langelier Index (@ 20C)	CALC	8565723	N/A	2023/03/27	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	8565724	N/A	2023/03/27	Automated Statchk
Sulphate by Automated Turbidimetry	KONE	8570220	N/A	2023/03/24	Alina Dobreanu
Total Dissolved Solids (TDS calc)	CALC	8564126	N/A	2023/03/27	Automated Statchk

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

GENERAL COMMENTS

Results relate only to the items tested.

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

Bureau Veritas Job #: C379713
Report Date: 2023/03/30

QUALITY ASSURANCE REPORT

EnVision Consultants Ltd.
Client Project #: 23-0360
Sampler Initials: MC

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8568516	Aluminum (Al)	2023/03/24	103	80 - 120	101	80 - 120	<4.9	ug/L		
8568516	Antimony (Sb)	2023/03/24	116	80 - 120	105	80 - 120	<0.50	ug/L		
8568516	Arsenic (As)	2023/03/24	109	80 - 120	98	80 - 120	<1.0	ug/L		
8568516	Barium (Ba)	2023/03/24	109	80 - 120	100	80 - 120	<2.0	ug/L		
8568516	Beryllium (Be)	2023/03/24	108	80 - 120	98	80 - 120	<0.40	ug/L		
8568516	Bismuth (Bi)	2023/03/24	106	80 - 120	97	80 - 120	<1.0	ug/L		
8568516	Boron (B)	2023/03/24	109	80 - 120	98	80 - 120	<10	ug/L		
8568516	Cadmium (Cd)	2023/03/24	111	80 - 120	101	80 - 120	<0.090	ug/L		
8568516	Calcium (Ca)	2023/03/24	NC	80 - 120	100	80 - 120	<200	ug/L		
8568516	Chromium (Cr)	2023/03/24	108	80 - 120	97	80 - 120	<5.0	ug/L		
8568516	Cobalt (Co)	2023/03/24	106	80 - 120	94	80 - 120	<0.50	ug/L		
8568516	Copper (Cu)	2023/03/24	107	80 - 120	100	80 - 120	<0.90	ug/L	4.6	20
8568516	Iron (Fe)	2023/03/24	108	80 - 120	99	80 - 120	<100	ug/L	NC	20
8568516	Lead (Pb)	2023/03/24	106	80 - 120	98	80 - 120	<0.50	ug/L	1.4	20
8568516	Lithium (Li)	2023/03/24	110	80 - 120	101	80 - 120	<5.0	ug/L		
8568516	Magnesium (Mg)	2023/03/24	100	80 - 120	100	80 - 120	<50	ug/L		
8568516	Manganese (Mn)	2023/03/24	105	80 - 120	97	80 - 120	<2.0	ug/L		
8568516	Molybdenum (Mo)	2023/03/24	117	80 - 120	105	80 - 120	<0.50	ug/L		
8568516	Nickel (Ni)	2023/03/24	104	80 - 120	95	80 - 120	<1.0	ug/L		
8568516	Potassium (K)	2023/03/24	110	80 - 120	104	80 - 120	<200	ug/L		
8568516	Selenium (Se)	2023/03/24	110	80 - 120	100	80 - 120	<2.0	ug/L		
8568516	Silicon (Si)	2023/03/24	106	80 - 120	103	80 - 120	<50	ug/L		
8568516	Silver (Ag)	2023/03/24	113	80 - 120	104	80 - 120	<0.090	ug/L		
8568516	Sodium (Na)	2023/03/24	NC	80 - 120	99	80 - 120	<100	ug/L		
8568516	Strontium (Sr)	2023/03/24	108	80 - 120	98	80 - 120	<1.0	ug/L		
8568516	Tellurium (Te)	2023/03/24	114	80 - 120	104	80 - 120	<1.0	ug/L		
8568516	Thallium (Tl)	2023/03/24	108	80 - 120	100	80 - 120	<0.050	ug/L		
8568516	Tin (Sn)	2023/03/24	115	80 - 120	104	80 - 120	<1.0	ug/L		
8568516	Titanium (Ti)	2023/03/24	108	80 - 120	101	80 - 120	<5.0	ug/L		
8568516	Tungsten (W)	2023/03/24	111	80 - 120	100	80 - 120	<1.0	ug/L		
8568516	Uranium (U)	2023/03/24	109	80 - 120	99	80 - 120	<0.10	ug/L		

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8568516	Vanadium (V)	2023/03/24	108	80 - 120	97	80 - 120	<0.50	ug/L		
8568516	Zinc (Zn)	2023/03/24	105	80 - 120	96	80 - 120	<5.0	ug/L	1.0	20
8568516	Zirconium (Zr)	2023/03/24	116	80 - 120	105	80 - 120	<1.0	ug/L		
8570214	Orthophosphate (P)	2023/03/24	137 (1)	75 - 125	98	80 - 120	<0.010	mg/L	NC	20
8570220	Dissolved Sulphate (SO4)	2023/03/24	NC	75 - 125	94	80 - 120	<1.0	mg/L	1.0	20
8570228	Dissolved Chloride (Cl-)	2023/03/24	NC	80 - 120	97	80 - 120	<1.0	mg/L	0.96	20
8570293	pH	2023/03/24			102	98 - 103			0.72	N/A
8570303	Alkalinity (Total as CaCO3)	2023/03/24			98	85 - 115	<1.0	mg/L	1.2	20
8570305	Conductivity	2023/03/24			99	85 - 115	<1.0	umho/cm	0	25
8570454	Nitrate (N)	2023/03/27	100	80 - 120	102	80 - 120	<0.10	mg/L	2.4	20
8570454	Nitrite (N)	2023/03/27	100	80 - 120	104	80 - 120	<0.010	mg/L	1.4	20
8570503	Total Ammonia-N	2023/03/24	100	75 - 125	103	80 - 120	<0.050	mg/L	8.2	20
8570521	Dissolved Organic Carbon	2023/03/24	99	80 - 120	96	80 - 120	<0.40	mg/L	1.9	20
8571107	Nitrate (N)	2023/03/24	91	80 - 120	94	80 - 120	<0.10	mg/L	NC	20
8571107	Nitrite (N)	2023/03/24	92	80 - 120	103	80 - 120	<0.010	mg/L	NC	20

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

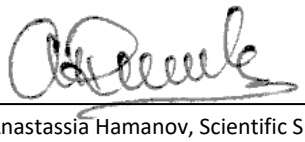
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:



Anastassia Hamanov, Scientific Specialist

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by {0}, {1} responsible for {2} {3} laboratory operations.

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

Bureau Veritas
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-563-6266 Fax:(905) 817-5777 www.bvna.com

Page of

CHAIN OF CUSTODY RECORD

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#37360 EnVision Consultants Ltd.	Company Name:		Quotation #:	C20578	Bureau Veritas Job #:	Bottle Order #:
Attention:	Accounts Payable	Attention:		P.O. #:			910123
Address:	40-6415 Northwest Drive Mississauga ON L4V 1X1	Address:		Project:	~~21-0956~~ 23-0360	COC #:	Project Manager:
Tel:	(905) 659-9456 Fax:	Tel:	Fax:	Project Name:		C#910123-01-01	Ashton Gibson
Email:	payables@envisionconsultants.ca; jhoyles@envisionco	Email:	shardingh envisionconsultants - ca	Site #:			
				Sampled By:			

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BUREAU VERITAS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)
- ☐ Table 1 ☐ Res/Park ☐ Medium/Fine
- ☐ Table 2 ☐ Ind/Comm ☐ Coarse
- ☐ Table 3 ☐ Agri/Other ☐ For RSC
- ☐ Table ___

Other Regulations
- ☐ CCME ☐ Sanitary Sewer Bylaw
- ☐ Reg 558 ☐ Storm Sewer Bylaw
- ☐ MISA Municipality ___
- ☐ PWQO ☐ Reg 406 Table ___
- ☐ Other ___

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? ___

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT:
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ___ Time Required: ___
Rush Confirmation Number: ___ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	ANALYSIS REQUESTED (PLEASE BE SPECIFIC): RCAp - Comprehensive	# of Bottles	Comments
1		BH23-2	23/03/17	2:00pm	GW		X	4	
2		BH23-1	23/03/17	11:00am	GW		X	4	
3									
4									
5									
6									
7									
8									
9									
10									

21-Mar-23 16:18
Ashton Gibson
C379713
RJM ENV-1646

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
MCon	2023/03/21		Ashton Gibson ASHTON Gibson	2023/03/21	16:18	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Recei	Custody Seal	Yes	No
	3/3.0	Present	✓	
		Intact	✓	

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/COC-TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/CHAIN-CUSTODY-FORMS-COCS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

White: Bureau Veritas Yellow: Client

664561

Bureau Veritas Canada (2019) Inc.

Exceedance Summary Table – Prov. Water Quality Obj.

Result Exceedances

Sample ID	Bureau Veritas ID	Parameter	Criteria	Result	DL	UNITS
BH23-2	VIQ337-03	. Boron (B)	200	280	10	ug/L
BH23-2	VIQ337-03	. Iron (Fe)	300	2900	100	ug/L
BH23-2	VIQ337-03	. Molybdenum (Mo)	40	44	0.50	ug/L
BH23-2	VIQ337-03	. Uranium (U)	5	7.1	0.10	ug/L
BH23-1	VIQ338-03	. Boron (B)	200	210	10	ug/L
BH23-1	VIQ338-03	. Cobalt (Co)	0.9	2.3	0.50	ug/L
BH23-1	VIQ338-03	. Copper (Cu)	5	11	0.90	ug/L
BH23-1	VIQ338-03	. Iron (Fe)	300	3600	100	ug/L
BH23-1	VIQ338-03	. Molybdenum (Mo)	40	49	0.50	ug/L
BH23-1	VIQ338-03	. Uranium (U)	5	13	0.10	ug/L
BH23-1	VIQ338-03	. Vanadium (V)	6	7.2	0.50	ug/L

The exceedance summary table is for information purposes only and should not be considered a comprehensive listing or statement of conformance to applicable regulatory guidelines.

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

APPENDIX F:

Construction Dewatering Analysis

ENVISION
CONSULTANTS LTD

Dewatering Source Information								Source Outputs		
Source #	Description	UTM 17N Coordinates			Dimensions (m)			Surface Area (m^2)	Volume (m^3)	R_{eff} (m)
		Northing	Easting	Elevation	Width	Length	Depth			
1	Wet Well	4765297	398023	181.60	20.00	30.00	7.00	600	4200	13.8
2	Manhole	4765297	398023	181.60	8.90	8.90	7.00	79.21	554.47	5.0

Hydraulic Parameters								
Description	Source							
	1		2					
Static Potentiometric Elev.	180.7	masl	180.7	masl		masl		masl
Height of Potentiometric Head (H)	8.7	m	8.7	m		m		m
Target Dewatered Elev. (m)	173.60	masl	173.6	masl		masl		masl
Height of dewatered potentiometric head (h)	1.60	m	1.6	m		m		m
Hydraulic Conductivity (K)	1.50E-07	m/sec	1.50E-07	m/sec		m/sec		m/sec
Base elev. of confined unit	172.00	masl	172.00	masl		masl		masl
Confined Aquifer Thickness (m)	8	m	8	m		m		m

Dewatering Assessment									
Source #	H	h	K	r_{eff}	R_{scih}	R_0	Q	S. Factor	Q
	(m)	*(m)*	*(m/sec)*	*(m)*	*(m)*	*(m)*	*(m3/day)*		*(L/day)*
1	8.7	1.6	1.50E-07	13.8	8.2	22.1	9.9	2	19,762
2	8.7	1.6	1.50E-07	5.0	8.2	13.3	4.8	1.5	7,139

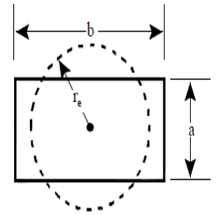
Stormwater Contribution		
Source	Precipitation	Volume
	(mm/day)	*(m^3/day)*
1	10	6
2	11	0.87131
	12	#VALUE!
	11	

Dewatering Discharge Rates (Maximum Expected with Stormwater)	
Source	Total Volume)
	(L/day)
1	25,800.00
2	8,000.00

Effective Radius Approximation

$$R_{eff} = \sqrt{\frac{ab}{\pi}}$$

Where;
R_{eff} = Effective radius of the excavation (m)
a = width of excavation (m)
b = length of excavation (m)



Conversion Factors Used (Typical)		
1 m	=	3.28 ft
1 cu. m.	=	1000 L
1 day	=	1440 min
1 day	=	86,400 sec.

Sichardt Approximation for Radius of Influence

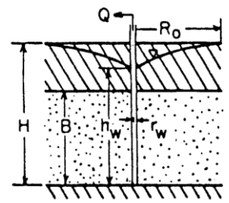
$$R_0 = 3000 * (H - h)\sqrt{K}$$

Where;

Radial Flow to Source (Unconfined)

$$Q = \frac{2\pi KB(H-h)}{\ln {R_0}/{r_{eff}}}$$

Where;
Q = discharge volume (m^3/day)
K = hydraulic conductivity (m/day)
H = height of potentiometric head above base of unit (m)
h = height of dewatered potentiometric surface above base of unit (m)
R_0 = Radius of influence (m)
R_{eff} = Effective radius of the excavation (m)
B = thickness of confined unit (m)



Radial flow, confined aquifer

Sources:
Construction dewatering and groundwater control, Powers, J.P., 2007
Kyrieleis, W., Sichardt, W. – Grundwasserabsenkung bei Fundierungsarbeiten, Springer, Berlin, 1930

Table F-2: Open Cut Trenching Dewatering Summary

Source Information							Dewatering Parameters									Radius of Influence			Q GW			
Drawing No	Trench Location		Length	Elevations		Nearby Monitoring Well/BH	K - EnVision		Inferred GWL	Adjusted GWL	H	h	ΔH	I	w	Sichardt (Min)	$R_0 = L$	r_w	Q_{max}	Safety Factor	Q_{safety}	Q Total
	From	*To*	*(m)*	*Max*	*Min*		*(m/sec)*	*(m/day)*	*(m ASL)*	*(m ASL)*	*(m)*	*(m)*	*(m)*	*(m)*	*(m)*	*(m)*	*(m)*	*(m)*	*(m^3/day)*		*(m^3/day)*	*Q (L/day)*
NA	Wet Well	Lake	30	173.0	173.0	BH23-2	1.40E-07	1.21E-02	180.70	180.70	8.7	0.0	8.7	30	20	9.8	29.8	20	8.2	3	24.5	24,500
NA	Plant	Wet Well	40	177.0	177.0	BH 22-4	1.40E-07	1.21E-02	180.70	181.70	5.7	0.0	5.7	40	2	6.4	7.4	1	2.7	3	8.2	8,200

Stormwater Contribution						
Section	Chainage		Precipitation	Surface Area	Volume	
	From	*To*	*(mm/day)*	*m^2*	*(m^3/day)*	*(L/day)*
NA	Wet Well	Lake	20	600	12	12000
NA	Plant	Wet Well	20	80	1.6	1600

Dewatering Discharge Rates (Maximum Expected with Stormwater)				
Section	Chainage		Total Volume per Section	
	From	*To*	*(L/day)*	
NA	Wet Well	Lake	36,500	
NA	Plant	Wet Well	9,800	

G

Appendix G: Detailed Evaluation Matrix

Client: Town of Petrolia
Project No.: T001646A
Task: Detailed Evaluation of Intake Alternatives

Category	Weight	Criteria	Alternative 1 - Intake length of 0.4km with a screening depth of 4.0m				Alternative 2 - Intake length of 1.5km with a screening depth of 6.0m				Alternative 3 - Intake length of 3.5km with a screening depth of 8.0m			
			Rationale	Score 1 to 5		Weighted Score	Rationale	Score 1 to 5		Weighted Score	Rationale	Score 1 to 5		Weighted Score
Natural Environment	20	**Wildlife –** Protects wildlife and species at risk	Impacts to wildlife (including species at risk) or identified habitat locations for these species will be minimized given the majority of work is contained inside the existing building and will not disrupt any additional habitats.	4.0	◕	4.0	Impacts to wildlife (including species at risk) or identified habitat locations for these species will be minimized given the majority of work is contained inside the existing building and will not disrupt any additional habitats. Alternative 2 has an approximate length of 1500m, which is longer than the existing intake structure and Alternative 1, and therefore will have increased impacts on marine wildlife.	3.5	◕	3.5	Impacts to wildlife (including species at risk) or identified habitat locations for these species will be minimized given the majority of work is contained inside the existing building and will not disrupt any additional habitats. Alternative 3 has an approximate length of 3500m, which is longer than the existing intake structure, Alternative 1 and Alternative 2, and therefore will have the highest impact on marine wildlife.	3.0	◑	3.0
		Natural Environmental Features: Potential impacts to existing natural environment	Alternative 1 has an approximate length of 400m, which is similar to the existing structure and will have minimal impacts on the marine environment.	4.0	◕	4.0	Alternative 2 has an approximate length of 1500m, which iwill extend past the existing intake structure and will have increased impacts on the marine environment compared to Alternative 1.	3.5	◕	3.5	Alternative 2 has an approximate length of 3500m, which iwill extend past the existing intake structure and will have the highest impact on the marine environment compared to Alternative 1 and Alternative 2.	3.0	◑	3.0
		Climate Change – Potential impact on climatic conditions during construction and project vulnerability to changing climatic conditions.	Intake structure for Alternative 1 is proposed at a depth of approximately 3m, similar to existing conditions, so no additional security buffer to the intake would be provided should water levels in Lake Huron start to decrease from potential extreme droughts, although not historically experienced. Intake pipeline material and marine construction will include a top layer of scour protection to ensure pipeline protection from potential extreme climatic conditions, such as strong wave actions and storms. Excavated rock material from lake bottom is expected to be used to backfill the remainder of the trench and return lake bottom to its original contours, which will eliminate/reduce the need to transport and dispose excavated material offsite.	4.0	◕	4.0	Intake structure for Alternative 2 is proposed at a depth of approximately 6m, which will provide a security buffer to the intake should water levels in Lake Huron start to decrease from potential extreme droughts, although not historically experienced. Intake pipeline material and marine construction will include a top layer of scour protection to ensure pipeline protection from potential extreme climatic conditions, such as strong wave actions and storms. Excavated rock material from lake bottom is expected to be used to backfill the remainder of the trench and return lake bottom to its original contours, which will eliminate/reduce the need to transport and dispose excavated material offsite.	4.5	●	4.5	Intake structure for Alternative 3 is proposed at a depth of approximately 8m, which will provide the largest security buffer to the intake should water levels in Lake Huron start to decrease from potential extreme droughts, although not historically experienced. Intake pipeline material and marine construction will include a top layer of scour protection to ensure pipeline protection from potential extreme climatic conditions, such as strong wave actions and storms. Excavated rock material from lake bottom is expected to be used to backfill the remainder of the trench and return lake bottom to its original contours, which will eliminate/reduce the need to transport and dispose excavated material offsite.	5.0	●	5.0
		Source Water Protection – Potential impact on source water protection areas and compliance with source water protection policies.	Source water protection vulnerabilities would need to be assessed to reflect new intake location. Although proposed intake location for Alternative 1 is generally within the same area as existing intake structure, so major changes to existing IPZs, source water protection policies or areas subject to these policies are not anticipated.	5.0	●	5.0	Source water protection vulnerabilities would need to be assessed to reflect new intake location. The proposed intake location for Alternative 2 extends past the existing intake structure, so major changes to existing IPZs, source water protection policies or areas subject to these policies are to be expected.	4.0	◕	4.0	Source water protection vulnerabilities would need to be assessed to reflect new intake location. The proposed intake location for Alternative 3 extends the furthest distance past the existing intake structure, so major changes to existing IPZs, source water protection policies or areas subject to these policies are to be expected.	3.0	◑	3.0
Maximum Sub-total Score – Natural Environment						**17.0**				**15.5**				**14.0**
Socio-Cultural	15	**Public Health and Safety –** Potential risk to public and operations staff health and safety related to water quality, and construction and operation of new intake pipeline and structure.	Water quality of the area surrounding intake structure for Alternative 1 is similar to that of existing intake structure, therefore, treated water quality from Bright's Grove WTP will continue to meet the ODWQ Standards. Onshore and offshore construction will adhere to standard safety operating procedures to ensure a high level of safety while working on, above and below the water.	4.0	◕	2.4	Water quality of the area surrounding intake structure for Alternative 2 would potentially have a reduction in high turbidity in raw water due to storm events, therefore, treated water quality from Bright's Grove WTP will continue to meet the ODWQ Standards. Onshore and offshore construction will adhere to standard safety operating procedures to ensure a high level of safety while working on, above and below the water.	4.5	●	2.7	Water quality of the area surrounding intake structure for Alternative 3 would potentially have a reduction in high turbidity in raw water due to storm events, therefore, treated water quality from Bright's Grove WTP will continue to meet the ODWQ Standards. Onshore and offshore construction will adhere to standard safety operating procedures to ensure a high level of safety while working on, above and below the water.	4.5	●	2.7
		Cultural Heritage Features – Potential impacts from construction to existing cultural heritage features.	The existing Bright's Grove WTP (2701 Old Lakeshore Road) was determined to have heritage value. The scope of the propesed work for Alternaate 1 poses no direct impact to the WTP.	4.0	◕	2.4	The existing Bright's Grove WTP (2701 Old Lakeshore Road) was determined to have heritage value. The scope of the propesed work for Alternaate 2 poses no direct impact to the WTP.	4.0	◕	2.4	The existing Bright's Grove WTP (2701 Old Lakeshore Road) was determined to have heritage value. The scope of the propesed work for Alternaate 3 poses no direct impact to the WTP.	4.0	◕	2.4
		Archaeological Features – Potential impact from construction to existing archaeological.	An Archaeological Study confirmed that the original intake pipe from 1896 still exists 30m off of the coast, though it will provide no significant archaeological information. The proposed intake structure for Alternative 1 will not impact the existing pipe.	4.0	◕	2.4	An Archaeological Study confirmed that the original intake pipe from 1896 still exists 30m off of the coast, though it will provide no significant archaeological information. The proposed intake structure for Alternative 1 will not impact the existing pipe.	4.0	◕	2.4	An Archaeological Study confirmed that the original intake pipe from 1896 still exists 30m off of the coast, though it will provide no significant archaeological information. The proposed intake structure for Alternative 1 will not impact the existing pipe.	4.0	◕	2.4
		Long-term Impacts – Potential long-term impact on adjacent residents and local users from siting of new infrastructure.	No long-term impacts on adjacent residents or local users are anticipated.	5.0	●	3.0	No long-term impacts on adjacent residents or local users are anticipated.	5.0	●	3.0	No long-term impacts on adjacent residents or local users are anticipated.	5.0	●	3.0
		Short-term Impacts – Potential short-term disruption to local residents, businesses, commercial and recreational activities due to construction (i.e., noise, dust, vibration, visual, access, parking, road and beach areas closures), look at business impacts	Construction of a 400m long in-water intake pipe would impact boat traffic and potential navigation ways, and may impede or limit recreational activities on the adjacent private beaches during the inwater construction window. Inwater works will need to comply with the Canadian Navigable Waters Act and ensure they do not interfere with navigation. Moderate construction disruptions to local residents in the immediate surrounding area such as noise, dust and vibration resulting from bedrock drilling and blasting will be experienced during the short in-water construction period.	3.5	◕	2.1	Construction of a 1500m long in-water intake pipe would impact boat traffic and potential navigation ways, and may impede or limit recreational activities on the adjacent private beaches during the inwater construction window. Alternative 2 would extend past the existing structure and Alternative 1, and therefore would have increased impacts. Inwater works will need to comply with the Canadian Navigable Waters Act and ensure they do not interfere with navigation. Moderate construction disruptions to local residents in the immediate surrounding area such as noise, dust and vibration resulting from bedrock drilling and blasting will be experienced during the short in-water construction period.	3.5	◕	2.1	Construction of a 3500m long in-water intake pipe would impact boat traffic and potential navigation ways, and may impede or limit recreational activities on the adjacent private beaches during the inwater construction window. Alternative 3 would extend the furthest distance past the existing structure, Alternative 1 and Alternative 2, and would therefore have the most short-term impacts. Inwater works will need to comply with the Canadian Navigable Waters Act and ensure they do not interfere with navigation. Construction disruptions to local residents in the immediate surrounding area such as noise, dust and vibration resulting from bedrock drilling and blasting will be experienced during the short in-water construction period.	3.5	◕	2.1
Maximum Sub-total Score – Socio- Cultural						**12.3**				**12.6**				**12.6**

Category	Weight	Criteria	Alternative 1 - Intake length of 0.4km with a screening depth of 4.0m				Alternative 2 - Intake length of 1.5km with a screening depth of 6.0m				Alternative 3 - Intake length of 3.5km with a screening depth of 8.0m			
			Rationale	Score 1 to 5	Weighted Score		Rationale	Score 1 to 5	Weighted Score		Rationale	Score 1 to 5	Weighted Score	
Technical and Operational	45	**Raw Water Quality -** Concentration of water quality parameters and chemicals of concern in the sediments for each potential intake location.	Alternative 1 proposes locating the new intake structure close to the existing intake, which would likely avoid the need for additional water quality and sedimentation sampling.	4.5	●	5.8	Alternative 2 proposes an approximate length of 1500m, which extends past the existing structure and Alternative 1, therefore, additional water quality and sedimentation sampling is recommended to confirm raw water quality.	4.0	◕	5.1	Alternative 3 proposes an approximate length of 3500m, which extends the furthest past the existing structure and Alternative 1, therefore, additional water quality and sedimentation sampling is recommended to confirm raw water quality.	4.0	◕	5.1
		Risk to Contaminants - Potential vulnerability/risk of new intake to contaminants based on intake depth, distance from shore, proximity to potential sources of contaminants such as creek discharges, storm outfalls, drainage ditches, etc.)	Alternative 1 is entirely located within the existing IPZ-1 with a vulnerability score of 7.0. Approximate intake pipe length of 400m and screening depth of 4m will be very similar to the existing conditions, thus, changes to drinking water threats are not be expected.	5.0	●	6.4	Alternative 2 is entirely located within the existing IPZ-1 with a vulnerability score of 7.0 Approximate intake pipe length of 1500m and screening depth of 6m will be further and deeper than existing conditions. Further investigations would have to be conducted to determine any changes in the IPZ locations.	4.0	◕	5.1	Alternative 2 is entirely located within the existing IPZ-1 with a vulnerability score of 7.0. Approximate intake pipe length of 3500m and a screening depth of 8m will be further and deeper than existing conditions and Alternative 2. Further investigations would have to be conducted to determine any changes in the IPZ locations.	3.5	◕	4.5
		Ease of Implementation – Potential level of complexity during construction, conflicts with existing infrastructure, ability to facilitate construction with uninterrupted supply of water and within a reasonable timeframe.	Construction of marine components will be implemented within the in-water construction window and necessary mitigation measures to protect aquatic habitats and species. A phased implementation approach will allow for simultaneous operation of the existing intake during construction. All work will be constrained to Regional property boundaries.	5.0	●	6.4	Construction of marine components will be implemented within the in-water construction window and necessary mitigation measures to protect aquatic habitats and species. A phased implementation approach will allow for simultaneous operation of the existing intake during construction. The screening will be deeper than the existing structure and Alternative 1, which will require the LLPS to be constructed deeper. All work will be constrained to Regional property boundaries.	3.5	◕	4.5	Construction of marine components will be implemented within the in-water construction window and necessary mitigation measures to protect aquatic habitats and species. A phased implementation approach will allow for simultaneous operation of the existing intake during construction. The depth of the intake structure will be deeper than the exsiting structure, Alternative 1, and Alternative 2, which will require the LLPS to be constructed deeper. All work will be constrained to Regional property boundaries.	2.0	◔	2.6
		Operational Complexity – Relative added complexity to existing operational practices resulting from construction and operation of new infrastructure.	Expected water quality at new intake location for Alternative 1 should not add any complexity to the existing treatment process or operational practices. New intake pipeline and structure will reduce operational requirements associated with the regular cleaning and inspection activities. All infrastructure will be confined to existing Regional site boundaries which will facilitate any activities required for maintenance or emergency events.	5.0	●	6.4	Expected water quality at new intake location for Alternative 3 should not add any complexity to the existing treatment process or operational practices. New intake pipeline and structure will reduce operational requirements associated with the regular cleaning and inspection activities. Alternative 3 has an intake length of 1500m, which is longer than Alternative 1 and 2, and will require a longer chlorine injection line for zebra mussel control.	4.5	●	5.8	Expected water quality at new intake location for Alternative 3 should not add any complexity to the existing treatment process or operational practices. New intake pipeline and structure will reduce operational requirements associated with the regular cleaning and inspection activities. Alternative 3 has the longest intake length of 3500m and will require the longest chlorine injection line for zebra mussel control.	4.0	◕	5.1
		Construction Duration - Duration of project construction and potential for staging and phased construction.	Marine construction will be completed within the specified inwater construction window. Inland construction activities, such as pipe fusion, hydrostatic testing, etc., will be planned to ensure the complete pipeline is fully tested and ready for installation on lake bed within specified timeframe. Construction of the new LLPS wet well and connection of new intake pipe will be staged to minimize interruptions to operation of existing intake pipe.	5.0	●	6.4	Marine construction will be completed within the specified inwater construction window. Inland construction activities, such as pipe fusion, hydrostatic testing, etc., will be planned to ensure the complete pipeline is fully tested and ready for installation on lake bed within specified timeframe. Construction of the new LLPS wet well and connection of new intake pipe will be staged to minimize interruptions to operation of existing intake pipe. The length length of 1500m will be longer than the existing structure and Alternative 1, and therefore would require a longer construction duration.	4.0	◕	5.1	Marine construction will be completed within the specified inwater construction window. Inland construction activities, such as pipe fusion, hydrostatic testing, etc., will be planned to ensure the complete pipeline is fully tested and ready for installation on lake bed within specified timeframe. Construction of the new LLPS wet well and connection of new intake pipe will be staged to minimize interruptions to operation of existing intake pipe. The length of 3500m of the intake structure will be longer than the existing structure, Alternative 1, and Alternative 2, and therefore would require a longer construction duration.	3.0	◑	3.9
		Regulatory Approvals – Number and complexity of permits/approvals needed for project construction.	Approvals will include: NPCA - Application for Development, Interference with Wetlands and Alterations to Shorelines and Watercourse, Update to Source Water Protection Program MECP - Amendments to DWWP, MDWL, PTTW, and Source Water Protection Program Update, SARs, Potential for temporary EASR if construction dewatering >50,000 L/day and <400,000 L/day, Completion of Information gathering Form (IGF) MNR - Work Permit subject to construction timeframe limitations for in-water works and potentially SARs permit (subject to IGF) DFO - Permit to Take Fish by Means other than Fishing (depending of construction technique and blasting requirements) Transport Canada - Approval under Navigable Water Act	4.5	●	5.8	Approvals will include: NPCA - Application for Development, Interference with Wetlands and Alterations to Shorelines and Watercourse, Update to Source Water Protection Program MECP - Amendments to DWWP, MDWL, PTTW, and Source Water Protection Program Update, SARs, Potential for temporary EASR if construction dewatering >50,000 L/day and <400,000 L/day, Completion of Information gathering Form (IGF) MNR - Work Permit subject to construction timeframe limitations for in-water works and potentially SARs permit (subject to IGF) DFO - Permit to Take Fish by Means other than Fishing (depending of construction technique and blasting requirements) Transport Canada - Approval under Navigable Water Act	4.0	◕	5.1	Approvals will include: NPCA - Application for Development, Interference with Wetlands and Alterations to Shorelines and Watercourse, Update to Source Water Protection Program MECP - Amendments to DWWP, MDWL, PTTW, and Source Water Protection Program Update, SARs, Potential for temporary EASR if construction dewatering >50,000 L/day and <400,000 L/day, Completion of Information gathering Form (IGF) MNR - Work Permit subject to construction timeframe limitations for in-water works and potentially SARs permit (subject to IGF) DFO - Permit to Take Fish by Means other than Fishing (depending of construction technique and blasting requirements) Transport Canada - Approval under Navigable Water Act	3.5	◕	4.5
		Property Acquisition – Need for land acquisition and availability of property, including temporary and permanent easements.	All inland infrastructure will be confined within Regional site boundaries, so no land acquisition required. Extension of the existing water lot may be required to accommodate new intake pipe.	5.0	●	6.4	All inland infrastructure will be confined within Regional site boundaries, so no land acquisition required. Extension of the existing water lot may be required to accommodate new intake pipe.	4.5	●	5.8	All inland infrastructure will be confined within Regional site boundaries, so no land acquisition required. Extension of the existing water lot may be required to accommodate new intake pipe.	4.5	●	5.8
Maximum Sub-total Score – Technical & Operational						**43.7**				**36.6**				**31.5**

Category	Weight	Criteria	Alternative 1 - Intake length of 0.4km with a screening depth of 4.0m				Alternative 2 - Intake length of 1.5km with a screening depth of 6.0m				Alternative 3 - Intake length of 3.5km with a screening depth of 8.0m			
			Rationale	Score 1 to 5	Weighted Score		Rationale	Score 1 to 5	Weighted Score		Rationale	Score 1 to 5	Weighted Score	
Economic	20	**Construction Cost –** Relative scale of construction costs	Estimated capital cost $2.5M to $3.0M	5.0	●	20.0	Estimated capital cost $7.0 to 8.0M	3.1	◑	12.5	Estimated capital cost $18M to $20m	2.5	◑	10.0
Maximum Sub-total Score – Economic						**20.0**				**12.5**				**10.0**
Total Overall						**93.0**				**77.2**				**68.1**

Client: Town of Petrolia
Project No.: T001646A
Task: Detailed Evaluation of LLPS Alternatives

Category	Weight	Criteria	**Alternative 1** - Retrofit Closed			**Alternative 2** - Retrofit Open			**Alternative 3** - New Closed			**Alternative 4** - New Open		
			Rationale	Score 1 to 5	Weighted Score	Rationale	Score 1 to 5	Weighted Score	Rationale	Score 1 to 5	Weighted Score	Rationale	Score 1 to 5	Weighted Score
Natural Environment	20	**Wildlife –** Potential impacts to wildlife and species at risk	Impacts to wildlife (including species at risk) or identified habitat locations for these species will be minimized given the work is contained inside the existing building and will not disrupt any additional habitats.	4.0	4.0	Impacts to wildlife (including species at risk) or identified habitat locations for these species will be minimized given the work is contained inside the existing building and will not disrupt any additional habitats.	4.0	4.0	Impacts to wildlife (including species at risk) or identified habitat locations for these species will be minimized given the work is generally in the same area as the existing building and will not disrupt any additional habitats.	4.0	4.0	Impacts to wildlife (including species at risk) or identified habitat locations for these species will be minimized given the work is generally in the same area as the existing building and will not disrupt any additional habitats.	4.0	4.0
		Natural Environmental Features: Potential impacts to existing natural environment	This alternative does not involve work outside of the existing building footprint, therefore no disturbance to existing vegetation is expected.	4.0	4.0	This alternative does not involve work outside of the existing building footprint, therefore no disturbance to existing vegetation is expected.	4.0	4.0	This alternative does not involve work outside of the existing building footprint, therefore no disturbance to existing vegetation is expected.	4.0	4.0	This alternative does not involve work outside of the existing building footprint, therefore no disturbance to existing vegetation is expected.	4.0	4.0
		Climate Change – Potential impact on climatic conditions during construction and project vulnerability to changing climatic conditions.	Alternative 1 is proposed as a retrofit closed system. Excavated material from site is expected to be used to backfill the remainder of the trench and return lake bottom to its original contours, which will eliminate/reduce the need to transport and dispose excavated material offsite. Small increase in energy requirements as a closed system compared to Alternative 2. None of the upgrades are expected to increase GHG emissions.	3.5	3.5	Alternative 2 is proposed as a retrofit open system. Excavated material from site is expected to be used to backfill the remainder of the trench and return lake bottom to its original contours, which will eliminate/reduce the need to transport and dispose excavated material offsite. Decrease in energy requirements as an open system compared to Alternative 1. None of the upgrades are expected to increase GHG emissions.	4.0	4.0	Intake structure for Alternative 3 is proposed as a new closed system. Excavated material from site is expected to be used to backfill the remainder of the trench and return lake bottom to its original contours, which will eliminate/reduce the need to transport and dispose excavated material offsite. Highest increase in energy requirements as a new closed system compared to Alternative 1, 2 and 3. None of the upgrades are expected to increase GHG emissions. Lowering the base of the new LLPS will provide additional contingency in the event that climate change results in lowered lake levels.	4.5	4.5	Alternative 4 is proposed as a new open system. Excavated material from site is expected to be used to backfill the remainder of the trench and return lake bottom to its original contours, which will eliminate/reduce the need to transport and dispose excavated material offsite. Moderate increase in energy requirements as a new open system compared to Alternative 1 and Alternative 2. None of the upgrades are expected to increase GHG emissions. Lowering the base of the new LLPS will provide additional contingency in the event that climate change results in lowered lake levels.	5.0	5.0
		Source Water Protection – Potential impact on source water protection areas and compliance with source water protection policies.	Proposed location for the retrofit closed system for Alternative 1 will be within the existing pumping station, so major changes to existing IPZs, source water protection policies or areas subject to these policies are not anticipated.	4.5	4.5	Proposed location for the retrofit open system for Alternative 2 will be within the existing pumping station, so major changes to existing IPZs, source water protection policies or areas subject to these policies are not anticipated.	4.5	4.5	Proposed location for the new closed system for Alternative 3 is generally within the same area as existing pumping station, so major changes to existing IPZs, source water protection policies or areas subject to these policies are not anticipated.	4.5	4.5	Proposed location for the new closed system for Alternative 4 is generally within the same area as existing pumping station, so major changes to existing IPZs, source water protection policies or areas subject to these policies are not anticipated.	4.5	4.5
Maximum Sub-total Score – Natural Environment					**16.0**			**16.5**			**17.0**			**17.5**
	15	**Cultural Heritage Features –** Potential impacts from construction to existing cultural heritage features.	The existing Bright's Grove WTP (2701 Old Lakeshore Road) was determined to have heritage value. The scope of the proposed work for Alternative 1 poses no direct impact to the WTP.	4.0	3.0	The existing Bright's Grove WTP (2701 Old Lakeshore Road) was determined to have heritage value. The scope of the proposed work for Alternative 2 poses no direct impact to the WTP.	4.0	3.0	The existing Bright's Grove WTP (2701 Old Lakeshore Road) was determined to have heritage value. The scope of the proposed work for Alternative 3 poses no direct impact to the WTP.	4.0	3.0	The existing Bright's Grove WTP (2701 Old Lakeshore Road) was determined to have heritage value. The scope of the proposed work for Alternative 4 poses no direct impact to the WTP.	4.0	3.0
		Archaeological Features – Potential impact from construction to existing archaeological.	An Archaeological Study confirmed that the original intake pipe from 1896 still exists 30m off of the coast, though it will provide no significant archaeological information. The retrofit closed system for Alternative 1 will not impact the existing pipe.	4.0	3.0	An Archaeological Study confirmed that the original intake pipe from 1896 still exists 30m off of the coast, though it will provide no significant archaeological information. The retrofit open system for Alternative 2 will not impact the existing pipe.	4.0	3.0	An Archaeological Study confirmed that the original intake pipe from 1896 still exists 30m off of the coast, though it will provide no significant archaeological information. The new closed system for Alternative 3 will not impact the existing pipe.	4.0	3.0	An Archaeological Study confirmed that the original intake pipe from 1896 still exists 30m off of the coast, though it will provide no significant archaeological information. The new open system for Alternative 4 will not impact the existing pipe.	4.0	3.0
		Long-term Impacts – Potential long-term impact on adjacent residents and local users from siting of new infrastructure.	No long-term impacts on adjacent residents or local users are anticipated, including impacts on long-term noise and visual effects, views of the natural landscape, existing distance between proposed infrastructure and the closest sensitive recptors, or air emmisions.	5.0	3.8	No long-term impacts on adjacent residents or local users are anticipated, including impacts on long-term noise and visual effects, views of the natural landscape, or existing distance between proposed infrastructure and the closest sensitive recptors, or air emissions.	5.0	3.8	No long-term impacts on adjacent residents or local users are anticipated, including impacts on long-term noise and visual effects, views of the natural landscape, or existing distance between proposed infrastructure and the closest sensitive recptors, or air emissions.	5.0	3.8	No long-term impacts on adjacent residents or local users are anticipated, including impacts on long-term noise and visual effects, views of the natural landscape, or existing distance between proposed infrastructure and the closest sensitive recptors, or air emissions.	5.0	3.8
		Short-term Impacts – Potential short-term disruption to local residents, businesses, commercial and recreational activities due to construction (i.e., noise, dust, vibration, visual, access, parking, road and beach areas closures), more impacts on businesses for new pumping stations	Construction trucks will be on site for the delivery of equipment and materials. Alternative 1 will be a retrofit closed system, therefore most short-term construction impacts from noise and dust will be contained within the WTP. Appropriate standard construction techniques and mitigation measures will be implemented.	4.5	3.4	Construction trucks will be on site for the delivery of equipment and materials. Alternative 2 will be a retrofit open system, therefore most short-term construction impacts from noise and dust will be contained within the WTP. Appropriate standard construction techniques and mitigation measures will be implemented.	4.5	3.4	Construction trucks will be on site for the delivery of equipment and materials. Alternative 3 involved a new closed system, which will result in moderate construction disruptions to local residents and businesses in the immediate surrounding area such as noise, dust and vibration resulting from bedrock drilling and blasting will be experienced during the short in-water construction period. Appropriate standard construction techniques and mitigation measures will be implemented.	4.0	3.0	Construction trucks will be on site for the delivery of equipment and materials. Alternative 4 involved a new open system, which will result in moderate construction disruptions to local residents and businesses in the immediate surrounding area such as noise, dust and vibration resulting from bedrock drilling and blasting will be experienced during the short in-water construction period. Appropriate standard construction techniques and mitigation measures will be implemented.	4.0	3.0
Maximum Sub-total Score – Socio- Cultural					**13.1**			**13.1**			**12.8**			**12.8**

Category	Weight	Criteria	**Alternative 1** - Retrofit Closed				**Alternative 2** - Retrofit Open				**Alternative 3** - New Closed				**Alternative 4** - New Open			
			Rationale	**Score 1 to 5**	**Weighted Score**		**Rationale**	**Score 1 to 5**	**Weighted Score**		**Rationale**	**Score 1 to 5**	**Weighted Score**		**Rationale**	**Score 1 to 5**	**Weighted Score**	
		Ease of Implementation – Potential level of complexity during construction, conflicts with existing infrastructure, ability to facilitate construction with uninterrupted supply of water and within a reasonable timeframe.	Construction of marine components will be implemented within the in-water construction window and necessary mitigation measures to protect aquatic habitats and species. A phased implementation approach will provide for protection of the existing pumping station as well as simultaneous operation of the existing pumping station during construction. Ease of implementation will be based on final equipment selection; may require a complex construction sequence. Upgrades are compatible with existing system. Scalability is limited within existing building footprint as Alternative 1 proposes a retrofit closed system.	3.0	◑	5.4	Construction of marine components will be implemented within the in-water construction window and necessary mitigation measures to protect aquatic habitats and species. A phased implementation approach will provide for protection of the existing pumping station as well as simultaneous operation of the existing pumping station during construction. Ease of implementation will be based on final equipment selection; may require a complex construction sequence. Upgrades are compatible with existing system. Scalability is limited within existing building footprint as Alternative 2 proposes a retrofit open system.	3.0	◑	5.4	Construction of marine components will be implemented within the in-water construction window and necessary mitigation measures to protect aquatic habitats and species. A phased implementation approach will provide for protection of the existing pumping station as well as simultaneous operation of the existing pumping station during construction. Ease of implementation will be based on final equipment selection; may require a complex construction sequence. Potential for scalability and future expansion since Alternative 3 proposes a new closed system.	5.0	●	9.0	Construction of marine components will be implemented within the in-water construction window and necessary mitigation measures to protect aquatic habitats and species. A phased implementation approach will provide for protection of the existing pumping station as well as simultaneous operation of the existing pumping station during construction. Ease of implementation will be based on final equipment selection; may require a complex construction sequence. Potential for scalability and future expansion since Alternative 4 proposes a new open system.	5.0	●	9.0
		Operational Complexity – Relative added complexity to existing operational practices resulting from construction and operation of new infrastructure.	Expected water quality with Alternative 1 should not add any complexity to the existing treatment process or operational practices. New intake pipeline and structure will reduce operational requirements associated with the regular cleaning and inspection activities. All infrastructure will be confined to existing Regional site boundaries which will facilitate any activities required for maintenance or emergency events.	5.0	●	9.0	Expected water quality with Alternative 2 should not add any complexity to the existing treatment process or operational practices. New intake pipeline and structure will reduce operational requirements associated with the regular cleaning and inspection activities. All infrastructure will be confined to existing Regional site boundaries which will facilitate any activities required for maintenance or emergency events.	5.0	●	9.0	Expected water quality with Alternative 3 should not add any complexity to the existing treatment process or operational practices. New intake pipeline and structure will reduce operational requirements associated with the regular cleaning and inspection activities. All infrastructure will be confined to existing Regional site boundaries which will facilitate any activities required for maintenance or emergency events.	5.0	●	9.0	Expected water quality with Alternative 4 should not add any complexity to the existing treatment process or operational practices. New intake pipeline and structure will reduce operational requirements associated with the regular cleaning and inspection activities.	5.0	●	9.0
	45	**Construction Duration -** Duration of project construction and potential for staging and phased construction.	Construction period is expected to be the shortest for Alternative 1 as it is a retrofit closed system, which is the most similar to the existing pumping station.	4.5	●	8.1	Construction period is expected to be short for Alternative 2 as it is a retrofit open system.	4.5	●	8.1	Construction period is expected to be moderate for Alternative 3 as it is a new closed system.	4.0	◕	7.2	Construction period is expected to be moderate for Alternative 3 as it is a new open system.	4.0	◕	7.2
		Regulatory Approvals – Number and complexity of permits/approvals needed for project construction.	Approvals will include: NPCA - Application for Development, Interference with Wetlands and Alterations to Shorelines and Watercourse, Update to Source Water Protection Program MECP - Amendments to DWWP, MDWL, PTTW, and Source Water Protection Program Update, SARs, Potential for temporary EASR if construction dewatering >50,000 L/day and >400,000 L/day, Completion of Information gathering Form (IGF) MNR - Work Permit subject to construction timeframe limitations for in-water works and potentially SARs permit (subject to IGF) DFO - Permit to Take Fish by Means other than Fishing (depending of construction technique and blasting requirements) Transport Canada - Approval under Navigable Water Act	4.0	◕	7.2	Approvals will include: NPCA - Application for Development, Interference with Wetlands and Alterations to Shorelines and Watercourse, Update to Source Water Protection Program MECP - Amendments to DWWP, MDWL, PTTW, and Source Water Protection Program Update, SARs, Potential for temporary EASR if construction dewatering >50,000 L/day and >400,000 L/day, Completion of Information gathering Form (IGF) MNR - Work Permit subject to construction timeframe limitations for in-water works and potentially SARs permit (subject to IGF) DFO - Permit to Take Fish by Means other than Fishing (depending of construction technique and blasting requirements) Transport Canada - Approval under Navigable Water Act	4.0	◕	7.2	Approvals will include: NPCA - Application for Development, Interference with Wetlands and Alterations to Shorelines and Watercourse, Update to Source Water Protection Program MECP - Amendments to DWWP, MDWL, PTTW, and Source Water Protection Program Update, SARs, Potential for temporary EASR if construction dewatering >50,000 L/day and >400,000 L/day, Completion of Information gathering Form (IGF) MNR - Work Permit subject to construction timeframe limitations for in-water works and potentially SARs permit (subject to IGF) DFO - Permit to Take Fish by Means other than Fishing (depending of construction technique and blasting requirements) Transport Canada - Approval under Navigable Water Act	4.0	◕	7.2	Approvals will include: NPCA - Application for Development, Interference with Wetlands and Alterations to Shorelines and Watercourse, Update to Source Water Protection Program MECP - Amendments to DWWP, MDWL, PTTW, and Source Water Protection Program Update, SARs, Potential for temporary EASR if construction dewatering >50,000 L/day and >400,000 L/day, Completion of Information gathering Form (IGF) MNR - Work Permit subject to construction timeframe limitations for in-water works and potentially SARs permit (subject to IGF) DFO - Permit to Take Fish by Means other than Fishing (depending of construction technique and blasting requirements) Transport Canada - Approval under Navigable Water Act	4.0	◕	7.2
		Property Acquisition – Need for land acquisition and availability of property, including temporary and permanent easements.	All inland infrastructure will be confined within Regional site boundaries, so no land acquisition required.	4.5	●	8.1	All inland infrastructure will be confined within Regional site boundaries, so no land acquisition required.	4.5	●	8.1	All inland infrastructure will be confined within Regional site boundaries, so no land acquisition required.	4.5	●	8.1	All inland infrastructure will be confined within Regional site boundaries, so no land acquisition required.	4.5	●	8.1
Maximum Sub-total Score – Technical & Operational						**37.8**				**37.8**				**40.5**				**40.5**

Category	Weight	Criteria	**Alternative 1** - Retrofit Closed				**Alternative 2** - Retrofit Open				**Alternative 3** - New Closed				**Alternative 4** - New Open			
			Rationale	**Score 1 to 5**	**Weighted Score**		**Rationale**	**Score 1 to 5**	**Weighted Score**		**Rationale**	**Score 1 to 5**	**Weighted Score**		**Rationale**	**Score 1 to 5**	**Weighted Score**	
Economic	20	**Construction Cost –** Relative scale of construction costs	Estimated capital cost $6.0M	5.0	●	20.0	Estimated capital cost $6.0M	5.0	●	20.0	Estimated capital cost $7.7M	4.5	●	18.0	Estimated capital cost $7.7M	4.5	●	18.0
Maximum Sub-total Score – Economic						**20.0**				**20.0**				**18.0**				**18.0**
Total Overall						**86.9**				**87.4**				**88.3**				**88.8**

H

Appendix H: Cost Estimates

Project Title:	**Bright's Grove WTP Replacement Intake Class EA**
Client:	Town of Petrolia
Project No.:	T001646A
Task:	Preliminary Cost Estimate
Prepared By:	AM

Date: 1-May-2023

Intake Option	Length (m)	Depth @ Intake Structure	In-Water Works	Sub-Total Estimated Cost	15% Contingency	Total Estimated Cost with Contingency
1	400	4.0	$ 3,840,000	$ 3,840,000	$ 576,000	$ 4,416,000
2	1,500	6.0	$ 5,995,000	$ 5,995,000	$ 899,000	$ 6,894,000
3	3,500	8.0	$ 7,180,000	$ 7,180,000	$ 1,077,000	$ 8,257,000

Project Title:	**Bright's Grove WTP Replacement Intake Class EA**		
Client:	Town of Petrolia		
Project No.:	T0016464A		
Task:	Preliminary Cost Estimate - In-Water Construction Works		
Prepared By:	AM	**Date:**	1-May-2023

CAPITAL COST Alternative 1 (Length 400 m / Screening Depth 4.0 m)

Item	Description	Estimated Cost
1	Mobilization & Demobilization	$ 500,000
2	Site Preparation	$ 50,000
3	Temporary Rock Berm	$ 150,000
4	Excavate Trench	$ 1,000,000
5	Intake Pipe - Supply & Install	$ 1,000,000
6	Water sampling line	$ 20,000
7	Chlorination line	$ 45,000
8	Backfill Trench	$ 500,000
9	Scour Protection	$ 185,000
11	Intake Structure	$ 300,000
12	Cleanup & Restoration	$ 30,000
13	Marine & Environmental Protection	$ 60,000
	Sub-Total =	**$ 3,840,000**

Notes:

1. Cost estimate is preliminary only based on assumed design parameters and site conditions.
2. Estimated costs include projected contractor's markup (overhead & profit).
3. Costs represented in 2023 dollars.
4. Assume all trenching on shore and offshore will occur in rock to full trench depth.
5. Depth at offshore intake structure relative to chart datum.

Project Title:	**Bright's Grove WTP Replacement Intake Class EA**
Client:	Town of Petrolia
Project No.:	T0016464A
Task:	Preliminary Cost Estimate - In-Water Construction Works
Prepared By:	AM

Date: 1-May-2023

CAPITAL COST Alternative 2 (Length 1,500 m / Screening Depth 6.0 m)

Item	Description	Estimated Cost
1	Mobilization & Demobilization	$ 500,000
2	Site Preparation	$ 75,000
3	Temporary Rock Berm	$ 160,000
4	Excavate Trench	$ 2,000,000
5	Intake Pipe - Supply & Install	$ 1,500,000
6	Water sampling line	$ 65,000
7	Chlorination line	$ 75,000
8	Backfill Trench	$ 900,000
9	Scour Protection	$ 300,000
11	Intake Structure	$ 300,000
12	Cleanup & Restoration	$ 60,000
13	Marine & Environmental Protection	$ 60,000
	Sub-Total =	**$ 5,995,000**

Notes:

1. Cost estimate is preliminary only based on assumed design parameters and site conditions.
2. Estimated costs include projected contractor's markup (overhead & profit).
3. Costs represented in 2023 dollars.
4. Assume all trenching on shore and offshore will occur in rock to full trench depth.
5. Depth at offshore intake structure relative to chart datum.

Project Title:	**Bright's Grove WTP Replacement Intake Class EA**		
Client:	Town of Petrolia		
Project No.:	T0016464A		
Task:	Preliminary Cost Estimate - In-Water Construction Works		
Prepared By:	AM	**Date:**	1-May-2023

CAPITAL COST Alternative 3 (Length 3,500 m / Depth at Intake Structure 8.0 m)		
Item	**Description**	**Estimated Cost**
1	Mobilization & Demobilization	$ 500,000
2	Site Preparation	$ 100,000
3	Temporary Rock Berm	$ 165,000
4	Excavate Trench	$ 2,500,000
5	Intake Pipe - Supply & Install	$ 2,000,000
6	Water sampling line	$ 75,000
7	Chlorination line	$ 90,000
8	Backfill Trench	$ 1,000,000
9	Scour Protection	$ 350,000
11	Intake Structure	$ 300,000
12	Cleanup & Restoration	$ 40,000
13	Marine & Environmental Protection	$ 60,000
	Sub-Total =	**$ 7,180,000**

Notes:

1. Cost estimate is preliminary only based on assumed design parameters and site conditions.
2. Estimated costs include projected contractor's markup (overhead & profit).
3. Costs represented in 2023 dollars.
4. Assume all trenching on shore and offshore will occur in rock to full trench depth.
5. Depth at offshore intake structure relative to chart datum.

Project Title:	**Bright's Grove WTP Replacement Intake Class EA**
Client:	Town of Petrolia
Project No.:	T001646A
Task:	Preliminary Cost Estimate
Prepared By:	AM
Date:	1-May-2023

LLPS Design Concepts	System	Sub-Total Estimated Cost	15% Contingency	Total Estimated Cost with Contingency
1	Retrofit Closed	$ 2,640,000	$ 396,000	$ 3,036,000
2	Retrofit Open	$ 2,640,000	$ 396,000	$ 3,036,000
3	New Closed	$ 2,760,000	$ 414,000	$ 3,174,000
4	New Open	$ 2,760,000	$ 414,000	$ 3,174,000

Project Title:	**Bright's Grove WTP Replacement Intake Class EA**
Client:	Town of Petrolia
Project No.:	T001646A
Task:	Preliminary Cost Estimate
Prepared By:	AM

Date: 1-May-2023

CAPITAL COST Alternative 1 (Retrofit Closed)

Item	Description	Estimated Cost
1	Mobilization & Demobilization	$ 300,000
2	Site Preparation	$ 250,000
3	Civil Works	$ 150,000
4	Concrete	$ 100,000
5	Metals	$ 750,000
6	Thermal and Moisture Protection	$ 40,000
7	Doors and Windows	$ 150,000
8	Equipment	$ 750,000
9	Electrical	$ 150,000
	Sub-Total =	**$ 2,640,000**

Notes:

1. Cost estimate is preliminary only based on assumed design parameters and site conditions.
2. Estimated costs include projected contractor's markup (overhead & profit).
3. Costs represented in 2023 dollars.

Project Title:	**Bright's Grove WTP Replacement Intake Class EA**
Client:	Town of Petrolia
Project No.:	T001646A
Task:	Preliminary Cost Estimate
Prepared By:	AM

Date: 1-May-2023

CAPITAL COST Alternative 2 (Retrofit Open)

Item	Description	Estimated Cost
1	Mobilization & Demobilization	$ 300,000
2	Site Preparation	$ 250,000
3	Civil Works	$ 150,000
4	Concrete	$ 100,000
5	Metals	$ 750,000
6	Thermal and Moisture Protection	$ 40,000
7	Doors and Windows	$ 150,000
8	Equipment	$ 750,000
9	Electrical	$ 150,000
	Sub-Total =	**$ 2,640,000**

Notes:

1. Cost estimate is preliminary only based on assumed design parameters and site conditions.
2. Estimated costs include projected contractor's markup (overhead & profit).
3. Costs represented in 2023 dollars.

Project Title:	**Bright's Grove WTP Replacement Intake Class EA**
Client:	Town of Petrolia
Project No.:	T001646A
Task:	Preliminary Cost Estimate
Prepared By:	AM

Date: 1-May-2023

CAPITAL COST Alternative 3 (New Closed)

Item	Description	Estimated Cost
1	Mobilization & Demobilization	$ 300,000
2	Site Preparation	$ 35,000
3	Civil Works	$ 150,000
4	Concrete	$ 500,000
5	Metals	$ 750,000
6	Thermal and Moisture Protection	$ 40,000
7	Doors and Windows	$ 50,000
8	Equipment	$ 750,000
9	Electrical	$ 185,000
	Sub-Total =	**$ 2,760,000**

Notes:

1. Cost estimate is preliminary only based on assumed design parameters and site conditions.
2. Estimated costs include projected contractor's markup (overhead & profit).
3. Costs represented in 2023 dollars.

Project Title:	**Bright's Grove WTP Replacement Intake Class EA**
Client:	Town of Petrolia
Project No.:	T001646A
Task:	Preliminary Cost Estimate
Prepared By:	AM

Date: 1-May-2023

CAPITAL COST Alternative 4 (New Open)

Item	Description	Estimated Cost
1	Mobilization & Demobilization	$ 300,000
2	Site Preparation	$ 35,000
3	Civil Works	$ 150,000
4	Concrete	$ 500,000
5	Metals	$ 750,000
6	Thermal and Moisture Protection	$ 40,000
7	Doors and Windows	$ 50,000
8	Equipment	$ 750,000
9	Electrical	$ 185,000
	Sub-Total =	**$ 2,760,000**

Notes:

1. Cost estimate is preliminary only based on assumed design parameters and site conditions.
2. Estimated costs include projected contractor's markup (overhead & profit).
3. Costs represented in 2023 dollars.

Engineering
for **people**