

File Report for the Northwest Trenton Water Capacity EA

January 18th, 2023



Prepared for:

City of Quinte West,
7 Creswell Drive, PO Box 490,
Trenton, ON
K8V 5R6

Submitted by:

The Greer Galloway Group Inc.
1620 Wallbridge-Loyalist Rd.
Belleville, ON K8N 4Z5

T: (613) 966-3068
F: (613) 966-3087
www.greergalloway.com

Project No.: 22-3-7761

Table of Contents

1.	Introduction	1
1.1.	Background	1
1.2.	Study Area	1
1.3.	Municipal Class Environmental Assessment Process	2
2.	Problem Or Opportunity	6
2.1.	Opportunity Statement	6
2.2.	Existing System	6
2.3.	Growth	6
3.	Existing environment inventory	7
3.1.	Land Use and Planning	7
3.2.	Natural Environment	7
3.2.1.	Terrestrial Environment - Species at Risk Assessment	7
3.2.2.	Geophysical Environment - Geotechnical Investigation	7
3.2.3.	Surface Water and Aquatic Environment	7
3.3.	Cultural Environment - Archaeological Assessment	7
4.	Evaluation of Alternative Solutions	8
4.1.	Alternative Solutions	8
4.2.	Evaluation of Alternatives	8
4.2.1.	Alternative 1: Do Nothing	8
4.2.2.	Alternative 2: New Watermain on 2nd Dug Hill Road	8
4.2.3.	Alternative 3: New Watermain on Country Road 40	8
5.	Preferred alternative	10
5.1.	Mitigating Measures	10
5.2.	Estimated Cost	10
6.	Consultation	11
6.1.	Notice of Commencement	11
6.2.	Public Information Centre	11
6.3.	Agency Consultation	11
6.4.	First Nations Consultation	11
6.5.	Notice of Completion	12
7.	Conclusion	13
8.	References	1

Figures

Figure 1: Aerial view of Northwest Trenton	1
Figure 2: Municipal Class EA Planning and Design Process Flow Diagram.	3
Figure 3 - Northeast Growth, from Quinte West Master Plan Report, 2021 (Ref. [1])	6
Figure 4 - Alteration to Route	9

Appendices

APPENDIX A: Environmental Impact Study	
APPENDIX B: Geotechnical Reports	
APPENDIX C: Archaeological Assessment of the Quinte West Watermain Project	
APPENDIX D: Checklist	
APPENDIX E: Notice of Commencement	
APPENDIX F: Public Information Centre	
APPENDIX G: Project Contacts	
APPENDIX H: Agency Correspondence	
APPENDIX I: First Nations Correspondence	
APPENDIX I: Public Correspondence	
APPENDIX K: Notice of Completion	
APPENDIX L: Route Drawing	

1. INTRODUCTION

1.1. Background

The City of Quinte West owns the municipal water distribution system in Trenton. The City has identified the need for additional pressure and flow to support the water demands of future expansion in northwest Trenton. Currently, the primary transmission main to the northwest boundary of Trenton is a single 300mm watermain along Telephone Road.

These upgrades and recommendations will be carried out as a Schedule 'B' project under the terms of the Municipal Class Environmental Assessment (Class EA) process, which is approved under the Environmental Assessment Act. A Notice of Study Commencement was release on May 11th, 2022, to mark the beginning of the project and a PIC was held on October 25th, 2022, during which proposed alternatives and the preferred alternative were presented.

1.2. Study Area

The relevant area of study is dependent on the alternative solution considered, however, in general this EA considers solutions within the area West of 2nd Dug Hill Road in Trenton, to Tate Road, and North of Highway 2, to Telephone Road. The area consists mostly of municipal roadways and farmland however the area most relevant to this ESR from an environmental and heritage standpoint is the Tremur Lake property located between County Road 40 and Tate Road which has several wetland areas and water sources.



Figure 1: Aerial view of Northwest Trenton

1.3. Municipal Class Environmental Assessment Process

In Ontario, municipal water and wastewater projects are subject to the provisions of the Municipal Class Environmental Assessment (2000, amended in 2007, 2011 and 2015). The Class Environmental Assessment (Class EA) is an approved planning document which describes the process that proponents must follow in order to meet the requirements of the Environmental Assessment Act (EAA) of Ontario. The Class EA approach allows for the evaluation of the environmental effects of carrying out a project and alternative methods of carrying out a project, includes mandatory requirements for public input, and expedites the environmental assessment of smaller recurring projects.

The Class EA planning process was developed to ensure that the potential social, economic, and natural environmental effects are considered in planning water, storm water and sewage projects. Class EAs are a method of dealing with projects which display the following important common characteristics: recurring, usually small in nature, usually limited in scale, predictable range of environmental effects, and responsive to mitigation measures.

Projects which do not display these characteristics must undergo an individual environmental assessment. The Class EA planning process represents an alternative for Ontario municipalities to carrying out individual environmental assessments for most municipal sewage, storm water management, and water projects. Since sewage, storm water management and water projects undertaken by municipalities under the Class EA planning process vary in their environmental impact such projects are classified in terms of schedules.

EXHIBIT A.2

MUNICIPAL CLASS EA PLANNING AND DESIGN PROCESS

NOTE: This flow chart is to be read in conjunction with Part A of the Municipal Class EA

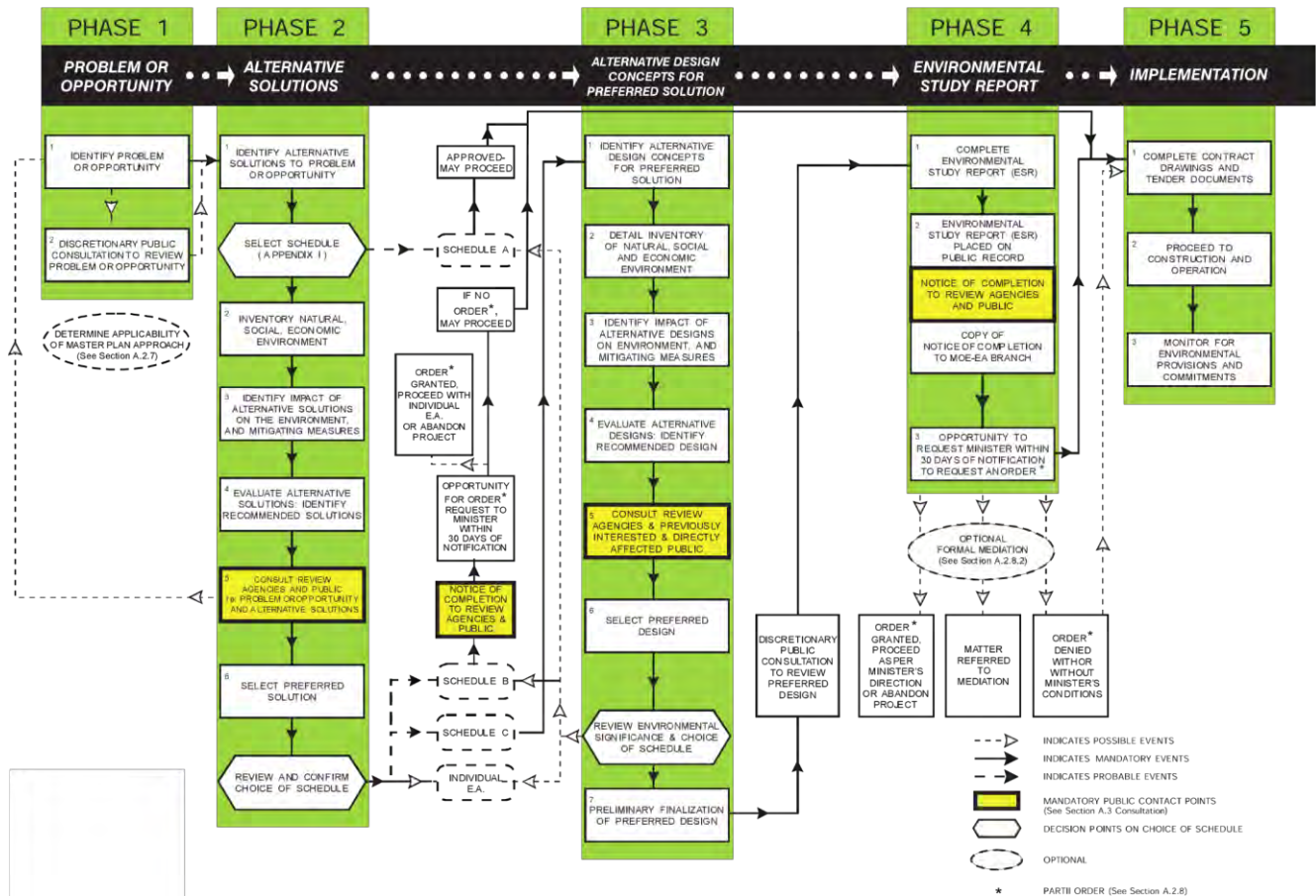


Figure 2: Municipal Class EA Planning and Design Process Flow Diagram.

Schedule A projects are limited in scale, have minimal adverse effects and include the majority of municipal sewage, storm water management and water operations as well as maintenance activities. These projects are pre-approved and may proceed to implementation without any further requirements under the provisions of the Class EA planning process. Schedule A+ projects are also pre-approved; however, the public must be informed prior to implementation.

Schedule B projects have the potential for some adverse environmental effects. The proponent is required to undertake a screening process involving mandatory contact with directly affected public and with relevant government agencies to ensure that they are aware of the project and that their concerns are addressed. If there are no outstanding concerns, then the proponent may proceed to implementation. If, however, the screening process raises a concern which cannot be resolved, then the Part II Order ("bump-up") procedure may be invoked; alternatively, the proponent may elect voluntarily to plan the project as a Schedule C undertaking. Typically, Schedule B projects involve extensions to existing Municipal infrastructure such as sewage collection systems and water distribution systems.

Schedule C projects have the potential for significant environmental effects and must proceed under the full planning and documentation procedures specified in the Class EA process. Schedule C projects require that an

ESR be prepared and submitted for review by the public. If concerns are raised that cannot be resolved, the "bump-up" procedure may be invoked, which may result in the requirement to complete a full environmental assessment. Typically, these projects involve the construction of Municipal infrastructure such as wastewater treatment facilities, new sewage collection and water distribution systems, and water treatment facilities.

Proponents then proceed through the planning process beginning with Phase 1 (Problem Definition) and advancing towards the end of Phase 2 (Evaluation of Alternative Solutions), where the preferred alternative solution is determined. Having determined the preferred alternative solution, the appropriate project schedule and process to be followed for the completion of the project.

For a Schedule B project, Phase 1 defines the nature and extent of the problem and the project opportunity. Often a discretionary public meeting is held to inform interested parties of the EA planning process and to discuss the problem.

Phase 2 involves the identification of the alternative solutions. Also included is an inventory of the natural, social, and economic environment; the identification of the impacts of alternative solutions on the environment; the identification of mitigation measures; an evaluation of alternative solutions; consultation with review agencies and the public regarding the identified problem and alternative solutions; the identification of the preferred alternative solution; and confirmation of the path or schedule to follow for the balance of the Class EA process. Public consultation is mandatory at this phase and includes review agencies and the affected public. The appropriate EA schedule for the project is also identified.

Phase 3 and 4 are relevant to a Schedule "C" EA. Phase 3 involves the identification of alternative designs for the selected alternative solution. Also included are a detailed inventory of the natural, social, and economic environment relating to the selected alternative solution; the identification of the impacts of alternative designs on the environment; the identification of mitigation measures; consultation with review agencies and the public regarding the alternative designs; and the identification of the recommended alternative design. Public consultation is mandatory at this phase and includes review agencies and the affected public.

Phase 4 represents the culmination of the planning and design process as set out in the Class EA. Phase 4 involves the completion of the documentation including the ESR, if required, and the Notice of Completion. The ESR documents all the activities undertaken through Phases 1, 2 and 3 including the consultation. The ESR is filed with the Clerk of the Municipality and is placed on the public record for at least 30 days to allow for public review. The public and mandatory agencies are notified through the Notice of Completion, which also discloses the Part II Order ("bump-up") provisions.

Phase 5 is the implementation phase of the Class EA process, and includes final design, construction plans and specifications, tender documents, and construction and operation. It also includes monitoring for environmental provisions and commitments (e.g. mitigation measures) as defined in the ESR

There is an opportunity for any interested parties to request a Part II Order that results in the project being bumped up from a Class Environmental Assessment to an Individual Environmental Assessment. The "bump-up" opportunity exists at the Notice of Completion stage and must be filed with the Minister of Environment within thirty (30) days of the notice date. The Notice of Completion occurs near the end of Phase 4 for Schedule C projects. It signifies that the Class EA process has been completed for the project and that the resulting document has been placed on public record.

For projects subject to the provisions of the Class Environmental Assessment Process, a person or agency with a significant concern must communicate the concern to the proponent any time between Phases 2 and 4. If the concern cannot be resolved between the party and the proponent, then that person or agency can request a Part II Order from the Minister. This must be done during the thirty-day public review period after the Notice of Completion has been issued.

The Environmental Assessment Branch of the Ministry of the Environment then has forty-five days to prepare a report to the Minister, who then has twenty-one days to decide. The Minister may deny the request, deny the request with conditions, refer to the Environmental Assessment Advisory Committee, or comply with the request. Obviously since the Part II Order procedure is arduous, an individual or agency with a significant and legitimate concern is wise to engage in an early and meaningful dialogue with the proponent. The process is specifically referenced in the Notice and addressed in detail during the PICs.

This project is a Schedule "B" Class EA.

The **Proponent** for the project is:

The City of Quinte West,
7 Creswell Drive,
Post Office Box, No. 490
Trenton, Ontario
K8V 5R6
Attention: Matt Tracey, Manager Water & Wastewater Services

The **Consulting Engineer** is:

The Greer Galloway Group Inc.
1620 Wallbridge Loyalist Rd.
Belleville, ON
K8N 4Z5
Attention: Tony Guerrero, P.Eng.

3. EXISTING ENVIRONMENT INVENTORY

A detailed inventory was taken as part of an Environmental Impact Study, available in Appendix A. A geotechnical report for the relevant areas was completed, available in Appendix B. A stage 1 and stage 2 archeological study was completed to assess archeological potential, available in Appendix C.

3.1. Land Use and Planning

The area has a mixture of land uses. The existing urban development is predominately located along Telephone Road and Highway 2. Surrounding the urban development, the land use is primarily agriculture use, undeveloped lands and some industrial land in the northwest of the area.

3.2. Natural Environment

3.2.1. Terrestrial Environment - Species at Risk Assessment

The ecological features are inventoried In the Environmental Impact Study available in Appendix A.

3.2.2. Geophysical Environment - Geotechnical Investigation

The full geotechnical Investigation is available in Appendix B.

3.2.3. Surface Water and Aquatic Environment

The ecological environment of affected aquatic environments are inventoried In the Environmental Impact Study available in Appendix A. There are several surface water features in the area, the most significant of which is Tremur Lake, located south of Telephone Road and West of Country Road 40. Two smaller creeks and one larger creek drain into Tremur Lake from the west flowing through marsh and wetland. The two smaller creeks have been identified to be dry for portions of the year, however the main tributary continues to flow throughout the year from the Glenburnie Farms Pond.

3.3. Cultural Environment - Archaeological Assessment

A Stage 2 Archaeological Assessment was completed the area, available in Appendix C. Areas which are located within 300 m of a primary water source or within 200 m of a secondary water source are considered to have a high potential for the presence of archaeological resources due to the proximity of potable water supplies. Checklists are available in Appendix D.

4. EVALUATION OF ALTERNATIVE SOLUTIONS

4.1. Alternative Solutions

The following alternative solutions to address the need for additional pressure and flow to support the water demands of future expansion in northwest Trenton were considered:

- 1) Do nothing
- 2) New Watermain on 2nd Dug Hill Road
- 3) New Watermain on Country Road 40

4.2. Evaluation of Alternatives

Selection of a preferred solution involves evaluating the relative merits of each alternative from a technical perspective as well as assessing the potential impacts on the natural, cultural, social and economic environments. Technical considerations include the ability to satisfy the problem statement while meeting applicable regulations, codes and standards including requirements for MECP approvals. Natural environment includes impacts to groundwater and surface water, terrestrial and aquatic environments, and species at risk. Cultural environment refers to cultural heritage and archaeological resources. Social environment includes impacts to people and communities (e.g. property impacts, noise, odour, aesthetics, recreation). Economic environment includes capital and operating costs as well as impacts on commercial or other activities contributing to overall economic health.

A description of each alternative and evaluation of environmental impacts is presented below:

4.2.1. Alternative 1: Do Nothing

This alternative would be the lowest capital cost and involves using the existing distribution system to deliver flow to the Northwest of Trenton without supplementing it by other means. The current distribution system is not sufficient to meet the demand required by future developments. This alternative would provide no detriment to the natural environment or cultural environment. It would limit growth within the community as the current distribution system is not sufficient to support significant growth or development, negatively affecting the economic environment. This option is not feasible.

4.2.2. Alternative 2: New Watermain on 2nd Dug Hill Road

This option involved a new 300mm PVC watermain along the length of 2nd Dug Hill Road, connecting at the Walmart Water Tower and the Telephone Road intersection and would require an additional valve chamber on Telephone Road and an additional valve chamber on 2nd Dug Hill Road. This alternative would be unlikely to cause negative affect to the to the natural and cultural environment as it would remain within municipal road allowance for the length of the route. Although this option would increase flows, it was calculated to be insufficient to support all future demands from proposed developments. This option would allow for increased flows but would not fully support planned growth and development and is therefore not feasible.

4.2.3. Alternative 3: New Watermain on Country Road 40

This option would involve a new watermain, of sizes 450mm to 500mm starting on Dundas Street West (Highway 2) at Walmart to the Tate Road/Telephone Road intersection through the Tremur Lake area and an additional valve chamber on Telephone Road. Two routes were considered around the Tremur Lake area for this option. It

was found that it was not feasible to install the watermain along the Tremur Lake dam, under the road allowance, so alternate routes had to be considered around Tremur Lake. Initially a route was considered that would pass through the undeveloped land south of Tremur Lake. The municipality owns most of the land relevant to that route with the exclusion of one easement through privately owned land that would be required. Through the environmental impact study (available in Appendix A), it was found that the undeveloped land to the south of Tremur Lake contains significant portions of wetland and the possible presence of Blanding's Turtle habitats. This route would also require the clearing of tree through the route that would need to be sequenced to mitigate possible negative affects to bird and bat populations.

Following the identification of these environmental factors, routing was revisited, and a possible alternative route was found. The alternative route would avoid the wetland areas by moving the watermain further south around the Tremur Lake property, utilising an existing access route, and non-wetland undeveloped land. This route also increases the distance between Tremur Lake and the watermain. The initial route was selected as the alternate route requires an additional easement through private land. The additional easement was found to be feasible in talks with the private landowner, therefore this route was adopted. The EIS and Stage 2 Archeological report include this route. In the image below, the red route was the original intended routeing through the Tremur Lake property, and the blue is the newly proposed routeing.



Figure 4 - Alteration to Route

This is the preferred alternative as it addresses future demand requirements while minimising affects to cultural and ecological environments.

5. PREFERRED ALTERNATIVE

The preferred alternative to water capacity in the Northwest of Trenton for future planned developments is a watermain routed west along Highway 2, North up County Road 40, West under wetland areas of Tremur Lake, before travelling north on Tate Road to the connection point near the Telephone Road intersection. This route is calculated to provide sufficient capacity, and has been routed to minimise affect on ecological, aquatic, and cultural heritage environments. The watermain is proposed to be sized at 500mm south of the School on Country Road 40, and at 450mm for the rest of the route.

5.1. Mitigating Measures

Minimal impact to the natural environment is expected, as the majority of the route is within road allowances or disturbed areas such as access roads or areas previously used for quarrying. Undeveloped areas that are not previously disturbed are routed around identified wetland areas. The route requires crossing of two smaller creeks and one larger creek. Mitigations include setbacks from creeks/waterways, and setbacks from wetland areas. A 30 m setback is proposed for wetland areas and a 15 m setback is proposed for creeks/waterways. Open cut crossings are proposed for creeks that dry during the summer season, and HDD installation is proposed for the larger creek that continues to flow year-round. Clearing will take place prior to April 15th to avoid affects to bats and birds. Other measures can be found in the full EIS Report in Appendix A.

5.2. Estimated Cost

The high-level estimated cost of the watermain installation is Approximately \$4,000,000.

6. CONSULTATION

6.1. Notice of Commencement

The Notice of Commencement (available in Appendix E) dated May 11th, 2022, was published on the City of Quinte West website and in the local newspaper. The notice provided contact information for the project and invited public participation and comments.

6.2. Public Information Centre

The PIC was advertised on the website using the notice prepared in Appendix and through the local newspaper. The public information centre was held on October 25th, 2022. There were three attendees and a prepared presentation was completed (available in Appendix F).

6.3. Agency Consultation

Consultation with review agencies has been undertaken throughout the project to establish requirements for approvals, determine the need for technical studies, evaluate environmental impacts of potential solutions and develop mitigating measures.

Project Notices were circulated to the list of project contacts, provided in Appendix G. Records of correspondence, meeting minutes, and responses from review agencies including MECP, MTCS, and MNRF are also included in Appendix H.

Highlights of Agency Consultation/Correspondence:

Meeting Minutes:

- September 27th, 2022 – EIS Discussion with MECP and LTC
- January 4th, 2023 – Revised Route Discussion with MECP

Emails:

- Northwest Trenton Water Capacity EA - Notice of Commencement – MECP response

Automatic Responses have not been included.

6.4. First Nations Consultation

The original notice with information regarding the EA process and goals of the project were distributed to first nations groups in May 2022. The public information centre invitations were also distributed inviting comment and collaboration. A meeting was organised with members of Curve Lake First Nations to discuss the project on November 18, 2022. The following responses, available in Appendix I were received in response to the original project notice:

- Curve Lake First Nations – Various
- Alderville First Nation – Request for continued notification

6.5. Notice of Completion

The Notice of Completion (see Appendix K) was issued on **January 17th, 2023** for publication on the Quinte West website. This environmental study report is now available for the required 30-day review period.

7. CONCLUSION

The City of Quinte West has identified that capacity in Trenton is insufficient to support future planned development. Various routes were considered for new watermain installations to resolve capacity shortfalls. Three alternatives were considered, and the only feasible alternative was selected and refined. Through study of the proposed route, a slight modification was implemented to reduce effect on wetland areas, the ecological environment, and possible cultural heritage sites. This route constitutes the final selected alternative. An EIS and a stage 2 Archeological study was completed for relevant areas along the route. No significant archaeological resources were found, and mitigations have been included to limit impact to the environment.

Respectfully Submitted,

**THE GREER GALLOWAY GROUP INC.
CONSULTING ENGINEERS**



**Tony Guerrero, P. Eng.
Senior Project Manager**

8. REFERENCES

[1] S. Hashemi, "Master Plan Report," The City of Quinte West, The City of Quinte West, 2021.

APPENDIX A: Environmental Impact Study

Environmental Impact Study

County Road 40 Watermain Extension

City of Quinte West

Prepared for:

The City of Quinte West
7 Creswell Drive
P.O. Box 490
Trenton, ON
K8V 5R6

Submitted by:

The Greer Galloway Group Inc.
Consulting Engineers
1620 Wallbridge Loyalist Road R.R. #5
Belleville, ON K8N 4Z5

T: (613) 966-3068
www.greergalloway.com

Project: 2237761

January 2023

Contents

1.	Introduction	1
2.	Background	1
2.1	Existing Conditions	1
2.2	Environmental Policy Context	2
3.	Biophysical Description of the Site	4
3.1	Study Approach	4
3.1.1	Study Area	4
3.1.2	Field Survey	4
3.1.3	Vegetation Community Mapping.....	5
3.1.4	Wildlife	5
3.1.5	Species at Risk	5
3.2	Geology and Soils	5
3.3	Topography and Drainage	6
3.4	Hydrology and Hydrogeology.....	6
3.5	Vegetation Communities	7
3.6	Wildlife.....	10
3.6.1	Birds.....	10
3.6.2	Mammals	10
3.6.3	Amphibians	10
3.6.4	Reptiles	10
3.6.5	Species at Risk	10
3.7	Aquatic Habitat.....	15
4.	Significant Natural Heritage Features and Functions.....	16
4.1	Significant Woodlands.....	16
4.2	Significant Wetlands.....	16
4.3	Areas of Natural and Scientific Interest (ANSI).....	16
4.4	Significant Habitat for Provincially Endangered and Threatened Species	16
4.5	Significant Wildlife Habitat	17
5.	Proposed Development.....	18
6.	Opportunities and Constraints	18
6.1	Natural Heritage System	18

6.2 Regulated Areas	19
7. Impact Assessment and Recommendations	19
8. Conclusions and Recommendations	28
9. References	29

Figures

Figure 1: Site Location Map

Figure 2: Natural Heritage Features

Figure 3: Vegetation Communities

Figure 4: Natural Heritage Constrains

Figure 5: Blanding's Turtle Wintering Habitat

Figure 6: Wetland Boundary

Tables

Table 1: Potential Endangered and Threatened Species within the Study Area

Table 2: Potential Impacts and Prevention, Mitigation and Restoration Measures

Appendices

Appendix A: List of Plant Species

Appendix B: List of Wildlife Species

Appendix C: Butternut Health Assessment Report

Appendix D: Site Photolog

1. Introduction

The Greer Galloway Group was retained by the City of Quinte West (herein The City) to prepare an Environmental Impact Study (EIS) report in support of the installation of an extension of the drinking water distribution line from Old Highway 2 to Tate Road. See Figure 1, Site Location Map.

The purpose of this report is to characterize the existing conditions of the area where the watermain will be installed, by assessing background information and field assessments and evaluating the environmental impacts that the proposed project may cause on the natural features. The report contains the information required for an EIS based on the Terms of Reference provided by LTC.

As the project is proposed to initiate in the winter of 2023, it was proposed to carry out field work during the last part of the summer and the fall. This information will be included in the report as specified in the Terms of Reference.

2. Background

2.1 Existing Conditions

The City of Quinte West owns the municipal water distribution system in Trenton. The City has identified the need for additional pressure and flow to support the water demands of future expansion in the northwest part of the City of Trenton. Currently, the primary transmission main to the northwest boundary of Trenton is a single 300 mm watermain along Telephone Road.

These upgrades and recommendations will be carried out as a Schedule 'B' project under the terms of the Municipal Class Environmental Assessment (Class EA) process, which is approved under the Environmental Assessment Act. Consultation with the public and interested stakeholders including government review agencies and First Nations is required to identify environmental impacts of alternative solutions, develop mitigating measures and identify a preferred solution.

Options considered for the project include:

Do Nothing

This alternative would have the lowest capital cost and would involve using the existing water distribution network to support demands. This alternative is not feasible as it does not consider the demands of future expansion in northwest Trenton.

New Watermain on 2nd Dug Hill Road

This option involved a new 300 mm PVC watermain along the length of 2nd Dug Hill Road, connecting at the Walmart Water Tower and the Telephone Road Intersection. Although this option would increase flows, it was calculated to be insufficient to support future demands.

New Watermain on Country Road 40

This option would involve a new watermain, of sizes 450 mm to 500 mm starting on Dundas Street West (Old Highway 2) at Walmart to the Tate Road/Telephone Road intersection through City land. It will include an additional valve chamber on Telephone Road. This is the preferred alternative as it addresses future demand requirements.

The preferred alternative consists of a 500 mm watermain from Walmart to Murray Centennial Public School and a 450 mm from the school to Telephone Road.

This alternative requires one rail crossing of CN and CPR rail properties of approximately 70 m in length. Also, it will be necessary to acquire land from landowners south of land owned by The City to avoid impacts to wetland.

The online MNDMNR NHIC mapping shows the Mayhew Creek, Tremur Lake, two watercourses draining into Mayhew Creek and unevaluated wetlands on The City's land and adjacent lands (See Figure 2: Natural Heritage Features).

Aerial photography from 1954 show the existing Old Highway 2 and County Road 40 with agricultural land and some natural areas adjacent to them. The City properties appears in the photograph with areas without vegetation (aggregate extraction), agricultural land and natural areas. In 1954, Tremur Lake did not exist. A wetland around the Mayhew creek existed in the area currently occupied by Tremur Lake. The Lake was constructed to store water and use it as a source of drinking water but water from the lake is no longer used for that purpose.

2.2 Environmental Policy Context

This EIS report has been prepared according to the legislation and policies described in the following subsections:

Provincial Policy Statement

The Ontario Planning Act (1990) requires that planning decisions be consistent with the Provincial Policy Statement, 2020 (PPS). Section 2.1 of the PPS specifies policy related to the protection of natural heritage features and functions.

Subsection 2.1.4 Development and Site Alteration shall not be permitted in:

- a. Significant wetlands in Ecoregions 5E, 6E and 7E; and
- b. Significant coastal wetlands.

Subsection 2.1.5 Development and Site Alteration shall not be permitted in:

- c. Significant woodlands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Mary's River);
- d. Significant valleylands in Ecoregions 6E and 7E (excluding island in Lake Huron and the St. Mary's River);
- e. Significant wildlife habitat;
- f. Significant areas of natural and scientific interest; and
- g. Coastal wetlands in Ecoregions 5E, 6E and 7E that are not subject to policy 2.1.4(b) unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.

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

Subsection 2.1.8 states that development and site alteration shall not be permitted on adjacent lands to the natural heritage features and areas identified in policies 2.1.4, 2.1.5, and 2.1.6 unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions.

Species at Risk Act

The purposes of the Species at Risk Act (SARA) are to prevent wildlife species in Canada from disappearing; to provide for the recovery of wildlife species that are extirpated (no longer exist in the wild in Canada), endangered, or threatened as a result of human activity; and to manage species of special concern to prevent them from becoming endangered or threatened. A series of measures applicable across Canada provides the framework to accomplish these goals. Some of these measures establish how governments, organizations, and individuals in Canada work together, while others implement a species assessment process to ensure the protection and recovery of species.

Endangered Species Act

Species listed on the Species at Risk in Ontario (SARO) list as endangered or threatened are protected under the *Endangered Species Act, 2007* (ESA). Section 9(1) of the ESA prohibits a person from killing, harming, harassing, capturing or taking a member of a species listed as endangered, threatened or extirpated on the SARO list. Section 10(1) of the ESA prohibits the damage or destruction of habitat of a species listed as endangered or threatened on the SARO list.

Lower Trent Region Conservation Authority

The Lower Trent Region Conservation Authority (Lower Trent Conservation) regulates watercourses, wetlands, and hazardous lands (valleylands, shorelines, floodplains) under Ontario Regulation 163/06. The purpose of the regulation is to prevent and restrict development and site alterations near water and wetlands to protect the public from flooding, erosion and other natural hazards. The regulation establishes guidelines for development, interference with wetlands and alterations to shorelines and watercourses.

City of Quinte West

The City of Quinte West's established goal in the Official Plan (January 9, 2013) is to ensure that all the necessary services required to accommodate development are available to meet the demand of residents. The objective is to develop land use patterns in the urban areas that are compact and avoid the need for unnecessary and uneconomical expansion of infrastructure.

Also, Section 10. Functional Policies, Subsection 10.1 Servicing, Subsubsection 10.1.1 Goal of the Official Plan states that it is the intent of the Plan to ensure that existing and proposed development within the City has an adequate supply of potable water and is serviced by proven sanitary sewage disposal systems. The objectives of the Plan related to services are:

- (i) To ensure that an adequate supply of serviced land will be provided to meet future development needs.
- (ii) To accommodate the growth provided by this Plan, the expansion of the Frankford Water Plant and the Batawa, Trenton and Frankford wastewater treatment plants will be necessary.
- (iii) To conduct improvements and/or expansions to the existing water distribution and sewage collection systems as required and in accordance with the capital works budget
- (iv) To effectively monitor municipal water and sanitary sewage service allocations to maintain sufficient treatment capacities for existing and future development within the Urban Settlement Areas of the City.
- (v) To ensure that no new development is permitted unless sufficient municipal sanitary sewage and water services are available.
- (vi) To discourage development that would result in the premature expansion of municipal services.
- (vii) To ensure sites for new development outside the Urban Settlement Area are capable of supporting private water and private sewage disposal systems over the long term.

Following the objectives to ensure adequate supply of drinking water, the City is proposing, as the best alternative, to extend the drinking water distribution line from Dundas Street West (Old Highway 2) at Walmart to the Tate Road/Telephone Road intersection through City land.

The City of Quinte West Official Plan, Schedule "A: - Land Use describes the land proposed for the watermain as Urban - Planning District. The Planning District Areas represent buildings blocks for the urban settlement areas within the Municipality that have specific land uses and policies that supplement the general land uses policies set up in the plan.

Based on the City of Quinte West Official Plan, Schedule "D" - Natural Heritage and Natural Hazards, the area where the watermain is proposed is not within an ANSI-Life Science, ANSI-Earth Science or Provincially Significant Wetland - Evaluated. An aggregate area is identified on the south part of Quinte West property.

The official Plan, Schedule "E" – Constrains indicate that the area for the watermain is not within a Surface Water Intake Protection Zones (IPZs) and Wellhead Protection Areas (WHPs). An abandoned natural gas well is identified to be present within The City's land.

The City of Quinte West Comprehensive Zoning By-law, Schedule "A Trenton West", describes the land where the watermain is proposed as Development (D) Zone.

3. Biophysical Description of the Site

3.1 Study Approach

3.1.1 Study Area

The study area for this EIS includes the area proposed for the watermain and potential area to be affected by the proposed works.

The study area includes roadside vegetation, non-vegetated areas, and natural areas. The comprehensive desktop review included the following sources:

- Ontario Ministry of Northern Development, Mines, Natural Resources and Forestry (MNDMNRF) Natural Heritage Information Centre (NHIC) geographic, species and natural areas information queries.
- Ontario Ministry of Natural Resources (MNR) Wetland Evaluation Reports.
- Ontario Reptile and Amphibian Atlas (ORAA) (Ontario Nature, 2022).
- Ontario Breeding Birds Atlas (OBBA) – First and Second Atlas, Birds Studies Canada.
- Atlas of the Mammals of Ontario (Dobbyn, 1994).
- Geology, topography, hydrogeology, hydrology maps and reports.
- Existing aerial photography.
- City of Quinte West Official Plan (July 17, 2013).
- City of Quinte West Comprehensive Zoning By-law No. 22-107 (July 21, 2014).
- Provincial Policy Statement, 2020

3.1.2 Field Survey

The natural features were evaluated through site investigations. Site investigations were carried out to determine the existing conditions of the natural features, document migratory birds, and other wildlife, and determine the general characteristics of the study area. Site investigations were performed on June 28, July 11, 22 and 28, and August 16 and 31, September 20, and October 5, 2022 between 6:00 am to 12:00 pm. Weather conditions during the field work varied from hot humid and sunny to cool, cloudy and dry.

The following methodology was applied to evaluate the natural features:

3.1.3 Vegetation Community Mapping

Vegetation communities were determined using a combination of aerial photography and field investigations. Aerial imagery allowed the delineation of distinct community boundaries and field assessments allow the collection of data to classify each community type. The Ecological Land Classification for Southern Ontario (Lee et al., 1998) was used to classify the vegetation communities. All the vegetation communities within the property were classified to at least the “ecosite” level when possible.

The wetland boundary was determined by applying the Ontario Wetland Evaluation System: Southern Manual, 3rd Edition (Ministry of Natural Resources, 2014). Wetland boundaries were determined using a combination of aerial photography and field investigations. During the site investigations, wetland boundaries were determined by applying the OWES 50 percent wetland vegetation rule. In some cases, to confirm the boundary, soil samples were collected and analyzed. A handheld GPS unit was used to mark the wetland boundaries and map the feature and applicable setbacks.

3.1.4 Wildlife

Specific Wildlife surveys were not conducted as part of this study. All the observed species were documented, including birds, reptiles, amphibians and mammals. Any sightings or signs (i.e., scat, tracks, vocalizations) indicating the potential use of the site by wildlife were documented. Wildlife was assessed in all the site investigations.

3.1.5 Species at Risk

Species at Risk (SAR) included those species listed in the SARO and Schedule 1 of the SARA. An initial desktop review for potential Species at Risk (SAR) was conducted. The MNDMNR online NHIC map was consulted to identify the SAR likely present in the property and adjacent land. Available information was reviewed for additional records of SAR. As part of the work performed during the site investigations, the area was assessed to determine the presence and potential habitat for SAR in the study area. A Butternut Health Assessment was conducted as the species has been documented to be present in the area.

3.2 Geology and Soils

The area's landscape has been shaped by glacial processes over the past 2 million years of the Pleistocene Epoch. Most of the topographic features and overburden materials date from the latter part of the most recent glacial period known as the Wisconsinan glaciation; however, older structural features exist in the underlying limestone bedrock. The maximum ice extent occurred approximately 23,000 years ago when glacial ice covered all of Ontario and extended as far south as Ohio, USA. The ice sheet melting in the area laid down a locally thick layer of stony, sandy silt to silty sand-textured till on the ice-scoured bedrock. Post-glacial soils consist of recent alluvial deposits and organic soils within low-lying or poorly drained areas.

The bedrock geology in the vicinity of the site consists of shales and limestones of the middle Ordovician age. This sedimentary sequence was laid down over older Precambrian-age rock of the Grenville Province beginning in the middle Ordovician (approximately 460 million years ago). It is part of a continent-wide marine transgression that was deposited in the following order; the Shadow Lake, the Gull River, the Bobcaygeon, the Verulam and the Lindsay Formations (Armstrong and Carter, 2010).

The Shadow Lake Formation is a discontinuous, time-transgressive unit that unconformably overlies the older Precambrian basement. The unit consists of non-fossiliferous, red, maroon and green, poorly sorted,

argillaceous, arkosic sandstones and conglomerates; arenaceous siliciclastic shales and siltstones (Armstrong, 2000).

The Gull River Formation overlies the Shadow Lake Formation. It consists of light grey to brown, variably fossiliferous, very fine-grained pale to medium grey-weathering limestone. Armstrong and Rhéaume (1993) subdivide the Formation into an upper and lower member, with the lower Gull River member typically containing a greater proportion of argillaceous to silty dolostone beds. The Gull River strata are regionally extensive and continuous.

The Bobcaygeon Formation overlies the Gull River Formation. It is a light grey-brown to blue-grey to grey-brown, fine- to coarse-textured fossiliferous limestone. Thin shale interbeds and partings are encountered within the limestone increasing in abundance upward. Crinoidal grainstones and nodular textures are more common in the lower part of the Formation (OGS, 2011). Armstrong and Rhéaume (1993) subdivide the Bobcaygeon Formation into an upper, middle and lower member with the lower member forming the uppermost bedrock beneath the property.

The Verulam Formation overlies the Bobcaygeon Formation and forms the uppermost bedrock in the general area. It consists of grey, interbedded, bioclastic to very fine-grained limestone and grey-green calcareous shale. The Verulam Formation is mapped as occurring in the north part of the project area (OGS, 2011).

The Lindsay Formation overlies the Verulam Formation and forms the uppermost bedrock in the south part of the area. It consists of dark grey and blue grey limestone with shaly partings or fine-grained bioclastic limestone. This formation is mapped as occurring in the south part of the project area.

Ontario Geological Survey mapping shows the project area as being covered with glaciolacustrine sediments washed out from highland areas (drumlins) to low areas resulting in modification of the local topography particularly close to the shoreline where silts and sands are over 10 m thick. Silt and clay deposits are mapped along Old Highway 2. Organic deposits (peat, muck) are mapped in the western part of Mayhew Creek.

The overburden geology is composed of unconsolidated deposits resulting primarily from glacial activity. The native soil in the area is mainly composed of sandy loam, stone free with muck material found along the Mayhew Creek and the wetland areas (Hoffman and Acton, 1974). Native soils in the project area have been impacted by the construction of Tremur Lake, roads, train rails, maintenance roads/trails, aggregate extraction, and agricultural activities.

3.3 Topography and Drainage

The topography in the area varies from gently to moderate sloping (Hoffman and Acton, 1974). Elevations in the property were determined from the Ontario Base Mapping (MNDMNRF), ranging from 105 to 93 metres Above Sea Level (mASL). The highest elevation is reported on Old Highway 2 where the watermain will begin and the intersection of Tate Road and Telephone Road, and the lowest on the Mayhew Creek.

The area drains towards Tremur Lake/Mayhew Creek. Along Old Highway 2 and County Road 40, drainage is towards the road ditches.

3.4 Hydrology and Hydrogeology

The study area is within the Lower Trent Watershed. The watershed includes the Trent River which flows out of Rice Lake to the Bay of Quinte at Trenton, eight main tributaries, and numerous smaller watercourses that flow directly into Lake Ontario and the Bay of Quinte from Grafton to Quinte West. The watershed has been divided into 10 subwatersheds. The study area is within the Mayhew Creek Tributary. Part of the watermain will

be located south of the Mayhew Creek/Tremur Lake. There are two surface water features along the area proposed for the watermain. The two features drain into the Mayhew Creek. The watermain will cross the two watercourses and the Mayhew Creek. One watercourse receives surface water from a pond/quarry located on adjacent land to the south. The other watercourse receives surface water drainage from upper land/agricultural fields. The Mayhew Creek runs from west to east discharging into Tremur Lake. Wetland is located north of the area proposed for the watermain. Wetland will not be affected by the watermain. There are no surface water features that cross Old Highway 2 and County Road 40 where a portion of the watermain will be installed.

Groundwater regional flow direction is from north to south toward Lake Ontario. Groundwater aquifers in the area are found in the Paleozoic limestone covered with various depths of overburden. The overburden has been shaped by glacial activity into a variety of physiographic features (including drumlins, eskers, and limestone plains). The pathways of many streams are controlled by bedrock depressions shaped by bedrock faults. The groundwater quality in the area is generally hard, sometimes mineralized and with typically poor yields. Based on the geotechnical investigations performed by Cambium (2022) south of Tremur Lake/Mayhew Creek, groundwater is found between 0.8 mbgs and 2.7 mbgs.

3.5 Vegetation Communities

Vegetation along the area to be affected by the watermain include roadside vegetation, deciduous, mixed and coniferous forest. The watermain will be installed in areas with natural vegetation on land owned by The City. On this land several trail/maintenance roads have been constructed. These roads have a gravel surface and vegetation typical of edges is found along the trails/road.

The roadside vegetation is mainly composed of herbaceous species growing along Old Highway 2 and County Road 40 and along the trails/roads. Species identified include upland species such as Canada goldenrod (*Solidago canadensis*), new England aster (*Symphyotrichum novae-angliae*), oxeye daisy (*Leucanthemum vulgare*), wild carrot (*Daucus carota*), common milkweed (*Asclepias syriaca*), riverbank grape (*Vitis riparia*), and species tolerant to wet conditions such as reed canary grass (*Phalaris arundinacea*), narrow-leaved cattail (*Typha angustifolia*), and common reed (*Phragmites australis*) among other species.

Also, herbaceous species were reported on the bank and the area adjacent to Mayhew Creek close to Tate Road. This area is between the creek's bank and the agricultural field. At the time of investigation, the vegetation appears to be cut.

There is a small area south of the trail/road that crosses the Mayhew creek/Tremur Lake that has been modified to receive drainage from the fields. Discharge pipes to the wetland from this area and a sediment control fence were observed. Substrate on this area consists mainly of cobbles. A combination of terrestrial and wetland species was found established within the rocks. The Silver maple (*Acer saccharinum*) trees have been planted along the edge of this area over the road. Species identified include gray dogwood, red-osier dogwood, blue vervain, rushes, willow (*Salix sp.*), alfalfa, red clover (*Trifolium pratense*), Canada goldenrod, white sweet clover, common buckthorn, riverbank grape, wild carrot, seedlings of silver maple, tamarak (*Larix laricina*), spruce (*Picea sp.*), pale smartweed (*Polygonum lapathifolium*), yellow evening primrose (*Oenothera macrocarpa*), and grasses.

Vegetation communities were identified in the portion of the watermain that will be within land owned by The City. Ten (10) vegetation communities were identified. See Figure 3: Vegetation Communities. A list of plant species documented during the site investigations is included in Appendix A.

SWM4 - White Cedar Organic Mixed Swamp

Three areas form part of this community and are found south of Tremur Lake. The community is a swamp composed of white cedar with white birch (*Betula papyrifera*), yellow birch (*Betula alleghaniensis*), red maple (*Acer rubrum*), sugar maple (*Acer saccharum*), balsam fir (*Abies balsamea*), eastern white pine (*Pinus strobus*),

green ash (*Fraxinus pennsylvanica*), and eastern hemlock (*Tsuga canadensis*). The wetland has irregular topography with depressional areas where wetland species have been established. The understory is well developed. The shrub layer is composed of red-osier dogwood (*Cornus sericea*), alternate dogwood (*Cornus alternifolia*), and saplings of tree species. Ground species found in the swamp include marsh marygold (*Caltha palustris*), horsetail (*Equisetum* sp.), sensitive fern (*Onoclea sensibilis*), Christmas fern (*Polystichum acrostichoides*), ostrich fern (*Matteuccia struthiopteris*), bracken fern (*Pteridium equilinum*), bulblet fern (*Cystopteris bulbifera*), spotted touch-me-not (*Impatiens capensis*), wild black currant (*Ribes americanum*), summer grape (*Vitis aestivalis*), sedges, rushes, and mosses.

MAS2 – Mineral Shallow Marsh

This community is present around the Mayhew Creek. It is dominated by narrow-leaved cattail. Other species found include reed canary grass, gray dogwood (*Cornus foemina* ssp. *racemosa*), red osier-dogwood, slender willow (*Salix petiolaris*), bebb's willow (*Salix bebbiana*), purple loosestrife (*Lythrum salicaria*), boneset (*Eupatorium perfoliatum*), northern water plantain (*Alisma triviale*), Canada clearweed (*Pilea pumila*), narrow-leaved meadowsweet (*Spiraea alba*), spotted touch-me-not (*Impatiens capensis*), spotted joe-pye-weed (*Eupatorium maculatum*), smooth blue aster (*Symphotrichum laeve*), variegated horsetail (*Equisetum variegatum*), broadleaf arrowhead (*Sagittaria latifolia*), water knotweed (*Polygonum amphibium*), sensitive fern (*Onoclea sensibilis*), American bur-reed (*Sparganium americanum*), soft rush (*Juncus effusus*), woolgrass bulrush (*Scirpus atrovirens*), retrorse sedge (*Carex retrorsa*), horsetails, and grasses.

FOD5-3 – Dry-Fresh Sugar Maple – Oak Deciduous Forest

Two areas form part of this community which are fragmented by the road/trail. Sugar Maple and Red Oak (*Quercus rubra*) are the dominant species. Associate tree species found include white ash (*Fraxinus americana*), green ash, ironwood (*Ostrya virginiana*), basswood (*Tilia americana*), American elm (*Ulmus americana*), Black Cherry (*Prunus serotina*), American beech (*Fagus grandifolia*), among other species. The shrub layer is not abundant but when present, is mainly composed of tree saplings and red elderberry (*Sambucus racemosa* var. *racemosa*). Ground cover is composed of tree seedlings, hairy goldenrod (*Solidago hispida*), grass-leaved goldenrod (*Euthamia graminifolia*), poison ivy (*Toxicodendron radicans*), jack-in-the-pulpit (*Arisaema triphyllum*), false Solomon's seal (*Maianthemum racemosum*), fringed loosestrife (*Lysimachia ciliata*), common helleborine (*Epipactis helleborine*), lady fern (*Athyrium filix-femina*), sedges, and mosses. The community is present on a moderate slope with presence of numerous boulders.

FOM2 – Dry-Fresh White Pine – Maple – Oak Mixed Forest

Two areas form part of this community. Species composition is similar to the deciduous forest, but coniferous species are present. The canopy layer is composed of sugar maple, red oak, white pine, Scots pine (*Pinus sylvestris*), trembling aspen (*Populus tremuloides*), eastern white cedar (*Thuja occidentalis*), white ash, ironwood, American beech, white birch, yellow birch, black cherry. The shrub layer is not abundant, but it is composed of saplings of the tree species, common buckthorn (*Rhamnus cathartica*), red-osier dogwood, and common prickly ash (*Zanthoxylum americanum*). A lot of fallen trees were observed within this community. The ground cover is more diverse along the edge of the community. Species found include Canada goldenrod, zig-zag goldenrod (*Solidago flexicaulis*), new England aster, wild carrot, riverbank grape, bracken fern, rushes, and mosses.

FOM5 – Dry-Fresh White Birch – Poplar - Coniferous Mixed Forest

Three areas form part of this community. Similar tree species found as in other communities, but aspens and birches are noticeable present compared to other species. Ground species include dog strangling vine (*Cynanchum rossicum*), red baneberry (*Actaea rubra*), wild black currant, bristly currant (*Ribes lacustre*),

Virginia creeper (*Parthenocissus quinquefolia*), riverbank grape, common red raspberry (*Rubus idaeus*), enchanter's nightshade (*Circaea lutetiana*), jack-in-the-pulpit, and fringed loosestrife.

FOC2-2 – Dry- Fresh White Cedar Coniferous Forest

This community was dominated with white cedar, forming a dense, shaded area that do not allow the establishment of other species. The understory is almost absent. Ground is covered with leaves, few bulblet ferns, poison ivy, common dandelion (*Taraxacum officinale*), and mosses. A lot of branches were also observed as part of the ground cover.

FOC1 – Dry – Fresh Pine Coniferous Forest

Two areas were identified and are fragmented by the road/trail. It appears that this originally was a plantation; however, it was defined as coniferous forest due to composition and advance forest stage. The dominant species are eastern white pine and Scots pine. The shrub layer is sparse mainly composed with tree species saplings such as sugar maple, black cherry, ash, spruce, eastern white cedar. Other species found include gray dogwood, common buckthorn, Tartarian honeysuckle (*Lonicera tatarica*), Ground species include poison ivy, seedlings of ash, pines, red oak, ironwood, and trembling aspen, Virginia creeper, wild black currant, summer grape, blue-stemmed goldenrod (*Solidago caesia*), bittersweet nightshade (*Solanum dulcamara*), dog strangling vine, oxeye daisy, common dandelion, cleavers (*Galium aparine*), common St. John's-wort (*Hypericum perforatum*), bristly currant, sedges and mosses. Within this community, it was observed the presence of dense mats dominated with poison ivy and dog strangling vine.

CUW –Cultural Woodland

Two small areas were mapped. This community is characterized by presence of native and non-native species such as Manitoba Maple. The two areas have a well developed understory, indicating that they were subjected to anthropogenic disturbance. Tree species found include eastern white pine, white ash, green ash, eastern white cedar, American elm, basswood, Manitoba maple, trembling aspen, crack willow (*Salix fragilis*), and black cherry. Shrub species include staghorn sumac (*Rhus thyphina*), common buckthorn, ground juniper (*Juniperus communis*), and saplings. Herbaceous species found include enchanter's nightshade, common red raspberry (*Rubus idaeus*), common yellow wood-sorrel (*Oxalis stricta*), poison ivy, herb Robert (*Geranium robertianum*), wild black currant, riverbank grape, summer grape, sensitive fern, Virginia creeper, mosses, rushes, and grasses.

CUM –Cultural Meadow

Two small areas were mapped containing meadow vegetation. Species identified in these areas include, bird's-foot trefoil (*Lotus corniculatus*), wild carrot, Canada goldenrod, common yarrow (*Achillea millefolium*), chicory (*Cichorium intybus*), white sweet clover (*Melilotus albus*), great mullein (*Verbascum Thapsus*), tufted vetch (*Vicia cracca*), new England aster, red clover (*Trifolium pratense*), tall goldenrod (*Solidago altissima*), common milkweed, timothy grass (*Phleum pratense*), blue vervain (*Vervena hastata*), alfalfa (*Medicago sativa*), and other grasses.

CUT –Cultural Thicket

Two areas were mapped as cultural thicket. Staghorn sumac is abundant. Other species found include eastern red cedar (*Juniperus virginiana*), ground juniper, Tartarian honeysuckle, American elm, Scots pine, white birch, white spruce (*Picea glauca*), Canada goldenrod, large-tooth aspen (*Populus grandidentata*), eastern white pine, and common lilac (*Syringa vulgaris*).

Vegetation to be affected by the project include pine coniferous forest, white pine-maple-oak mixed forest, sugar maple-oak deciduous forest, cultural meadow, and cultural woodland.

3.6 Wildlife

3.6.1 Birds

A total of thirty-two (32) species of birds were recorded as incidental observations. The majority of the birds documented are common and widespread in Ontario and have been reported in the area except for Wood Thrush, which is listed as Special Concern species under the SARO. A list of Wildlife species documented during the site investigations is included in Appendix B.

3.6.2 Mammals

A total of eight (8) mammals were observed using the property. The animals were observed and/or scats or prints were found. White-tail deer (*Odocoileus virginianus*), Coyote (*Canis latrans*) prints, Beaver (*Castor canadensis*), Raccoon (*Procyon lotor*) scats, Eastern Cottontail (*Sylvilagus floridanus*), Eastern chipmunk (*Tamias striatus*), Red Squirrel (*Tamiasciurus hudsonicus*), and Eastern Gray Squirrel (*Sciurus carolinensis*).

3.6.3 Amphibians

Wood frog (*Lithobates sylvaticus*), Northern Leopard Frog (*Lithobates pipiens*), American Toad (*Anaxyrus americanus*), and Green Frogs (*Lithobates clamitans*), were observed and/or heard within the wetland and forest.

3.6.4 Reptiles

Visual observations of reptiles were completed during each site investigation. In the forest area logs and other objects were randomly lifted and inspected. No reptiles were observed except for turtle nests found east side of Tate Road on the shoulder where the Mayhew Creek crosses the road. it was not possible to identify the turtle species that nested in that area.

3.6.5 Species at Risk

General reports were obtained from the MNDMNRF online NHIC database regarding records of SAR within the Study Area. Additional records of SAR were obtained from other sources of information. A list of SAR records is included in the following Table 1.

Table 1: Potential Endangered and Threatened Species within the Study Area.

Common Name	Scientific Name	Federal Status	Provincial Status	Probability of Occurrence	Rationale
Birds					
Bobolink	<i>Dolichonyx oryzivorus</i>	Threatened	Threatened	Low	Habitat includes hayfields, pastures, fallow or abandoned fields, meadows, tall grass prairie remnants, savannahs and alvar grasslands (COSEWIC, 2010). There are two small areas with meadow vegetation; these are not considered suitable habitat for Bobolink.
Eastern Meadowlark	<i>Sturnella magna</i>	Threatened	Threatened	Low	Habitat includes hayfields, pastures, fallow or abandoned fields, meadows, tall grass prairie remnants, savannahs and alvar grasslands (COSEWIC, 2011a). Suitable

Common Name	Scientific Name	Federal Status	Provincial Status	Probability of Occurrence	Rationale
					habitat for Eastern Meadowlark is not found on the area where the watermain will be installed. The two areas with meadow vegetation are too small.
Loggerhead Shrike	<i>Lanius ludovicianus</i>	No status eastern subspecies	Endangered	Low	Habitat includes trees or shrubs for nesting, elevated perches natural for hunting, mating, and territory advertisement, and short to medium height grassy areas for foraging. In all the habitats, shrikes require scattered small trees, shrubs or hedgerows for foraging perches and nesting sites (Environment Canada, 2015). Suitable habitat for Loggerhead Shrike is not found on the property.
Barn Swallow	<i>Hirundo rustica</i>	Threatened	Threatened	Low	The natural habitat of Barn Swallow includes caves, holes, crevices and ledges in cliff faces. However, anthropogenic features are often used in farmlands, rural, suburban areas, and villages where they build the nest around many kinds of structures, especially barns and other farm outbuildings, under bridges, wharves, boat-houses, and culverts (COSEWIC, 2011b). Suitable habitat is not found on the property.
Eastern Wood-pewee	<i>Contopus virens</i>	Special Concern	Special Concern	High	The Eastern Wood-Pewee prefers mature and intermediate-age deciduous and mixed forests having an open understorey (COSEWIC, 2012a). Suitable Habitat is found in the forest
Wood Thrush	<i>Hylocichla mustelina</i>	Threatened	Special Concern	High	Wood Thrush nests mainly in second growth and mature deciduous and mixed forests, with saplings and well-developed understorey layers. The species prefers large forest mosaics and small forest fragments (COSEWIC, 2012b). Wood Thrush was heard in three areas within the forest. Suitable habitat is present.
Least Bittern	<i>Ixobrychus exilis</i>	Threatened	Threatened	Low	Least Bitterns are found in a variety of wetland habitats, but their preferred habitat is cattail marshes with a mix of open pools and channels. The preferred habitat consists of robust-emergent-dominated but interspersed wetlands free of purple Loosestrife and European Common Red, with limited urban land use and a high proportion of wetlands in the surrounding landscape. The presence of dense vegetation is essential for nesting because the nest of Least Bittern consists of platforms of stiff stems (COSEWIC, 2009). Suitable habitat is not found on the area for the watermain.

Amphibians

Common Name	Scientific Name	Federal Status	Provincial Status	Probability of Occurrence	Rationale
Western Chorus Frog	<i>Pseudacris triseriata</i>	Threatened	Not at Risk	High	The Western Chorus Frog requires both terrestrial and aquatic habitats in close proximity. Terrestrial habitat consists mostly of humid prairie, moist woods, meadows, marshes, bottomland swaps, and temporary ponds in open county. For reproduction and tadpole development, this species requires seasonally dry, temporary ponds that are devoid of predators such as fish. The western chorus frog overwinters underground or under surface cover, such as fallen logs (COSEWIC, 2008a). Western Chorus frogs were not heard or seen on the property. The wetland provides suitable habitat for this species.

Reptiles

Blanding's Turtle	<i>Emydoidea blandingii</i>	Endangered	Threatened	High	The preferred habitat is found in shallow water in large wetlands and shallow lakes with lots of submergent and emergent vegetation (COSEWIC, 2005a). Suitable habitat for this species is found in the wetland.
Snapping Turtle	<i>Chelydra serpentina</i>	Special Concern	Special Concern	High	The Snapping Turtle prefers slow-moving water with soft mud bottom and dense aquatic vegetation. Snapping turtles can be found in almost every kind of freshwater habitat. Nesting occurs on sand and gravel banks along waterways, including artificial dams and railway embankments. Hibernation takes place beneath logs, sticks/overhangs, banks, stumps, submerged logs, deep anoxic mud in marshy areas, and floating mats of vegetation. The nesting season occurs through June into July with hatchlings emerging in late September–early October (COSEWIC, 2008b). Suitable habitat for Snapping Turtles is found in the wetland.
Midland Painted Turtle	<i>Chrysemys picta marginata</i>	Special Concern	No Status	High	Habitats include ponds, marshes, lakes and slow-moving creeks. Midland Painted Turtles prefer waterbodies with soft bottoms and areas to bask like logs and rocks protruding from the water (COSEWIC, 2018). Suitable habitat is found in the wetland.
Eastern Ribbonsnake (Great Lakes Population)	<i>Thamnophis sauritus</i>	Special Concern	Special Concern	Low-Medium	Eastern Ribbonsnake is semi-aquatic and found in a variety of wetlands with both flowing and standing water (marshes, bogs, fens, ponds, lake shorelines and wet meadows), vernal pools and moist woods. Snakes may move away from water to give birth, shed or seek cover. Ribbonsnakes appear to select microhabitats suitable for behavioural thermoregulation, foraging, and predator avoidance (COSEWIC,

Common Name	Scientific Name	Federal Status	Provincial Status	Probability of Occurrence	Rationale
					2012c). Potentially suitable habitat is found in the wetland.
Mammals					
Northern Myotis	<i>Myotis septentrionalis</i>		Endangered	Low-Medium	Hibernation roosts for the three species are found in caves, hollow trees, abandoned buildings, and abandoned mines. Most species choose maternity roosts in woodlands with appropriate tree cavities, caves, crevices, under loose bark, and cracks in cliffs. Little Brown Myotis is found in buildings and rocky habitats (COSEWIC, 2013). Suitable habitat for bats is found in the forest.
Little Brown Myotis	<i>Myotis lucifugus</i>		Endangered	Low-Medium	
Tri-coloured Bat	<i>Perimyotis subflavus</i>		Endangered	Low-Medium	
Insects					
Monarch	<i>Danaus plexippus</i>	Special Concern	Special Concern	High	Caterpillars feed on milkweed plants found in meadows and open areas. Adult butterflies are found in diverse habitats where they feed on nectar from a variety of wildflowers (COSEWIC, 2016). Adult Monarch butterflies and caterpillars were observed on the City's land.
Plants					
Hill's Pondweed	<i>Potamogeton hillii</i>	Special Concern	Special Concern	Low	Hill's Pondweed is found in cold, clear, calcareous streams, ponds and ditches with an alkalinity of 53.0 to 316.7 mg/l HCO ₃ . It is usually located where there is dolomitic limestone (COSEWIC, 2005b). Suitable habitat for this species is not found on the City's land.
Butternut	<i>Juglans cinerea</i>	Endangered	Endangered	High	The preferred habitat is in neutral to calcareous soils, with a pH that ranges from 5.5 to 8. Often found in areas with rich well-drained mesic loams. Suitable habitat includes floodplains, streambanks, terraces, and ravine slopes (COSEWIC, 2017). Butternuts are present on the forest.

Three (3) Species at Risk were observed and/or heard during the site investigations (Wood Thrush, Monarch Butterfly, and Butternut). Wood Thrush is listed as a Special Concern under the SARO and Threatened under Schedule 1 of the SARA. Monarch Butterfly is listed as a Special Concern under the SARO and Schedule 1 of the SARA. The species listed as Special Concern are not protected under the Ontario Endangered Species Act. Measures should be applied to protect the species and their habitat. Butternut trees are listed as an Endangered species under the SARO and Schedule 1 of the SARA.

Wood Thrush was heard in the forest, in three locations. Figure 4 shows the locations where Wood Thrush was heard. The site investigations were performed outside the nesting season, but the nesting habitat is present. Impacts to Wood Thrush are not expected as the area required for the watermain is minimal and vegetation will be removed outside the nesting season. Mitigation measures should be applied to avoid harm to Wood Thrush.

Monarch Butterflies were observed during the site investigations in the cultural meadow vegetation south part of The City's land. Milkweeds and wildflowers provide food to caterpillars. There is the potential for adult butterflies and caterpillars to be disturbed/affected during the installation of the watermain due to dumping of soil and sediment over the meadow vegetation. Measures are recommended to prevent harm to caterpillars and adult butterflies.

Butternut trees are present in the forest. The Butternut trees on The City's land were assessed by a qualified Butternut Health assessor on August 24 to 28, 2022 and the assessment report submitted to the MNRF. Report is included in Appendix C. Results from the Health Assessment indicate presence of 18 butternut trees, one (1) is considered retainable (Category 2). The retainable butternut is located northeast of Tremur Lake, away from the area proposed for the watermain. For the retainable Butternuts, a minimum protective buffer of a 25 m radius from the stem of each Butternut is required to prevent root disturbance. A larger area up to 50 m is also considered protected habitat for the tree. Within the 25 m buffer area, activities that would remove or significantly compact the roots and soil, and cause direct harm to the Butternut are not permitted. Within the 25-50 metre buffer area, activities that would significantly damage or destroy habitat e.g., by impacting the tree's ability to disperse seeds, are also not permitted. Removal of other vegetation and careful logging practices within this radius are permitted. Butternut trees are not present close to or adjacent to the area proposed for the watermain. Therefore, impacts to butternuts are not expected.

Eastern Wood-Pewee is listed as a species of Special Concern under the Ontario's Endangered Species Act (2007) and the SARA. This species is still a common species in deciduous and mixed forests of all sizes. Eastern Wood Pee-wee was not observed during the site investigations; however, nesting habitat is present in the woodland. It is planned the removal of vegetation outside the breeding bird nesting period to avoid harm to nesting birds. If additional development is proposed on the forested areas, breeding bird surveys should be performed during the nesting period to determine the presence of this species and additional measures to be applied to protect the species.

Western Chorus Frog is not listed under Ontario's Endangered Species Act (2007), but it is listed as a Threatened species under the Schedule 1 of the SARA. Western Chorus Frogs were not heard or observed, but the Mayhew Creek, Tremur Lake, and the swamp provide suitable habitat to this species. A setback of 30 m from the wetland and 15 m setback from the Mayhew Creek have been established to protect suitable habitat for Western Chorus Frog and other amphibians. Potential impacts on Western Chorus Frog are not expected as the watermain will be located outside the wetland, creek and setbacks. The two watercourses do not provide suitable habitat for Western Chorus Frog. As this species requires both terrestrial and aquatic habitats, mitigation measures should be applied to avoid harm to the species.

Wintering habitat for Blanding's Turtle, Snapping Turtle, and Midland Painted Turtle is found in the wetland south of Tremur Lake and the wetland associated with the Mayhew Creek. Field assessments were performed outside the turtle nesting season, but it is known that Blanding's Turtle is found in the wetland north of Telephone Road. This species has not been reported in and adjacent to the area for the watermain. However, as there is wetland on the south side of Tremur Lake, the wetland potentially provides wintering habitat for Blanding's Turtle. Based on the MECP Critical Habitat for Blanding's Turtles, there is a Category 1 and Category 2 habitat. Figure 5 shows Blanding's Turtle Wintering Habitat present close to the area proposed for the watermain. Blanding's turtles were not observed during the site investigations on the area proposed for the watermain and along the shore of Tremur Lake where potential basking areas are present. It has been suggested that the turtles identified north of Telephone Road could move via the unnamed tributary of the Tremur Lake, if they occur. No observations of movement from the north of Telephone Road to Tremur Lake were reported during the field visits performed by others in 2019 and 2020, assuming that Blanding's turtles avoid the area south of Telephone Road (Ainley, 2020). To avoid harm to Blanding's Turtle wintering habitat, the watermain is proposed outside the wetland/wintering habitat and established setback. Therefore, impacts to Blanding's Turtles and its wintering habitat are not expected.

Turtle nests were observed east side of Tate Road, on the road shoulder, on the area where Mayhew Creek crosses Tate Road. It is unknown the turtle species that used the area. The watermain will pass under the creek, to avoid impacts to the creek and indirectly to the nesting site, directed drilling will be used in this part of the project. Construction activities should be avoided during the turtle nesting season to avoid impacts to the nesting behaviour of the turtle(s). Additional measures should be applied to protect the species and its nests.

Eastern Ribbonsnake was not seen during the site investigations. The wetland provides habitat to this species and so it is possible to find the snake on the area. Impacts on Ribbonsnake's habitat are not expected; however, recommended measures should be applied to ensure the species is not harmed.

There is the potential for bats to use the woodland present in The City's land and adjacent land as maternity roosting habitat, and for foraging and feeding. Removal of forest vegetation is planned prior to the bat roosting period to avoid harm to bats. If the City of Quinte West is planning future development in the forested area, it is recommended that a maternity roosting survey be performed to determine the measures to be applied to protect the species.

If an impact on a Species at Risk or its habitat cannot be avoided, a person(s) should contact MECP and/or MNDMNR to discuss options, including applying for an authorization under the ESA. In situations where an activity is not registered with or authorized by the MECP, a person(s) must comply with the ESA by modifying proposed activities to avoid impacts to Species at Risk and habitat protected under the ESA.

3.7 Aquatic Habitat

A portion of the watermain will be located south of the Tremur Lake and the Mayhew Creek. On Tate Road the watermain will pass under the creek. Also, the watermain will pass under two watercourses.

One of the watercourses flows from south to north, discharging into Mayhew Creek. Flow in the watercourse is from an old quarry that is believed most of the water is from the aquifer. It was observed that during the site investigations water was flowing in the watercourse. No fish were observed in the watercourse. The watercourse bed was composed of hard grey clay with some boulders, gravel, fallen trees, and branches that create riffles. Pools were observed along the channel. Boulders, pebbles, and cobbles are present in some areas along the edges of the watercourse channel. Aquatic vegetation was observed in some areas and close to the discharge point. Steep slope was observed toward the quarry and gentle slopes close to the discharge point at the Mayhew Creek. Steep slopes were almost 90 degrees and close to 5 m high, well vegetated with shrubs and trees with some areas showing erosion. The vegetation cover was observed also on top of the watercourse banks and beyond until the edge of the agricultural fields.

The watercourse receiving runoff from the agricultural fields has a narrow channel with steep slopes to the south and gentle slopes close to the discharge point. The watercourse is seasonal, getting dry during the drought season. Some aquatic vegetation was observed close to the area where the watercourse discharges to the Mayhew Creek. The banks are vegetated with grasses, herbaceous species and some shrubs. Small trees and shrubs were observed close to the Mayhew Creek. The watercourse is interrupted by agricultural land, but it is assumed receives flow from the ditch located west side of Tate Road through a culvert. No fish were observed in the watercourse during the site investigations and fish habitat is not present.

The headwaters of the Mayhew Creek are in the Municipality of Brighton, the creek flows eastward towards the Trent River where it discharges. The creek crosses Tate Road through a culvert. A steel corrugated pipe is located under Tate Road. Creek banks are well vegetated with trees, shrubs and herbaceous species. It has been documented the presence of Brook Trout (*Salvelinus fontinalis*), Brown Trout (*Salmo trutta*), and Rainbow Trout (*Oncorhynchus mykiss*) in the creek (Fish On-Line, 2022). Around the culvert steep slope is present from the road to the creek channel and moderate slopes from adjacent land to the creek channel. The road shoulders

are covered with grasses and herbaceous species with some areas without vegetation. The aquatic vegetation is abundant. Creek's width is variable. There is a device attached to the culvert on the east side to monitor the water levels in the creek. The creek's bed is composed of sand with gravel and pebbles. Sunfish, snails, and mussels were observed. The creek bank on the south side is steep and well vegetated, the riparian area on top of the bank was observed to be covered with grasses and herbaceous species; however, the vegetation is regularly cut as an agricultural field is next to it.

4. Significant Natural Heritage Features and Functions

4.1 Significant Woodlands

Significant Woodlands are not identified on Schedule D Natural Heritage and Natural Hazards of the current City of Quinte West's Official Plan. Section 11, subsection 11.3, and subsubsection 11.3.8 of the City of Quinte West Official Plan identify Significant Woodlands as treed areas, wood lots or forested areas that provide a variety of ecological functions, also prevent soil erosion, affect water quality and quantity, provide for habitat and the sustainable harvest of woodland products.

No significant Woodlands are identified on The City's land or adjacent lands. The proposed changes to Schedule D of the Official Plan include Significant Woodlands south of Tremur Lake. The Watermain will be outside the area proposed as Significant Woodland. Therefore, no impacts to Significant Woodlands are anticipated as a result of the proposed watermain. The watermain will run approximately 200 m on a coniferous forest and 650 m on mixed forest. An approximately area of 0.85 ha of woodland will be affected.

4.2 Significant Wetlands

Provincially Significant Wetlands (PSWs) are those areas identified by the province as being the most valuable. They are determined by a science-based ranking system known as the Ontario Wetland Evaluation System (OWES).

The online MNDMNRF NHIC mapping shows unevaluated wetlands on The City's land and adjacent lands. Wetland boundaries were determined through site investigations. Wetland found in the area include swamp and marsh. The swamp is located south side of Tremur Lake and the marsh is found around the Mayhew Creek.

A 30 m setback has been established from the wetland and 15 m from top of the creek's bank. The watermain will be located outside the wetland and the Mayhew Creek setbacks. Figure 6 shows the wetland, applicable setbacks and the watermain. Impacts to wetland are not expected.

4.3 Areas of Natural and Scientific Interest (ANSI)

The area to be affected by the watermain is not within an Area of Natural and Scientific Interest (ANSI).

4.4 Significant Habitat for Provincially Endangered and Threatened Species

The general habitat of species that are listed as endangered or threatened is automatically protected under the Endangered Species Act (ESA), 2007. Development shall not be permitted within the habitat of endangered and threatened species, except in accordance with applicable provincial and federal requirements. Special Concern species listed under the ESA are not protected. The Ministry of Natural Resources and Forestry (MNRF) issues authorizations regarding wildlife identified in the schedules (Ont. Reg. 669/98) under the Fish and Wildlife Conservation Act (FWCA). Some species under the ESA (Endangered, Threatened and Special Concern) are also listed in the FWCA schedules. In the case of ESA Special Concern species, the FWCA

prevails as the ESA does not provide protection to Special Concern species. Measures should be applied to avoid harm to the species and their habitat.

Three (3) Species at Risk were heard and/or observed during the site investigations. The land where the watermain is proposed is not within habitat designated for the maintenance, survival, and/or the recovery of natural occurring or introduced populations of endangered or threatened species. However, habitat for threatened species is found within the land owned by the City of Quinte West.

Wood Thrush were heard in the woodland. The site investigations were performed at the end of the nesting season, but it was possible to determine presence of Wood Thrush. Individuals were observed in the woodland south side of Tremur Lake. It is the potential for Wood Thrush habitat to be affected as a part of the watermain will be located close to the area where Wood Thrush was heard. It is proposed the removal of vegetation outside the nesting season. It is expected that the impact will be minimal and no additional impacts to Wood Thrush habitat will be caused by the proposed project. Additional measures should be applied to ensure the project does not cause impacts to Wood Thrush during the nesting season.

Adult Monarch butterflies were observed on the meadow vegetation and areas where wildflowers are present. The watermain will be installed using part of the existing trails, it is expected that the area affected by the removal of vegetation where the meadow vegetation is located will be minimal. Recommended measures should be applied to avoid indirect harm to caterpillars and adult butterflies during the construction activities.

Butternut trees are present within The City's land. A butternut health assessment was carried out to determine presence of retainable butternuts on the areas to be impacted by the project. A total of 18 butternut trees were identified in The City land, only one (1) tree was identified as retainable Category 2. The retainable tree is located north side of Mayhew Creek. Therefore, it will not be impacted by the proposed project.

The identified Special Concern species and the other SAR and SAR habitat identified are not anticipated to be impacted by the proposed project as long as recommended measures are applied.

Field assessments were initiated outside the turtle nesting season, but it is known that Blanding's Turtle is found in the wetland north of Telephone Road (Ainley Group, 2020). The watermain will be located outside Blanding's Turtle wintering habitat, additional protection will be provided as a 30 m setback has been established to protect the species and its habitat. Impacts to Blanding's turtle are not expected; however, measures are recommended to avoid indirect impacts to turtles during the construction of the watermain.

4.5 Significant Wildlife Habitat

Wildlife habitat are areas where plants, animals, and other organisms live, and find adequate amounts of food, water, shelter, and space needed to sustain their populations. Specific wildlife habitats of concern may include areas where species concentrate at a vulnerable point in their annual or life cycle; and areas which are important to migratory or non-migratory species (PPS, 2020). Wildlife habitat is considered significant where it is: ecologically important in terms of features, functions, representation, or amount; and contributes to the quality and diversity of an identifiable geographic area or Natural Heritage System.

Based on the Natural Heritage Reference Manual (MNRF, 2010), an assessment to determine Significant Wildlife Habitat is required for the creation of more than three lots through either consent or a plan of subdivision, change in land use that requires approval under the Planning Act, shoreline consent along a large lake, small inland lake or large river, and construction of recreational uses. Therefore, an assessment for the proposed watermain is not required.

Wildlife observations on the property and adjacent land were sparse and included incidental species of birds, mammals, and amphibians. Two Special Concern species were heard and/or observed. This area can be significant as it provides habitat to special concern species and may provide habitat to other species due to its size, features and the ecological functions that it provides.

An approximately area of 0.85 ha of deciduous and mixed forest vegetation will be removed for the installation of the watermain. The area required for the watermain is not significant and will be maintained as a hiking trail. As the future trail is considered of low impact. It is concluded that wildlife habitat will not be significantly impacted.

5. Proposed Development

The City of Quinte West is planning to extend the drinking water distribution system from Old Highway 2 to Tate Road. The watermain will be installed along the northern side of Old Highway 2, then along County Road 40, then within land owned by The City. The watermain within The City's land will be located on current trails, forest and agricultural land.

The watermain will be installed along the north side of Old Highway 2 for approximately 670 m, then along the eastern side of County Road 40 for approximately 600 m. The watermain will then cross County Road 40 to run for approximately 360 m along the western side of the road and crossing the CN and CPR rails, before turning westward along the existing trail, forest, meadow, and agricultural land for approximately 1.9 km up to Tate Road. The watermain will then run for approximately 180 m along the east side of Tate Road. The watermain will then cross Tate Road to run on the west side for approximately 200 m up to Telephone Road. A photolog showing the existing conditions of the study area is included in Appendix D.

The area along Old Highway 2 and County Road 40 where the watermain will be installed, is covered with roadside vegetation mainly composed of grassed and herbaceous species. This area is constantly subject to impact due to road maintenance and vehicular traffic. The existing trail on The City's land is approximately 3 m wide and has a gravel surface with grasses and herbaceous species along the edges of the trail.

The City is in the process to acquire land from others to accommodate the watermain away from the wetland. Removal of forest vegetation will be required to install the watermain. Around the Mayhew Creek, on both sides of Tate Road, vegetation is mainly composed of shrub and herbaceous species. Further north up to the intersection of Tate Road with Telephone Road vegetation is composed of maintained grass as an industrial business is in this area.

There are no buildings or structures on the area proposed for the watermain except for the CN and CPR rails crossing County Road 40.

The watermain will be 450 mm in diameter and installed at least 1.8 m below ground elevation. It has been determined that the width of the area required for excavation and installation of the watermain will be approximately 10 m. The area occupied for the watermain will be maintained as a hiking trail.

Several options have been evaluated and the proposed location is the best option for the installation of the watermain. The location of the watermain will avoid impacts to wetland/turtle wintering habitat. The watermain is required to provide adequate pressure and flow to a designated development area. The installation of the watermain is planned for 2023. The watermain will cross two (2) watercourses, installation of the watermain in these features will be open cut. Installation of the watermain through Mayhew Creek will be using directional drilling to avoid impacts to the creek and turtle nesting habitat.

6. Opportunities and Constraints

6.1 Natural Heritage System

The land where the watermain is proposed is not within an Area of Natural and Scientific Interest or a Provincially Significant Wetland. The wetland is a constraint to the proposed watermain as it provides habitat

for Blanding's Turtles. The location of the watermain has been adjusted to avoid impacts to wetland/Blanding's Turtle nesting habitat. Originally, it was proposed to install the watermain on wetland, but due to the presence of Blanding's turtle wintering habitat, it was decided to change the location of the project. Therefore, the wetland will not be impacted by the proposed watermain. No impacts to wetland are expected.

6.2 Regulated Areas

Lower Trent Conservation regulates activities in natural and hazardous areas subject to processes such as flooding, erosion, dynamic beaches, or unstable soil or bedrock.

A 30 m setback from the wetland boundary has been applied to protect its ecological functions. Also, a 15 m setback has been applied to the Mayhew Creek and the two watercourses. However, temporary disturbance is expected in these three features as the watermain will pass under them. Open cut will be used for the two watercourses and directional drilling for the Mayhew Creek. Impacts to the watercourses will be temporary. No impacts to the Mayhew Creek are expected except for some vegetation on the riparian area to allow the operation of machinery. The potential impacts will be minimal and temporary. During the site investigations, it was observed that one of the watercourses is seasonal, it receives runoff from the agricultural fields. Flow was observed in the watercourse that is connected to the quarry. It has been mentioned that this watercourse gets dry in the summer. Flow observed could be due to high groundwater in the quarry. Measures should be applied to avoid impacts to the watercourse.

A permit is required from Lower Trent Conservation under the Conservation Authorities Act as installation of the watermain is proposed under two watercourses and the Mayhew Creek which are regulated by the Conservation Authority.

The wetland boundary, creeks and setbacks applied are shown in Figure 6.

7. Impact Assessment and Recommendations

The intent to applied mitigation measures is to ensure protection of wildlife by reducing construction-related impacts and remain compliant with federal and provincial legislation.

An evaluation of the impacts is provided in the following table.

Table 2: Potential Impacts and Prevention, Mitigation and Restoration Measures

Potential Impacts	Prevention, Mitigation and Restoration Measures
Significant Wetlands	
<ul style="list-style-type: none"> The wetland identified in the City's land is not classified as PSW. An unevaluated wetland is present south of Tremur Lake and along Mayhew Creek. 	<ul style="list-style-type: none"> A 30 m setback has been established to protect the wetland. The watermain will be installed outside the wetland and applicable setback. Directional drilling will be used in the area where Mayhew Creek is located. Therefore, impacts to the Creek and related wetland are not expected. The setback for the wetland should be clearly marked onsite to avoid impacts to the vegetation within the setback and the wetland. Used of sediment and control measures in the areas close to the wetland setback to avoid impacts to vegetation.
Habitat for Threatened and Endangered Species	
<p>Direct Impacts during Construction:</p> <ul style="list-style-type: none"> Potential contravention of the Endangered Species Act., 2007 if active nests are removed during the breeding season. Impacts to Wood Thrush and its habitat. Harm to Monarch butterfly and caterpillar during removal of vegetation. Impacts to Blanding's Turtles. Impacts to turtles nesting habitat. Damage to butternut trees. Removal of butterfly habitat. Removal of SAR habitat. 	<ul style="list-style-type: none"> It is recommended that construction workers be briefed on the potential species to be found in the area for the watermain and made them familiar with the regulations of the ESA. All personnel involved in the project should be briefed about wildlife protection measures at the outset of the project, in order to ensure that these measures are clearly understood and appropriately implemented. <p>The briefing (handout) needs to provide an overview of the mitigation measures that are being used at the site, as well as instructions on what do to if and when wildlife are encountered during the work. It should also include information on any species at risk that may be present, and what to do if one is seen. A laminated handout summarising key information on wildlife protection should be kept on-site at all times for reference by personnel. The handout should include the following subjects:</p> <ul style="list-style-type: none"> General provisions – e.g., do not harm, feed or unnecessarily harass wildlife; drive slowly and avoid hitting wildlife where possible; keep site tidy and secure. Species at risk – basic identification tips and recommendations (needs to be modified to address species most likely to be encountered at the site). Contact information for: <ol style="list-style-type: none"> Project biologist / wildlife service provider, and Ministry of the Environment, Conservation and Parks-Species at Risk Branch (for species at risk) and Wildlife rehabilitators and veterinarians (for orphaned or injured wildlife). Best practices should be implemented during construction to ensure species are not harmed by equipment or workers activities.

Potential Impacts	Prevention, Mitigation and Restoration Measures
	<ul style="list-style-type: none"> • Contractors should ensure exclusion fence is installed prior to installation of the watermain or any activity related to the project and maintained throughout the construction period and removed following rehabilitation of the affected areas. Sediment and erosion control measures (i.e., silt fencing) and other protective measures should be inspected regularly and particularly after storm events, to ensure their continued effectiveness. • Prior to beginning activities each day, checks for wildlife should be conducted thorough a visual inspection of the work area and immediate surroundings. Areas with wildflowers including milkweeds should be inspected for the presence of Monarch caterpillars. • Restrict all activities, vehicles and structures to the designated areas. Minimize any disturbance to the surrounding areas. The designated areas should be clearly marked by posting signs or fencing. The areas not to be disturbed should be clearly marked on-site with signs or by installing a protection fence. • Keep secure stockpile materials, vehicles and structures against wildlife entry. • Litter and other waste material must be appropriately contained and promptly disposed of. • Avoid harm to any SAR. Many species are protected under provincial and/or federal legislation. Legal protection of egg-laying species applies to their eggs as well. Penalties for contravening these Acts are severe. • Stand back and allow the animal to leave the site. Wildlife may be encouraged to move away from the work area by shouting, waving of arms, clapping of hands or gentle redirection using a broom. Contact a project biologist/wildlife service provider for assistance if needed (e.g., if young animals are found). Do not unnecessarily harass any wildlife. • Turtles may need to be helped to safety. All the turtle species in Ontario are protected under provincial and/or federal legislation. If a turtle is found in the work area, it can be gently removed to a safe location nearby. Wear gloves or use a broom to steer the turtle into a bucket or other container. Handle with care to avoid injury to the turtles or yourself, since turtles may bite or scratch. Turtles may also wet themselves when handled. • Work areas should be checked by a qualified person for the presence of Wood Thrush and nests containing eggs and/or young. If the birds and/or nests are encountered, work should not be initiated in the affected location of the nest until after July 31st (or as soon as it has been determined that the young have left the nest). Please note that the breeding bird season in the subject area extends from April 15th to August 31st. Therefore, work should commence after August 31st whenever possible. • Many species of snake are also protected under provincial and/or federal legislation. If a snake is found in the work area, it should be gently herded out to a safe location.

Potential Impacts	Prevention, Mitigation and Restoration Measures
	<ul style="list-style-type: none"> Work should stop immediately if any species protected under the Endangered Species Act, 2007 are seen in or near the work site. A picture should be taken, if possible, to confirm the sighting, and contact the Ministry of the Environment, Conservation and Parks-Species at Risk Branch at NHICrequest@ontario.ca. Additional measures may be required by the Ministry before work can resume. The areas affected by the installation of the watermain that will not be part of the trail surface should be subject to restoration using native species.
Indirect Impact during Construction <ul style="list-style-type: none"> Potential contravention of the Endangered Species Act., 2007 if SAR species are harmed or active nest are removed during the breeding season. Noise caused by machinery can affect birds breeding behaviour. Removal of unnecessary vegetation in the forest that is considered habitat for Special Concern species. Damage to SAR habitat due to storage or dumping of construction material. Noise of machinery early in spring. Removal of Monarch food resources (wildflowers). Disposal of waste outside of the designated areas, in the natural areas. 	<ul style="list-style-type: none"> Restrict noise related to work to day hours and avoid unnecessary running of machinery causing noise. Inspection of the area prior to removal of vegetation to ensure Monarchs are not harmed. Restrict all activities, vehicles and structures to the designated areas. The designated area should be clearly marked by posting signs or fencing. The areas not to be disturbed should be clearly marked on-site with signs or by installing a protection fence. Keep secure stockpile materials, vehicles and structures against wildlife entry. Litter and other waste material must be appropriately contained and promptly disposed of.
No direct Impacts Post-Construction:	
Wildlife	
Direct Impacts during Construction: <ul style="list-style-type: none"> Disturbance of wildlife movement. Destruction of mammals and bird habitat in the area for the watermain. Potential contravention of the Endangered Species Act., 2007 if active nests are removed during the breeding season. 	<ul style="list-style-type: none"> Use of fence to establish the working area prior to the initiation of construction work to avoid unnecessary damage to vegetation. All personnel involved in the project should be briefed about wildlife protection measures at the outset of the project, in order to ensure that these measures are clearly understood and appropriately implemented. <p>The briefing (handout) needs to provide an overview of the mitigation measures that are being used at the site, as well as instructions on what to do if and when wildlife are encountered during the work. It should also include information on any species at risk that may be present, and what</p>

Potential Impacts	Prevention, Mitigation and Restoration Measures
<ul style="list-style-type: none"> • Potential contravention of the Migratory Bird Convention Act., 1994 if removal of habitat takes place during the breeding season. • Harm to wildlife and their habitat by machinery. 	<p>to do if one is seen. A laminated handout summarising key information on wildlife protection should be kept on-site at all times for reference by personnel. The handout should include the following subjects:</p> <ul style="list-style-type: none"> • General provisions – e.g., do not harm, feed or unnecessarily harass wildlife; drive slowly and avoid hitting wildlife where possible; keep site tidy and secure. • Species at risk – basic identification tips and recommendations (needs to be modified to address species most likely to be encountered at the site). • Contact information for: <ul style="list-style-type: none"> c. Project biologist / wildlife service provider, and d. Ministry of the Environment, Conservation and Parks-Species at Risk Branch (for species at risk) and Wildlife rehabilitators and veterinarians (for orphaned or injured wildlife). • Apply erosion and sedimentation control measures. • In all cases, each area to be cleared should be inspected (and, if necessary, pre-stressed) by the project biologist one more time the day before clearing, to determine whether any trees or other habitat features are still being used by wildlife. Any occupied trees/features should be flagged for temporary retention for at least one additional day, to allow wildlife a last chance to move out. In cases where occupancy is uncertain, the same precaution should apply. If they do not leave on their own, then it may be necessary to have a professional wildlife service provider relocate them, in accordance with applicable laws (e.g., Fish and Wildlife Conservation Act, 1997 for most commonly encountered wildlife species). • The project area should be inspected by a biologist prior to clearing; to identify any potential wildlife issues (e.g., hibernating animals or nursing mothers and their young, etc.) and to inform or adjust mitigation planning as needed. • Remove vegetation prior to birds nesting season (April 15th – August 31st) or after the nesting season. • Watch out for wildlife while driving, and avoid hitting them, provided that it is safe to do so. • Prior to beginning activities each day, check for wildlife by conducting a thorough visual inspection of the work area and immediate surroundings. • Perform searches prior to removal of the vegetation to ensure fauna will not be affected by machinery. • Restrict all activities, vehicles and structures to the designated areas. The designated area should be clearly mark by posting signs or fencing. The areas not to be disturbed should be clearly marked on-site with signs or by installing protection fence.

Potential Impacts	Prevention, Mitigation and Restoration Measures
	<ul style="list-style-type: none"> • Keep secure stockpile materials, vehicles and structures against wildlife entry. • Litter and other waste material must be appropriately contained and promptly disposed of. • Avoid feeding any wildlife or leaving food out where it could attract them. • The use of 'Clean Equipment Protocol' during construction activities is strongly recommended to reduce the spread of exotic species of plants. • Workers must be vigilant and check work areas for the presence of breeding birds and nests containing eggs and/or young. If breeding birds and/or nests are encountered, work should not continue in the location of the nest until after July 31st (or as soon as it has been determined that the young have left the nest). • Workers must be vigilant and check work areas for the presence of wildlife. If animals are encountered, work should be temporarily suspended until the animal is out of harm's way. Activities which may cause adverse impacts to a species or habitat (e.g., use of heavy equipment) should commence after Aug 15th. <p>If workers have an encounter with wildlife:</p> <ul style="list-style-type: none"> • Avoid feeding any wildlife or leaving food out where it could attract them. • Avoid harm to any wildlife. Many species are protected under provincial and/or federal legislation. Legal protection of egg-laying species applies to their eggs as well. Penalties for contravening these Acts are severe. • Stand back and allow the animal to leave the site. Wildlife may be encouraged to move away from the work area by shouting, waving of arms, clapping of hands or gentle redirection using push broom. Contact project biologist/wildlife service provider for assistance if needed (e.g., if young animals are found). Do not unnecessarily harass any wildlife. • Many species of snake are also protected under provincial and/or federal legislation. If a snake is found in the work area, it should be gently herded out to a safe location. Snakes found on work areas will usually try to escape or hide when disturbed and only defend themselves when trapped. None of the snakes in Ontario are venomous, but bites may cause infections. Some produce a foul-smelling musk when handled, instead of biting. • Stop work immediately if any species protected under the Endangered Species Act, 2007 are seen in or near the work site. Take a picture, if possible, to confirm the sighting, and contact the project biologist at (xxx) xxx-xxxx and the Ministry of the Environment, Conservation and Parks-Species at Risk Branch at NHICrequest@ontario.ca. Additional measures may be required by the Ministry before work can resume. <p>For health and safety reasons, and for protection of animals, removal and relocation of mammals or treatment of injured birds or other animals must only be done by qualified and properly equipped personnel. Call the wildlife service provider closest to the project area.</p>

Potential Impacts	Prevention, Mitigation and Restoration Measures
	Scratches and bites from animals, whether domestic or wild, can result in serious infections and/or transmit diseases. Seek medical treatment immediately for any person injured by an animal.
Indirect Impacts during Construction <ul style="list-style-type: none"> Harm to wildlife by machinery during movement of wildlife to other areas of the property Harm to wildlife trap between machinery. 	<ul style="list-style-type: none"> Inspect machinery prior to commencing operation to ensure wildlife is not using it. Workers should be aware of the presence of wildlife and the potential for them to cross through or enter the construction areas. Workers must be vigilant and check work areas for the presence of snakes. If snakes are encountered, work should be temporarily suspended until the animal is out of harm's way.
No direct Impacts Post-Construction:	
Terrestrial Habitat	
Direct Impacts during Construction: <ul style="list-style-type: none"> Removal of vegetation in the area for construction of the watermain. Removal of vegetation during the open-cut trenching for installation of the watermain. Soil erosion and sedimentation during excavation. Changes in hydrogeology/hydrology as a result of excavations. Contamination of groundwater and soil due to spills or leaks from hydraulic fluids and fuels. 	<ul style="list-style-type: none"> Use of fencing to establish the working area and to avoid unnecessary damage to the vegetation. Vegetation clearing is recommended to take place before April 15th or after August 31st to avoid contravention of the Migratory Bird Convention Act, 1994 unless it can be confirmed that there are no nesting birds in the area to be cleared. Application of erosion and sedimentation control measures. Any tree removals, pruning or root cutting required should be conducted by a qualified person. Storage, handling and disposal of material used or generated (e.g., organics, soil, grass, woody debris, temporary stockpiles, etc.) during the site preparation should be carried out in a manner that prevents these materials from entering into naturalized areas in the vicinity of the excavation site. Place silt fence between all excavation operations and any drainage, waterway or other area designated for such protection. Application of spill plan to protect the environment from any hydraulic fluid spills. Proper disposal of cut vegetation to avoid the spreading of invasive species. Re-vegetate the areas affected by the construction and excavation work to prevent erosion. Native species should be specified for the post-construction seeding and planting.
Indirect Impacts during Construction: <ul style="list-style-type: none"> Damage of the vegetation on the areas outside the construction and excavation area. Deposit of sediment over the surrounding forest vegetation. 	<ul style="list-style-type: none"> Application of erosion and sedimentation control measures. Erosion and sediment control measures should be regularly inspected to ensure that the forest is not affected by construction and excavation activities. Restoration of areas affected by construction and excavation with native species.
Direct Impacts Post-Construction: <ul style="list-style-type: none"> Erosion caused by exposed soil and/or sediment. 	<ul style="list-style-type: none"> Revegetation of areas affected by construction and excavation activities with native species. Removal of invasive species.

Potential Impacts	Prevention, Mitigation and Restoration Measures
Aquatic Habitat	
Direct Impact during Construction <ul style="list-style-type: none"> Disturbance of the creeks bed during excavation. Changes in water quality. Temporary disruption to migration and habitat access. Temporary damage of banks and riparian vegetation. Damage to downstream habitats due to sedimentation and creation of new in-stream barriers as a result of erosion. Littering from workers. In-water work. 	<ul style="list-style-type: none"> Application of erosion and sediment control measures along both banks to prevent loose material from entering the creek. Minimize the removal of riparian vegetation to only what is required to access the creek crossing location. The use of trenchless technology is recommended to crossing watercourses to avoid direct impacts. Stabilized exposed soils immediately upon completion of the work to prevent bank erosion. Restoration will be carried out on the areas adjacent to the creeks immediately after completion of installation of the watermain. Operation of machinery outside the watercourses channel. Application of spill plan. No maintenance of machinery should be allowed in the working area. Avoid in-water work from March 15th to July 15th.
Indirect Impacts during Construction: <ul style="list-style-type: none"> Potential changes in water quality due to contaminants from machinery and drilling fluids. Transport of sediments during construction to surrounding aquatic habitat. Alterations of flow conditions and creek morphology from machinery. 	<ul style="list-style-type: none"> Application of erosion and sediment control measures. Operation of machinery restricted to the working areas. Application of Spill Plan. Restoration of vegetation immediately after the construction work and excavation are finalized.
No direct Impacts expected Post-Construction	
Hydrology/Hydrogeology	
Direct Impacts during Construction: <ul style="list-style-type: none"> Changes in hydrogeology as a result of encounter groundwater during excavation. Contamination of the groundwater during installation of watermain. Failing of dewatering control measures. 	<ul style="list-style-type: none"> Storage or stockpiling of material should be in designated areas within the construction and excavation areas and covered to avoid runoff or deposition in adjacent land. To the extent practical, carry out refueling of generators and construction equipment offsite. All onsite refueling to be carried out over an area provided with spill containment. The construction contractor should have a spills kit and an emergency plan in the case of spills. Application of erosion and sediment control measures. Erosion and sediment control measures will be inspected regularly (every 7 days or bi-weekly depending in structures) and after every major rain event; necessary repairs will be made immediately after damage has been discovered.

Potential Impacts	Prevention, Mitigation and Restoration Measures
	<ul style="list-style-type: none"> Monitoring procedures will be in place for early identification of dewatering system failure, so that the volume of water released is minimized and corrective actions can be taken to avoid migration of water with high sediments to aquatic and sensitive resources. If dewatering is required, a PTTW and a dewatering plan may be required.
Indirect Impacts during Construction <ul style="list-style-type: none"> Failing of dewatering control measures. Poor dewatering executed. High turbidity water directed to adjacent vegetation. 	<ul style="list-style-type: none"> Erosion and sediment control measures will be inspected regularly and after every major rain event; necessary repairs will be made immediately after damage has been discovered. Monitoring procedures will be in place for early identification of dewatering system failure, so that the volume of water released is minimized and corrective actions can be taken to avoid migration of water with high sediments to aquatic and sensitive features. Leave a continuous buffer of vegetation around the site perimeter to intercept any sediment that might be transferred off site via surface water flow.
No direct Impacts Post-Construction:	

8. Conclusions and Recommendations

The City of Quinte West is planning to install a new watermain, of sizes 450 mm to 500 mm starting on Dundas Street West (Old Highway 2) at Walmart to the Tate Road/Telephone Road intersection through The City's land and an additional valve chamber on Telephone Road. The watermain within The City's land will be located on current trails, forest and agricultural land. The watermain will be installed at least 1.8 m below ground elevation and watercourses/Mayhew Creek beds.

Review of background information and from site investigations performed in 2022 indicated the presence of wetland which provides wintering habitat for Blanding's Turtles. A review of the location of the watermain was carried out and it was decided to relocate the watermain originally proposed within the wetland to outside the wetland and 30 m setback to protect the wetland and Blanding's Turtle habitat.

Butternut trees are present on the forest. A Butternut Health Assessment was performed. Eighteen butternut trees were identified with only one identified as retainable Category 2. The retainable tree is on the northeast side of Tremur Lake away from the area proposed for the watermain.

The watermain will pass under two watercourses and the Mayhew Creek. The two watercourses are seasonal, getting dry during the summer. Therefore, open cut will be used to install the watermain and directional drilling will be used for installation of the watermain across the Mayhew Creek. Minimal and temporary impacts are expected during the installation of the watermain under the surface water features. Restoration of the affected areas will be required.

Construction and excavation activities are not proposed in significant natural features. In addition, measures will be applied to protect and ensure the ecological functions of the natural areas.

Impacts on terrestrial and aquatic features due to the installation of the new watermain are expected to be minimal and temporary providing that the recommended mitigation measures are applied.

Recommendations to avoid impacts and/or mitigate potential impacts have been proposed and are considered adequate. Therefore, it is our opinion that the proposed construction of a new watermain will cause minimal impact in the natural features or their ecological functions.

It is recommended to conduct a wildlife inventory with species specific surveys such as breeding bird surveys, bat maternity roosting habitat assessment, amphibian survey, at least during appropriate timelines as future development is planned in this land.

I trust that this report is complete within the Lower Trent Conservation Terms of Reference and sufficient for your present requirements. Please contact me at your convenience if you have any questions about this report or our recommendations.

THE GREER GALLOWAY GROUP INC.
CONSULTING ENGINEERS



Yazmin Ramirez Avila, M.Sc.
Biologist

9. References

- Ainley Group. 2020. Environmental Impact Study for Exeter Court Subdivision. City of Quinte West. July 2020. 66 p.
- Armstrong, D.K. and Carter, T.R. 2006. An updated guide to the subsurface Paleozoic stratigraphy of southern Ontario; Ontario Geological Survey, Open File Report 6191, 214p
- Atlas of Breeding Birds of Ontario. www.birdsontario.org/atlas/maps.jsp?lang=en. 2022.
- Carson, D.M. 198. Paleozoic Geology of the Trenton – Consecon Area, Southern Ontario. Ontario Geological Survey. Survey Preliminary Map P.2375, Geological Series. Scale 1: 50 000. Geology 1979.
- Chapman, L.J. and Putnam, D.F. 1984. The Physiography of Southern Ontario. Third Edition. Ontario Geological Survey, Map 2556, scale 1:1 000 000.
- COSEWIC, 2005a. COSEWIC Assessment and Status Report on the Blanding's Turtle *Emydoidea blandingii* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. 40pages.
- COSEWIC, 2005b. COSEWIC Assessment and Update Status Report on the Hill's Pondweed *Potamogeton hillii* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 19 pp.
- COSEWIC. 2008a. COSEWIC Assessment and Updated Status Report on the Western Chorus Frog *Pseudacris triseriata* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. v + 22 pp.
- COSEWIC. 2008b. COSEWIC Assessment and Status Report on the Snapping Turtle *Chelydra serpentina* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 47 pp.
- COSEWIC. 2009. COSEWIC Assessment and Update Status Report on the Least Bittern *Ixobrychus exilis* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 36 pp.
- COSEWIC. 2010. COSEWIC Assessment and Status Report on the Bobolink *Dolichonyx oryzivorus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 42 pp.
- COSEWIC. 2011a. COSEWIC Assessment and Status Report on the Eastern Meadowlark *Sturnella magna* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 40 pp.
- COSEWIC. 2011b. COSEWIC Assessment and Status Report on the Barn Swallow *Hirundo rustica* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. ix + 37 pp.
- COSEWIC. 2012a. COSEWIC Assessment and Status Report on the Eastern Wood-pewee *Contopus virens* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 39 pp.
- COSEWIC, 2012b. COSEWIC Assessment and Status Report on the Wood Thrush *Hylocichla mustelina* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. ix + 46 pp.
- COSEWIC. 2012c. COSEWIC Assessment and Status Report on the Eastern Ribbonsnake *Thamnophis sauritus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xii + 39 pp.
- COSEWIC, 2013. COSEWIC Assessment and Status Report on the Little Brown Myotis *Myotis lucifugus*, Northern Myotis *Myotis septentrionalis*, Tri-colored Bat *Perimotis subflavus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. ix + 93 pp.
- COSEWIC, 2016. COSEWIC Assessment and Status Report on the Monarch *Danaus plexippus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xiii + 59 pp.

COSEWIC. 2017. COSEWIC assessment and status report on the Butternut *Juglans cinerea* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xiii + 74 pp. (<http://www.registrelep-sararegistry.gc.ca/default.asp?lang=en&n=24F7211B-1>).

COSEWIC. 2018. COSEWIC assessment and status report on the Midland Painted Turtle *Chrysemys picta marginate* and the Eastern Painted Turtle *Chrysemys picta picta* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xvi + 107 pp.

The City of Quinte West. 2009. Official Plan City of Quinte West. Effective Date January 9, 2013.

Endangered Species at Risk Act. 2007. Ontario. Version October 19, 2021.

Environment Canada. 2015. Recovery Strategy for the Loggerhead Shrike, *migrans* subspecies (*Lanius ludovicianus migrans*), in Canada. *Species at Risk Act* Recovery Strategy Series. Environment Canada, Ottawa. vii + 35 pp.

Gillespie, J.E., Wicklund, R.E. and Richards, N.R. 1962. The Soils Survey of Hastings County. Research Branch Canada Department of Agriculture and the Ontario Agriculture College. Report No. 27 of the Ontario Soil Survey. 73 pp.

Government of Canada. Species at Risk Act. 2002. Version February 3, 2022

Government of Ontario. 2020. Provincial Policy Statement. Queen's Printer for Ontario. ISBN 978-1-4868-4231-5

Lee, H.T., W.D. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig and S. McMurray. 1998. *Ecological Land Classification for Southern Ontario: First Approximation and Its Application*. Ontario Ministry of Natural Resources, Southcentral Science Section, Science Development and Transfer Branch. SCSS Field Guide FG-02 North Bay, Ontario. 225 pp.

Leyland, J.G. and Mihychuk, M. 1984. Quaternary Geology of the Trenton - Consecon Area, Southern Ontario; Ontario Geological Survey, Map P. 2586, Geological Series-Preliminary Map, scale 1:50 000. Geology 1980.

Ontario Ministry of natural Resources. 2013. Ontario Wetland Evaluation System. Southern Manual. Thirds Edition, Version 3.2.

Ontario Ministry of Natural Resources and Forestry. 2022. Ministry of Natural Resources Natural Heritage Information Centre Mapping application. Available at

<https://www.gisapplication.lrc.gov.on.ca/Mamnh/Index.html/....>

Ontario Nature. Available at: <https://ontarionature.org>

The City of Quinte West. 2014. Comprehensive Zoning By-law No. 22-107. July 21, 2014.

Wester, M.C., B.L. Henson, W.J. Crins, P.W.C. Uhlig, and P.A. Gray. 2018. The Ecosystems of Ontario, Part 2: Ecodistricts. Ontario Ministry of Northern Development, Mines, Natural Resources and Forestry. Science and Research Branch, Peterborough, ON. Science and Research Technical Report TR-26. 474 p. + appendices

Figures

CAD PLOTTER: Robyn Sills
FILE PATH: P:\Belleville Project\7000\2237761 - Trenton Water Main EADrawings\Working\22-3-7761 - Report Figures.dwg
PLOT SCALE: 1:1
DATE PLOTTED: 2023 / 01 / 13 @ 12:35 PM
BORDER SIZE: ISO A1 (841mm x 594mm)



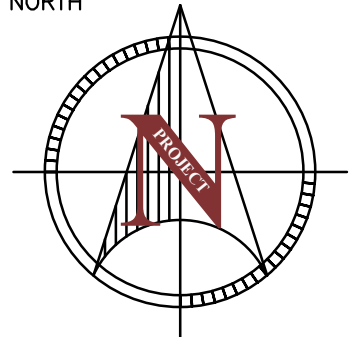
GREER GALLOWAY
CONSULTING ENGINEERS
PETERBOROUGH
BELLEVILLE
KINGSTON
1620 WALLBRIDGE LOYALIST ROAD
BELLEVILLE, ONTARIO, K8N 4Z5
PHONE: 613-966-3068
FAX: 613-966-3087

- NOTES:
1. ALL WORK SHALL BE IN ACCORDANCE WITH RELEVANT CODES AND GUIDELINES.
 2. ALL DRAWINGS AND ADDENDA ARE TO BE READ AS, AND IN CONJUNCTION WITH THE SPECIFICATIONS.
 3. ALL EQUIPMENT SHALL BE INSTALLED AS SPECIFIED OR APPROVED EQUIVALENT.
 4. CONTRACTOR MUST CHECK AND VERIFY ALL DIMENSIONS BEFORE PROCEEDING WITH WORK AND BE RESPONSIBLE FOR SAME.
 5. CONTRACTOR MUST REPORT ANY DISCREPANCIES TO ENGINEER FOR RESOLUTION BEFORE COMMENCING THE WORK.
 6. ANY CHANGES MUST BE APPROVED BY THE ENGINEER.

A	A DETAIL NO.
B	B DRAWING NO. - WHERE DETAILED

LEGEND	
—	PROPERTY BOUNDARY
—WAT—	WATERMAIN
—	CREEK

REVISION	DESCRIPTION	DATE
01	—	YY/MM/DD



PROJECT
COUNTY ROAD 40
WATERMAIN INSTALLATION

MUNICIPALITY OF QUINTE WEST
DRAWING TITLE
SITE LOCATION MAP

DESIGNED BY

DRAWN BY
R. SILLS

REVIEWED BY

APPROVED BY

PROJECT DATE
2022/09/08
(YY/MM/DD)

PROJECT #
22-3-7761

DRAWING #
FIGURE 1
DRAWING SCALE (ISO A1)
HOR: 1 : 3000
VER:

(METRIC SCALE - ALL DIMS IN METERS U.N.O.)

CAD PLOTTER: Robyn Sills

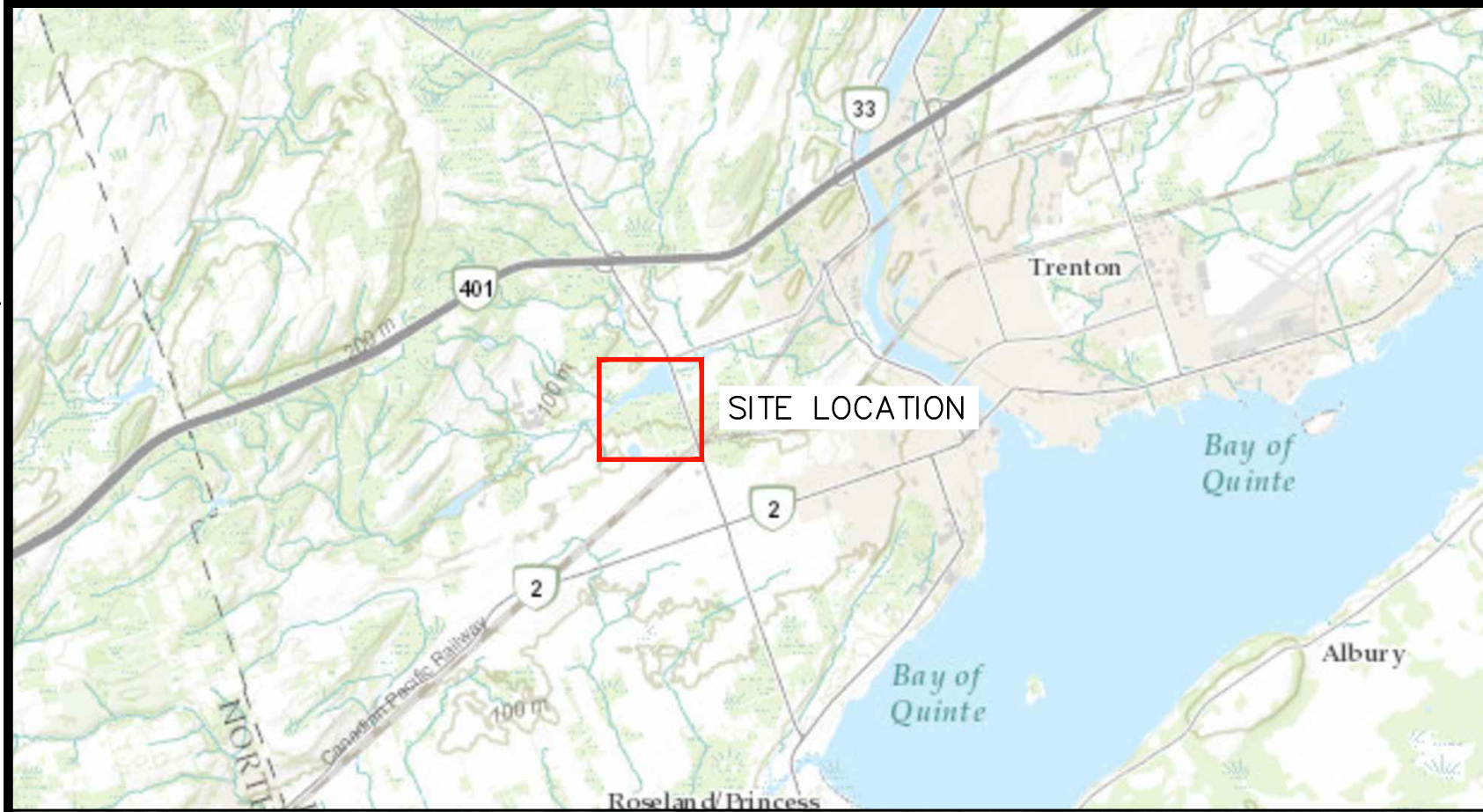
FILE PATH: P:\Belleville Project\7000\2237761 - Trenton Water Main EA\Drawings\Working\22-3-7761 - Report Figures.dwg

PLOT SCALE: 1:1

DATE PLOTTED: 2023 / 01 / 13 @ 12:35 PM

BORDER SIZE: ISO A1 (841mm x 594mm)

(METRIC SCALE - ALL DIMS IN METERS U.N.O.)



GREER GALLOWAY
CONSULTING ENGINEERS
PETERBOROUGH
BELLEVILLE
KINGSTON
1620 WALLBRIDGE LOYALIST ROAD
BELLEVILLE, ONTARIO, K8N 4Z5
PHONE: 613-966-3068
FAX: 613-966-3087

- NOTES:
1. ALL WORK SHALL BE IN ACCORDANCE WITH RELEVANT CODES AND GUIDELINES.
 2. ALL DRAWINGS AND ADDENDA ARE TO BE READ AS, AND IN CONJUNCTION WITH THE SPECIFICATIONS.
 3. ALL EQUIPMENT SHALL BE INSTALLED AS SPECIFIED OR APPROVED EQUIVALENT.
 4. CONTRACTOR MUST CHECK AND VERIFY ALL DIMENSIONS BEFORE PROCEEDING WITH WORK AND BE RESPONSIBLE FOR SAME.
 5. CONTRACTOR MUST REPORT ANY DISCREPANCIES TO ENGINEER FOR RESOLUTION BEFORE COMMENCING THE WORK.
 6. ANY CHANGES MUST BE APPROVED BY THE ENGINEER.

A	A DETAIL NO.
B	B DRAWING NO. - WHERE DETAILED

LEGEND	
	PROPERTY BOUNDARY
	WATERMAIN
	CREEK
	UNEVALUATED WETLAND

REVISION	DESCRIPTION	DATE
01	-	YY/MM/DD

STAMP

PROJECT
COUNTY ROAD 40
WATERMAIN INSTALLATION

MUNICIPALITY OF QUINTE WEST

DRAWING TITLE
NATURAL HERITAGE
FEATURES

DESIGNED BY

DRAWN BY
R. SILLS

REVIEWED BY

APPROVED BY

PROJECT DATE
2022/09/08
(YY/MM/DD)

PROJECT #
22-3-7761

DRAWING # FIGURE 2	DRAWING SCALE (ISO A1) HOR: 1 : 3000 VER:
-----------------------	---

CAD PLOTTER: Robyn Sills

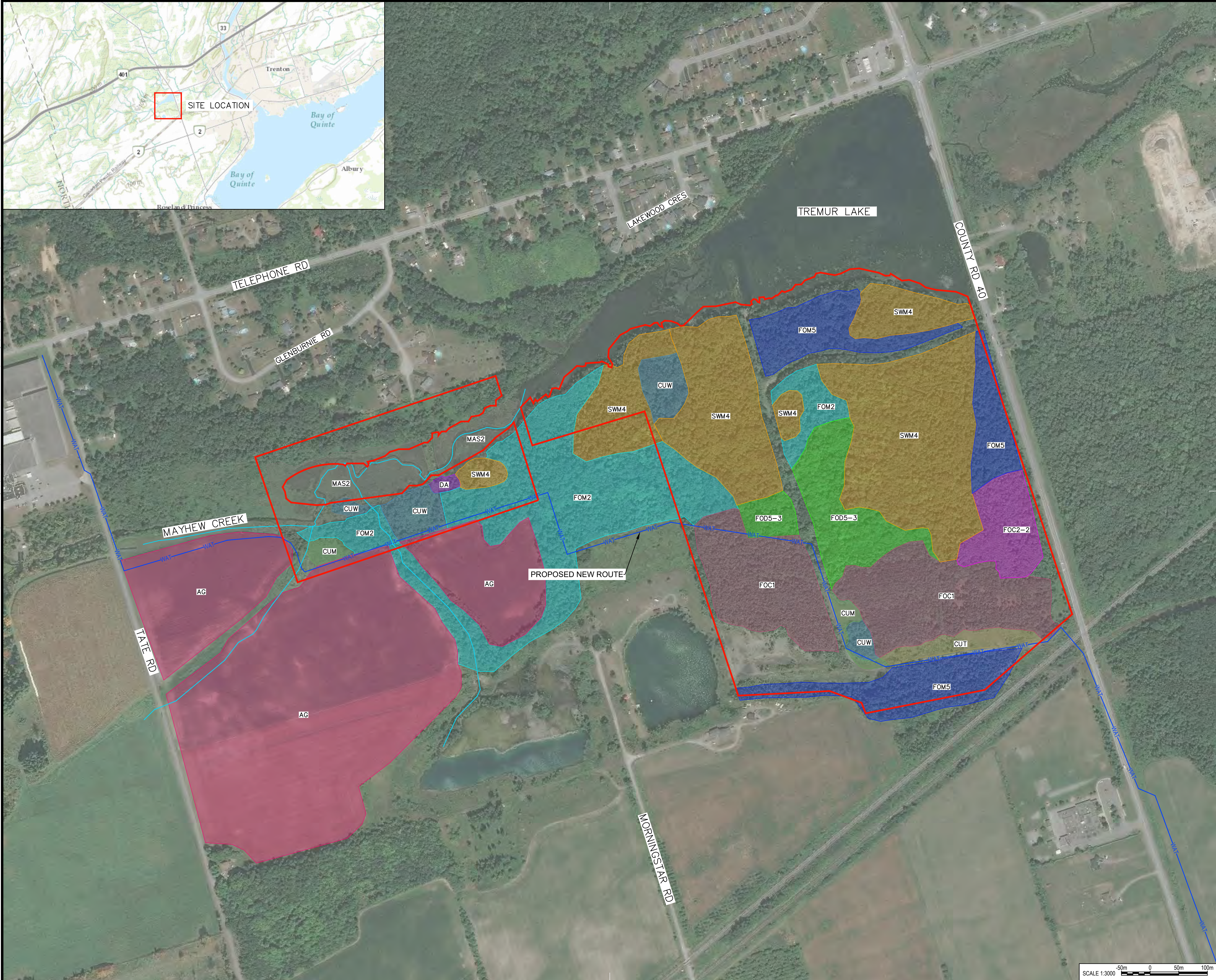
FILE PATH: P:\Belleville Project\7000\2237761 - Trenton Water Main EADrawings\Working\22-3-7761 - Report Figures.dwg

PLOT SCALE: 1:1

DATE PLOTTED: 2023 / 01 / 16 @ 02:23 PM

BORDER SIZE: ISO A1 (841mm x 594mm)

(METRIC SCALE - ALL DIMS IN METERS U.N.O.)



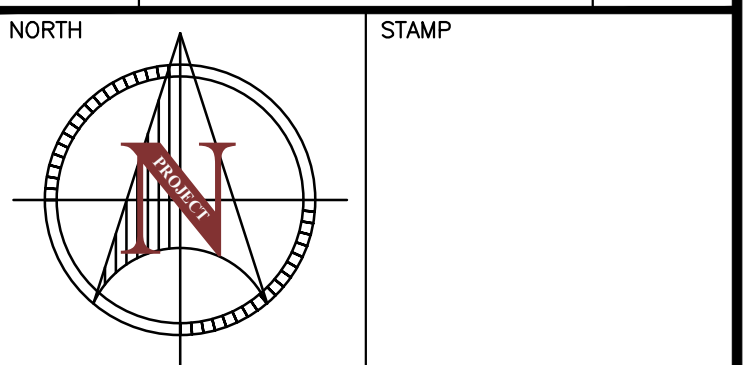
GREER GALLOWAY
CONSULTING ENGINEERS
PETERBOROUGH
BELLEVILLE
KINGSTON
1620 WALLBRIDGE LOYALIST ROAD
BELLEVILLE, ONTARIO, K8N 4Z5
PHONE: 613-966-3068
FAX: 613-966-3087

- NOTES:
1. ALL WORK SHALL BE IN ACCORDANCE WITH RELEVANT CODES AND GUIDELINES.
 2. ALL DRAWINGS AND ADDENDA ARE TO BE READ AS, AND IN CONJUNCTION WITH THE SPECIFICATIONS.
 3. ALL EQUIPMENT SHALL BE INSTALLED AS SPECIFIED OR APPROVED EQUIVALENT.
 4. CONTRACTOR MUST CHECK AND VERIFY ALL DIMENSIONS BEFORE PROCEEDING WITH WORK AND BE RESPONSIBLE FOR SAME.
 5. CONTRACTOR MUST REPORT ANY DISCREPANCIES TO ENGINEER FOR RESOLUTION BEFORE COMMENCING THE WORK.
 6. ANY CHANGES MUST BE APPROVED BY THE ENGINEER.

A A DETAIL NO.
B B DRAWING NO. - WHERE DETAILED

LEGEND	
	PROPERTY BOUNDARY
	WATERMAIN
	CREEK
	SWM4 - WHITE CEDAR ORGANIC MIXED SWAMP
	FOD5-3 - DRY-FRESH SUGAR MAPLE - OAK DECIDUOUS FOREST
	FOM2 - DRY-FRESH WHITE PINE-MAPLE-OAK MIXED FOREST
	FOM5 - DRY-FRESH WHITE BIRCH-POPLAR-CONIFER MIXED FOREST
	FOC2-2 - DRY-FRESH WHITE CEDAR CONIFEROUS FOREST
	FOC1 - DRY-FRESH PINE CONIFEROUS FOREST
	CUW - CULTURAL WOODLAND
	CUM - CULTURAL MEADOW
	CUT - CULTURAL THICKET
	MAS2 - MINERAL SHALLOW MARSH
	AG - AGRICULTURAL FIELD
	DA - DRAINAGE AREA

01	-	YY/MM/DD
REVISION	DESCRIPTION	DATE



PROJECT
COUNTY ROAD 40
WATERMAIN INSTALLATION

MUNICIPALITY OF QUINTE WEST

DRAWING TITLE
VEGETATION
COMMUNITIES

DESIGNED BY

DRAWN BY
R. SILLS

REVIEWED BY

APPROVED BY

PROJECT DATE
2022/09/08 (YY/MM/DD)


PROJECT #
22-3-7761

DRAWING #
FIGURE 3

DRAWING SCALE (ISO A1)
HOR: 1 : 3000
VER:

CAD PLOTTER: Robyn Sills
FILE PATH: P:\Belleville Project\7000\2237761 - Trenton Water Main EA\Drawings\Working\22-3-7761 - Report Figures.dwg
PLOT SCALE: 1:1
DATE PLOTTED: 2023 / 01 / 13 @ 12:36 PM
BORDER SIZE: ISO A1 (841mm x 594mm)





GREER GALLOWAY
CONSULTING ENGINEERS
PETERBOROUGH
BELLEVILLE
KINGSTON
1620 WALLBRIDGE LOYALIST ROAD
BELLEVILLE, ONTARIO, K8N 4Z5
PHONE: 613-966-3068
FAX: 613-966-3087

- NOTES:
1. ALL WORK SHALL BE IN ACCORDANCE WITH RELEVANT CODES AND GUIDELINES.
 2. ALL DRAWINGS AND ADDENDA ARE TO BE READ AS, AND IN CONJUNCTION WITH THE SPECIFICATIONS.
 3. ALL EQUIPMENT SHALL BE INSTALLED AS SPECIFIED OR APPROVED EQUIVALENT.
 4. CONTRACTOR MUST CHECK AND VERIFY ALL DIMENSIONS BEFORE PROCEEDING WITH WORK AND BE RESPONSIBLE FOR SAME.
 5. CONTRACTOR MUST REPORT ANY DISCREPANCIES TO ENGINEER FOR RESOLUTION BEFORE COMMENCING THE WORK.
 6. ANY CHANGES MUST BE APPROVED BY THE ENGINEER.
- A

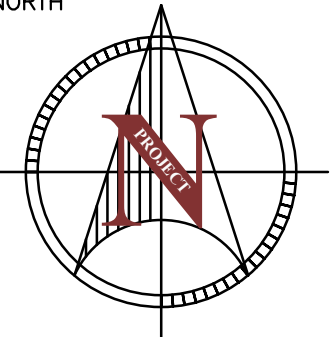
B

A DETAIL NO.
B DRAWING NO. - WHERE DETAILED

- LEGEND
- PROPERTY BOUNDARY
 - WATERMAIN
 - CREEK
 - UNEVALUATED WETLAND
 - WOOD THRUSH
 - BLANDINGS TURTLE
 - RETAINED BUTTERNUT TREE
 - RETAINED BUTTERNUT TREE 25m SETBACK

01	-	YY/MM/DD
REVISION	DESCRIPTION	DATE

NORTH



STAMP

PROJECT
COUNTY ROAD 40
WATERMAIN INSTALLATION

MUNICIPALITY OF QUINTE WEST

DRAWING TITLE
NATURAL HERITAGE
CONSTRAINS

DESIGNED BY

DRAWN BY
R. SILLS

REVIEWED BY

APPROVED BY

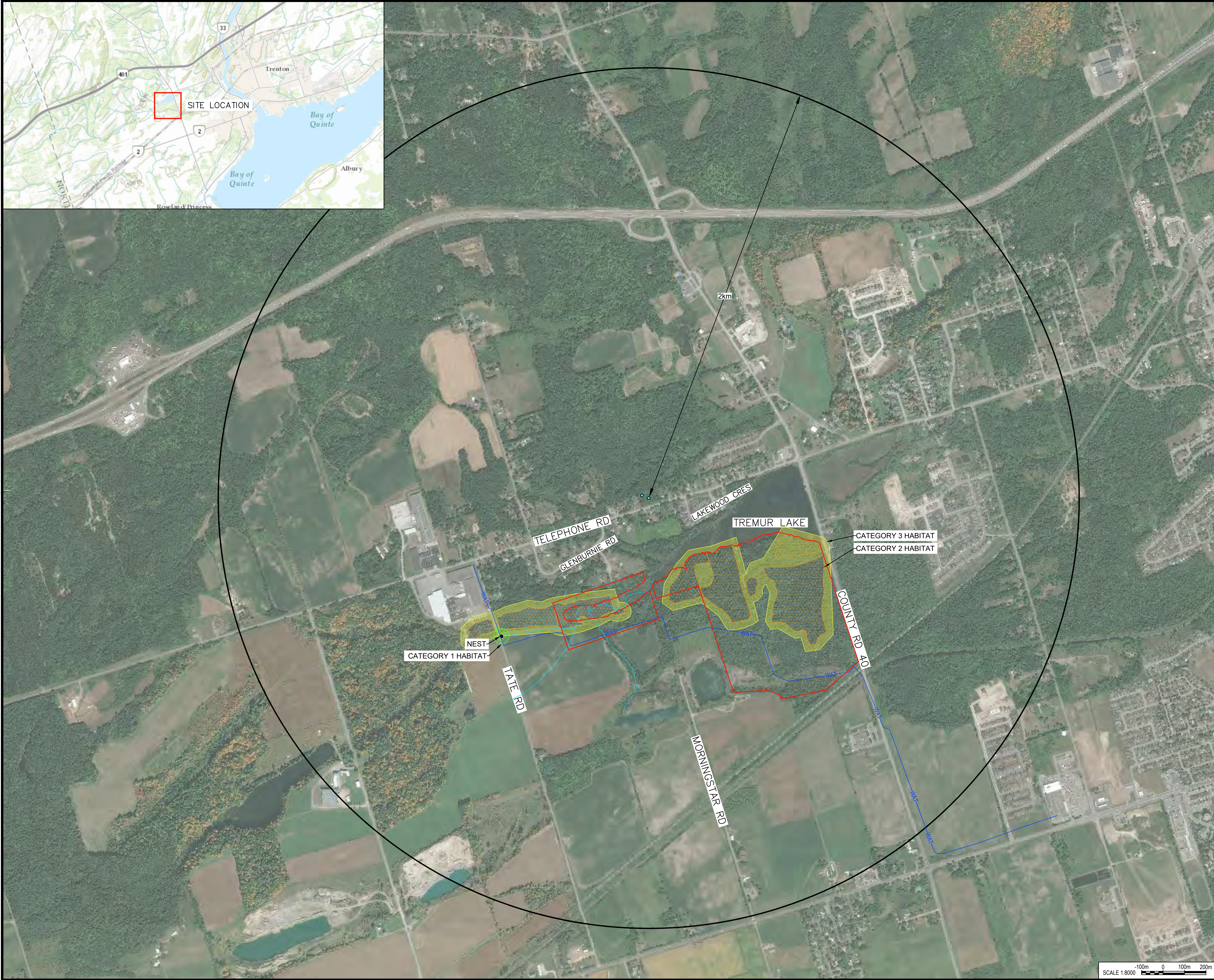
PROJECT DATE
2022/09/08
(YY/MM/DD)


PROJECT #
22-3-7761

DRAWING #
FIGURE 4

DRAWING SCALE (ISO A1)
HOR: 1 : 3000
VER:

CAD PLOTTER: Robyn Sills
FILE PATH: P:\Belleville Project\7000\2237761 - Trenton Water Main EADrawings\Working\22-3-7761 - Report Figures.dwg
PLOT SCALE: 1:1
DATE PLOTTED: 2023 / 01 / 13 @ 12:40 PM
BORDER SIZE: ISO A1 (841mm x 594mm)





GREER GALLOWAY
CONSULTING ENGINEERS
PETERBOROUGH
BELLEVILLE
KINGSTON
1620 WALLBRIDGE LOYALIST ROAD
BELLEVILLE, ONTARIO, K8N 4Z5
PHONE: 613-966-3068
FAX: 613-966-3087

- NOTES:
1. ALL WORK SHALL BE IN ACCORDANCE WITH RELEVANT CODES AND GUIDELINES.
 2. ALL DRAWINGS AND ADDENDA ARE TO BE READ AS, AND IN CONJUNCTION WITH THE SPECIFICATIONS.
 3. ALL EQUIPMENT SHALL BE INSTALLED AS SPECIFIED OR APPROVED EQUIVALENT.
 4. CONTRACTOR MUST CHECK AND VERIFY ALL DIMENSIONS BEFORE PROCEEDING WITH WORK AND BE RESPONSIBLE FOR SAME.
 5. CONTRACTOR MUST REPORT ANY DISCREPANCIES TO ENGINEER FOR RESOLUTION BEFORE COMMENCING THE WORK.
 6. ANY CHANGES MUST BE APPROVED BY THE ENGINEER.
- A

B

A DETAIL NO.
B DRAWING NO. - WHERE DETAILED

- LEGEND
- PROPERTY BOUNDARY
 - WATERMAIN
 - CREEK
 - BLANDINGS TURTLE
 - TURTLE NEST
 - CATEGORY 1 HABITAT
 - CATEGORY 2 HABITAT
 - CATEGORY 3 HABITAT

01	-	YY/MM/DD
----	---	----------

REVISION	DESCRIPTION	DATE
NORTH		

PROJECT
COUNTY ROAD 40
WATERMAIN INSTALLATION

MUNICIPALITY OF QUINTE WEST

DRAWING TITLE
GENERAL HABITAT
PROTECTION FOR
BLANDINGS TURTLE

DESIGNED BY	
DRAWN BY	R. SILLS
REVIEWED BY	
APPROVED BY	
PROJECT DATE	2022/09/08 (YY/MM/DD)
PROJECT #	22-3-7761
DRAWING #	FIGURE 5
DRAWING SCALE (ISO A1)	HOR: 1 : 8000 VER:

CAD PLOTTER: Robyn Sills

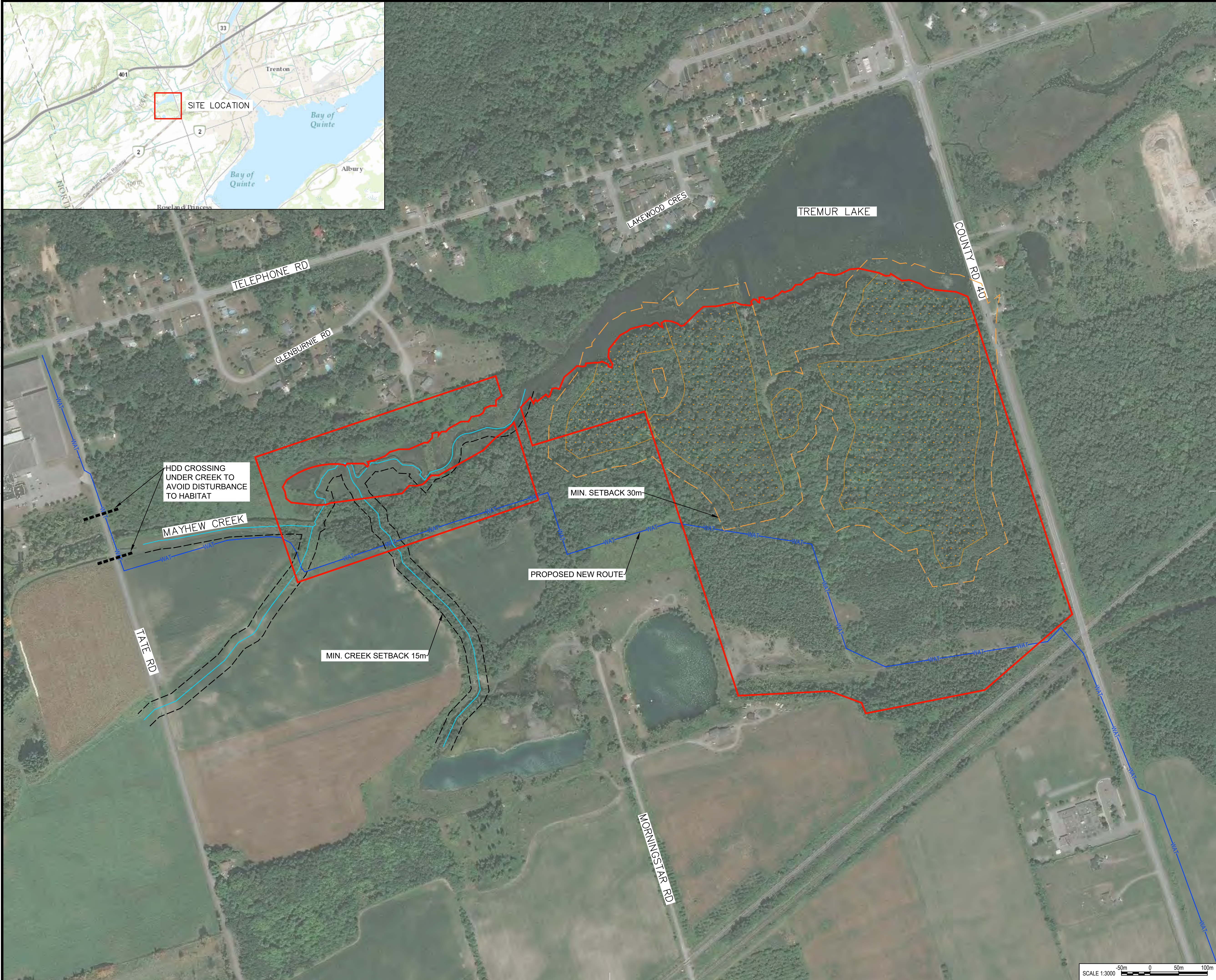
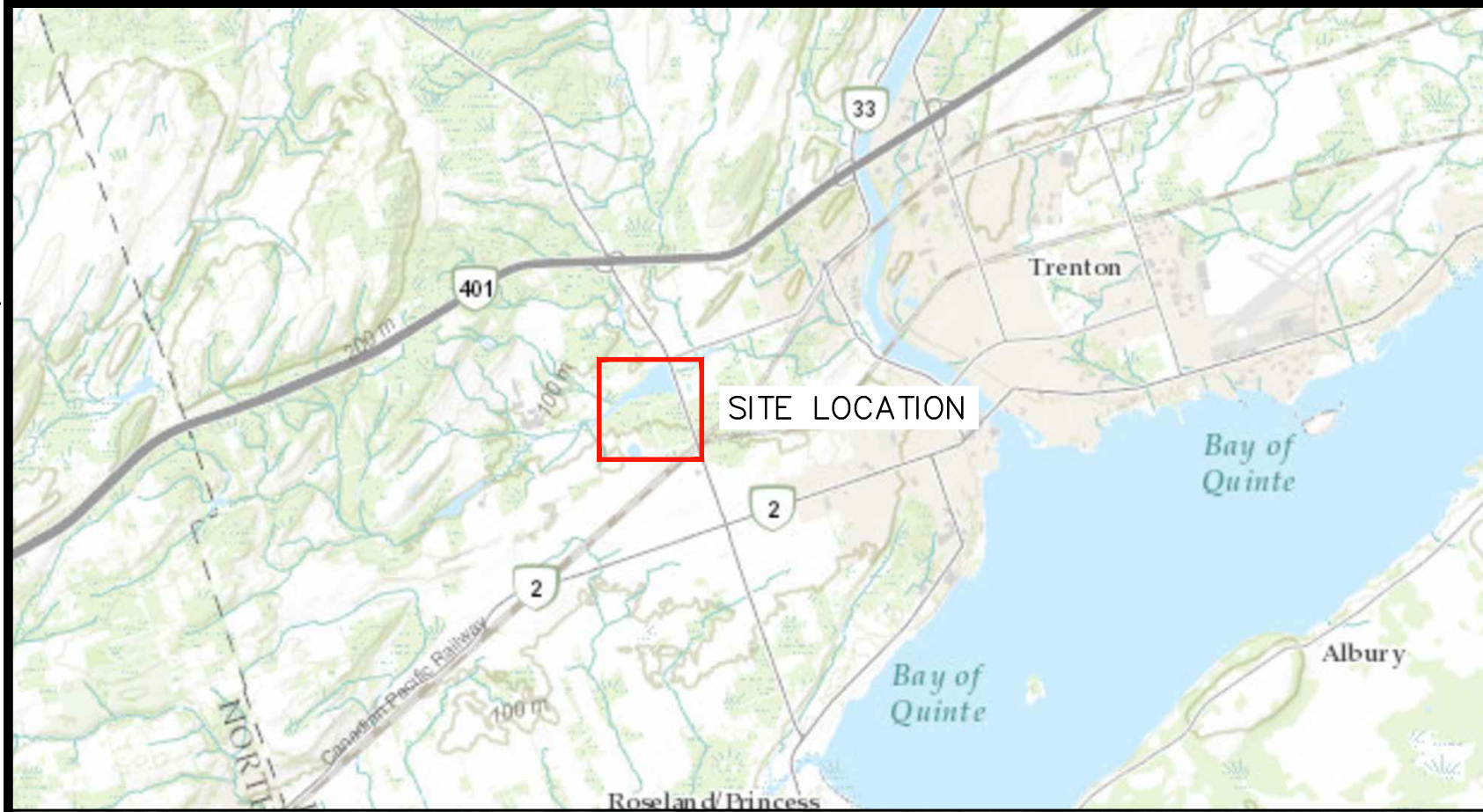
FILE PATH: P:\Belleville Project\7000\2237761 - Trenton Water Main EADrawings\Working\22-3-7761 - Report Figures.dwg

PLOT SCALE: 1:1

DATE PLOTTED: 2023 / 01 / 13 @ 12:46 PM

BORDER SIZE: ISO A1 (841mm x 594mm)

(METRIC SCALE - ALL DIMS IN METERS U.N.O.)



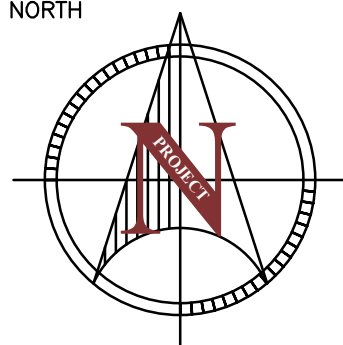
GREER GALLOWAY
CONSULTING ENGINEERS
PETERBOROUGH
BELLEVILLE
KINGSTON
1620 WALLBRIDGE LOYALIST ROAD
BELLEVILLE, ONTARIO, K8N 4Z5
PHONE: 613-966-3068
FAX: 613-966-3087

- NOTES:
1. ALL WORK SHALL BE IN ACCORDANCE WITH RELEVANT CODES AND GUIDELINES.
 2. ALL DRAWINGS AND ADDENDA ARE TO BE READ AS, AND IN CONJUNCTION WITH THE SPECIFICATIONS.
 3. ALL EQUIPMENT SHALL BE INSTALLED AS SPECIFIED OR APPROVED EQUIVALENT.
 4. CONTRACTOR MUST CHECK AND VERIFY ALL DIMENSIONS BEFORE PROCEEDING WITH WORK AND BE RESPONSIBLE FOR SAME.
 5. CONTRACTOR MUST REPORT ANY DISCREPANCIES TO ENGINEER FOR RESOLUTION BEFORE COMMENCING THE WORK.
 6. ANY CHANGES MUST BE APPROVED BY THE ENGINEER.

A A DETAIL NO.
B B DRAWING NO. - WHERE DETAILED

- LEGEND
- PROPERTY BOUNDARY
 - WATERMAIN
 - CREEK
 - SUITABLE WINTERING HABITAT
 - SETBACK - 30m
 - CREEK SETBACK - 15m

REVISION	DESCRIPTION	DATE
01	-	YY/MM/DD



PROJECT
COUNTY ROAD 40
WATERMAIN INSTALLATION

MUNICIPALITY OF QUINTE WEST
DRAWING TITLE
WETLAND BOUNDARY

DESIGNED BY

DRAWN BY
R.S./I.T.

REVIEWED BY

APPROVED BY

PROJECT DATE
2022/09/08
(YY/MM/DD)

PROJECT #
22-3-7761

DRAWING #
FIGURE 6
DRAWING SCALE (ISO A1)
HOR: 1 : 3000
VER:

SCALE 1:3000
-50m 0 50m 100m

Appendix A

List of Plant Species

Table 1. List of Plant Species

	Scientific Name	Family	S Rank	G Rank
Trees				
Manitoba Maple	<i>Acer negundo</i>	Aceraceae	S5	G5
Red Maple	<i>Acer rubrum</i>	Aceraceae	S5	G5
Silver Maple	<i>Acer saccharinum</i>	Aceraceae	S5	G5
Sugar Maple	<i>Acer saccharum</i>	Aceraceae	S5	G5
Ironwood	<i>Ostrya virginiana</i>	Betulaceae	S5	G5
White Birch	<i>Betula papyrifera</i>	Betulaceae	S5	G5
Yellow Birch	<i>Betula alleghaniensis</i>	Betulaceae	S5	G5
Eastern Red Cedar	<i>Juniperus virginiana</i>	Cupressaceae	S5	G5
Eastern White-cedar	<i>Thuja occidentalis</i>	Cupressaceae	S5	G5
Red Oak	<i>Quercus rubra</i>	Fagaceae	S5	G5
White Oak	<i>Quercus alba</i>	Fagaceae	S5	G5
American Beech	<i>Fagus grandifolia</i>	Fagaceae	S4	G5
Butternut	<i>Juglans cinerea</i>	Juglandaceae	S2?	G3
Green Ash	<i>Fraxinus pennsylvanica</i>	Oleaceae	S5	G5
White Ash	<i>Fraxinus americana</i>	Oleaceae	S5	G5
Eastern Hemlock	<i>Tsuga canadensis</i>	Pinaceae	S5	G4G5
Eastern Larch	<i>Larix laricina</i>	Pinaceae	S5	G5
Eastern White Pine	<i>Pinus strobus</i>	Pinaceae	S5	G5
Scots Pine	<i>Pinus sylvestris</i>	Pinaceae	SNA	GNR
White Spruce	<i>Picea glauca</i>	Pinaceae	S5	G5
Balsam Fir	<i>Abies balsamea</i>	Pinaceae	S5	G5
Black Cherry	<i>Prunus serotina</i>	Rosaceae	S5	G5
Crack Willow	<i>Salix fragilis</i>	Salicaceae	SNA	GNRQ
Eastern Cottonwood	<i>Populus deltoides</i>	Salicaceae	S5	G5
Large-tooth Aspen	<i>Populus grandidentata</i>	Salicaceae	S5	G5

	Scientific Name	Family	S Rank	G Rank
Trembling Aspen	<i>Populus tremuloides</i>	Salicaceae	S5	G5
White Poplar	<i>Populus alba</i>	Salicaceae	SNA	G5
Basswood	<i>Tilia americana</i>	Tiliaceae	S5	G5
American Elm	<i>Ulmus americana</i>	Ulmaceae	S5	G5
Shrubs				
Staghorn Sumac	<i>Rhus thyphina</i>	Anacardiaceae	S5	G5
Speckler Elder	<i>Alnus incana</i>	Betulaceae	S5	G5
American Black Elderberry	<i>Sambucus nigra ssp. canadensis</i>	Caprifoliaceae	S5	G5T5
Red Elderberry	<i>Sambucus racemosa</i>	Caprifoliaceae	S5	G5
Tatarian Honeysuckle	<i>Lonicera tatarica</i>	Caprifoliaceae	SNA	GNR
Ground Juniper	<i>Juniperus communis</i>	Cupressaceae	S5	G5
Alternate-leaf Dogwood	<i>Cornus alternifolia</i>	Cornaceae	S5	G5
Gray Dogwood	<i>Cornus foemina ssp. Racemosa</i>	Cornaceae	S5	G5
Red-osier Dogwood	<i>Cornus sericea</i>	Cornaceae	S5	G5
Round-leaved Dogwood	<i>Cornus rugosa</i>	Cornaceae	S5	G5
Common Lilac	<i>Syringa vulgaris</i>	Oleaceae	SNA	GNR
Common Buckthorn	<i>Rhamnus cathartica</i>	Rhamnaceae	SNA	GNR
Common Red Raspberry	<i>Rubus idaeus</i>	Rosaceae	SNR	G5
Common Prickly Ash	<i>Zanthoxylum americanum</i>	Rutaceae	S5	G5
Bebb's Willow	<i>Salix bebbiana</i>	Salicaceae	S5	G5
Slender Willow	<i>Salix petiolaris</i>	Salicaceae	S5	G5
Vines				
Wild Cucumber	<i>Cucumis anguria</i>	Cucurbitaceae	?	GNR
Virgin's-bower	<i>Clematis virginiana</i>	Ranunculaceae	S5	G5
Creeping Jenny	<i>Lysimachia nummularia</i>	Primulaceae	SNA	GNR
Bittersweet Nightshade	<i>Solanum dulcarama</i>	Solanaceae	SNA	GNR
Riverbank Grape	<i>Vitis riparia</i>	Vitaceae	S5	G5

	Scientific Name	Family	S Rank	G Rank
Summer Grape	<i>Vitis aestivalis</i>	Vitaceae	S4	G5
Virginia Creeper	<i>Parthenocissus quinquefolia</i>	Vitaceae	S4?	G5
Ferns				
Bracken Fern	<i>Pteridium aquilinum</i>	Dennstaedtiaceae	S5	G5
Bulblet Fern	<i>Cystopteris bulbifera</i>	Dryopteridaceae	S5	G5
Christmas Fern	<i>Polystichum acrostichoides</i>	Dryopteridaceae	S5	G5
Lady Fern	<i>Athyrium filix-femina</i>	Dryopteridaceae	S5	G5
Ostrich Fern	<i>Matheuccia struthiopteris</i>	Dryopteridaceae	S5	G5
Sensitive Fern	<i>Onoclea sensibilis</i>	Dryopteridaceae	S5	G5
Spinulose Wood Fern	<i>Dryopteris carthusiana</i>	Dryopteridaceae	S5	G5
Herbs				
Poison Ivy	<i>Toxicodendron radicans</i>	Anacardiaceae	S5	G5
Queen Anne's Lace (Wild Carrot)	<i>Daucus carota</i>	Apiaceae	SNA	GNR
Common Milkweed	<i>Asclepias syriaca</i>	Apocynaceae	S5	G5
Dog-strangling Vine	<i>Cynanchum rossicum</i>	Apocynaceae	SNA	GNR
Indian Hemp	<i>Apocynum cannabinum</i>	Apocynaceae	SNR	G5
Jack-in-the-Pulpit	<i>Arisaema triphyllum</i>	Araceae	S5	G5
Black-eyed Susan	<i>Rubdeckia hirta</i>	Asteraceae	S5	G5
Boneset	<i>Eupatorium perfoliatum</i>	Asteraceae	S5	G5
Canada Goldenrod	<i>Solidago canadensis</i>	Asteraceae	S5	G5
Coltsfoot	<i>Tussilago farfara</i>	Asteraceae	SNA	GNR
Common Burdock	<i>Arctium minus</i>	Asteraceae	SNA	GNR
Common Dandelion	<i>Taraxacum officinale</i>	Asteraceae	SNA	G5
Common Yarrow	<i>Achillea millefolium</i>	Asteraceae	SNA	G5
Chicory	<i>Cichorium intybus</i>	Asteraceae	SNA	GNR
Goat's Beard	<i>Tragopogon dubius</i>	Asteraceae	SNA	GNR
Grass-leaved Goldenrod	<i>Euthamia graminifolia</i>	Asteraceae	S5	G5

	Scientific Name	Family	S Rank	G Rank
Hairy Goldenrod	<i>Solidago hispida</i>	Asteraceae	S5	G5
New England Aster	<i>Symphyotrichum novae-angliae</i>	Asteraceae	S5	G5
Oxeye Daisy	<i>Leucanthemum vulgare</i>	Asteraceae	SNA	GNR
Philadelphia Fleabane	<i>Erigeron philadelphicus</i>	Asteraceae	S5	G5
Rough-stemmed Goldenrod	<i>Solidago rugosa</i>	Asteraceae	S5	G5
Smooth Blue Aster	<i>Symphyotrichum laeve</i>	Asteraceae	S5	G5
Spotted Joe-pye-weed	<i>Eupatorium maculatum</i>	Asteraceae	S5	G5
Tall Goldenrod	<i>Solidago altissima</i>	Asteraceae	S5	G5
Zig-zag Goldenrod	<i>Solidago flexicaulis</i>	Asteraceae	S5	G5
Jewelweed (Spotted Touch-me-not)	<i>Impatiens capensis</i>	Balsaminaceae	S5	G5
Mayapple	<i>Podophyllum peltatum</i>	Berberidaceae	S5	G5
Bouncing-bet	<i>Saponaria officinalis</i>	Caryophyllaceae	SNA	GNR
Common St. John's wort	<i>Hypericum perforatum</i>	Clusiaceae	SNA	GNR
Variegated Horsetail	<i>Equisetum variegatum</i>	Equisetaceae	S5	G5
Alfalfa	<i>Medicago sativa</i>	Fabaceae	SNA	GNR
Bird's-foot Trefoil	<i>Lotus corniculatus</i>	Fabaceae	SNA	GNR
Red Clover	<i>Trifolium pratense</i>	Fabaceae	SNA	GNR
White Sweet Clover	<i>Melilotus albus</i>	Fabaceae	SNA	GNR
Tufted Vetch	<i>Vicia cracca</i>	Fabaceae	SNA	GNR
Herb Robert	<i>Geranium robertianum</i>	Geraniaceae	S5	G5
Wild Geranium	<i>Geranium maculatum</i>	Geraniaceae	S5	G5
Bristly Black Currant	<i>Ribes lacustre</i>	Grossulariaceae	S5	G5
Wild Black Currant (Gooseberry)	<i>Ribes americanum</i>	Grossulariaceae	SNA	GNR
Heal-all	<i>Prunella vulgaris</i>	Lamiaceae	S5	G5
Northern Bugleweed	<i>Lycopus uniflorus</i>	Lamiaceae	S5	G5
Trillium	<i>Trillium sp.</i>	Liliaceae		
False Solomon's-seal	<i>Maianthemum racemosum</i>	Liliaceae	SNR	G5

	Scientific Name	Family	S Rank	G Rank
Wild Lily-of-the-Valley	<i>Maianthemum canadense</i>	Liliaceae	S5	G5
Purple Loosestrife	<i>Lythrum salicaria</i>	Lythraceae	SNA	G5
Broadleaf Enchanter's Nightshade	<i>Circaea lutetiana</i>	Onagraceae	S5	G5
Common Helleborine	<i>Epipactis helleborine</i>	Orchidaceae	SNA	GNR
Common Yellow Wood-sorrel	<i>Oxalis stricta</i>	Oxalidaceae	SNA	G5
Bloodroot	<i>Sanguinaria canadensis</i>	Papaveraceae	S5	G5
Common Plantain	<i>Plantago major</i>	Plantaginaceae	SNA	G4
Pale Smartweed	<i>Polygonum lapathifolia</i>	Polygonaceae	S5	G5
American Wintergreen	<i>Pyrola americana</i>	Pyrolaceae	S4?	G5
Fringed Loosestrife	<i>Lysimachia ciliata</i>	Primulaceae	S5	G5
Water Loosestrife	<i>Lysimachia thyrsiflora</i>	Primulaceae	S5	G5
Canada Anemone	<i>Anemone canadensis</i>	Ranunculaceae	S5	G5
Kidney-leaf Buttercup	<i>Ranunculus abortivus</i>	Ranunculaceae	S5	G5
Marsh Marygold	<i>Caltha palustris</i>	Ranunculaceae	S5	G5
Narrow-leaved Meadowsweet	<i>Spiraea alba</i>	Rosaceae	S5	G5
Wild Strawberry	<i>Fragaria virginiana</i>	Rosaceae	S5	G5
Cleavers	<i>Galium aparine</i>	Rubiaceae	S5	G5
Sweet-scent Bedstraw	<i>Galium triflorum</i>	Rubiaceae	S5	G5
Great Mullein	<i>Verbascum Thapsus</i>	Scrophulariaceae	SNA	GNR
Canada Clearweed	<i>Pilea pumila</i>	Urticaceae	S5	G5
Canada Wood-nettle	<i>Laportea canadensis</i>	Urticaceae	S5	G5
Blue Vervain	<i>Verbena hastata</i>	Verbenaceae	S5	G5
Violet	<i>Viola sp.</i>	Violaceae		
Aquatic				
Broadleaf Arrowhead	<i>Sagittaria latifolia</i>	Alismataceae	S5	G5
Northern Water plantain	<i>Alisma triviale</i>	Alismataceae	S5	G5
Water Horsetail	<i>Equisetum fluviatile</i>	Equisetaceae	S5	G5

	Scientific Name	Family	S Rank	G Rank
Water Knotweed	<i>Polygonum amphibium</i>	Polygonaceae	S5	G5
Large Bur-reed	<i>Sparganium eurycarpum</i>	Sparganiaceae	S5	G5
Narrow-leaved Cattail	<i>Typha angustifolia</i>	Typhaceae	SNA	G5
Grasses, Sedges & Rushes				
Porcupine Sedge	<i>Carex hystericina</i>	Cyperaceae	S5	G5
Retrorse Sedge	<i>Carex retrorsa</i>	Cyperaceae	S5	G5
Woolgrass Bulrush	<i>Scirpus atrovirens</i>	Cyperaceae	S5	G5
Blue Joint Grass	<i>Calamagrostis canadensis</i>	Poaceae	S5	G5
Common Reed	<i>Phragmites australis</i>	Poaceae	SU	G5
Fowl Mannagrass	<i>Glyceria striata</i>	Poaceae	S5	G5
Timothy grass	<i>Phleum pratense</i>	Poaceae	SNA	GNR
Reed Canary grass	<i>Phalaris arundinacea</i>	Poaceae	S5	G5
American Bur-reed	<i>Sparganium americanum</i>	Sparganiaceae	S5	G5

Nature Conservancy conservation concern ranking (2022). G – Global Level, S – Provincial Conservation Status.

SRANK Definition

S1 – Critically imperiled - At very high risk of extirpation in the province due to restricted range, very few populations or occurrences, very steep declines, severe threats, or other factors.

S2 – Imperiled - At high risk of extirpation in the province due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.

S3 – Vulnerable - At moderate risk of extirpation in the province due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.

S4 – Apparently Secure - It denotes that a species is apparently secure, with over 100 occurrences in the province.

S5 – Secure - Indicates that a species is widespread in Ontario, it is demonstrably secure in the province.

SNA - Not Applicable - A conservation status rank is not applicable because the species or ecosystem is not a suitable target for conservation activities.

SNR - Unranked – National or subnational conservation status not yet assessed.

GRANK definition

G1 – Critically Imperiled – At very high risk of extinction or collapse due to very restricted range, very few populations or occurrences, steep declines, severe threats, or other factors.

G2 – Imperiled – At very high risk of extinction or collapse due to very restricted range, very few populations or occurrences, steep declines, severe threats, or other factors.

G3 – Vulnerable - At moderate risk of extinction or collapse due to a fairly restricted range, relatively few populations or occurrences, recently and widespread declines, threats, or other factors.

G4 – Apparently secure – At fairly low risk of extinction or collapse due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as result of local recent declines, threats or other factors.

G5 – Secure - At very low risk of extinction or collapse due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats.

GNR – Unranked – Global rank not yet assessed.

GNA - Not Applicable - A conservation status rank is not applicable because the species or ecosystem is not a suitable target for conservation activities.

T - denotes that the rank applies to a subspecies variety.

Appendix B

List of Wildlife Species

Table 2. List of Wildlife

Common Name	Scientific Name	Family	S Rank	G Rank
Birds				
Hawk	?	Accipitridae		
Canada Goose	<i>Branta canadensis</i>	Anatidae	S5	G5
Trumpeter Swan	<i>Cygnus buccinator</i>	Anatidae	S4	G4
Great Blue Heron	<i>Ardea herodias</i>	Ardeidae	S4B	G5
Great Egret	<i>Ardea alba</i>	Ardeidae	S2B,S3M	G5
Cedar Waxwing	<i>Bombycilla cedrorum</i>	Bombycillidae	S5B	G5
Northern Cardinal	<i>Cardinalis cardinalis</i>	Cardinalidae	S5	G5
Mourning Dove	<i>Zenaida macroura</i>	Columbidae	S5	G5
American Crow	<i>Corvus brachyrhynchos</i>	Corvidae	S5B	G5
Blue Jay	<i>Cyanocitta cristata</i>	Corvidae	S5	G5
American Goldfinch	<i>Carduelis tristis</i>	Fringillidae	S5	G5
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	Icteridae	S4	G5
Common Grackle	<i>Quiscalus quiscula</i>	Icteridae	S5B	G5
Brown Thrasher	<i>Toxostoma rufum</i>	Mimidae	S4B	G5
Gray Catbird	<i>Dumetella carolinensis</i>	Mimidae	S4B	G5
Black-capped Chickadee	<i>Poecile atricapillus</i>	Paridae	S5	G5
Common Yellowthroat	<i>Geothlypis trichas</i>	Parulidae	S5B	G5
Dark-eyed Junco	<i>Junco hyemalis</i>	Passerellidae	S5	G5
Fox Sparrow	<i>Passerella iliaca</i>	Passerellidae	S5B,S3N	G5
Swamp Sparrow	<i>Melospiza georgiana</i>	Passerellidae	S5B	G5
Song Sparrow	<i>Melospiza melodia</i>	Passerellidae	S5	G5
Ruffed Grouse	<i>Bonasa umbellus</i>	Phasianidae	S5	G5
Downy Woodpecker	<i>Dryobates pubescens</i>	Picidae	S5	G5
Hairy Woodpecker	<i>Dryobates villosus</i>	Picidae	S5	G5
Northern Flicker	<i>Colaptes auratus</i>	Picidae	S4B	G5
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	Picidae	S5B	G5
White-breasted Nuthatch	<i>Sitta carolinensis</i>	Sittidae	S5	G5
Eastern Kingbird	<i>Tyrannus tyrannus</i>	Tyrannidae	S4B	G5
American Robin	<i>Turdus migratorius</i>	Turdidae	S5B	G5
Swainson's Thrush	<i>Catharus ustulatus</i>	Turdidae	S5B	G5
Wood Thrush	<i>Hylocichla mustelina</i>	Turdidae	S4B	G4
Red-eyed Vireo	<i>Vireo olivaceus</i>	Vireonidae	S5	G5
Mammals				
Coyote	<i>Canis Latrans</i>	Canidae	S5	G5
American Beaver	<i>Castor canadensis</i>	Castoridae	S5	G5
White-tailed Deer	<i>Odocoileus virginianus</i>	Cervidae	S5	G5
Eastern Cottontail	<i>Sylvilagus floridanus</i>	Leporidae	S5	G5

Common Name	Scientific Name	Family	S Rank	G Rank
Raccoon	<i>Procyon lotor</i>	Procyonidae	S5	G5
Eastern Chipmunk	<i>Tamias striatus</i>	Sciuridae	S5	G5
Eastern Gray Squirrel	<i>Sciurus carolinensis</i>	Sciuridae	S5	G5
Red Squirrel	<i>Tamiasciurus hudsonicus</i>	Sciuridae	S5	G5
Amphibians				
American Toad	<i>Anaxyrus americanus</i>	Bufonidae	S5	G5
Green Frog	<i>Lithobates clamitans</i>	Ranidae	S5	G5
Northern Leopard Frog	<i>Lithobates pipiens</i>	Ranidae	S5	G5
Wood Frog	<i>Lithobates sylvaticus</i>	Ranidae	S5	G5

Nature Conservancy conservation concern ranking (2022). G – Global Level, S – Provincial Conservation Status.

SRANK Definition

S1 – Critically imperiled - At very high risk of extirpation in the province due to restricted range, very few populations or occurrences, very steep declines, severe threats, or other factors.

S2 – Imperiled - At high risk of extirpation in the province due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.

S3 – Vulnerable - At moderate risk of extirpation in the province due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.

S4 – Apparently Secure - It denotes that a species is apparently secure, with over 100 occurrences in the province.

S5 – Secure - Indicates that a species is widespread in Ontario, it is demonstrably secure in the province.

SNA - Not Applicable - A conservation status rank is not applicable because the species or ecosystem is not a suitable target for conservation activities.

SNR - Unranked – National or subnational conservation status not yet assessed.

GRANK definition

G1 – Critically Imperiled – At very high risk of extinction or collapse due to very restricted range, very few populations or occurrences, steep declines, severe threats, or other factors.

G2 – Imperiled – At very high risk of extinction or collapse due to very restricted range, very few populations or occurrences, steep declines, severe threats, or other factors.

G3 – Vulnerable - At moderate risk of extinction or collapse due to a fairly restricted range, relatively few populations or occurrences, recently and widespread declines, threats, or other factors.

G4 – Apparently secure – At fairly low risk of extinction or collapse due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as result of local recent declines, threats or other factors.

G5 – Secure - At very low risk of extinction or collapse due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats.

GNR – Unranked – Global rank not yet assessed.

GNA - Not Applicable - A conservation status rank is not applicable because the species or ecosystem is not a suitable target for conservation activities.

T - denotes that the rank applies to a subspecies variety.

Appendix C

Butternut Health Assessment Report

Butternut Health Assessor 173
Scott Brown
44 Sidney Crescent
Batawa, ON
K0K 1E0

August 30, 2022

I have been a Butternut health assessor since the inception of the program with over 35 years experience in the field as a forest technician. I generally work in the Hastings, Northumberland, Frontenac and Lennox and Addington Counties.

Quinte West, Tremur Lake

**Yasmin Ramirez of
Greer Galloway**

Concession 1
Part Lots 9, 10
Murray Township

BHE Report Number: GGQW01

Map Datum: NAD 83
Date of assessment: August 24-28, 2022
Total of Number trees assessed: 18

Tree #	UTM Zone 18	Category	Dia cm	Main Bole length	Origin	Tree future	Reason
1	289316 4886435	N	38	5	Natural	Unknown	
2	289392 4886416	N	14	1	Natural	Unknown	
3	289419 4886587	N	44	3	Natural	Unknown	
4	289427 4886579	N	28	5	Natural	Unknown	
5	289407 4886607	N	30	2	Natural	Unknown	
6	289406 4886600	N	16	1	Natural	Unknown	
7	289403 4886602	N	14	1	Natural	Unknown	
8	289343 4886569	N	62	7	Natural	Unknown	
9	289270 4886580	N	32	6	Natural	Unknown	
10	289266 4886583	N	26	3	Natural	Unknown	
11	289191 4886541	N	18	3	Natural	Unknown	
12	289191 4886545	N	34	2	Natural	Unknown	
13	289530 4886675	N	26	3	Natural	Unknown	
14	289596 4886697	R	38	7	Natural	Unknown	
15	288509 4886625	N	32	7	Natural	Unknown	
16	289511 4886627	N	30	2	Natural	Unknown	
17	289465 4886610	N	26	2	Natural	Unknown	
18	289461 4886608	N	28	3	Natural	Unknown	

Tree category summery:

	<u>Category 1</u>	<u>Category 2</u>	<u>Non-Retainable</u>
	1 tree		17 trees

This letter is in regard to my assessment of the Butternut trees on the aforementioned property. A copy of this assessment will be required to be forwarded to the Species at Risk Biologist of the Ministry of Natural Resources and Forestry District office. Please fill in the required sections in Form 1, property landowner.

MNRF may contact you regarding the need for an audit of my assessment within 30 calendar days following the receipt of the BHA report by the MNR District Manager. During this period no Butternut can be harmed, killed or taken. Butternut are protected under the Endangered Species Act 2007 (section 23 of O. Reg. 242/08).

As a qualified Butternut Health Assessor (BHA), I am providing the following about Butternut trees I located and assessed at the above noted property during the site visits of August 24-28, 2022.

The trees were numbered sequentially with fluorescent orange paint so they can be identified as retainable, non-retainable or a hybrid.

The property consists of 134 acres of various forest types that became established after the farm was abandoned in the mid 1900's. The forest types include white cedar, tolerant hardwood, pine and spruce plantations and shrubland. Soil depth ranges from shallow to moderately shallow. Drainage is moderate to poor. The tree species associated with the butternut are White ash, White cedar, Hemlock and Hard maple.

A total of 18 butternut trees were located on the property with 1 tree considered retainable using the Butternut retainable tree analysis spreadsheet developed by the MNRF. The tree is considered a category 2 tree. (this tree is close if not on the property line). The other 17 trees are classified as Non retainable. Category 2 trees are retainable, while category 3 trees are retainable while showing evidence that they may be resistant to or tolerant of infection by Butternut Canker, or their symptoms are less severe with other trees that have been infected to a similar extent. Category 3 trees are important to the recovery of Butternut.

Hybrid trees

No hybrid butternut trees were found. No indications from leaf, pith, bud scar, bark type or twig indicators.

Permits may be issued by the MNRF for the removal of retainable trees. In order to apply for a permit for the removal of retainable trees contact your local district MNR Species at Risk Biologist to discuss the matter further.

Please feel free to contact with any questions concerning the assessment.

Scott Brown

Tremur Lake Quinte West



This map should not be relied on as a precise indicator of routes or locations, nor as a guide to navigation. The Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) shall not be liable in any way for the use or any information on this map. of, or reliance upon, this map.

Butternut retainable tree analysis

using data collected by a designated BHA (ESA 2007)

Contact the OMNR Provincial SAR Branch for a more detailed explanation of its derivation (June 2009).

ESA 2007 analysis method:

BHA #	173	Assessment Date(s)	30-Aug-22												Total # trees	18			
Landowner name		Quinte West Tremor Lake																	
Property Location		Telephone Rd & County Rd # 40																	
input field data									automatic calculations from field data							Retainable R=yes or N=no			
	Live Crown %	tree dbh (cm)	# bole cankers				# root flare (RF) cankers		Circ. (cm) = Pi x dbh	total bole canker width (sooty x 2.5 + open x 5)	total root flare canker width (sooty x 2.5 + openx5)	bole canker % of circ.	root flare canker % of circ.	total bole & root canker % of 2xCirc	3 R scenarios			Final Call	
			sooty (S) (will be assigned 2.5 cm per canker)	open (O) (will be assigned 5 cm per canker)	LC%> / = 50 and BC% = 0	LC%>7 0 & BRC% <20 even if BC% > 20									LC% > 70 & BC%< 20,even if RC%> 20 (or get exp. crown assess.)				
Tree #	LC %	dbh (cm)	S <2 m	S >2m	O <2m	O >2m	RF sooty	RF open	Circ (cm)	BC (cm)	RC (cm)	BC%	RC%	BRC%	1	2	3	R/N	
1	60	38	4	21	5	4	4	6	119.3	107.5	40	90	34	62	n	n	n	N	
2	40	14	3	0	4	0	1	0	43.96	27.5	2.5	63	6	34	n	n	n	N	
3	80	44	12	5	1	2	4	2	138.2	57.5	20	42	14	28	n	n	n	N	
4	90	28	4	3	8	1	3	4	87.92	62.5	27.5	71	31	51	n	n	n	N	
5	100	3	6	3	0	1	5	0	9.42	27.5	12.5	292	133	212	n	n	n	N	
6	90	16	4	3	6	3	4	0	50.24	62.5	10	124	20	72	n	n	n	N	
7	100	14	3	1	1	1	2	0	43.96	20	5	45	11	28	n	n	n	N	
8	35	62	14	6	3	1	5	6	194.7	70	42.5	36	22	29	n	n	n	N	
9	90	32	7	3	2	2	2	4	100.5	45	25	45	25	35	n	n	n	N	
10	80	26	18	7	4	4	3	3	81.64	102.5	22.5	126	28	77	n	n	n	N	
11	30	18	4	2	0	1	3	2	56.52	20	17.5	35	31	33	n	n	n	N	
12	60	34	14	5	0	0	4	0	106.8	47.5	10	44	9	27	n	n	n	N	
13	65	26	6	4	1	0	3	2	81.64	30	17.5	37	21	29	n	n	n	N	
14	90	38	1	1	1	1	2	2	119.3	15	15	13	13	13	n	r	r	R	
15	80	32	17	5	3	0	6	1	100.5	70	20	70	20	45	n	n	n	N	
16	30	30	15	7	8	0	3	3	94.2	95	22.5	101	24	62	n	n	n	N	
17	65	26	10	4	0	0	4	2	81.64	35	20	43	24	34	n	n	n	N	
18	70	28	4	2	0	0	1	1	87.92	15	7.5	17	9	13	n	n	n	N	
19									0	0	0	#DIV/0!	#####	#####	####	#####	#DIV/0!	###	
20									0	0	0	#DIV/0!	#####	#####	####	#####	#DIV/0!	###	
21									0	0	0	#DIV/0!	#####	#####	####	#####	#DIV/0!	###	
22									0	0	0	#DIV/0!	#####	#####	####	#####	#DIV/0!	###	
23									0	0	0	#DIV/0!	#####	#####	####	#####	#DIV/0!	###	
24									0	0	0	#DIV/0!	#####	#####	####	#####	#DIV/0!	###	
25									0	0	0	#DIV/0!	#####	#####	####	#####	#DIV/0!	###	
26									0	0	0	#DIV/0!	#####	#####	####	#####	#DIV/0!	###	
27									0	0	0	#DIV/0!	#####	#####	####	#####	#DIV/0!	###	
28									0	0	0	#DIV/0!	#####	#####	####	#####	#DIV/0!	###	
29									0	0	0	#DIV/0!	#####	#####	####	#####	#DIV/0!	###	
30									0	0	0	#DIV/0!	#####	#####	####	#####	#DIV/0!	###	
31									0	0	0	#DIV/0!	#####	#####	####	#####	#DIV/0!	###	
32									0	0	0	#DIV/0!	#####	#####	####	#####	#DIV/0!	###	
33									0	0	0	#DIV/0!	#####	#####	####	#####	#DIV/0!	###	
34									0	0	0	#DIV/0!	#####	#####	####	#####	#DIV/0!	###	
35									0	0	0	#DIV/0!	#####	#####	####	#####	#DIV/0!	###	
36									0	0	0	#DIV/0!	#####	#####	####	#####	#DIV/0!	###	
37									0	0	0	#DIV/0!	#####	#####	####	#####	#DIV/0!	###	
38									0	0	0	#DIV/0!	#####	#####	####	#####	#DIV/0!	###	

Appendix D

Site Photolog



Photo 1. View of the White Cedar Mixed Swamp.



Photo 2. View of the Shallow Marsh surrounding the Mayhew Creek.



Photo 3. View of the Sugar Maple-Oak Mixed Forest.



Photo 4. View of the White Pine-Maple-Oak Mixed Forest.



Photo 5. View of the White Birch - Poplar Coniferous Mixed Forest mapped south of Tremur Lake.



Photo 6. View of the White Cedar Coniferous Forest.



Photo 7. View of the Pine Coniferous Forest.



Photo 8. View of the Cultural Woodland.



Photo 9. View of the Cultural Thicket.



Photo 10. View of the Cultural Meadow.



Photo 11. Looking north the east side of County Road 40 where the watermain will be located.



Photo 12. Looking south the area where the waterman will cross the train rails.



Photo 13. Looking east the trail/road southern part of the land owned by the City where the watermain will be installed.



Photo 14. Cultural woodland and meadow vegetation to be affected by the installation of the watermain.



Phot 15. View of a portion of the trail/road that runs in south to north direction where the watermain will be installed.



Photo 16. Looking east the agricultural land where the watermain will be installed prior to reach Tate Road.



Photo 17. Looking north Tate Road where the final section of the watermain will be installed.



Photo 18. Looking North the watercourse receiving flow from the old quarry.



Photo 19. View of the watercourse receiving flow from the surrounding agricultural fields.

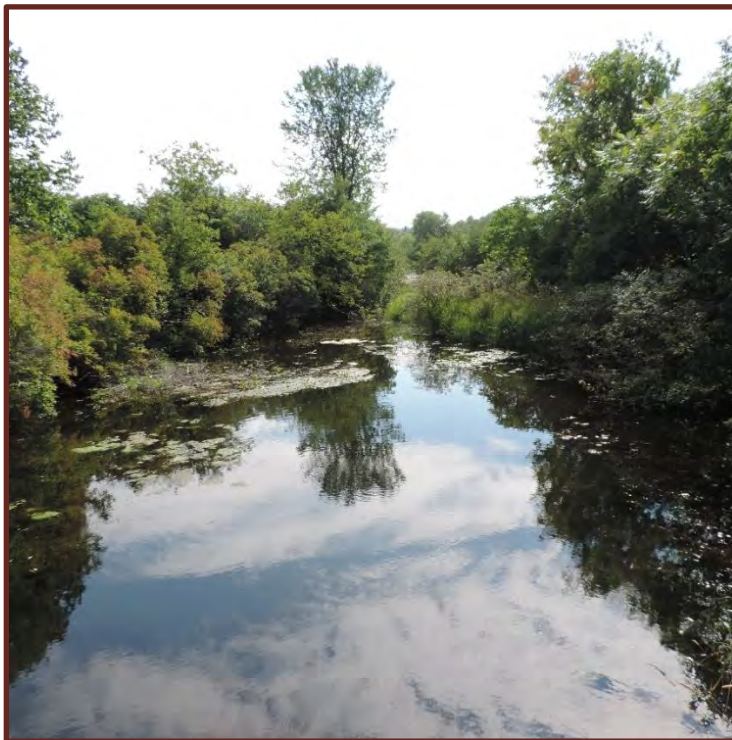


Photo 20. Looking east the Mayhew Creek from Tate Road.

APPENDIX B: Geotechnical Reports



Geotechnical Investigation - QW Watermain Extension - County Road 2, County Road 40 (Wooler Road) & Tate Road

January 6, 2023

Prepared for: City of Quinte West

Cambium Reference: 13324-052

CAMBIUM INC.

866.217.7900

cambium-inc.com

Peterborough | Barrie | Oshawa | Kingston



Table of Contents

1.0	Introduction.....	1
1.1	Background	1
1.2	Project Description	1
2.0	Investigation Methodology	2
2.1	Field Work	2
2.2	Physical Laboratory Testing	3
2.3	Soil Characterization Report.....	3
3.0	Subsurface Conditions	4
3.1	County Road 2	4
3.1.1	Pavement Structure.....	4
3.1.2	Fill Material	5
3.1.3	Native Soils	6
3.1.4	Groundwater.....	6
3.2	County Road 40 (Wooler Road)	7
3.2.1	Surface Materials	7
3.2.2	Fill Material	9
3.2.3	Native Soils	9
3.2.4	Groundwater.....	10
3.3	Tate Road.....	11
3.3.1	Pavement Structure.....	11
3.3.2	Fill Material	13
3.3.3	Native Soils	13
3.3.4	Groundwater.....	14
4.0	Discussion and Recommendations.....	16
4.1	General Site Preparations	16
4.2	Excavations	17
4.3	Groundwater Control	17



4.4	Pipe Bedding	18
4.4.1	Frost Penetration	19
4.5	Trench Backfill.....	19
4.6	Pavement Reconstruction Design	20
4.6.1	Performance Graded Asphalt Cement	22
4.7	Trenchless Construction.....	22
4.7.1	Horizontal Directional Drilling	22
4.7.2	Jack and Bore	23
5.0	Limitations	24
5.1	Design Review and Inspections	24
5.2	Winter Construction.....	24
5.3	Changes in Site and Project Scope	24
6.0	Closing	25
7.0	Standard Limitations.....	26



List of Embedded Tables

Table 1	Existing Asphalt Thickness - CR2.....	4
Table 2	Particle Size Distribution Analysis – CR2 Pavement Structure	5
Table 3	Particle Size Distribution Analysis – Native Material.....	6
Table 4	Groundwater Observations and Borehole Integrity – CR2.....	7
Table 5	Existing Surface Layer Thickness - CR40.....	8
Table 6	Particle Size Distribution Analysis – CR40 Pavement Structure	9
Table 7	Particle Size Distribution Analysis – CR40 Native Material.....	10
Table 8	Groundwater Observations and Borehole Integrity CR40	11
Table 9	Existing Surface Layer Thickness – Tate Road	12
Table 10	Particle Size Distribution Analysis – Tate Road Pavement Structure	12
Table 11	Particle Size Distribution Analysis – Tate Road Fill Material.....	13
Table 12	Particle Size Distribution Analysis – Tate Native Material.....	14
Table 13	Groundwater Observations and Borehole Integrity Tate Road	15
Table 14	Recommended Minimum Pavement Structure, CR2, CR40	20
Table 15	Alternative Recommended Pavement Structure – CR2, CR40.....	20
Table 16	Recommended Minimum Pavement Structure – Tate Road.....	21

List of Appended Figures

Figure 1	Site Plan
Figure 2	Borehole Location Plan

List of Appendices

Appendix A	Record of Borehole Logs
Appendix B	Laboratory Testing Results
Appendix C	Soil Characterization Report



1.0 Introduction

1.1 Background

Cambium Inc. (Cambium) has been requested by The City of Quinte West (The Client) to provide a subsurface investigation for the proposed watermain extension to be completed from 190 m east of Little Farm Boulevard along Highway 2 to the intersection of Tate Road and Telephone Road. The site is located in Trenton, Ontario, in the Municipality of Quinte West. A Site Location Plan is provided as Figure 1.

The purpose of the investigation was to identify the general subsurface conditions at the site by means of a limited number of boreholes and, based on the factual information obtained, provide engineering guidelines regarding the watermain installation and subsequent roadway reconstruction, including construction considerations that may influence design decisions.

1.2 Project Description

Plans are being prepared for the construction of a watermain extension for the Municipality of Quinte West. The watermain will extend along Highway 2 from approximately 190 m east of Little Farm Boulevard where the existing watermain ends to County Road 40 (Wooler Road), along County Road 40 to approximately 450 m south of Telephone Road, crossing in the east-west direction at this point between County Road 40 and Tate Road, and along Tate Road due north to Telephone Road. A total length of approximately 4.1 km.

It is understood that the watermain will be installed approximately 1.5 to 2 metres below ground surface (mbgs).

This report provides the results of the investigation located within the paved area along County Roads 2 and 40 and Tate Road (boreholes BH101-22 through BH121-22 and BH135-22 to BH141-22). The investigation was completed concurrently with the remaining areas at the site and this report should be read in conjunction with the other report (Cambium Reference 13324-051).



2.0 Investigation Methodology

2.1 Field Work

The field investigation involved advancing a total of twenty-eight (28) boreholes. The boreholes were advanced from grade to a depth of approximately 3 mbgs. The locations of the boreholes relative to existing conditions at each site are provided on the attached Figure 2, Borehole Location Plan.

Drilling and sampling of all the boreholes was completed using a truck-mounted drill rig operating under the fulltime supervision of a Cambium technician. Borehole BH114-22 through BH116-22 were advanced within the school yard of Murray Centennial Public School by means of a track mounted drill rig. The boreholes were advanced to the sampling depths by means of continuous flight solid stem augers and 50 mm O.D. split spoon samplers. Standard Penetration Test (SPT) results (N-values) were recorded for the sampled intervals as the number of blows required to drive a split spoon sampler 305 mm in to the soil, using a 63.5 kg drop hammer falling 750 mm, as per ASTM D1586 procedures. In-situ field vane shear tests were completed when soft, cohesive soils were encountered in accordance with ASTM D2573. The SPT N-values in conjunction with shear vane results are used in this report to assess consistency of cohesive soils and relative density of non-cohesive soils.

Borehole samples were inspected and logged in the field using visual and tactile methods. Soil samples were placed in labelled plastic containers for transport, review, potential laboratory testing, and temporary storage. Open boreholes were checked for groundwater and stability prior to backfilling and were backfilled in accordance with O.Reg. 903, as amended.

GPS coordinates of each test hole were obtained using a handheld GPS device and elevation provided on the borehole logs are approximate grade elevations base on publicly available ArcGIS maps through Hastings County.

Records of the individual Borehole Logs are provided in Appendix A.



2.2 Physical Laboratory Testing

Physical laboratory testing was completed on select soil samples to confirm textural classification and to assess geotechnical parameters. The results are summarized in the respective soil stratigraphy sections in Section 3.0 and included in detail in Appendix B.

2.3 Soil Characterization Report

Soil sampling was requested by the Client as part of the geotechnical investigation to characterize soil along the roadway and allow for an Excess Soil Management Plan to be developed in the future. The soil characterization report is included as Appendix C.



3.0 Subsurface Conditions

The subsurface soil and groundwater conditions encountered in the boreholes are presented on the attached Borehole Logs in Appendix A. The stratigraphic boundaries indicated on the logs are inferred from non-continuous samples and observations of drilling resistance and typically represent a transition from one soil type to another, sometimes gradually. The boundaries should not be interpreted to represent exact planes of geologic change. The subsurface conditions have been confirmed in a series of widely spaced boreholes and will vary between and beyond the borehole locations.

3.1 County Road 2

A total of six (6) boreholes were advanced along County Road 2 between approximately 190 meters west of Little Farm Road and the intersection of County Road 2 and County Road 40 (Wooler Road).

3.1.1 Pavement Structure

All six boreholes were advanced into the existing pavement structure. The encountered asphalt thicknesses are summarized in Table 1 below:

Table 1 Existing Asphalt Thickness - CR2

Boreholes	Asphalt Thickness (mm)
BH101-22	130
BH102-22	130
BH103-22	130
BH104-22	100
BH105-22	130
BH106-22	120

Underlying the asphalt pavement, the structure of the base and subbase resembled a mixture of crushed sandy Granular A base overlying Granular B like subbase material extending from directly below the existing asphalt to between approximately 0.3 m to 0.8 m below surface.



These pavement structure layers appeared to be mixed, with no easily definable boundary from base to subbase. All boreholes encountered gravelly silty sand or gravel and sand soil directly underlying the asphalt that falls within the envelope of a Granular B material but does not meet the requirements of a Granular A soil. The coarse-grained material was generally described as brown and slightly moist to moist at the time of investigation. Based on laboratory analysis the moisture content of the granular material was found to be between 1.4% and 13.4% indicating a slightly moist to moist material. SPT N values ranged from 7 to over 50 blows for 300 mm of penetration, however, the granular based was generally found to have compact to dense relative density.

Laboratory particle size distribution analyses were completed for one sample of the granular material, taken from the depths and boreholes shown in Table 2. The analysis results, based on the Unified Soil Classification System (USCS) scale, are summarized in Table 2 with full results provided in Appendix B.

Table 2 Particle Size Distribution Analysis – CR2 Pavement Structure

Sample	Depth (mbgs)	Soil	Gravel (%)	Sand (%)	Silt and Clay (%)
BH103-22, SS1	0.1 – 0.6	Sand and Gravel some Silt	36	47	17

Based on the laboratory analyses, the existing base/subbase material does not meet the gradation requirements for OPSS1010 Granular A material. However, the material may be reused as Granular B Type I subbase fill. The granular fill material is also acceptable for reuse utility trench backfill and site grading.

3.1.2 Fill Material

Underlying the granular material, all boreholes except BH101-22 encountered fill material consisting of predominately sand soils prior to encountering native material. The fill material was encountered directly underlying the granular base layer and extended to depths ranging between approximately 0.8 m – 1.5 m below ground surface. Borehole BH101-22 did not appear to encounter the fill material and instead appeared to transition directly to native soils beneath the granular. The fill soil was generally described as brown to brownish grey and



moist at the time of investigation with trace to some amounts of silt and gravel content. Based on laboratory analysis the moisture content of the fill material was found to be between 3.2% and 19.5% indicating a slightly moist to moist material. SPT N values ranged from 7 to 25 blows for 300 mm of penetration, indicating a loose to compact relative density.

3.1.3 Native Soils

Native subgrade soils encountered at the site were generally identified to consist of a glacial till or Glaciolacustrine material that consist of varying amounts of silt, sand, and gravel soils extending to borehole termination depths of approximately 3.0 mbgs. Native soils were encountered in all boreholes advanced at the site. The native material was described as a silt, sandy silt, silty sand, or gravelly sand soil that was brown to grey and moist to wet at the time of investigation. Based on laboratory analysis the moisture content of the native material was found to be between 6.6% and 23.3% indicating a moist to wet soil. SPT N values ranged from 7 to 25 for 300 mm of penetration, indicating a very loose to compact relative density. Generally, the material encountered was found to be compact, and the relative density increased with depth.

Laboratory particle size distribution analyses were completed for two samples of the granular material, taken from the depths and boreholes shown in Table 3. The analysis results, based on the Unified Soil Classification System (USCS) scale, are summarized in Table 3 with full results provided in Appendix B.

Table 3 Particle Size Distribution Analysis – Native Material

Sample	Depth (mbgs)	Soil	Gravel (%)	Sand (%)	Silt and Clay (%)
BH101-22, SS2	0.8 – 1.4	Sandy Silt trace Gravel	8	25	67
BH105-22, SS2	1.5 – 2.1	Silt some Sand some Gravel	12	14	74

3.1.4 Groundwater

Groundwater observations were made in boreholes immediately following drilling. In addition to groundwater, the integrity of the open borehole walls were also noted at each borehole location.



Table 4 Groundwater Observations and Borehole Integrity – CR2

Borehole	Depth of Groundwater (mbgs)	Depth of Borehole Caving (mbgs)
BH101-22	2.6	Remained Open
BH102-22	2.0	2.1
BH103-22	Dry	Remained Open
BH104-22	Dry	Remained Open
BH105-22	Dry	Remained Open
BH106-22	2.7	Remained Open

Groundwater levels may fluctuate seasonally, depending on the amount of precipitation and surface runoff.

3.2 County Road 40 (Wooler Road)

A total of fifteen (15) boreholes were advanced along County Road 40 between approximately 450 meters south of Telephone Road and the intersection of County Road 2 and County Road 40 (Wooler Road).

3.2.1 Surface Materials

Nine of the boreholes were advanced into the existing pavement structure, while the remaining boreholes were advanced to the west of County Road 40 due to the proposed watermain route. It is understood that the watermain will run along the east side of County Road 40 until Murray Centennial School where the watermain will travel through the eastern limits of the school yard, cross the CP and CN rail lines, and then return to County Road 40 where it will run along the west side of the County Road 40. The encountered surface material thicknesses are summarized in Table 5 below:



Table 5 Existing Surface Layer Thickness - CR40

Boreholes	Layer Thickness (mm)	Surficial Material
BH107-22	130	Asphalt
BH108-22	150	Asphalt
BH109-22	120	Asphalt
BH110-22	150	Asphalt
BH111-22	150	Asphalt
BH112-22	150	Asphalt
BH113-22	175	Asphalt
BH114-22*	250	Topsoil
BH115-22*	250	Topsoil
BH116-22*	120	Topsoil
BH117-22*	200	Topsoil
BH118-22*	125	Topsoil
BH119-22	180	Asphalt
BH120-22	180	Asphalt
BH121-22	180	Asphalt

Where boreholes were advanced through asphalt, the structure of the underlying base and subbase resembled a Granular B like subbase material extending from directly below the existing asphalt to between approximately 0.7 m to 1.3 m below surface. An obvious Granular A base layer was not evident in any of the boreholes advanced. All boreholes advanced within the roadway encountered gravelly silty sand or gravel and sand soil directly underlying the asphalt that falls within the envelope of a Granular B material but does not meet the requirements of a Granular A soil. The coarse-grained material was generally described as brown and slightly moist to moist at the time of investigation. Based on laboratory analysis the moisture content of the granular material was found to be between 2.4% and 7.0% indicating a slightly moist to moist material. SPT N values ranged from 21 to over 50 blows for 300 mm of penetration, indicating a compact to dense relative density.



Where boreholes were advanced within the school yard and to the west of County Road 40, the topsoil material encountered generally consisted of a silty sand and was described as light to dark brown, moist, loose, with some organics and trace clay and gravel.

Laboratory particle size distribution analyses were completed for three samples of the granular material, taken from the depths and boreholes shown in Table 6. The analysis results, based on the Unified Soil Classification System (USCS) scale, are summarized in Table 6 with full results provided in Appendix B.

Table 6 Particle Size Distribution Analysis – CR40 Pavement Structure

Sample	Depth (mbgs)	Soil	Gravel (%)	Sand (%)	Silt and Clay (%)
BH107-22, SS1	0.1 – 0.6	Gravelly Sand some Silt	32	54	14
BH113-22, SS1	0.2 – 0.6	Gravelly Sand some Silt	21	61	18
BH119-22, SS1	0.2 – 0.6	Gravelly Sand trace Silt	31	60	9

Based on the laboratory analyses, the existing base/subbase material does not meet the gradation requirements for OPSS1010 Granular A material. However, the material may be reused as Granular B Type I subbase fill. The granular fill material is also acceptable for reuse utility trench backfill and site grading.

3.2.2 Fill Material

Underlying the granular material, borehole BH107-22 encountered a fill material consisting of predominately gravel soil which extended to approximately 1.5 mbgs. The gravel soil was described as grey and moist with some sand and trace silt.

3.2.3 Native Soils

Native subgrade soils encountered at the site were generally identified to consist of a glacial till or Glaciolacustrine material that predominately consists of silt, with varying amounts of gravel, sand, and clay soils extending to borehole termination depths of approximately 3.0 mbgs.

Native soils were encountered in all boreholes advanced at the site. The native material was described as a silt, sandy silt, or silty sand soil that was brown to grey and moist to wet at the



time of investigation. Boreholes BH117-22 and BH118-22 encountered a layer of predominately gravel material within the native soils layer and was described as greyish brown, moist, and generally dense. Borehole BH121-22 encountered a layer of silty clay near borehole termination depths which correlates well with the subsurface conditions encountered in the boreholes advanced to the west of County Road 40 (boreholes 122-22 and above). Based on laboratory analysis the moisture content of the native material was found to be between 4% and 40.4% indicating a moist to wet soil. SPT N values ranged from 3 to over 50 for 300 mm of penetration, indicating a soft/loose to very dense relative density. Generally, the material encountered was found to be stiff or compact, and the relative density increased with depth.

Laboratory particle size distribution analyses were completed for four samples of the native material, taken from the depths and boreholes shown in Table 7. The analysis results, based on the Unified Soil Classification System (USCS) scale, are summarized in Table 7 with full results provided in Appendix B.

Table 7 Particle Size Distribution Analysis – CR40 Native Material

Sample	Depth (mbgs)	Soil	Gravel (%)	Sand (%)	Silt and Clay (%)
BH109-22, SS2B	0.8 – 1.4	Sandy Silt trace Gravel	2	25	73
BH111-22, SS3	1.5 – 2.1	Silt trace Sand trace Gravel	1	2	97
BH117-22, SS2	0.8 – 1.4	Sand and Silt trace Gravel	4	52	44
BH121-22, SS2	0.8 – 1.4	Silt trace Sand	0	6	94

3.2.4 Groundwater

Groundwater observations were made in boreholes immediately following drilling. In addition to groundwater, the integrity of the open borehole walls were also noted at each borehole location.



Table 8 Groundwater Observations and Borehole Integrity CR40

Borehole	Depth of Groundwater (mbgs)	Depth of Borehole Caving (mbgs)
BH107-22	1.1	1.2
BH108-22	1.5*	0.9
BH109-22	0.8	0.9
BH110-22	0.8*	Remained Open
BH111-22	Dry	0.6
BH112-22	1.6	2.3
BH113-22	2.3	2.4
BH114-22*	2.3	Remained Open
BH115-22*	Dry	Remained Open
BH116-22*	Dry	Remained Open
BH117-22*	Dry	Remained Open
BH118-22*	1.2	2.4
BH119-22	Dry	Remained Open
BH120-22	1.0	1.1
BH121-22	0.9	1.1

*first groundwater encounter, not standing

Groundwater levels may fluctuate seasonally, depending on the amount of precipitation and surface runoff.

3.3 Tate Road

A total of seven (7) boreholes were advanced along Tate Road between approximately 400 meters south of Telephone Road along Tate Road and the intersection of Tate Road and Telephone Road. Boreholes BH136-22 and BH137-22 were advanced to 5.0 mbgs on either side of the culvert located along Tate Road approximately 350 m south of Telephone Road. The remaining boreholes were advanced to 3.0 mbgs.

3.3.1 Pavement Structure

All seven boreholes were advanced into the existing pavement structure. The encountered asphalt thicknesses are summarized in Table 9 below:



Table 9 Existing Surface Layer Thickness – Tate Road

Boreholes	Layer Thickness (mm)	Surficial Material
BH135-22	25	Asphalt
BH136-22	25	Asphalt
BH137-22	25	Asphalt
BH138-22	25	Asphalt
BH139-22	25	Asphalt
BH140-22	25	Asphalt
BH141-22	25	Asphalt

Underlying the asphalt pavement, the structure of the base and subbase resembled a Granular B like subbase material extending from directly below the existing asphalt to between approximately 0.3 m to 0.7 m below surface. No obvious layer of Granular A base material was encountered. All boreholes encountered gravelly silty sand or gravel and sand soil directly underlying the asphalt that falls within the envelope of a Granular B material but does not meet the requirements of a Granular A soil. The coarse-grained material was generally described as brown to grey and slightly moist to moist at the time of investigation. Based on laboratory analysis the moisture content of the granular material was found to be between 3.3% and 5.2% indicating a generally moist material. SPT N values ranged from 8 to 30 blows for 300 mm of penetration, indicating a loose to compact relative density, however, the material was generally found to be compact.

Laboratory particle size distribution analyses were completed for one sample of the granular material, taken from the depths and boreholes shown in Table 10. The analysis results, based on the Unified Soil Classification System (USCS) scale, are summarized in Table 10 with full results provided in Appendix B.

Table 10 Particle Size Distribution Analysis – Tate Road Pavement Structure

Sample	Depth (mbgs)	Soil	Gravel (%)	Sand (%)	Silt and Clay (%)
BH139-22, SS1	0.2 – 0.6	Gravel and Sand some Silt	38	49	13



Based on the laboratory analyses, the existing base/subbase material does not meet the gradation requirements for OPSS1010 Granular A material. However, the material may be reused as Granular B Type I subbase fill. The granular fill material is also acceptable for reuse utility trench backfill and site grading.

3.3.2 Fill Material

Underlying the granular material, all boreholes, except borehole BH139-22, advanced along Tate Road encountered a fill material consisting of predominately sand soil which generally extended to approximately 1.5 mbgs. In boreholes BH135-22 through BH137-22, BH140-22, and BH141-22, the fill material generally consisted of sand and was described as brown, moist, loose and with trace to some silt. In borehole BH138-22, the fill material appeared to resemble the overlying Granular B material, extending past the typical road structure and consisting of a gravelly silty sand.

Based on laboratory analysis the moisture content of the fill material was found to be between 4.2% and 12.5% indicating a generally moist soil. SPT N values ranged from 8 to 25 for 300 mm of penetration, indicating a loose to compact relative density. Generally, the material encountered was found to be compact.

Laboratory particle size distribution analyses were completed for one sample of the fill material, taken from the depths and boreholes shown in Table 11. The analysis results, based on the Unified Soil Classification System (USCS) scale, are summarized in Table 11 with full results provided in Appendix B.

Table 11 Particle Size Distribution Analysis – Tate Road Fill Material

Sample	Depth (mbgs)	Soil	Gravel (%)	Sand (%)	Silt and Clay (%)
BH141-22, SS2	0.8 – 1.0	Sand some Silt trace Gravel	1	88	11

3.3.3 Native Soils

Native subgrade soils encountered at the site were generally identified to consist of a glacial till or Glaciolacustrine material that predominately consists of silt and sand soils, with varying



amounts of gravel and clay soils extending to borehole termination depths of approximately 3.0 mbgs to 5.0 mbgs. Native soils were encountered in all boreholes advanced at the site. The native material was described as a silt, sandy silt, or sand with silt soil that was brown to grey and moist to wet at the time of investigation. Borehole BH138-22 encountered a layer of silty clay near borehole termination depths. Based on laboratory analysis the moisture content of the native material was found to be between 6.7% and 68% indicating a moist to wet soil. Excessively high moisture contents are usually indicative of organics present within the sample during testing. SPT N values ranged from 2 to 12 for 300 mm of penetration, indicating a soft/loose to stiff/compact relative density. Generally, the material encountered was found to be firm or compact.

Laboratory particle size distribution analyses were completed for two samples of the native material, taken from the depths and boreholes shown in Table 12. The analysis results, based on the Unified Soil Classification System (USCS) scale, are summarized in Table 12 with full results provided in Appendix B.

Table 12 Particle Size Distribution Analysis – Tate Native Material

Sample	Depth (mbgs)	Soil	Gravel (%)	Sand (%)	Silt and Clay (%)
BH135-22, SS2	0.8 – 1.4	Silt trace Sand trace Gravel	3	5	92
BH137-22, SS5	3.0 – 3.7	Sand some Silt trace Gravel	1	88	12

3.3.4 Groundwater

Groundwater observations were made in boreholes immediately following drilling. In addition to groundwater, the integrity of the open borehole walls were also noted at each borehole location.



Table 13 *Groundwater Observations and Borehole Integrity Tate Road*

Borehole	Depth of Groundwater (mbgs)	Depth of Borehole Caving (mbgs)
BH135-22	Dry	Remained Open
BH136-22	1.7	2.4
BH137-22	2.6*	Remained Open
BH138-22	2.3	2.6
BH139-22	Dry	2.6
BH140-22	1.7	2.9
BH141-22	2.7	Remained Open

*first groundwater encounter, not standing

Groundwater levels may fluctuate seasonally, depending on the amount of precipitation and surface runoff. It is likely that stable groundwater levels within proximity to the culvert crossing Tate Road will correlate closely to the surface waters of the creek.



4.0 Discussion and Recommendations

The following discussion and recommendations are based on the factual data obtained from this investigation and are intended for use by the owner and the design engineer. Contractors bidding or providing services on this project should review the factual data and determine their own conclusions regarding the construction methods and scheduling.

This report is based on the assumption that the design features relevant to the geotechnical analysis will be completed in accordance with applicable codes, standards, and guidelines of practice. If there are changes to the site development features, or there is any significant variations in the subsurface conditions that are found before or during construction, Cambium should be retained to review the implications of these changes with respect to the contents of this report.

It is understood that the proposed watermain is to be along County Road 2, County Road 40, and Tate Road. Additionally, it is understood that sections of the watermain may be installed alongside each of the roadways instead of below the roadway and that a horizontal boring is proposed to allow the watermain to extend below the creek which crosses Tate Road. The following recommendations should be consulted for the applicable lengths of the proposed watermain.

4.1 General Site Preparations

Existing asphalt in the roadway areas should be removed to full depth and sent off-site for recycling. Any organic material within the roadway should also be excavated and removed from Site and excavations should extend the full depth of the proposed pavement structure. Native silty sands to sands encountered at this depth should be removed and stockpiled for further testing to determine if it is suitable for reuse as trench backfill or subgrade fill. The existing granular base material should be removed and may be stockpiled to confirm if it is appropriate for future reuse as trench backfill or subgrade fill. The final subgrade surface should be proof rolled and inspected by a Geotechnical Engineer prior to the placement of any



material. Areas where soft or loose soils are noted should be sub-excavated and replaced with suitable fill, compacted to at least 98% of standard Proctor maximum dry density (SPMDD).

4.2 Excavations

Excavation of the proposed watermain will extend through the fill material, native clays, silt, sands, and gravels.

Temporary excavations must be carried out in accordance with the latest edition of the Occupational Health and Safety Act (OHSA), Ontario Regulation 213/91 (as amended). For practical purposes, the overburden soils at the site above the water table can be considered to be Type 3 soils, as such excavation side slopes should be no steeper than 1H:1V. Any excavations that are carried out through the non-cohesive deposits below the water table should be considered as Type 4 soils, and excavation side slopes should be flattened to 3H:1V. Minimum support system requirements (shoring) for steeper excavations are stipulated in Sections 235 through 238 of the Occupational Health and Safety Act (OHSA), Construction Projects, Part III.

Excavation side slopes should be protected from exposure to precipitation and associated ground surface runoff and should be inspected regularly for signs of instability. If localized instability is noted during excavation or if wet conditions are encountered, the side slopes should be flattened as required to maintain safe working conditions or the excavation sidewalls must be fully supported (shored).

4.3 Groundwater Control

Stabilized groundwater measurements were not taken as part of this investigation; rather, observations were made in the open boreholes immediately following drilling field work. Groundwater, whether standing or localized, appeared to range between 0.8 and 2.7 mbgs throughout each roadway. Perched water should also be anticipated from within sandy deposits overlying clay deposits. It may be necessary to complete excavation work during the drier season in order to avoid large scale site dewatering.



Based on the anticipated invert elevations, it is expected that the groundwater will be encountered during excavation. It may be necessary to temporarily lower the groundwater in advance of the excavation. Pumping from wells, well points, and/or sumps to achieve groundwater lowering is considered appropriate. Pumping should be taken from each side of opened excavation.

If flows from pumps exceed 50,000 L/day but is less than 400,000 L/day, an Environmental Activity and Sector Registry (EASR) will be required. It is recommended that an EASR posting should be obtained in advance of construction to avoid possible delays. If water takings exceed more than 400,000 L/day, the project will require a Permit to Take Water (PTTW) issued by MECP. If it is identified that a EASR or PTTW is required for the Site, a hydrogeological report will need to be submitted in support of the application. It is recommended that construction is staged to maintain flows from pumps to below 50,000 L/day.

4.4 Pipe Bedding

The bedding requirements for the proposed watermain should be in accordance with OPSD 0802.0310 for rigid pipes in overburden (Type 3) excavations. The pipe bedding material should consist of at least 150 mm of a Class B bedding such as that meeting OPSS.MUNI 1010 Granular A.

In areas where the subgrade becomes disturbed due to construction activities, the unsuitable/disturbed material should be removed and replaced with a sub-bedding layer of compacted granular material, such as that meeting OPSS.MUNI 1010 Granular B Type II. To provide adequate support for the pipe in areas where subexcavation of material is required below design subgrade level, the excavations should be sized to allow a 1 horizontal to 2 vertical spread of granular material down and out from the bottom of the pipe.

Cover material, from pipe spring line to at least 300 mm above the top of the pipe, should consist of OPSS.MUNI 1010 Granular A.

The use of clear crushed stone as bedding or sub-bedding material should not be permitted.



The sub-bedding, bedding and cover materials should be compacted in maximum 200 mm thick lifts to at least 98 % of the Standard Proctor Dry Density (SPMDD) value.

4.4.1 Frost Penetration

Based on climate data and design charts, the maximum frost penetration depth below the existing grade at the Site is estimated at 1.2 m. It is assumed that any reconstructed pavement structure thickness will be less than 1.2 m, so grading and drainage are important for good pavement performance and life expectancy. Any buried services should be located below this depth or be appropriately insulated.

4.5 Trench Backfill

In general, excavated soils encountered at both sites may be re-used as backfill provided the moisture content of these materials is within 2% of optimum to ensure adequate compaction, the trenches are wide enough to accommodate large compaction equipment, and the soil is free of any organic and/or deleterious material. Soils with elevated moisture could be put aside to dry, tilled to reduce the moisture content so that they can be effectively compacted, or could be mixed with dryer material. Alternatively, materials of higher moisture content could be wasted and replaced with imported material which can be readily compacted.

The backfill should consist of clean earth fill and should be placed in lifts of 300 mm thickness or less and compacted to a minimum 95% of SPMMD at water content within 2% of optimum. Existing earth fill and native soils will be difficult to place and compact successfully in narrow trench excavations, where large compaction equipment could not operate. For narrow trench excavations, it is recommended that free draining granular material, such as OPSS.MUNI 1010 Granular B Type I or II be used in order to allow for adequate compaction using walk behind vibratory equipment. The placement and inspection of any earth fill as backfill must be conducted under the full-time observation of Cambium.



4.6 Pavement Reconstruction Design

Where the watermain is to be embedded below the roadway, full depth reconstruction without grade raise is considered for pavement reconstruction. It is assumed that the roadway will be reconstructed to the municipal design standard presented in the City of Quinte West Engineering Design Standards. The recommended minimum pavement thickness design has been developed as provided in Table 14 for County Road 2 and County Road 40.

Table 14 Recommended Minimum Pavement Structure, CR2, CR40

Pavement Layer	Thickness	GBE
Surface Course Asphalt	40 mm HL3	80
Binder Course Asphalt	60 mm HL8	120
Granular Base	150 mm OPSS 1010 Granular A	150
Granular Subbase	300 mm OPSS 1010 Granular B	200
Total	550 mm	550

If desirable, the Superpave 12.5 HMA may be replaced with HL-3, and the Superpave 19.0 HMA may be replaced with HL-8, both conforming to OPSS.MUNI 1150 and with a minimum traffic level/category of B.

Following discussions with the Client, the following alternative pavement structure shown in Table 15 would also be acceptable for County Road 2 and County Road 40.

Table 15 Alternative Recommended Pavement Structure – CR2, CR40

Pavement Layer	Thickness	GBE
Surface Course Asphalt	50 mm Superpave 12.5	100
Binder Course Asphalt	60 mm Superpave 19.0	120
Granular Base	150 mm OPSS 1010 Granular A (crushed Limestone)	150
Granular Subbase	300 mm OPSS 1010 Granular B	200
Total	560 mm	570



The recommended minimum pavement thickness design has been developed as provided in Table 16 for Tate Road.

Table 16 Recommended Minimum Pavement Structure – Tate Road

Pavement Layer	Thickness	GBE
Surface Course Asphalt	40 mm HL3	80
Binder Course Asphalt	50 mm HL8	100
Granular Base	150 mm OPSS 1010 Granular A	150
Granular Subbase	300 mm OPSS 1010 Granular B	200
Total	540 mm	530

The performance of the pavement is dependent upon proper subgrade preparation. All existing asphalt and/or underlying granular fill material should be removed down to native material. Alternatively, the asphalt and granular base can be pulverized to a depth of 200 mm to create a 50/50 recycled asphalt product blend and stockpiled for re-use as subbase fill throughout the roadway. The subgrade should then be proof rolled and inspected by a Geotechnical Engineer. Any areas where rutting or appreciable deflection is noted should be sub excavated and replaced with suitable fill and compacted to 98% of SPMDD.

The thickness of the subbase layer could be increased at the discretion of the Engineer, to accommodate site conditions at the time of construction, including soft or weak subgrade soil replacement.

Compaction of the subgrade should be verified by the Engineer prior to placing the granular fill. Granular layers should be placed in 200 mm thick loose lifts and compacted to at least 100% SPMDD, per ASTM D698 standard. The granular materials specified should conform to OPSS standards, as confirmed by appropriate materials testing.

The final asphalt surface should be sloped at a minimum of 2 percent to shed runoff. Abutting pavements should be sawcut to provide clean vertical joints with new pavement areas.



4.6.1 Performance Graded Asphalt Cement

The standard base grade of Performance Graded Asphalt Cement (PGAC) for Southern Ontario is PG 58-28. The PGAC material should confirm to OPSS.MUNI 1101.

4.7 Trenchless Construction

It is understood that the proposed watermain will be installed using trenchless technology where it crosses the creek located along Tate Road approximately 350 m south of Telephone Road. Boreholes BH136-22 and BH137-22 were advanced adjacent to the culvert, while boreholes BH135-22 and BH138-22 were advanced in the approximate location of the sending and receiving pits.

Subsurface conditions at boreholes BH135-22 through BH138-22, on either side of the subject rail line, generally consist of predominately coarse-grained surface soils, underlain by a mix of sand and fine-grained soils, which extend to borehole termination depths of 3.0 to 5.0 mbgs. Groundwater levels throughout the area of the boreholes was measured during the investigation, indicating that groundwater levels in proximity to the creek will fluctuate with the surface water level of the creek.

Given the proposed utility diameter, ground conditions, and changes in elevation, the preferred trenchless technique option for installation of the watermain beneath the CP rail is Horizontal Directional Drilling (HDD).

It is noted that the contractor should be fully responsible for the selection of the trenchless technology which best fits the subsurface conditions, the contract requirements, their equipment availability, and their staff capabilities and experience.

4.7.1 Horizontal Directional Drilling

HDD is considered to be a feasible alternative for installing the watermain beneath the creek along Tate Road. With HDD, a small rotating and steerable bit is used to drill a pilot hole supported with drilling fluid. Once the pilot bore is complete, the drill head is replaced with a



backreamer or expander which enlarges the drill hole. HDD is adaptable to a range of drilling conditions through proper selection of compatible drilling fluids, downhole tools and equipment. Based on the anticipated depths of the proposed services, the HDD will be completed through compact to very dense gravel and sand soils.

4.7.2 Jack and Bore

Alternatively, jack and bore, or auger boring, may be utilized to advance the watermain below the creek along Tate Road. Jack and bore consists of a pipe jacking operation that involves pushing a casing sleeve horizontally into the ground by means of jacking. Generally, the process involves advancing the casing while simultaneously advancing an auger boring machine to remove the spoils generated from within the casing. Soil and pipe friction is generally reduced by utilizing lubrication, and different types of bentonites or polymers can be used as lubricating agents. Advancement of casing slightly ahead or simultaneously with the auger boring machine reduces the risk of settlement above the proposed utility crossing. When considering jack and bore trenchless methods, the excavations for the sending and receiving pits should be supported properly and the design of the proposed utility casing should be reviewed to ensure an adequate thickness is utilized. Although this method would require significantly deeper sending and receiving pits, the casing advanced simultaneously with the auger can help support sidewalls of the bored lateral hole.



5.0 Limitations

5.1 Design Review and Inspections

Cambium should be contacted to review and approve design drawings, prior to tendering or commencing construction, to ensure that all pertinent geotechnical-related factors have been addressed. It is important that onsite geotechnical supervision be provided at this site for excavation and backfill procedures, deleterious soil removal, subgrade inspections and compaction testing.

5.2 Winter Construction

In order to carry out the work during freezing temperatures and maintain adequate performance of the trench backfill as a roadway subgrade, the service trench should be opened for as short a time as practicable and the excavations should be carried out only in lengths which allow all of the construction operations, including backfilling, to be fully completed in one working day. The materials on the sides of the trench should not be allowed to freeze. In addition, the backfill should be excavated, stored and replaced without being disturbed by frost or contaminated by snow or ice.

5.3 Changes in Site and Project Scope

This geotechnical engineering report is intended for planning and design purposes only.

Subsurface conditions can be altered by the passage of sufficient time, natural occurrences, and human intervention.

The design parameters provided, and the engineering advice offered in this report are intended for use by the owner and its retained design consultants. If there are changes to the project scope and development features, these interpretations made of the subsurface information, for geotechnical design parameters, advice, and comments relating to constructability issues and quality control may not be complete for the project. Cambium should be retained to conduct further review to interpret the implications of such changes with respect to this report.



6.0 Closing

We trust that the information contained in this report meets your current requirements. If you have questions or comments regarding this document, please do not hesitate to contact the undersigned reviewer at (705) 742-7900.

Respectfully submitted,

Cambium Inc.

Mackenzie Garrison, M.Eng, P. Eng.
Geotechnical Engineer/Project Manager

Stuart Baird, M.Eng., P.Eng.
Director – Building Sciences, Geotechnical,
and CQV

MDG/BV/SEB

P:\13300 to 13399\13324-052 CoQW - GEO - Quinte West Watermain Extension - CR2, Wooler Road, & Tate Road\Deliverables\REPORT - GEO\Final\2023-01-06 QW Watermain Extension - CR2, Wooler, Tate.docx



7.0 Standard Limitations

Limited Warranty

In performing work on behalf of a client, Cambium relies on its client to provide instructions on the scope of its retainer and, on that basis, Cambium determines the precise nature of the work to be performed. Cambium undertakes all work in accordance with applicable accepted industry practices and standards. Unless required under local laws, other than as expressly stated herein, no other warranties or conditions, either expressed or implied, are made regarding the services, work or reports provided.

Reliance on Materials and Information

The findings and results presented in reports prepared by Cambium are based on the materials and information provided by the client to Cambium and on the facts, conditions and circumstances encountered by Cambium during the performance of the work requested by the client. In formulating its findings and results into a report, Cambium assumes that the information and materials provided by the client or obtained by Cambium from the client or otherwise are factual, accurate and represent a true depiction of the circumstances that exist. Cambium relies on its client to inform Cambium if there are changes to any such information and materials. Cambium does not review, analyze or attempt to verify the accuracy or completeness of the information or materials provided, or circumstances encountered, other than in accordance with applicable accepted industry practice. Cambium will not be responsible for matters arising from incomplete, incorrect or misleading information or from facts or circumstances that are not fully disclosed to or that are concealed from Cambium during the provision of services, work or reports.

Facts, conditions, information and circumstances may vary with time and locations and Cambium's work is based on a review of such matters as they existed at the particular time and location indicated in its reports. No assurance is made by Cambium that the facts, conditions, information, circumstances or any underlying assumptions made by Cambium in connection with the work performed will not change after the work is completed and a report is submitted. If any such changes occur or additional information is obtained, Cambium should be advised and requested to consider if the changes or additional information affect its findings or results.

When preparing reports, Cambium considers applicable legislation, regulations, governmental guidelines and policies to the extent they are within its knowledge, but Cambium is not qualified to advise with respect to legal matters. The presentation of information regarding applicable legislation, regulations, governmental guidelines and policies is for information only and is not intended to and should not be interpreted as constituting a legal opinion concerning the work completed or conditions outlined in a report. All legal matters should be reviewed and considered by an appropriately qualified legal practitioner.

Site Assessments

A site assessment is created using data and information collected during the investigation of a site and based on conditions encountered at the time and particular locations at which fieldwork is conducted. The information, sample results and data collected represent the conditions only at the specific times at which and at those specific locations from which the information, samples and data were obtained and the information, sample results and data may vary at other locations and times. To the extent that Cambium's work or report considers any locations or times other than those from which information, sample results and data was specifically received, the work or report is based on a reasonable extrapolation from such information, sample results and data but the actual conditions encountered may vary from those extrapolations.

Only conditions at the site and locations chosen for study by the client are evaluated; no adjacent or other properties are evaluated unless specifically requested by the client. Any physical or other aspects of the site chosen for study by the client, or any other matter not specifically addressed in a report prepared by Cambium, are beyond the scope of the work performed by Cambium and such matters have not been investigated or addressed.

Reliance

Cambium's services, work and reports may be relied on by the client and its corporate directors and officers, employees, and professional advisors. Cambium is not responsible for the use of its work or reports by any other party, or for the reliance on, or for any decision which is made by any party using the services or work performed by or a report prepared by Cambium without Cambium's express written consent. Any party that relies on services or work performed by Cambium or a report prepared by Cambium without Cambium's express written consent, does so at its own risk. No report of Cambium may be disclosed or referred to in any public document without Cambium's express prior written consent. Cambium specifically disclaims any liability or responsibility to any such party for any loss, damage, expense, fine, penalty or other such thing which may arise or result from the use of any information, recommendation or other matter arising from the services, work or reports provided by Cambium.

Limitation of Liability

Potential liability to the client arising out of the report is limited to the amount of Cambium's professional liability insurance coverage. Cambium shall only be liable for direct damages to the extent caused by Cambium's negligence and/or breach of contract. Cambium shall not be liable for consequential damages.

Personal Liability

The client expressly agrees that Cambium employees shall have no personal liability to the client with respect to a claim, whether in contract, tort and/or other cause of action in law. Furthermore, the client agrees that it will bring no proceedings nor take any action in any court of law against Cambium employees in their personal capacity.



Appended Figures

**GEOTECHNICAL
INVESTIGATION**
CITY OF QUINTE WEST
Wooler Road to Tate Road
Quinte West, Ontario

LEGEND

- Highway
- Major Road
- Railroad
- Watercourse
- Water Area
- Provincial Park
- Wooded Area
- Built Up Area

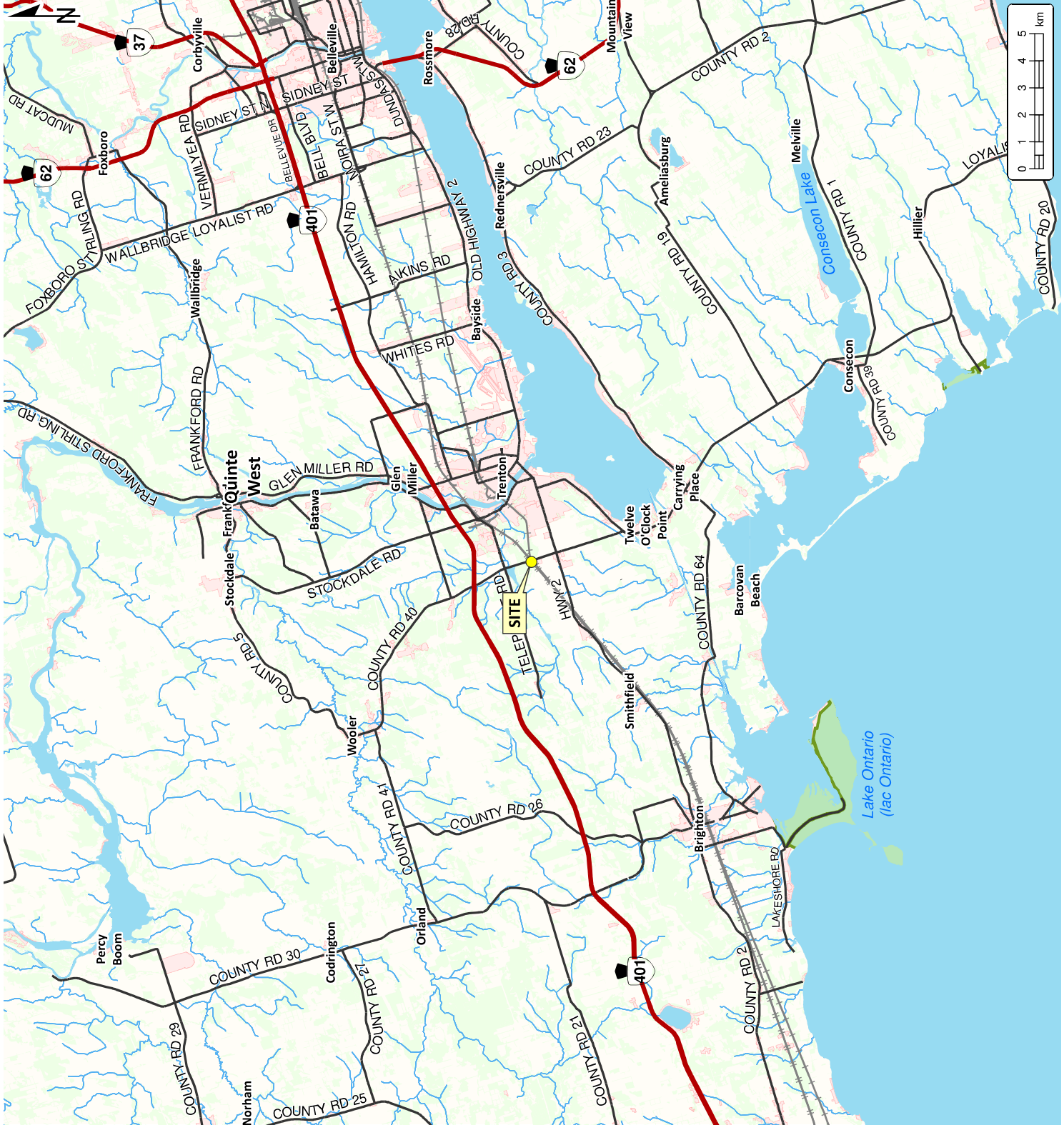
Notes:
• Base mapping features are © Queen's Printer of Ontario, 2019 (this does not constitute an endorsement by the Ministry of Natural Resources or the Ontario Government).
• All distances on this plan are in metres and can be converted to feet by multiplying by 3.28.
• Cambium Inc. makes every effort to ensure this map is free from errors but cannot be held responsible for any damages due to error or omissions. This map should not be used for navigation or legal purposes. It is intended for general reference use only.



194 Sophia Street
Peterborough, Ontario, K9H 1E5
Tel: (705) 742-7900 Fax: (705) 742-7907
www.cambium-inc.com

SITE LOCATION MAP

Project No.:	13324-052	Date:	May 2022
Scale:	1:200,000	Projection:	NAD 1983 UTM Zone 18N
Created by:	TLC	Checked by:	MG
			Figure: 1



**GEOTECHNICAL
INVESTIGATION**
CITY OF QUINTE WEST
Wooler Road to Tate Road
Quinte West, Ontario

LEGEND



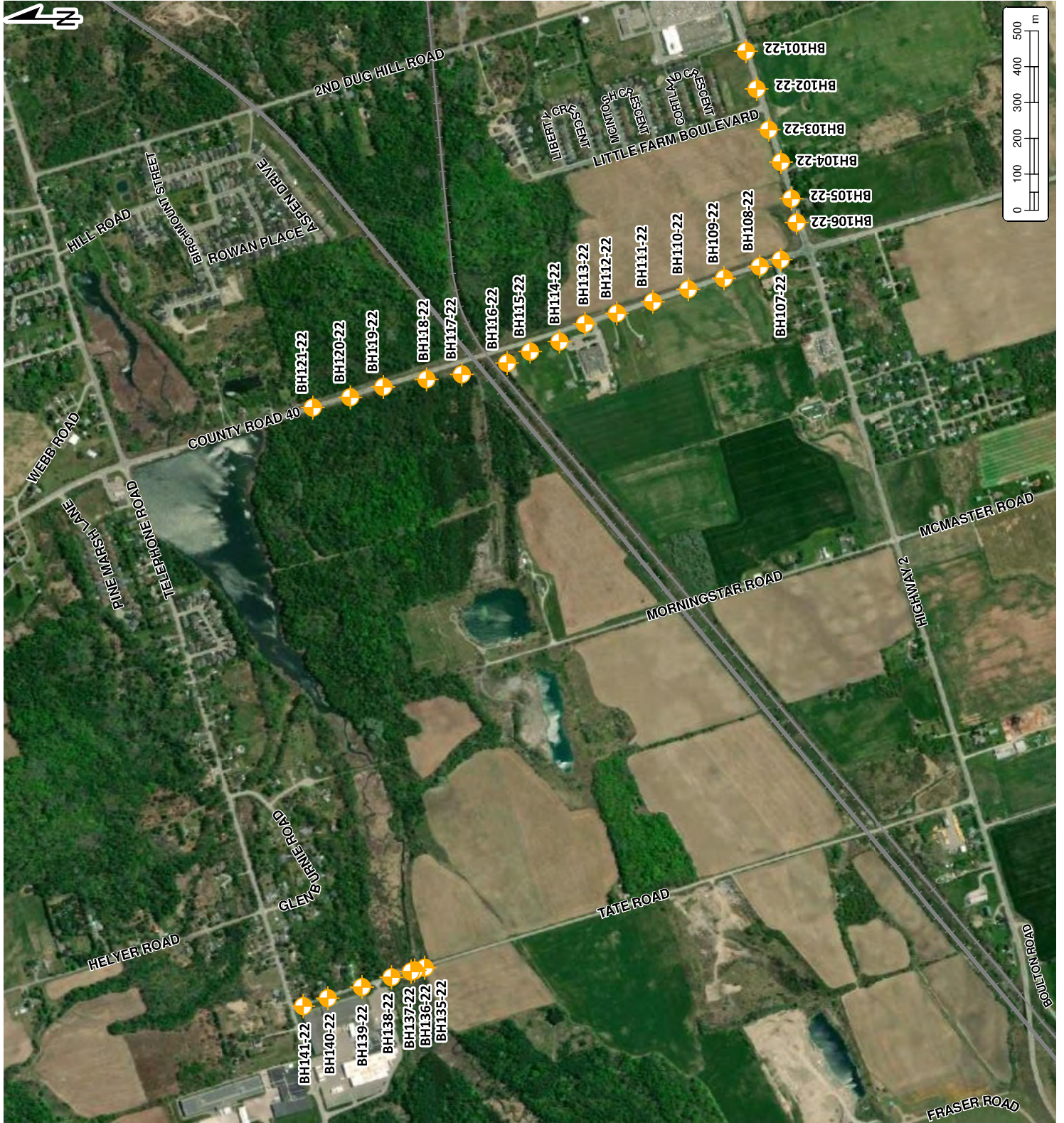
Notes:
• Base mapping features are © Queen's Printer of Ontario, 2019 (this does not constitute an endorsement by the Ministry of Natural Resources or the Ontario Government).
• Distances shown on this plan are in metres and can be converted to feet by multiplying by 3.28.
• Cambium Inc. makes every effort to ensure this map is free from errors but cannot be held responsible for any damages due to error or omissions. This map should not be used for navigation or legal purposes. It is intended for general reference use only.



194 Sophia Street
Peterborough, Ontario, K9H 1E5
Tel: (705) 742-7900 Fax: (705) 742-7907
www.cambium-inc.com

BOREHOLE LOCATION PLAN

Project No.:	13324-052	Date:	May 2022
Scale:	1:15,000	Projection:	NAD 1983 UTM Zone 18N
Created by:	TLC	Checked by:	MG
			Figure: 2





Appendix A

Record of Borehole Logs



Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH101-22
Page 1 of 1

Client: City of Quinte West
Contractor: Canadian Environmental Drillers
Location: County Road 2, Quinte West, ON

Project Name: CoQW WM Ext - CR2, Wooler, Tate Road
Method: Truck Mounted Solid Stem Auger
UTM: 18T N: 4885474.8 E: 291437.7

Project No.: 13324-052
Date Completed: April 25, 2022
Elevation: 105 mASL

SUBSURFACE PROFILE				SAMPLE												
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT				Well Installation	Log Notes
								25	50	75	20	40	60	80		
105	0		ASPHALT: 130 mm Asphalt													
			(SM) gravelly SILTY SAND: brownish grey, moist, loose	1A	SS			1.4%								
				1B	SS			13.1%								
						78	7							7		
104.5	0.5		(ML) sandy SILT: grey, moist, firm, some gravel, some clay	1C	SS			18%								
104	1		Becomes Soft	2	SS	54	3	20.8%						3		
103.5	1.5		Becomes Grey to Brown, Stiff	3A	SS			23.3%								
			(SM) SILTY SAND: greyish brown, moist, compact, trace clay	3B	SS	88	12	19.7%						12		
103	2															
102.5	2.5		(SP) gravelly SAND: light brown, wet, compact, trace silt, trace clay	4	SS	0	71	9.7%							71	
102	3															
101.5	3.5		Borehole Terminated @ 3m Due to Target Depth Reached.													
101	4															

GRAINSIZE DISTRIBUTION

SAMPLE	GRAVEL	SAND	SILT	CLAY
1.10	8	25	67	

0.8m: Environmental sample obtained.

2.7m: Cobbles observed.

3m: Borehole terminated. Caving not observed. Groundwater encountered at 2.4 mbgs. Standing water observed at 2.6 mbgs.

0.8m: Environmental sample obtained.

2.7m: Cobbles observed.

3m: Borehole terminated. Caving not observed. Groundwater encountered at 2.4 mbgs. Standing water observed at 2.6 mbgs.

1m = 45 units
Logged By: NV

Input By: FI



Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH102-22
Page 1 of 1

Client: City of Quinte West
Contractor: Canadian Environmental Drillers
Location: County Road 2, Quinte West, ON

Project Name: CoQW WM Extension - CR2, Wooler, Tate Road
Method: Truck Mounted Solid Stem Auger
UTM: 18T N: 4885445.5 E: 291332.6
Project No.: 13324-052
Date Completed: April 25, 2022
Elevation: 105 mASL

SUBSURFACE PROFILE			SAMPLE										Well Installation	Log Notes		
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT					
								25	50	75	20	40			60	80
105	0		ASPHALT: 130 mm Asphalt													
			(SM) gravelly SILTY SAND: grey to blackish brown, moist, very dense	1	SS	83	59	1.6%						59		
104.5	0.5		Becomes Compact	2A	SS			7%								
104	1		(SM) SILTY SAND: brownish grey, moist, compact, trace clay	2B	SS	83	10	21%						10		
			Becomes Light Brown	2C	SS			19.8%								
103.5	1.5		Becomes Grey to Brown, Loose, decrease in Clay Content	3	SS	75	9	20.3%						9	1.6m: Environmental sample obtained.	
102.5	2.5		(SP) SAND: brown, wet, compact, trace silt, trace clay	4	SS	71	21	17.4%						21	3m: Borehole terminated. Caving observed at 2.1 mbgs, groundwater encountered at 2.4 mbgs, standing water observed at 2.0 mbgs.	
102	3		Borehole Terminated @ 3m Due to Target Depth Reached.													
101.5	3.5															
101	4															

GRAINSIZE DISTRIBUTION

SAMPLEGRAVELSANDSILTCLAY

GRAINSIZE DISTRIBUTION SAMPLE GRAVEL SAND SILT CLAY

1m = 45 units

Logged By: NV

Input By: FI

Client: City of Quinte West
Contractor: Canadian Environmental Drillers
Location: County Road 2, Kingston, ON

Project Name: CoQW WM Ext - CR2, Wooler, Tate Road
Method: Truck Mounted Solid Stem Auger
UTM: 18T **N:** 4885411.3 **E:** 291219.3

Project No.: 13324-052
Completed: April 25, 2022
Elevation: 110 mASL

SUBSURFACE PROFILE			SAMPLE												
Elevation (m) Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT				Well Installation	Log Notes
							25	50	75	20	40	60	80		
110 0		ASPHALT: 130 mm Asphalt 109.87													
109.5 0.5		(SW) SAND: brownish grey, moist, dense, some silt 109.24	1	SS	50	35	1.5%				35				0.6m: Environmental sample obtained.
109 1		(SP) SAND: brown, moist, compact, some gravel 108.17	2	SS	54	14	4%				14				
108.5 1.5		Becomes Loose 108.17	3A	SS			8.3%				5				
108 2		(ML) SILT: greyish brown, moist, firm, some gravel, some sand, some clay 107.56	3B	SS	67	5	22.5%								
107.5 2.5		(SP) gravelly SAND: light brown, moist, loose, trace silt, trace clay 106.95	4	SS	79	5	10.8%				5				3m: Borehole terminated. Caving not observed, groundwater not encountered.
107 3		Borehole Terminated @ 3m Due to Target Depth Reached.													
106.5 3.5															
106 4															
GRAINSIZE DISTRIBUTION															
SAMPLE GRAVEL SAND SILT CLAY															
0.25 36 47 17															

1m = 45 units
Logged By: NV

Input By: FI



**Peterborough
Barrie
Oshawa
Kingston**
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH104-22
Page 1 of 1

Client: City of Quinte West
Contractor: Canadian Environmental Drillers
Location: County Road 2, Quinte West, ON

Project Name: CoQW WM Extension - CR2, Wooler, Tate Road
Method: Truck Mounted Solid Stem Auger
UTM: 18T N: 4885377.1 E: 291129.3
Project No.: 13324-052
Date Completed: April 25, 2022
Elevation: 110 mASL

SUBSURFACE PROFILE				SAMPLE												
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT				Well Installation	Log Notes
								25	50	75	20	40	60	80		
110	0		ASPHALT: 100 mm Asphalt	109.9												
			(SM) gravelly SILTY SAND: brownish grey, moist, dense	109.75	1A	SS		1.9%								
			(SP) SAND: brown, moist, dense, some gravel		1B	SS	78	38	2.6%			38				
109.5	0.5															
				109.24												
			(SP) gravelly SAND: brown, moist, compact, trace silt, trace clay													
109	1				2	SS	58	18	3.7%			18				1.1m: Cobbles observed.
108.5	1.5		Becomes Very Dense		3	SS	44	50	3.2%			50				
108	2															
107.5	2.5		Becomes Compact, increase in Clay content		4	SS	67	12	6.6%			12				2.7m: Cobbles observed.
107	3			106.95												3m: Borehole terminated. Caving not observed, groundwater not encountered.
			Borehole Terminated @ 3m Due to Target Depth Reached.													
106.5	3.5															
106	4															

GRAINSIZE DISTRIBUTION

SAMPLEGRAVELSANDSILTCLAY

1.1m: Cobbles observed.
1.3m: Environmental sample obtained.
2.7m: Cobbles observed.
3m: Borehole terminated. Caving not observed, groundwater not encountered.

GRAINSIZE DISTRIBUTION SAMPLE GRAVEL SAND SILT CLAY

1m = 45 units
Logged By: NV

Input By: FI



Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH105-22
Page 1 of 1

Client: City of Quinte West
Contractor: Canadian Environmental Drillers
Location: County Road 2, Quinte West, ON

Project Name: CoQW WM Extension - CR2, Wooler, Tate Road
Method: Truck Mounted Solid Stem Auger
UTM: 18T N: 4885347.9 E: 291027.4
Project No.: 13324-052
Date Completed: April 25, 2022
Elevation: 107 mASL

SUBSURFACE PROFILE				SAMPLE										Well Installation	Log Notes	
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT					
								25	50	75	20	40	60			80
107	0		ASPHALT: 130 mm Asphalt	106.87											0.7m: Environmental sample obtained.	
			(SM) gravelly SILTY SAND: brownish grey, moist, dense													
				1	SS	67	36	2.8%				36				
106.5	0.5			106.24												
			(SM) SILTY SAND: brown to blackish red, moist, loose, trace clay													
				2	SS	71	7	19.5%				7				
106	1															
105.5	1.5			105.48												
			(ML) SILT: light brown to grey to orange, mottled, moist, stiff, some sand, some gravel, some clay to clayey													
				3	SS	67	13	14.6%				13				
105	2															
				104.56												
104.5	2.5		(SP) gravelly SAND: brown to orange, mottled, moist, compact, trace silt, trace clay													
				4	SS	67	15	8.5%				15				
104	3			103.95												
			Borehole Terminated @ 3m Due to Target Depth Reached.													
103.5	3.5															
103	4															

GRAINSIZE DISTRIBUTION

SAMPLE	GRAVEL	SAND	SILT	CLAY
1.80	12	14	74	

0.7m: Environmental sample obtained.

3m: Borehole terminated. Caving not observed. Groundwater not encountered.

GRAINSIZE DISTRIBUTION

SAMPLE	GRAVEL	SAND	SILT	CLAY
1.80	12	14	74	

1m = 45 units

Logged By: NV

Input By: FI



**Peterborough
Barrie
Oshawa
Kingston**
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH106-22
Page 1 of 1

Client: City of Quinte West
Contractor: Canadian Environmental Drillers
Location: County Road 2, Kingston, ON

Project Name: CoQW WM Extension - CR2, Wooler, Tate Road
Method: Truck Mounted Solid Stem Auger
UTM: 18T N: 4885333.5 E: 290960.4
Project No.: 13324-052
Date Completed: April 25, 2022
Elevation: 106 mASL

SUBSURFACE PROFILE				SAMPLE										
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT		Well Installation	Log Notes
								25	50	75	20	40	60	80
106	0		ASPHALT: 120 mm Asphalt	105.9										
			(SM) gravelly SILTY SAND: greyish brown, moist, compact	105.77	1A	SS		1.7%						
			(SP) SAND: brown, moist, compact, some gravel, trace silt		1B	SS	89	25	2.5%			25		
105.5	0.5													
				105.24										
			(ML) SILT: grey, moist, firm, some clay, some sand, trace gravel		2	SS	63	6	14.9%			6		
105	1													
			Becomes Black, Stiff, increase in Gravel, Silt content, Organics observed		3	SS	54	10	11.6%			10		
104.5	1.5													
			Becomes Grey, Wet, Very Stiff, decrease in Silt content	103.46	4A	SS			14.6%					
			(SP) gravelly SAND: light brown to grey, mottled, wet, compact, trace silt, trace clay		4B	SS	55	27	12.5%			27		
103	3			102.95										
			Borehole Terminated @ 3m Due to Target Depth Reached.											
102.5	3.5													
102	4													

GRAINSIZE DISTRIBUTION

SAMPLEGRAVELSANDSILTCLAY

1.9m: Environmental sample obtained.

2.9m: SPT refusal encountered, Borehole terminated, Caving not observed, Groundwater encountered at 2.4 mbgs. Standing water observed at 2.7 mbgs.

1.9m: Environmental sample obtained.

2.9m: SPT refusal encountered, Borehole terminated, Caving not observed, Groundwater encountered at 2.4 mbgs. Standing water observed at 2.7 mbgs.

GRAINSIZE DISTRIBUTION SAMPLE GRAVEL SAND SILT CLAY

1m = 45 units

Logged By: NV

Input By: FI



Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH107-22
Page 1 of 1

Client: City of Quinte West
Contractor: Canadian Environmental Drillers
Location: Wooler Road, Quinte West, ON

Project Name: CoQW WM Extension - CR2, Wooler, Tate Road
Method: Truck Mounted Solid Stem Auger
UTM: 18T N: 4885378 E: 290856.8
Project No.: 13324-052
Date Completed: April 26, 2022
Elevation: 106 mASL

SUBSURFACE PROFILE			SAMPLE												
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT		Well Installation	Log Notes	
								25	50	75	20	40	60	80	
106	0		ASPHALT: 130 mm Asphalt												0.5m: Environmental sample obtained.
			(SM) gravelly SILTY SAND: brownish grey, moist, very dense	1	SS	78	70	2.4%					70		
105.5	0.5		Becomes Compact	2A	SS			4%							
			(GP) GRAVEL: grey, moist, compact, some sand, trace silt	2B	SS	63	17	8.9%					17		3m: Borehole terminated. Caving observed at 1.2 mbgs. Groundwater encountered at 0.85 mbgs. Standing water observed at 1.1 mbgs.
104.5	1.5		(SP-SM) SAND with SILT: brown, wet, compact, some clay, trace gravel	3	SS	88	11	16.2%					11		
104	2		Increase in Gravel content	4	SS	75	23	13.2%					23		
103	3		Borehole Terminated @ 3m Due to Target Depth Reached.												
102.5	3.5														
102	4														

GRAINSIZE DISTRIBUTION

SAMPLE	GRAVEL	SAND	SILT	CLAY
0.25	32	54	14	

0.5m: Environmental sample obtained.

3m: Borehole terminated, Caving observed at 1.2 mbgs. Groundwater encountered at 0.85 mbgs. Standing water observed at 1.1 mbgs.

1m = 45 units
Logged By: NV

Input By: FI



Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH108-22
Page 1 of 1

Client: City of Quinte West
Contractor: Canadian Environmental Drillers
Location: Wooler Road, Quinte West, ON

Project Name: CoQW WM Ext - CR2, Wooler, Tate Road
Method: Truck Mounted Solid Stem Auger
UTM: 18T N: 4885436.4 E: 290838.6

Project No.: 13324-052
Date Completed: April 26, 2022
Elevation: 106 mASL

SUBSURFACE PROFILE				SAMPLE										
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT	Well Installation	Log Notes	
								25	50	75	20	40	60	80
106	0		ASPHALT: 150 mm Asphalt											
			105.85											
			(SM) gravelly SILTY SAND: brownish grey, moist, dense	1	SS	72	35	5%			35			
105.5	0.5													
			Becomes Loose	2A	SS			8.9%						
			105.01											
105	1		(SM) SILTY SAND: brown, moist, loose, some clay	2B	SS	63	8	18.1%			8			1.2m: Environmental sample obtained.
			- increase in clay and gravel content											
104.5	1.5													
				3	SS	100	4	22.9%			4			
104	2													
			103.56											
103.5	2.5		(SP) gravelly SAND: brown, wet, compact, trace silt, trace clay	4	SS	58	14	12.6%			14			2.7m: Cobbles observed.
103	3		102.95											
			Borehole Terminated @ 3m Due to Target Depth Reached.											3m: Borehole terminated. Caving observed at 0.9 mbgs. Groundwater encountered at 1.5 mbgs. Standing water not observed.
102.5	3.5													
102	4													

GRAINSIZE DISTRIBUTION

SAMPLEGRAVELSANDSILTCLAY

1.2m: Environmental sample obtained.

2.7m: Cobbles observed.

3m: Borehole terminated. Caving observed at 0.9 mbgs. Groundwater encountered at 1.5 mbgs. Standing water not observed.

GRAINSIZE DISTRIBUTION
SAMPLE GRAVEL SAND SILT CLAY

1m = 45 units
Logged By: NV

Input By: FI



**Peterborough
Barrie
Oshawa
Kingston**
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH109-22
Page 1 of 1

Client: City of Quinte West
Contractor: Canadian Environmental Drillers
Location: Wooler Road, Quinte West, ON

Project Name: CoQW WM Extension - CR2, Wooler, Tate Road
Method: Truck Mounted Solid Stem Auger
UTM: 18T N: 4885536 E: 290805.8
Project No.: 13324-052
Date Completed: April 26, 2022
Elevation: 108 mASL

SUBSURFACE PROFILE			SAMPLE							Well Installation	Log Notes			
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture				SPT (N) / DCPT		
								25	50			75	20	40
108	0		ASPHALT: 120 mm Asphalt	107.9										
			(SM) gravelly SILTY SAND: greyish brown, moist, compact											
107.5	0.5			1	SS	83	28	2.8%				28		
107	1			2A	SS			5.4%						
						71	15					15		
			(ML) SILT: brown, moist, stiff, some clay, some sand, trace gravel	2B	SS			19.5%						
106.5	1.5													
			Becomes Wet, Very Stiff, decrease in Clay content	3	SS	58	17	19.7%				17		
106	2													
105.5	2.5													
			Becomes Hard	4	SS	75	33	18.1%				33		
105	3													
			Borehole Terminated @ 3m Due to Target Depth Reached.											
104.5	3.5													
104	4													

GRAINSIZE DISTRIBUTION

SAMPLE	GRAVEL	SAND	SILT	CLAY
1	2	25	73	

1.1m: Cobbles observed.

3m: Borehole terminated. Caving observed at 0.9 mbgs. Groundwater encountered at 1.5 mbgs. Standing water observed at 0.8 mbgs.

1.1m: Cobbles observed.

3m: Borehole terminated, Caving observed at 0.9 mbgs. Groundwater encountered at 1.5 mbgs. Standing water observed at 0.8 mbgs.

GRAINSIZE DISTRIBUTION

SAMPLE	GRAVEL	SAND	SILT	CLAY
1.25	2	25	73	

1m = 45 units
Logged By: NV

Input By: FI



Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH110-22
Page 1 of 1

Client: City of Quinte West
Contractor: Canadian Environmental Drillers
Location: Wooler Road, Quinte West, ON

Project Name: CoQW WM Extension - CR2, Wooler, Tate Road
Method: Truck Mounted Solid Stem Auger
UTM: 18T N: 4885635.8 E: 290775.3
Project No.: 13324-052
Date Completed: April 26, 2022
Elevation: 108 mASL

SUBSURFACE PROFILE				SAMPLE											
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT		Well Installation	Log Notes	
								25	50	75	20	40	60	80	
108	0		ASPHALT: 150 mm Asphalt												0.8m: Depth of first groundwater encounter
			107.85												
			(SM) gravelly SILTY SAND: brownish grey, moist, compact	1	SS	78	26	3.6%			26				
107.5	0.5														
			Becomes Wet, decrease in Sand content	2A	SS			8.9%							3m: Borehole terminated, Caving not observed. Groundwater encountered at 0.8 mbgs. Standing water not observed.
107	1		106.93			58	11	14.9%			11				
			(ML) SILT: brown, wet, stiff, some clay, some sand, trace gravel	2B	SS										
106.5	1.5														3m: Borehole terminated, Caving not observed. Groundwater encountered at 0.8 mbgs. Standing water not observed.
				3	SS	79	13	17.2%			13				
106	2														
105.5	2.5														3m: Borehole terminated, Caving not observed. Groundwater encountered at 0.8 mbgs. Standing water not observed.
			Becomes Brown to Orange mottled	4	SS	54	10	19%			10				
105	3		104.95												
			Borehole Terminated @ 3m Due to Target Depth Reached.												
104.5	3.5														
104	4														

GRAINSIZE DISTRIBUTION

SAMPLEGRAVELSANDSILTCLAY

GRAINSIZE DISTRIBUTION SAMPLE GRAVEL SAND SILT CLAY

1m = 45 units
Logged By: NV

Input By: FI



Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH111-22
Page 1 of 1

Client: City of Quinte West
Contractor: Canadian Environmental Drillers
Location: Wooler Road, Quinte West, ON

Project Name: CoQW WM Extension - CR2, Wooler, Tate Road
Method: Truck Mounted Solid Stem Auger
UTM: 18T N: 4885734.9 E: 290740
Project No.: 13324-052
Date Completed: April 26, 2022
Elevation: 108 mASL

SUBSURFACE PROFILE				SAMPLE												
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT				Well Installation	Log Notes
								25	50	75	20	40	60	80		
108	0		ASPHALT: 150 mm Asphalt													
			107.85													
			(SM) gravelly SILTY SAND: greyish brown, moist, compact	1	SS	83	21	7%				21				
107.5	0.5															
			107.06	2A	SS			6.7%								
107	1		(ML) SILT: light brown to orange mottled, moist, very stiff, some clay to clayey, trace sand, trace gravel	2B	SS	79	19	15.3%				19				
106.5	1.5															
				3	SS	96	23	18.4%				23				
106	2															
105.5	2.5															
				4	SS	96	23	21%				23				
105	3		104.95													
			Borehole Terminated @ 3m Due to Target Depth Reached.													
104.5	3.5															
104	4															
GRAINSIZE DISTRIBUTION																
SAMPLE GRAVEL SAND SILT CLAY																
1.8 1 2 97																

3m: Borehole terminated. Caving observed at 0.6 mbgs. Groundwater not encountered.

1m = 45 units
Logged By: NV

Input By: FI



Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH112-22
Page 1 of 1

Client: City of Quinte West
Contractor: Canadian Environmental Drillers
Location: Wooler Road, Quinte West, ON

Project Name: CoQW WM Extension - CR2, Wooler, Tate Road
Method: Truck Mounted Solid Stem Auger
UTM: 18T N: 4885834.8 E: 290707.5
Project No.: 13324-052
Date Completed: April 26, 2022
Elevation: 107 mASL

SUBSURFACE PROFILE				SAMPLE												
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT				Well Installation	Log Notes
								25	50	75	20	40	60	80		
107	0		ASPHALT: 150 mm Asphalt													1.8m: Environmental sample obtained.
			(SM) gravelly SILTY SAND: greyish brown, moist, compact	1	SS	83	24	4.5%				24				
106.5	0.5															
			(ML) SILT: brown, moist, stiff, some clay, some sand, trace gravel	2	SS	83	9	17.8%			9					
106	1															
105.5	1.5		Becomes Light Brown to Orange mottled, Very Stiff	3	SS	88	21	18.2%			21					
105	2															
104.5	2.5															
104	3															
103.5	3.5		Borehole Terminated @ 3m Due to Target Depth Reached.													3m: Borehole terminated. Caving observed at 2.3 mbgs. Groundwater encountered at 1.5 mbgs. Standing water observed at 1.6 mbgs.
103	4															

GRAINSIZE DISTRIBUTION

SAMPLEGRAVELSANDSILTCLAY

1.8m: Environmental sample obtained.

3m: Borehole terminated, Caving observed at 2.3 mbgs. Groundwater encountered at 1.5 mbgs. Standing water observed at 1.6 mbgs.

GRAINSIZE DISTRIBUTION SAMPLE GRAVEL SAND SILT CLAY

1m = 45 units
Logged By: NV

Input By: FI



Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH113-22
Page 1 of 1

Client: City of Quinte West
Contractor: Canadian Environmental Drillers
Location: Wooler Road, Quinte West, ON

Project Name: CoQW WM Ext - CR2, Wooler, Tate Road
Method: Truck Mounted Solid Stem Auger
UTM: 18T N: 4885924 E: 290678.6

Project No.: 13324-052
Date Completed: April 26, 2022
Elevation: 107 mASL

SUBSURFACE PROFILE				SAMPLE											
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT	Well Installation	Log Notes		
								25	50	75	20	40	60	80	
107	0		ASPHALT: 175 mm Asphalt												0.5m: Environmental sample obtained.
			106.82												
			(SM) gravelly SILTY SAND: greyish brown, moist, compact	1	SS	82	26	4.5%			26				
106.5	0.5		decrease in gravel content												
															3m: Borehole terminated. Caving observed at 2.4 mbgs. Groundwater encountered at 2.4 mbgs. Standing water observed at 2.3 mbgs.
106	1			2A	SS			18.4%			12				
			105.81			96	12								
			(ML) SILT: dark grey, moist, stiff, some clay, some sand, trace gravel	2B	SS			20.7%							
105.5	1.5														
			Becomes Brownish Grey to Black, Very Stiff	3	SS	96	22	13%			22				
105	2														
104.5	2.5		Becomes Brown to Orange mottled, Wet, Stiff	4	SS	83	14	17.5%			14				
104	3		103.95												
			Borehole Terminated @ 3m Due to Target Depth Reached.												
103.5	3.5														
103	4														
GRAINSIZE DISTRIBUTION															
SAMPLE GRAVEL SAND SILT CLAY															
0.40 21 61 18															

0.5m: Environmental sample obtained.

3m: Borehole terminated, Caving observed at 2.4 mbgs. Groundwater encountered at 2.4 mbgs. Standing water observed at 2.3 mbgs.

1m = 45 units
Logged By: NV

Input By: FI



Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH114-22
Page 1 of 1

Client: City of Quinte West
Contractor: Canadian Environmental Drillers
Location: Wooler Road, Quinte West, ON

Project Name: CoQW WM Extension - CR2, Wooler, Tate Road
Method: Track Mounted Solid Stem Auger
UTM: 18T N: 4885995 E: 290629
Project No.: 13324-052
Date Completed: April 25, 2022
Elevation: 107 mASL

SUBSURFACE PROFILE				SAMPLE												
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT				Well Installation	Log Notes
								25	50	75	20	40	60	80		
107	0		(SM) SILTY SAND: [TOPSOIL], light to dark brown, moist, loose, some organics, trace clay, trace gravel	1A	SS											2.9m: Borehole terminated. Caving not observed. Groundwater encountered at 2.3 mbgs. Standing water observed at 2.3 mbgs.
			106.75													
				(ML) sandy SILT: greyish brown, moist, soft, some clay	1B	SS	75	4								
106.5	0.5															
			106.24													
			(SM) SILTY SAND: greyish brown, moist, compact													
106	1			2	SS	100	17									
105.5	1.5															
				Becomes Brown to Orange mottled	3	SS	67	18								
105	2															
104.5	2.5		Becomes Dense	4	SS	88	31									
			104.1													
104	3		Borehole Terminated @ 2.9m Due to Target Depth Reached.													
103.5	3.5															
103	4															

GRAINSIZE DISTRIBUTION

SAMPLEGRAVELSANDSILTCLAY

2.9m: Borehole terminated. Caving not observed. Groundwater encountered at 2.3 mbgs. Standing water observed at 2.3 mbgs.

GRAINSIZE DISTRIBUTION SAMPLE GRAVEL SAND SILT CLAY

1m = 45 units
Logged By: AF

Input By: FI



Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH115-22
Page 1 of 1

Client: City of Quinte West
Contractor: Canadian Environmental Drillers
Location: Wooler Road, Quinte West, ON

Project Name: CoQW WM Ext - CR2, Wooler, Tate Road
Method: Track Mounted Solid Stem Auger
UTM: 18T N: 4886077 E: 290601

Project No.: 13324-052
Date Completed: April 25, 2022
Elevation: 105 mASL

SUBSURFACE PROFILE				SAMPLE												
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT				Well Installation	Log Notes
								25	50	75	20	40	60	80		
105	0		(SM) SILTY SAND: [TOPSOIL], light to dark brown, moist, loose, some organics	1A	SS											
			104.75													
			(SP) SAND: dark brown, moist, loose, some silt, trace organics	1B	SS	75	5									
104.5	0.5															
104	1			2	SS	54	9									
103.5	1.5		Becomes Very Loose													
			103.4	3A	SS											
			(ML) SILT: light brown, moist, soft, some sand, some clay	3B	SS											
						63	3									
103	2			3C	SS											
102.5	2.5		- increase in clay content, trace fine gravel													
				4	SS	92	4									
102	3		101.95													
			Borehole Terminated @ 3m Due to Target Depth Reached.													
101.5	3.5															
101	4															

GRAINSIZE DISTRIBUTION

SAMPLE	GRAVEL	SAND	SILT	CLAY
1.80	0	8	92	

2.7m: Shear Vane Test Initiated, Peak: 37 kPa, Residual: 10 kPa

3m: Borehole terminated, Caving not observed, Groundwater not encountered.

2.7m: Shear Vane Test Initiated, Peak: 37 kPa, Residual: 10 kPa
3m: Borehole terminated, Caving not observed, Groundwater not encountered.

GRAINSIZE DISTRIBUTION: SAMPLE GRAVEL SAND SILT CLAY
1.80 0 8 92

1m = 45 units
Logged By: AF

Input By: FI






Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH116-22
Page 1 of 1

Client: City of Quinte West
Contractor: Canadian Environmental Drillers
Location: Wooler Road, Quinte West, ON

Project Name: CoQW WM Extension - CR2, Wooler, Tate Road
Method: Track Mounted Solid Stem Auger
UTM: 18T N: 4886150.6 E: 290571
Date Completed: April 13, 2022
Elevation: 203.87 m Rel.

SUBSURFACE PROFILE				SAMPLE												
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT		Well Installation	Log Notes		
								25	50	75	20	40	60	80		
203.9	0		(SM) SILTY SAND: [TOPSOIL], dark brown, moist, loose, some organics 203.74	1A	SS											
	1B			SS	92	5										
203.4	0.5															
202.9	1			2	SS	100	21									
202.4	1.5		(ML) sandy SILT: grey to brown, moist, stiff, trace clay 202.35													
				3	SS	100	12									
201.9	2															
201.4	2.5		Becomes Soft, increase in Clay content													
				4	SS	96	3									
200.9	3		Borehole Terminated @ 3m Due to Target Depth Reached. 200.82													
200.4	3.5															
199.9	4															

GRAINSIZE DISTRIBUTION

SAMPLEGRAVELSANDSILTCLAY

3m: Borehole terminated. Caving observed at 2.4 mbgs. Groundwater not encountered within depths explored.

3m: Borehole terminated, Caving observed at 2.4 mbs. Groundwater not encountered within depths explored.

GRAINSIZE DISTRIBUTION
SAMPLE GRAVEL SAND SILT CLAY

1m = 45 units
Logged By: NV

Input By: FI



Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH117-22
Page 1 of 1

Client: City of Quinte West
Contractor: Canadian Environmental Drillers
Location: Wooler Road, Quinte West, ON

Project Name: CoQW WM Ext - CR2, Wooler, Tate Road
Method: Track Mounted Solid Stem Auger
UTM: 18T N: 4886267.6 E: 290537.3

Project No.: 13324-052
Date Completed: April 28, 2022
Elevation: 102 mASL

SUBSURFACE PROFILE				SAMPLE												
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT				Well Installation	Log Notes
								25	50	75	20	40	60	80		
102	0		(SM) SILTY SAND: [TOPSOIL], dark brown, moist, loose, some organics 101.8	1A	SS			13.6%								0.5m: Environmental sample obtained.
			(SW) SAND: brown, moist, loose, trace gravel 101.24	1B	SS	83	5	11.5%			5					
101.5	0.5															
101	1		(SM) SILTY SAND: greyish brown, moist, stiff, trace gravel, trace clay	2	SS	75	12	15.3%			12					3m: Borehole terminated, Caving not observed. Groundwater not encountered.
100.5	1.5															
			Decrease in Gravel content	3	SS	88	12	16.3%			12					
100	2															
99.5	2.5		(GP) sandy GRAVEL: brownish grey, moist, very dense, trace silt 98.96	4	SS	65	50	4%			50					
99	3		Borehole Terminated @ 3m Due to Target Depth Reached.													
98.5	3.5															
98	4															

GRAINSIZE DISTRIBUTION

SAMPLE	GRAVEL	SAND	SILT	CLAY
1.10	4	52	44	

0.5m: Environmental sample obtained.

3m: Borehole terminated, Caving not observed, Groundwater not encountered.

1m = 45 units
Logged By: NV

Input By: FI



Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH118-22
Page 1 of 1

Client: City of Quinte West
Contractor: Canadian Environmental Drillers
Location: Wooler Road, Quinte West, ON

Project Name: CoQW WM Ext - CR2, Wooler, Tate Road
Method: Track Mounted Solid Stem Auger
UTM: 18T N: 4886365.9 E: 290523.6

Project No.: 13324-052
Date Completed: April 28, 2022
Elevation: 103 mASL

SUBSURFACE PROFILE			SAMPLE							Well Installation	Log Notes																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
Elevation (m)	Depth	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture					SPT (N) / DCPT																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
							25	50	75				20	40	60	80																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
103	0	 	102.87	1A	SS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	

1.1m: Cobbles observed.
1.4m: Environmental sample obtained.
3m: Borehole terminated, Caving observed at 2.4 mbgs. Groundwater encountered at 1.5 mbgs. Standing water observed at 1.2 mbgs.

GRAINSIZE DISTRIBUTION [SAMPLE] GRAVEL SAND SILT CLAY

1m = 45 units
Logged By: NV

Input By: FI



**Peterborough
Barrie
Oshawa
Kingston**
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH119-22
Page 1 of 1

Client: City of Quinte West
Contractor: Canadian Environmental Drillers
Location: Wooler Road, Quinte West, ON

Project Name: CoQW WM Extension - CR2, Wooler, Tate Road
Method: Truck Mounted Solid Stem Auger
UTM: 18T N: 4886486.4 E: 290502.6
Project No.: 13324-052
Date Completed: April 26, 2022
Elevation: 97 mASL

SUBSURFACE PROFILE				SAMPLE										
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT	Well Installation	Log Notes	
								25	50	75	20	40	60	80
97	0		ASPHALT: 180 mm Asphalt											
			96.82											
			(SP-SM) gravelly SAND with SILT: brownish grey to black, moist, dense	1	SS	76	42	2.7%				42		
96.5	0.5		96.24											
			(SP-SM) SAND with SILT: grey to brown, moist, compact, some gravel	2	SS	88	17	11.9%				17		
96	1													
95.5	1.5			3	SS	83	24	13.6%				24		
95	2													
94.5	2.5		(ML) SILT: grey to brownish orange, mottled, moist, very stiff, some sand, some clay to clayey	4	SS	79	18	25.1%				18		
94	3		93.95											
			Borehole Terminated @ 3m Due to Target Depth Reached.											
93.5	3.5													
93	4													

GRAINSIZE DISTRIBUTION

SAMPLE	GRAVEL	SAND	SILT	CLAY
0.40	31	60	9	

1.4m: Environmental sample obtained.

3m: Borehole terminated, Caving not observed, Groundwater not encountered.

1.4m: Environmental sample obtained.

3m: Borehole terminated. Caving not observed. Groundwater not encountered.

GRAINSIZE	SAMPLE	GRAVEL	SAND	SILT	CLAY
DISTRIBUTION	0.40	31	60	9	

1m = 45 units
Logged By: NV

Input By: FI



Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH120-22
Page 1 of 1

Client: City of Quite West
Contractor: Canadian Environmental Drillers
Location: Wooler Road, Quinte West, ON

Project Name: CoQW WM Ext - CR2, Wooler, Tate Road
Method: Truck Mounted Solid Stem Auger
UTM: 18T N: 4886578.7 E: 290473.2

Project No.: 13324-052
Date Completed: April 26, 2022
Elevation: 96 mASL

SUBSURFACE PROFILE				SAMPLE											
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT	Well Installation	Log Notes		
								25	50	75	20	40	60	80	
96	0		ASPHALT: 180 mm Asphalt												0.6m: Environmental sample obtained.
			95.82												
			(SP-SM) gravelly SAND with SILT: greyish brown, moist, very dense	1	SS	82	55	4.6%				55			
95.5	0.5														
			Becomes Loose	2A	SS			12.7%							
95	1		94.98												3m: Borehole terminated. Caving observed at 1.1 mbgs. Groundwater encountered at 1.5 mbgs. Standing water observed at 1.0 mbgs.
			(ML) sandy SILT: grey to brownish orange, mottled, moist, stiff, some clay to clayey	2B	SS	83	9	21.3%				9			
94.5	1.5		Becomes Wet, Very Stiff	3	SS	71	16	26.4%				16			
94	2														
			- increase in silt content, brownish grey, stiff												
93.5	2.5														
				4	SS	21	11	27%				11			
93	3		92.95												
			Borehole Terminated @ 3m Due to Target Depth Reached.												
92.5	3.5														
92	4														

GRAINSIZE DISTRIBUTION

SAMPLEGRAVELSANDSILTCLAY

0.6m: Environmental sample obtained.

3m: Borehole terminated, Caving observed at 1.1 mbgs. Groundwater encountered at 1.5 mbgs. Standing water observed at 1.0 mbgs.

1m = 45 units
Logged By: NV

Input By: FI



**Peterborough
Barrie
Oshawa
Kingston**
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH121-22
Page 1 of 1

Client: City of Quinte West
Contractor: Canadian Environmental Drillers
Location: Wooler Road, Quinte West, ON

Project Name: CoQW WM Extension - CR2, Wooler, Tate Road
Method: Truck Mounted Solid Stem Auger
UTM: 18T N: 4886683.7 E: 290444.8
Project No.: 13324-052
Date Completed: April 26, 2022
Elevation: 93 mASL

SUBSURFACE PROFILE			SAMPLE												
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT			Well Installation	Log Notes
								25	50	75	20	40	60	80	
93	0		ASPHALT: 180 mm Asphalt												
			92.82												
			(SP-SM) gravelly SAND with SILT: greyish brown, moist, dense	1	SS	82	37	5.3%				37			
92.5	0.5		92.24												
			(ML) SILT: brownish grey, wet, soft, some sand, some clay to clayey	2	SS	63	4	22.4%				4			
92	1														
			Becomes Grey, Stiff	3	RC	71	14	21%				14			
91.5	1.5		90.56												
			(CL) CLAY: grey, wet, soft, trace silt, trace sand	4	SS	54	3	23.3%				3			
91	2		89.95												
			Borehole Terminated @ 3m Due to Target Depth Reached.												
90.5	2.5														
90	3														
89.5	3.5														
89	4														

GRAINSIZE DISTRIBUTION

SAMPLE	GRAVEL	SAND	SILT	CLAY
1.10	0	6	94	

1.3m: Environmental sample obtained.

3m: Borehole terminated. Caving observed at 1.1 mbgs. Groundwater encountered at 0.75 mbgs. Standing water observed at 0.9 mbgs.

1.3m: Environmental sample obtained.

3m: Borehole terminated, Caving observed at 1.1 mbgs. Groundwater encountered at 0.75 mbgs. Standing water observed at 0.9 mbgs.

GRAINSIZE DISTRIBUTION

SAMPLE	GRAVEL	SAND	SILT	CLAY
1.10	0	6	94	

1m = 45 units
Logged By: NV

Input By: FI

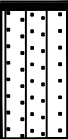





Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH135-22
Page 1 of 1

Client: City of Quinte West
Contractor: Canadian Environmental Drilling
Location: Tate Road, Quinte West, ON

Project Name: CoQW WM Extension - CR2, Wooler, Tate Road
Method: Truck Mounted Solid Stem Auger
UTM: 18T N: 4886371 E: 288884.5
Project No.: 13324-052
Date Completed: April 27, 2022
Elevation: 94 mASL

SUBSURFACE PROFILE				SAMPLE										
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT		Well Installation	Log Notes
								25	50	75	20	40	60	80
94	0		ASPHALT: 25 mm Asphalt											
			(SM) gravelly SILTY SAND: grey to brown, moist, compact	1A	SS		89	25	3.3%			25		
93.5	0.5		(SP) SAND: brown, moist, compact, trace silt	1B	SS			12.5%						
			(ML) SILT: grey to brown, moist, firm, some sand, some clay to clayey, trace gravel	2	SS		88	8	29.4%			8		
92.5	1.5													
				3	SS		100	6	29.8%			6		
92	2													
			(CL) SILTY CLAY: grey to light brown, moist, firm	4	SS		100	6	29.9%			6		
91.5	2.5													
91	3		Borehole Terminated @ 3m Due to Target Depth Reached.											
90.5	3.5													
90	4													

GRAINSIZE DISTRIBUTION

SAMPLE	GRAVEL	SAND	SILT	CLAY
1.10	3	5	92	

0.8m: Environmental sample obtained.

3m: Borehole terminated. Caving observed at 2.0 mbgs. Groundwater not encountered.

0.8m: Environmental sample obtained.

3m: Borehole terminated. Caving observed at 2.0 mbgs. Groundwater not encountered.

1m = 45 units
Logged By: NV

Input By: FI



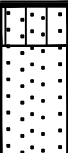
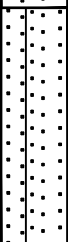

Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH136-22
Page 1 of 1

Client: City of Quinte West
Contractor: Canadian Environmental Drilling
Location: Tate Road, Quinte West, ON

Project Name: CoQW WM Ext - CR2, Wooler, Tate Road
Method: Truck Mounted Solid Stem Auger
UTM: 18T N: 4886399.2 E: 288876.9

Project No.: 13324-052
Date Completed: April 27, 2022
Elevation: 92 mASL

SUBSURFACE PROFILE				SAMPLE													
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT				Well Installation	Log Notes	
								25	50	75	20	40	60	80			
92	0		91.97 ASPHALT: 25 mm Asphalt														
			91.75 (SM) gravelly SILTY SAND: grey to brown, moist, compact	1A	SS												
91.5	0.5		(SP) SAND: brown, moist, compact, trace silt	1B	SS	89	19								19		
			Becomes Loose														
91	1		91.09 (SP-SM) SAND with SILT: dark grey, moist, loose, some clay to clayey	2A	SS												
				2B	SS	50	6							6			
90.5	1.5		Becomes Very Loose														
90	2			3	SS	54	3							3			
89.5	2.5		89.71 (ML) sandy SILT: grey, moist, soft, some clay	4	SS	42	2							2			
89	3		Becomes Stiff														
88.5	3.5			5	SS	0.00	12								12		
88	4																
87.5	4.5		Becomes Wet	6	SS	78	9							9			
87	5		86.97														
86.5	5.5		Borehole Terminated @ 5m Due to Target Depth Reached.														
86	6																
85.5	6.5																
85	7																

GRAINSIZE DISTRIBUTION

SAMPLEGRAVELSANDSILTCLAY

2.3m: Organics observed.

5m: Borehole terminated. Caving observed at 2.4 mbgs. Groundwater encountered at 2.3 mbgs. Standing water observed at 1.7 mbgs.

2.3m: Organics observed.

5m: Borehole terminated. Caving observed at 2.4 mbgs. Groundwater encountered at 2.3 mbgs. Standing water observed at 1.7 mbgs.

GRAINSIZE DISTRIBUTION SAMPLE GRAVEL SAND SILT CLAY

1m = 26 units
Logged By: NV

Input By: FI



Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH137-22
Page 1 of 1

Client: City of Quinte West
Contractor: Canadian Environmental Drilling
Location: Tate Road, Quinte West, ON

Project Name: CoQW WM Extension - CR2, Wooler, Tate Road
Method: Truck Mounted Solid Stem Auger
UTM: 18T N: 4886409 E: 288873.7
Date Completed: April 27, 2022
Elevation: 92 mASL

SUBSURFACE PROFILE				SAMPLE										Well Installation		Log Notes
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT					
								25	50	75	20	40	60	80		
92	0		ASPHALT: 25 mm Asphalt												5m: Borehole terminated, Caving not observed, Groundwater encountered at 2.6 mbgs. Standing water not observed,	
			(SM) gravelly SILTY SAND: grey to brown, moist, loose	1A	SS						4%					8
91.5	0.5		(SP) SAND: brown, moist, loose, trace silt	1B	SS	78	8			4.2%						
91	1		(SP-SM) SAND with SILT: brown, moist, loose, trace clay, trace gravel	2	SS	58	6			10%				6		
90.5	1.5															
			Becomes Dark Brown to Grey, Very Loose, increase in Clay content	3	SS	67	3				36.7%					3
90	2															
			Becomes Loose, Organics observed	4A	SS							39%				5
89.5	2.5															
			Becomes Grey, Wet, decrease in Silt content	4B	SS	88	5				19.3%					
89	3															
			Becomes Compact	5	SS	92	12				18%					12
88.5	3.5															
88	4															
87.5	4.5															
87	5															
86.5	5.5															
86	6															
85.5	6.5															
85	7															
Borehole Terminated @ 5m Due to Target Depth Reached.																

GRAINSIZE DISTRIBUTION

SAMPLE	GRAVEL	SAND	SILT	CLAY
3.35	1	88	11	

5m: Borehole terminated. Caving not observed. Groundwater encountered at 2.6 mbgs. Standing water not observed.

Logged By: NV

Input By: FI







Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH138-22
Page 1 of 1

Client: City of Quinte West
Contractor: Canadian Environmental Drilling
Location: Tate Road, Quinte West, ON

Project Name: CoQW WM Extension - CR2, Wooler, Tate Road
Method: Truck Mounted Solid Stem Auger
UTM: 18T N: 4886463.5 E: 288858.2
Project No.: 13324-052
Date Completed: April 27, 2022
Elevation: 92 mASL

SUBSURFACE PROFILE			SAMPLE										Well Installation	Log Notes
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT			
								25	50	75	20	40		
92	0		ASPHALT: 25 mm Asphalt											
			(SM) gravelly SILTY SAND: brown to grey, moist, dense	1	SS	78	30	3.1%				30		
91.5	0.5		Increase in Silt content, decrease in Gravel content											
91	1			2	SS	83	32	6%				32		
90.5	1.5		(SW-SM) SAND with SILT: dark grey to brown, moist, loose, trace clay, trace gravel	3	SS	54	9	12.6%				9		
90	2													
89.5	2.5		(CL) CLAY: dark grey, wet, firm, some sand, trace silt	4	SS	75	5	29.9%				5		
89	3													
			Borehole Terminated @ 3m Due to Target Depth Reached.											
88.5	3.5													
88	4													

GRAINSIZE DISTRIBUTION

SAMPLEGRAVELSANDSILTCLAY

3m: Borehole terminated. Caving observed at 2.6 mbgs. Groundwater encountered at 2.4 mbgs. Standing water observed at 2.3 mbgs.

3m: Borehole terminated, Caving observed at 2.6 mbgs. Groundwater encountered at 2.4 mbgs. Standing water observed at 2.3 mbgs.

GRAINSIZE DISTRIBUTION SAMPLE GRAVEL SAND SILT CLAY

1m = 45 units
Logged By: NV

Input By: FI





Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH139-22
Page 1 of 1

Client: City of Quinte West
Contractor: Canadian Environmental Drilling
Location: Tate Road, Quinte West, ON

Project Name: CoQW WM Ext - CR2, Wooler, Tate Road
Method: Truck Mounted Solid Stem Auger
UTM: 18T N: 4886546.1 E: 288830.8

Project No.: 13324-052
Date Completed: April 27, 2022
Elevation: 97 mASL

SUBSURFACE PROFILE				SAMPLE										
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT		Well Installation	Log Notes
								25	50	75	20	40	60	80
97	0		ASPHALT: 25 mm Asphalt											
			(SW) SAND: grey to brown, moist, compact, some silt	1	SS	78	29	3.6%				29		
96.5	0.5													
96	1		(ML) sandy SILT: grey to brown, moist, stiff, some clay, trace fine gravel	2	SS	13	9	20%				9		
95.5	1.5													
			Decrease in Clay content, increase in Silt content	3	SS	88	10	17.9%				10		
95	2													
94.5	2.5													
			- becomes grey, soft	4	SS	71	6	22.8%				6		
94	3													
			Borehole Terminated @ 3m Due to Target Depth Reached.											
93.5	3.5													
93	4													

GRAINSIZE DISTRIBUTION

SAMPLE	GRAVEL	SAND	SILT	CLAY
0.40	38	49	13	

0.4m: Environmental sample obtained.

3m: Borehole terminated. Caving observed at 2.6 mbgs. Groundwater not encountered.

1m = 45 units
Logged By: NV

Input By: FI



Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH140-22
Page 1 of 1

Client: City of Quinte West
Contractor: Canadian Environmental Drilling
Location: Tate Road, Quinte West, ON

Project Name: CoQW WM Extension - CR2, Wooler, Tate Road
Method: Truck Mounted Solid Stem Auger
UTM: 18T N: 4886641.8 E: 288799.4
Project No.: 13324-052
Date Completed: April 27, 2022
Elevation: 101 mASL

SUBSURFACE PROFILE			SAMPLE												
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT			Well Installation	Log Notes
								25	50	75	20	40	60	80	
101	0		ASPHALT: 25 mm Asphalt												
			(SM) gravelly SILTY SAND: grey to brown, moist, compact	1A	SS			3.2%							
				1B	SS	89	17	5.3%					17		
100.5	0.5		(SP-SM) SAND with SILT: brown, moist, compact, trace gravel												
100	1		Becomes Brown to Orange, Loose	2	SS	71	8	11.7%					8		
99.5	1.5		Becomes Grey to Brown, Wet	3	SS	79	6	20.4%					6		
99	2														
98.5	2.5														
98	3														
97.5	3.5														
97	4														

1.5m: Environmental sample obtained.

3m: Borehole terminated, Caving observed at 2.9 mbgs. Groundwater encountered at 1.5 mbgs. Standing water observed at 1.7 mbgs.

GRAINSIZE DISTRIBUTION SAMPLE GRAVEL SAND SILT CLAY

1m = 45 units
Logged By: NV

Input By: FI



Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH141-22
Page 1 of 1

Client: City of Quinte West
Contractor: Canadian Environmental Drilling
Location: Tate Road, Quinte West, ON

Project Name: CoQW WM Extension - CR2, Wooler, Tate Road
Method: Truck Mounted Solid Stem Auger
UTM: 18T N: 4886709.8 E: 288777.6
Project No.: 13324-052
Date Completed: April 27, 2022
Elevation: 101 mASL

SUBSURFACE PROFILE			SAMPLE							Well Installation	Log Notes		
Elevation (m)	Depth	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture					SPT (N) / DCPT	
							25	50	75	20	40	60	80
101	0	ASPHALT: 25 mm Asphalt											
		(SM) gravelly SILTY SAND: grey to brown, moist, compact	1A	SS			3.3%						
					100	12	5.9%			12			
100.5	0.5	(SP-SM) SAND with SILT: brown, moist, compact, trace gravel	1B	SS									
100	1	Becomes Brown to Grey, Loose	2	SS	63	7	6.7%			7			
99.5	1.5												
			3	SS	83	9	14.6%			9			
99	2												
98.5	2.5	Becomes Wet											
			4	SS	75	9	18.2%			9			
98	3	Borehole Terminated @ 3m Due to Target Depth Reached.											
97.5	3.5												
97	4												

GRAINSIZE DISTRIBUTION

SAMPLE	GRAVEL	SAND	SILT	CLAY
1.10	1	88	11	

0.4m: Environmental sample obtained.

3m: Borehole terminated. Caving not observed, Groundwater encountered at 2.4 mbgs. Standing water observed at 2.7 mbgs.

1m = 45 units
Logged By: NV

Input By: FI

0.4m: Environmental sample obtained.

3m: Borehole terminated, Caving not observed, Groundwater encountered at 2.4 mbgs. Standing water observed at 2.7 mbgs.



Appendix B

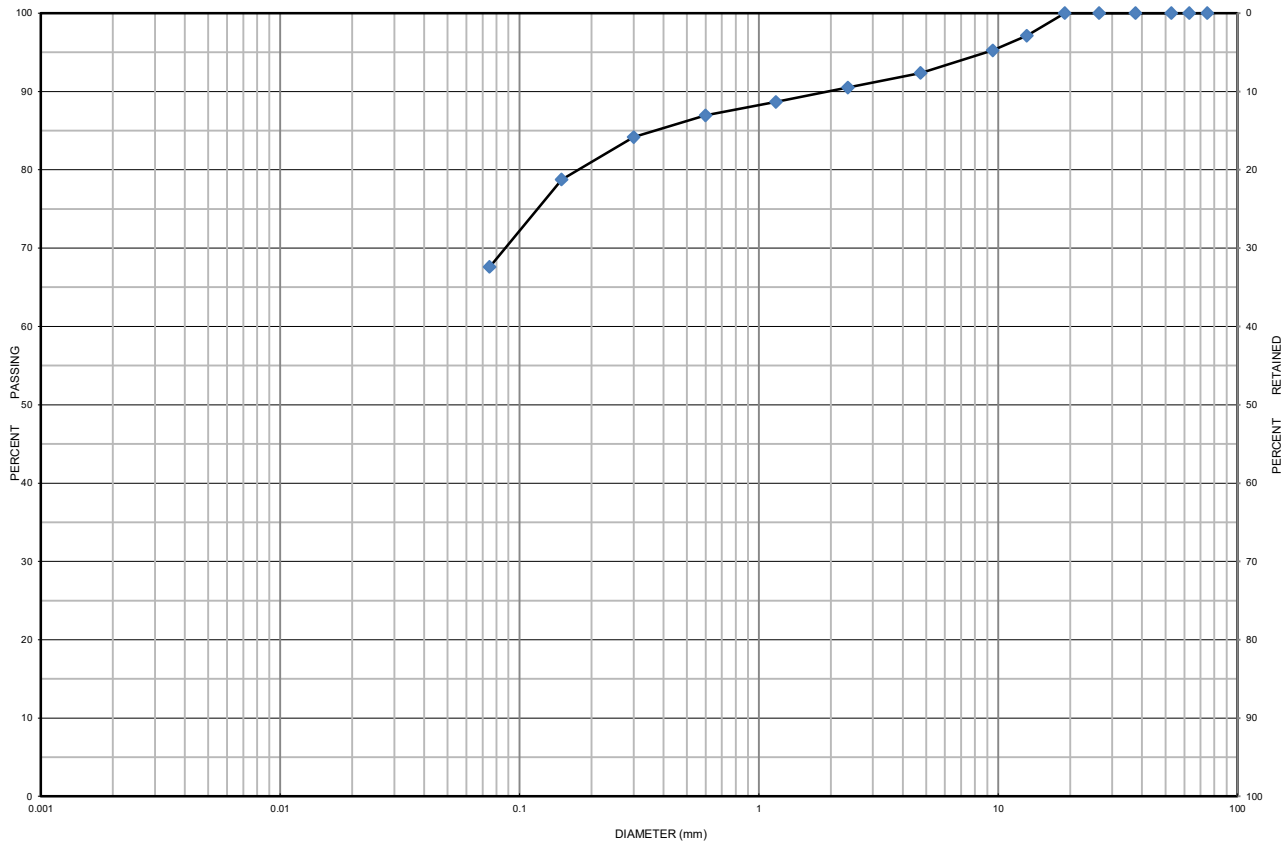
Laboratory Testing Results



Grain Size Distribution Chart

Project Number: 13324-052 **Client:** City of Quinte West
Project Name: GEO - Wooler Road Watermain Extension
Sample Date: April 25 - 29, 2022 **Sampled By:** Nik Valiant - Cambium Inc.
Location: BH 101-22 SS 2 **Depth:** 0.8 m to 1.4 m **Lab Sample No:** S-22-0724

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 101-22	SS 2	0.8 m to 1.4 m	8	25	67		20.8
Description		Classification	D ₆₀	D ₃₀	D ₁₀	C _u	C _c
Sandy Silt trace Gravel		ML	-	-	-	-	-

Additional information available upon request

Issued By: 
(Senior Project Manager)

Date Issued: May 19, 2022

Cambium Inc. (Laboratory)
866.217.7900 | cambium-inc.com
194 Sophia St. | Peterborough | ON | K9H 1E5

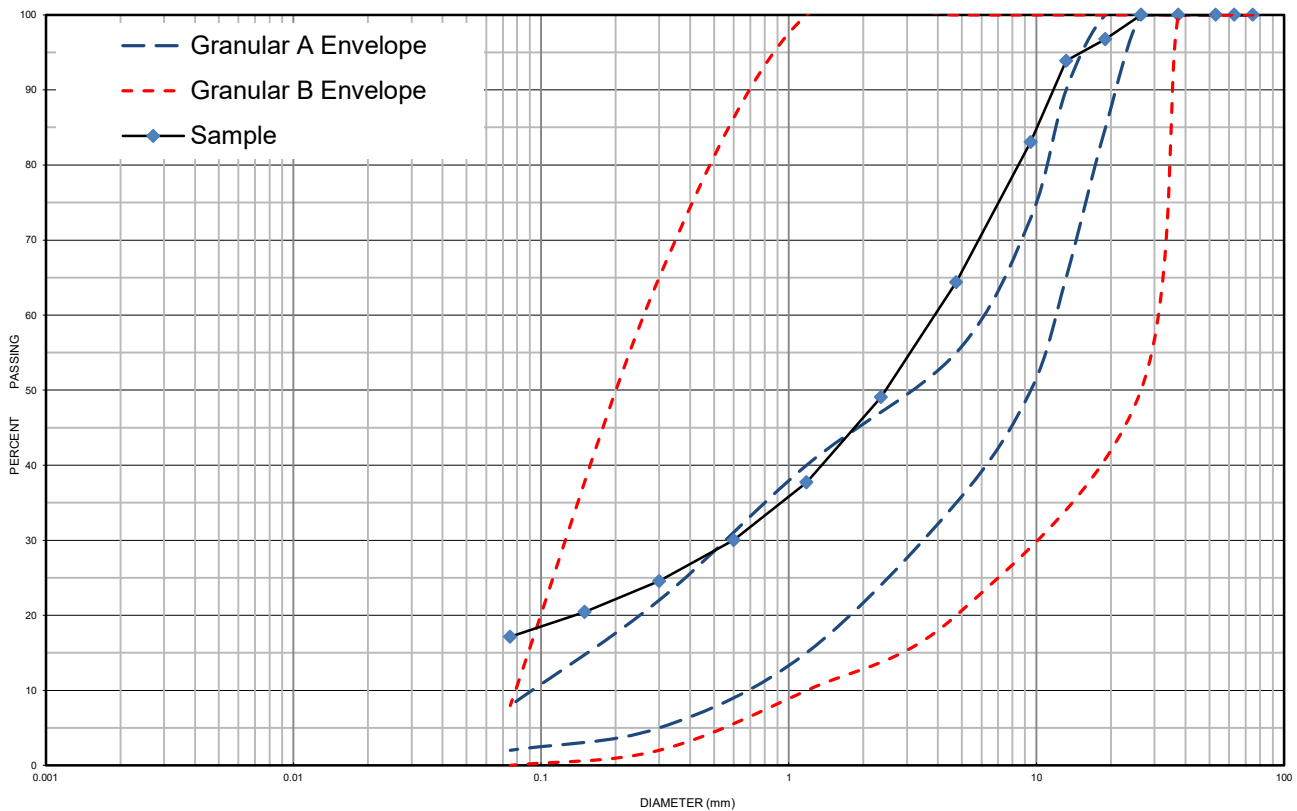
Form: L6V.2 - Grad.Hydo



Grain Size Distribution Chart

Project Number: 13324-052 **Client:** City of Quinte West
Project Name: GEO - Wooler Road Watermain Extension
Sample Date: April 25 - 29, 2022 **Sampled By:** Nik Valiant - Cambium Inc.
Location: BH 103-22 SS 1 **Depth:** 0.1 m to 0.6 m **Lab Sample No:** S-22-0725

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 103-22	SS 1	0.1 m to 0.6 m	36	47	17		1.5
Description		Classification	D ₆₀	D ₃₀	D ₁₀	C _u	C _c
Sand and Gravel some Silt		SM	3.950	0.600	-	-	-

Additional information available upon request

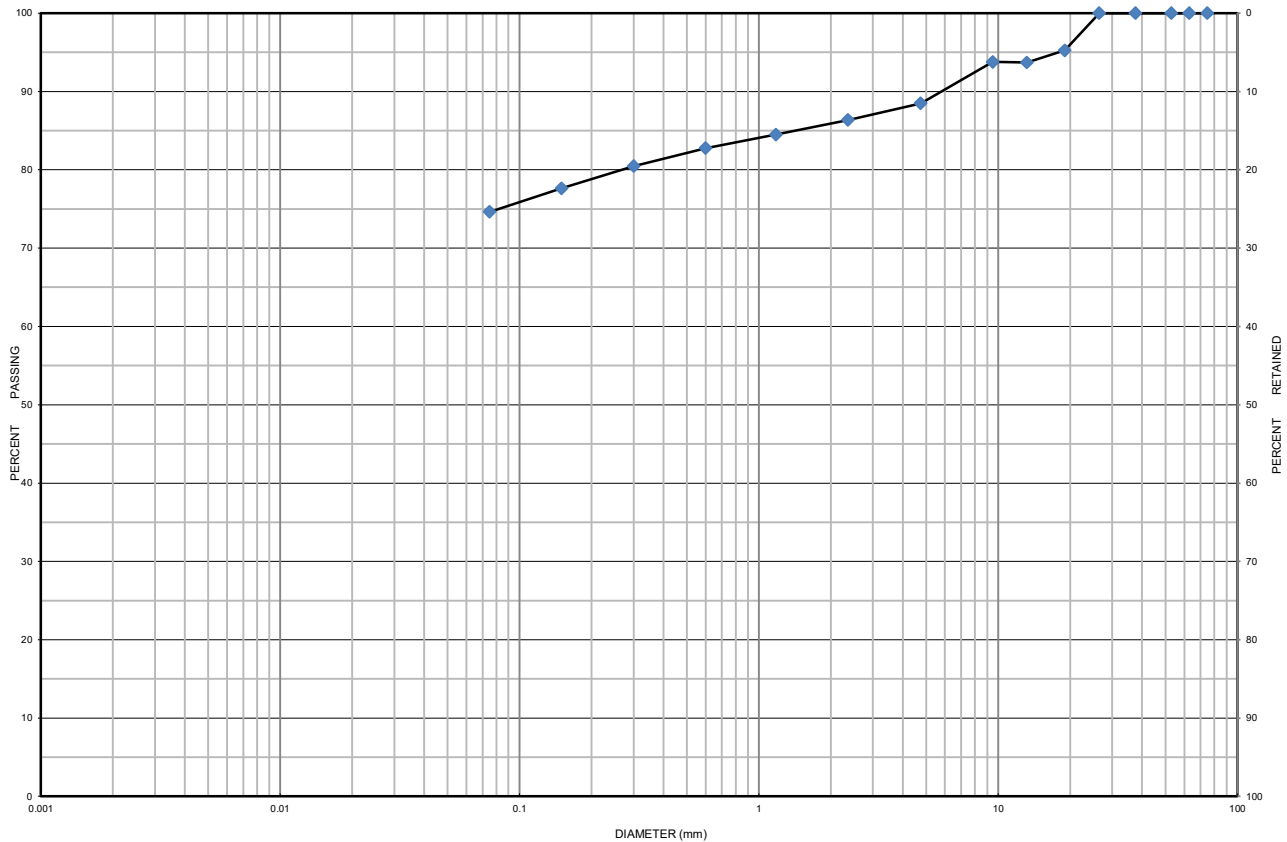
Issued By:  (Senior Project Manager) Date Issued: August 8, 2022



Grain Size Distribution Chart

Project Number: 13324-052 **Client:** City of Quinte West
Project Name: GEO - Wooler Road Watermain Extension
Sample Date: April 25 - 29, 2022 **Sampled By:** Nik Valiant - Cambium Inc.
Location: BH 105-22 SS 3 **Depth:** 1.5 m to 2.1 m **Lab Sample No:** S-22-0726

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 105-22	SS 3	1.5 m to 2.1 m	12	14	74		14.6
Description		Classification	D ₆₀	D ₃₀	D ₁₀	C _u	C _c
Silt some Sand some Gravel		ML	-	-	-	-	-

Additional information available upon request

Issued By: 
(Senior Project Manager)

Date Issued: May 19, 2022

Cambium Inc. (Laboratory)
866.217.7900 | cambium-inc.com
194 Sophia St. | Peterborough | ON | K9H 1E5

Form: L6V.2 - Grad.Hydo

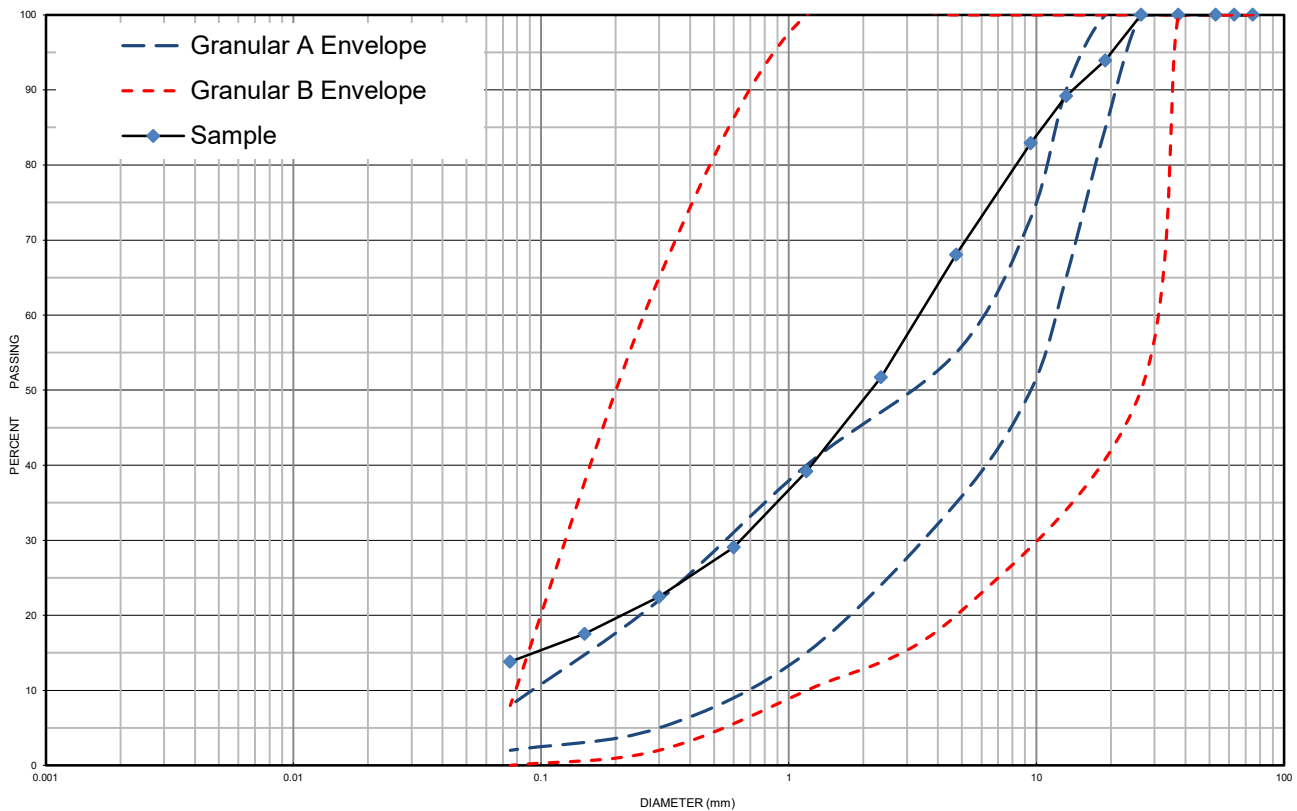


Grain Size Distribution Chart

Project Number: 13324-052 **Client:** City of Quinte West
Project Name: GEO - Wooler Road Watermain Extension
Sample Date: April 25 - 29, 2022 **Sampled By:** Nik Valiant - Cambium Inc.
Location: BH 107-22 SS 1 **Depth:** 0.1 m to 0.6 m **Lab Sample No:** S-22-0727

UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE




MIT SOIL CLASSIFICATION SYSTEM

MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 107-22	SS 1	0.1 m to 0.6 m	32	54	14		2.4
Description		Classification	D ₆₀	D ₃₀	D ₁₀	C _u	C _c
Gravelly Sand some Silt		SM	3.400	0.630	-	-	-

Additional information available upon request

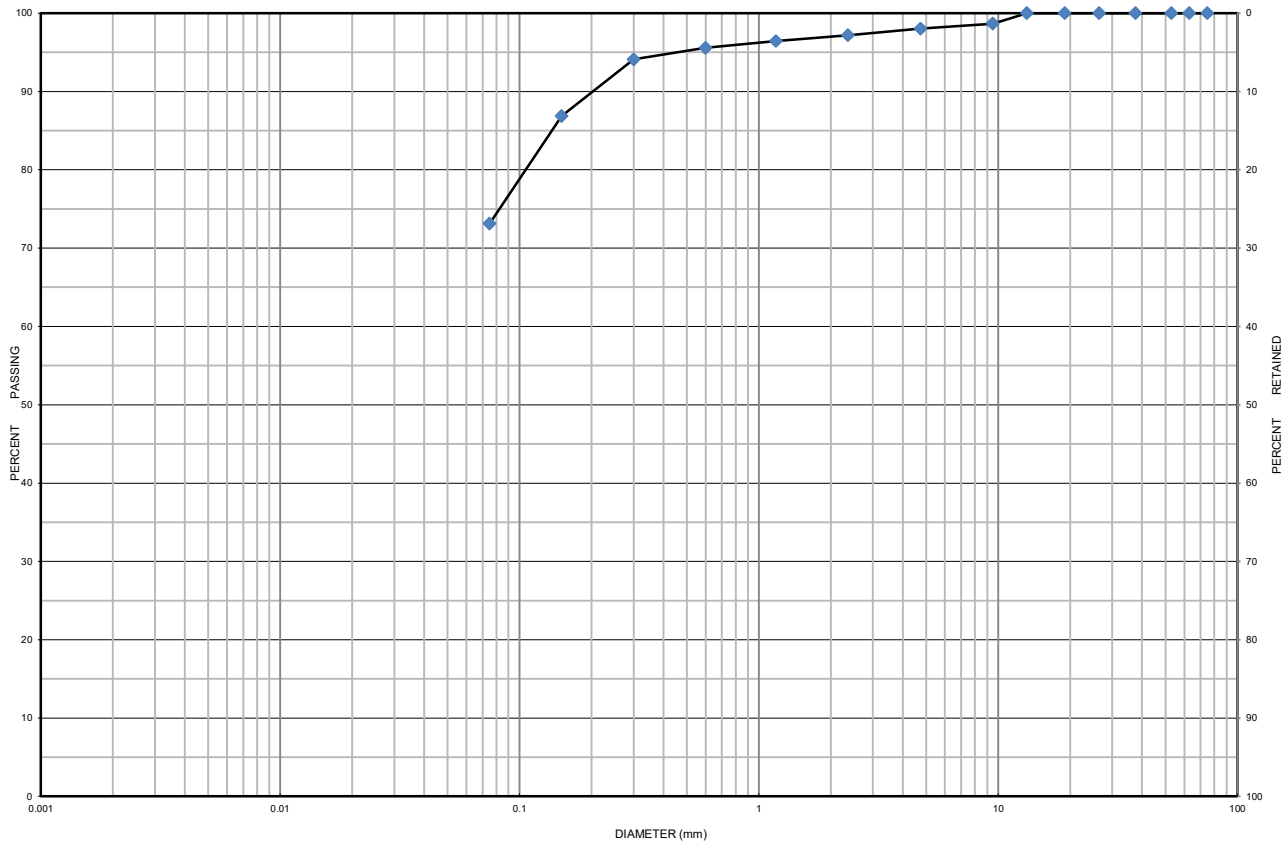
Issued By:  **Date Issued:** August 8, 2022
(Senior Project Manager)



Grain Size Distribution Chart

Project Number: 13324-052 **Client:** City of Quinte West
Project Name: GEO - Wooler Road Watermain Extension
Sample Date: April 25 - 29, 2022 **Sampled By:** Nik Valiant - Cambium Inc.
Location: BH 109-22 SS 2B **Depth:** 1.1 m to 1.4 m **Lab Sample No:** S-22-0728

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 109-22	SS 2B	1.1 m to 1.4 m	2	25	73		19.5
Description		Classification	D ₆₀	D ₃₀	D ₁₀	C _u	C _c
Sandy Silt trace Gravel		ML	-	-	-	-	-

Additional information available upon request

Issued By: 
(Senior Project Manager)

Date Issued: May 19, 2022

Cambium Inc. (Laboratory)
866.217.7900 | cambium-inc.com
194 Sophia St. | Peterborough | ON | K9H 1E5

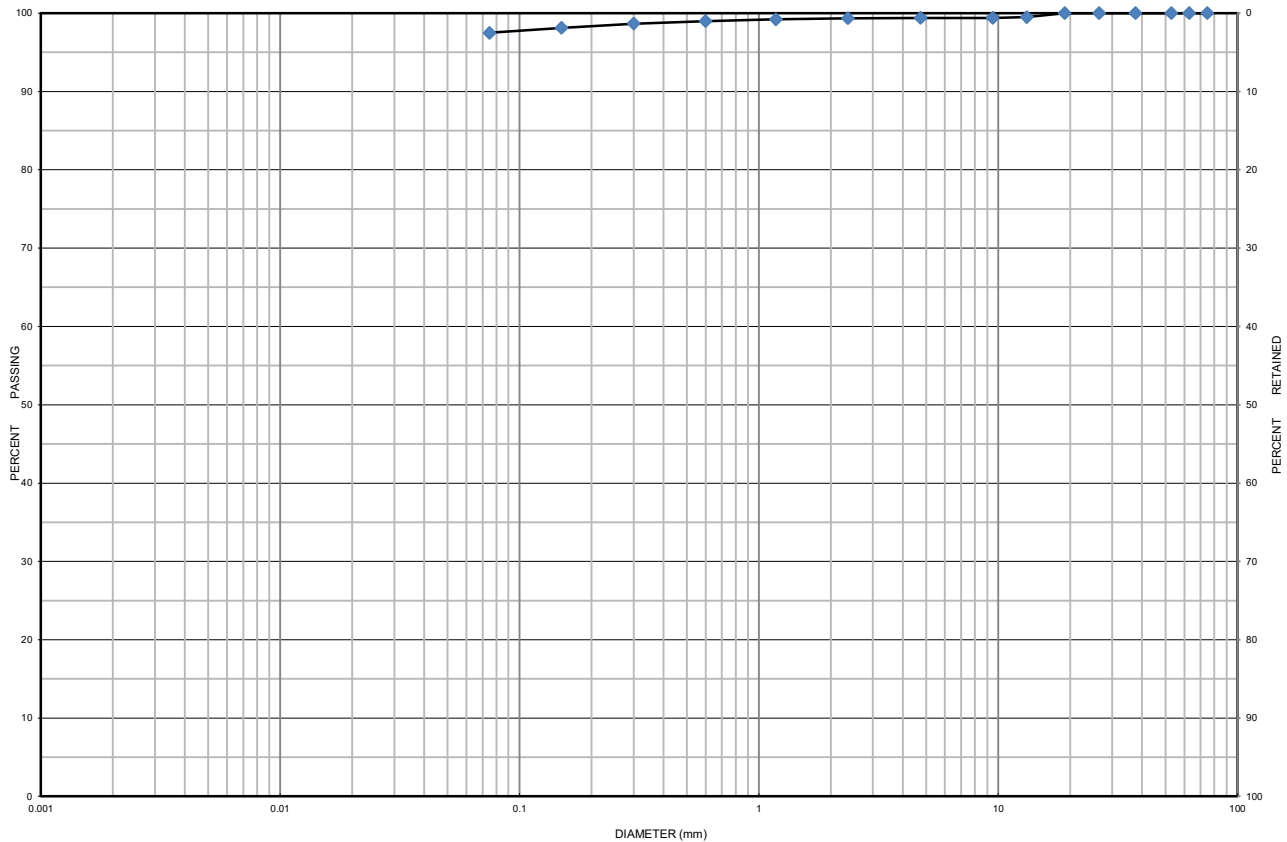
Form: L6V.2 - Grad.Hydo



Grain Size Distribution Chart

Project Number: 13324-052 **Client:** City of Quinte West
Project Name: GEO - Wooler Road Watermain Extension
Sample Date: April 25 - 29, 2022 **Sampled By:** Nik Valiant - Cambium Inc.
Location: BH 111-22 SS 3 **Depth:** 1.5 m to 2.1 m **Lab Sample No:** S-22-0729

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 111-22	SS 3	1.5 m to 2.1 m	1	2	97		18.4
Description		Classification	D ₆₀	D ₃₀	D ₁₀	C _u	C _c
Silt trace Sand trace Gravel		ML	-	-	-	-	-

Additional information available upon request

Issued By:
(Senior Project Manager)

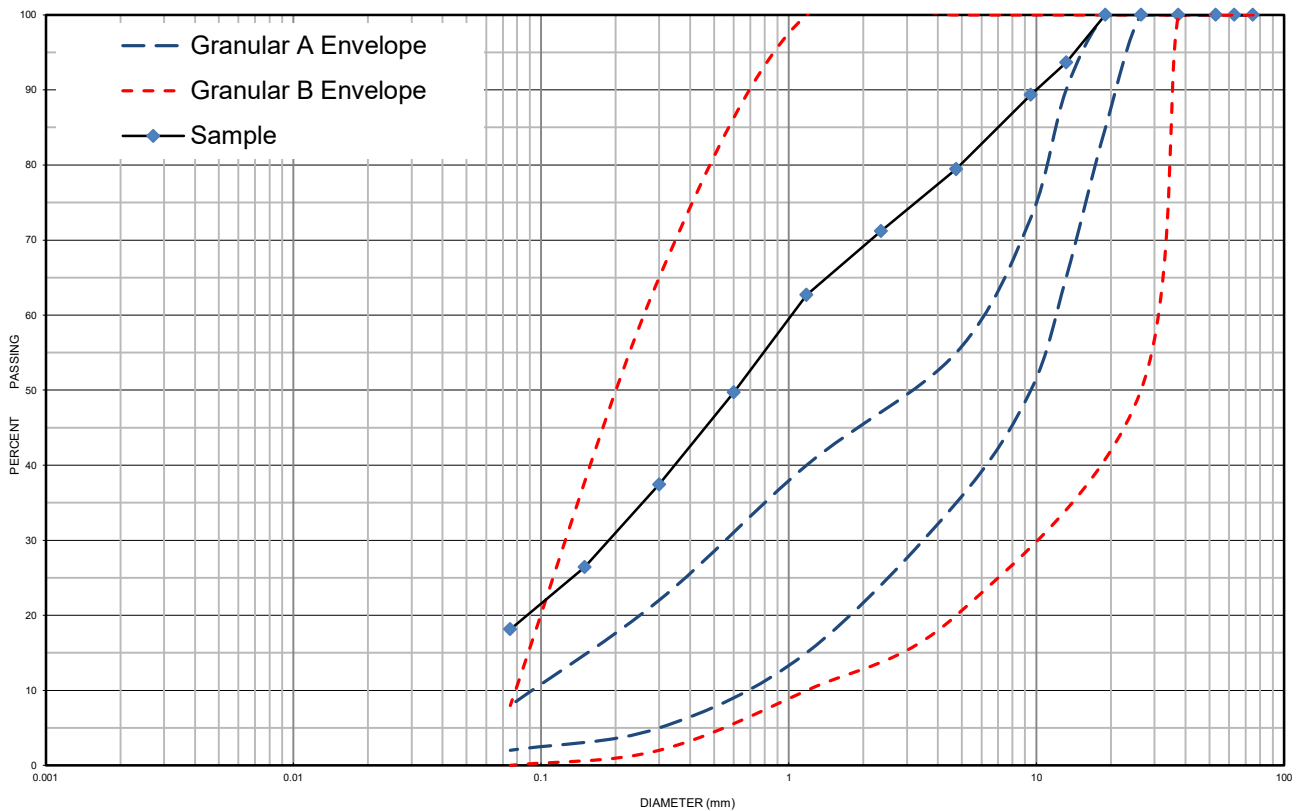
Date Issued: May 19, 2022



Grain Size Distribution Chart

Project Number: 13324-052 **Client:** City of Quinte West
Project Name: GEO - Wooler Road Watermain Extension
Sample Date: April 25 - 29, 2022 **Sampled By:** Nik Valiant - Cambium Inc.
Location: BH 113-22 SS 1 **Depth:** 0.2 m to 0.6 m **Lab Sample No:** S-22-0730

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 113-22	SS 1	0.2 m to 0.6 m	21	61	18		4.5
Description		Classification	D ₆₀	D ₃₀	D ₁₀	C _u	C _c
Gravelly Sand some Silt		SM	1.100	0.190	-	-	-

Additional information available upon request

Issued By:  (Senior Project Manager) Date Issued: August 8, 2022

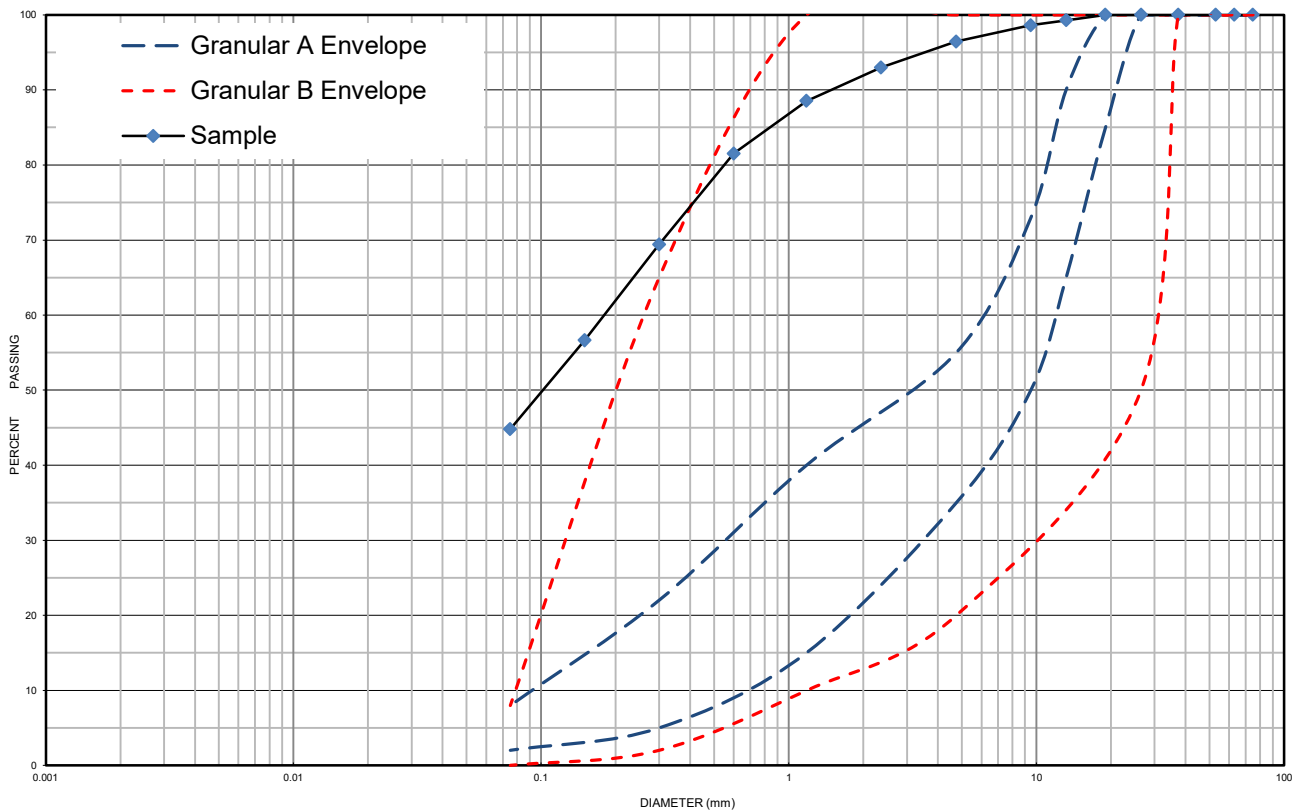


Grain Size Distribution Chart

Project Number: 13324-051 **Client:** City of Quinte West
Project Name: GEO - Watermain, Wooler Road to Tate Road, Trenton
Sample Date: April 25 29, 2022 **Sampled By:** Nik Valiant - Cambium Inc.
Location: BH 117-22 SS 2 **Depth:** 0.8 m to 1.4 m **Lab Sample No:** S-22-0716

UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE




MIT SOIL CLASSIFICATION SYSTEM

MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 117-22	SS 2	0.8 m to 1.4 m	4	52	44		15.3
Description		Classification	D ₆₀	D ₃₀	D ₁₀	C _u	C _c
Sand and Silt trace Gravel		SM	0.180	-	-	-	-

Additional information available upon request

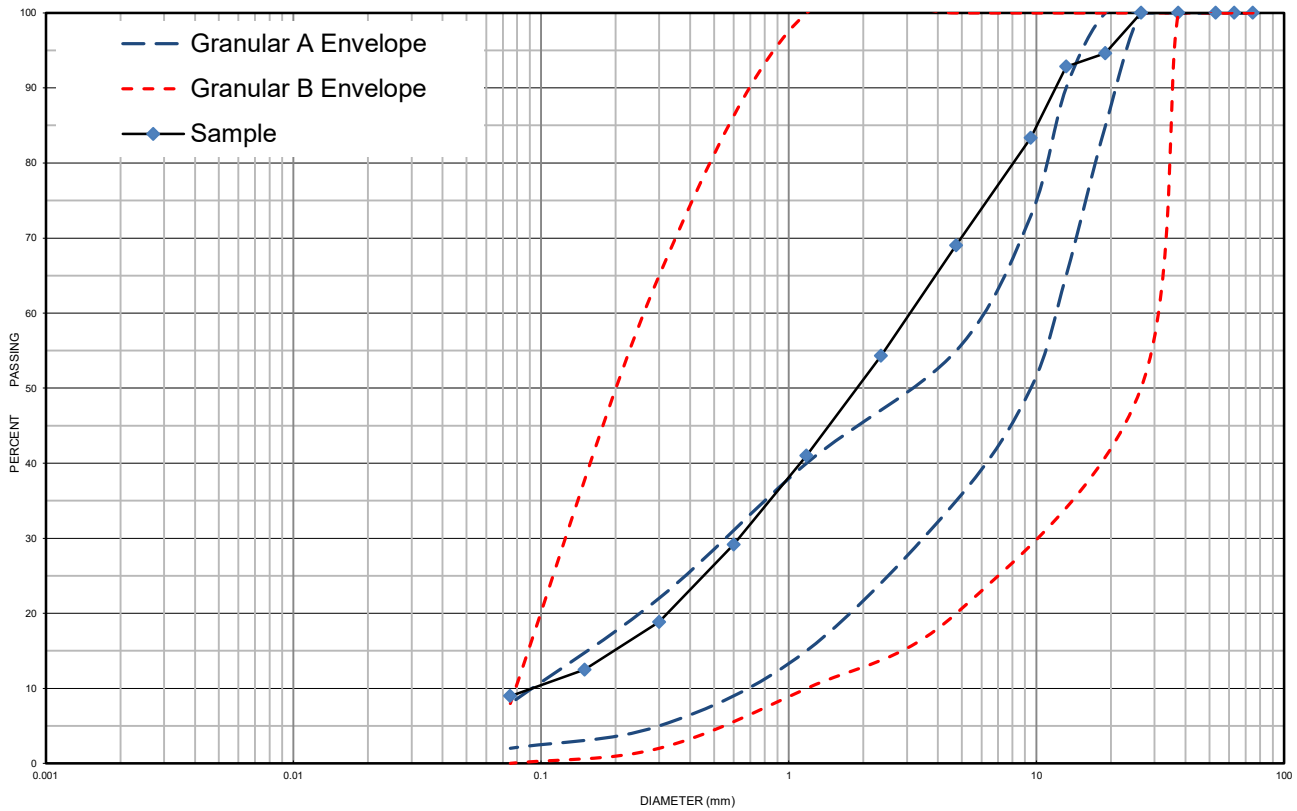
Issued By:  **Date Issued:** August 8, 2022
(Senior Project Manager)



Grain Size Distribution Chart

Project Number: 13324-052 **Client:** City of Quinte West
Project Name: GEO - Wooler Road Watermain Extension
Sample Date: April 25 - 29, 2022 **Sampled By:** Nik Valiant - Cambium Inc.
Location: BH 119-22 SS 1 **Depth:** 0.2 m to 0.6 m **Lab Sample No:** S-22-0731


UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 119-22	SS 1	0.2 m to 0.6 m	31	60	9		2.7
Description		Classification	D ₆₀	D ₃₀	D ₁₀	C _u	C _c
Gravelly Sand trace Silt		SW	3.115	0.620	0.090	34.61	1.37

Additional information available upon request

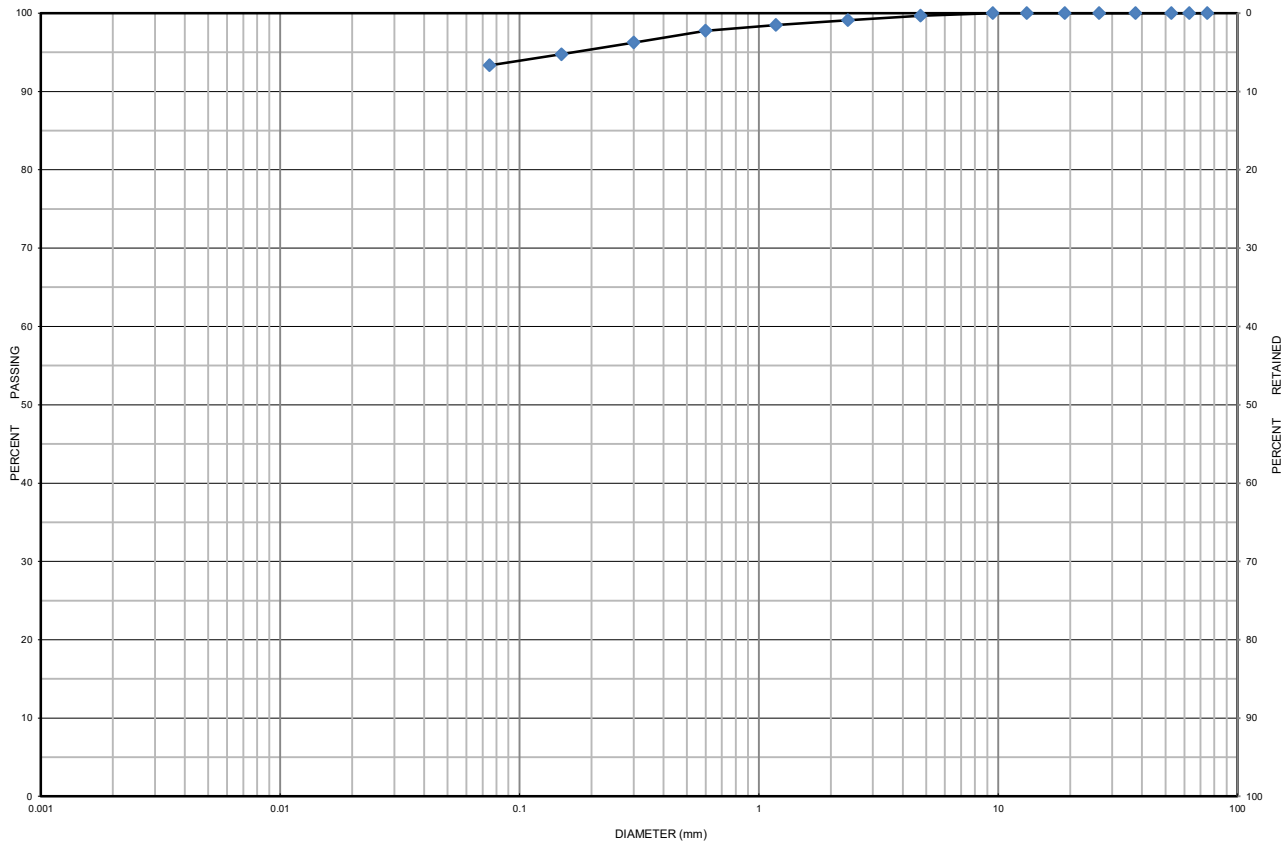
Issued By:  _____ **Date Issued:** August 8, 2022
 (Senior Project Manager)



Grain Size Distribution Chart

Project Number: 13324-052 **Client:** City of Quinte West
Project Name: GEO - Wooler Road Watermain Extension
Sample Date: April 25 - 29, 2022 **Sampled By:** Nik Valiant - Cambium Inc.
Location: BH 121-22 SS 2 **Depth:** 0.8 m to 1.4 m **Lab Sample No:** S-22-0732


UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 121-22	SS 2	0.8 m to 1.4 m	0	6	94		22.4
Description		Classification	D ₆₀	D ₃₀	D ₁₀	C _u	C _c
Silt trace Sand		ML	-	-	-	-	-

Additional information available upon request

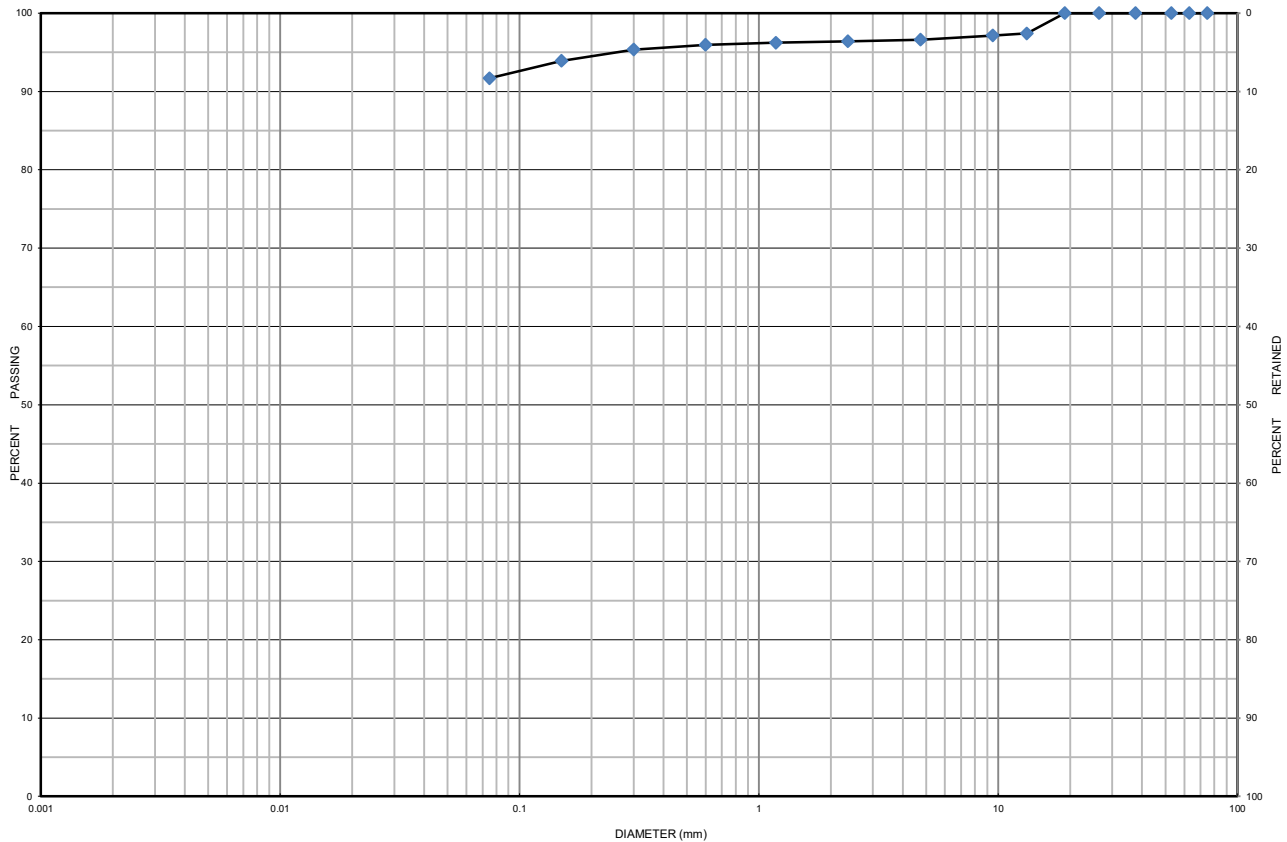
Issued By:  Date Issued: May 19, 2022
(Senior Project Manager)



Grain Size Distribution Chart

Project Number: 13324-052 **Client:** City of Quinte West
Project Name: GEO - Wooler Road Watermain Extension
Sample Date: April 25 - 29, 2022 **Sampled By:** Nik Valiant - Cambium Inc.
Location: BH 135-22 SS 2 **Depth:** 0.8 m to 1.4 m **Lab Sample No:** S-22-0733


UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 135-22	SS 2	0.8 m to 1.4 m	3	5	92		29.4
Description		Classification	D ₆₀	D ₃₀	D ₁₀	C _u	C _c
Silt trace Sand trace Gravel		ML	-	-	-	-	-

Additional information available upon request

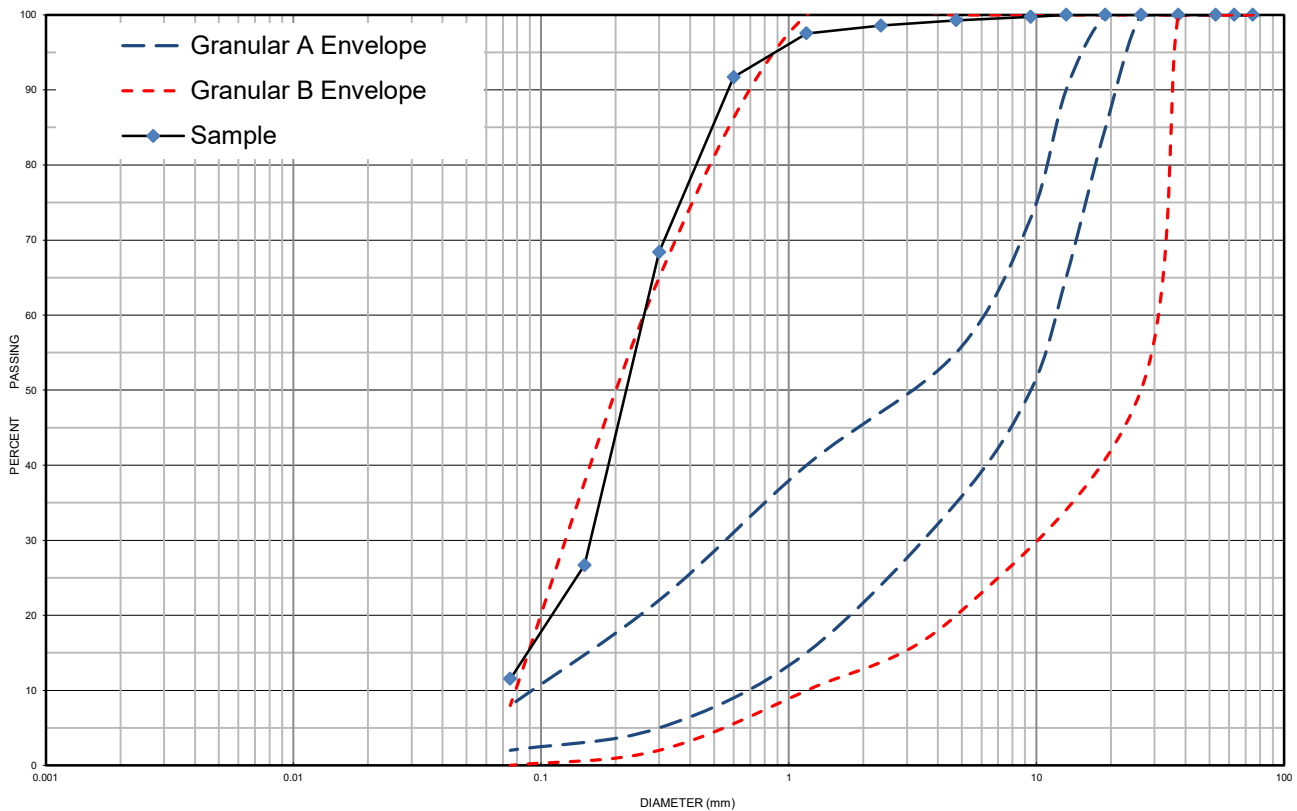
Issued By:  Date Issued: May 19, 2022
(Senior Project Manager)



Grain Size Distribution Chart

Project Number: 13324-052 **Client:** City of Quinte West
Project Name: GEO - Wooler Road Watermain Extension
Sample Date: April 25 - 29, 2022 **Sampled By:** Nik Valiant - Cambium Inc.
Location: BH 137-22 SS 5 **Depth:** 3 m to 3.7 m **Lab Sample No:** S-22-0734


UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 137-22	SS 5	3 m to 3.7 m	1	88	12		18.0
Description		Classification	D ₆₀	D ₃₀	D ₁₀	C _u	C _c
Sand some Silt trace Gravel		SP	0.265	0.165	-	-	-

Additional information available upon request

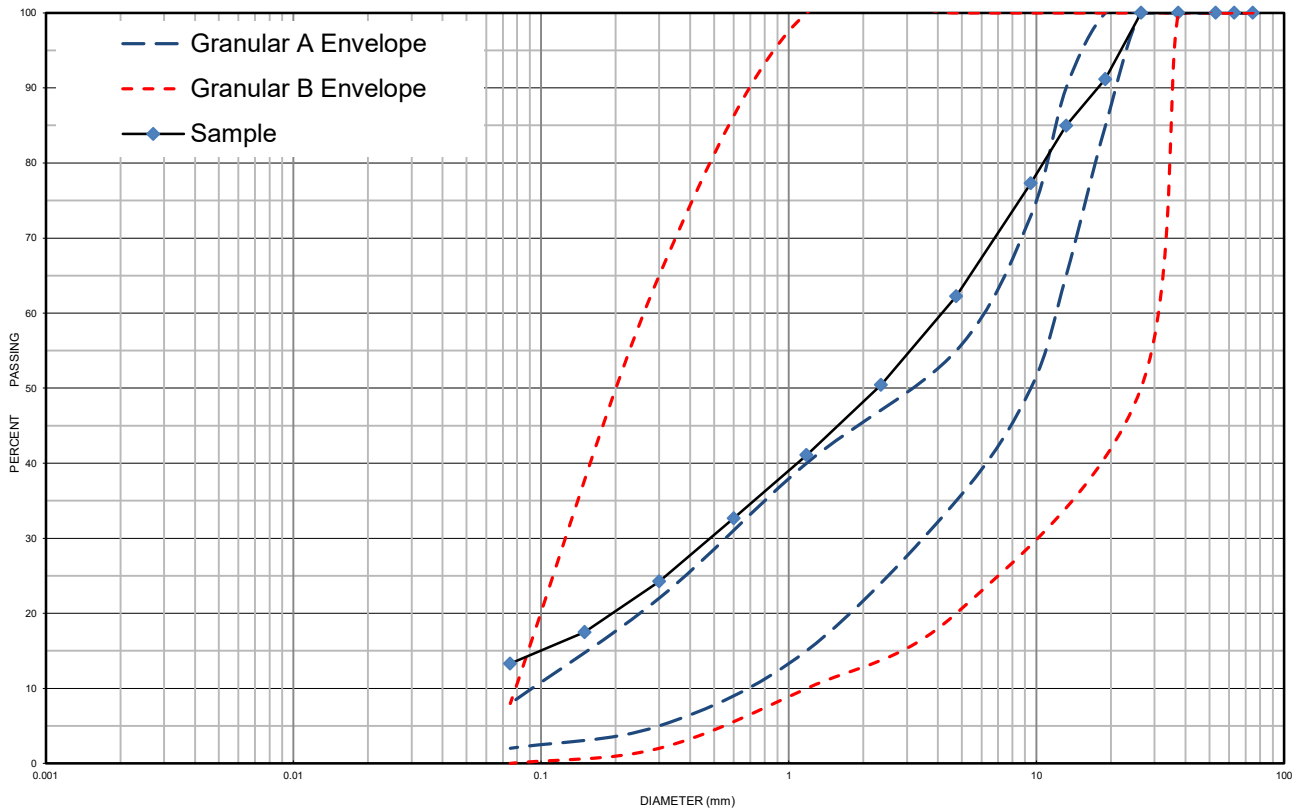
Issued By:  _____ **Date Issued:** August 8, 2022
 (Senior Project Manager)



Grain Size Distribution Chart

Project Number: 13324-052 **Client:** City of Quinte West
Project Name: GEO - Wooler Road Watermain Extension
Sample Date: April 25 - 29, 2022 **Sampled By:** Nik Valiant - Cambium Inc.
Location: BH 139-22 SS 1 **Depth:** 0.2 m to 0.6 m **Lab Sample No:** S-22-0735


UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 139-22	SS 1	0.2 m to 0.6 m	38	49	13		3.6
Description		Classification	D ₆₀	D ₃₀	D ₁₀	C _u	C _c
Sand and Gravel some Silt		SM	4.200	0.495	-	-	-

Additional information available upon request

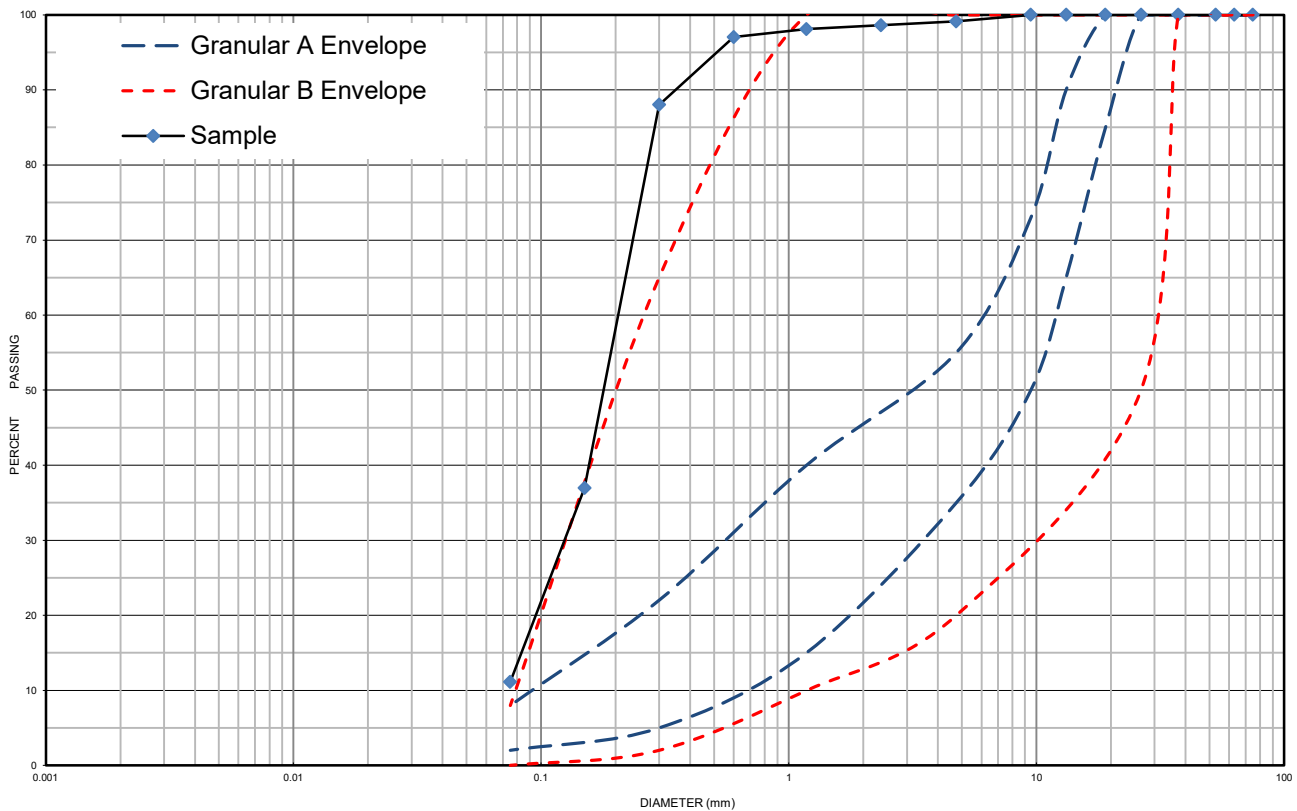
Issued By:  _____ **Date Issued:** August 10, 2022
 (Senior Project Manager)



Grain Size Distribution Chart

Project Number: 13324-052 **Client:** City of Quinte West
Project Name: GEO - Wooler Road Watermain Extension
Sample Date: April 25 - 29, 2022 **Sampled By:** Nik Valiant - Cambium Inc.
Location: BH 141-22 SS 2 **Depth:** 0.8 m to 1.4 m **Lab Sample No:** S-22-0736

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 141-22	SS 2	0.8 m to 1.4 m	1	88	11		6.7
Description		Classification	D ₆₀	D ₃₀	D ₁₀	C _u	C _c
Sand some Silt trace Gravel		SP	0.210	0.135	-	-	-

Additional information available upon request

Issued By:  (Senior Project Manager) **Date Issued:** August 8, 2022



Moisture Content



Project Number:

13324-052

Project Name:

GEO - Wooler Road Watermain Extension

Client:

City of Quinte West

Date Taken:

2022-04-25

Lab Number:

S-22-0723

Date Tested:

2022-05-11

Tested By:

K. Dickson

Borehole Number	Sample Number	Sample Depth (m)	Water Weight (g)	Water Content (%)	Additional Observations
101	1A	0.13-0.28	2.8	1.4	NR
101	1B	0.28-0.38	23.1	13.1	NR
101	1C	0.38-0.61	38.9	18.0	NR
101	2	0.76-1.37	111.5	20.8	NR
101	3A	1.52-1.70	56.7	23.3	NR
101	3B	1.70-2.13	70.4	19.7	
101	4	2.44-3.05	30.9	9.7	
102	1	0.13-0.61	5.0	1.6	
102	2A	0.76-0.86	11.3	7.0	NR
102	2B	0.86-1.19	54.0	21.0	
102	2C	0.86-1.37	25.8	19.8	NR
102	3	1.52-2.13	80.1	20.3	
102	4	2.44-3.05	54.9	17.4	
103	1	0.13-0.61	6.0	1.5	NR
103	2	0.76-1.37	9.4	4.0	
103	3A	1.52-1.83	23.5	8.3	
103	3B	1.83-2.13	29.7	22.5	
103	4	2.44-3.05	48.1	10.8	
104	1A	0.10-0.25	6.3	1.9	NR
104	1B	0.25-0.61	8.4	2.8	NR
104	2	0.76-1.37	13.1	3.7	
104	3	1.52-2.13	6.9	3.2	
104	4	2.44-3.05	17.0	6.6	
105	1	0.13-0.61	8.2	2.8	
105	2	0.76-1.37	36.2	19.5	
105	3	1.52-2.13	89.6	14.6	NR
105	4	2.44-3.05	28.8	8.5	

1 – Contains organics

2 – Contains rubble

3 – Hydrocarbon Odour

4 – Unknown Chemical Odour

5 – Saturated – free water visible

6 – Very moist – near optimum moisture content

7 – Moist – below optimum moisture

8 – Dry – dry texture – powdery

9 – Very small – caution may not be representative

10 – Hold sample for gradation analysis



Moisture Content



Project Number:

13324-052

Project Name:

GEO - Wooler Road Watermain Extension

Client:

City of Quinte West

Date Taken:

2022-04-25

Lab Number:

S-22-0723

Date Tested:

2022-05-11

Tested By:

K. Dickson

Borehole Number	Sample Number	Sample Depth (m)	Water Weight (g)	Water Content (%)	Additional Observations
106	1A	0.13-0.23	5.4	1.7	NR
106	1B	0.23-0.61	6.8	2.5	
106	2	0.76-1.37	35.1	14.9	
106	3	1.52-2.13	11.9	11.6	NR
106	4A	2.44-2.54	10.1	14.6	NR
106	4B	2.54-2.95	35.3	12.5	
107	1	0.13-0.61	15.8	2.4	NR
107	2A	0.76-0.86	6.5	4.0	NR
107	2B	0.86-1.37	17.8	8.9	
107	3	1.52-2.13	64.2	16.2	
107	4	2.44-3.05	47.7	13.2	
108	1	0.15-0.61	12.2	5.0	
108	2A	0.76-0.99	23.2	8.9	
108	2B	0.99-1.37	41.3	18.1	NR
108	3	1.52-2.13	73.8	22.9	
108	4	2.44-3.05	46.3	12.6	
109	1	0.10-0.61	7.4	2.8	
109	2A	0.76-1.07	17.8	5.4	
109	2B	1.07-1.37	42.5	19.5	NR
109	3	1.52-2.13	44.3	19.7	
109	4	2.44-3.05	54.3	18.1	
110	1	0.15-0.61	11.3	3.6	
110	2A	0.76-1.07	21.2	6.9	
110	2B	1.07-1.37	23.4	14.9	NR
110	3	1.52-2.13	43.9	17.2	
110	4	2.44-3.05	59.4	19.0	
111	1	0.15-0.61	20.2	7.0	

1 – Contains organics

2 – Contains rubble

3 – Hydrocarbon Odour

4 – Unknown Chemical Odour

5 – Saturated – free water visible

6 – Very moist – near optimum moisture content

7 – Moist – below optimum moisture

8 – Dry – dry texture – powdery

9 – Very small – caution may not be representative

10 – Hold sample for gradation analysis



Moisture Content



Project Number:

13324-052

Project Name:

GEO - Wooler Road Watermain Extension

Client:

City of Quinte West

Date Taken:

2022-04-25

Lab Number:

S-22-0723

Date Tested:

2022-05-11

Tested By:

K. Dickson

Borehole Number	Sample Number	Sample Depth (m)	Water Weight (g)	Water Content (%)	Additional Observations
111	2A	0.76-0.94	16.5	6.7	NR
111	2B	0.94-1.22	38.7	15.3	
111	3	1.52-2.13	197.7	18.4	NR
111	4	2.44-3.05	63.3	21.0	
112	1	0.15-0.61	12.8	4.5	
112	2	0.76-1.37	71.4	17.6	
112	3	1.52-2.13	70.4	18.2	
112	4	2.44-3.05	62.6	19.7	
113	1	0.18-0.61	33.5	4.5	NR
113	2A	0.76-1.19	35.9	18.4	
113	2B	1.19-1.37	36.3	20.7	NR
113	3	1.52-2.13	27.6	13.1	brown
113	3	1.52-2.13	44.8	13.0	greyish
113	3	1.52-2.13	32.1	16.9	dark
113	4	2.44-3.05	48.4	17.5	NR
119	1	0.18-0.61	18.8	2.7	NR
119	2	0.76-1.37	27.7	11.9	
119	3	1.52-2.13	28.8	13.6	
119	4	2.44-3.05	45.5	25.1	
120	1	0.15-0.61	11.8	4.6	
120	2A	0.76-1.01	38.0	12.7	
120	2A	1.01-1.37	40.7	21.3	
120	3	1.52-2.13	52.8	26.4	
120	4	2.44-3.05	46.5	27.0	
121	1	0.13-0.61	12.6	5.3	
121	2	0.76-1.37	141.0	22.4	NR
121	3	1.52-2.13	52.7	21.0	

1 – Contains organics

2 – Contains rubble

3 – Hydrocarbon Odour

4 – Unknown Chemical Odour

5 – Saturated – free water visible

6 – Very moist – near optimum moisture content

7 – Moist – below optimum moisture

8 – Dry – dry texture – powdery

9 – Very small – caution may not be representative

10 – Hold sample for gradation analysis



Moisture Content



Project Number:

13324-052

Project Name:

GEO - Wooler Road Watermain Extension

Client:

City of Quinte West

Date Taken:

2022-04-25

Lab Number:

S-22-0723

Date Tested:

2022-05-11

Tested By:

K. Dickson

Borehole Number	Sample Number	Sample Depth (m)	Water Weight (g)	Water Content (%)	Additional Observations
121	4	2.44-3.05	48.4	23.3	
135	1A	0.15-0.46	10.0	3.3	
135	1B	0.46-0.61	24.5	12.5	NR
135	2	0.76-1.37	216.7	29.4	NR
135	3	1.52-2.13	68.4	29.8	
135	4	2.44-3.05	59.0	29.9	
136	1A	0.15-0.25	6.5	3.0	
136	1B	0.25-0.61	11.0	5.2	
136	2A	0.76-0.91	13.3	8.4	
136	2B	0.91-1.22	35.8	15.2	
136	3	1.52-2.13	57.2	25.6	
136	4	2.29-2.90	80.0	68.1	NR,1
136	6	4.57-5.03	40.8	17.1	
137	1A	0.15-0.30	15.8	4.0	
137	1B	0.30-0.61	3.7	4.2	NR
137	2	0.76-1.37	20.2	10.0	
137	3	1.52-2.13	77.5	38.7	
137	4A	2.29-2.59	108.4	39.0	NR
137	4B	2.59-2.90	64.8	19.3	NR
137	5	3.05-3.66	209.5	18.0	NR
137	6	4.57-5.03	65.2	18.5	
138	1	0.15-0.61	8.4	3.1	
138	2	0.76-1.37	18.1	6.0	
138	3	1.52-2.13	30.9	12.6	
138	4	2.44-3.05	88.0	29.9	
139	1	0.15-0.61	28.9	3.6	NR
139	2	0.76-1.37	14.4	20.0	NR

1 – Contains organics

2 – Contains rubble

3 – Hydrocarbon Odour

4 – Unknown Chemical Odour

5 – Saturated – free water visible

6 – Very moist – near optimum moisture content

7 – Moist – below optimum moisture

8 – Dry – dry texture – powdery

9 – Very small – caution may not be representative

10 – Hold sample for gradation analysis



Moisture Content



Project Number:

13324-052

Project Name:

GEO - Wooler Road Watermain Extension

Client:

City of Quinte West

Date Taken:

2022-04-25

Lab Number:

S-22-0723

Date Tested:

2022-05-11

Tested By:

K. Dickson

Borehole Number	Sample Number	Sample Depth (m)	Water Weight (g)	Water Content (%)	Additional Observations
139	3	1.52-2.13	42.1	17.9	
139	4	2.44-3.05	62.5	22.8	
140	1A	0.15-0.30	10.2	3.2	
140	1B	0.30-0.61	10.3	5.3	
140	2	0.76-1.37	26.0	11.7	
140	3	1.52-2.13	62.7	20.4	
140	4	2.44-3.05	44.8	18.6	
141	1A	0.15-0.30	8.7	3.3	NR
141	1B	0.30-0.61	13.5	5.9	
141	2	0.76-1.37	42.8	6.7	NR
141	3	1.52-2.13	27.2	14.6	
141	4	2.44-3.05	35.0	18.2	

1 – Contains organics

2 – Contains rubble

3 – Hydrocarbon Odour

4 – Unknown Chemical Odour

5 – Saturated – free water visible

6 – Very moist – near optimum moisture content

7 – Moist – below optimum moisture

8 – Dry – dry texture – powdery

9 – Very small – caution may not be representative

10 – Hold sample for gradation analysis



Appendix C

Soil Characterization Report



Environmental

Geotechnical

Building Sciences

Construction Quality
Verification

Telephone

(866) 217.7900

(705) 742.7900

Website

cambium-inc.com

Mailing Address

P.O. Box 325,
Peterborough, Ontario
Canada, K9J 6Z3

Locations

Peterborough
Kingston
Barrie
Oshawa
Calgary

Laboratory

Peterborough



August 11, 2022

The City of Quinte West
7 Creswell Drive
Trenton, ON K8V 5R6

Re: Excess Soil Characterization – Watermain Extension, City of Quinte West, Ontario

Cambium Reference: 13324-052

To Whom it May Concern,

Cambium Inc. (Cambium) was retained by City of the Quinte West to characterize excess in-situ soil between Highway 2, Wooler Road and Tate Road, in Trenton, Ontario (the Site). Cambium understands that the City of Quinte West will be expanding underground watermain services along Highway 2, Wooler Road and Tate Road. Approximately 4,200 m of underground watermain will be installed.

Soil sampling was requested by the Client as part of the geotechnical investigation to characterize soil along the roadway and allow for an Excess Soil Management Plan to be developed in the future. The excess soil characterization involved soil sampling and analysis to assess environmental quality, including the presence of contaminants and their respective concentration relative to regulatory standards.

The methodology for the excess soil characterization was based on the requirements of Ontario Regulation (O.Reg.) 406/19 and the associated document “Rules for Soil Management and Excess Soil Quality Standards”. Note that for work being conducted and concluded prior to January 1, 2023, amendments to O.Reg. 406/19 allows some deviation from the regulatory requirements. Any deviations from the regulation in 2022 should be approved by the intended receiving site if one is identified prior to commencement of work.

In the absence of an Assessment of Past Uses, the contaminants of potential concern (COPCs) for the Site were metals, hydride-forming metals, electrical conductivity (EC), sodium adsorption ratio (SAR), petroleum hydrocarbon



Environmental

Geotechnical

Building Sciences

Construction Quality
Verification

Telephone

(866) 217.7900

(705) 742.7900

Website

cambium-inc.com

Mailing Address

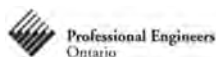
P.O. Box 325,
Peterborough, Ontario
Canada, K9J 6Z3

Locations

Peterborough
Kingston
Barrie
Oshawa
Calgary

Laboratory

Peterborough



August 11, 2022

fractions 1 to 4 (PHC F1-F4), benzene, toluene, ethylbenzene, xylenes (BTEX), volatile organic compounds (VOCs), and polychlorinated biphenyls (PCBs).

Methodology

The methodology for the excess soil characterization was developed by a qualified person (QP) based on the requirements of O.Reg. 406/19.

Cambium personnel conducted the soil sampling on April 25, 2022. Cambium oversaw the advancement of 28 boreholes by Canadian Environmental Drilling & Contractors Inc. throughout the subject soil volume source. Each borehole was advanced to varying depths during the geotechnical investigation completed by Cambium¹.

Soil was examined for soil type, moisture content, presence of deleterious material, odour, and visual evidence of impacts such as staining. The borehole logs are provided in the geotechnical investigation report¹. Soil samples from selected borehole were submitted for analysis of the COPCs, at the following depths:

- 0.8 metres below ground surface (mbgs) in BH101
- 1.6 mbgs in BH102
- 0.6 mbgs in BH103
- 1.3 mbgs in BH104
- 0.7 mbgs in BH105
- 1.9 mbgs in BH106
- 0.5 mbgs in BH107
- 1.2 mbgs in BH108

¹ Geotechnical Investigation – Watermain extension, Wooler Road to Tate Road, Quinte West, Cambium Inc. August 12, 2022.



Environmental

Geotechnical

Building Sciences

Construction Quality
Verification

Telephone

(866) 217.7900

(705) 742.7900

Website

cambium-inc.com

Mailing Address

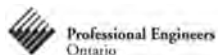
P.O. Box 325,
Peterborough, Ontario
Canada, K9J 6Z3

Locations

Peterborough
Kingston
Barrie
Oshawa
Calgary

Laboratory

Peterborough



August 11, 2022

- 0.7 mbgs in BH110
- 1.8 mbgs in BH112
- 0.5 mbgs in BH113
- 1.0 – 2.0 mbgs in BH115
- 0.5 mbgs in BH117
- 1.4 mbgs in BH118
- 1.4 mbgs in BH119
- 0.6 mbgs in BH120
- 1.3 mbgs in BH121
- 0.7 mbgs in BH135
- 1.9 mbgs in BH138
- 0.4 mbgs in BH139
- 1.5 mbgs in BH140
- 0.4 mbgs in BH141

The soil samples were submitted to Paracel Laboratories Ltd. (Paracel).

BH101 to BH106 were completed along Highway 2, BH107 to BH121 were completed along Wooler Road and BH135 to BH141 were completed along Tate Road.

Quality Assurance and Control Analysis

In addition, quality control duplicate samples were analyzed as part of a Quality Assurance/Quality Control (QA/QC) program. The following blind duplicate soil samples were submitted for analysis of the COPCs:

- QAQC1 is a duplicate of BH110 at 0.7 mbgs
- QAQC2 is a duplicate of BH118 at 1.4 mbgs



Environmental

Geotechnical

Building Sciences

Construction Quality
Verification

Telephone

(866) 217.7900

(705) 742.7900

Website

cambium-inc.com

Mailing Address

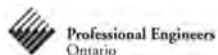
P.O. Box 325,
Peterborough, Ontario
Canada, K9J 6Z3

Locations

Peterborough
Kingston
Barrie
Oshawa
Calgary

Laboratory

Peterborough



August 11, 2022

Where analytical parameters were detected in both the parent and the duplicate samples at concentrations greater than five times the laboratory reported detection limit (RDL), relative percent difference (RPD) was calculated to assess the precision of the results. RPD between was calculated as follows:

$$RPD(\%) = \frac{|x_1 - x_2|}{x_m} \times 100\%$$

Where: x_1 = parent sample result

x_2 = duplicate sample result

x_m = arithmetic mean of parent and duplicate sample results

RPD are generally more sensitive at low parameter concentrations; as such, RPD is not calculated when the parameter concentration if the parent and/or duplicate sample is less than five times the laboratory RDL.

The calculated RPD results were compared to data quality objectives (DQOs) of 50% for soil. These DQOs are accepted by the Ministry.

All calculated RPDs met the DQOs, with the exception of SAR from BH110 (QAQC1). As such, the sample results were considered acceptable and suitable for use in evaluating soil quality at the Site.

Results

No odours, staining, deleterious material, or elevated vapours were noted in the soil samples. Soil analysis results were compared to the volume independent generic excess soil quality standards (ESQS) and Generic Leachate Screening Levels For Excess Soil Reuse in Appendix 1 of the *Rules for Soil Management and Excess Soil Quality Standards*.

As a receiving site had not yet been determined, analysis results were compared to the Table 1 standards for residential, parkland, institutional, industrial, commercial, community (RPIICC) property use, as well as the Table 2.1 and 3.1 ESQS for residential, parkland, institutional (RPI) property use and industrial, commercial, community (ICC) property use. The original laboratory Certificates of Analysis are attached, with results compared to Table 1 AO standards.



Environmental

Geotechnical

Building Sciences

Construction Quality
Verification

Telephone

(866) 217.7900
(705) 742.7900

Website

cambium-inc.com

Mailing Address

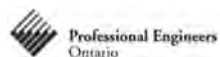
P.O. Box 325,
Peterborough, Ontario
Canada, K9J 6Z3

Locations

Peterborough
Kingston
Barrie
Oshawa
Calgary

Laboratory

Peterborough



August 11, 2022

The following is a summary of the excess soil quality standards that are met based on the analysis.

Table 1 Excess Soil Quality Standards Met

Sample ID	Sample Depth (mbgs)	Table 1 (RPI/ICC)	Table 2.1 (RPI)	Table 2.1 (ICC)	Table 3.1 (RPI)	Table 3.1 (ICC)
BH101	0.8	✓*	✓*	✓*	✓*	✓*
BH102	1.6	✓	✓	✓	✓	✓
BH103	0.6	✗	✗	✓	✗	✓
BH104	1.3	✓	✓	✓	✓	✓
BH105	0.7	✗	✗	✗	✓*	✓
BH106	1.9	✓*	✓*	✓	✓*	✓
BH107	0.5	✓	✓	✓	✓	✓
BH108	1.2	✓	✓	✓	✓	✓
BP110	0.7	✗	✗	✓	✗	✓
BH112	1.8	✓	✓	✓	✓	✓
BH113	0.5	✓*	✓*	✓	✓*	✓
BH115	1.0-2.0	✓	✓	✓	✓	✓
BH117	0.5	✓	✓	✓	✓	✓
BH118	1.4	✓	✓	✓	✓	✓
BH119	1.4	✓*	✓*	✓	✓*	✓
BH120	0.6	✗	✗	✓	✗	✓
BH121	1.3	✓	✓	✓	✓	✓
BH135	0.7	✓	✓	✓	✓	✓
BH138	1.9	✓	✓	✓	✓	✓
BH139	0.4	✓	✓	✓	✓	✓
BH140	1.5	✓	✓	✓	✓	✓
BH141	0.4	✗	✗	✓	✗	✓

✓* exceeds for SAR and/or EC only



Environmental

Geotechnical

Building Sciences

Construction Quality
Verification

Telephone

(866) 217.7900

(705) 742.7900

Website

cambium-inc.com

Mailing Address

P.O. Box 325,
Peterborough, Ontario
Canada, K9J 6Z3

Locations

Peterborough
Kingston
Barrie
Oshawa
Calgary

Laboratory

Peterborough



August 11, 2022

Salt-Impacted Excess Soil

Salt-related contaminants, SAR and/or EC, were present in some samples at levels exceeding the standards. Excess soil quality standards for chemicals (e.g., SAR and EC) in soil resulting solely from the use of a substance for the safety of vehicular or pedestrian traffic applied under conditions of snow or ice or both, are deemed to be met if the following criteria are met:

- i. The excess soil is finally placed at one of the following locations:
 - a) where it is reasonable to expect that the soil will be affected by the same chemicals as a result of continued application of a substance for the safety of vehicular or pedestrian traffic under conditions of snow or ice; or
 - b) with an industrial or commercial property use and to which non-potable standards would be applicable; or
 - c) that is at least 1.5 m below the surface of the soil.
- ii. The excess soil is not finally placed at any of the following locations:
 - a) within 30 m of a waterbody;
 - b) within 100 m of a potable water well or area with an intended property use that may require a potable water well; or
 - c) that will be used for growing crops or pasturing livestock unless the excess soil is placed 1.5 m or greater below the soil surface.

Recommendations

Recommendations for reuse/disposal are summarized below.

The following options are available for the soil tested from locations along Highway 2 (BH101 to BH106):

- Reuse on-site as backfill or for re-grading, under the guidance of a QP and as approved by a geotechnical engineer.
- Soil from BH101 to BH102 can be reused off-site at a Table 1 RPIICC, Table 2.1 or 3.1 (RPI or ICC) receiving site in accordance with the salt-impacted excess soil rules, under the guidance of the receiving site's QP, and subject



Environmental

Geotechnical

Building Sciences

Construction Quality
Verification

Telephone

(866) 217.7900

(705) 742.7900

Website

cambium-inc.com

Mailing Address

P.O. Box 325,
Peterborough, Ontario
Canada, K9J 6Z3

Locations

Peterborough
Kingston
Barrie
Oshawa
Calgary

Laboratory

Peterborough



August 11, 2022

to applicable municipal fill bylaws. Leachate analysis will be required to support a soil transfer.

- Soil from BH102 to BH106 can be reused off-site at a Table 3.1 ICC receiving site, under the guidance of the receiving site's QP, and subject to applicable municipal fill bylaws. Leachate analysis will be required to support a soil transfer.

The following options are available for soil tested from locations along Wooler Road (BH107 to BH122):

- Reuse on-site as backfill or for re-grading, under the guidance of a QP and as approved by a geotechnical engineer.
- Soil from BH107 to BH108 and BH112 to BH119 can be reused off-site at a Table 1 RPIICC, Table 2.1 or 3.1 (RPI or ICC) receiving site in accordance with the salt-impacted excess soil rules, under the guidance of the receiving site's QP, and subject to applicable municipal fill bylaws. Leachate analysis will be required to support a soil transfer.
- Soil in the vicinity of BH110 and BH120 can be reused off-site at a Table 2.1 ICC or 3.1 ICC receiving site, under the guidance of the receiving site's QP, and subject to applicable municipal fill bylaws. Leachate analysis will be required to support a soil transfer.

The following options are available for soil tested from locations along Tate Road (BH135 to BH141):

- Reuse on-site as backfill or for re-grading, under the guidance of a QP and as approved by a geotechnical engineer
- Soil from BH135 to BH140 can be reused off-site at a Table 1 RPIICC, Table 2.1 or 3.1 (RPI or ICC) receiving site, under the guidance of the receiving site's QP, and subject to applicable municipal fill bylaws. Leachate analysis will be required to support a soil transfer.
- Soil from BH140 to BH141 can be reused off-site at a Table 2.1 ICC or 3.1 ICC receiving site, under the guidance of the receiving site's QP, and subject



Environmental

Geotechnical

Building Sciences

Construction Quality
Verification

Telephone

(866) 217.7900

(705) 742.7900

Website

cambium-inc.com

Mailing Address

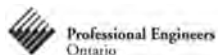
P.O. Box 325,
Peterborough, Ontario
Canada, K9J 6Z3

Locations

Peterborough
Kingston
Barrie
Oshawa
Calgary

Laboratory

Peterborough



August 11, 2022

to applicable municipal fill bylaws. Leachate analysis will be required to support a soil transfer.

Recommendations provided herein are based solely on the analysis of samples obtained and do not represent acceptance or suitability of this material on behalf of an intended receiving site. Should conditions encountered during excavation vary from those described in this report, Cambium should be notified to evaluate the need for further work.

Closing

We trust that this report meets your requirements. Should you have any questions or concerns regarding any aspect of this report, or should you require any further assistance, please do not hesitate to contact our office

Best regards,

Cambium Inc.

Arlie Flynn, B.Sc.

Technician

Alex Wood, P.Eng. QP_{ESA}

Project Manager

AF/AW

Encl. *Tables C1*
 Laboratory Certificates of Analysis

P:\13300 to 13399\13324-052 CoQW - GEO - Quinte West Watermain Extension - CR2, Wooler Road, & Tate Road\Deliverables\REPORT - SCR\Final\2022-08-11 RPT SCR Watermain extension CoQW.docx

[illegible]

NSA - not applicable
NC - The duplicate NPD was not collected. One or both samples = SAHCL.

Certificate of Analysis

Cambium Inc. (Kingston)

625 Fortune Cres
Kingston, ON K7P 0L5
Attn: Patrick Garrett

Client PO:

Project: 13324-052

Custody: 136127, 136125, 135931

Report Date: 5-May-2022

Order Date: 26-Apr-2022

Order #: 2218118

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID	Paracel ID	Client ID
2218118-01	BH101_0.8	2218118-17	BH138_1.9
2218118-02	BH102_1.6	2218118-18	BH139_0.4
2218118-03	BH103_0.6	2218118-19	BH140_1.5
2218118-04	BH104_1.3	2218118-20	BH141_0.4
2218118-05	BH105_0.7		
2218118-06	BH106_1.9		
2218118-07	BH107_0.5		
2218118-08	BH108_1.2		
2218118-09	BH110_0.7		
2218118-10	QAQC1		
2218118-11	BH112_1.8		
2218118-12	BH113_0.5		
2218118-13	BH119_1.4		
2218118-14	BH120_0.6		
2218118-15	BH121_1.3		
2218118-16	BH135_0.7		

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis
 Client: Cambium Inc. (Kingston)
 Client PO:
 Report Date: 05-May-2022
 Order Date: 26-Apr-2022
 Project Description: 13324-052

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Conductivity	MOE E3138 - probe @25 °C, water ext	29-Apr-22	28-Apr-22
PCBs, total	SW846 8082A - GC-ECD	28-Apr-22	2-May-22
pH, soil	EPA 150.1 - pH probe @ 25 °C, CaCl buffered ext.	28-Apr-22	28-Apr-22
PHC F1	CWS Tier 1 - P&T GC-FID	28-Apr-22	28-Apr-22
PHC F4G (gravimetric)	CWS Tier 1 - Extraction Gravimetric	4-May-22	5-May-22
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	27-Apr-22	29-Apr-22
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	2-May-22	28-Apr-22
REG 153: VOCs by P&T GC/MS	EPA 8260 - P&T GC-MS	29-Apr-22	28-Apr-22
SAR	Calculated	29-Apr-22	28-Apr-22
Solids, %	Gravimetric, calculation	29-Apr-22	28-Apr-22

Summary of Criteria Exceedances

(If this page is blank then there are no exceedances)
Only those criteria that a sample exceeds will be highlighted in red

Regulatory Comparison:

Paracel Laboratories has provided regulatory guidelines on this report for informational purposes only and makes no representations or warranties that the data is accurate or reflects the current regulatory values. The user is advised to consult with the appropriate official regulations to evaluate compliance. Sample results that are highlighted have exceeded the selected regulatory limit. Calculated uncertainty estimations have not been applied for determining regulatory exceedances.

Sample	Analyte	MDL / Units		Result	Reg 406/19 -T1 Agr
BH101_0.8	SAR	0.01	N/A	30.5	1 N/A
BH101_0.8	Conductivity	5	uS/cm	3760	0.47 mS/cm
BH101_0.8	F4 PHCs (C34-C50)	6	ug/g	316 [1]	120 ug/g
BH101_0.8	F4G PHCs (gravimetric)	50	ug/g	709	120 ug/g
BH102_1.6	SAR	0.01	N/A	2.06	1 N/A
BH102_1.6	Conductivity	5	uS/cm	584	0.47 mS/cm
BH103_0.6	Conductivity	5	uS/cm	920	0.47 mS/cm
BH103_0.6	Xylenes, total	0.05	ug/g	0.06	0.05 ug/g
BH103_0.6	F2 PHCs (C10-C16)	4	ug/g	19	10 ug/g
BH103_0.6	F4 PHCs (C34-C50)	6	ug/g	220 [1]	120 ug/g
BH104_1.3	SAR	0.01	N/A	2.97	1 N/A
BH104_1.3	Conductivity	5	uS/cm	604	0.47 mS/cm
BH104_1.3	F4 PHCs (C34-C50)	6	ug/g	357 [1]	120 ug/g
BH104_1.3	F4G PHCs (gravimetric)	50	ug/g	609	120 ug/g
BH105_0.7	SAR	0.01	N/A	5.68	1 N/A
BH105_0.7	Conductivity	5	uS/cm	792	0.47 mS/cm
BH105_0.7	F3 PHCs (C16-C34)	8	ug/g	287	240 ug/g
BH105_0.7	F4 PHCs (C34-C50)	6	ug/g	479 [1]	120 ug/g
BH105_0.7	F4G PHCs (gravimetric)	50	ug/g	1090	120 ug/g
BH106_1.9	SAR	0.01	N/A	5.29	1 N/A
BH106_1.9	Conductivity	5	uS/cm	1070	0.47 mS/cm
BH107_0.5	SAR	0.01	N/A	3.52	1 N/A

Summary of Criteria Exceedances

(If this page is blank then there are no exceedances)
Only those criteria that a sample exceeds will be highlighted in red

Regulatory Comparison:

Paracel Laboratories has provided regulatory guidelines on this report for informational purposes only and makes no representations or warranties that the data is accurate or reflects the current regulatory values. The user is advised to consult with the appropriate official regulations to evaluate compliance. Sample results that are highlighted have exceeded the selected regulatory limit. Calculated uncertainty estimations have not been applied for determining regulatory exceedances.

Sample	Analyte	MDL / Units	Result	Reg 406/19 -T1 Agr
BH107_0.5	Antimony	1.0 ug/g	4.2	1 ug/g
BH107_0.5	F4G PHCs (gravimetric)	50 ug/g	582	120 ug/g
BH108_1.2	SAR	0.01 N/A	1.36	1 N/A
BH108_1.2	Antimony	1.0 ug/g	1.8	1 ug/g
BH110_0.7	SAR	0.01 N/A	1.65	1 N/A
BH110_0.7	Conductivity	5 uS/cm	510	0.47 mS/cm
BH110_0.7	F4 PHCs (C34-C50)	6 ug/g	503 [1]	120 ug/g
BH110_0.7	F4G PHCs (gravimetric)	50 ug/g	1240	120 ug/g
QAQC1	SAR	0.01 N/A	2.89	1 N/A
QAQC1	F2 PHCs (C10-C16)	4 ug/g	11	10 ug/g
QAQC1	F4 PHCs (C34-C50)	6 ug/g	456 [1]	120 ug/g
QAQC1	F4G PHCs (gravimetric)	50 ug/g	769	120 ug/g
BH112_1.8	SAR	0.01 N/A	2.45	1 N/A
BH113_0.5	SAR	0.01 N/A	5.22	1 N/A
BH113_0.5	Conductivity	5 uS/cm	670	0.47 mS/cm
BH113_0.5	F4 PHCs (C34-C50)	6 ug/g	213 [1]	120 ug/g
BH113_0.5	F4G PHCs (gravimetric)	50 ug/g	659	120 ug/g
BH119_1.4	SAR	0.01 N/A	4.54	1 N/A
BH119_1.4	Conductivity	5 uS/cm	751	0.47 mS/cm
BH119_1.4	F4G PHCs (gravimetric)	50 ug/g	353	120 ug/g
BH120_0.6	SAR	0.01 N/A	6.29	1 N/A
BH120_0.6	Conductivity	5 uS/cm	635	0.47 mS/cm

Summary of Criteria Exceedances

(If this page is blank then there are no exceedances)
 Only those criteria that a sample exceeds will be highlighted in red

Regulatory Comparison:

Paracel Laboratories has provided regulatory guidelines on this report for informational purposes only and makes no representations or warranties that the data is accurate or reflects the current regulatory values. The user is advised to consult with the appropriate official regulations to evaluate compliance. Sample results that are highlighted have exceeded the selected regulatory limit. Calculated uncertainty estimations have not been applied for determining regulatory exceedances.

Sample	Analyte	MDL / Units	Result	Reg 406/19 -T1 Agr
BH120_0.6	F2 PHCs (C10-C16)	4 ug/g	14	10 ug/g
BH120_0.6	F4 PHCs (C34-C50)	6 ug/g	710 [1]	120 ug/g
BH120_0.6	F4G PHCs (gravimetric)	50 ug/g	1440	120 ug/g
BH121_1.3	SAR	0.01 N/A	1.10	1 N/A
BH135_0.7	Antimony	1.0 ug/g	3.1	1 ug/g
BH138_1.9	Antimony	1.0 ug/g	1.4	1 ug/g
BH140_1.5	SAR	0.01 N/A	2.38	1 N/A
BH141_0.4	SAR	0.01 N/A	2.94	1 N/A
BH141_0.4	F2 PHCs (C10-C16)	4 ug/g	19	10 ug/g
BH141_0.4	F4 PHCs (C34-C50)	6 ug/g	456 [1]	120 ug/g
BH141_0.4	F4G PHCs (gravimetric)	50 ug/g	296	120 ug/g

Certificate of Analysis
 Client: Cambium Inc. (Kingston)
 Report Date: 05-May-2022
 Order Date: 26-Apr-2022
 Project Description: 13324-052
 Client PO:

MDL/Units	Client ID:		BH101_0.8 25-Apr-22 09:15 2218118-01 Soil	BH102_1.6 25-Apr-22 10:00 2218118-02 Soil	BH103_0.6 25-Apr-22 11:00 2218118-03 Soil	BH104_1.3 25-Apr-22 12:00 2218118-04 Soil	Criteria: Reg 406/19 -T1 Agr -

Physical Characteristics

% Solids	0.1 % by Wt.	86.1	82.6	98.8	95.3	-
----------	--------------	------	------	------	------	---

General Inorganics

SAR	0.01 N/A	30.5	2.06	0.30	2.97	1 N/A
Conductivity	5 uS/cm	3760	584	920	604	0.47 mS/cm
pH	0.05 pH Units	7.50	7.53	7.60	7.69	5.00 - 9.00 pH Units

Metals

Antimony	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	1 ug/g
Arsenic	1.0 ug/g	2.6	1.5	1.6	2.4	11 ug/g
Barium	1.0 ug/g	47.7	22.2	154	43.3	210 ug/g
Beryllium	0.5 ug/g	<0.5	<0.5	<0.5	<0.5	2.5 ug/g
Boron	5.0 ug/g	5.6	<5.0	6.9	6.9	36 ug/g
Cadmium	0.5 ug/g	<0.5	<0.5	<0.5	<0.5	1 ug/g
Chromium	5.0 ug/g	13.4	7.9	<5.0	9.6	67 ug/g
Cobalt	1.0 ug/g	3.8	2.4	2.0	3.1	19 ug/g
Copper	5.0 ug/g	6.8	5.2	<5.0	<5.0	62 ug/g
Lead	1.0 ug/g	11.2	4.5	6.8	5.7	45 ug/g
Molybdenum	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	2 ug/g
Nickel	5.0 ug/g	7.6	<5.0	<5.0	6.4	37 ug/g
Selenium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	1.2 ug/g
Silver	0.3 ug/g	<0.3	<0.3	<0.3	<0.3	0.5 ug/g
Thallium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	1 ug/g
Uranium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	1.9 ug/g
Vanadium	10.0 ug/g	18.3	13.0	<10.0	12.7	86 ug/g
Zinc	20.0 ug/g	28.5	<20.0	<20.0	<20.0	290 ug/g

Volatiles

Certificate of Analysis

Report Date: 05-May-2022

Client: Cambium Inc. (Kingston)

Order Date: 26-Apr-2022

Client PO:

Project Description: 13324-052

Client ID:	BH101_0.8	BH102_1.6	BH103_0.6	BH104_1.3	Criteria:
Sample Date:	25-Apr-22 09:15	25-Apr-22 10:00	25-Apr-22 11:00	25-Apr-22 12:00	Reg 406/19 -T1 Agr
Sample ID:	2218118-01	2218118-02	2218118-03	2218118-04	-
Matrix:	Soil	Soil	Soil	Soil	
MDL/Units					

Volatiles

Acetone	0.50 ug/g	<0.50	<0.50	<0.50	0.5 ug/g	-
Benzene	0.02 ug/g	<0.02	<0.02	<0.02	0.02 ug/g	-
Bromodichloromethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Bromoform	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Bromomethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Carbon Tetrachloride	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Chlorobenzene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Chloroform	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Dibromochloromethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Dichlorodifluoromethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,2-Dichlorobenzene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,3-Dichlorobenzene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,4-Dichlorobenzene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1-Dichloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,2-Dichloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1-Dichloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
cis-1,2-Dichloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
trans-1,2-Dichloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,2-Dichloropropane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
cis-1,3-Dichloropropylene	0.05 ug/g	<0.05	<0.05	<0.05	-	-
trans-1,3-Dichloropropylene	0.05 ug/g	<0.05	<0.05	<0.05	-	-
1,3-Dichloropropene, total	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Ethylene dibromide (dibromoethane,	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Ethylbenzene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Hexane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-

Certificate of Analysis
 Client: Cambium Inc. (Kingston)
 Client PO:
 Report Date: 05-May-2022
 Order Date: 26-Apr-2022
 Project Description: 13324-052

Client ID:	BH101_0.8	BH102_1.6	BH103_0.6	BH104_1.3	Criteria:
Sample Date:	25-Apr-22 09:15	25-Apr-22 10:00	25-Apr-22 11:00	25-Apr-22 12:00	Reg 406/19 -T1 Agr
Sample ID:	2218118-01	2218118-02	2218118-03	2218118-04	-
Matrix:	Soil	Soil	Soil	Soil	
MDL/Units					

Volatiles

Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g	<0.50	<0.50	<0.50	0.5 ug/g	-
Methyl Isobutyl Ketone	0.50 ug/g	<0.50	<0.50	<0.50	0.5 ug/g	-
Methyl tert-butyl ether	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Methylene Chloride	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Styrene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1,1,2-Tetrachloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1,2,2-Tetrachloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Tetrachloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Toluene	0.05 ug/g	<0.05	<0.05	<0.05	0.2 ug/g	-
1,1,1-Trichloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1,2-Trichloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Trichloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Trichlorofluoromethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Vinyl chloride	0.02 ug/g	<0.02	<0.02	<0.02	0.02 ug/g	-
m,p-Xylenes	0.05 ug/g	<0.05	0.06	<0.05	-	-
o-Xylene	0.05 ug/g	<0.05	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g	<0.05	0.06	<0.05	0.05 ug/g	-
Dibromofluoromethane	Surrogate	106%	102%	99.7%	-	-
4-Bromofluorobenzene	Surrogate	128%	91.4%	116%	-	-
Toluene-d8	Surrogate	113%	93.8%	103%	-	-

Hydrocarbons

F1 PHCs (C6-C10)	7 ug/g	<7	7	<7	17 ug/g	-
F2 PHCs (C10-C16)	4 ug/g	<4	19	<4	10 ug/g	-
F3 PHCs (C16-C34)	8 ug/g	130	150	234	240 ug/g	-
F4 PHCs (C34-C50)	6 ug/g	316 [1]	220 [1]	357 [1]	120 ug/g	-

Certificate of Analysis
 Client: Cambium Inc. (Kingston)
 Client PO:
 Report Date: 05-May-2022
 Order Date: 26-Apr-2022
 Project Description: 13324-052

Client ID:		BH101_0.8	BH102_1.6	BH103_0.6	BH104_1.3	Criteria: Reg 406/19 -T1 Agr
Sample Date:		25-Apr-22 09:15	25-Apr-22 10:00	25-Apr-22 11:00	25-Apr-22 12:00	
Sample ID:		2218118-01	2218118-02	2218118-03	2218118-04	
Matrix:		Soil	Soil	Soil	Soil	
MDL/Units						
Hydrocarbons						
F4G PHCs (gravimetric)	50 ug/g	709	-	-	609	120 ug/g
PCBs						
PCBs, total	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.3 ug/g
Decachlorobiphenyl	Surrogate	60.8%	61.9%	61.8%	69.7%	-

Certificate of Analysis
 Client: Cambium Inc. (Kingston)
 Report Date: 05-May-2022
 Order Date: 26-Apr-2022
 Project Description: 13324-052
 Client PO:

Client ID:	BH105_0.7	BH106_1.9	BH107_0.5	BH108_1.2	Criteria:
Sample Date:	25-Apr-22 13:30	25-Apr-22 14:30	26-Apr-22 08:30	26-Apr-22 09:30	-
Sample ID:	2218118-05	2218118-06	2218118-07	2218118-08	Reg 406/19 -T1 Agr
Matrix:	Soil	Soil	Soil	Soil	
MDL/Units					

Physical Characteristics

% Solids	0.1 % by Wt.	85.3	87.2	99.7	87.8	-
----------	--------------	------	------	------	------	---

General Inorganics

SAR	0.01 N/A	5.68	5.29	3.52	1.36	1 N/A
Conductivity	5 uS/cm	792	1070	375	381	0.47 mS/cm
pH	0.05 pH Units	7.66	7.61	8.00	7.58	5.00 - 9.00 pH Units

Metals

Antimony	1.0 ug/g	<1.0	<1.0	4.2	1.8	1 ug/g
Arsenic	1.0 ug/g	2.3	2.4	2.3	2.5	11 ug/g
Barium	1.0 ug/g	31.7	40.0	41.6	41.4	210 ug/g
Beryllium	0.5 ug/g	<0.5	<0.5	<0.5	<0.5	2.5 ug/g
Boron	5.0 ug/g	7.2	6.0	9.2	7.9	36 ug/g
Cadmium	0.5 ug/g	<0.5	<0.5	<0.5	<0.5	1 ug/g
Chromium	5.0 ug/g	11.9	12.0	12.3	15.2	67 ug/g
Cobalt	1.0 ug/g	2.8	3.2	3.6	4.2	19 ug/g
Copper	5.0 ug/g	6.3	6.6	5.8	8.0	62 ug/g
Lead	1.0 ug/g	10.5	12.1	10.8	3.4	45 ug/g
Molybdenum	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	2 ug/g
Nickel	5.0 ug/g	6.1	6.9	7.1	8.1	37 ug/g
Selenium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	1.2 ug/g
Silver	0.3 ug/g	<0.3	<0.3	<0.3	<0.3	0.5 ug/g
Thallium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	1 ug/g
Uranium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	1.9 ug/g
Vanadium	10.0 ug/g	11.4	17.0	15.0	20.6	86 ug/g
Zinc	20.0 ug/g	<20.0	22.3	<20.0	<20.0	290 ug/g

Volatiles

Certificate of Analysis
 Client: Cambium Inc. (Kingston)
 Report Date: 05-May-2022
 Order Date: 26-Apr-2022
 Project Description: 13324-052

Client PO:

Client ID:	BH105_0.7	BH106_1.9	BH107_0.5	BH108_1.2	Criteria:
Sample Date:	25-Apr-22 13:30	25-Apr-22 14:30	26-Apr-22 08:30	26-Apr-22 09:30	Reg 406/19 -T1 Agr
Sample ID:	2218118-05	2218118-06	2218118-07	2218118-08	-
Matrix:	Soil	Soil	Soil	Soil	
MDL/Units					

Volatiles

Acetone	0.50 ug/g	<0.50	<0.50	<0.50	0.5 ug/g	-
Benzene	0.02 ug/g	<0.02	<0.02	<0.02	0.02 ug/g	-
Bromodichloromethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Bromoform	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Bromomethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Carbon Tetrachloride	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Chlorobenzene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Chloroform	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Dibromochloromethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Dichlorodifluoromethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,2-Dichlorobenzene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,3-Dichlorobenzene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,4-Dichlorobenzene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1-Dichloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,2-Dichloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1-Dichloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
cis-1,2-Dichloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
trans-1,2-Dichloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,2-Dichloropropane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
cis-1,3-Dichloropropylene	0.05 ug/g	<0.05	<0.05	<0.05	-	-
trans-1,3-Dichloropropylene	0.05 ug/g	<0.05	<0.05	<0.05	-	-
1,3-Dichloropropene, total	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Ethylene dibromide (dibromoethane,	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Ethylbenzene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Hexane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-

Certificate of Analysis
 Client: Cambium Inc. (Kingston)
 Client PO:
 Report Date: 05-May-2022
 Order Date: 26-Apr-2022
 Project Description: 13324-052

Client ID:	BH105_0.7	BH106_1.9	BH107_0.5	BH108_1.2	Criteria:
Sample Date:	25-Apr-22 13:30	25-Apr-22 14:30	26-Apr-22 08:30	26-Apr-22 09:30	Reg 406/19 -T1 Agr
Sample ID:	2218118-05	2218118-06	2218118-07	2218118-08	-
Matrix:	Soil	Soil	Soil	Soil	
MDL/Units					

Volatiles

Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g	<0.50	<0.50	<0.50	0.5 ug/g	-
Methyl Isobutyl Ketone	0.50 ug/g	<0.50	<0.50	<0.50	0.5 ug/g	-
Methyl tert-butyl ether	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Methylene Chloride	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Styrene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1,1,2-Tetrachloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1,2,2-Tetrachloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Tetrachloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Toluene	0.05 ug/g	<0.05	<0.05	<0.05	0.2 ug/g	-
1,1,1-Trichloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1,2-Trichloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Trichloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Trichlorofluoromethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Vinyl chloride	0.02 ug/g	<0.02	<0.02	<0.02	0.02 ug/g	-
m,p-Xylenes	0.05 ug/g	<0.05	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g	<0.05	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Dibromofluoromethane	Surrogate	116%	126%	102%	-	-
Toluene-d8	Surrogate	106%	109%	109%	-	-
4-Bromofluorobenzene	Surrogate	113%	127%	103%	-	-

Hydrocarbons

F1 PHCs (C6-C10)	7 ug/g	<7	<7	<7	17 ug/g	-
F2 PHCs (C10-C16)	4 ug/g	<4	<4	<4	10 ug/g	-
F3 PHCs (C16-C34)	8 ug/g	287	40	26	240 ug/g	-
F4 PHCs (C34-C50)	6 ug/g	479 [1]	47	112 [1]	120 ug/g	-

Certificate of Analysis
 Client: Cambium Inc. (Kingston)
 Client PO:
 Report Date: 05-May-2022
 Order Date: 26-Apr-2022
 Project Description: 13324-052

Client ID:		BH105_0.7	BH106_1.9	BH107_0.5	BH108_1.2	Criteria: Reg 406/19 -T1 Agr
Sample Date:		25-Apr-22 13:30	25-Apr-22 14:30	26-Apr-22 08:30	26-Apr-22 09:30	
Sample ID:		2218118-05	2218118-06	2218118-07	2218118-08	
Matrix:		Soil	Soil	Soil	Soil	
MDL/Units						
Hydrocarbons						
F4G PHCs (gravimetric)	50 ug/g	1090	-	582	-	120 ug/g
PCBs						
PCBs, total	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.3 ug/g
Decachlorobiphenyl	Surrogate	60.6%	67.4%	73.4%	72.2%	-

Certificate of Analysis
 Client: Cambium Inc. (Kingston)
 Report Date: 05-May-2022
 Order Date: 26-Apr-2022
 Project Description: 13324-052
 Client PO:

Client ID: Sample Date: Sample ID: Matrix:	BH110_0.7 26-Apr-22 10:15 2218118-09 Soil	QAQC1 26-Apr-22 09:00 2218118-10 Soil	BH112_1.8 26-Apr-22 11:45 2218118-11 Soil	BH113_0.5 26-Apr-22 12:15 2218118-12 Soil	Criteria: Reg 406/19 -T1 Agr -
MDL/Units					

Physical Characteristics

% Solids	0.1 % by Wt.	98.0	97.6	85.2	94.1	-
----------	--------------	------	------	------	------	---

General Inorganics

SAR	0.01 N/A	1.65	2.89	2.45	5.22	1 N/A
Conductivity	5 uS/cm	510	423	373	670	0.47 mS/cm
pH	0.05 pH Units	8.05	7.69	7.86	7.75	5.00 - 9.00 pH Units

Metals

Antimony	1.0 ug/g	1.0	<1.0	<1.0	<1.0	1 ug/g
Arsenic	1.0 ug/g	2.1	1.8	1.9	1.5	11 ug/g
Barium	1.0 ug/g	58.4	51.9	31.5	17.3	210 ug/g
Beryllium	0.5 ug/g	<0.5	<0.5	<0.5	<0.5	2.5 ug/g
Boron	5.0 ug/g	8.2	6.7	7.1	5.6	36 ug/g
Cadmium	0.5 ug/g	<0.5	<0.5	<0.5	<0.5	1 ug/g
Chromium	5.0 ug/g	13.4	12.9	11.6	11.2	67 ug/g
Cobalt	1.0 ug/g	3.3	3.0	3.2	2.3	19 ug/g
Copper	5.0 ug/g	5.5	5.2	6.0	<5.0	62 ug/g
Lead	1.0 ug/g	2.9	2.6	2.7	2.2	45 ug/g
Molybdenum	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	2 ug/g
Nickel	5.0 ug/g	6.9	6.0	6.7	<5.0	37 ug/g
Selenium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	1.2 ug/g
Silver	0.3 ug/g	<0.3	<0.3	<0.3	<0.3	0.5 ug/g
Thallium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	1 ug/g
Uranium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	1.9 ug/g
Vanadium	10.0 ug/g	18.2	16.3	16.0	12.9	86 ug/g
Zinc	20.0 ug/g	<20.0	<20.0	<20.0	<20.0	290 ug/g

Volatiles

Certificate of Analysis

Report Date: 05-May-2022

Client: Cambium Inc. (Kingston)

Order Date: 26-Apr-2022

Client PO:

Project Description: 13324-052

Client ID:	BH110_0.7	QAQC1	BH112_1.8	BH113_0.5	Criteria:
Sample Date:	26-Apr-22 10:15	26-Apr-22 09:00	26-Apr-22 11:45	26-Apr-22 12:15	Reg 406/19 -T1 Agr
Sample ID:	2218118-09	2218118-10	2218118-11	2218118-12	-
Matrix:	Soil	Soil	Soil	Soil	
MDL/Units					

Volatiles

Acetone	0.50 ug/g	<0.50	<0.50	<0.50	0.5 ug/g	-
Benzene	0.02 ug/g	<0.02	<0.02	<0.02	0.02 ug/g	-
Bromodichloromethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Bromoform	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Bromomethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Carbon Tetrachloride	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Chlorobenzene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Chloroform	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Dibromochloromethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Dichlorodifluoromethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,2-Dichlorobenzene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,3-Dichlorobenzene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,4-Dichlorobenzene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1-Dichloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,2-Dichloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1-Dichloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
cis-1,2-Dichloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
trans-1,2-Dichloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,2-Dichloropropane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
cis-1,3-Dichloropropylene	0.05 ug/g	<0.05	<0.05	<0.05	-	-
trans-1,3-Dichloropropylene	0.05 ug/g	<0.05	<0.05	<0.05	-	-
1,3-Dichloropropene, total	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Ethylbenzene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Ethylene dibromide (dibromoethane,	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Hexane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-

Certificate of Analysis
 Client: Cambium Inc. (Kingston)
 Client PO:
 Report Date: 05-May-2022
 Order Date: 26-Apr-2022
 Project Description: 13324-052

Client ID:	BH110_0.7	QAQC1	BH112_1.8	BH113_0.5	Criteria:
Sample Date:	26-Apr-22 10:15	26-Apr-22 09:00	26-Apr-22 11:45	26-Apr-22 12:15	Reg 406/19 -T1 Agr
Sample ID:	2218118-09	2218118-10	2218118-11	2218118-12	-
Matrix:	Soil	Soil	Soil	Soil	
MDL/Units					

Volatiles

Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g	<0.50	<0.50	<0.50	0.5 ug/g	-
Methyl Isobutyl Ketone	0.50 ug/g	<0.50	<0.50	<0.50	0.5 ug/g	-
Methyl tert-butyl ether	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Methylene Chloride	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Styrene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1,1,2-Tetrachloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1,2,2-Tetrachloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Tetrachloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Toluene	0.05 ug/g	<0.05	<0.05	<0.05	0.2 ug/g	-
1,1,1-Trichloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1,2-Trichloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Trichloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Trichlorofluoromethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Vinyl chloride	0.02 ug/g	<0.02	<0.02	<0.02	0.02 ug/g	-
m,p-Xylenes	0.05 ug/g	<0.05	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g	<0.05	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Dibromofluoromethane	Surrogate	102%	106%	106%	-	-
Toluene-d8	Surrogate	97.0%	105%	100%	-	-
4-Bromofluorobenzene	Surrogate	109%	121%	115%	-	-

Hydrocarbons

F1 PHCs (C6-C10)	7 ug/g	<7	<7	<7	17 ug/g	-
F2 PHCs (C10-C16)	4 ug/g	<4	11	<4	10 ug/g	-
F3 PHCs (C16-C34)	8 ug/g	191	122	<8	240 ug/g	-
F4 PHCs (C34-C50)	6 ug/g	503 [1]	456 [1]	<6	213 [1]	-

Certificate of Analysis
Client: Cambium Inc. (Kingston)
Client PO:
Report Date: 05-May-2022
Order Date: 26-Apr-2022
Project Description: 13324-052

		Client ID:		BH110_0.7		QAQC1		BH112_1.8		BH113_0.5		Criteria: Reg 406/19 -T1 Agr
		Sample Date:		26-Apr-22 10:15		26-Apr-22 09:00		26-Apr-22 11:45		26-Apr-22 12:15		
		Sample ID:		2218118-09		2218118-10		2218118-11		2218118-12		
		Matrix:		Soil		Soil		Soil		Soil		
MDL/Units												
Hydrocarbons												
F4G PHCs (gravimetric)		50 ug/g	1240		769		-		659		120 ug/g	-
PCBs												
PCBs, total		0.05 ug/g	<0.05		<0.05		<0.05		<0.05		0.3 ug/g	-
Decachlorobiphenyl		Surrogate	67.7%		70.3%		68.5%		67.2%		-	-

Certificate of Analysis
 Client: Cambium Inc. (Kingston)
 Report Date: 05-May-2022
 Order Date: 26-Apr-2022
 Project Description: 13324-052
 Client PO:

Client ID:	BH119_14	BH120_06	BH121_1.3	BH135_0.7	Criteria:
Sample Date:	26-Apr-22 14:00	26-Apr-22 15:00	26-Apr-22 15:45	27-Apr-22 09:30	Reg 406/19 -T1 Agr
Sample ID:	2218118-13	2218118-14	2218118-15	2218118-16	-
Matrix:	Soil	Soil	Soil	Soil	
MDL/Units					

Physical Characteristics

% Solids	0.1 % by Wt.	93.5	97.2	84.6	83.8	-
----------	--------------	------	------	------	------	---

General Inorganics

SAR	0.01 N/A	4.54	6.29	1.10	0.80	1 N/A
Conductivity	5 uS/cm	751	635	277	238	0.47 mS/cm
pH	0.05 pH Units	7.91	7.83	7.83	7.66	5.00 - 9.00 pH Units

Metals

Antimony	1.0 ug/g	<1.0	<1.0	<1.0	3.1	1 ug/g
Arsenic	1.0 ug/g	2.2	1.6	2.6	3.6	11 ug/g
Barium	1.0 ug/g	46.7	70.0	114	111	210 ug/g
Beryllium	0.5 ug/g	<0.5	<0.5	<0.5	0.6	2.5 ug/g
Boron	5.0 ug/g	6.7	5.4	10.9	7.6	36 ug/g
Cadmium	0.5 ug/g	<0.5	<0.5	<0.5	<0.5	1 ug/g
Chromium	5.0 ug/g	17.5	14.0	23.0	23.3	67 ug/g
Cobalt	1.0 ug/g	4.0	2.4	6.6	6.8	19 ug/g
Copper	5.0 ug/g	7.3	<5.0	11.9	12.1	62 ug/g
Lead	1.0 ug/g	3.2	4.2	4.1	7.2	45 ug/g
Molybdenum	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	2 ug/g
Nickel	5.0 ug/g	8.3	<5.0	13.4	13.5	37 ug/g
Selenium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	1.2 ug/g
Silver	0.3 ug/g	<0.3	<0.3	<0.3	<0.3	0.5 ug/g
Thallium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	1 ug/g
Uranium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	1.9 ug/g
Vanadium	10.0 ug/g	24.3	15.8	32.7	35.6	86 ug/g
Zinc	20.0 ug/g	<20.0	<20.0	32.8	41.9	290 ug/g

Volatiles

Certificate of Analysis
 Client: Cambium Inc. (Kingston)
 Client PO:
 Report Date: 05-May-2022
 Order Date: 26-Apr-2022
 Project Description: 13324-052

Client ID:	BH119_14	BH120_06	BH121_13	BH135_07	Criteria:
Sample Date:	26-Apr-22 14:00	26-Apr-22 15:00	26-Apr-22 15:45	27-Apr-22 09:30	Reg 406/19 -T1 Agr
Sample ID:	2218118-13	2218118-14	2218118-15	2218118-16	-
Matrix:	Soil	Soil	Soil	Soil	
MDL/Units					

Volatiles

Acetone	0.50 ug/g	<0.50	<0.50	<0.50	0.5 ug/g	-
Benzene	0.02 ug/g	<0.02	<0.02	<0.02	0.02 ug/g	-
Bromodichloromethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Bromoform	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Bromomethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Carbon Tetrachloride	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Chlorobenzene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Chloroform	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Dibromochloromethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Dichlorodifluoromethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,2-Dichlorobenzene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,3-Dichlorobenzene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,4-Dichlorobenzene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1-Dichloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,2-Dichloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1-Dichloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
cis-1,2-Dichloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
trans-1,2-Dichloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,2-Dichloropropane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
cis-1,3-Dichloropropylene	0.05 ug/g	<0.05	<0.05	<0.05	-	-
trans-1,3-Dichloropropylene	0.05 ug/g	<0.05	<0.05	<0.05	-	-
1,3-Dichloropropene, total	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Ethylbenzene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Ethylene dibromide (dibromoethane,	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Hexane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-

Certificate of Analysis
 Client: Cambium Inc. (Kingston)
 Client PO:
 Report Date: 05-May-2022
 Order Date: 26-Apr-2022
 Project Description: 13324-052

Client ID:	BH119_1.4	BH120_0.6	BH121_1.3	BH135_0.7	Criteria:
Sample Date:	26-Apr-22 14:00	26-Apr-22 15:00	26-Apr-22 15:45	27-Apr-22 09:30	Reg 406/19 -T1 Agr
Sample ID:	2218118-13	2218118-14	2218118-15	2218118-16	-
Matrix:	Soil	Soil	Soil	Soil	
MDL/Units					

Volatiles

Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g	<0.50	<0.50	<0.50	0.5 ug/g	-
Methyl Isobutyl Ketone	0.50 ug/g	<0.50	<0.50	<0.50	0.5 ug/g	-
Methyl tert-butyl ether	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Methylene Chloride	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Styrene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1,1,2-Tetrachloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1,2,2-Tetrachloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Tetrachloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Toluene	0.05 ug/g	<0.05	<0.05	<0.05	0.2 ug/g	-
1,1,1-Trichloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1,2-Trichloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Trichloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Trichlorofluoromethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Vinyl chloride	0.02 ug/g	<0.02	<0.02	<0.02	0.02 ug/g	-
m,p-Xylenes	0.05 ug/g	<0.05	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g	<0.05	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
4-Bromofluorobenzene	Surrogate	114%	125%	127%	-	-
Dibromofluoromethane	Surrogate	106%	120%	89.4%	-	-
Toluene-d8	Surrogate	101%	96.4%	119%	-	-

Hydrocarbons

F1 PHCs (C6-C10)	7 ug/g	<7	<7	<7	17 ug/g	-
F2 PHCs (C10-C16)	4 ug/g	<4	14	<4	10 ug/g	-
F3 PHCs (C16-C34)	8 ug/g	24	112	<8	240 ug/g	-
F4 PHCs (C34-C50)	6 ug/g	118 [1]	710 [1]	19	120 ug/g	-

Certificate of Analysis

Report Date: 05-May-2022

Client: Cambium Inc. (Kingston)

Order Date: 26-Apr-2022

Client PO:

Project Description: 13324-052

		Client ID:		BH119_1.4	BH120_0.6	BH121_1.3	BH135_0.7	Criteria: Reg 406/19 -T1 Agr
		Sample Date:		26-Apr-22 14:00	26-Apr-22 15:00	26-Apr-22 15:45	27-Apr-22 09:30	
		Sample ID:		2218118-13	2218118-14	2218118-15	2218118-16	
		Matrix:		Soil	Soil	Soil	Soil	
		MDL/Units						
Hydrocarbons								
F4G PHCs (gravimetric)	50 ug/g	353	1440	-	-	-	120 ug/g	-
PCBs								
PCBs, total	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.3 ug/g
Decachlorobiphenyl	Surrogate	68.8%	65.2%	68.3%	68.3%	63.6%	63.6%	-
								-

Certificate of Analysis

Client: Cambium Inc. (Kingston)

Client PO:

Client ID:	BH138_1.9	BH139_0.4	BH140_1.5	BH141_0.4	Criteria:
Sample Date:	27-Apr-22 12:15	27-Apr-22 13:30	27-Apr-22 14:15	27-Apr-22 14:50	Reg 406/19 -T1 Agr
Sample ID:	2218118-17	2218118-18	2218118-19	2218118-20	-
Matrix:	Soil	Soil	Soil	Soil	
MDL/Units					

Physical Characteristics

% Solids	0.1 % by Wt.	86.6	96.1	84.0	94.5	-	-
----------	--------------	------	------	------	------	---	---

General Inorganics

SAR	0.01 N/A	0.68	1.00	2.38	2.94	1 N/A	-
Conductivity	5 uS/cm	307	203	193	429	0.47 mS/cm	-
pH	0.05 pH Units	7.12	7.78	7.36	7.65	5.00 - 9.00 pH Units	-

Metals

Antimony	1.0 ug/g	1.4	<1.0	<1.0	<1.0	1 ug/g	-
Arsenic	1.0 ug/g	1.6	2.2	1.9	1.7	11 ug/g	-
Barium	1.0 ug/g	52.1	37.8	24.7	22.9	210 ug/g	-
Beryllium	0.5 ug/g	<0.5	<0.5	<0.5	<0.5	2.5 ug/g	-
Boron	5.0 ug/g	5.8	6.3	<5.0	<5.0	36 ug/g	-
Cadmium	0.5 ug/g	<0.5	<0.5	<0.5	<0.5	1 ug/g	-
Chromium	5.0 ug/g	14.5	8.8	8.4	8.7	67 ug/g	-
Cobalt	1.0 ug/g	3.4	3.0	2.1	1.9	19 ug/g	-
Copper	5.0 ug/g	7.2	<5.0	<5.0	<5.0	62 ug/g	-
Lead	1.0 ug/g	3.9	2.6	1.5	3.6	45 ug/g	-
Molybdenum	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	2 ug/g	-
Nickel	5.0 ug/g	6.6	5.4	<5.0	<5.0	37 ug/g	-
Selenium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	1.2 ug/g	-
Silver	0.3 ug/g	<0.3	<0.3	<0.3	<0.3	0.5 ug/g	-
Thallium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	1 ug/g	-
Uranium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	1.9 ug/g	-
Vanadium	10.0 ug/g	20.6	14.1	19.1	16.2	86 ug/g	-
Zinc	20.0 ug/g	25.6	<20.0	<20.0	<20.0	290 ug/g	-

Volatiles

Certificate of Analysis
 Client: Cambium Inc. (Kingston)
 Client PO:
 Report Date: 05-May-2022
 Order Date: 26-Apr-2022
 Project Description: 13324-052

Client ID:	BH138_1.9	BH139_0.4	BH140_1.5	BH141_0.4	Criteria:
Sample Date:	27-Apr-22 12:15	27-Apr-22 13:30	27-Apr-22 14:15	27-Apr-22 14:50	Reg 406/19 -T1 Agr
Sample ID:	2218118-17	2218118-18	2218118-19	2218118-20	-
Matrix:	Soil	Soil	Soil	Soil	
MDL/Units					

Volatiles

Acetone	0.50 ug/g	<0.50	<0.50	<0.50	0.5 ug/g	-
Benzene	0.02 ug/g	<0.02	<0.02	<0.02	0.02 ug/g	-
Bromodichloromethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Bromoform	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Bromomethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Carbon Tetrachloride	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Chlorobenzene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Chloroform	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Dibromochloromethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Dichlorodifluoromethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,2-Dichlorobenzene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,3-Dichlorobenzene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,4-Dichlorobenzene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1-Dichloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,2-Dichloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1-Dichloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
cis-1,2-Dichloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
trans-1,2-Dichloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,2-Dichloropropane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
cis-1,3-Dichloropropylene	0.05 ug/g	<0.05	<0.05	<0.05	-	-
trans-1,3-Dichloropropylene	0.05 ug/g	<0.05	<0.05	<0.05	-	-
1,3-Dichloropropene, total	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Ethylbenzene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Ethylene dibromide (dibromoethane,	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Hexane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-

Certificate of Analysis

Report Date: 05-May-2022

Client: Cambium Inc. (Kingston)

Order Date: 26-Apr-2022

Client PO:

Project Description: 13324-052

Client ID:	BH138_1.9	BH139_0.4	BH140_1.5	BH141_0.4	Criteria:
Sample Date:	27-Apr-22 12:15	27-Apr-22 13:30	27-Apr-22 14:15	27-Apr-22 14:50	Reg 406/19 -T1 Agr
Sample ID:	2218118-17	2218118-18	2218118-19	2218118-20	-
Matrix:	Soil	Soil	Soil	Soil	
MDL/Units					

Volatiles

Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g	<0.50	<0.50	<0.50	0.5 ug/g	-
Methyl Isobutyl Ketone	0.50 ug/g	<0.50	<0.50	<0.50	0.5 ug/g	-
Methyl tert-butyl ether	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Methylene Chloride	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Styrene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1,1,2-Tetrachloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1,2,2-Tetrachloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Tetrachloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Toluene	0.05 ug/g	<0.05	<0.05	<0.05	0.2 ug/g	-
1,1,1-Trichloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1,2-Trichloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Trichloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Trichlorofluoromethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Vinyl chloride	0.02 ug/g	<0.02	<0.02	<0.02	0.02 ug/g	-
m,p-Xylenes	0.05 ug/g	<0.05	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g	<0.05	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Dibromofluoromethane	Surrogate	88.7%	82.2%	94.0%	-	-
Toluene-d8	Surrogate	118%	109%	118%	-	-
4-Bromofluorobenzene	Surrogate	126%	116%	124%	-	-

Hydrocarbons

F1 PHCs (C6-C10)	7 ug/g	<7	<7	<7	17 ug/g	-
F2 PHCs (C10-C16)	4 ug/g	<4	<4	19	10 ug/g	-
F3 PHCs (C16-C34)	8 ug/g	15	15	103	240 ug/g	-
F4 PHCs (C34-C50)	6 ug/g	18	20	456 [1]	120 ug/g	-

Certificate of Analysis
Client: Cambium Inc. (Kingston)
Client PO:
Report Date: 05-May-2022
Order Date: 26-Apr-2022
Project Description: 13324-052

Client ID:		BH138_1.9	BH139_0.4	BH140_1.5	BH141_0.4	Criteria: Reg 406/19 -T1 Agr
Sample Date:		27-Apr-22 12:15	27-Apr-22 13:30	27-Apr-22 14:15	27-Apr-22 14:50	
Sample ID:		2218118-17	2218118-18	2218118-19	2218118-20	
Matrix:		Soil	Soil	Soil	Soil	
MDL/Units						
Hydrocarbons						
F4G PHCs (gravimetric)	50 ug/g	-	-	-	296	120 ug/g
PCBs						
PCBs, total	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.3 ug/g
Decachlorobiphenyl	Surrogate	70.1%	68.7%	68.1%	67.9%	-

Certificate of Analysis
 Client: Cambium Inc. (Kingston)
 Client PO:
 Report Date: 05-May-2022
 Order Date: 26-Apr-2022
 Project Description: 13324-052

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC Limit	%REC Limit	RPD Limit	Notes
General Inorganics							
Conductivity	ND	5	uS/cm				
Hydrocarbons							
F1 PHCs (C6-C10)	ND	7	ug/g				
F2 PHCs (C10-C16)	ND	4	ug/g				
F3 PHCs (C16-C34)	ND	8	ug/g				
F4 PHCs (C34-C50)	ND	6	ug/g				
F4G PHCs (gravimetric)	ND	50	ug/g				
Metals							
Antimony	ND	1.0	ug/g				
Arsenic	ND	1.0	ug/g				
Barium	ND	1.0	ug/g				
Beryllium	ND	0.5	ug/g				
Boron	ND	5.0	ug/g				
Cadmium	ND	0.5	ug/g				
Chromium	ND	5.0	ug/g				
Cobalt	ND	1.0	ug/g				
Copper	ND	5.0	ug/g				
Lead	ND	1.0	ug/g				
Molybdenum	ND	1.0	ug/g				
Nickel	ND	5.0	ug/g				
Selenium	ND	1.0	ug/g				
Silver	ND	0.3	ug/g				
Thallium	ND	1.0	ug/g				
Uranium	ND	1.0	ug/g				
Vanadium	ND	10.0	ug/g				
Zinc	ND	20.0	ug/g				
PCBs							
PCBs, total	ND	0.05	ug/g				
Surrogate: Decachlorobiphenyl	0.0734		ug/g	73.4	60-140		
Volatiles							
Acetone	ND	0.50	ug/g				
Benzene	ND	0.02	ug/g				

Certificate of Analysis
 Client: Cambium Inc. (Kingston)
 Client PO:
 Report Date: 05-May-2022
 Order Date: 26-Apr-2022
 Project Description: 13324-052

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC Limit	%REC Limit	RPD Limit	Notes
Bromodichloromethane	ND	0.05	ug/g				
Bromoform	ND	0.05	ug/g				
Bromomethane	ND	0.05	ug/g				
Carbon Tetrachloride	ND	0.05	ug/g				
Chlorobenzene	ND	0.05	ug/g				
Chloroform	ND	0.05	ug/g				
Dibromochloromethane	ND	0.05	ug/g				
Dichlorodifluoromethane	ND	0.05	ug/g				
1,2-Dichlorobenzene	ND	0.05	ug/g				
1,3-Dichlorobenzene	ND	0.05	ug/g				
1,4-Dichlorobenzene	ND	0.05	ug/g				
1,1-Dichloroethane	ND	0.05	ug/g				
1,2-Dichloroethane	ND	0.05	ug/g				
1,1-Dichloroethylene	ND	0.05	ug/g				
cis-1,2-Dichloroethylene	ND	0.05	ug/g				
trans-1,2-Dichloroethylene	ND	0.05	ug/g				
1,2-Dichloropropane	ND	0.05	ug/g				
cis-1,3-Dichloropropylene	ND	0.05	ug/g				
trans-1,3-Dichloropropylene	ND	0.05	ug/g				
1,3-Dichloropropene, total	ND	0.05	ug/g				
Ethylbenzene	ND	0.05	ug/g				
Ethylene dibromide (dibromoethane, 1,2-)	ND	0.05	ug/g				
Hexane	ND	0.05	ug/g				
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g				
Methyl Isobutyl Ketone	ND	0.50	ug/g				
Methyl tert-butyl ether	ND	0.05	ug/g				
Methylene Chloride	ND	0.05	ug/g				
Styrene	ND	0.05	ug/g				
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g				
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g				
Tetrachloroethylene	ND	0.05	ug/g				
Toluene	ND	0.05	ug/g				
1,1,1-Trichloroethane	ND	0.05	ug/g				

Certificate of Analysis
Client: Cambium Inc. (Kingston)
Client PO:
Report Date: 05-May-2022
Order Date: 26-Apr-2022
Project Description: 13324-052

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
1,1,2-Trichloroethane	ND	0.05	ug/g					
Trichloroethylene	ND	0.05	ug/g					
Trichlorofluoromethane	ND	0.05	ug/g					
Vinyl chloride	ND	0.02	ug/g					
m,p-Xylenes	ND	0.05	ug/g					
o-Xylene	ND	0.05	ug/g					
Xylenes, total	ND	0.05	ug/g					
Surrogate: 4-Bromofluorobenzene	3.77		ug/g	118	50-140			
Surrogate: Dibromofluoromethane	4.15		ug/g	130	50-140			
Surrogate: Toluene-d8	3.06		ug/g	95.7	50-140			

Certificate of Analysis
 Client: Cambium Inc. (Kingston)
 Report Date: 05-May-2022
 Order Date: 26-Apr-2022
 Project Description: 13324-052

Client PO:

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
SAR	0.08	0.01	N/A	0.07			13.3	30	
Conductivity	175	5	uS/cm	183			4.6	5	
pH	7.46	0.05	pH Units	7.50			0.5	2.3	
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g	ND			NC	40	
F2 PHCs (C10-C16)	ND	4	ug/g	ND			NC	30	
F3 PHCs (C16-C34)	ND	8	ug/g	ND			NC	30	
F4 PHCs (C34-C50)	ND	6	ug/g	ND			NC	30	
Metals									
Antimony	3.0	1.0	ug/g	ND			NC	30	
Arsenic	3.3	1.0	ug/g	2.9			14.8	30	
Barium	29.4	1.0	ug/g	26.8			9.3	30	
Beryllium	ND	0.5	ug/g	ND			NC	30	
Boron	5.8	5.0	ug/g	ND			NC	30	
Cadmium	ND	0.5	ug/g	ND			NC	30	
Chromium	10.1	5.0	ug/g	11.6			13.7	30	
Cobalt	3.2	1.0	ug/g	3.1			5.1	30	
Copper	17.9	5.0	ug/g	17.0			5.0	30	
Lead	18.6	1.0	ug/g	19.2			3.3	30	
Molybdenum	ND	1.0	ug/g	ND			NC	30	
Nickel	7.3	5.0	ug/g	7.0			4.3	30	
Selenium	ND	1.0	ug/g	ND			NC	30	
Silver	ND	0.3	ug/g	ND			NC	30	
Thallium	ND	1.0	ug/g	ND			NC	30	
Uranium	ND	1.0	ug/g	ND			NC	30	
Vanadium	15.1	10.0	ug/g	14.6			3.4	30	
Zinc	67.4	20.0	ug/g	65.9			2.2	30	
PCBs									
PCBs, total	ND	0.05	ug/g	ND			NC	40	
Surrogate: Decachlorobiphenyl	0.0746		ug/g		64.2	60-140			

Certificate of Analysis
 Client: Cambium Inc. (Kingston)
 Client PO:
 Report Date: 05-May-2022
 Order Date: 26-Apr-2022
 Project Description: 13324-052

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Physical Characteristics									
% Solids	78.7	0.1	% by Wt.	83.8			6.3	25	
Volatiles									
Acetone	ND	0.50	ug/g	ND			NC	50	
Benzene	ND	0.02	ug/g	ND			NC	50	
Bromodichloromethane	ND	0.05	ug/g	ND			NC	50	
Bromoform	ND	0.05	ug/g	ND			NC	50	
Bromomethane	ND	0.05	ug/g	ND			NC	50	
Carbon Tetrachloride	ND	0.05	ug/g	ND			NC	50	
Chlorobenzene	ND	0.05	ug/g	ND			NC	50	
Chloroform	ND	0.05	ug/g	ND			NC	50	
Dibromochloromethane	ND	0.05	ug/g	ND			NC	50	
Dichlorodifluoromethane	ND	0.05	ug/g	ND			NC	50	
1,2-Dichlorobenzene	ND	0.05	ug/g	ND			NC	50	
1,3-Dichlorobenzene	ND	0.05	ug/g	ND			NC	50	
1,4-Dichlorobenzene	ND	0.05	ug/g	ND			NC	50	
1,1-Dichloroethane	ND	0.05	ug/g	ND			NC	50	
1,2-Dichloroethane	ND	0.05	ug/g	ND			NC	50	
1,1-Dichloroethylene	ND	0.05	ug/g	ND			NC	50	
cis-1,2-Dichloroethylene	ND	0.05	ug/g	ND			NC	50	
trans-1,2-Dichloroethylene	ND	0.05	ug/g	ND			NC	50	
1,2-Dichloropropane	ND	0.05	ug/g	ND			NC	50	
cis-1,3-Dichloropropylene	ND	0.05	ug/g	ND			NC	50	
trans-1,3-Dichloropropylene	ND	0.05	ug/g	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g	ND			NC	50	
Ethylene dibromide (dibromoethane, 1,2-)	ND	0.05	ug/g	ND			NC	50	
Hexane	ND	0.05	ug/g	ND			NC	50	
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g	ND			NC	50	
Methyl Isobutyl Ketone	ND	0.50	ug/g	ND			NC	50	
Methyl tert-butyl ether	ND	0.05	ug/g	ND			NC	50	
Methylene Chloride	ND	0.05	ug/g	ND			NC	50	

Certificate of Analysis
 Client: Cambium Inc. (Kingston)
 Client PO:
 Report Date: 05-May-2022
 Order Date: 26-Apr-2022
 Project Description: 13324-052

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Styrene	ND	0.05	ug/g	ND			NC	50	
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g	ND			NC	50	
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g	ND			NC	50	
Tetrachloroethylene	ND	0.05	ug/g	ND			NC	50	
Toluene	ND	0.05	ug/g	ND			NC	50	
1,1,1-Trichloroethane	ND	0.05	ug/g	ND			NC	50	
1,1,2-Trichloroethane	ND	0.05	ug/g	ND			NC	50	
Trichloroethylene	ND	0.05	ug/g	ND			NC	50	
Trichlorofluoromethane	ND	0.05	ug/g	ND			NC	50	
Vinyl chloride	ND	0.02	ug/g	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g	ND			NC	50	
o-Xylene	ND	0.05	ug/g	ND			NC	50	
Surrogate: 4-Bromofluorobenzene	4.36		ug/g		120	50-140			
Surrogate: Dibromofluoromethane	3.64		ug/g		99.8	50-140			
Surrogate: Toluene-d8	3.76		ug/g		103	50-140			

Certificate of Analysis

Client: Cambium Inc. (Kingston)

Client PO:

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC Limit	%REC Limit	RPD Limit	Notes
Hydrocarbons								
F1 PHCs (C6-C10)	211	7	ug/g	ND	106	80-120		
F2 PHCs (C10-C16)	81	4	ug/g	ND	73.1	60-140		
F3 PHCs (C16-C34)	272	8	ug/g	ND	101	60-140		
F4 PHCs (C34-C50)	190	6	ug/g	ND	111	60-140		
F4G PHCs (gravimetric)	840	50	ug/g	ND	84.0	80-120		
Metals								
Antimony	39.3	1.0	ug/g	ND	77.2	70-130		
Arsenic	44.6	1.0	ug/g	1.1	87.0	70-130		
Barium	50.0	1.0	ug/g	10.7	78.5	70-130		
Beryllium	42.7	0.5	ug/g	ND	85.3	70-130		
Boron	43.2	5.0	ug/g	ND	82.5	70-130		
Cadmium	39.5	0.5	ug/g	ND	78.8	70-130		
Chromium	45.3	5.0	ug/g	ND	81.5	70-130		
Cobalt	42.1	1.0	ug/g	1.2	81.8	70-130		
Copper	45.6	5.0	ug/g	6.8	77.6	70-130		
Lead	45.0	1.0	ug/g	7.7	74.7	70-130		
Molybdenum	40.7	1.0	ug/g	ND	81.1	70-130		
Nickel	43.5	5.0	ug/g	ND	81.3	70-130		
Selenium	40.6	1.0	ug/g	ND	81.0	70-130		
Silver	40.2	0.3	ug/g	ND	80.4	70-130		
Thallium	40.9	1.0	ug/g	ND	81.8	70-130		
Uranium	43.4	1.0	ug/g	ND	86.5	70-130		
Vanadium	47.3	10.0	ug/g	ND	82.9	70-130		
Zinc	62.1	20.0	ug/g	26.4	71.5	70-130		
PCBs								
PCBs, total	0.581	0.05	ug/g	ND	125	60-140		
Surrogate: Decachlorobiphenyl	0.0756		ug/g		65.1	60-140		
Volatiles								
Acetone	11.1	0.50	ug/g	ND	111	50-140		
Benzene	4.29	0.02	ug/g	ND	107	60-130		

Certificate of Analysis
 Client: Cambium Inc. (Kingston)
 Report Date: 05-May-2022
 Order Date: 26-Apr-2022
 Project Description: 13324-052

Client PO:

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC Limit	RPD Limit	Notes
Bromodichloromethane	4.15	0.05	ug/g	ND	104	60-130	
Bromoform	4.55	0.05	ug/g	ND	114	60-130	
Bromomethane	4.30	0.05	ug/g	ND	108	50-140	
Carbon Tetrachloride	4.51	0.05	ug/g	ND	113	60-130	
Chlorobenzene	4.25	0.05	ug/g	ND	106	60-130	
Chloroform	4.62	0.05	ug/g	ND	115	60-130	
Dibromochloromethane	4.19	0.05	ug/g	ND	105	60-130	
Dichlorodifluoromethane	5.03	0.05	ug/g	ND	126	50-140	
1,2-Dichlorobenzene	4.46	0.05	ug/g	ND	112	60-130	
1,3-Dichlorobenzene	4.02	0.05	ug/g	ND	100	60-130	
1,4-Dichlorobenzene	4.67	0.05	ug/g	ND	117	60-130	
1,1-Dichloroethane	4.15	0.05	ug/g	ND	104	60-130	
1,2-Dichloroethane	4.17	0.05	ug/g	ND	104	60-130	
1,1-Dichloroethylene	4.34	0.05	ug/g	ND	108	60-130	
cis-1,2-Dichloroethylene	4.31	0.05	ug/g	ND	108	60-130	
trans-1,2-Dichloroethylene	4.44	0.05	ug/g	ND	111	60-130	
1,2-Dichloropropane	4.03	0.05	ug/g	ND	101	60-130	
cis-1,3-Dichloropropylene	4.37	0.05	ug/g	ND	109	60-130	
trans-1,3-Dichloropropylene	3.96	0.05	ug/g	ND	98.9	60-130	
Ethylbenzene	3.72	0.05	ug/g	ND	93.1	60-130	
Ethylene dibromide (dibromoethane, 1,2-)	3.91	0.05	ug/g	ND	97.8	60-130	
Hexane	4.73	0.05	ug/g	ND	118	60-130	
Methyl Ethyl Ketone (2-Butanone)	10.8	0.50	ug/g	ND	108	50-140	
Methyl Isobutyl Ketone	10.1	0.50	ug/g	ND	101	50-140	
Methyl tert-butyl ether	12.3	0.05	ug/g	ND	123	50-140	
Methylene Chloride	3.60	0.05	ug/g	ND	90.0	60-130	
Styrene	3.75	0.05	ug/g	ND	93.7	60-130	
1,1,1,2-Tetrachloroethane	4.47	0.05	ug/g	ND	112	60-130	
1,1,2,2-Tetrachloroethane	2.96	0.05	ug/g	ND	73.9	60-130	
Tetrachloroethylene	4.36	0.05	ug/g	ND	109	60-130	
Toluene	4.48	0.05	ug/g	ND	112	60-130	

Certificate of Analysis
Client: Cambium Inc. (Kingston)
Client PO:
Report Date: 05-May-2022
Order Date: 26-Apr-2022
Project Description: 13324-052

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
1,1,1-Trichloroethane	4.69	0.05	ug/g	ND	117	60-130			
1,1,2-Trichloroethane	4.24	0.05	ug/g	ND	106	60-130			
Trichloroethylene	4.83	0.05	ug/g	ND	121	60-130			
Trichlorofluoromethane	4.18	0.05	ug/g	ND	105	50-140			
Vinyl chloride	3.87	0.02	ug/g	ND	96.8	50-140			
m,p-Xylenes	8.41	0.05	ug/g	ND	105	60-130			
o-Xylene	4.37	0.05	ug/g	ND	109	60-130			
Surrogate: 4-Bromofluorobenzene	2.11		ug/g		65.8	50-140			
Surrogate: Dibromofluoromethane	3.64		ug/g		114	50-140			
Surrogate: Toluene-d8	3.34		ug/g		104	50-140			

Certificate of Analysis
 Client: Cambium Inc. (Kingston)
 Client PO:
 Report Date: 05-May-2022
 Order Date: 26-Apr-2022
 Project Description: 13324-052

Qualifier Notes:

QC Qualifiers :

Sample Qualifiers :

- 1: GC-FID signal did not return to baseline by C50

Sample Data Revisions:

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

NC: Not Calculated

Soil results are reported on a dry weight basis unless otherwise noted.

Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.

- F1 range corrected for BTEX.

- F2 to F3 ranges corrected for appropriate PAHs where available.

- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.

- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.

- When reported, data for F4G has been processed using a silica gel cleanup.

Any use of these results implies your agreement that our total liability in connection with this work, however arising, shall be limited to the amount paid by you for this work, and that our employees or agents shall not under any circumstances be liable to you in connection with this work.

Paracel ID: 2218118

Paracel ID: 2218118



LABORATORIES LTD.

Parcel Order Number
(Lab Use Only)

2218118

Chain Of Custody
(Lab Use Only)

No 136127

Client Name:	CAMB/UM	Project Ref:	13324-052	Page <u>1</u> of <u>1</u>
Contact Name:	Patrick Garrett, Christine Wilson	Quote #:	21-404	Turnaround Time <input type="checkbox"/> 1 day <input type="checkbox"/> 2 day <input type="checkbox"/> 3 day <input checked="" type="checkbox"/> Regular
Address:	625 Fortune Cres Unit 1 Kingston ON	PO #:		
Telephone:	1-866-217-7900	Email:	Patrick.garrett@cambium-inc.com Christine.Wilson@ " "	
		Date Required:		

<input type="checkbox"/> REG-13304- <input type="checkbox"/> Table 1 <input type="checkbox"/> Reg/Pls-k <input type="checkbox"/> Reg/Hr/9 <input checked="" type="checkbox"/> REG-13304- <input type="checkbox"/> Reg/Pls-k <input type="checkbox"/> Reg/Hr/9	Other Reg/Lstn <input type="checkbox"/> REG-558 <input type="checkbox"/> MWD	Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer)	Required Analysis
---	--	--	-------------------

[illegible]

Requested By (Sig.)	Received By (Print/Signature)	Received at Lab:	Method of Delivery:
<i>[Signature]</i>	<i>[Signature]</i>	Temperature 7.8 °C	drop box
Requested By (Print)	Date/Time	Date/Time	Verified By
J.K. Vulliamt	26 April 22 8:30	26 April 22 8:45	Kacey Cooper
Date/Time	Temperature	Temperature	Date/Time
04-25-22, 7:30 PM	9.1 °C	7.8 °C	Apr 26 12:26

Unit of Custody (Inventory)

Discussion



LABORATORIES LTD.

Paracel ID: 2218118



Chain Of Custody
(Lab Use Only)

No 136125

Client Name:	CAMBION	Project Ref:	13324-052	Page 1 of 1
Contact Name:	Patrick Garrett, Gordon Wilson	Quote #:		
Address:	625 Fortingale Cres Kingston	PO #:		
Telephone:		Email:	Patrick.Garrett@Cambion-inc.com Christine.Wilson@	
		Turnaround Time	<input type="checkbox"/> 1 day <input type="checkbox"/> 2 day <input checked="" type="checkbox"/> Regular	Date Required:

<input type="checkbox"/> REG 152/94 <input type="checkbox"/> Table 1 <input type="checkbox"/> Table 2 <input type="checkbox"/> Table 3 <input type="checkbox"/> Table 4 <input type="checkbox"/> Table 5 For RSCs: <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Other:	<input checked="" type="checkbox"/> REG 408/10 <input type="checkbox"/> Res/Park <input type="checkbox"/> Med/Flow <input type="checkbox"/> Ind/Comm <input type="checkbox"/> Agri/Other Mun: <input type="checkbox"/> Other:	Other Regulation <input type="checkbox"/> REG 558 <input type="checkbox"/> RCME <input type="checkbox"/> SU-San <input type="checkbox"/> SU-Storm													
Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)	Matrix	Sample Taken	Required Analysis												
Matrix	Air Volume	# of Containers	Date	Time	PHCs T1-T4+BTEX	VOCs	PAHs	Metals by ICP	Hg	Cd	B (HWS)	SAR	EC	PH	PCBs
1		3	04-26-22	8:30	X	X	X	X	X	X	X	X	X	X	X
2		3		9:30	X	X	X	X	X	X	X	X	X	X	X
3		3		10:15	X	X	X	X	X	X	X	X	X	X	X
4		3		—	X	X	X	X	X	X	X	X	X	X	X
5		3		11:45	X	X	X	X	X	X	X	X	X	X	X
6		3		12:15	X	X	X	X	X	X	X	X	X	X	X
7		3		2:00	X	X	X	X	X	X	X	X	X	X	X
8		3		3:00	X	X	X	X	X	X	X	X	X	X	X
9		3		3:45	X	X	X	X	X	X	X	X	X	X	X
10															

Relinquished By (Sign)	Received By (Driver/Captain)	Rec'd by (Sign)	Method of Delivery
Relinquished By (Print)	Date/Time	Date/Time	Verified by: Roney Cooper
Date/Time: 04-26-22, 7:50 PM	27 Apr 22 8:30	27 Apr 22 8:30	Date/Time: Apr 23 14:53
Temperature: 24 °C	9.4 °C	9.3 °C	pt Verifed: <input type="checkbox"/> by
Chain of Custody (Sign) x10	Revision: 4.0		



Client Name: CAUBIUM Contact Name: Christine Wilson Address: 625 Fortus Cross Unit 1 Kingston ON Telephone:		Project Ref: 13324-952 Client Ref: PO#: Email: christie.wilson@caubium-inc.ca Telephone:	Parcel Order Number (Lab Use Only) 2218118	Chain Of Custody (Lab Use Only) NO 135931
Page 1 of 1 Turnaround Time <input type="checkbox"/> 1 day <input type="checkbox"/> 3 day <input type="checkbox"/> 2 day <input checked="" type="checkbox"/> Regular Date Required:				

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) D (Other)		Sample Taken		Required Analysis										
Matrix	Air Volume	# of Containers	Date	Time	PHCs P1-F4+BTEX	VOCs	PAHs	Hg	CM	B (HWH)	SAR	EC	PH	PCBs
5		3	04-27-22	9:30	X	X		X			X	X	X	X
5		3		12:15	X	X		X			X	X	X	X
5		3		1:30	X	X		X			X	X	X	X
5		3		2:15	X	X		X			X	X	X	X
5		3		2:50	X	X		X			X	X	X	X
6														
7														
8														
9														
10														

Method of Delivery: dropbox	Received By: Karen Cooper	Date/Time: Apr 28 11:56
Received By: NIK Vallant	Date/Time: 28 Apr 22 8:30	Temperature: 7.8 °C
Received By: NIK Vallant	Date/Time: 04-27-22 6:40 AM	Temperature: 7.8 °C

Printed: 04/28/2022 14:03

Certificate of Analysis

Cambium Inc. (Kingston)
625 Fortune Crescent Unit 1
Kingston, ON K7P0L5
Attn: Christine Wilson

Client PO:
Project: 13324-051
Custody: 135902

Report Date: 6-May-2022
Order Date: 29-Apr-2022

Order #: 2218537

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
2218537-01	BH115_1.0_2.0
2218537-02	BH117_0.5
2218537-03	BH118_1.4
2218537-04	QAQC2

Approved By:



Dale Robertson, BSc
Laboratory Director

Certificate of Analysis
Client: Cambium Inc. (Kingston)
Client PO:
Report Date: 06-May-2022
Order Date: 29-Apr-2022
Project Description: 13324-051

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Conductivity	MOE E3138 - probe @25 °C, water ext	3-May-22	4-May-22
PCBs, total	SW846 8082A - GC-ECD	2-May-22	3-May-22
pH, soil	EPA 150.1 - pH probe @ 25 °C, CaCl buffered ext.	3-May-22	4-May-22
PHC F1	CWS Tier 1 - P&T GC-FID	3-May-22	4-May-22
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	3-May-22	6-May-22
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	5-May-22	5-May-22
REG 153: VOCs by P&T GC/MS	EPA 8260 - P&T GC-MS	3-May-22	4-May-22
SAR	Calculated	4-May-22	4-May-22
Solids, %	Gravimetric, calculation	4-May-22	4-May-22

Certificate of Analysis
Client: Cambium Inc. (Kingston)
Client PO:
Report Date: 06-May-2022
Order Date: 29-Apr-2022
Project Description: 13324-051

Summary of Criteria Exceedances

(If this page is blank then there are no exceedances)
Only those criteria that a sample exceeds will be highlighted in red

Regulatory Comparison:

Paracel Laboratories has provided regulatory guidelines on this report for informational purposes only and makes no representations or warranties that the data is accurate or reflects the current regulatory values. The user is advised to consult with the appropriate official regulations to evaluate compliance. Sample results that are highlighted have exceeded the selected regulatory limit. Calculated uncertainty estimations have not been applied for determining regulatory exceedances.

Sample	Analyte	MDL / Units		Result	Reg 406/19 -T1 Agr
BH115_1.0_2.0	Antimony	1.0	ug/g	1.5	1 ug/g

Certificate of Analysis
 Client: Cambium Inc. (Kingston)
 Report Date: 06-May-2022
 Order Date: 29-Apr-2022
 Project Description: 13324-051
 Client PO:

Client ID:		BH115_1.0_2.0 25-Apr-22 09:45 2218537-01 Soil	BH117_0.5 28-Apr-22 15:30 2218537-02 Soil	BH118_1.4 28-Apr-22 16:15 2218537-03 Soil	QAQC2 28-Apr-22 09:00 2218537-04 Soil	Criteria: Reg 406/19 -T1 Agr -
Sample Date:						
Sample ID:						
Matrix:						
MDL/Units						
Physical Characteristics						
% Solids	0.1 % by Wt.	73.8	89.9	86.3	84.4	-
General Inorganics						
SAR	0.01 N/A	0.20	0.12	0.13	0.13	1 N/A
Conductivity	5 uS/cm	112	113	188	186	0.47 mS/cm
pH	0.05 pH Units	7.41	7.45	7.51	7.48	5.00 - 9.00 pH Units
Metals						
Antimony	1.0 ug/g	1.5	<1.0	<1.0	<1.0	1 ug/g
Arsenic	1.0 ug/g	2.7	1.5	2.4	2.5	11 ug/g
Barium	1.0 ug/g	25.3	16.2	62.4	64.8	210 ug/g
Beryllium	0.5 ug/g	<0.5	<0.5	<0.5	<0.5	2.5 ug/g
Boron	5.0 ug/g	6.0	<5.0	5.7	6.3	36 ug/g
Cadmium	0.5 ug/g	<0.5	<0.5	<0.5	<0.5	1 ug/g
Chromium	5.0 ug/g	14.0	11.7	18.5	19.5	67 ug/g
Cobalt	1.0 ug/g	4.2	2.8	4.5	4.7	19 ug/g
Copper	5.0 ug/g	8.3	<5.0	6.3	6.4	62 ug/g
Lead	1.0 ug/g	3.6	3.0	5.4	5.8	45 ug/g
Molybdenum	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	2 ug/g
Nickel	5.0 ug/g	8.5	5.5	7.9	8.4	37 ug/g
Selenium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	1.2 ug/g
Silver	0.3 ug/g	<0.3	<0.3	<0.3	<0.3	0.5 ug/g
Thallium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	1 ug/g
Uranium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	1.9 ug/g
Vanadium	10.0 ug/g	23.2	20.7	22.6	23.3	86 ug/g
Zinc	20.0 ug/g	<20.0	<20.0	27.0	28.5	290 ug/g
Volatiles						

Certificate of Analysis

Report Date: 06-May-2022

Client: Cambium Inc. (Kingston)

Order Date: 29-Apr-2022

Client PO:

Project Description: 13324-051

Client ID:	BH115_1.0_2.0	BH117_0.5	BH118_1.4	QAQC2	Criteria:
Sample Date:	25-Apr-22 09:45	28-Apr-22 15:30	28-Apr-22 16:15	28-Apr-22 09:00	Reg 406/19 -T1 Agr
Sample ID:	2218537-01	2218537-02	2218537-03	2218537-04	-
Matrix:	Soil	Soil	Soil	Soil	
MDL/Units					

Volatiles

Acetone	0.50 ug/g	<0.50	<0.50	<0.50	0.5 ug/g	-
Benzene	0.02 ug/g	<0.02	<0.02	<0.02	0.02 ug/g	-
Bromodichloromethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Bromoform	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Bromomethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Carbon Tetrachloride	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Chlorobenzene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Chloroform	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Dibromochloromethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Dichlorodifluoromethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,2-Dichlorobenzene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,3-Dichlorobenzene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,4-Dichlorobenzene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1-Dichloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,2-Dichloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1-Dichloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
cis-1,2-Dichloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
trans-1,2-Dichloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,2-Dichloropropane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
cis-1,3-Dichloropropylene	0.05 ug/g	<0.05	<0.05	<0.05	-	-
trans-1,3-Dichloropropylene	0.05 ug/g	<0.05	<0.05	<0.05	-	-
1,3-Dichloropropene, total	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Ethylbenzene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Ethylene dibromide (dibromoethane,	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Hexane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-

Certificate of Analysis
 Client: Cambium Inc. (Kingston)
 Client PO:
 Report Date: 06-May-2022
 Order Date: 29-Apr-2022
 Project Description: 13324-051

Client ID:	BH115_1.0_2.0	BH117_0.5	BH118_1.4	QAQC2	Criteria:
Sample Date:	25-Apr-22 09:45	28-Apr-22 15:30	28-Apr-22 16:15	28-Apr-22 09:00	Reg 406/19 -T1 Agr
Sample ID:	2218537-01	2218537-02	2218537-03	2218537-04	-
Matrix:	Soil	Soil	Soil	Soil	
MDL/Units					

Volatiles

Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g	<0.50	<0.50	<0.50	0.5 ug/g	-
Methyl Isobutyl Ketone	0.50 ug/g	<0.50	<0.50	<0.50	0.5 ug/g	-
Methyl tert-butyl ether	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Methylene Chloride	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Styrene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1,1,2-Tetrachloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1,2,2-Tetrachloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Tetrachloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Toluene	0.05 ug/g	<0.05	<0.05	<0.05	0.2 ug/g	-
1,1,1-Trichloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
1,1,2-Trichloroethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Trichloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Trichlorofluoromethane	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
Vinyl chloride	0.02 ug/g	<0.02	<0.02	<0.02	0.02 ug/g	-
m,p-Xylenes	0.05 ug/g	<0.05	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g	<0.05	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g	<0.05	<0.05	<0.05	0.05 ug/g	-
4-Bromofluorobenzene	Surrogate	131%	119%	124%	-	-
Dibromofluoromethane	Surrogate	90.9%	82.6%	87.2%	-	-
Toluene-d8	Surrogate	123%	114%	117%	-	-

Hydrocarbons

F1 PHCs (C6-C10)	7 ug/g	<7	<7	<7	17 ug/g	-
F2 PHCs (C10-C16)	4 ug/g	<4	<4	<4	10 ug/g	-
F3 PHCs (C16-C34)	8 ug/g	<8	<8	24	240 ug/g	-
F4 PHCs (C34-C50)	6 ug/g	<6	<6	7	120 ug/g	-

Certificate of Analysis
 Client: Cambium Inc. (Kingston)
 Client PO:
 Report Date: 06-May-2022
 Order Date: 29-Apr-2022
 Project Description: 13324-051

Client ID:		BH115_1.0_2.0 25-Apr-22 09:45 2218537-01 Soil	BH117_0.5 28-Apr-22 15:30 2218537-02 Soil	BH118_1.4 28-Apr-22 16:15 2218537-03 Soil	QAQC2 28-Apr-22 09:00 2218537-04 Soil	Criteria: Reg 406/19 -T1 Agr -
Sample Date:						
Sample ID:						
Matrix:						
MDL/Units						
PCBs						
PCBs, total	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	0.3 ug/g
Decachlorobiphenyl	Surrogate	94.3%	93.7%	97.0%	94.2%	-

Certificate of Analysis
Client: Cambium Inc. (Kingston)
Client PO:
Report Date: 06-May-2022
Order Date: 29-Apr-2022
Project Description: 13324-051

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC Limit	%REC Limit	RPD Limit	Notes
General Inorganics							
Conductivity	ND	5	uS/cm				
Hydrocarbons							
F1 PHCs (C6-C10)	ND	7	ug/g				
F2 PHCs (C10-C16)	ND	4	ug/g				
F3 PHCs (C16-C34)	ND	8	ug/g				
F4 PHCs (C34-C50)	ND	6	ug/g				
Metals							
Antimony	ND	1.0	ug/g				
Arsenic	ND	1.0	ug/g				
Barium	ND	1.0	ug/g				
Beryllium	ND	0.5	ug/g				
Boron	ND	5.0	ug/g				
Cadmium	ND	0.5	ug/g				
Chromium	ND	5.0	ug/g				
Cobalt	ND	1.0	ug/g				
Copper	ND	5.0	ug/g				
Lead	ND	1.0	ug/g				
Molybdenum	ND	1.0	ug/g				
Nickel	ND	5.0	ug/g				
Selenium	ND	1.0	ug/g				
Silver	ND	0.3	ug/g				
Thallium	ND	1.0	ug/g				
Uranium	ND	1.0	ug/g				
Vanadium	ND	10.0	ug/g				
Zinc	ND	20.0	ug/g				
PCBs							
PCBs, total	ND	0.05	ug/g				
Surrogate: Decachlorobiphenyl	0.0954		ug/g	95.4	60-140		
Volatiles							
Acetone	ND	0.50	ug/g				
Benzene	ND	0.02	ug/g				
Bromodichloromethane	ND	0.05	ug/g				

Certificate of Analysis
 Client: Cambium Inc. (Kingston)
 Client PO:
 Report Date: 06-May-2022
 Order Date: 29-Apr-2022
 Project Description: 13324-051

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC Limit	RPD Limit	Notes
Bromoform	ND	0.05	ug/g			
Bromomethane	ND	0.05	ug/g			
Carbon Tetrachloride	ND	0.05	ug/g			
Chlorobenzene	ND	0.05	ug/g			
Chloroform	ND	0.05	ug/g			
Dibromochloromethane	ND	0.05	ug/g			
Dichlorodifluoromethane	ND	0.05	ug/g			
1,2-Dichlorobenzene	ND	0.05	ug/g			
1,3-Dichlorobenzene	ND	0.05	ug/g			
1,4-Dichlorobenzene	ND	0.05	ug/g			
1,1-Dichloroethane	ND	0.05	ug/g			
1,2-Dichloroethane	ND	0.05	ug/g			
1,1-Dichloroethylene	ND	0.05	ug/g			
cis-1,2-Dichloroethylene	ND	0.05	ug/g			
trans-1,2-Dichloroethylene	ND	0.05	ug/g			
1,2-Dichloropropane	ND	0.05	ug/g			
cis-1,3-Dichloropropylene	ND	0.05	ug/g			
trans-1,3-Dichloropropylene	ND	0.05	ug/g			
1,3-Dichloropropene, total	ND	0.05	ug/g			
Ethylbenzene	ND	0.05	ug/g			
Ethylene dibromide (dibromoethane, 1,2-)	ND	0.05	ug/g			
Hexane	ND	0.05	ug/g			
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g			
Methyl Isobutyl Ketone	ND	0.50	ug/g			
Methyl tert-butyl ether	ND	0.05	ug/g			
Methylene Chloride	ND	0.05	ug/g			
Styrene	ND	0.05	ug/g			
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g			
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g			
Tetrachloroethylene	ND	0.05	ug/g			
Toluene	ND	0.05	ug/g			
1,1,1-Trichloroethane	ND	0.05	ug/g			
1,1,2-Trichloroethane	ND	0.05	ug/g			

Certificate of Analysis
Client: Cambium Inc. (Kingston)
Client PO:
Report Date: 06-May-2022
Order Date: 29-Apr-2022
Project Description: 13324-051

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Trichloroethylene	ND	0.05	ug/g					
Trichlorofluoromethane	ND	0.05	ug/g					
Vinyl chloride	ND	0.02	ug/g					
m,p-Xylenes	ND	0.05	ug/g					
o-Xylene	ND	0.05	ug/g					
Xylenes, total	ND	0.05	ug/g					
Surrogate: 4-Bromofluorobenzene	9.16		ug/g	115	50-140			
Surrogate: Dibromofluoromethane	6.94		ug/g	86.8	50-140			
Surrogate: Toluene-d8	8.39		ug/g	105	50-140			

Certificate of Analysis

Report Date: 06-May-2022

Client: Cambium Inc. (Kingston)

Order Date: 29-Apr-2022

Client PO:

Project Description: 13324-051

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
SAR	0.24	0.01	N/A	0.20			18.2	30	
Conductivity	116	5	uS/cm	112			3.6	5	
pH	7.04	0.05	pH Units	6.99			0.7	2.3	
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g	ND			NC	40	
F2 PHCs (C10-C16)	ND	4	ug/g	ND			NC	30	
F3 PHCs (C16-C34)	ND	8	ug/g	ND			NC	30	
F4 PHCs (C34-C50)	ND	6	ug/g	ND			NC	30	
Metals									
Antimony	2.7	1.0	ug/g	3.4			23.8	30	
Arsenic	3.4	1.0	ug/g	3.5			2.3	30	
Barium	197	1.0	ug/g	213			7.9	30	
Beryllium	0.7	0.5	ug/g	0.7			3.4	30	
Boron	ND	5.0	ug/g	6.1			NC	30	
Cadmium	ND	0.5	ug/g	ND			NC	30	
Chromium	55.3	5.0	ug/g	60.2			8.6	30	
Cobalt	14.6	1.0	ug/g	16.2			10.0	30	
Copper	29.5	5.0	ug/g	31.8			7.7	30	
Lead	5.5	1.0	ug/g	5.8			5.3	30	
Molybdenum	ND	1.0	ug/g	ND			NC	30	
Nickel	31.1	5.0	ug/g	34.2			9.5	30	
Selenium	ND	1.0	ug/g	ND			NC	30	
Silver	ND	0.3	ug/g	ND			NC	30	
Thallium	ND	1.0	ug/g	ND			NC	30	
Uranium	ND	1.0	ug/g	ND			NC	30	
Vanadium	74.0	10.0	ug/g	81.3			9.4	30	
Zinc	87.1	20.0	ug/g	93.9			7.5	30	
PCBs									
PCBs, total	ND	0.05	ug/g	ND			NC	40	
Surrogate: Decachlorobiphenyl	0.119		ug/g		96.7	60-140			

Certificate of Analysis
 Client: Cambium Inc. (Kingston)
 Client PO:
 Report Date: 06-May-2022
 Order Date: 29-Apr-2022
 Project Description: 13324-051

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Physical Characteristics									
% Solids	76.0	0.1	% by Wt.	76.3			0.5	25	
Volatiles									
Acetone	ND	0.50	ug/g	ND			NC	50	
Benzene	ND	0.02	ug/g	ND			NC	50	
Bromodichloromethane	ND	0.05	ug/g	ND			NC	50	
Bromoform	ND	0.05	ug/g	ND			NC	50	
Bromomethane	ND	0.05	ug/g	ND			NC	50	
Carbon Tetrachloride	ND	0.05	ug/g	ND			NC	50	
Chlorobenzene	ND	0.05	ug/g	ND			NC	50	
Chloroform	ND	0.05	ug/g	ND			NC	50	
Dibromochloromethane	ND	0.05	ug/g	ND			NC	50	
Dichlorodifluoromethane	ND	0.05	ug/g	ND			NC	50	
1,2-Dichlorobenzene	ND	0.05	ug/g	ND			NC	50	
1,3-Dichlorobenzene	ND	0.05	ug/g	ND			NC	50	
1,4-Dichlorobenzene	ND	0.05	ug/g	ND			NC	50	
1,1-Dichloroethane	ND	0.05	ug/g	ND			NC	50	
1,2-Dichloroethane	ND	0.05	ug/g	ND			NC	50	
1,1-Dichloroethylene	ND	0.05	ug/g	ND			NC	50	
cis-1,2-Dichloroethylene	ND	0.05	ug/g	ND			NC	50	
trans-1,2-Dichloroethylene	ND	0.05	ug/g	ND			NC	50	
1,2-Dichloropropane	ND	0.05	ug/g	ND			NC	50	
cis-1,3-Dichloropropylene	ND	0.05	ug/g	ND			NC	50	
trans-1,3-Dichloropropylene	ND	0.05	ug/g	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g	ND			NC	50	
Ethylene dibromide (dibromoethane, 1,2-)	ND	0.05	ug/g	ND			NC	50	
Hexane	ND	0.05	ug/g	ND			NC	50	
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g	ND			NC	50	
Methyl Isobutyl Ketone	ND	0.50	ug/g	ND			NC	50	
Methyl tert-butyl ether	ND	0.05	ug/g	ND			NC	50	
Methylene Chloride	ND	0.05	ug/g	ND			NC	50	

Certificate of Analysis
 Client: Cambium Inc. (Kingston)
 Client PO:
 Report Date: 06-May-2022
 Order Date: 29-Apr-2022
 Project Description: 13324-051

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Styrene	ND	0.05	ug/g	ND			NC	50	
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g	ND			NC	50	
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g	ND			NC	50	
Tetrachloroethylene	ND	0.05	ug/g	ND			NC	50	
Toluene	ND	0.05	ug/g	ND			NC	50	
1,1,1-Trichloroethane	ND	0.05	ug/g	ND			NC	50	
1,1,2-Trichloroethane	ND	0.05	ug/g	ND			NC	50	
Trichloroethylene	ND	0.05	ug/g	ND			NC	50	
Trichlorofluoromethane	ND	0.05	ug/g	ND			NC	50	
Vinyl chloride	ND	0.02	ug/g	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g	ND			NC	50	
o-Xylene	ND	0.05	ug/g	ND			NC	50	
Surrogate: 4-Bromofluorobenzene	11.4		ug/g		122	50-140			
Surrogate: Dibromofluoromethane	8.42		ug/g		90.1	50-140			
Surrogate: Toluene-d8	10.8		ug/g		115	50-140			

Certificate of Analysis
 Client: Cambium Inc. (Kingston)
 Report Date: 06-May-2022
 Order Date: 29-Apr-2022
 Project Description: 13324-051

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC Limit	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	204	7	ug/g	ND	102	80-120			
F2 PHCs (C10-C16)	115	4	ug/g	ND	106	60-140			
F3 PHCs (C16-C34)	289	8	ug/g	ND	109	60-140			
F4 PHCs (C34-C50)	190	6	ug/g	ND	113	60-140			
Metals									
Antimony	36.4	1.0	ug/g	1.4	70.1	70-130			
Arsenic	48.8	1.0	ug/g	1.4	94.9	70-130			
Barium	118	1.0	ug/g	85.4	65.0	70-130			
Beryllium	45.0	0.5	ug/g	ND	89.4	70-130			
Boron	43.3	5.0	ug/g	ND	81.8	70-130			
Cadmium	41.7	0.5	ug/g	ND	83.3	70-130			
Chromium	70.3	5.0	ug/g	24.1	92.5	70-130			
Cobalt	52.3	1.0	ug/g	6.5	91.6	70-130			
Copper	56.2	5.0	ug/g	12.7	87.0	70-130			
Lead	46.6	1.0	ug/g	2.3	88.5	70-130			
Molybdenum	45.2	1.0	ug/g	ND	90.0	70-130			
Nickel	57.7	5.0	ug/g	13.7	88.0	70-130			
Selenium	44.9	1.0	ug/g	ND	89.5	70-130			
Silver	41.0	0.3	ug/g	ND	81.9	70-130			
Thallium	44.4	1.0	ug/g	ND	88.5	70-130			
Uranium	47.5	1.0	ug/g	ND	94.4	70-130			
Vanadium	78.0	10.0	ug/g	32.5	90.9	70-130			
Zinc	76.5	20.0	ug/g	37.5	78.0	70-130			
PCBs									
PCBs, total	0.414	0.05	ug/g	ND	84.3	60-140			
Surrogate: Decachlorobiphenyl	0.124		ug/g		101	60-140			
Volatiles									
Acetone	9.07	0.50	ug/g	ND	90.7	50-140			
Benzene	3.18	0.02	ug/g	ND	79.6	60-130			
Bromodichloromethane	4.42	0.05	ug/g	ND	110	60-130			

Certificate of Analysis
 Client: Cambium Inc. (Kingston)
 Report Date: 06-May-2022
 Order Date: 29-Apr-2022
 Project Description: 13324-051
 Client PO:

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC Limit	RPD Limit	Notes
Bromoform	3.80	0.05	ug/g	ND	94.9	60-130	
Bromomethane	4.35	0.05	ug/g	ND	109	50-140	
Carbon Tetrachloride	3.18	0.05	ug/g	ND	79.5	60-130	
Chlorobenzene	4.13	0.05	ug/g	ND	103	60-130	
Chloroform	3.38	0.05	ug/g	ND	84.4	60-130	
Dibromochloromethane	3.75	0.05	ug/g	ND	93.8	60-130	
Dichlorodifluoromethane	4.48	0.05	ug/g	ND	112	50-140	
1,2-Dichlorobenzene	4.10	0.05	ug/g	ND	103	60-130	
1,3-Dichlorobenzene	4.24	0.05	ug/g	ND	106	60-130	
1,4-Dichlorobenzene	4.10	0.05	ug/g	ND	102	60-130	
1,1-Dichloroethane	3.54	0.05	ug/g	ND	88.6	60-130	
1,2-Dichloroethane	3.25	0.05	ug/g	ND	81.3	60-130	
1,1-Dichloroethylene	4.02	0.05	ug/g	ND	101	60-130	
cis-1,2-Dichloroethylene	3.15	0.05	ug/g	ND	78.6	60-130	
trans-1,2-Dichloroethylene	4.12	0.05	ug/g	ND	103	60-130	
1,2-Dichloropropane	3.27	0.05	ug/g	ND	81.6	60-130	
cis-1,3-Dichloropropylene	4.48	0.05	ug/g	ND	112	60-130	
trans-1,3-Dichloropropylene	3.84	0.05	ug/g	ND	96.0	60-130	
Ethylbenzene	4.05	0.05	ug/g	ND	101	60-130	
Ethylene dibromide (dibromoethane, 1,2-)	4.98	0.05	ug/g	ND	125	60-130	
Hexane	3.96	0.05	ug/g	ND	99.0	60-130	
Methyl Ethyl Ketone (2-Butanone)	8.31	0.50	ug/g	ND	83.1	50-140	
Methyl Isobutyl Ketone	8.81	0.50	ug/g	ND	88.1	50-140	
Methyl tert-butyl ether	12.6	0.05	ug/g	ND	126	50-140	
Methylene Chloride	3.70	0.05	ug/g	ND	92.5	60-130	
Styrene	4.12	0.05	ug/g	ND	103	60-130	
1,1,1,2-Tetrachloroethane	4.63	0.05	ug/g	ND	116	60-130	
1,1,2,2-Tetrachloroethane	3.81	0.05	ug/g	ND	95.2	60-130	
Tetrachloroethylene	4.29	0.05	ug/g	ND	107	60-130	
Toluene	4.27	0.05	ug/g	ND	107	60-130	
1,1,1-Trichloroethane	3.64	0.05	ug/g	ND	91.1	60-130	

Certificate of Analysis
 Client: Cambium Inc. (Kingston)
 Client PO:
 Report Date: 06-May-2022
 Order Date: 29-Apr-2022
 Project Description: 13324-051

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC Limit	%REC Limit	RPD Limit	Notes
1,1,2-Trichloroethane	3.27	0.05	ug/g	ND	81.7	60-130		
Trichloroethylene	3.52	0.05	ug/g	ND	88.1	60-130		
Trichlorofluoromethane	4.44	0.05	ug/g	ND	111	50-140		
Vinyl chloride	4.67	0.02	ug/g	ND	117	50-140		
m,p-Xylenes	7.93	0.05	ug/g	ND	99.1	60-130		
o-Xylene	3.94	0.05	ug/g	ND	98.5	60-130		
Surrogate: 4-Bromofluorobenzene	8.95		ug/g		112	50-140		
Surrogate: Dibromofluoromethane	7.67		ug/g		95.9	50-140		
Surrogate: Toluene-d8	8.23		ug/g		103	50-140		

Certificate of Analysis

Client: Cambium Inc. (Kingston)

Client PO:

Report Date: 06-May-2022

Order Date: 29-Apr-2022

Project Description: 13324-051

Qualifier Notes:

QC Qualifiers :

QM-07: The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on other acceptable QC.

Sample Data Revisions:

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

NC: Not Calculated

Soil results are reported on a dry weight basis unless otherwise noted.

Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.

- F1 range corrected for BTEX.

- F2 to F3 ranges corrected for appropriate PAHs where available.

- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.

- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.

- When reported, data for F4G has been processed using a silica gel cleanup.

Any use of these results implies your agreement that our total liability in connection with this work, however arising, shall be limited to the amount paid by you for this work, and that our employees or agents shall not under any circumstances be liable to you in connection with this work.



Parcel Order Number
(Lab Use Only)
2218537

Chain Of Custody
(Lab Use Only)
Nº 135902

Client Name: **Cumbeum Inc**
 Contact Name: **Christine Wilson**
 Address: **685 Bisme Cres unit 1**
Kingston
 Telephone: **1-866-217-7900**

Project Ref: **13324-051**
 Quote #:
 PO #:
 Email: **christine.wilson@cumbeum-inc.com**
dutch.gunn@cumbeum-inc.com

Turnaround Time
☐ 1 day
☐ 3 day
☐ 2 day
☒ Regular
 Date Required:
 Page **1** of **1**

Matrix Type: S (Soil/Sed) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer)				Required Analysis											
Sample ID/Location Name		Matrix	# of Containers	Sample Taken		PHCs P1-P4+BTEX	VOCs	PAHs	Metals by ICP	Hg	OM	B (HWS)	EC	DE	PCBs
				Date	Time										
1	BH15-1.0-2.0	S	3	03.04.22	9:45	X	X	X	X				X	X	X
2	BH17-0.5	S	3	04.28.22	3:30	X	X	X	X				X	X	X
3	BH18-1.4	S	3	↓	4:15	X	X	X	X				X	X	X
4	GAQC2	S	3	↓	—	X	X	X	X				X	X	X
5															
6															
7															
8															
9															
10															

Comments:
 Method of Delivery: **DROP BOX**
 Received By: **Stan**
 Date/Time: **April 30, 22 15:03**
 Temperature: **6.1 °C**
 Date/Time: **April 30, 22 14:14**
 off Verified: ☐ 30



Geotechnical Investigation - Quinte West Watermain Extension - Wooler Road to Tate Road

January 6, 2023

Prepared for:
City of Quinte West

Cambium Reference: 13324-051

CAMBIUM INC.

866.217.7900

cambium-inc.com

Peterborough | Barrie | Oshawa | Kingston



Table of Contents

1.0	Introduction.....	1
1.1	Background	1
1.2	Project Description	1
2.0	Investigation Methodology	2
2.1	Field Work	2
2.2	Physical Laboratory Testing	3
3.0	Subsurface Conditions	4
3.1	Surface Soils	4
3.2	Non-Cohesive Deposits.....	5
3.3	Cohesive Deposits	6
3.4	Groundwater.....	7
4.0	Discussion and Recommendations.....	9
4.1	Excavations	9
4.2	Groundwater Control	10
4.3	Pipe Bedding	11
4.4	Trench Backfill.....	11
5.0	Limitations	13
5.1	Design Review and Inspections	13
5.2	Winter Construction	13
5.3	Changes in Site and Project Scope	13
6.0	Closing	14
7.0	Standard Limitations.....	15



List of Embedded Tables

Table 1	Existing Surface Material Thickness	5
Table 2	Particle Size Distribution Results – Non-cohesive Soils.....	6
Table 3	Particle Size Distribution Results –Cohesive Soils	7
Table 4	Groundwater Observations and Borehole Integrity	8

List of Appended Figures

Figure 1	Site Plan
Figure 2	Borehole Location Plan

List of Appendices

Appendix A	Borehole Logs
Appendix B	Laboratory Testing Results



1.0 Introduction

1.1 Background

Cambium Inc. (Cambium) was requested by The City of Quinte West (The Client) to provide a subsurface investigation for the proposed watermain extension to be completed from 190 m east of Little Farm Boulevard along Highway 2 to the intersection of Tate Road and Telephone Road. The site is located in Trenton, Ontario, in the Municipality of Quinte West. A Site Location Plan is provided as Figure 1.

The purpose of the investigation was to identify the general subsurface conditions at the site by means of a limited number of boreholes and, based on the factual information obtained, provide engineering guidelines regarding the watermain installation and subsequent roadway reconstruction, including construction considerations that may influence design decisions.

1.2 Project Description

Plans are being prepared for the construction of a watermain extension for the Municipality of Quinte West. The watermain will extend along Highway 2 from 190 m east of Little Farm Boulevard to County Road 40 (Wooler Road), along County Road 40 from Highway 2 to 450 m south of Telephone Road, then crossing in the east-west direction at this point between County Road 40 and Tate Road, and along Tate Road due north to Telephone Road. A total length of approximately 4.1 km.

It is understood that the watermain is to be installed approximately 1.5 to 2 metres below ground surface (mbgs).

This report provides the results of the investigation located within the unpaved area between County Road 40 and Tate Road (boreholes BH122-22 through BH134-22). The investigation was completed concurrently with the remaining areas at the site and this report should be read in conjunction with the other report (Cambium Project No. 13324-052).



2.0 Investigation Methodology

2.1 Field Work

The field investigation involved advancing a total of thirteen boreholes. The boreholes were advanced from grade to a depth of approximately 3 mbgs. The locations of the boreholes relative to existing conditions at each site are provided on the attached Figure 2.

Drilling and sampling of all the boreholes was completed using a track-mounted drill rig operating under the fulltime supervision of a Cambium technician. The boreholes were advanced to the sampling depths by means of continuous flight solid stem augers and 50 mm O.D. split spoon samplers. Standard Penetration Test (SPT) results (N-values) were recorded for the sampled intervals as the number of blows required to drive a split spoon sampler 305 mm in to the soil, using a 63.5 kg drop hammer falling 750 mm, as per ASTM D1586 procedures. In-situ field vane shear tests were completed when soft, cohesive soils were encountered in accordance with ASTM D2573.

The SPT N-values in conjunction with shear vane results are used in this report to assess consistency of cohesive soils and relative density of non-cohesive soils.

Borehole samples were inspected and logged in the field using visual and tactile methods. Soil samples were placed in labelled plastic containers for transport, review, potential laboratory testing, and temporary storage. Open boreholes were checked for groundwater and stability prior to backfilling and were backfilled in accordance with O.Reg. 903, as amended.

GPS coordinates of each test hole were obtained using a handheld GPS device and elevation provided on the borehole logs are approximate grade elevations base on publicly available ArcGIS maps through Hastings County.

Records of the individual Borehole Logs are provided in Appendix A.



2.2 Physical Laboratory Testing

Physical laboratory testing was completed on select soil samples to confirm textural classification and to assess geotechnical parameters. The results are summarized in the respective soil stratigraphy sections in Section 3.0 and included in detail in Appendix B.



3.0 Subsurface Conditions

The subsurface soil and groundwater conditions encountered in the boreholes are presented on the attached Borehole Logs in Appendix A. The stratigraphic boundaries indicated on the logs are inferred from non-continuous samples and observations of drilling resistance and typically represent a transition from one soil type to another, sometimes gradually. The boundaries should not be interpreted to represent exact planes of geologic change. The subsurface conditions have been confirmed in a series of widely spaced boreholes and will vary between and beyond the borehole locations.

The boreholes for this investigation were advanced along the east-west direction between County Road 40 and Tate Road. This area is unpaved, and it is understood that there are no immediate plans for roadway construction within this area. The boreholes advanced here were numbered BH122-22 through BH134-22. Due to access constraints, a length of approximately 550 m between BH125-22 and BH126-22 was not included within the subsurface investigation. The subsurface conditions in these areas are inferred based on adjacent borehole data and will have to be verified by Cambium during construction.

The results of the remaining boreholes advanced as part of this investigation (BH101-22 through BH121-22 and BH135-22 through 141-22) are provided in a separate report under a separate cover.

3.1 Surface Soils

Topsoil was encountered from the surface at eleven borehole locations (BH123-22 and BH125-22 through 134-22). The topsoil varies in thickness between borehole locations, ranging between 0.1 and 0.8 meters. The encountered surface material thicknesses are summarized in Table 1 below:

Table 1 Existing Surface Material Thickness

Boreholes	Surface Material Thickness (mm)	Surface Material
BH122-22	750	Gravel
BH123-22	100	Topsoil
BH124-22	100	Gravel
BH125-22	100	Topsoil
BH126-22	350	Topsoil
BH127-22	300	Topsoil
BH128-22	250	Topsoil
BH129-22	320	Topsoil
BH130-22	750	Topsoil
BH131-22	750	Topsoil
BH132-22	750	Topsoil
BH133-22	150	Topsoil
BH134-22	750	Topsoil

3.2 Non-Cohesive Deposits

Non-cohesive deposits composed of a mixture of silts, sands, and gravels were encountered at all borehole locations including from the surface of BH122-22 and BH124-22. The deposits range in composition with depth and between borehole locations. More detailed descriptions of the subsurface conditions at each borehole location can be found on the respective logs in Appendix A.

The deposits composed of greyish brown to grey sandy gravel encountered from the surface of boreholes BH122-22 and BH124-22 and underlying the topsoil in boreholes BH123-22 and 125-22, are likely fill material placed for the construction of the existing gravel road. The material is composed of sandy gravel with trace silt and ranges in thickness from 0.1 to 0.8 meters.

The topsoil and probable fill material is underlain by native non-cohesive deposits. Boreholes BH126-22 through BH129-22, and BH131-22 encountered brown to grey sandy silt to silty sand to silt with trace sand. These boreholes terminated within the non-cohesive deposits at a depth of 2.9 mbgs, apart from borehole BH129-22. It should be noted that a cohesive deposit was encountered interbedded with non-cohesive layers in boreholes BH130-22 and BH131-22. Further discussion on the cohesive deposits is provided in Section 3.3.

The non-cohesive deposits in the remaining boreholes extend to depths ranging from 1.5 to 2.4 mbgs.

SPT N-values measured in the non-cohesive deposits range from 3 to 17 blows per 305 mm of penetration (bpf), indicative of a loose to compact relative density.

Laboratory gradation analyses were completed on select samples of the non-cohesive materials. The analytical results are shown on the respective borehole logs and are summarized in Table 2. Detailed laboratory results diagrams are found in Appendix B.

Table 2 Particle Size Distribution Results – Non-cohesive Soils

Borehole Sample	Depth (mbgs)	Soil	% Gravel	% Sand	% Silt and Clay
BH123-22 SS3A	1.5 - 2.1	Silty sand	0	79	21
BH125-22 SS2	0.8 - 1.4	Sand, some silt, trace gravel	1	88	11
BH127-22 SS1B	0.0 - 0.6	Sandy Silt, trace gravel	3	32	65

3.3 Cohesive Deposits

Cohesive deposits composed of clay, silty clay, and or silt with some clay to clayey silt were encountered underlying the non-cohesive deposits at ten of the borehole locations. The deposits vary in composition with depth and between borehole locations. More detailed descriptions of the subsurface conditions at each borehole location can be found on the respective logs in Appendix A.

With the exception of BH131-22, where cohesive deposits were encountered, all boreholes terminated within these deposits at depths ranging from 2.9 to 3.1 mbgs.



SPT N-values measured in the non-cohesive deposits range from 2 to 39 blow per 300 mm, indicative of a soft to hard consistency. Undrained shear strength was measured with the cohesive deposits and ranged from 38 to 66 kPa, indicative of a firm to stiff consistency. Residual shear vane values range from 15 to 25 kPa, clay sensitivity, where tested, can therefore be categorized as low to medium sensitivity.

Laboratory gradation analyses were completed on select samples of the cohesive materials. The analytical results are shown on the respective borehole logs and are summarized in Table 3. Detailed laboratory results diagrams are found in Appendix B.

Table 3 Particle Size Distribution Results –Cohesive Soils

Borehole Sample	Depth (mbgs)	Soil	% Gravel	% Sand	% Silt and Clay
BH129-22 SS3	1.5 - 2.1	Silt, some clay to clayey, trace sand	0	2	98
BH131-22 SS2	0.8 - 1.4	Silt, some sand, some to trace clay	0	17	83
BH133-22 SS1B	0.0 - 0.6	Silt, some sand, some clay to clayey, trace gravel	5	11	84

3.4 Groundwater

Groundwater observations were made in boreholes immediately following drilling, as shown in Table 4. In addition to groundwater, the integrity of the open borehole walls was also noted at each borehole location.



Table 4 Groundwater Observations and Borehole Integrity

Borehole	Depth of Groundwater (mbgs)	Depth of Borehole Caving (mbgs)
BH122-22	0.8	2.0
BH123-22	1.7	Remained Open
BH124-22	Dry	Remained Open
BH125-22	0.8	Remained Open
BH126-22	1.5	1.8
BH127-22	1.7	1.8
BH128-22	1.5	1.8
BH129-22	Dry	Remained Open
BH130-22	1.5	2.0
BH131-22	1.5	Remained Open
BH132-22	1.2	Remained Open
BH133-22	2.1	Remained Open
BH134-22	1.5	0.6

Groundwater levels may fluctuate seasonally, depending on the amount of precipitation and surface runoff.



4.0 Discussion and Recommendations

The following discussion and recommendations are based on the factual data obtained from this investigation and are intended for use by the owner and the design engineer. Contractors bidding or providing services on this project should review the factual data and determine their own conclusions regarding the construction methods and scheduling.

This report is based on the assumption that the design features relevant to the geotechnical analysis will be completed in accordance with applicable codes, standards, and guidelines of practice. If there are changes to the site development features, or there is any significant variations in the subsurface conditions that are found before or during construction, Cambium should be retained to review the implications of these changes with respect to the contents of this report.

It is understood that the proposed watermain is to be installed between County Road 40 and Tate Road, south of Telephone Road. The proposed corridor runs in the east-west direction. A dirt road has been constructed in the approximate area of boreholes BH122-22 through BH125-22, the remaining length of this section of the watermain installation is undeveloped land.

It should be noted that there is a gap in the borehole coverage data between boreholes BH125-22 and BH126-22 that measures a length of approximately 550 meters. This gap is due to access constraints at the time of drilling; clear cutting of the area was not possible at the time of investigation. The subsurface conditions in this area are likely similar to the adjacent boreholes, and therefore additional test holes will likely not be required. However, it is recommended that geotechnical subgrade inspections are carried out in greater frequency in this area and that contingencies are taken by the contractor for additional sub excavation if required.

4.1 Excavations

Excavation of the proposed watermain will extend through the fill material, native sands, gravel and clay. Temporary excavations must be carried out in accordance with the latest edition of



the Occupational Health and Safety Act (OHSA), Ontario Regulation 213/91 (as amended). For practical purposes, the overburden soils at the site above the water table can be considered to be Type 3 soils, as such excavation side slopes should be no steeper than 1H:1V. Any excavations that are carried out through the non-cohesive deposits below the water table should be considered as Type 4 soils, and excavation side slopes should be flattened to 3H:1V. Minimum support system requirements (shoring) for steeper excavations are stipulated in Sections 235 through 238 of the Occupational Health and Safety Act (OHSA), Construction Projects, Part III.

Excavation side slopes should be protected from exposure to precipitation and associated ground surface runoff and should be inspected regularly for signs of instability. If localized instability is noted during excavation or if wet conditions are encountered, the side slopes should be flattened as required to maintain safe working conditions or the excavation sidewalls must be fully supported (shored).

4.2 Groundwater Control

Stabilized groundwater measurements were not taken as part of this investigation; rather, observations were made in the open boreholes immediately following drilling field work. Groundwater ranged between 0.8 and 2.1 mbgs, and standing water was observed near some borehole locations. Perched water should also be anticipated from within sandy deposits overlying clay deposits. It may be necessary to complete excavation work during the drier season in order to avoid large scale site dewatering.

Based on the anticipated invert elevations, it is expected that the groundwater will be encountered during excavation. It may be necessary to temporarily lower the groundwater in advance of the excavation. Pumping from wells, well points, and/or sumps to achieve groundwater lowering is considered appropriate. Pumping should be taken from each side of opened excavation.

If flows from pumps exceed 50,000 L/day but is less than 400,000 L/day, an Environmental Activity and Sector Registry (EASR) will be required. It is recommended that an EASR posting should be obtained in advance of construction to avoid possible delays. If water takings



exceed more than 400,000 L/day, the project will require a Permit to Take Water (PTTW) issued by MECP. If it is identified that a EASR or PTTW is required for the Site, a hydrogeological report will need to be submitted in support of the application. It is recommended that construction is staged to maintain flows from pumps to below 50,000 L/day.

4.3 Pipe Bedding

The bedding requirements for the proposed watermain should be in accordance with OPSD 0802.0310 for rigid pipes in overburden (Type 3) excavations. The pipe bedding material should consist of at least 150 mm of a Class B bedding such as that meeting OPSS.MUNI 1010 Granular A.

In areas where the subgrade becomes disturbed due to construction activities, the unsuitable/disturbed material should be removed and replaced with a sub-bedding layer of compacted granular material, such as that meeting OPSS.MUNI 1010 Granular B Type II. To provide adequate support for the pipe in areas where sub excavation of material is required below design subgrade level, the excavations should be sized to allow a 1H:2V spread of granular material down and out from the bottom of the pipe.

Cover material, from pipe spring line to at least 300 mm above the top of the pipe, should consist of OPSS.MUNI 1010 Granular A.

The use of clear crushed stone as bedding or sub-bedding material should not be permitted.

The sub-bedding, bedding and cover materials should be compacted in maximum 200 mm thick lifts to at least 98 % of the Standard Proctor Dry Density (SPMDD) value.

4.4 Trench Backfill

In general, excavated soils encountered at both sites may be re-used as backfill provided the moisture content of these materials is within 2% of optimum to ensure adequate compaction, the trenches are wide enough to accommodate large compaction equipment, and the soil is free of any organic and/or deleterious material. Soils with elevated moisture could be put aside to dry, tilled to reduce the moisture content so that they can be effectively compacted, or could



be mixed with dryer material. Alternatively, materials of higher moisture content could be wasted and replaced with imported material which can be readily compacted.

The backfill should consist of clean earth fill and should be placed in lifts of 300 mm thickness or less and compacted to a minimum 95% of SPMMD at water content within 2% of optimum. Existing earth fill and native soils will be difficult to place and compact successfully in narrow trench excavations, where large compaction equipment could not operate. For narrow trench excavations, it is recommended that free draining granular material, such as OPSS.MUNI 1010 Granular B Type I or II be used in order to allow for adequate compaction using walk behind vibratory equipment. The placement and inspection of any earth fill as backfill must be conducted under the full-time observation of Cambium.



5.0 Limitations

5.1 Design Review and Inspections

Cambium should be contacted to review and approve design drawings, prior to tendering or commencing construction, to ensure that all pertinent geotechnical-related factors have been addressed. It is important that onsite geotechnical supervision be provided at this site for excavation and backfill procedures, deleterious soil removal, subgrade inspections and compaction testing.

5.2 Winter Construction

In order to carry out the work during freezing temperatures and maintain adequate performance of the trench backfill as a roadway subgrade, the service trench should be opened for as short a time as practicable and the excavations should be carried out only in lengths which allow all of the construction operations, including backfilling, to be fully completed in one working day. The materials on the sides of the trench should not be allowed to freeze. In addition, the backfill should be excavated, stored and replaced without being disturbed by frost or contaminated by snow or ice.

5.3 Changes in Site and Project Scope

This geotechnical engineering report is intended for planning and design purposes only.

Subsurface conditions can be altered by the passage of sufficient time, natural occurrences, and human intervention.

The design parameters provided, and the engineering advice offered in this report are intended for use by the owner and its retained design consultants. If there are changes to the project scope and development features, these interpretations made of the subsurface information, for geotechnical design parameters, advice, and comments relating to constructability issues and quality control may not be complete for the project. Cambium should be retained to conduct further review to interpret the implications of such changes with respect to this report.



6.0 Closing

We trust that the information contained in this report meets your current requirements. If you have questions or comments regarding this document, please do not hesitate to contact the undersigned reviewer at (705) 719-0700.

Respectfully submitted,

Cambium Inc.

Mackenzie Garrison, M.Eng., P.Eng.
Project Manager – Geotechnical Engineering

Stuart Baird, M.Eng., P.Eng.
Director – Building Sciences, Geotechnical
and Construction Quality Verifications

MG/seb

P:\13300 to 13399\13324-051 CoQW - GEO - Quinte West Watermain Extension - Wooler Road to Tate Road\Deliverables\REPORT - GEO\Final\2023-01-06 RPT GEO - QW Watermain Extension East West Crossing.docx



7.0 Standard Limitations

Limited Warranty

In performing work on behalf of a client, Cambium relies on its client to provide instructions on the scope of its retainer and, on that basis, Cambium determines the precise nature of the work to be performed. Cambium undertakes all work in accordance with applicable accepted industry practices and standards. Unless required under local laws, other than as expressly stated herein, no other warranties or conditions, either expressed or implied, are made regarding the services, work or reports provided.

Reliance on Materials and Information

The findings and results presented in reports prepared by Cambium are based on the materials and information provided by the client to Cambium and on the facts, conditions and circumstances encountered by Cambium during the performance of the work requested by the client. In formulating its findings and results into a report, Cambium assumes that the information and materials provided by the client or obtained by Cambium from the client or otherwise are factual, accurate and represent a true depiction of the circumstances that exist. Cambium relies on its client to inform Cambium if there are changes to any such information and materials. Cambium does not review, analyze or attempt to verify the accuracy or completeness of the information or materials provided, or circumstances encountered, other than in accordance with applicable accepted industry practice. Cambium will not be responsible for matters arising from incomplete, incorrect or misleading information or from facts or circumstances that are not fully disclosed to or that are concealed from Cambium during the provision of services, work or reports.

Facts, conditions, information and circumstances may vary with time and locations and Cambium's work is based on a review of such matters as they existed at the particular time and location indicated in its reports. No assurance is made by Cambium that the facts, conditions, information, circumstances or any underlying assumptions made by Cambium in connection with the work performed will not change after the work is completed and a report is submitted. If any such changes occur or additional information is obtained, Cambium should be advised and requested to consider if the changes or additional information affect its findings or results.

When preparing reports, Cambium considers applicable legislation, regulations, governmental guidelines and policies to the extent they are within its knowledge, but Cambium is not qualified to advise with respect to legal matters. The presentation of information regarding applicable legislation, regulations, governmental guidelines and policies is for information only and is not intended to and should not be interpreted as constituting a legal opinion concerning the work completed or conditions outlined in a report. All legal matters should be reviewed and considered by an appropriately qualified legal practitioner.

Site Assessments

A site assessment is created using data and information collected during the investigation of a site and based on conditions encountered at the time and particular locations at which fieldwork is conducted. The information, sample results and data collected represent the conditions only at the specific times at which and at those specific locations from which the information, samples and data were obtained and the information, sample results and data may vary at other locations and times. To the extent that Cambium's work or report considers any locations or times other than those from which information, sample results and data was specifically received, the work or report is based on a reasonable extrapolation from such information, sample results and data but the actual conditions encountered may vary from those extrapolations.

Only conditions at the site and locations chosen for study by the client are evaluated; no adjacent or other properties are evaluated unless specifically requested by the client. Any physical or other aspects of the site chosen for study by the client, or any other matter not specifically addressed in a report prepared by Cambium, are beyond the scope of the work performed by Cambium and such matters have not been investigated or addressed.

Reliance

Cambium's services, work and reports may be relied on by the client and its corporate directors and officers, employees, and professional advisors. Cambium is not responsible for the use of its work or reports by any other party, or for the reliance on, or for any decision which is made by any party using the services or work performed by or a report prepared by Cambium without Cambium's express written consent. Any party that relies on services or work performed by Cambium or a report prepared by Cambium without Cambium's express written consent, does so at its own risk. No report of Cambium may be disclosed or referred to in any public document without Cambium's express prior written consent. Cambium specifically disclaims any liability or responsibility to any such party for any loss, damage, expense, fine, penalty or other such thing which may arise or result from the use of any information, recommendation or other matter arising from the services, work or reports provided by Cambium.

Limitation of Liability

Potential liability to the client arising out of the report is limited to the amount of Cambium's professional liability insurance coverage. Cambium shall only be liable for direct damages to the extent caused by Cambium's negligence and/or breach of contract. Cambium shall not be liable for consequential damages.

Personal Liability

The client expressly agrees that Cambium employees shall have no personal liability to the client with respect to a claim, whether in contract, tort and/or other cause of action in law. Furthermore, the client agrees that it will bring no proceedings nor take any action in any court of law against Cambium employees in their personal capacity.



Figures

**GEOTECHNICAL
INVESTIGATION**
CITY OF QUINTE WEST
Wooler Road to Tate Road
Quinte West, Ontario

LEGEND

- Highway
- Major Road
- Railroad
- Watercourse
- Water Area
- Provincial Park
- Wooded Area
- Built Up Area

Notes:
• Base mapping features are © Queen's Printer of Ontario, 2019 (this does not constitute an endorsement by the Ministry of Natural Resources or the Ontario Government).
• All distances are in metres and can be converted to feet by multiplying by 3.28.
• Cambium Inc. makes every effort to ensure this map is free from errors but cannot be held responsible for any damages due to error or omissions. This map should not be used for navigation or legal purposes. It is intended for general reference use only.

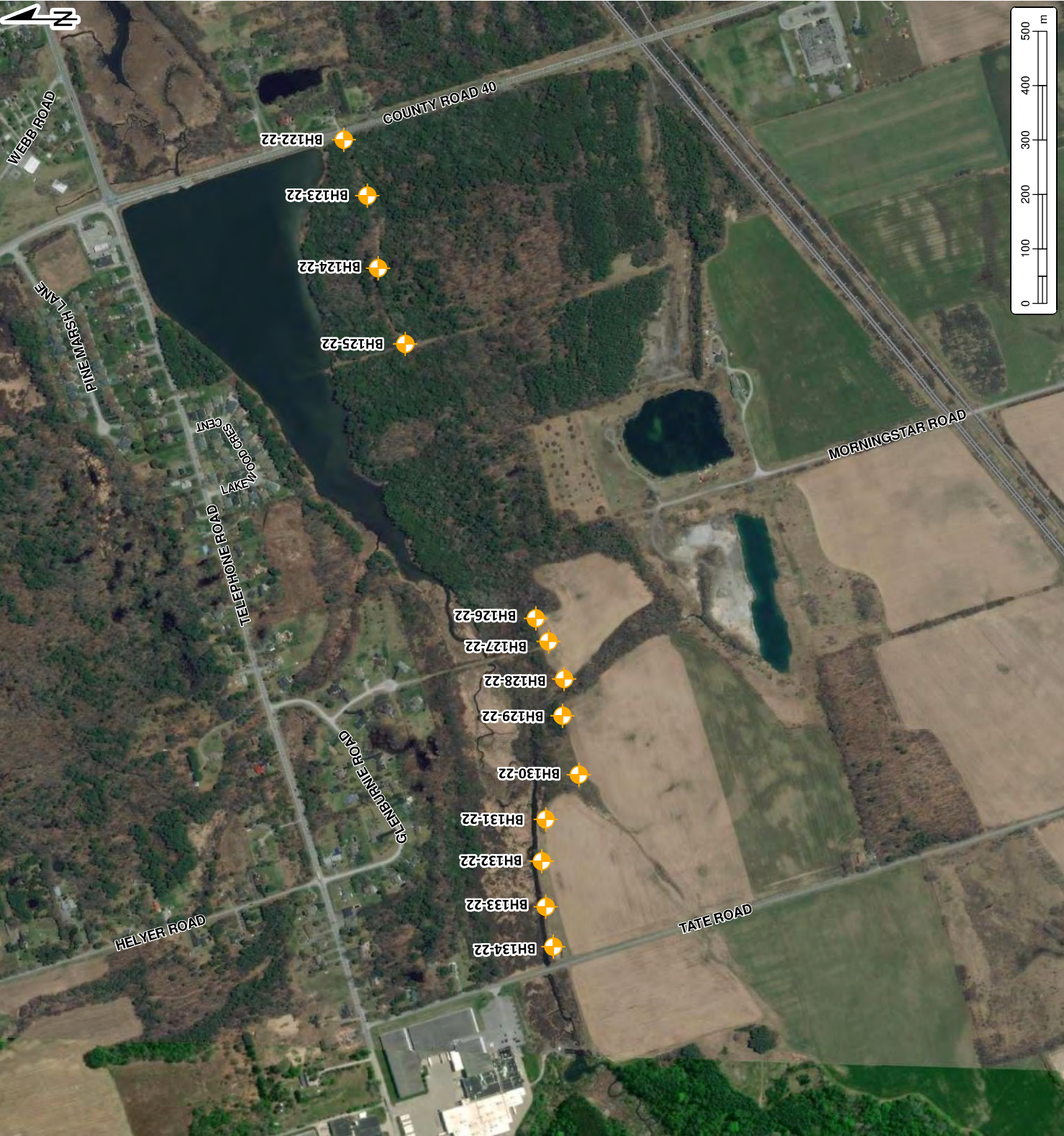


194 Sophia Street
Peterborough, Ontario, K9H 1E5
Tel: (705) 742-7900 Fax: (705) 742-7907
www.cambium-inc.com

SITE LOCATION MAP

Project No.:	Date:	May 2022
Rev.:	13324-051	
Scale:	Projection:	NAD 1983 UTM Zone 18N
1:200,000	Checked by:	TLC
Created by:	MG	Figure: 1





**GEOTECHNICAL
INVESTIGATION**
CITY OF QUINTE WEST
Wooler Road to Tate Road
Quinte West, Ontario

LEGEND

- Borehole
- Railroad

Notes:

- Base mapping features are © Queen's Printer of Ontario, 2019 (this does not constitute an endorsement by the Ministry of Natural Resources or the Ontario Government).
- Distances shown on this plan are in metres and can be converted to feet by multiplying by 3.28.
- Cambium Inc. makes every effort to ensure this map is free from errors but cannot be held responsible for any damages due to error or omissions. This map should not be used for navigation or legal purposes. It is intended for general reference use only.



194 Sophia Street
Peterborough, Ontario, K9H 1E5
Tel: (705) 742.7900 Fax: (705) 742.7907
www.cambium-inc.com

BOREHOLE LOCATION PLAN

Project No.:	13324-051	Date:	May 2022
Scale:	1:10,000	Projection:	NAD 1983 UTM Zone 18N
Created by:	TLC	Checked by:	MG
		Figure:	2



Appendix A

Borehole Logs



**Peterborough
Barrie
Oshawa
Kingston**
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH122-22
Page 1 of 1

Client: City of Quinte West **Project Name:** CoQW WM Extension - East West Crossing **Project No.:** 13324-051
Contractor: Canadian Environmental Drillers **Method:** Track Mounted Solid Stem Auger **Date Completed:** April 25, 2022
Location: Wooler Road to Tate Road, Quinte West, ON **UTM:** 18T N: 4886779.2 E: 290401.8 **Elevation:** 92 mASL

SUBSURFACE PROFILE				SAMPLE												
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT				Well Installation	Log Notes
								25	50	75	20	40	60	80		
92	0		(GP) sandy GRAVEL: greyish brown, moist, compact, trace silt	1	SS	67	17	3.9%				17				2.9m: Borehole terminated. Caving observed at 2.0 mbgs. Groundwater encountered at 0.75 mbgs. Standing water observed at 1.7 mbgs.
91.5	0.5															
91	1		(SP) gravelly SAND: brown, moist, compact, trace silt	2	SS	50	15	10.7%				15				
90.5	1.5															
			(CL) SILTY CLAY: grey, moist, stiff, trace gravel	3	SS	100	12	25.3%				12				
90	2															
89.5	2.5		Becomes Firm	4	SS	92	6	25.7%				6				
89	3		Borehole Terminated @ 2.9m Due to Target Depth Reached.													
88.5	3.5															
88	4															

GRAINSIZE DISTRIBUTION

SAMPLEGRAVELSANDSILTCLAY

2.9m: Borehole terminated. Caving observed at 2.0 mbgs. Groundwater encountered at 0.75 mbgs. Standing water observed at 1.7 mbgs.

GRAINSIZE DISTRIBUTION
SAMPLE GRAVEL SAND SILT CLAY

1m = 45 units
Logged By: JN

Input By: FI



Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH123-22
Page 1 of 1

Client: City of Quinte West Project Name: CoQW WM Extension - East West Crossing Project No.: 13324-051
Contractor: Canadian Environmental Drillers Method: Track Mounted Solid Stem Auger Date Completed: April 25, 2022
Location: Wooler Road to Tate Road, Quinte West, ON UTM: 18T N: 4886736 E: 290299 Elevation: 97 mASL

SUBSURFACE PROFILE				SAMPLE												
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT		Well Installation	Log Notes		
								25	50	75	20	40	60	80		
97.0	0		(SM) SILTY SAND: [TOPSOIL], dark brown, moist, loose, some organics	96.9	1A	SS	63	8	22.7%							
			96.8	1B	SS	4.1%										
			(GP) sandy GRAVEL: grey, moist, loose								8					
			(SM) SILTY SAND: light to dark brown, moist, loose	1C	SS				13.6%							
96.5	0.5															
96.0	1			2	SS	83	9		22.5%		9					
95.5	1.5		Becomes Compact													
				3A	SS	67	11		18.1%							
				3B	SS										16.5%	11
				3C	SS										17.3%	
95.0	2		(CL) SILTY CLAY: light grey to brown, wet, stiff													
				Becomes Firm												
				- decrease in silt content, becomes grey	4A	SS			22.9%							
94.5	2.5			4B	SS	92	5		28.5%		5					
94.0	3															
			Borehole Terminated @ 3m Due to Target Depth Reached.													
93.5	3.5															
93.0	4															

GRAINSIZE DISTRIBUTION

SAMPLE	GRAVEL	SAND	SILT	CLAY
1.80	0	79	21	

2.9m: Borehole terminated. Caving not observed. Groundwater encountered at 1.7 mbgs. Standing water observed at 0.15 mbgs.

2.9m: Borehole terminated, Caving not observed. Groundwater encountered at 1.7 mbgs. Standing water observed at 0.15 mbgs.

GRAINSIZE DISTRIBUTION: SAMPLE GRAVEL SAND SILT CLAY
1.80 0 79 21

1m = 45 units
Logged By: AF



Input By: FI



Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH124-22
Page 1 of 1

Client: City of Quinte West Project Name: CoQW WM Extension - East West Crossing Project No.: 13324-051
Contractor: Canadian Environmental Drillers Method: Track Mounted Solid Stem Auger Date Completed: April 25, 2022
Location: Wooler Road to Tate Road, Quinte West, ON UTM: 18T N: 4886716 E: 290166 Elevation: 100 m Rel.

SUBSURFACE PROFILE				SAMPLE												
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT				Well Installation	Log Notes
								25	50	75	20	40	60	80		
100	0		(GP) sandy GRAVEL: grey, moist, compact 99.87	1A	SS											2.9m: Borehole terminated, Caving, groundwater, and standing water not observed.
			(SM) SILTY SAND: light brown to brown, moist, compact	1B	SS	54	10								10	
99.5	0.5															
99	1			2	SS	46	12								12	
98.5	1.5															
			Becomes Loose	3	SS	50	8								8	
98	2															
			Becomes Compact													
			97.59	4A	SS											
97.5	2.5		(CL) CLAY: grey, moist, stiff, trace silt													
				4B	SS	50	10								10	
			97.1													
97	3		Borehole Terminated @ 2.9m Due to Target Depth Reached.													
96.5	3.5															
96	4															

GRAINSIZE DISTRIBUTION

SAMPLEGRAVELSANDSILTCLAY

2.9m: Borehole terminated. Caving, groundwater, and standing water not observed.

GRAINSIZE DISTRIBUTION SAMPLE GRAVEL SAND SILT CLAY

1m = 45 units
Logged By: AF


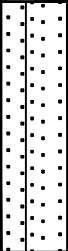

Input By: FI



**Peterborough
Barrie
Oshawa
Kingston**
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH125-22
Page 1 of 1

Client: City of Quinte West **Project Name:** CoQW WM Extension - East West Crossing **Project No.:** 13324-051
Contractor: Canadian Environmental Drillers **Method:** Track Mounted Solid Stem Auger **Date Completed:** April 25, 2022
Location: Wooler Road to Tate Road, Quinte West, ON **UTM:** 18T N: 4886666 E: 290027 **Elevation:** 95 mASL

SUBSURFACE PROFILE			SAMPLE												
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT		Well Installation	Log Notes	
								25	50	75	20	40	60	80	
95	0		(SM) SILTY SAND: [TOPSOIL], dark brown, moist, loose, trace gravel, some organics	94.92	1A	SS									
			(GP) sandy GRAVEL: greyish black to brown, moist, loose		1B	SS	46	7							
94.5	0.5														
				94.24											
			(SP-SM) SAND with SILT: brown, wet, loose, trace fine gravel												
94	1			2	SS	63	7								
93.5	1.5														
			(CL) SILTY CLAY: brown, moist, firm	93.4	3A	SS									
				3B	SS	63	4								
93	2														
92.5	2.5				4A	SS									
				- becomes grey, stiff, decrease in silt content			92	4							
					4B	SS									
92	3														
				91.95											
		Borehole Terminated @ 3m Due to Target Depth Reached.													
91.5	3.5														
91	4														

GRAINSIZE DISTRIBUTION

SAMPLE	GRAVEL	SAND	SILT	CLAY
1.10	1	88	11	

2.9m: Borehole terminated. Caving not observed. Groundwater encountered at 0.76 mbgs. Standing water observed at 0.6 mbgs.

3m: Shear Vane test initiated. Peak = 66 kPa, Residual = 21 kPa.

2.9m: Borehole terminated. Caving not observed. Groundwater encountered at 0.76 mbgs. Standing water observed at 0.6 mbgs.

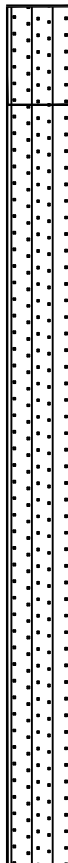
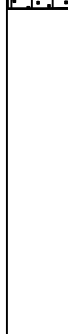
3m: Shear Vane test initiated. Peak = 66 kPa, Residual = 21 kPa.

GRAINSIZE	SAMPLE	GRAVEL	SAND	SILT	CLAY
DISTRIBUTION	1.10	1	88	11	

1m = 45 units
Logged By: AF

Input By: FI

Client:	City of Quinte West	Project Name:	CoQW WM Extension - East West Crossing			Project No.:	13324-051
Contractor:	Canadian Environmental Drillers	Method:	Track Mounted Solid Stem Auger			Date Completed:	April 25, 2022
Location:	Wooler Road to Tate Road, Quinte West, ON	UTM:	18T	N: 4886426	E: 289523	Elevation:	100 mASL

SUBSURFACE PROFILE				SAMPLE											
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT			Well Installation	Log Notes
								25	50	75	20	40	60	80	
100	0		(SM) SILTY SAND: [TOPSOIL], dark brown, moist, very loose, some organics	1A	SS	67	1	● 20%							2.9m: Borehole terminated. Caving observed at 1.8 mbgs, groundwater encountered at 1.5 mbgs, standing water observed at 0.3 mbgs.
	99.67											● 1			
99.5	0.5		(SM) SILTY SAND: light grey to brown, moist, very loose, trace clay	1B	SS			● 18.5%							
99	1		Becomes Compact, increase in Clay content	2	SS	67	14	● 13.1%			● 14				
98.5	1.5		Decrease in Clay Content	3	SS	83	14	● 19%			● 14				
98	2														
97.5	2.5	Becomes Grey, Loose	4	SS	58	9	● 18.5%			● 9					
		97.1													
97	3		Borehole Terminated @ 2.9m Due to Target Depth Reached.												
96.5	3.5														
96	4														

GRAINSIZE

SAMPLE

GRAVEL

SAND

SILT

CLAY

DISTRIBUTION

1m = 45 units
Logged By: AF

Input By: FI



Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH127-22
Page 1 of 1

Client: City of Quinte West Project Name: CoQW WM Extension - East West Crossing Project No.: 13324-051
Contractor: Canadian Environmental Drillers Method: Track Mounted Solid Stem Auger Date Completed: April 26, 2022
Location: Wooler Road to Tate Road, Quinte West, ON UTM: 18T N: 4886403 E: 289481 Elevation: 99 mASL

SUBSURFACE PROFILE			SAMPLE															
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT			Well Installation	Log Notes			
								25	50	75	20	40	60	80				
99	0		(SM) SILTY SAND: [TOPSOIL], dark brown, moist, loose, some organics	1A	SS	75	6	18.9%										
	98.7											6						
98.5	0.5			(ML) sandy SILT: light brown to grey, moist, firm, trace gravel	1B	SS			18%									
			98.24															
98	1		(SM) SILTY SAND: greyish brown, moist, compact, trace clay	2	SS	67	11	21.7%										
97.5	1.5																	
				3	SS	71	17	18.3%										
97	2																	
96.5	2.5		Becomes Loose, increase in moisture content	4	SS	67	6	18.8%										
			96.1															
96	3		Borehole Terminated @ 2.9m Due to Target Depth Reached.															
95.5	3.5																	
95	4																	
GRAINSIZE DISTRIBUTION															SAMPLE GRAVEL SAND SILT CLAY			
															0.30 3 32 65			

2.9m: Borehole terminated, Caving observed at 1.7 mbgs, groundwater encountered at 1.8 mbgs, standing water observed at surface of open borehole.

1m = 45 units
Logged By: AF

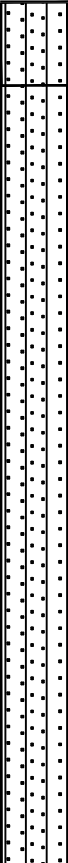
Input By: FI



**Peterborough
Barrie
Oshawa
Kingston**
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH128-22
Page 1 of 1

Client: City of Quinte West **Project Name:** CoQW WM Extension - East West Crossing **Project No.:** 13324-051
Contractor: Canadian Environmental Drillers **Method:** Track Mounted Solid Stem Auger **Date Completed:** April 26, 2022
Location: Wooler Road to Tate Road, Quinte West, ON **UTM:** 18T **N:** 4886374 **E:** 289412 **Elevation:** 99 mASL

SUBSURFACE PROFILE				SAMPLE													
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT				Well Installation	Log Notes	
								25	50	75	20	40	60	80			
99	0		(SM) SILTY SAND: [TOPSOIL], dark brown, moist, very loose, some organics, trace gravel	1A	SS			17.7%								2.9m: Borehole terminated, Caving observed at 1.8 mbgs, groundwater encountered at 1.5 mbgs, standing water observed at 1.5 mbgs.	
			98.72			75	3										
			(SM) SILTY SAND: light brown, moist, very loose, trace clay, trace gravel	1B	SS			16.4%									3
98.5	0.5																
			Becomes Compact, increase in Gravel content														
				2A	SS			10.2%									
98	1			Becomes Grey, increase in Clay content	2B	SS	75	13	19.1%								13
97.5	1.5			Becomes Loose	3	SS	67	8	18.8%								8
97	2																
				Becomes Compact	4	SS	0	10	%								10
96.5	2.5		96.1														
96	3		Borehole Terminated @ 2.9m Due to Target Depth Reached.														
95.5	3.5																
95	4																

GRAINSIZE DISTRIBUTION

SAMPLEGRAVELSANDSILTCLAY

2.9m: Borehole terminated, Caving observed at 1.8 mbgs, groundwater encountered at 1.5 mbgs, standing water observed at 1.5 mbgs.

GRAINSIZE DISTRIBUTION [SAMPLE] GRAVEL SAND SILT CLAY

1m = 45 units
Logged By: AF

Input By: FI



Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH129-22
Page 1 of 1

Client: City of Quinte West Project Name: CoQW WM Extension - East West Crossing Project No.: 13324-051
Contractor: Canadian Environmental Drillers Method: Track Mounted Solid Stem Auger Date Completed: April 26, 2022
Location: Wooler Road to Tate Road, Quinte West, ON UTM: 18T N: 4886377 E: 289344 Elevation: 95 mASL

SUBSURFACE PROFILE				SAMPLE										
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT		Well Installation	Log Notes
								25	50	75	20	40	60	80
95	0		(SM) SILTY SAND: [TOPSOIL], dark brown, moist, very loose, some organics, trace fine gravel	1A	SS	75	3	17.2%						
			94.67									3		
94.5	0.5		(SM) SILTY SAND: brown, moist, very loose, trace clay	1B	SS			16.6%						
			Becomes Light Brown to Light Grey, Loose											
94	1			2	SS	100	7	33.5%			7			
93.5	1.5		(ML) SILT: light grey, moist, firm, some clay to clayey, trace sand											
				93.48										
93	2			3	SS	100	6	39%			6			2.3m: Shear Vane test initiated, Peak: 45 kPa, Residual: 15 kPa
92.5	2.5			4	SS	100	6	29.4%			6			2.9m: Borehole terminated. Caving, groundwater, standing water not observed.
92	3		Borehole Terminated @ 2.9m Due to Target Depth Reached.											
91.5	3.5													
91	4													
GRAINSIZE DISTRIBUTION														
SAMPLE GRAVEL SAND SILT CLAY														
1.80 0 2 98														

2.3m: Shear Vane test initiated, Peak: 45 kPa, Residual: 15 kPa

2.9m: Borehole terminated. Caving, groundwater, standing water not observed.

1m = 45 units
Logged By: AF

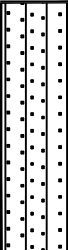
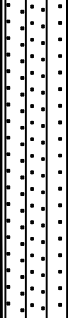

Input By: FI



Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH130-22
Page 1 of 1

Client: City of Quinte West Project Name: CoQW WM Extension - East West Crossing Project No.: 13324-051
Contractor: Canadian Environmental Drillers Method: Track Mounted Solid Stem Auger Date Completed: April 26, 2022
Location: Wooler Road to Tate Road, Quinte West, ON UTM: 18T N: 4886347 E: 289256 Elevation: 95 mASL

SUBSURFACE PROFILE			SAMPLE							Well Installation	Log Notes		
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture				SPT (N) / DCPT	
								25	50				75
95	0		(SM) SILTY SAND: [TOPSOIL], dark brown to black, moist, loose, some organics, trace fine gravel	1	SS	50	4	15.2%				4	
94.5	0.5												
				94.24									
94	1		(SM) SILTY SAND: brown, moist, loose, trace clay	2A	SS			24.4%				5	
				- layer of increased silt content			100	5					
					2B	SS			29.2%				
93.5	1.5												
				3A	SS			26%					
			93.25										
93	2		(CL) CLAY: light grey, moist, stiff, some sand, trace silt, trace gravel	3B	SS	100	3	35%				3	
92.5	2.5		Increase in Gravel content	4	SS	83	3	38.5%				3	
			92.1										
92	3		Borehole Terminated @ 2.9m Due to Target Depth Reached.										
91.5	3.5												

GRAINSIZE DISTRIBUTION

SAMPLE GRAVEL SAND SILT CLAY

2.3m: Shear Vane test initiated, Peak: 38 kPa, Residual: 25 kPa

2.9m: Borehole terminated, Caving observed at 2.0 mbgs, groundwater encountered at 1.5 mbgs, standing water observed at 1.5 mbgs.

2.3m: Shear Vane test initiated, Peak: 38 kPa, Residual: 25 kPa

2.9m: Borehole terminated, Caving observed at 2.0 mbgs, groundwater encountered at 1.5 mbgs, standing water observed at 1.5 mbgs.

Logged By: AF

Input By: FI



Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH131-22
Page 1 of 1

Client: City of Quinte West Project Name: CoQW WM Extension - East West Crossing Project No.: 13324-051
Contractor: Canadian Environmental Drillers Method: Track Mounted Solid Stem Auger Date Completed: April 26, 2022
Location: Wooler Road to Tate Road, Quinte West, ON UTM: 18T N: 4886408 E: 289154 Elevation: 92 mASL

SUBSURFACE PROFILE			SAMPLE							Well Installation	Log Notes		
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture				SPT (N) / DCPT	
								25	50				75
92.0	0		(SM) SILTY SAND: [TOPSOIL], dark brown to black, moist, very loose, some organics	1	SS	83	4	23.3%			4		
91.5	0.5												
				91.24									
91.0	1		(ML) SILT: brown, moist, loose, some sand, some clay increase in clay content, grey to brown, mottled	2	SS	83	2	30.5%			2		
90.5	1.5												
90.0	2			3	SS	100	9	30%			9		
				89.71									
89.5	2.5		(SM) SILTY SAND: light brown to light grey, wet, compact, trace clay	4	SS	100	10	20.2%			10		
				89.1									
89.0	3		Borehole Terminated @ 2.9m Due to Target Depth Reached.										
88.5	3.5												
88.0	4												

GRAINSIZE DISTRIBUTION

SAMPLE	GRAVEL	SAND	SILT	CLAY
1.10	0	17	83	

2.9m: Borehole terminated. Caving not observed. Groundwater encountered at 1.5 mbgs, standing water observed at 1.5 mbgs.

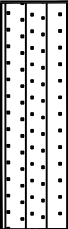
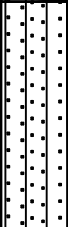



2.9m: Borehole terminated. Caving not observed. Groundwater encountered at 1.5 mbgs, standing water observed at 1.5 mbgs.



**Peterborough
Barrie
Oshawa
Kingston**
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH132-22
Page 1 of 1

Client: City of Quinte West **Project Name:** CoQW WM Extension - East West Crossing **Project No.:** 13324-051
Contractor: Canadian Environmental Drillers **Method:** Track Mounted Solid Stem Auger **Date Completed:** April 26, 2022
Location: Wooler Road to Tate Road, Quinte West, ON **UTM:** 18T N: 4886415 E: 289077 **Elevation:** 92 mASL

SUBSURFACE PROFILE				SAMPLE										
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT		Well Installation	Log Notes
								25	50	75	20	40	60	80
92.0	0		(SM) SILTY SAND: [TOPSOIL], dark brown to black, moist, very loose, some organics	1	SS	42	3	19%			3			
91.5	0.5													
			91.24											
91.0	1		(SM) SILTY SAND: brownish black to orange, mottled, moist, very loose, trace fine gravel, trace clay	2A	SS	100	3	33.8%			3			
						2B	SS			21.1%				
90.5	1.5		Becomes Compact, increase in Clay content	3A	SS	100	18	20.9%			18			
			90.17											
90.0	2		(CL) SILTY CLAY: light grey to grey, moist, very stiff	3B	SS			19%						
89.5	2.5		Becomes Hard	4	SS	83	39	20.4%			39			
			89.1											
89.0	3		Borehole Terminated @ 2.9m Due to Target Depth Reached.											
88.5	3.5													
88.0	4													

GRAINSIZE DISTRIBUTION

SAMPLEGRAVELSANDSILTCLAY

2.9m: Borehole terminated. Caving not observed. Groundwater encountered at 1.2 mbgs, standing water observed at 1.2 mbgs.

2.9m: Borehole terminated. Caving not observed. Groundwater encountered at 1.2 mbgs, standing water observed at 1.2 mbgs.

GRAINSIZE DISTRIBUTION SAMPLE GRAVEL SAND SILT CLAY

1m = 45 units
Logged By: AF



Input By: FI



**Peterborough
Barrie
Oshawa
Kingston**
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH133-22
Page 1 of 1

Client: City of Quinte West **Project Name:** CoQW WM Extension - East West Crossing **Project No.:** 13324-051
Contractor: Canadian Environmental Drillers **Method:** Track Mounted Solid Stem Auger **Date Completed:** April 26, 2022
Location: Wooler Road to Tate Road, Quinte West, ON **UTM:** 18T N: 4886408 E: 288993 **Elevation:** 93 m Rel.

SUBSURFACE PROFILE				SAMPLE										
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT	Well Installation	Log Notes	
								25	50	75	20	40	60	80
93	0		(SM) SILTY SAND: [TOPSOIL], dark brown to black, moist, loose, some organics	92.87	1A	SS								
			(ML) SILT: light brown to grey, moist, firm, some sand, some clay to clayey, trace gravel		1B	SS	67	5						
92.5	0.5													
				Becomes Black to Brown		2A	SS							
						2B	SS							
92	1					2C	SS	83	5					
91.5	1.5		(CL) SILTY CLAY: grey, moist, stiff, trace gravel	91.48										
					3	SS	79	13						
91	2													
90.5	2.5		Decrease in Gravel content		4	SS	63	10						
90	3		Borehole Terminated @ 2.9m Due to Target Depth Reached.	90.1										
89.5	3.5													
89	4													

GRAINSIZE DISTRIBUTION

SAMPLE	GRAVEL	SAND	SILT	CLAY
0.30	5	11	84	

2.9m: Borehole terminated. Caving not observed. Groundwater encountered at 2.1 mbgs, standing water observed at 2.1 mbgs.

2.9m: Borehole terminated. Caving not observed. Groundwater encountered at 2.1 mbgs, standing water observed at 2.1 mbgs.

GRAINSIZE DISTRIBUTION	SAMPLE	GRAVEL	SAND	SILT	CLAY
	0.30	5	11	84	

1m = 45 units
Logged By: AF

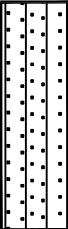
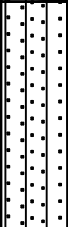

Input By: FI



**Peterborough
Barrie
Oshawa
Kingston**
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH134-22
Page 1 of 1

Client: City of Quinte West **Project Name:** CoQW WM Extension - East West Crossing **Project No.:** 13324-051
Contractor: Canadian Environmental Drillers **Method:** Track Mounted Solid Stem Auger **Date Completed:** April 27, 2022
Location: Wooler Road to Tate Road, Quinte West, ON **UTM:** 18T N: 4886394 E: 288920.2 **Elevation:** 93 mASL

SUBSURFACE PROFILE			SAMPLE													
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)/DCPT	% Moisture			SPT (N) / DCPT				Well Installation	Log Notes
								25	50	75	20	40	60	80		
93	0		(SM) SILTY SAND: [TOPSOIL], dark brown to grey, moist, loose, some organics	1	SS	83	5	22.6%			5					3m: Borehole terminated. Caving observed at 0.6 mbgs, groundwater encountered at 1.5 mbgs, standing water observed at 0.6 mbgs.
92.5	0.5															
			92.24													
92	1		(SM) SILTY SAND: brown to grey, moist, loose, trace clay, trace gravel Becomes Dark Grey, increase in Clay content	2	SS	58	4	30.3%			4					
91.5	1.5															
		91.17	-becomes brownish grey, wet, decrease in silt and clay content	3A	SS			19.6%					14			
						71	14									
91	2		(CL) SILTY CLAY: brownish grey to orange, mottled, moist, stiff	3B	SS			18.6%								
90.5	2.5															
			Becomes Grey, Firm, increase in Gravel content	4	SS	100	5	17.1%			5					
90	3	89.95														
			Borehole Terminated @ 3m Due to Target Depth Reached.													
89.5	3.5															
89	4															

GRAINSIZE DISTRIBUTION

SAMPLEGRAVELSANDSILTCLAY

3m: Borehole terminated, Caving observed at 0.6 mbgs, groundwater encountered at 1.5 mbgs, standing water observed at 0.6 mbgs.

GRAINSIZE DISTRIBUTION SAMPLE GRAVEL SAND SILT CLAY

1m = 45 units

Logged By: NV

Input By: FI



Appendix B

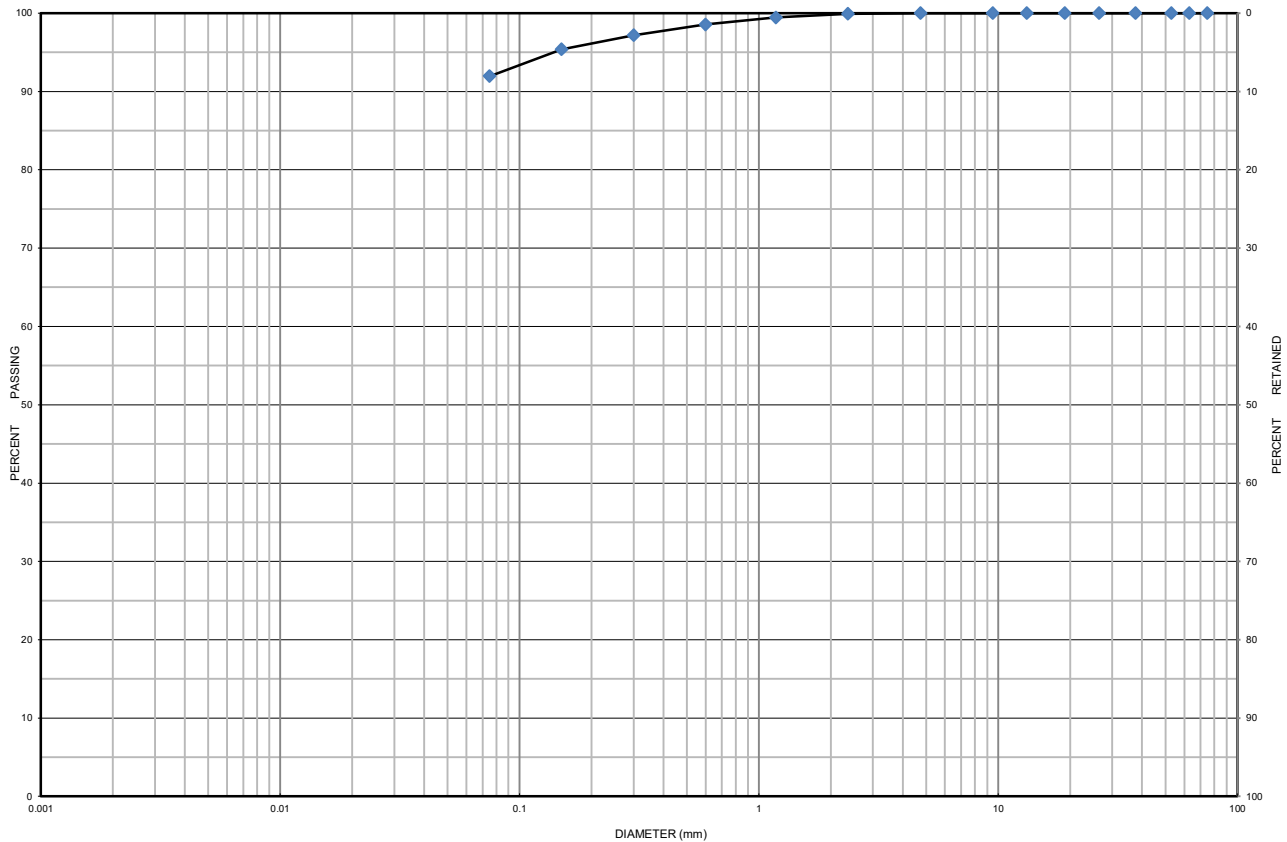
Laboratory Testing Results



Grain Size Distribution Chart

Project Number: 13324-051 **Client:** City of Quinte West
Project Name: GEO - Watermain, Wooler Road to Tate Road, Trenton
Sample Date: April 25 - 29, 2022 **Sampled By:** Nik Valiant - Cambium Inc.
Location: BH 115-22 SS 3 **Depth:** 1.5 m to 2.1 m **Lab Sample No:** S-22-0715

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 115-22	SS 3	1.5 m to 2.1 m	0	8	92		28.7
Description		Classification	D ₆₀	D ₃₀	D ₁₀	C _u	C _c
Silt trace Sand		ML	-	-	-	-	-

Additional information available upon request

Issued By: 
(Senior Project Manager)

Date Issued: May 19, 2022

Cambium Inc. (Laboratory)
866.217.7900 | cambium-inc.com
194 Sophia St. | Peterborough | ON | K9H 1E5

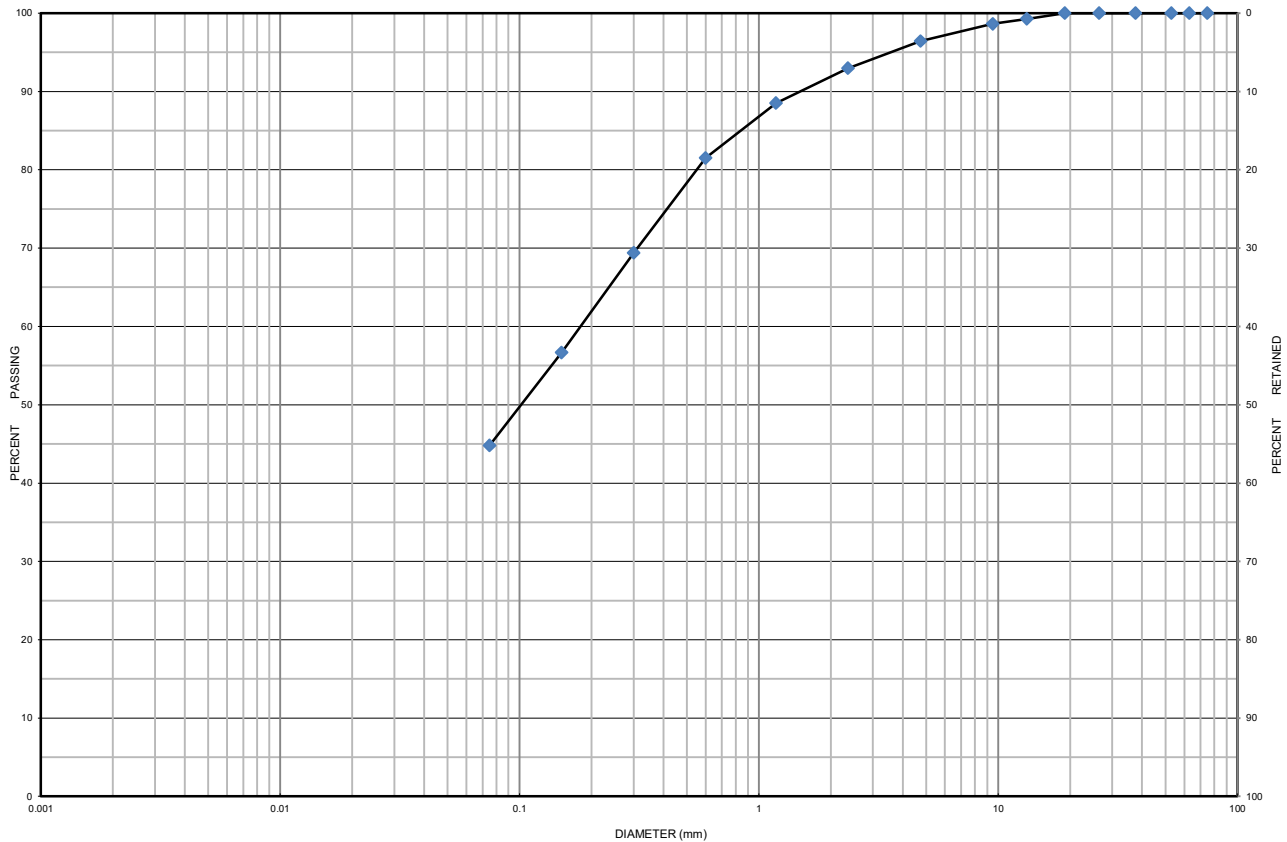
Form: L6V.2 - Grad.Hydo



Grain Size Distribution Chart

Project Number: 13324-051 **Client:** City of Quinte West
Project Name: GEO - Watermain, Wooler Road to Tate Road, Trenton
Sample Date: April 25 29, 2022 **Sampled By:** Nik Valiant - Cambium Inc.
Location: BH 117-22 SS 2 **Depth:** 0.8 m to 1.4 m **Lab Sample No:** S-22-0716

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 117-22	SS 2	0.8 m to 1.4 m	4	52	44		15.3
Description		Classification	D ₆₀	D ₃₀	D ₁₀	C _u	C _c
Sand and Silt trace Gravel		SM	0.180	-	-	-	-

Additional information available upon request

Issued By: 
(Senior Project Manager)

Date Issued: May 19, 2022

Cambium Inc. (Laboratory)
866.217.7900 | cambium-inc.com
194 Sophia St. | Peterborough | ON | K9H 1E5

Form: L6V.2 - Grad.Hydo

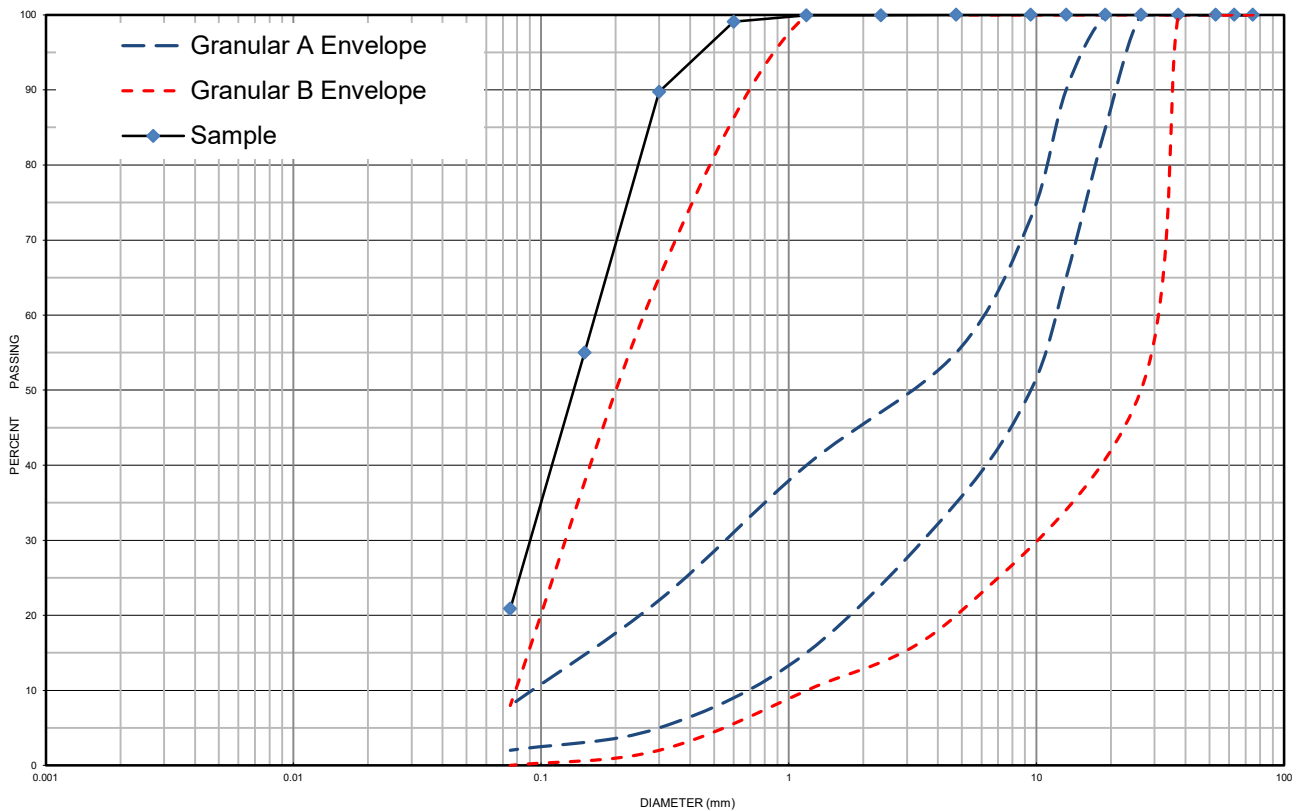


Grain Size Distribution Chart

Project Number: 13324-051 **Client:** City of Quinte West
Project Name: GEO - Watermain, Wooler Road to Tate Road, Trenton
Sample Date: April 25 - 29, 2022 **Sampled By:** Nik Valiant - Cambium Inc.
Location: BH 123-22 SS 3A **Depth:** 1.5 m to 2.1 m **Lab Sample No:** S-22-0717

UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE




MIT SOIL CLASSIFICATION SYSTEM

MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 123-22	SS 3A	1.5 m to 2.1 m	0	79	21		18.1
Description		Classification	D ₆₀	D ₃₀	D ₁₀	C _u	C _c
Silty Sand		SM	0.165	0.090	-	-	-

Additional information available upon request

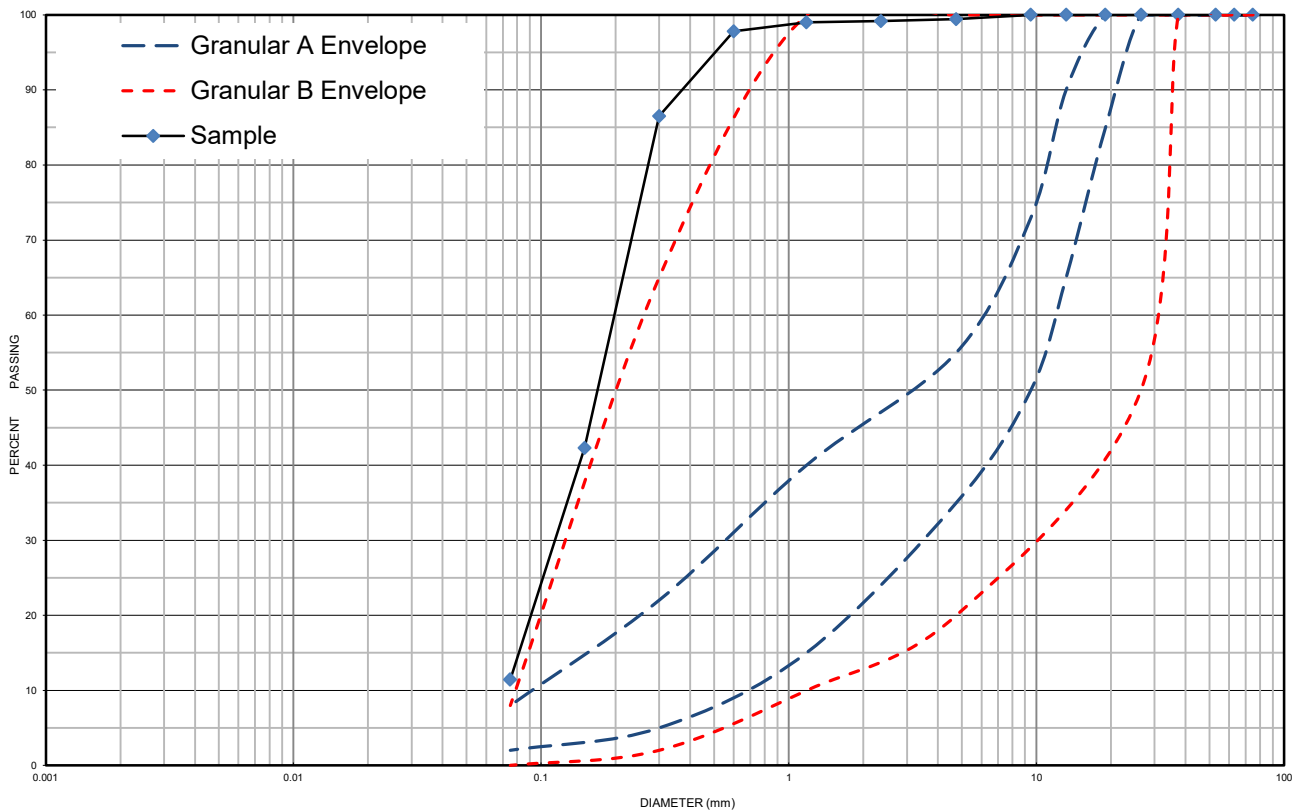
Issued By:  **Date Issued:** August 8, 2022
(Senior Project Manager)



Grain Size Distribution Chart

Project Number: 13324-051 **Client:** City of Quinte West
Project Name: GEO - Watermain, Wooler Road to Tate Road, Trenton
Sample Date: April 25 - 29, 2022 **Sampled By:** Nik Valiant - Cambium Inc.
Location: BH 125-22 SS 2 **Depth:** 0.8 m to 1.4 m **Lab Sample No:** S-22-0718

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 125-22	SS 2	0.8 m to 1.4 m	1	88	11		18.6
Description		Classification	D ₆₀	D ₃₀	D ₁₀	C _u	C _c
Sand some Silt trace Gravel		SP	0.195	0.120	-	-	-

Additional information available upon request

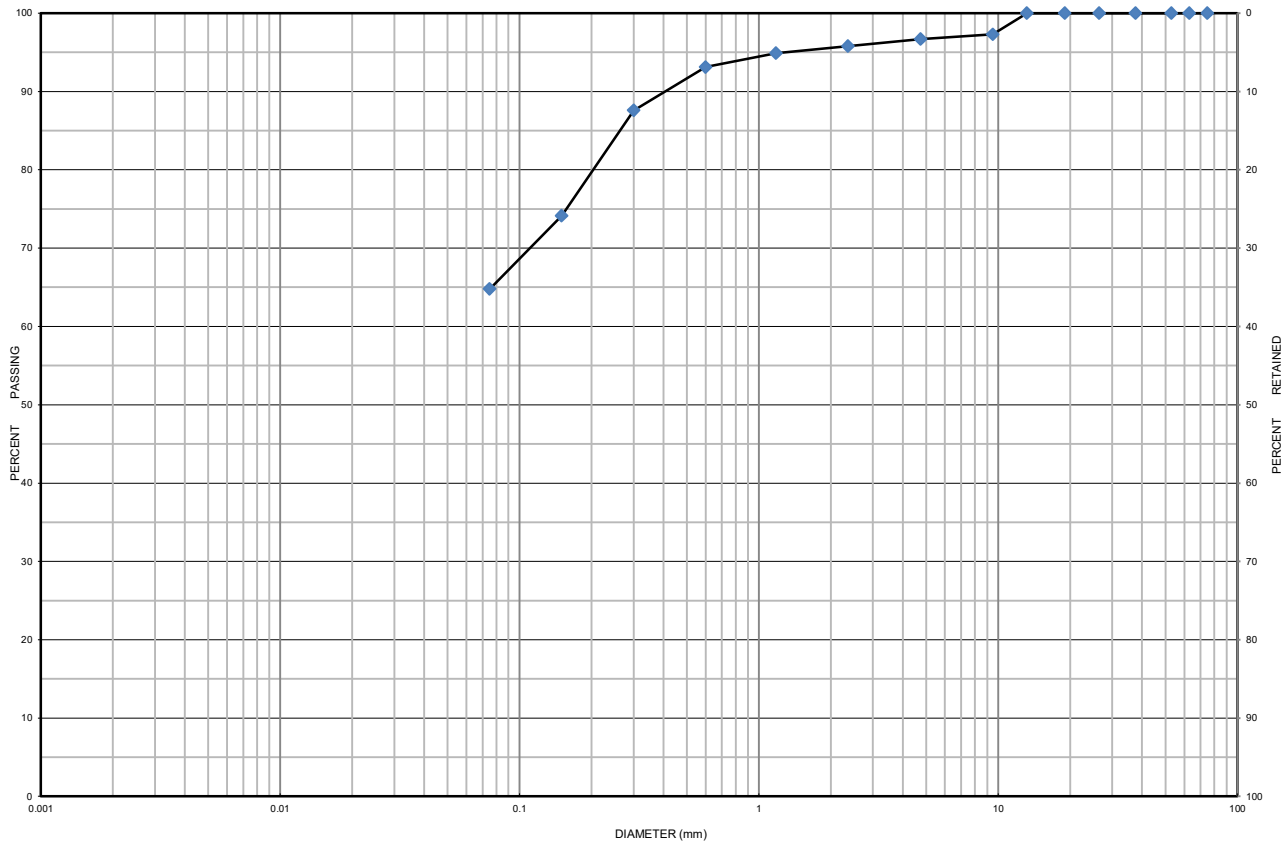
Issued By:  _____ **Date Issued:** August 8, 2022
 (Senior Project Manager)



Grain Size Distribution Chart

Project Number: 13324-051 **Client:** City of Quinte West
Project Name: GEO - Watermain, Wooler Road to Tate Road, Trenton
Sample Date: April 25 - 29, 2022 **Sampled By:** Nik Valiant - Cambium Inc.
Location: BH 127-22 SS 1B **Depth:** 0 m to 0.6 m **Lab Sample No:** S-22-0719

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 127-22	SS 1B	0 m to 0.6 m	3	32	65		18.0
Description		Classification	D ₆₀	D ₃₀	D ₁₀	C _u	C _c
Sandy Silt trace Gravel		ML	-	-	-	-	-

Additional information available upon request

Issued By: 
(Senior Project Manager)

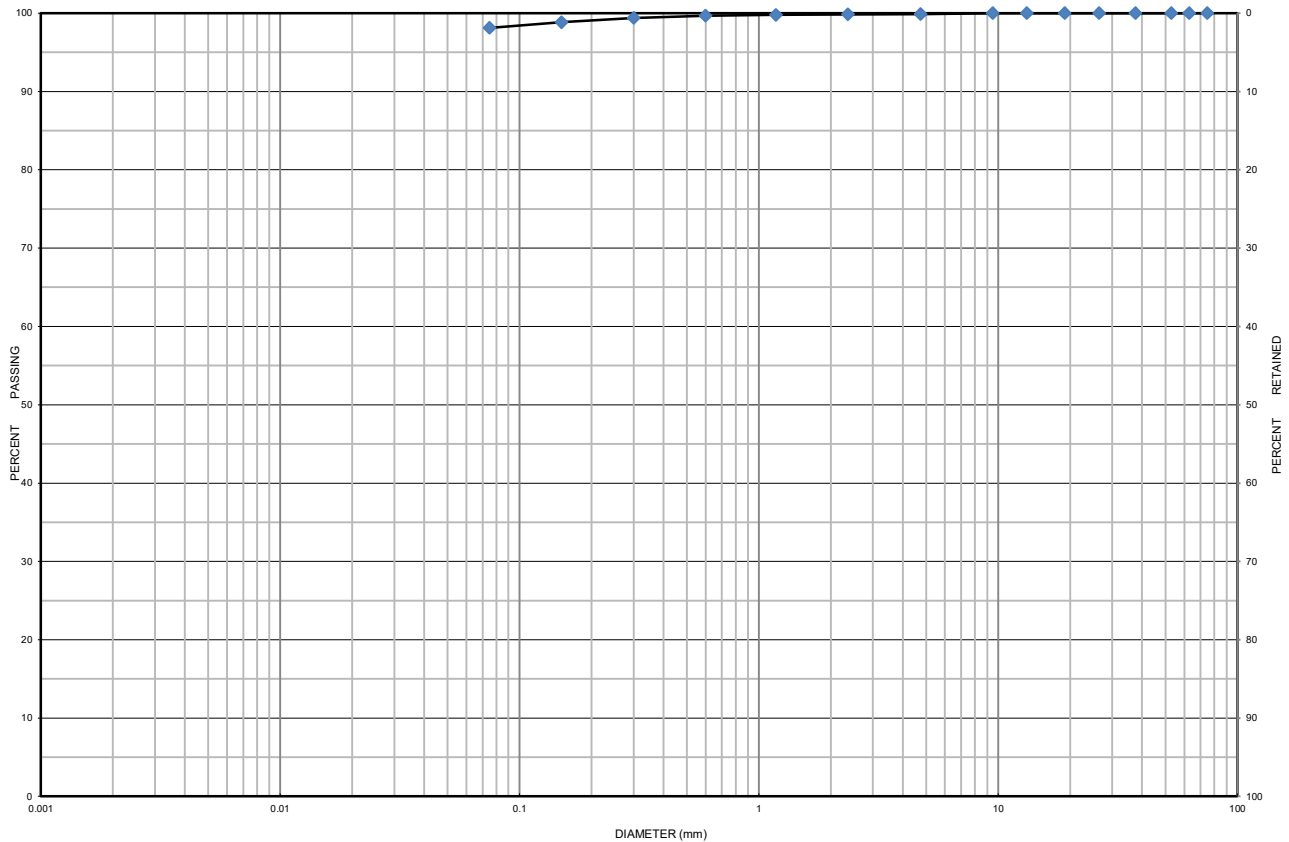
Date Issued: May 19, 2022



Grain Size Distribution Chart

Project Number: 13324-051 **Client:** City of Quinte West
Project Name: GEO - Watermain, Wooler Road to Tate Road, Trenton
Sample Date: April 25 - 29, 2022 **Sampled By:** Nik Valiant - Cambium Inc.
Location: BH 129-22 SS 3 **Depth:** 1.5 m to 2.1 m **Lab Sample No:** S-22-0720


UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 129-22	SS 3	1.5 m to 2.1 m	0	2	98		39.0
Description		Classification	D ₆₀	D ₃₀	D ₁₀	C _u	C _c
Silt trace Sand		ML	-	-	-	-	-

Additional information available upon request

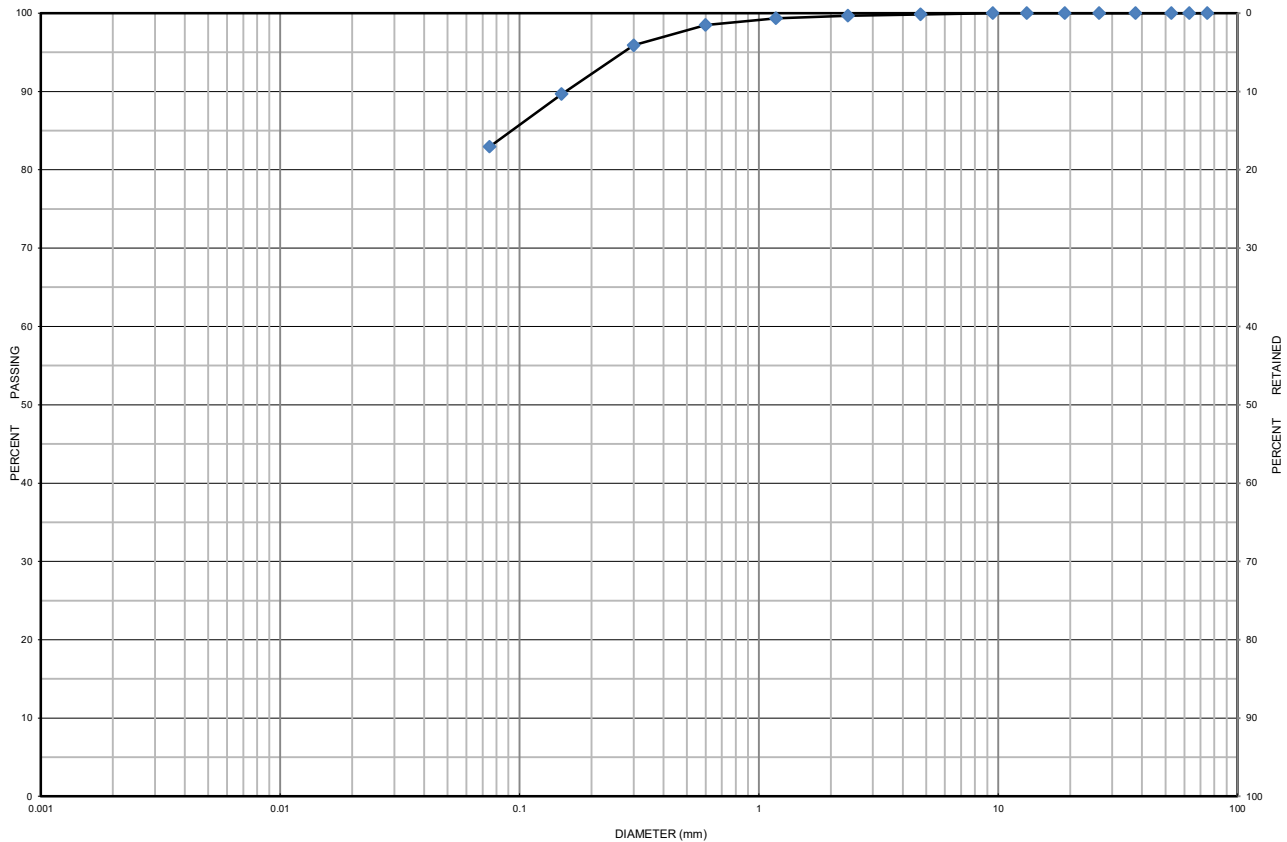
Issued By:  Date Issued: May 19, 2022
(Senior Project Manager)



Grain Size Distribution Chart

Project Number: 13324-051 **Client:** City of Quinte West
Project Name: GEO - Watermain, Wooler Road to Tate Road, Trenton
Sample Date: April 25 - 29, 2022 **Sampled By:** Nik Valiant - Cambium Inc.
Location: BH 131-22 SS 2 **Depth:** 0.8 m to 1.4 m **Lab Sample No:** S-22-0721

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 131-22	SS 2	0.8 m to 1.4 m	0	17	83		30.5
Description		Classification	D ₆₀	D ₃₀	D ₁₀	C _u	C _c
Silt some Sand		ML	-	-	-	-	-

Additional information available upon request

Issued By: 
(Senior Project Manager)

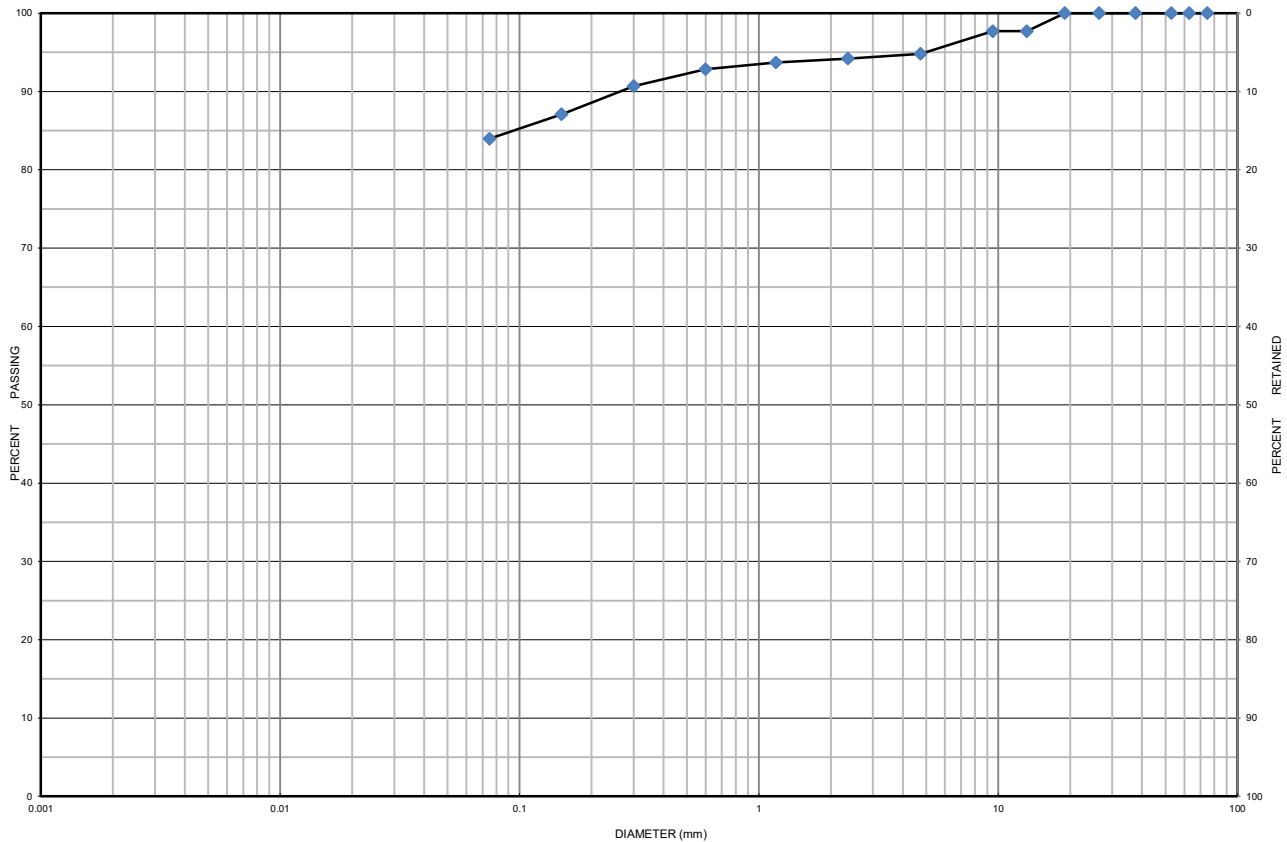
Date Issued: May 19, 2022



Grain Size Distribution Chart

Project Number: 13324-051 **Client:** City of Quinte West
Project Name: GEO - Watermain, Wooler Road to Tate Road, Trenton
Sample Date: April 25 - 29, 2022 **Sampled By:** Nik Valiant - Cambium Inc.
Location: BH 133-22 SS 1B **Depth:** 0 m to 0.6 m **Lab Sample No:** S-22-0722

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 133-22	SS 1B	0 m to 0.6 m	5	11	84		17.5
Description		Classification	D ₆₀	D ₃₀	D ₁₀	C _u	C _c
Silt some Sand trace Gravel		ML	-	-	-	-	-

Additional information available upon request

Issued By: 
(Senior Project Manager)

Date Issued: May 19, 2022

Cambium Inc. (Laboratory)
866.217.7900 | cambium-inc.com
194 Sophia St. | Peterborough | ON | K9H 1E5

Form: L6V.2 - Grad.Hydo



Moisture Content



Project Number: 13324-051

Project Name: GEO - Watermain, Wooler Road to Tate Road, Trenton

Client: City of Quinte West

Date Taken: 2022-04-25

Lab Number: S-22-0714

Date Tested: 2022-05-11

Tested By: S-22-0714

Borehole Number	Sample Number	Sample Depth (m)	Water Weight (g)	Water Content (%)	Additional Observations
114	1A	0.00-0.25	60.6	32.5	1
114	1B	0.25-0.46	49.7	20.6	
114	2	0.76-1.37	42.5	17.7	
114	3	1.52-2.13	54.6	21.5	
114	4	2.29-2.90	48.3	19.6	
115	1A	0.00-0.30	38.1	30.8	1
115	1B	0.30-0.61	25.9	18.1	1
115	2	0.76-1.37	41.0	20.3	
115	3A	1.52-1.83	7.7	20.5	NR
115	3B	1.83-1.98	2.2	20.8	NR
115	3C	1.98-2.13	31.9	32.7	NR
115	4	2.44-3.05	59.0	24.2	
116	1A	0.00-0.13	20.3	17.2	NR,1
116	1B	0.13-0.61	19.0	8.0	
116	2	0.76-1.37	28.0	10.1	
116	3	1.52-2.13	44.9	18.3	
116	4	2.44-3.05	62.0	30.5	
117	1A	0.00-0.20	19.2	13.6	1
117	1B	0.20-0.61	16.0	11.5	
117	2	0.76-1.37	114.7	15.3	NR
117	3	1.52-2.13	38.1	16.3	
117	4	2.44-2.74	10.1	4.0	
118	1A	0.00-0.20	26.7	19.0	
118	1B	0.20-0.61	23.1	10.6	
118	2	0.76-1.37	14.4	5.4	
118	3	1.52-2.13	61.3	22.5	
118	4	2.44-3.05	44.2	17.4	

- 1 – Contains organics

2 – Contains rubble

3 – Hydrocarbon Odour

4 – Unknown Chemical Odour

5 – Saturated – free water visible
- 6 – Very moist – near optimum moisture content

7 – Moist – below optimum moisture

8 – Dry – dry texture – powdery

9 – Very small – caution may not be representative

10 – Hold sample for gradation analysis



Moisture Content



Project Number: 13324-051

Project Name: GEO - Watermain, Wooler Road to Tate Road, Trenton

Client: City of Quinte West

Date Taken: 2022-04-25

Lab Number: S-22-0714

Date Tested: 2022-05-11

Tested By: S-22-0714

Borehole Number	Sample Number	Sample Depth (m)	Water Weight (g)	Water Content (%)	Additional Observations
122	1	0.00-0.61	10.5	3.9	
122	2	0.76-1.37	27.6	10.7	
122	3	1.52-2.13	54.3	25.3	
122	4	2.29-2.90	60.3	25.7	
123	1A	0.00-0.10	16.0	22.7	
123	1B	0.10-0.20	5.3	4.1	
123	1C	0.20-0.38	32.9	13.6	
123	2	0.76-1.37	56.7	22.5	
123	3A	1.52-2.13	27.5	18.1	NR
123	3B	1.52-2.13	49.8	16.5	NR
123	3C	1.52-2.13	26.6	17.3	NR
123	4A	2.29-2.90	46.9	22.9	
123	4B	2.29-2.90	57.8	28.5	
124	1A	0.00-0.13	6.8	5.7	NR
124	1B	0.13-0.33	20.3	7.7	
124	2	0.76-1.37	23.4	7.3	
124	3	1.52-2.13	22.1	8.8	
124	4A	2.29-2.90	14.2	13.9	NR
125	1A	0.00-0.08	10.1	13.2	NR,1
125	1B	0.08-0.18	16.9	10.4	
125	2	0.76-1.37	108.7	18.6	NR
125	3A	1.52-2.13	26.1	28.4	NR
125	3B	1.52-2.13	51.8	34.4	
125	4A	2.29-2.90	64.7	38.0	
125	4B	2.29-2.90	82.8	27.0	
126	1A	0.00-0.61	49.3	20.0	
126	1B	0.00-0.61	42.8	18.5	

- 1 – Contains organics

2 – Contains rubble

3 – Hydrocarbon Odour

4 – Unknown Chemical Odour

5 – Saturated – free water visible
- 6 – Very moist – near optimum moisture content

7 – Moist – below optimum moisture

8 – Dry – dry texture – powdery

9 – Very small – caution may not be representative

10 – Hold sample for gradation analysis



Moisture Content



Project Number: 13324-051
Project Name: GEO - Watermain, Wooler Road to Tate Road, Trenton
Client: City of Quinte West
Date Taken: 2022-04-25

Lab Number: S-22-0714
Date Tested: 2022-05-11
Tested By: S-22-0714

Borehole Number	Sample Number	Sample Depth (m)	Water Weight (g)	Water Content (%)	Additional Observations
126	2	0.76-1.37	43.0	13.1	
126	3	1.52-2.13	42.3	19.0	
126	4	2.29-2.90	38.4	18.5	
127	1A	0.00-0.61	38.6	18.9	
127	1B	0.00-0.61	36.0	18.0	NR
127	2	0.76-1.37	47.5	21.7	
127	3	1.52-2.13	51.9	18.3	
127	4	2.29-2.90	36.3	18.8	
127	4B	2.29-2.90	37.8	21.8	
128	1A	0.00-0.61	42.7	17.7	NR
128	1B	0.00-0.61	61.3	16.4	
128	2A	0.76-1.37	32.8	10.2	NR
128	2B	0.76-1.37	40.7	19.1	
128	3	1.52-2.13	43.0	18.8	
129	1A	0.00-0.61	31.0	17.2	
129	1B	0.00-0.61	28.3	16.8	NR
129	2	0.76-1.37	71.1	33.5	
129	3	1.52-2.13	255.8	39.0	NR
129	4	2.29-2.90	124.4	29.4	
130	1	0.00-0.61	49.9	15.2	NR,1
130	2A	0.76-1.37	56.9	24.4	
130	2B	0.76-1.37	77.4	29.2	NR
130	3A	1.52-2.13	34.9	26.0	NR
130	3B	1.52-2.13	79.7	35.0	
130	4	2.29-2.90	81.7	38.5	
131	1	0.00-0.61	59.3	23.3	
131	2	0.76-1.37	167.0	30.5	NR

- 1 – Contains organics

2 – Contains rubble

3 – Hydrocarbon Odour

4 – Unknown Chemical Odour

5 – Saturated – free water visible
- 6 – Very moist – near optimum moisture content

7 – Moist – below optimum moisture

8 – Dry – dry texture – powdery

9 – Very small – caution may not be representative

10 – Hold sample for gradation analysis



Moisture Content



Project Number: 13324-051

Project Name: GEO - Watermain, Wooler Road to Tate Road, Trenton

Client: City of Quinte West

Date Taken: 2022-04-25

Lab Number:

Date Tested: 2022-05-11

Tested By: S-22-0714

Borehole Number	Sample Number	Sample Depth (m)	Water Weight (g)	Water Content (%)	Additional Observations
131	3	1.52-2.13	55.4	30.0	
131	4	2.29-2.90	45.1	20.2	
132	1	0.00-0.61	38.6	19.0	1
132	2A	0.76-1.37	83.9	33.8	
132	2B	0.76-1.37	45.6	21.1	NR
132	3A	1.52-2.13	42.7	20.9	
132	3B	1.52-2.13	57.9	19.0	
132	4	2.29-2.90	46.6	20.4	
133	1A	0.00-0.61	42.3	34.1	NR,1
133	1B	0.00-0.61	72.0	17.5	NR
133	2A	0.76-1.37	35.2	23.2	NR
133	2B	0.76-1.37	62.4	20.6	NR
133	2C	0.76-1.37	59.7	29.4	NR
133	3	1.52-2.13	47.2	18.0	
133	4	2.29-2.90	66.5	23.1	
134	1	0.00-0.61	59.5	22.6	
134	2	0.76-1.37	71.9	30.3	
134	3A	1.52-1.83	41.8	19.6	NR
134	3B	1.83-2.13	43.8	18.6	
134	4	2.44-3.05	41.7	17.1	

- 1 – Contains organics

2 – Contains rubble

3 – Hydrocarbon Odour

4 – Unknown Chemical Odour

5 – Saturated – free water visible
- 6 – Very moist – near optimum moisture content

7 – Moist – below optimum moisture

8 – Dry – dry texture – powdery

9 – Very small – caution may not be representative

10 – Hold sample for gradation analysis

APPENDIX C: Archaeological Assessment of the Quinte West Watermain Project

**Stage 1-2 Archaeological Assessment
of the Quinte West Watermain Project,
Part of Lots 7, 8, 9, 10, 11 & 12, Concession 1
Geographic Township of Murray
City of Quinte West
Hastings County, Ontario
Original Report**

**Approval
Authority:** City of Quinte West

Licensee: Michael Berry, PhD
Licence No: P246
Prepared by: Michael Berry, PhD
Stage 1 PIF# P246-0619-2022
Stage 1 PIF# P246-0623-2022
Date 09-January-2022



www.abacusarchaeology.ca
abacusarchservices@gmail.com
(613)530-7944

Executive Summary

In August of 2022 Abacus Archaeological Services was retained by to undertake a Stage 1 archaeological assessment of the proposed route of the Quinte West Project, located within parts of Lots 7 through 12 of Concession 1 of the Geographic Township of Murray, now within the Town of Quinte West, Hastings County (Map 3). The proposed route of the watermain begins at its eastern end on Highway 2, just west of 2nd Dug Hill Road, continues westward along Highway 2 until turning north along the route of County Road 40. At a location just south of Tremur Lake, the watermain route turns west along a wooded section of the south shore of Tremur Lake and the path of Mayhew Creek before meeting with Tate Road. The route terminates along Tate Road at the intersection with Telephone Road (Map 4). An archaeological assessment was conducted at the request of the City of Quinte West.

The subject property is located within an area known to have been traditionally inhabited by the Michi Saagiig (Mississauga Anishinaabeg) peoples. One registered archaeological site is found within 1 kilometre of the subject property. The property is identified as having pre-contact and historic potential for archaeological resources based upon its proximity to the Tremur Lake/Mayhew Creek waterway system, as well as its location adjacent to historic transport routes and related farmsteads. Historical research has shown that the lands around the subject property were directly developed during the c. 1830s with the construction of roads, homesteads and related farm lands.

The study area was visited by the licensee, Michael Berry, on September 20th, 2022. The collective site data and inspection combine to indicate that the property contains a mixture of high potential areas, and areas where potential has been removed. The modern development and subsequent use of roadway sections of the property has resulted in extensive and deep land alterations. This activity will have severely damaged the integrity of any archaeological resources resulting in the disturbance and removal of archaeological potential in those sections. Portions of the wooded sections of the property appear undisturbed and retain archaeological potential requiring further study.

Based upon the established potential for archaeological resources within the subject property Stage 2 testing was performed on October 7th, 2022 under Project Information Form number P246-0623-2022. In November of 2022 the licensee was advised by the proponents that an alteration to the proposed route of the Quinte West Watermain Project had been made. The new route travels westward from a point at the crossing of the existing CN railway line at County Road 40. This new section of pipeline was assessed on December 9th, 2022. No features or material of archaeological significance was recovered during either phase of the Stage 2 excavation (Map 11).

Based upon these results the licensee makes the following recommendations with regard to the study area (Map 11).

- The subject property tested during Stage 2 excavation has been assessed and found to contain no significant archaeological resources. No further work is required within the assessed Stage 2 study area.

Table of Contents

Project Personnel	iv
1.0 Project Context.....	1
1.1 Development Context:	1
1.2 Historical Context:	2
1.3 Property and Structural History:	3
1.4 Archaeology of the Region:	4
2.0 Project Context: Archaeological Context	8
2.1 Previous Archaeological Research near the Subject Property:	8
2.2 Physiography of the Study Area:	9
2.3 Archaeological Potential of the Study Area:	10
3.0 Field Methods	12
4.0 Record of Finds.....	13
4.1 Inventory of Documentary Record Generated in the Field.....	14
5.0 Analysis and Conclusions	16
6.0 Recommendations.....	17
7.0 Advice on Compliance with Legislation.....	18
8.0 Bibliography and Sources	19
Images	21
Maps.....	30
Appendix 1:.....	41

Images

Image 1. A view west along the north frontage of Highway 2.	21
Image 2. A view west along the north frontage of Highway 2.	21
Image 3. A view north along the east frontage of County Road 40.	22
Image 4. A view north along the east frontage of County Road 40.	22
Image 5. A view north along the east frontage of County Road 40	23
Image 6. A view south along the west frontage of County Road 40	23
Image 7. A view north along the west frontage of County Road 40..	24
Image 8. A view west along the south shore area of Tremur Lake.	24
Image 9. A view east along the south shore area of Tremur Lake	25
Image 10. A view west along the south shore area of Tremur Lake.	25
Image 11. A view west along the south shore area of Tremur Lake	26
Image 12. A view east along the south shore area of Mayhew Creek.	26
Image 13. A view north of the CN overpass and rail line.	27
Image 14. A view west of the southern route area.	27
Image 15. A view north along the existing gravel roadways.	28
Image 16. A view west along the south route area.	28
Image 17. A view west along the south route area.	29
Image 18. A view of the dense vegetation within areas of the water main route.	29

Maps

Map 1. The subject property location on 1:250 000 NTS plan.	30
Map 2. The subject property location on 1:50 000 NTS plan.	31
Map 3. The subject property location on 1:10 000 Ontario Base Map.	32
Map 4. A plan of the subject property.	33
Map 5. A section from an 1851 map of Murray Township.	34
Map 6. A section from an 1878 map of Murray Township.	35
Map 7. A section from the 1932 National Topographic Series map.	36
Map 8. An aerial view of the subject property and surrounding area in 1953.	37
Map 9. A current aerial view of the subject property and surrounding area	38
Map 10. A section of the soil survey plan of Northumberland County	39
Map 11. A plan of the archaeological potential and Stage 2 assessment.	40

Project Personnel

Project Manager/Licence Holder	Michael Berry, PhD Licence No. P246
Field Director	Michael Berry
Historical Research/Report Writing	Michael Berry
Field Crew	Noah Dupere John Errington Douglas Kirk

1.0 Project Context

1.1 Development Context:

In August of 2022 Abacus Archaeological Services was retained by to undertake a Stage 1 archaeological assessment of the proposed route of the Quinte West Watermain Project, located within parts of Lots 7 through 12 of Concession 1 of the Geographic Township of Murray, now within the Town of Quinte West, Hastings County (Map 3). The proposed route of the watermain begins at its eastern end on Highway 2, just west of 2nd Dug Hill Road, continues westward along Highway 2 until turning north along the route of County Road 40. At a location just south of Tremur Lake, the watermain route turns west along a wooded section of the south shore of Tremur Lake and the path of Mayhew Creek before meeting with Tate Road. The route terminates along Tate Road at the intersection with Telephone Road (Map 4). An archaeological assessment was conducted at the request of the City of Quinte West. The legislation triggering the assessment is the Planning Act. The Town of Quinte West is the approval authority for this application.

The study area was visited by the licensee, Michael Berry, on September 20th, 2022 at which time a property inspection took place. The property inspection included the entire property and its periphery via a systematic coverage. Coverage was sufficient to identify the presence or absence of any features of archaeological potential. Stage 2 testing was performed on October 7th, 2022 and December 9th, 2022 under Project Information Form number P246-0623-2022. All activities carried out during the Stage 1-2 assessment were completed in accordance with the terms of the *Ontario Heritage Act* and the Ministry of Tourism and Culture's (now Ministry of Heritage, Sport, Tourism and Culture Industries) 2011 *Standards and Guidelines for Consultant Archaeologists*. Aboriginal Engagement was carried out in cooperation with the Curve Lake First Nation in compliance with the Archaeological Protocols approved by Curve Lake First Nation Chief and Council (2016).

This report was written and assembled by Michael Berry, PhD of Abacus Archaeological Services. Stage 1 background research utilized Land Registry Records, local histories and relevant maps. Permission to access the subject property and to carry out the assessment was granted by the property owner. All images and documents generated during this project will be archived by the licensee until such time that a suitable repository is established.

1.2 Historical Context:

The subject property is located within the geographic Township of Murray, originally located within Northumberland County, and now located within but administratively separated from Hastings County. Champlain was the first European visitor to the area in 1615 when French troops accompanied by allied Huron's traversed the Trent River system with the intention on attacking Iroquois located south of Lake Ontario. In the years that followed increased use of the lands north of Lake Ontario lead to a meeting between Anishinaabe and Haudenosaunee nations at Montréal in 1701. The One Dish One Spoon Treaty was agreed upon by these nations establishing a shared resource area spanning from the current province of Ontario between the Great Lakes and extending east along the north shore of the St. Lawrence River up to the border with the current province of Quebec. Systematic Euro-Canadian settlement of the townships within Ontario started during the late 1700's following the end of the American Revolutionary War.

The need for land on which to settle refugees of the conflict led the British government into negotiations with their military allies, the Mississauga. It was assumed by the British that the Mississauga were the only Native peoples inhabiting eastern Ontario. In 1783 Captain William Redford Crawford negotiated on behalf of the British government. Crawford was given the position due to the established trust he had developed with the Mississauga chiefs living in the Bay of Quinte region. The 'Crawford Purchase' of 1783 granted title to most of eastern Ontario, including what would become the counties of Stormont, Dundas, Glengarry, Prescott, Russell, Leeds, Grenville and Prince Edward, as well as the front townships of Frontenac, Lennox, Addington and Hastings Counties and areas as far inland as what is now the City of Ottawa (Lockwood, 1996).

Northumberland County originally joined with Durham County to form the Newcastle District from 1802 to 1849, after which it formed part of the United Counties of Northumberland and Durham from 1850 to 1973. In 1974 Northumberland once again became a standalone county. Like neighbouring areas the county was originally settled by United Empire Loyalists fleeing the former British American Colonies in the 1790s. The City of Quinte West was formed in 1998 consisting of the amalgamation of the City of Trenton, the Village of Frankford, the Township of Sidney, and the Township of Murray from Northumberland County.

Hastings County was separated into the first five townships, which were surveyed and divided into lots and concession roadways. Hastings County was named in honour of Francis Rawdon-Hastings, a military leader during the American Revolution. By 1830 Hastings County had a population in excess of 5800 with Sidney, Thurlow and Tyendinaga Townships holding the largest populations. The population continued to expand based on the lumber industry of the northern townships and the ports along the Lake Ontario shores. However as the lumber industry declined by the advent of the 20th century so too did the population.

1.3 Property and Structural History:

Lots 7, 8, 9, 10, 11, 12

Concession 1, Geographic Township of Murray

The study area is located within parts of Lots 7 to 12 of Concession 1 of the Geographic Township of Murray, originally within Northumberland County (Map 5). The subject property follows a path along the southern terminus of Lots 7 and 8, turns northward between Lots 8 and 9, proceeds west along the northern half of Lots 9, 10, 11 and 12, before turning northward along the western end of the north half of Lot 12, terminating at the northwestern end of Lot 12 (Map 3). A summary of the ownership and development of each lot is presented in the following.

The 200 acres of Lot 7, Concession 1 within Murray Township was granted by the Crown to Joseph Forsyth on September 15, 1803 (OLR). The subject property begins at the southwestern quarter of Lot 7. A homestead was potentially located there as early as the 1840s following the purchase of the southwestern 50 acres of Lot 7 by Elijah Myers. The parcel was purchased by Henry Coons in 1875 and is noted at that location in 1878 (Map 6).

The subject property passes the location of a homestead located within the southeast quarter of Lot 9. This homestead was owned by Reuben Young in the 1870s, but was purchased by his descendant Stephen Young on November 29, 1834. The Young family owned and farmed the majority of Lot 9 during the 19th century. The study area crosses the current CN railway line at the junction of Lots 8 and 9. This line was originally installed as the Grand Trunk Railway, which began purchasing the lands c. 1856.

The western portion of the subject property crosses the northern parts of Lots 10, 11 and 12. This path crosses the Young family farmlands before entering Lot 10, Concession 1. Lot 10 was granted by the Crown to David Burns on May 22, 1798. Burns was granted Lots 12 at the same time. The northern half of the Lot was acquired by Henry MacAuley during the mid-19th century. The will of Henry MacAuley passed the northeast 50 acres of Lot 10 to his daughter Jane Maguire in 1878. Jane Maguire is noted on the 1878 Township map source (Map 6). The northwestern limit of the subject property follows the south bank of the Mayhew Creek waterway and passes the location of a homestead within Lot 12 which was owned by John Tate. The northern half of Lot 12 was sold to James Cummings in 1856. In 1878 his executors sold this parcel to John Tate. The Tate homestead was located directly south of the subject property path where it turns northward along the northwest limits of Lot 12.

In summary, the subject property crosses a number of rural Lots located west of the town centre of Trenton. This land was dispersed by the Crown during the turn of the 19th century. During the mid-19th century farms and homesteads were established throughout the area, mainly grouped around the Concession and Lot roadways.

1.4 Archaeology of the Region:

Southern Ontario has been occupied by human populations since the retreat of the Laurentide glacier approximately 13,000 years before present (BP) (Ferris, 2013). The earliest human occupation of southern Ontario began with the arrival of small groups of hunter-gatherers referred to by archaeologists as Paleo-Indians (Ellis and Deller, 1990: 39). The Paleo-Indian Period in Eastern Ontario (here defined as the Trent Valley and eastwards) begins during the Belleville phase of Lake Iroquois (12,000 BP) when the land between the ice covered Algonquin Highlands and Lake Iroquois was exposed as far east as the Champlain Sea (Muller and Prest, 1985). Later as the land rebounded from the weight of the glacier the shallows of Lake Iroquois became a fertile plain. Small bands of hunters likely moved into the area after a steppe environment had been established and they could hunt caribou and megafauna such as mastodons. As the climate moderated to the general conditions of the recent Holocene a boreal lifeway became established. This lifeway can be superficially described as alternating between spring/summer amalgamation of the regional people around locations for harvesting spawning fish; the fall/winter dispersal of the population into small family units, to winter in large hunting territories where moose hunting was important (Wright, 1972).

Paleo-Indian sites are rare but not unknown in Eastern Ontario and are usually the random find of a spear point typical of the Late-Paleo Period. The rarity of Paleo-Indian sites is in part due to physiographic changes upon the landscape. Between approximately 10,000-5,500 BP, the Great Lakes basins experienced low-water levels, and many sites which would have been located on those former shorelines are now submerged. However, late Paleo-Indian non-fluted lanceolate points have been found in the Thousand Islands and along the Cataraqui River.

The Archaic Period begins around 7000 BP in Eastern Ontario and is marked by the extinction of the megafauna and the switch to a way of life focused on fishing and the harvesting of wild foods such as hickory nuts. The earliest evidence of heavy wood working tools appears in this period, which is interpreted as an indication of greater investment of labour in felling trees for fuel, to build shelter, and watercraft production. These activities suggest prolonged seasonal residency at occupation sites. With greater ties to direct land areas and socially prescribed territories we see the earliest evidence for cemeteries and indications of increased social organization (approximately 4,500-3,000 BP), and an investment of labour into social infrastructure, and the establishment of socially prescribed territories (Ellis et al., 1990).

For the most part the Archaic way of life appears similar to the historic way of life of the Cree and Ojibwa of northern Ontario. In the spring, family groups coalesce into large encampments around rapids and waterfalls in order to catch spawning fish. In the late fall, family groups disperse across the landscape to individual hunting territories where they trap and hunt locally. The bulk of the goods made by natives were of biodegradable materials so the majority of the artifacts found on Archaic sites are of stone, though in good soil conditions bone tools and refuse bone can survive. On occasion tools or fragments of copper are also found. Copper appears on sites east of the Rouge River

about 5000 BP, particularly along the Trent and Ottawa River systems. Maize was first introduced into southern Ontario during this period, though at that time it would have only supplemented people's diet and would not have been the primary energy source. Archaic sites have been identified in the Rideau Lakes area (Watson, 1981) and at Jessups Falls (Daechsel, 1980). Late Archaic components consisting of Narrow Point traditions have been recorded on Wolfe Island including the Armstrong site on Button Bay. Evidence of Archaic occupations within the Upper St. Lawrence Valley includes the Gordon Island (Wright, 2004: 357).

The beginning of the Woodland period is marked by the appearance of pottery on First Nation's sites. The Early Woodland people of Ontario were the first to use pottery in this province. In many other respects, people of the Early Woodland Period continued to live in much the same way as their predecessors of the Late Archaic. In Eastern Ontario this occurs around 3000 BP a time when the Meadowood Culture of Western New York State begins to occupy the province.

Shortly after 2300 BP the Middle Woodland Period begins with a steady increase in the population of Ontario. Long distance trade is evident from the appearance of exotic materials such as marine shell, mica and copper. Evidence from archaeological sites indicates that by the Middle Woodland Period the people of Ontario began to identify with specific regions of the province. For the first time this allows archaeologists to distinguish regional cultural traditions - sets of characteristics which are unique to a part of the province. Archaeologists have named these cultural traditions Laurel (northern Ontario), Point Peninsula (eastern and south-central Ontario), Saugeen (southwestern Ontario) and Couture (extreme southwestern Ontario).

The range of sites and archaeological evidence collected thus far have provided a picture of the seasonal patterns of activity that Middle Woodland people used to exploit the wide variety of resources in their territories. The spring, summer and fall saw macrobands, larger groups of people congregating at lakeshore sites to fish, collect shellfish and hunt in the surrounding forests. The approaching close of the summer season resulted in an emphasis on collection and storage of hunted resources, due to the need to store up large quantities of food for the winter. By late fall and early winter, the community would split into microbands, small family hunting groups, each relocating to a smaller 'family' hunting area inland where they would stay until the process repeated and larger macrobands rejoined in the spring.

By the Late Woodland Period, c. 800 AD, a definitively Iroquoian people were occupying the north shore of Lake Ontario. The period is most clearly distinguished by the changes in pottery construction and decoration. By the beginning of the Late Woodland (ie. by A.D. 900) period the coil method with various stamped decorations (dentate, rocker, pseudo scallop shell) was abandoned in favour of the paddle and anvil method, with vessels decorated with 'cord-wrapped stick' decoration. Intensive horticulture is practiced in this period as maize provided a large food reserve. Beans, squash and sunflowers were also grown. Villages of longhouses with many hundreds of people begin to be seen particularly in Prince Edward County and on the sandy ridges

along the north shore of Lake Ontario. The area appears to have been largely abandoned around 1550 AD likely due to conflict between the Iroquois of New York State and the Huron Confederacy.

In the wider region of Frontenac-Lennox and Addington most archaeological sites are known from the north shore of Lake Ontario and the islands to the south, the mouth of the Cataraqui River, the Napanee River and Wilton Creek environs and the shore of the St. Lawrence east of Kingston along with the Thousand Islands. Many of the registered sites in this region around Kingston and up the Cataraqui/Rideau Waterway were first documented by avocational archaeologist Guy Blomely and subsequently registered by Hugh Daechsel (Daechsel, 1988, 1989).

It would appear that the majority of the sites in the area are located south of the Frontenac Axis. The Frontenac Axis is a continuation of the exposed granites of the Canadian Shield that runs southeast crossing the St. Lawrence River and thus forming the Thousand Islands before it enters Up State New York and rises as the Adirondack Mountains. Sites on the Frontenac Axis are generally restricted to the shores of the many lakes in this area and at portage points along the connecting rivers. This pattern may be due to a lack of archaeological survey work over most of the Frontenac Axis but given the terrain a settlement pattern focused on the waterways is not surprising.

Period	Group	Time Range	Comment
Paleo-Indian			
	Fluted Point Hi-Lo	11000 - 10400 BP 10400 - 9500 BP	big game hunters small nomadic groups
Archaic			
Early	Side Notched Corner Notched Bifurcate Base	10000 - 9700 BP 9700 - 8900 BP 8900 - 8000 BP	nomadic hunters and gatherers
Middle	Early Middle Archaic Laurentian	8000 - 5500 BP 5500 - 4000 BP	transition to territorial settlements
Late	Narrow Point Broad Point Small Point Glacial Kame	4500 - 3000 BP 4000 - 3500 BP 3500 - 3000 BP ca. 3000 BP	polished - ground stone tools, river - lakeshore orientation burial ceremonialism
Woodland			
Early	Meadowood Middlesex	2900 - 2400 BP 2400 - 2000 BP	introduction of pottery elaborate burials
Middle	Point Peninsula Sandbanks - Princess Point	2300 - 1300 BP 1500 - 1200 BP	long distance trade, burial mounds agriculture begins
Late	Pickering Middleport Huron - St. Lawrence Iroquois	1100 - 700 BP 670 - 600 BP 600 - 350 BP	transition to defended villages, horticulture large village sites tribal organization, warfare abandonment
Historic			
Early	Mississauga	300 - Present	southward migration
Late	Euro-Canadian	225 - Present	European Settlement

¹ Table based upon material assembled by N. Adams.

2.0 Project Context: Archaeological Context

2.1 Previous Archaeological Research near the Subject Property:

No archaeological excavations have been undertaken directly within the study area. No known archaeological assessments have been previously completed within 50 m of the subject property. Consultation with the Ministry of Culture's Archaeological Sites Database found that one registered archaeological site is found within 1 km of the study area; The Finlan site (BaGj-16). The MHSTCI sites registry database provides very little detail on the site other than to describe the site location as "W. side of New Wooler Road 1/2 mi. N. of Hwy. 401 and 5 mi. W. of Trenton"². The Finlan site (BaGj-16) was registered by Rev. Bowan Squire, a pastor, artist and amateur archaeologist who worked on sites along the north shore of Lake Ontario and notably was involved in research at his farm lands in Consecon, Prince Edward County.

Other available sources describe the site in greater details; William Donaldson details that in 1964 red ochre burials were bulldozed out of the southeastern slope of a sand knoll at that location after which the neighbourhood children quickly collected some of the scattered remains as curios (Donaldson and Wortner, 1995: 52). Once informed of the finds Rev. Bowen collected the material and shared it with J.V. Wright for analysis. Wright returned to the site for further shovel shining and investigation but found no further evidence for burials. Wright did obtain some of the site finds which were retained by the Canadian Museum of Civilization (now the Canadian Museum of History). Reverend Squire died in 1991 and the present location of his Finlan site collection is unknown. The described finds consisted of red ochre stained marine shell gorgets, pendants, seventy-five portions of discoidal marine shell beads, and a copper axe. The Canadian Museum of Civilization collection includes marine shell finds, beads, and three proximal end portions of human femora all belonging to young adults of undetermined sex (Donaldson and Wortner, 1995: 57). While details of the Finlan site (BaGj-16) remain cloudy it is clear these represented a significant Pre-Contact mortuary complex within the Trenton area and likely formed part of the wider "Glacial Kame" burial sites found in southern Ontario.

This portion of Ontario has not been the focus of much archaeological investigation and therefore the numbers of sites registered in the Archaeological Sites Database is low in comparison to surrounding areas. The relative paucity of registered sites in the wider area is likely more a result of the number of archaeological studies previously performed and not a true reflection of the archaeological richness of the region.

² The sites geographic coordinates incorrectly place it adjacent the subject property in an area south of Tremur Lake whereas the descriptions of the location would be at an area further north of the subject property.

2.2 Physiography of the Study Area:

The study area is located in the Canadian Shield region featuring exposed Precambrian igneous and high-grade metamorphic rocks. The area of the subject property commonly features small lakes, bogs and marshes. The subject property lies within the Great Lakes-St. Lawrence Forest Region. The Great Lakes–St. Lawrence forest is dominated by hardwood forests, featuring maple, oak, yellow birch, white and red pines. Coniferous trees such as white pine, red pine, hemlock and white cedar, are found to commonly mix with deciduous broad-leaved species, such as yellow birch, sugar and red maples.

The subject property is located in an area of Newcastle sandy loam (Ne), Pontypool sand (Ps), Muck (M), Bookton sandy loam (Bo), and Granby sandy loam (Gr) (Map 10) (Hoffman and Acton, 1974). Most of the soils in the subject property area are sandy based, developed from water-laid silt loams. The Newcastle sandy loam (Ne) is highly productive for crops such as winter wheat, oats, barley and grain corn. Pontypool sand (Ps) soils are well drained but commonly occupy rough topography and steep slopes. Bookton sandy loam (Bo) are also well draining and occur where sand and clay deposits adjoin. Granby sandy loam (Gr) soils are less well drained than the other series and, like Muck soils (M), they occupy depressional areas within landscapes formed by glacial till or kame and outwash areas. These soils are mostly used for pasture where available.

The subject property is situated adjacent to Tremur Lake, a man-made watersource constructed in 1967 by the Trenton Public Utilities Commission as a source for water. The reservoir is maintained by a dam at Wooler Road/County Road 40. Tremur Lake is fed by the Mayhew Creek waterway.

2.3 Archaeological Potential of the Study Area:

The subject property has a mixture of high archaeological potential, and areas with potential removed, according to the 2011 MHSTCI Standards and Guidelines (2011). The archaeological potential of the study area is primarily dictated by the proximity to significant physiographic features of potential near the subject property. One registered archaeological site is found within one kilometre of the subject property which is located within 300 m of a water source. The subject property is located within an area known to have been traditionally inhabited by the Haudenosaunee and the Anishinaabe peoples. Historical research has shown that the lands around the subject property were likely developed during the earliest phases of Euro-Canadian occupation of the area with specific development and intensification by the mid-19th century. The subject property has existed adjacent to historic transport routes from the beginning of Euro-Canadian occupation.

The study area was visited by the licensee on September 20th, 2022 at which time a property inspection took place (see Images 1-18). The property inspection included the entire property and its periphery via a systematic coverage. Coverage was sufficient to identify the presence or absence of any features of archaeological potential. The site visit revealed that the property contains areas of high potential and areas where potential has been removed through deep subsurface modern mechanical disturbance.

The property inspection found that the roadside areas of the subject property contain deep mechanical disturbance. The watermain route along the north frontage of Highway 2 contains a raised roadbed area and deep ditching between the road surface and the privately owned fields to the north (Image 1, 2). The impact of modern mechanical construction, repair and upkeep of the roadways has removed potential in these areas. The eastern frontage of County Road 40 was found to contain large berms (Image 3) and additional ditching (Image 4). At the location south of the CN railway overpass the subject property contains a large fill deposit which was created to support the roadway overpass of the railway line (Image 5). Additional disturbance was created by the construction of a nearby school structure along the County Road 40 road frontage. At the northern end of the overpass a gravel roadway providing access to the railway was created.

At an area along the southern shore of Tremur Lake the subject property travels westward away from County Road 40 (Image 6). This area was found to contain sections of gravel trails (Image 7) and wooded areas where the watermain route is prepared to travel (Image 8, 9, 10). The entire wooded section of the subject appears to be largely undisturbed and contains archaeological potential due to its proximity to the Tremur Lake/Mayhew Creek waterway, as well as proximity to registered archaeological sites. The northwestern end of the subject property lies along the roadway of Tate Road (Image 11, 12). These areas are disturbed through roadway construction and the construction of an industrial facility at the northern terminus of Tate Road. The property portions which retain archaeological potential require Stage 2 archaeological assessment (Map 11).

In November of 2022 the licensee was advised by the proponents that an alteration to the proposed route of the Quinte West Watermain Project had been made. The new route travels westward from a point at the crossing of the existing CN railway line. This new section of pipeline was assessed on December 9th, 2022 through Stage 1 inspection and Stage 2 test pit assessment. The southern sections of the new watermain route cross an area previously disturbed through mechanical excavation during the mid-20th century operation of a quarry located south of the route (Map 8). This area served as an access roadway for the quarry and was subject to significant and widespread disturbance (Image 14, 15).

In accordance with Ministry of Heritage, Sport, Tourism and Culture Industries Standards and Guidelines a Stage 2 archaeological assessment was recommended and subsequently performed within the subject property. The results of this testing will follow.

Stage 1 Recommendation

Based upon these results the licensee makes the following recommendations with regard to the study area (Map 11).

- The subject property has been assessed and determined to contain areas of high potential for significant archaeological resources. A Stage 2 assessment should be performed within areas of high potential within the subject property. Due to the wooded nature of these property areas this assessment should take the form of a test pit survey on a five metre interval.

3.0 Field Methods

Based upon the established potential for archaeological resources within the subject property Stage 2 testing was performed on October 7th, 2022 and December 9th, 2022 under Project Information Form number P246-0623-2022 by the licensee and a team of experienced archaeological technicians. Field conditions were photo documented. The study area consisted of the proposed water main corridor located south of the Tremur Lake waterway (Map 11). The study area limits were determined in the field using a combination of marked survey pegs along the corridor route, GPS technology and aerial photography. This area was subject to test pit assessment.

The test pits were 30cm in diameter and dug by hand at least 5cm into subsoil or to bedrock. The pits were examined for evidence of fill, stratigraphy and cultural features. All soils from the test pits were screened through ¼” (6mm) mesh and the test pits were backfilled. Any positive test pits were to be flagged and geo-located using a Garmin model Etrex 32x handheld GPS unit. All finds were to be flagged and geo-located. Field conditions were photo documented.

The area assessed by test pit survey represents approximately 50% of the total subject property limits, approximately 50% of the subject property limits contained disturbances removing potential. Permission to enter the property and remove artifacts was received from the landowner prior to commencement of the project. The licensee will retain all field notes and photographs taken during the project, until such time that a suitable repository is established for their curation. A total of 1 field notebook page was used during the Stage 2 assessment. The field notes and photographs will be retained by the licensee. The record is considered stable and the long-term curation plan is that the data be stored within the licensees archive. The weather during the Stage 2 was cool and sunny. The lighting conditions during the entire Stage 2 testing were conducive to the identification and recovery of archaeological resources.

4.0 Record of Finds

As noted above, the study area consisted of the grassed and wooded areas within the proposed water main corridor (Images 1-18) (Map 11). The areas of high potential were assessed via test pit survey on a five metre interval. Survey of this area revealed primarily a dense cover of mixed hardwood forest with open grassed areas located along the western end of the corridor, located adjacent to an agricultural field.

The property contained mostly thin clay based soils. Testing along the eastern extents of the high potential area found primarily disturbed gravel roadway fills associated with the established lane (Image 9). Within the undisturbed wooded areas dense silty clay topsoil was commonly found over the subsoil clay or in some locations directly over the bedrock. A consistent soil profile was encountered with a dark greyish brown silty clay topsoil (20% silt, 80% clay) found over top of mid greyish brown clay subsoil or bedrock. The test pits in the property were excavated to an average depth of 25-30 cm. The western limits of the Stage 2 study area found looser clay loam soils within an area located adjacent to the stream and bounded to the south by an agricultural field.

During the December 9th, 2022 assessment the new route areas were observed for disturbance and areas retaining potential were tested (Image 16, 17). Similar vegetation and soil conditions were found consisting of dense silty clay topsoil found over the subsoil clay (Image 18). No cultural material was observed during testing. The test pit survey resulted in the identification of no archaeological resources, features or finds of archaeological significance (Map 11).

4.1 Inventory of Documentary Record Generated in the Field

Photographs

Photo #	Description	Direction	Date
2460619D01	View of the Highway 2 roadside	W	20-Sep-22
2460619D02	View of the Highway 2 roadside	W	20-Sep-22
2460619D03	View of the Highway 2 roadside	W	20-Sep-22
2460619D04	View of the Highway 2 roadside	W	20-Sep-22
2460619D05	View of the Highway 2 roadside	W	20-Sep-22
2460619D06	View of the Highway 2 roadside	W	20-Sep-22
2460619D07	View of the County Road 40 roadside	N	20-Sep-22
2460619D08	View of the County Road 40 roadside	N	20-Sep-22
2460619D09	View of the County Road 40 roadside	N	20-Sep-22
2460619D10	View of the County Road 40 roadside	N	20-Sep-22
2460619D11	View of the County Road 40 roadside	N	20-Sep-22
2460619D12	View of the County Road 40 roadside	N	20-Sep-22
2460619D13	View of the County Road 40 roadside	S	20-Sep-22
2460619D14	View of the County Road 40 roadside	S	20-Sep-22
2460619D15	View of the CN overpass area	N	20-Sep-22
2460619D16	View of the CN overpass area	N	20-Sep-22
2460619D17	View of the CN overpass area	S	20-Sep-22
2460619D18	View of the CN overpass area	S	20-Sep-22
2460619D19	View of the County Road 40 roadside	N	20-Sep-22
2460619D20	View of the County Road 40 roadside	S	20-Sep-22
2460619D21	View of trail area	W	20-Sep-22
2460619D22	View of trail area	E	20-Sep-22
2460619D23	View of trail area	W	20-Sep-22
2460619D24	View of trail area	W	20-Sep-22
2460619D25	View of trail area	W	20-Sep-22
2460619D26	View of trail area	W	20-Sep-22
2460619D27	View of the Tate Road roadside	N	20-Sep-22
2460619D28	View of the Tate Road roadside	N	20-Sep-22
2460619D29	View of the Tate Road roadside	S	20-Sep-22
2460619D30	View of the Tate Road roadside	S	20-Sep-22
2460619D31	Testing along corridor laneway	W	07-Oct-22
2460619D32	Testing along corridor laneway	W	07-Oct-22
2460619D33	Testing along corridor laneway	W	07-Oct-22
2460619D34	Testing along corridor laneway	W	07-Oct-22

Photo #	Description	Direction	Date
2460619D35	Testing along wooded corridor	W	07-Oct-22
2460619D36	Testing along wooded corridor	E	07-Oct-22
2460619D37	Testing along wooded corridor	W	07-Oct-22
2460619D38	Testing along wooded corridor	W	07-Oct-22
2460619D39	Testing in open field area	W	07-Oct-22
2460619D40	Testing in open field area	E	07-Oct-22
2460619D41	View of CN overpass and gravel road	S	09-Dec-22
2460619D42	View of former quarry gravel road	W	09-Dec-22
2460619D43	View of former quarry gravel road	W	09-Dec-22
2460619D44	View of former quarry gravel road	N	09-Dec-22
2460619D45	Testing along wooded corridor	W	09-Dec-22
2460619D46	Testing along wooded corridor	W	09-Dec-22
2460619D47	Testing along wooded corridor	W	09-Dec-22
2460619D48	Testing along north edge of open field	W	09-Dec-22
2460619D49	Testing along north edge of open field	W	09-Dec-22
2460619D50	Densely wooded area	N	09-Dec-22
2460619D51	Densely wooded area	N	09-Dec-22

Field Notes

Catalogue #	Format
P246-0619-N-1	Field Notebook page

5.0 Analysis and Conclusions

In August of 2022 Abacus Archaeological Services was retained by to undertake a Stage 1 archaeological assessment of the proposed route of the Quinte West Project, located within parts of Lots 7 through 12 of Concession 1 of the Geographic Township of Murray, now within the Town of Quinte West, Hastings County (Map 3). The proposed route of the watermain begins at its eastern end on Highway 2, just west of 2nd Dug Hill Road, continues westward along Highway 2 until turning north along the route of County Road 40. At a location just south of Tremur Lake, the watermain route turns west along a wooded section of the south shore of Tremur Lake and the path of Mayhew Creek before meeting with Tate Road. The route terminates along Tate Road at the intersection with Telephone Road (Map 4). An archaeological assessment was conducted at the request of the City of Quinte West.

The subject property is located within an area known to have been traditionally inhabited by the Michi Saagiig (Mississauga Anishinaabeg) peoples. One registered archaeological site is found within 1 kilometre of the subject property. The property is identified as having pre-contact and historic potential for archaeological resources based upon its proximity to the Tremur Lake/Mayhew Creek waterway system, as well as its location adjacent to historic transport routes and related farmsteads. Historical research has shown that the lands around the subject property were directly developed during the c. 1830s with the construction of roads, homesteads and related farm lands.

The study area was visited by the licensee, Michael Berry, on September 20th, 2022. The collective site data and inspection combine to indicate that the property contains a mixture of high potential areas, and areas where potential has been removed. The modern development and subsequent use of roadway sections of the property has resulted in extensive and deep land alterations. This activity will have severely damaged the integrity of any archaeological resources resulting in the disturbance and removal of archaeological potential in those sections. Portions of the wooded sections of the property appear undisturbed and retain archaeological potential requiring further study.

Based upon the established potential for archaeological resources within the subject property Stage 2 testing was performed on October 7th, 2022 under Project Information Form number P246-0623-2022. In November of 2022 the licensee was advised by the proponents that an alteration to the proposed route of the Quinte West Watermain Project had been made. The new route travels westward from a point at the crossing of the existing CN railway line at County Road 40. This new section of pipeline was assessed on December 9th, 2022. No features or material of archaeological significance was recovered during either phase of the Stage 2 excavation (Map 11).

6.0 Recommendations

Based upon these results the licensee makes the following recommendations with regard to the study area (Map 11).

- The subject property tested during Stage 2 excavation has been assessed and found to contain no significant archaeological resources. No further work is required within the assessed Stage 2 study area.

7.0 Advice on Compliance with Legislation

This report is submitted to the Minister of Heritage, Sport, Tourism and Culture Industries as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological fieldwork and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the Ministry of Heritage, Sport, Tourism and Culture Industries, a letter will be issued by the ministry stating that there are no further concerns with regard to alterations to archaeological sites by the proposed development.

It is an offence under Sections 48 and 69 of the *Ontario Heritage Act* 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*. d.

The *Cemeteries Act*, R.S.O. 1990 c. C.4 and the *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33 (when proclaimed in force) require that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the Ministry of Consumer Services.

8.0 Bibliography and Sources

Image and Topographic Map References

1:250, 000 Topographical Map - NTS 31/C, 1975

1:50, 000 Topographical Map - NTS 31/C4b – 31/C4a, 1975

1:10, 000 Ontario Base Map – OBM # 1018 2850 48850 – 1018 2900 48850, 1992

1 inch to 1 mile National Topographical Series Map - Sheet 31C4, 1932.

1953 Ontario Provincial Series. 53-4405-35-83. Queen's University Library Air Photograph Collection.

Archival Map References

1851 Map of Murray Township.

1878 Murray Township plan from the Illustrated historical atlas of the counties of Northumberland and Durham, Ont., Ontario, Belleville. H. Belden & Co. Queen's University Library Map Collection.

Source References

2011. Standards and Guidelines for Consultant Archaeologists. Toronto: Ministry of Tourism and Culture.

2016. Archaeological Protocol: Curve Lake First Nation. Curve Lake ON: Curve Lake First Nation.

DAECHSEL, H. 1980. An Archaeological Overview of the South Nation River Drainage Basin: . *Background Paper No. 3. South Nation River Conservation Authority.*

DAECHSEL, H. 1988. Frontenac County: Conservation License Report 1987. License 87-21. Report prepared by the Cataraqui Archaeological Research Foundation. On file with the Ontario Ministry of Culture and Communications.

DAECHSEL, H. 1989. Frontenac and Leeds-Grenville Conservation License Report 1988. Licence 88-19. Report prepared by the Cataraqui Archaeological Research Foundation. On file with the Ontario Ministry of Culture and Communications.

- DONALDSON, W. S. & WORTNER, S. 1995. The Hind Site and the Glacial Kame Burial Complex in Ontario. *Ontario Archaeology*, 59, 5-95.
- ELLIS, C. & DELLER, B. 1990. Paleo-Indians. In: ELLIS, C. & FERRIS, N. (eds.) *The Archaeology of Southern Ontario to A.D. 1650*. Occasional Publication of the London Chapter, OAS.
- ELLIS, C., KENYON, I. & SPENCE, M. W. 1990. The Archaic. In: ELLIS, C. & FERRIS, N. (eds.) *The Archaeology of Southern Ontario to A.D. 1650*. London: Ontario Archaeological Society.
- FERRIS, N. 2013. Place, Space, and Dwelling in the Late Woodland. *Before Ontario: The Archaeology of a Province*. McGill-Queen's University Press.
- HOFFMAN, D. W. & ACTON, C. J. 1974. The Soils of Northumberland County. *Ontario Soil Survey*. Guelph: Ontario Department of Agriculture.
- LOCKWOOD, G. 1996. *The Rear of Leeds & Lansdowne: The Making of Community on the Gananoque River Frontier 1796-1996*, Lyndhurst, The Corporation of the Township of Rear of Leeds and Lansdowne.
- MULLER, E. H. & PREST, V. K. 1985. Glacial Lakes in the Ontario Basin. In: KARROW, P. F. & CALKIN, P. E. (eds.) *Quaternary Evolution of the Great Lakes*.
- OLR Ontario Land Records Abstract Index.
- WATSON, G. 1981. A Late Archaic Broadpoint Phase in the Rideau Lakes Area of Eastern Ontario. *Arch Notes*, 1981, 7-20.
- WRIGHT, J. V. 1972. *Ontario Prehistory: an eleven thousand-year archaeological outline*, Ottawa, Archaeological Survey of Canada, National Museum of Man.
- WRIGHT, J. V. 2004. The Gordon Island North Site and Cultural Settlement Distributions along the Upper St. Lawrence River Valley. In: WRIGHT, J. V. & PILON, J. (eds.) *Passion for the Past: Papers in Honour of James F. Pendergast*. Gatineau: Canadian Museum of Civilization.

Images



Image 1. A view west along the north frontage of Highway 2.



Image 2. A view west along the north frontage of Highway 2.



Image 3. A view north along the east frontage of County Road 40.



Image 4. A view north along the east frontage of County Road 40.



Image 5. A view north along the east frontage of County Road 40 near CN rail crossing.



Image 6. A view south along the west frontage of County Road 40 near CN rail crossing.



Image 7. A view north along the west frontage of County Road 40..



Image 8. A view west along the south shore area of Tremur Lake.



Image 9. A view east along the south shore area of Tremur Lake towards County Road 40.



Image 10. A view west along the south shore area of Tremur Lake.



Image 11. A view west along the south shore area of Tremur Lake



Image 12. A view east along the south shore area of Mayhew Creek.



Image 13. A view north of the CN overpass and rail line.



Image 14. A view west of the southern route area.



Image 15. A view north along the existing gravel roadways.



Image 16. A view west along the south route area.

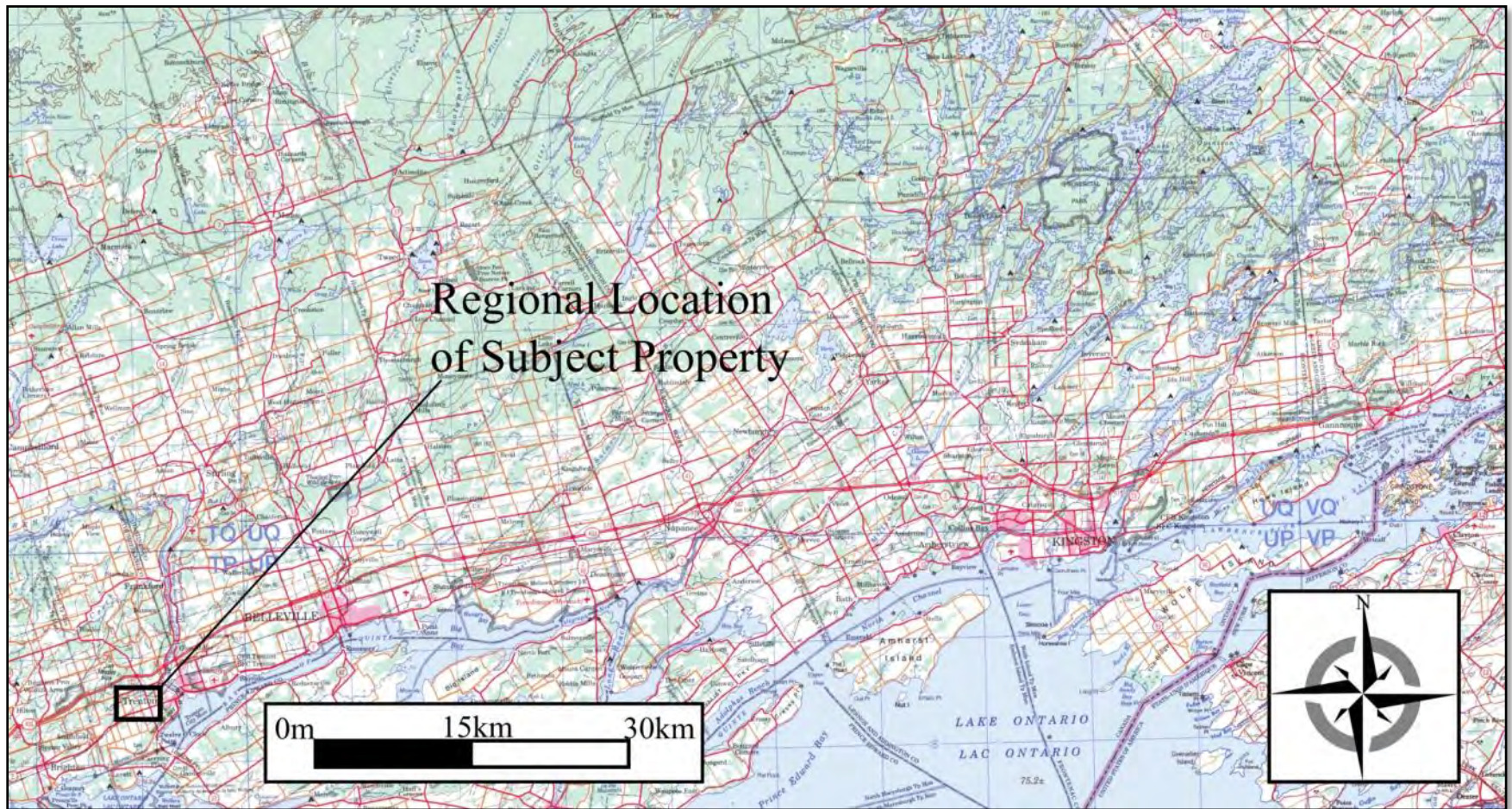


Image 17. A view west along the south route area.

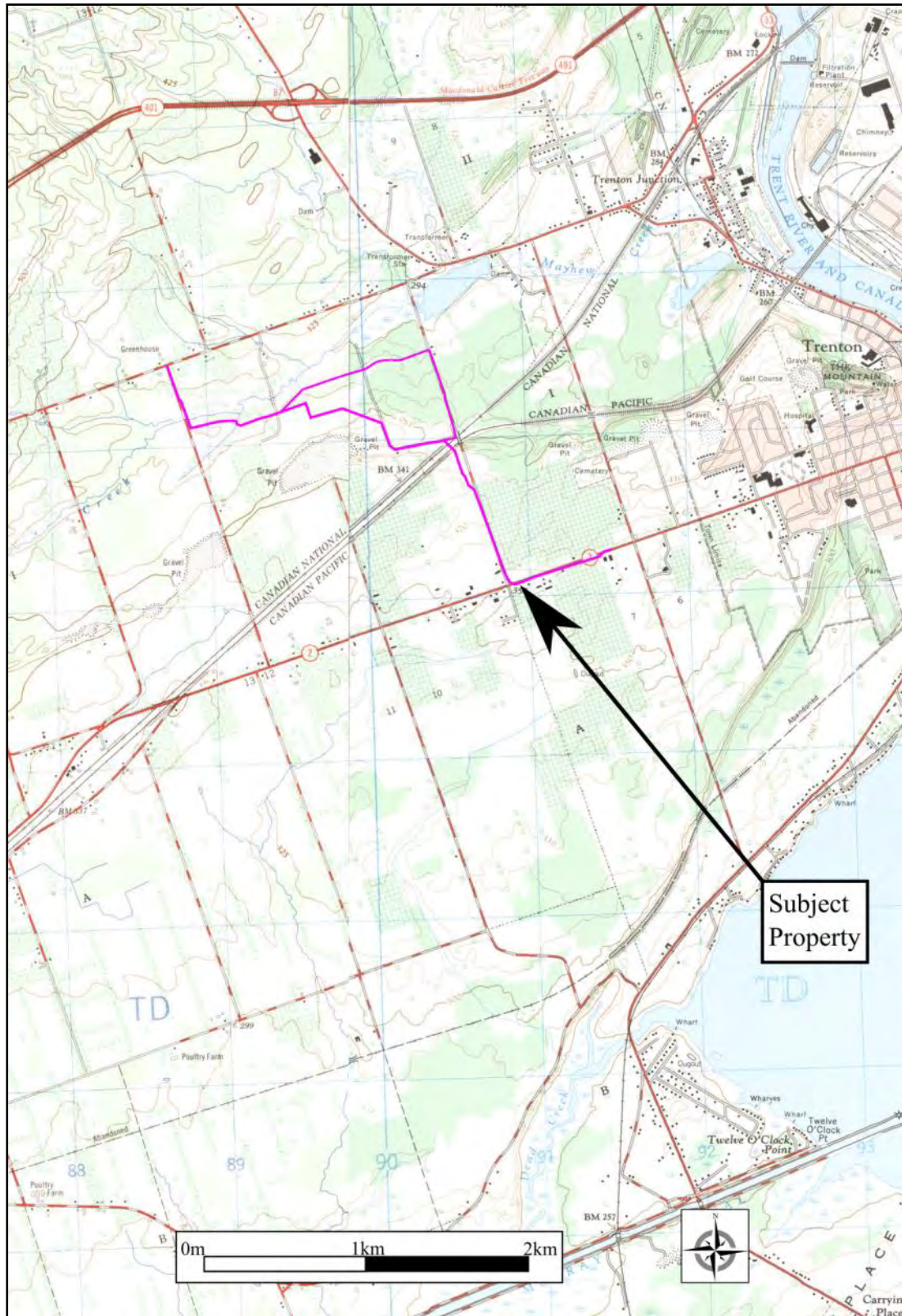


Image 18. A view of the dense vegetation within areas of the water main route.

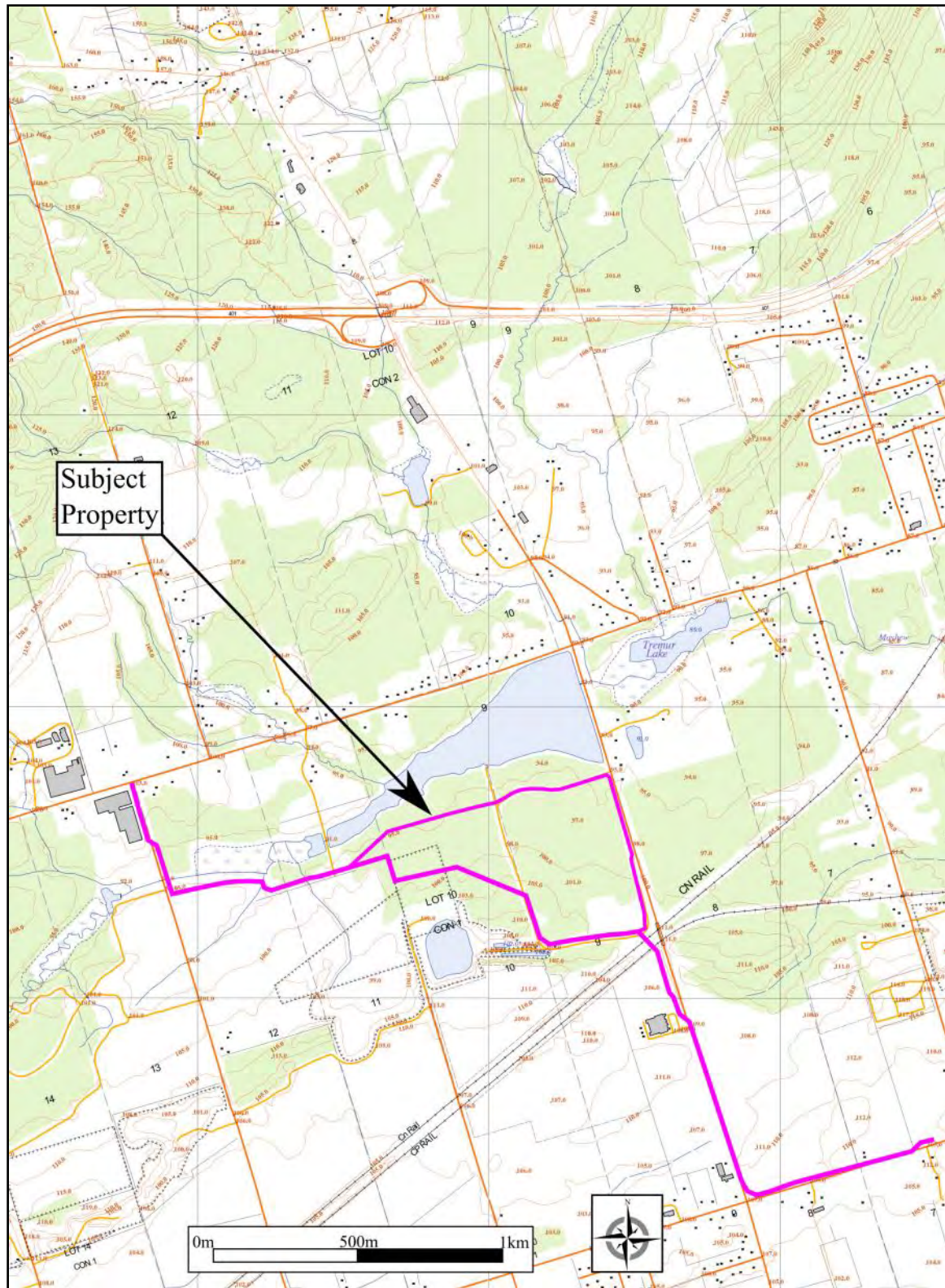
Maps



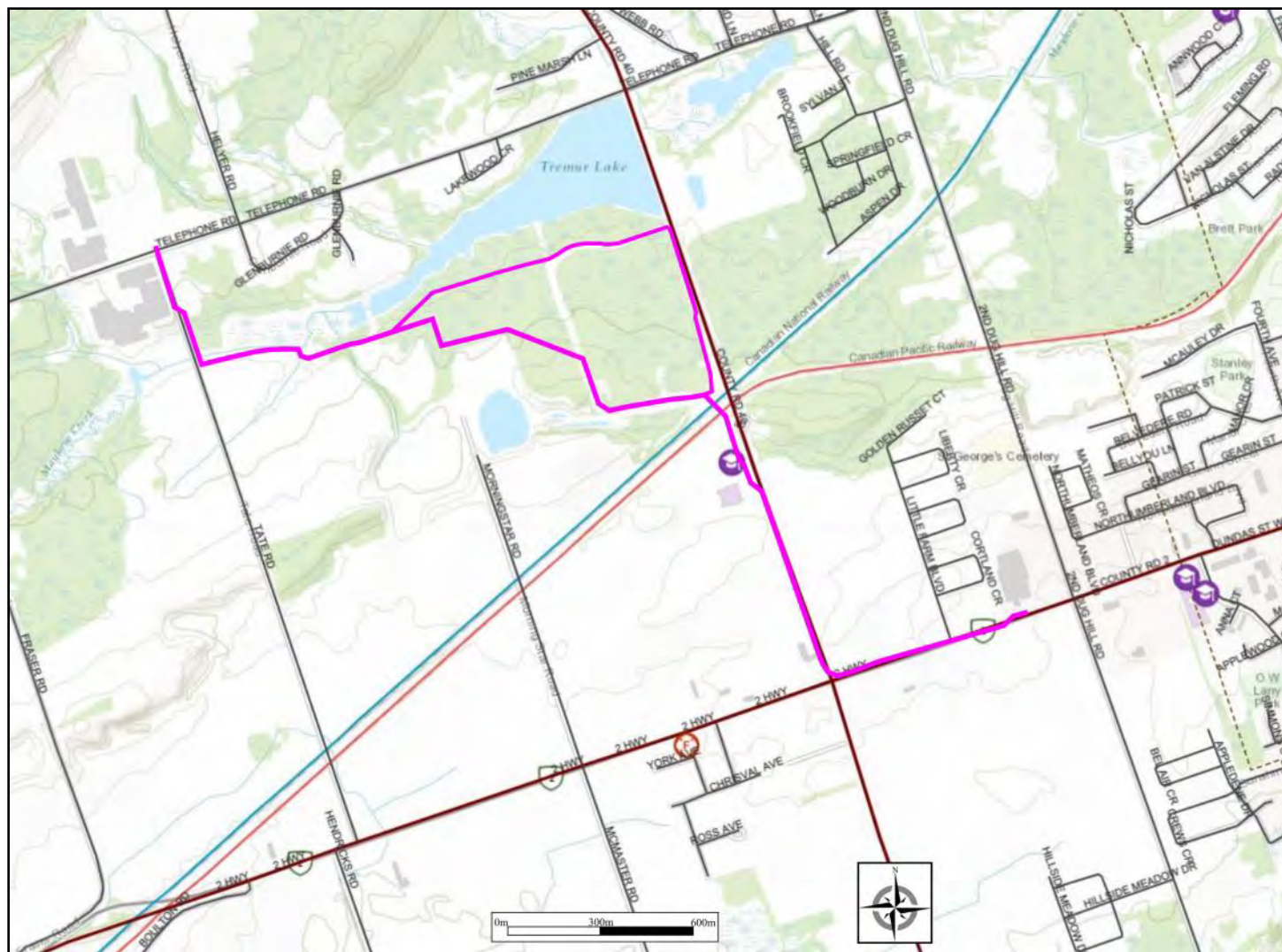
Map 1. The subject property location on 1:250 000 NTS plan (31 C).

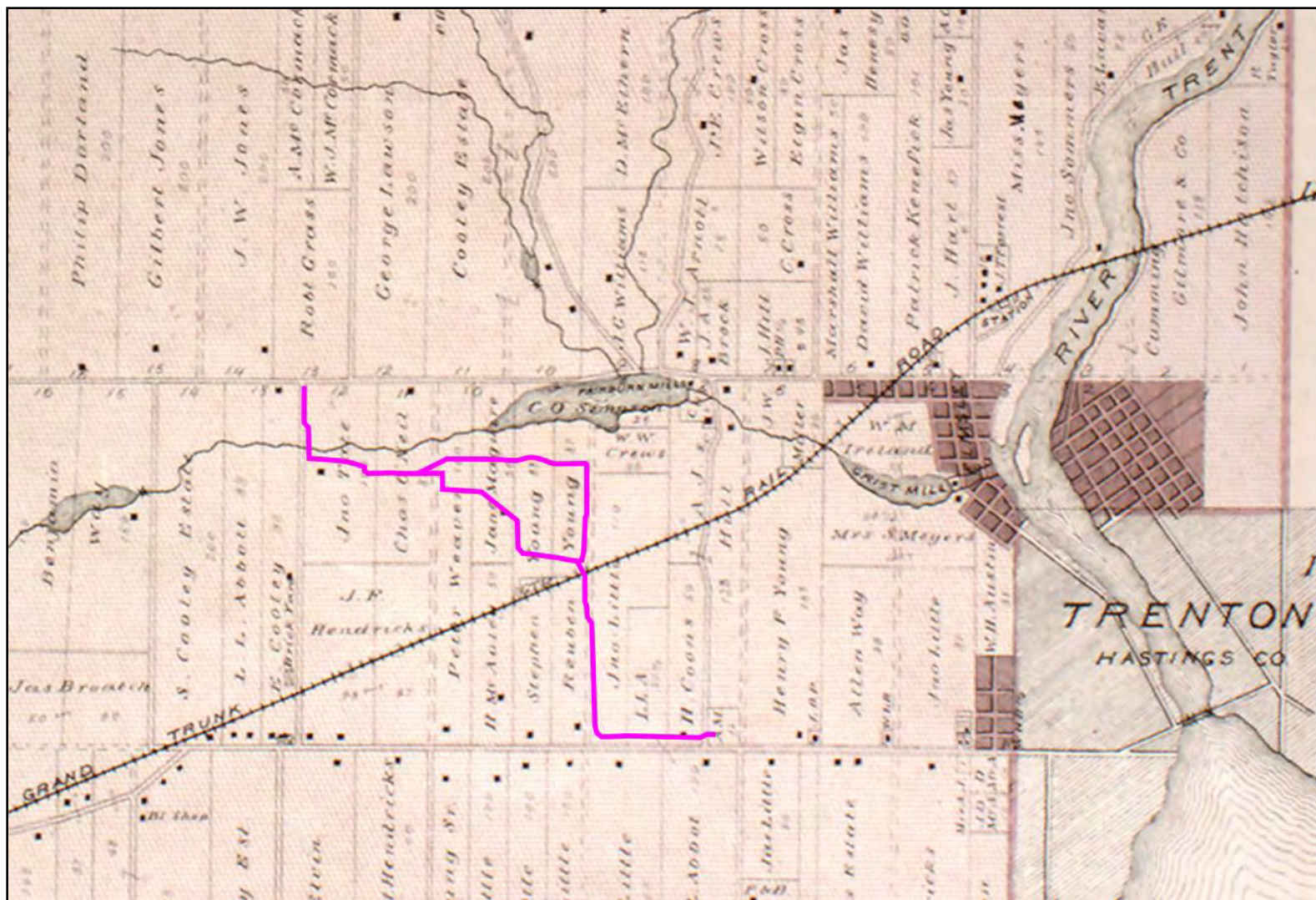


Map 2. The subject property location on 1:50 000 NTS plan (31C4b).

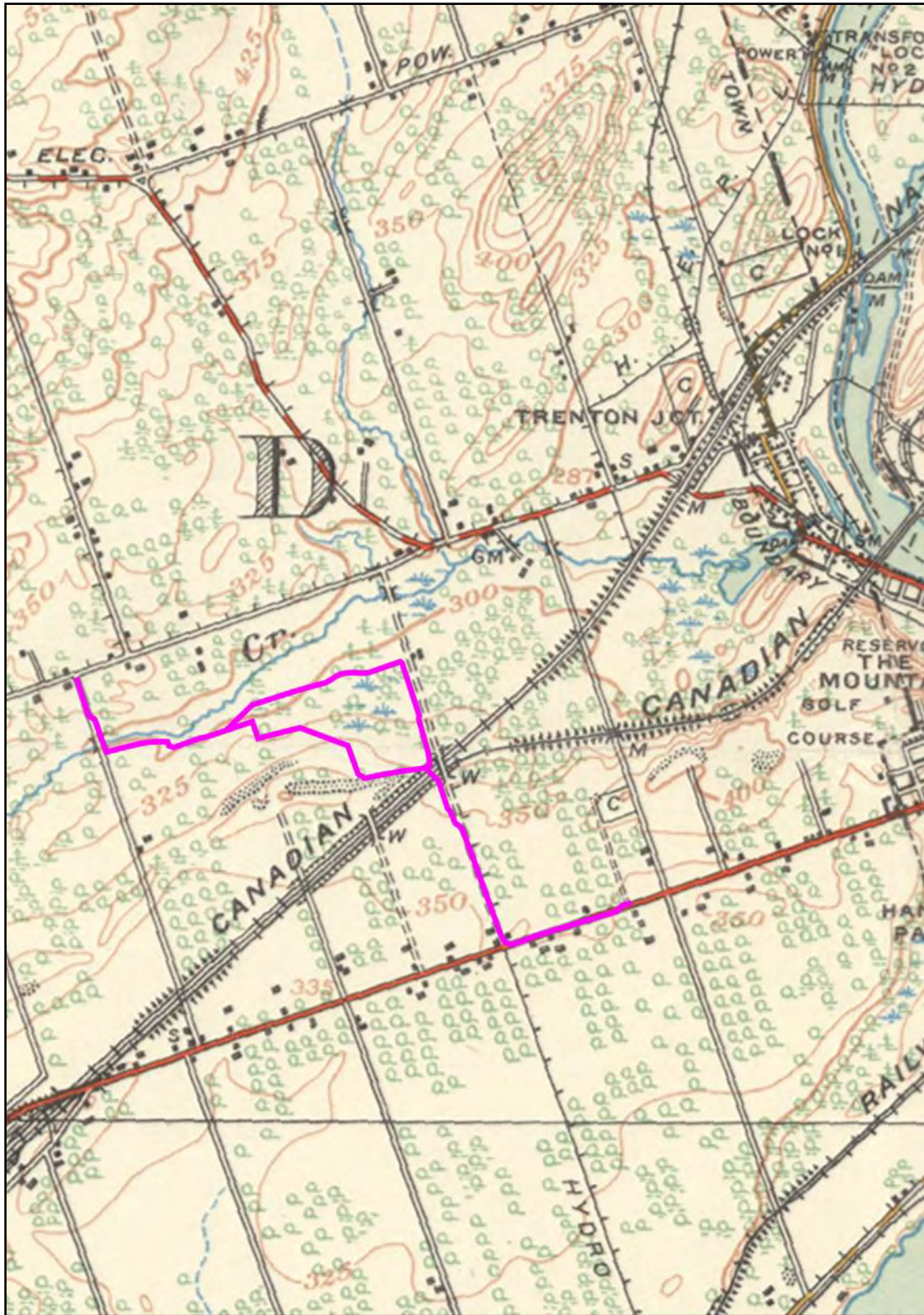


Map 3. The subject property location on 1:10 000 Ontario Base Map (OBM #1018 2850 48850/1018 2900 48850).





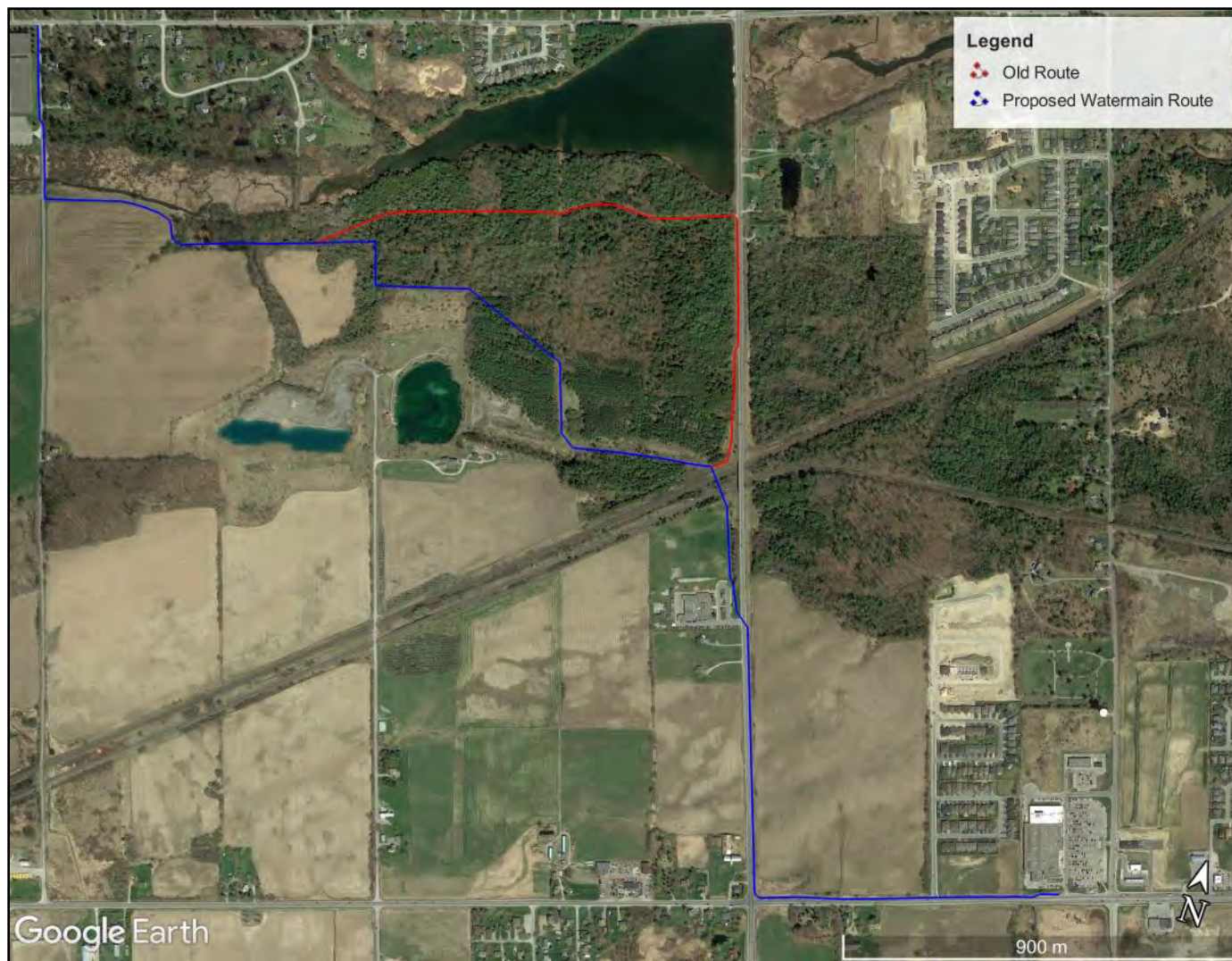
Map 6. A section from an 1878 map of Murray Township.



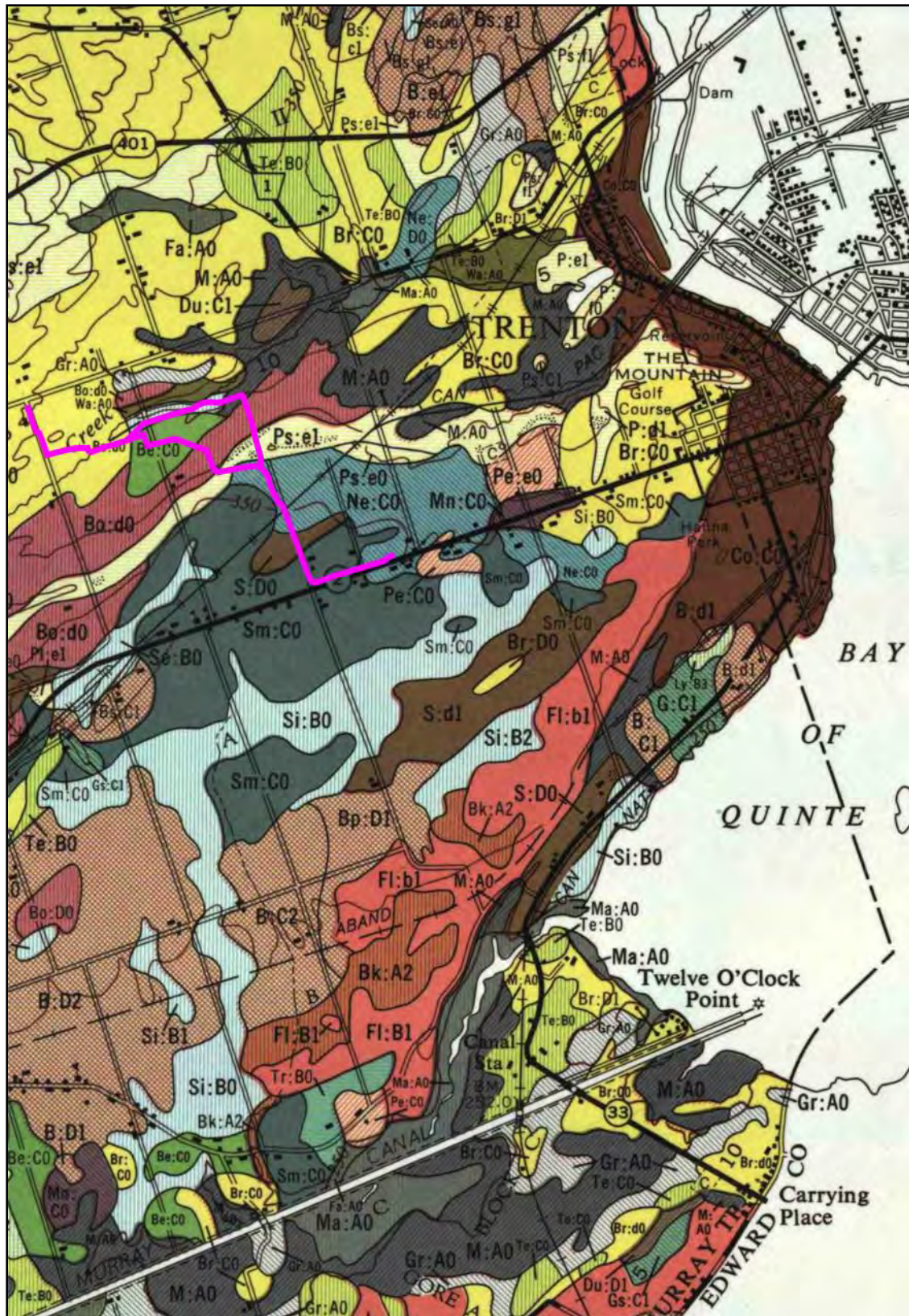
Map 7. A section from the 1932 National Topographic Series map (NTS Sheet 31C4).



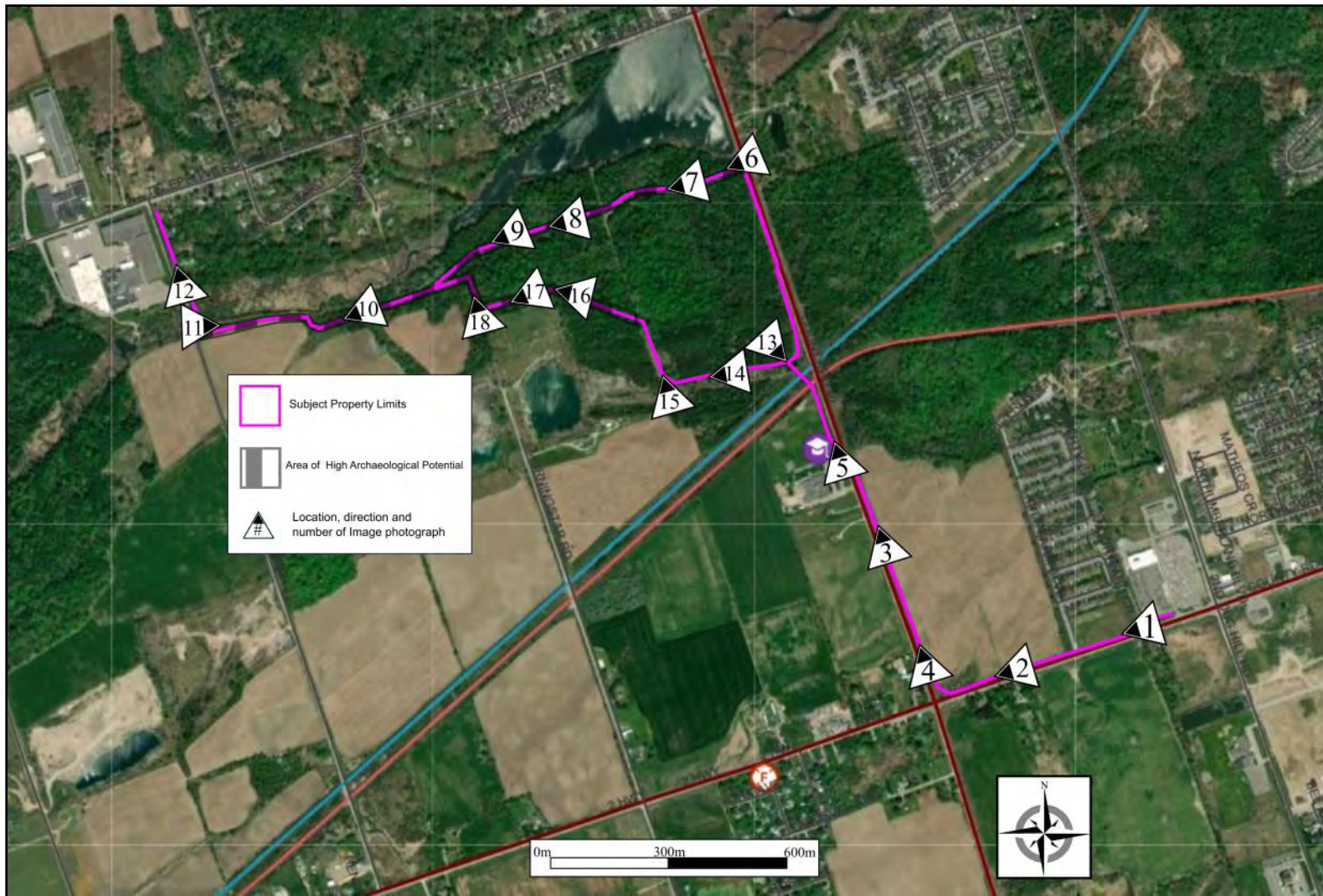
Map 8. An aerial view of the subject property and surrounding area in 1953 (53-4405-35-83).



Map 9. A current aerial view of the subject property and surrounding area (Hastings GIS).



Map 10. A section of the soil survey plan of Northumberland County (Hoffman and Acton, 1974).



Map 11. A plan of the archaeological potential within the subject property and Stage 2 assessment.

Appendix 1:

Michi Saagiig Historical/Background context:

The traditional homelands of the Michi Saagiig (Mississauga Anishinaabeg) encompass a vast area of what is now known as southern Ontario. The Michi Saagiig are known as “the people of the big river mouths” and were also known as the “Salmon People” who occupied and fished the north shore of Lake Ontario where the various tributaries emptied into the lake. Their territories extended north into and beyond the Kawarthas as winter hunting grounds on which they would break off into smaller social groups for the season, hunting and trapping on these lands, then returning to the lakeshore in spring for the summer months.

The Michi Saagiig were a highly mobile people, travelling vast distances to procure subsistence for their people. They were also known as the “Peacekeepers” among Indigenous nations. The Michi Saagiig homelands were located directly between two very powerful Confederacies: The Three Fires Confederacy to the north and the Haudenosaunee Confederacy to the south. The Michi Saagiig were the negotiators, the messengers, the diplomats, and they successfully mediated peace throughout this area of Ontario for countless generations.

Michi Saagiig oral histories speak to their people being in this area of Ontario for thousands of years. These stories recount the “Old Ones” who spoke an ancient Algonquian dialect. The histories explain that the current Ojibwa phonology is the 5th transformation of this language, demonstrating a linguistic connection that spans back into deep time. The Michi Saagiig of today are the descendants of the ancient peoples who lived in Ontario during the Archaic and Paleo-Indian periods. They are the original inhabitants of southern Ontario, and they are still here today.

The traditional territories of the Michi Saagiig span from Gananoque in the east, all along the north shore of Lake Ontario, west to the north shore of Lake Erie at Long Point. The territory spreads as far north as the tributaries that flow into these lakes, from Bancroft and north of the Haliburton highlands. This also includes all the tributaries that flow from the height of land north of Toronto like the Oak Ridges Moraine, and all of the rivers that flow into Lake Ontario (the Rideau, the Salmon, the Ganaraska, the Moira, the Trent, the Don, the Rouge, the Etobicoke, the Humber, and the Credit, as well as Wilmot and 16 Mile Creeks) through Burlington Bay and the Niagara region including the Welland and Niagara Rivers, and beyond. The western side of the Michi Saagiig Nation was located around the Grand River which was used as a portage route as the Niagara portage was too dangerous. The Michi Saagiig would portage from present-day Burlington to the Grand River and travel south to the open water on Lake Erie.

Michi Saagiig oral histories also speak to the occurrence of people coming into their territories sometime between 500-1000 A.D. seeking to establish villages and a corn growing economy – these newcomers included peoples that would later be known as the Huron-Wendat, Neutral, Petun/Tobacco Nations. The Michi Saagiig made Treaties with

these newcomers and granted them permission to stay with the understanding that they were visitors in these lands. Wampum was made to record these contracts, ceremonies would have bound each nation to their respective responsibilities within the political relationship, and these contracts would have been renewed annually (see Gitiga Migizi and Kapyrka 2015). These visitors were extremely successful as their corn economy grew as well as their populations. However, it was understood by all nations involved that this area of Ontario were the homeland territories of the Michi Saagiig.

The Odawa Nation worked with the Michi Saagiig to meet with the Huron-Wendat, the Petun, and Neutral Nations to continue the amicable political and economic relationship that existed – a symbiotic relationship that was mainly policed and enforced by the Odawa people.

Problems arose for the Michi Saagiig in the 1600s when the European way of life was introduced into southern Ontario. Also, around the same time, the Haudenosaunee were given firearms by the colonial governments in New York and Albany which ultimately made an expansion possible for them into Michi Saagiig territories. There began skirmishes with the various nations living in Ontario at the time. The Haudenosaunee engaged in fighting with the Huron-Wendat and between that and the onslaught of European diseases, the Iroquoian speaking peoples in Ontario were decimated. The onset of colonial settlement and missionary involvement severely disrupted the original relationships between these Indigenous nations. Disease and warfare had a devastating impact upon the Indigenous peoples of Ontario, especially the large sedentary villages, which mostly included Iroquoian speaking peoples. The Michi Saagiig were largely able to avoid the devastation caused by these processes by retreating to their wintering grounds to the north, essentially waiting for the smoke to clear. Michi Saagiig Elder Gitiga Migizi (2017) recounts:

“We weren’t affected as much as the larger villages because we learned to paddle away for several years until everything settled down. And we came back and tried to bury the bones of the Huron but it was overwhelming, it was all over, there were bones all over – that is our story.

There is a misnomer here, that this area of Ontario is not our traditional territory and that we came in here after the Huron-Wendat left or were defeated, but that is not true. That is a big misconception of our history that needs to be corrected. We are the traditional people, we are the ones that signed treaties with the Crown. We are recognized as the ones who signed these treaties and we are the ones to be dealt with officially in any matters concerning territory in southern Ontario.

We had peacemakers go to the Haudenosaunee and live amongst them in order to change their ways. We had also diplomatically dealt with some of the strong chiefs to the north and tried to make peace as much as possible. So we are very important in terms of keeping the balance of relationships in harmony.

Some of the old leaders recognized that it became increasingly difficult to keep the peace after the Europeans introduced guns. But we still continued to meet, and we still continued to have some wampum, which doesn’t mean we negated our territory or gave up our territory – we did not do that. We still consider ourselves a sovereign nation

despite legal challenges against that. We still view ourselves as a nation and the government must negotiate from that basis.”

Often times, southern Ontario is described as being “vacant” after the dispersal of the Huron-Wendat peoples in 1649 (who fled east to Quebec and south to the United States). This is misleading as these territories remained the homelands of the Michi Saagiig Nation.

The Michi Saagiig participated in eighteen treaties from 1781 to 1923 to allow the growing number of European settlers to establish in Ontario. Pressures from increased settlement forced the Michi Saagiig to slowly move into small family groups around the present day communities: Curve Lake First Nation, Hiawatha First Nation, Alderville First Nation, Scugog Island First Nation, New Credit First Nation, and Mississauga First Nation.

The Michi Saagiig have been in Ontario for thousands of years, and they remain here to this day.

****This historical context was prepared by Gitiga Migizi, a respected Elder and Knowledge Keeper of the Michi Saagiig Nation.****

Publication reference:

Gitiga Migizi and Julie Kapyrka
2015 Before, During, and After: Mississauga Presence in the Kawarthas. In *Peterborough Archaeology*, Dirk Verhulst, editor, pp.127-136. Peterborough, Ontario: Peterborough Chapter of the Ontario Archaeological Society.

APPENDIX D: Checklist

The **purpose of the checklist** is to determine:

- if a property(ies) or project area may contain archaeological resources i.e., have archaeological potential
- 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

Archaeological assessment

If you are not sure how to answer one or more of the questions on the checklist, you may want to hire a licensed consultant archaeologist (see page 4 for definitions) to undertake an archaeological assessment.

The assessment will help you:

- identify, evaluate and protect archaeological resources on your property or project area
- reduce potential delays and risks to your project

Note: By law, archaeological assessments **must** be done by a licensed consultant archaeologist. Only a licensed archaeologist can assess – or alter – an archaeological site.

What to do if you:

- **find an archaeological resource**

If you find something you think may be of archaeological value during project work, you must – by law – stop all activities immediately and contact a licensed consultant archaeologist

The archaeologist will carry out the fieldwork in compliance with the *Ontario Heritage Act* [s.48(1)].

- **unearth a burial site**

If you find a burial site containing human remains, you must immediately notify the appropriate authorities (i.e., police, coroner's office, and/or Registrar of Cemeteries) and comply with the *Funeral, Burial and Cremation Services Act*.

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 when completing this form.

Project or Property Name

Northwest Trenton Water Capacity

Project or Property Location (upper and lower or single tier municipality)

Northwest Trenton - County Hwy 2, County Rd 40, Tate Rd, Telephone Rd

Proponent Name

The City of Quinte West

Proponent Contact Information

Sam Hutton - shutton@greergalloway.com - (613) 966-3068 ext. 349

Screening Questions

	Yes	No
1. Is there a pre-approved screening checklist, methodology or process in place?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

If Yes, please follow the pre-approved screening checklist, methodology or process.

If No, continue to Question 2.

	Yes	No
2. Has an archaeological assessment been prepared for the property (or project area) and been accepted by MTCS?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

If Yes, do **not** complete the rest of the checklist. You are expected to follow the recommendations in the archaeological assessment report(s).

The proponent, property owner and/or approval authority will:

- summarize the previous assessment
- add this checklist to the project file, with the appropriate documents that demonstrate an archaeological assessment was undertaken e.g., MTCS letter stating acceptance of archaeological assessment report

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g., environmental assessment document
- maintained by the property owner, proponent or approval authority

If No, continue to Question 3.

	Yes	No
3. Are there known archaeological sites on or within 300 metres of the property (or the project area)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

	Yes	No
4. Is there Aboriginal or local knowledge of archaeological sites on or within 300 metres of the property (or project area)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

	Yes	No
5. Is there Aboriginal knowledge or historically documented evidence of past Aboriginal use on or within 300 metres of the property (or project area)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

	Yes	No
6. Is there a known burial site or cemetery on the property or adjacent to the property (or project area)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

	Yes	No
7. Has the property (or project area) been recognized for its cultural heritage value?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

If Yes to any of the above questions (3 to 7), do **not** complete the checklist. Instead, you need to hire a licensed consultant archaeologist to undertake an archaeological assessment of your property or project area.

If No, continue to question 8.

	Yes	No
8. Has the entire property (or project area) been subjected to recent, extensive and intensive disturbance?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

If Yes to the preceding question, do **not** complete the checklist. Instead, please keep and maintain a summary of documentation that provides evidence of the recent disturbance.

An archaeological assessment is not required.

If No, continue to question 9.

	Yes	No
9. Are there present or past water sources within 300 metres of the property (or project area)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

If Yes, an archaeological assessment is required.

If No, continue to question 10.

	Yes	No
10. Is there evidence of two or more of the following on the property (or project area)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

- elevated topography
- pockets of well-drained sandy soil
- distinctive land formations
- resource extraction areas
- early historic settlement
- early historic transportation routes

If Yes, an archaeological assessment is required.

If No, there is low potential for archaeological resources at the property (or project area).

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

In this context, the following definitions apply:

- **consultant archaeologist** means, as defined in Ontario regulation as an archaeologist who enters into an agreement with a client to carry out or supervise archaeological fieldwork on behalf of the client, produce reports for or on behalf of the client and provide technical advice to the client. In Ontario, these people also are required to hold a valid professional archaeological licence issued by the Ministry of Tourism, Culture and Sport.
- **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 be already in place for identifying archaeological potential, including:

- one prepared and adopted by the municipality e.g., archaeological management plan
- an environmental assessment process e.g., screening checklist for municipal bridges
- one that is approved by the Ministry of Tourism, Culture and Sport under the Ontario government's [Standards & Guidelines for Conservation of Provincial Heritage Properties](#) [s. B.2.]

2. Has an archaeological assessment been prepared for the property (or project area) and been accepted by MTCS?

Respond 'yes' to this question, if all of the following are true:

- an archaeological assessment report has been prepared and is in compliance with MTCS requirements
 - a letter has been sent by MTCS to the licensed archaeologist confirming that MTCS has added the report to the Ontario Public Register of Archaeological Reports (Register)
- the report states that there are no concerns regarding impacts to archaeological sites

Otherwise, if an assessment has been completed and deemed compliant by the MTCS, and the ministry recommends further archaeological assessment work, this work will need to be completed.

For more information about archaeological assessments, contact:

- approval authority
- proponent
- consultant archaeologist
- Ministry of Tourism, Culture and Sport at archaeology@ontario.ca

3. Are there known archaeological sites on or within 300 metres of the property (or project area)?

MTCS maintains a database of archaeological sites reported to the ministry.

For more information, contact MTCS Archaeological Data Coordinator at archaeology@ontario.ca.

4. Is there Aboriginal or local knowledge of archaeological sites on or within 300 metres of the property?

Check with:

- Aboriginal communities in your area
- local municipal staff

They may have information about archaeological sites that are not included in MTCS' database.

Other sources of local knowledge may include:

- property owner
- [local heritage organizations and historical societies](#)
- local museums
- [municipal heritage committee](#)
- published local histories

5. Is there Aboriginal knowledge or historically documented evidence of past Aboriginal use on or within 300 metres of the property (or property area)?

Check with:

- Aboriginal communities in your area
- local municipal staff

Other sources of local knowledge may include:

- property owner
- [local heritage organizations and historical societies](#)
- local museums
- [municipal heritage committee](#)
- published local histories

6. Is there a known burial site or cemetery on the property or adjacent to the property (or project area)?

For more information on known cemeteries and/or burial sites, see:

- Cemeteries Regulation Unit, Ontario Ministry of Consumer Services – for [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.

7. Has the property (or project area) been recognized for its cultural heritage value?

There is a strong chance there may be archaeological resources on your property (or immediate area) if it has been listed, designated or otherwise identified as being of cultural heritage value by:

- your municipality
- Ontario government
- Canadian government

This includes a property that is:

- designated under *Ontario Heritage Act* (the OHA), including:
 - individual designation (Part IV)
 - part of a heritage conservation district (Part V)
 - an archaeological site (Part VI)
- subject to:
 - an agreement, covenant or easement entered into under the OHA (Parts II or IV)
 - a notice of intention to designate (Part IV)
 - a heritage conservation district study area by-law (Part V) of the OHA
- listed on:
 - a municipal register or inventory of heritage properties
 - Ontario government’s list of provincial heritage properties
 - Federal government’s list of federal heritage buildings
- part of a:
 - National Historic Site
 - UNESCO World Heritage Site
- designated under:
 - *Heritage Railway Station Protection Act*
 - *Heritage Lighthouse Protection Act*
- subject of a municipal, provincial or federal commemorative or interpretive plaque.

To determine if your property or project area is covered by any of the above, see:

- Part A of the MTCS Criteria for Evaluating Potential for Built Heritage and Cultural Heritage Landscapes

Part VI – Archaeological Sites

Includes five sites designated by the Minister under Regulation 875 of the Revised Regulation of Ontario, 1990 (Archaeological Sites) and 3 marine archaeological sites prescribed under Ontario Regulation 11/06.

For more information, check [Regulation 875](#) and [Ontario Regulation 11/06](#).

8. Has the entire property (or project area) been subjected to recent extensive and intensive ground disturbance?

Recent: after-1960

Extensive: over all or most of the area

Intensive: thorough or complete disturbance

Examples of ground disturbance include:

- quarrying
- major landscaping – involving grading below topsoil
- building footprints and associated construction area
 - where the building has deep foundations or a basement
- infrastructure development such as:
 - sewer lines
 - gas lines
 - underground hydro lines
 - roads
 - any associated trenches, ditches, interchanges. **Note:** this applies only to the excavated part of the right-of-way; the remainder of the right-of-way or corridor may not have been impacted.

A ground disturbance does **not** include:

- agricultural cultivation
- gardening
- landscaping

Site visits

You can typically get this information from a site visit. In that case, please document your visit in the process (e.g., report) with:

- photographs
- maps
- detailed descriptions

If a disturbance isn't clear from a site visit or other research, you need to hire a licensed consultant archaeologist to undertake an archaeological assessment.

9. Are there present or past water bodies within 300 metres of the property (or project area)?

Water bodies are associated with past human occupations and use of the land. About 80-90% of archaeological sites are found within 300 metres of water bodies.

Present

- Water bodies:
 - primary - lakes, rivers, streams, creeks
 - secondary - springs, marshes, swamps and intermittent streams and creeks
- accessible or inaccessible shoreline, for example:
 - high bluffs
 - swamps
 - marsh fields by the edge of a lake
 - sandbars stretching into marsh

Water bodies not included:

- man-made water bodies, for example:
 - temporary channels for surface drainage
 - rock chutes and spillways
 - temporarily ponded areas that are normally farmed
 - dugout ponds
- artificial bodies of water intended for storage, treatment or recirculation of:
 - runoff from farm animal yards
 - manure storage facilities
 - sites and outdoor confinement areas

Past

Features indicating past water bodies:

- raised sand or gravel beach ridges – can indicate glacial lake shorelines
- clear dip in the land – can indicate an old river or stream
- shorelines of drained lakes or marshes
- cobble beaches

You can get information about water bodies through:

- a site visit
- aerial photographs
- 1:10,000 scale [Ontario Base Maps](#) - or [equally detailed and scaled maps](#).

10. Is there evidence of two or more of the following on the property (or project area)?

- elevated topography
- pockets of well-drained sandy soil
- distinctive land formations
- resource extraction areas
- early historic settlement
- early historic transportation routes

• **Elevated topography**

Higher ground and elevated positions - surrounded by low or level topography - often indicate past settlement and land use.

Features such as eskers, drumlins, sizeable knolls, plateaus next to lowlands, or other such features are a strong indication of archaeological potential.

Find out if your property or project area has elevated topography, through:

- site inspection
- aerial photographs
- [topographical maps](#)

• **Pockets of well-drained sandy soil, especially within areas of heavy soil or rocky ground**

Sandy, well-drained soil - in areas characterized by heavy soil or rocky ground - may indicate archaeological potential

Find out if your property or project area has sandy soil through:

- site inspection
- [soil survey reports](#)

- **Distinctive land formations**

Distinctive land formations include – but are not limited to:

- waterfalls
- rock outcrops
- rock faces
- caverns
- mounds, etc.

They were often important to past inhabitants as special or sacred places. The following sites may be present – or close to – these formations:

- burials
- structures
- offerings
- rock paintings or carvings

Find out if your property or project areas has a distinctive land formation through:

- a site visit
- aerial photographs
- 1:10,000 scale [Ontario Base Maps](#) - or [equally detailed and scaled maps](#).

- **Resource extraction areas**

The following resources were collected in these extraction areas:

- food or medicinal plants e.g., migratory routes, spawning areas, prairie
- scarce raw materials e.g., quartz, copper, ochre or outcrops of chert
- resources associated with early historic industry e.g., fur trade, logging, prospecting, mining

Aboriginal communities may hold traditional knowledge about their past use or resources in the area.

- **Early historic settlement**

Early Euro-Canadian settlement include – but are not limited to:

- early military or pioneer settlement e.g., pioneer homesteads, isolated cabins, farmstead complexes
- early wharf or dock complexes
- pioneers churches and early cemeteries

For more information, see below – under the early historic transportation routes.

- **Early historic transportation routes** - such as trails, passes, roads, railways, portage routes, canals.

For more information, see:

- historical maps and/or historical atlases
 - for information on early settlement patterns such as trails (including Aboriginal trails), monuments, structures, fences, mills, historic roads, rail corridors, canals, etc.
 - [Archives of Ontario](#) holds a large collection of historical maps and historical atlases
 - digital versions of historic atlases are available on the [Canadian County Atlas Digital Project](#)
- commemorative markers or plaques such as local, [provincial](#) or [federal](#) agencies
- [municipal heritage committee](#) or other [local heritage organizations](#)
 - for information on early historic settlements or landscape features (e.g., fences, mill races, etc.)
 - for information on commemorative markers or plaques

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

Northwest Trenton Water Capacity

Project or Property Location (upper and lower or single tier municipality)

Northwest Trenton - County Hwy 2, County Rd 40, Tate Rd, Telephone Rd

Proponent Name

The City of Quinte West

Proponent Contact Information

Sam Hutton - shutton@greergalloway.com - (613) 966-3068 ext. 349

Screening Questions

	Yes	No
1. Is there a pre-approved screening checklist, methodology or process in place?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

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?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

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 <i>Ontario Heritage Act</i> as being of cultural heritage value?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b. a National Historic Site (or part of)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c. designated under the <i>Heritage Railway Stations Protection Act</i> ?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d. designated under the <i>Heritage Lighthouse Protection Act</i> ?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e. identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office (FHBRO)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f. located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

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?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b. has or is adjacent to a known burial site and/or cemetery?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c. is in a Canadian Heritage River watershed?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d. contains buildings or structures that are 40 or more years old?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

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?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b. has a special association with a community, person or historical event?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c. contains or is part of a cultural heritage landscape?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

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 E: Notice of Commencement



City of Quinte West

NOTICE OF STUDY COMMENCEMENT

Northwest Trenton Water Capacity – Class Environmental Assessment



The City of Quinte West has identified the need for additional pressure and flow to support the water demands of future expansion in northwest Trenton. Currently, the primary transmission main to the northwest boundary of Trenton is a single 300mm watermain along Telephone Road.

A Class Environmental Assessment (EA) study has been initiated to determine a preferred solution that provides improved water services to the northwest of Trenton. Options for consideration include an additional transmission main, from a connection point on Highway 2, near Walmart, to Tate Road (see map). This option may require additional valve stations to achieve required pressures at the northwest boundary.

This project is being planned in accordance with the requirements for a Schedule “B” Municipal Class Environmental Assessment (EA). The Class EA process includes consultation with the public and review agencies, an evaluation of viable alternative solutions, an assessment of the impacts of the alternative solutions, identification of measures to mitigate any adverse impacts, and the selection of a preferred solution.

Public input into the planning and design of this project is encouraged. If you have any comments or questions regarding this project, or would like to receive further information, please send an email to one of the following project contacts:

Matt Tracey, Manager Water & Wastewater Services
Public Works & Environmental Services
City of Quinte West, 7 Creswell Drive, PO Box 490, Trenton, ON K8V 5R6
T: (613) 392-2841 ext. 4482 | F: (613) 392-7151
Email: mattt@quintewest.ca

Tony Guerrero, P. Eng.
The Greer Galloway Group Inc.
1620 Wallbridge Loyalist Road, Belleville, ON K8N 4Z5
T: (613) 966-3068 | F: (613) 966-3087
Email: tguerrera@greergalloway.com

This notice issued **May 11th, 2022.**

Under the *Freedom of Information and Protection of Privacy Act* and the *Environmental Assessment Act*, unless otherwise stated in the submission, any personal information such as name, address, telephone number and property location included in a submission will become part of the public record files for this project and will be released, if requested, to any person.

APPENDIX F: Public Information Centre



City of Quinte West

NOTICE OF PUBLIC INFORMATION CENTRE

Northwest Trenton Water Capacity – Class Environmental Assessment



The City of Quinte West has identified the need for additional pressure and flow to support the water demands of future expansion in northwest Trenton. Currently, the primary transmission main to the northwest boundary of Trenton is a single 300mm watermain along Telephone Road.

This project is being planned in accordance with the requirements for a Schedule “B” Municipal Class Environmental Assessment (EA). As part of the Class EA process for reviewing the upgrade of the sewage treatment system, public comment will be requested.

The preferred alternative is a new watermain in the following location:

- Starting on Dundas Street at Walmart, running westward to County Road 40
- Northward on County Road 40 to the Tremur Lake area
- Westward through the Tremur Lake area to Tate Road
- Northward on Tate Road to Telephone Road

The City of Quinte West is conducting a public information centre on **Tuesday October 25th, 2022 at 6:30pm to 7:30pm** at **City Hall**, in the **Council Chambers**. We are interested in hearing any comments or concerns that you may have about this project. Should you wish to ask a question, please send content in advance of the meeting to a member of the project team below. A public database of comments will be maintained and, except for personal information, included in the study documentation that will be made available for public review. Parties interested in providing input or that wish to obtain additional information at this stage of the study are asked to submit comments in writing to:

Matt Tracey, Manager Water & Wastewater Services
Public Works & Environmental Services
City of Quinte West, 7 Creswell Drive, PO Box 490,
Trenton, ON K8V 5R6
T: (613) 392-2841 ext. 4482 | F: (613) 392-7151
Email: mattt@quintewest.ca

Tony Guerrero, P. Eng.
The Greer Galloway Group Inc.
1620 Wallbridge Loyalist Road,
Belleville, ON K8N 4Z5
T: (613) 966-3068 | F: (613) 966-3087
Email: tguerrera@greergalloway.com

This notice issued **October 18th, 2022**.

Under the *Freedom of Information and Protection of Privacy Act* and the *Environmental Assessment Act*, unless otherwise stated in the submission, any personal information such as name, address, telephone number and property location included in a submission will become part of the public record files for this project and will be released, if requested, to any person.

TRENTON WATER DISTRIBUTION IMPROVEMENT

PUBLIC MEETING

OCT 25 / 22

SIGN IN SHEET.

SUSAN CURRY sue.curry.home@gmail.com

Andrea Brads paulandsandy@rogers.com

TERVOR WILSON

TANYA WILSON tanya.wilson887@outlook.com

Public Information Centre

Northwest Trenton Water Capacity

October 25th, 2022

Location:	City Hall, Council Chambers
Time:	6:30 pm



Background Information

The City of Quinte West owns the municipal water distribution system in Trenton. The City has identified the need for additional pressure and flow to support the water demands of future expansion in northwest Trenton. Currently, the primary transmission main to the northwest boundary of Trenton is a single 300mm watermain along Telephone Road.

These upgrades and recommendations will be carried out as a Schedule 'B' project under the terms of the Municipal Class Environmental Assessment (Class EA) process, which is approved under the Environmental Assessment Act.



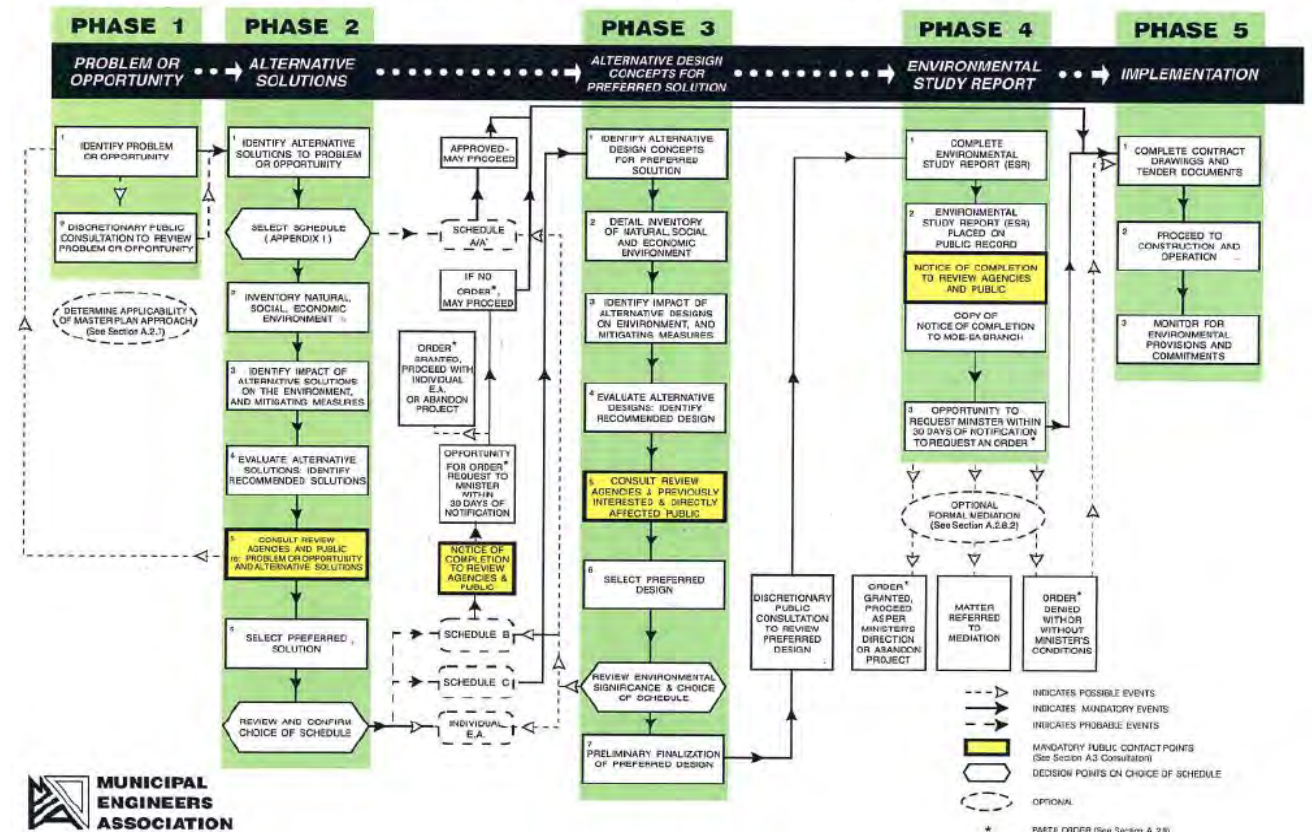
Municipal Class EA Process

- Meets the requirements of Ontario's Environmental Assessment Act by ensuring that potential environmental impacts of projects are considered.
- Consultation with the public and interested stakeholders including government review agencies and First Nations is required to identify environmental impacts of alternative solutions, develop mitigating measures and identify a preferred solution.

EXHIBIT A.2

MUNICIPAL CLASS EA PLANNING AND DESIGN PROCESS

NOTE: This flow chart is to be read in conjunction with Part A of the Municipal Class EA



 **MUNICIPAL ENGINEERS ASSOCIATION**



Alternatives

Do Nothing

This alternative would have the lowest capital cost and would involve using the existing water distribution network to support demands. This alternative is not feasible as it doesn't consider the demands of future expansion in northwest Trenton.

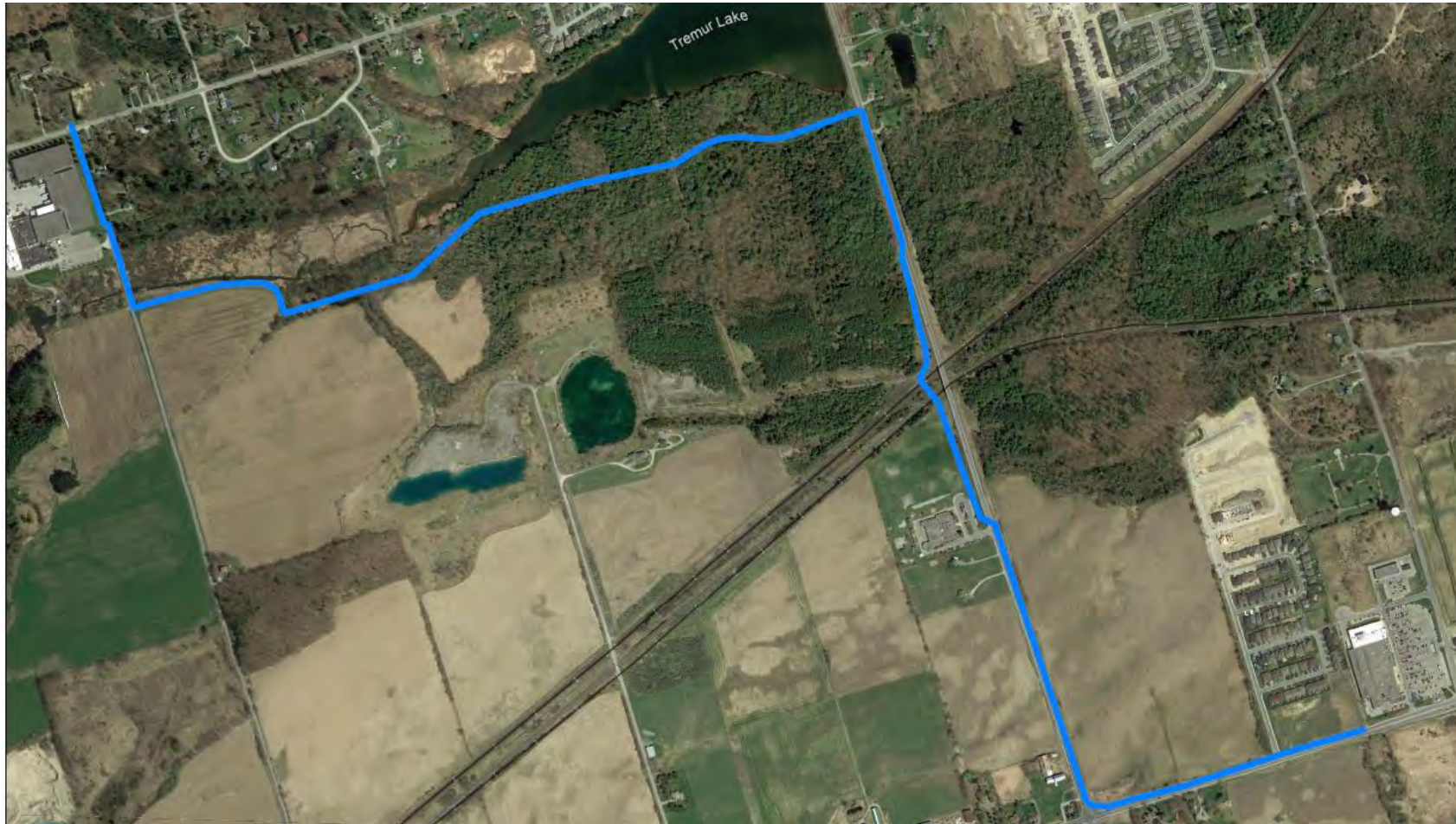
New Watermain on 2nd Dug Hill Road

This option involved a new 300mm PVC watermain along the length of 2nd Dug Hill Road, connecting at the Walmart Water Tower and the Telephone Road Intersection. Although this option would increase flows, it was calculated to be insufficient to support future demands.

New Watermain on Country Road 40

This option would involve a new watermain, of sizes 450mm to 500mm starting on Dundas Street West (Highway 2) at Walmart to the Tate Road/Telephone Road intersection through the Tremur Lake area and an additional valve chamber on Telephone road. This is the preferred alternative as it addresses future demand requirements.







Preferred Alternative

- The preferred alternative is a new watermain starting on Dundas Street at Walmart, running westward to County Road 40 then Northward on County Road 40. It is proposed to travel west through the Tremur Lake area before traveling Northward on Tate Road, connecting to the existing watermain at Telephone Road.
- The preferred alternative consists of a 500mm watermain from Walmart to Murray Centennial Public School and a 450mm from the school to Telephone Road.
- This alternative requires one rail crossing of CN and CPR rail properties of approximately 70 m in length.



Preferred Alternative

- The proposed route passes through the Tremur Lake property. An Environmental Impact Study (EIS) and Species At Risk (SAR) assessment is being completed to develop appropriate mitigation measures for protection of SAR and the ecosystem through the Tremur Lake area.
- The project has involved collaboration with the Lower Trent Conservation Authority (LTCA) and the Ministry of Environment Conservation and Parks (MECP) to identify strict construction sequencing and timelines that minimize the affect on the environment during and after construction.
- A stage 1 and stage 2 archeological assessment has been completed for the Tremur Lake area to ensure construction areas are absent of cultural and historical assets.



Thank you



APPENDIX G: Project Contacts

Stakeholder	Address	Number	Email	Attention	Comment
Ministry of Heritage, Sport, Tourism and Culture Industries			Joseph.Harvey@ontario.ca Karla.Barboza@ontario.ca	Barboza, Karla Harvey, Joseph	
Mississaugas of Scugog Island First Nation	22521 Island Road, Port Perry, ON L9L 1B6		info@scugogfirstnation.com;	Dave Mowat, Community Consultation Specialist	
Curve Lake First Nation	22 Winookeeda Road, Curve Lake, ON K0L 1R0		emilyw@curvelake.ca; juliek@curvelake.ca; kaitlinh@curvelake.ca;	Chief Emily Whetung, Julie Kapyrka, Lands Resource Consultation Liaison Kaitlin Hill, Lands Resource Consultation Liaison	
Mohawks of the Bay of Quinte	24 Meadow Drive, Tyendinaga Mohawk Territory, ON K0K 1X0		consultation@mbq-tmt.org lisam@mbq-tmt.org nicoles@mbq-tmt.org	Charlotte Gurnsey, Consultation Coordinator	
Alderville First Nation	11696 Second Line, P.O. Box 46 Roseneath, ON K0K 2X0		consultation@alderville.ca;	Chief Dave Mowat	
MNO Peterborough and District Wapiti Metis Council	1116 Hayes Street, Peterborough, ON K9J 5S8		ptbometis@gmail.com consultations@metisnation.org	Andy Dufrane, President CC the consultations email	For first nations also CC: inquiries@williamstreatiesfirstnations.ca
Kawartha Nishnawbe		807.623.8228	kawarthanishnawbecouncil@outlook.com CC: nodin.webb@hotmail.com samgharvey@live.com		
Hiawatha First Nation	123 Paudash Street R. R. #2	705-295-4421	chiefcarr@hiawathafn.ca tcowie@hiawathafn.ca sdavison@hiawathafn.ca	Chief Greg Cowie	
Chippewas of Georgina Island			jl.porte@georginaisland.com		
Chippewas of Rama First Nation			evelynb@ramafirstnation.ca shardayj@ramafirstnation.ca		
Chippewas of Beausoleil First Nation			info@chimnissing.ca jcopegog@chimnissing.ca		
Environment Canada, Public Works Canada	4900 Yonge St., Suite 1205 North York, ON M2N 6A6	416-952-0813	ONT.Web@pwgsc-tpsgc.gc.ca		
Lower Trent Conservaiton	714 Murray Street, R.R. 1, Trenton, Ontario, K8V 5P4	613-394-4829	janet.noyes@ltc.on.ca		
MECP - Eastern Region	1259 Gardiners Road, Unit 3 Kingston ON K7P 3J6	613 549 4000	Jacqueline.Fuller@ontario.ca, Jon.Orpana@ontario.ca, eanotification.eregion@ontario.ca	Notices go the the specific notice email	
Kawartha Pine Ridge District School board	1994 Fisher Drive Peterborough, ON K9J 6X6	705-742-9773	joseph_newbery@kprdsb.ca jeffrey_stewart@kprdsb.ca		
CN			permits.gld@cn.ca		
CP			Jack_Carello@cpr.ca		
Stan Bigford	Trenton Cold Storage	+1 (613) 394-3317 ext 230	stan@trencold.com		

APPENDIX H: Agency Correspondence



G R E E R
G A L L O W A Y
C O N S U L T I N G
E N G I N E E R S

1620 Wallbridge Loyalist Road

R.R. #5

Belleville, Ontario

K8N 4Z5

Telephone

(613) 966-3068

Facsimile

(613) 966-3087

E-mail

Belleville@greergalloway.com

Update Meeting

Project: Northwest Trenton Water Capacity EA

Location: Microsoft Teams

Time: 10:00 am, Tuesday the 27th of September 2022

Purpose of Meeting

The purpose of this meeting is to discuss the EIS that is required for the Quinte West Northwest Trenton Water Capacity EA.

Attendees:

- Matt Tracey, The City of Quinte West (QW)
- Tony Guerrero, Greer Galloway Group (GGG)
- Yazmin Ramirez (GGG)
- Sam Hutton (GGG)
- Monique Charette, Ministry of Environment, Conservation and Parks (MECP)
- Janet Noyes, Lower Trent Conservation (LTC)
- Kim Stephens (LTC)

1. Minutes

TG reviews project and latest updates from the project team. Two seasons have been completed so far. The proposal is the utilisation of a previous EIS, completed for a nearby property to the east of County Road 40, Exeter Court Subdivision.

MT Provides additional background. 2nd Dug Hill Road was previously considered for the watermain, but it was calculated that this option would not provide the required flow. This led to the Country Road 40 option and triggered the requirement for the EIS.

We are legally bound to provide water as part of a new development by next summer., so this is a timing issue. Winter was previously identified as the preferred time for construction in the wetland area.

The previous EIS completed for the Exeter Court Subdivision property over the road, identified certain species and we had hoped to use that EIS and include the same mitigations for those same species.

JN Would defer to MC for this but would expect there would be no issue with that approach.

MC has no issue with the use of the Exeter court EIS and assessment of suitability of mitigations. The proposed watermain is going through a different and a more natural habitat. Construction over winter might be an issue. Turtles may winter in the wetland during winter. I know there has been inspection of the area for wetland but we must investigate for overwintering sights. From the perspective of the Blanding's turtle, the active season would be safer, as they would be able to move away from construction. As long as there is flowing water they can winter in that location, not standing water.

Is there flowing water in the west?



**G R E E R
G A L L O W A Y**
C O N S U L T I N G
E N G I N E E R S

1620 Wallbridge Loyalist Road
R.R. #5
Belleville, Ontario
K8N 4Z5

Telephone
(613) 966-3068

Facsimile
(613) 966-3087

E-mail
Belleville@greengalloway.com

YR believes the area was dry in June/July however has not seen the area in spring so can't say there are definitely no wintering sites.

MC believes we need more information on potential wintering sites and turtles on the move in the area.

YR asks if a fence could be applied to the path that has been cleared to keep turtles out of the affected area?

MC explains if there are wintering sites there already a fence would obstruct the turtle's natural behaviour. We would need to consider the affect of that approach and determine if there are any wintering sites in the area already.

YR will look for sites and send pictures of anything she finds.

MT explains winter was only selected under recommendation from LTC, so the project team are open to change.

MC explains that the preferred time of year depends on what species we are looking to protect. For birds, winter is best, and for turtles' winter is the worst time to construct.

MT suggests that perhaps we can sequence construction to avoid turtle sites in winter and avoid trees for birds in summer.

MC worries about bats when considering trees, however, over winter bats and birds aren't a concern as they are either elsewhere or in caves. Routes of the equipment would need to be considered for any winter work as equipment would need to drive routes that do not affect turtle overwintering sites.

Over wintering sites would need to be mapped and we would have to determine how many over wintering sites are being removed and how much is staying. Trail maintenance is removed habitat, so we need to assess whether the turtles can still function and carry out their life processes after the trail is completed.

Generally, when over wintering habitats are affected, permits are required, but that depends on the project. We need to aim for the least affect to turtles, even after the project is completed, considering removed habitat.

MT asks if there is such a thing as a culvert that the turtles could use for crossing under the trail.

YR points out that a trail will effectively create two wetlands instead of one.

MC will consider use of a culvert and get back to the project team.

TG asks if turtles will want to nest on the gravel road.

MC is not certain but thinks we will need to consider best practice for vehicles in future.

MT explains that the trail will be used for bikes and walkers and will not be open to public vehicle access, so the city could address this through best practice for city employees.



G R E E R
G A L L O W A Y
C O N S U L T I N G
E N G I N E E R S

1620 Wallbridge Loyalist Road

R.R. #5

Belleville, Ontario

K8N 4Z5

Telephone

(613) 966-3068

Facsimile

(613) 966-3087

E-mail

Belleville@greengalloway.com

MC requests that areas are numbered as category 1, 2 or 3 so they can see which type of habitat the watermain is passing through.

YR agrees and asks about wood thrush.

MC explains that they are a species of special concern so are not covered under her ministry or their ESR processes.

YR asks if MC would be able to advise who covers them and what mitigations they may need.

MC knows that her ministry does not cover wood thrush but is not sure who does.

YR asks in the event a permit is required, what is the timeline for it to be issued, and would the ministry allow work to start prior to the issuing of the permit.

MC explains that if a permit is required then it will not be available for winter, so it is in everyone's interest, including the turtles, to avoid overwintering sites altogether.

YR asks about building extra habitats near wintering sites as a mitigation.

MC suggests this would depend on the benefit. If we have to build through wintering sites, then we could look at new habitats.

2. Follow ups

GGG

- Determine if wintering sites exist in the area and determine their locations
- Identify areas as category 1, 2 or 3
- Sequence construction to avoid wintering sites in winter and avoid trees in summer.
- Identify appropriate contact for information regarding wood thrush protections.

MECP

- Consider use of a culvert for under road turtle crossing and

End of Meeting

These minutes are intended to relate and record the matters discussed at the meeting and are not a verbatim record of the meeting. If there are any errors, omissions or comments please advise.

~ End of Minutes ~



G R E E R
G A L L O W A Y
C O N S U L T I N G
E N G I N E E R S

1620 Wallbridge Loyalist Road
R.R. #5
Belleville, Ontario
K8N 4Z5

Telephone
(613) 966-3068

Facsimile
(613) 966-3087

E-mail
Belleville@greergalloway.com

Update Meeting

Project: Northwest Trenton Water Capacity EA

Location: Microsoft Teams

Time: 10:00 am, Wednesday the 4th of January 2023

Purpose of Meeting

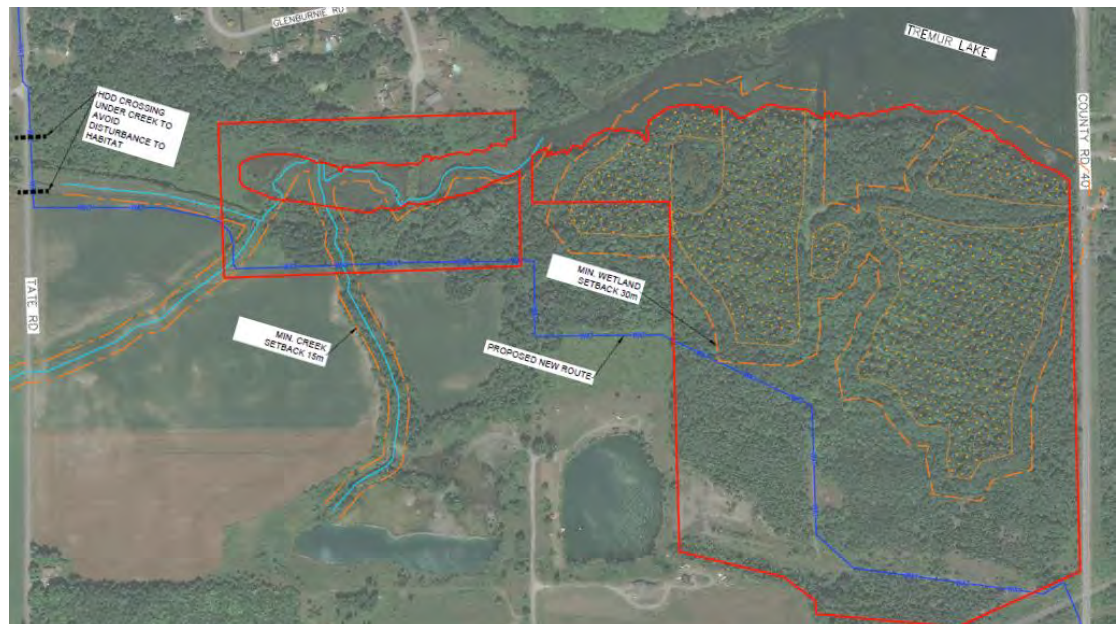
The purpose of this meeting is to discuss the EIS that is required for the Quinte West Northwest Trenton Water Capacity EA.

Attendees:

- Matt Tracey, The City of Quinte West (QW)
- Tony Guerrero, Greer Galloway Group (GGG)
- Yazmin Ramirez (GGG)
- Sam Hutton (GGG)
- Monique Charette, Ministry of Environment, Conservation and Parks (MECP)

1. Minutes

TG reviews the new proposed route of the watermain. There are three creek crossings. Two of the crossing that are nominally dry throughout significant portions of the year are proposed to be crossed using open cut, and the larger creek on Tate road that flows year round is proposed to be crossed using HDD. The new route does not cross through any wetlands and setbacks of 30 m are proposed for wetland areas. A setback of 15 meters is proposed for creeks.



MC asks how deep under the primary creek/ culvert are we proposing to drill?

TG confirms 2 meters are proposed for depth below the bottom of the culvert/creek.

MC approves and explains that 2 meters is what past projects she has seen have used. MC explains that she is most concerned with bats regarding clearing of trees



G R E E R
G A L L O W A Y
C O N S U L T I N G
E N G I N E E R S

and brush. She explains that clearing should be completed by April for bats and by March for birds so clearing by March as proposed is acceptable. In general, the updated route looks good regarding MC's previous concerns. MC would recommend including mitigations, for the two smaller creek crossings, for a wet spring. Specifically, MC would recommend mitigations to keep turtles out of the construction zone if those creeks are unexpectedly wet during construction.

2. **Follow ups**
GGG

- Include mitigations in the even the two smaller creeks are wet during construction

■

1620 Wallbridge Loyalist Road
R.R. #5
Belleville, Ontario
K8N 4Z5

■

Telephone
(613) 966-3068

■

Facsimile
(613) 966-3087

E-mail
Belleville@greergalloway.com

These minutes are intended to relate and record the matters discussed at the meeting and are not a verbatim record of the meeting. If there are any errors, omissions or comments please advise.

~ End of Minutes ~

From: [Samuel Hutton](#)
To: [EA Notices to ERegion \(MECP\)](#)
Cc: [Tony Guerrero](#)
Subject: RE: Northwest Trenton Water Capacity EA - Notice of Commencement
Date: May 16, 2022 14:25:00
Attachments: [Streamlined_ea_project_information_form.xlsx](#)

Hello,

Please see attached the completed Project Information Form for the Northwest Trenton Water Capacity project.

Thank you,

Samuel Hutton



1620 Wallbridge Loyalist Road, Belleville ON K8N 4Z5
Tel: (613) 966-3068 ext. 349; Fax: (613) 966-3087
Web Site: www.greergalloway.com
E-Mail: shutton@greergalloway.com

This email and any files transmitted with it are confidential and intended solely for the use of the individual or entity to whom they are addressed. If you have received this email in error, please notify the sender immediately, delete this email and its contents from your system and refrain from using, distributing or copying this email. If you are not the intended recipient, you are notified that disclosing, copying, distributing or taking any action in reliance on the contents of this information is strictly prohibited.

From: EA Notices to ERegion (MECP) <eanotification.eregion@ontario.ca>
Sent: Thursday, May 12, 2022 11:32 AM
To: Samuel Hutton <shutton@greergalloway.com>
Cc: Tony Guerrero <tguerrera@greergalloway.com>
Subject: RE: Northwest Trenton Water Capacity EA - Notice of Commencement

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

Hello Samuel

Thanks for this notice. I have referred your notice to other MECP staff to confirm a list of indigenous community consultation for you.

MECP also requires the attached Excel form to be filled out as we have done so since May 2018 for all Class EA projects in the province.

Thanks in advance.

Jon

Jon K. Orpana
Regional Environmental Planner
Environmental Assessment Branch
Ministry of the Environment, Conservation and Parks
Kingston Regional Office
PO Box 22032, 1259 Gardiners Road
Kingston, Ontario
K7M 8S5

Phone: (613) 548-6918
Fax: (613) 548-6908
Email: jon.orpana@ontario.ca

From: Samuel Hutton <shutton@greergalloway.com>
Sent: May 11, 2022 2:20 PM
To: 'ptbometis@gmail.com' <ptbometis@gmail.com>; Chief Laurie Carr <chiefcarr@hiawathafn.ca>; 'consultation@alderville.ca' <consultation@alderville.ca>; 'juliek@curvelake.ca' <juliek@curvelake.ca>; 'kaitlinh@curvelake.ca' <kaitlinh@curvelake.ca>; 'EmilyW@curvelake.ca' <EmilyW@curvelake.ca>; 'Janet Noyes' <janet.noyes@ltc.on.ca>; Harvey, Joseph (MHSTCI) <Joseph.Harvey@ontario.ca>; Barboza, Karla (MHSTCI) <Karla.Barboza@ontario.ca>; info@scugogfirstnation.com; Charlotte Gurnsey <consultation@mbq-tmt.org>; lisam@mbq-tmt.org; nicoles@mbq-tmt.org; ONT.Web@pwgsc-tpsgc.gc.ca; Fuller, Jacqueline (MECP) <Jacqueline.Fuller@ontario.ca>; Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>; Vicki.Mitchell@ontario.ca; EA Notices to ERegion (MECP) <eanotification.eregion@ontario.ca>; Joseph Newbery <joseph_newbery@kprdsb.ca>; jeffrey_stewart <jeffrey_stewart@kprdsb.ca>; GLD-Permits <permits.gld@cn.ca>; Jack Carello <Jack_Carello@cpr.ca>
Cc: consultations@metisnation.org; inquiries@williamstreatiesfirstnations.ca; Tony Guerrero <tguerrera@greergalloway.com>; Matt Tracey <mathtt@quintewest.ca>; 'Amy Russell' <amyr@quintewest.ca>; Tim Colasante <timc@quintewest.ca>; Jeff Shortt <jeffs@quintewest.ca>
Subject: Northwest Trenton Water Capacity EA - Notice of Commencement

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

Hello,

Please see attached the Notice of Commencement for the Northwest Trenton Water Capacity EA project.

Please contact us if you have any questions or comments.

Thank you,

Samuel Hutton



1620 Wallbridge Loyalist Road, Belleville ON K8N 4Z5
Tel: (613) 966-3068 ext. 349; Fax: (613) 966-3087
Web Site: www.greergalloway.com
E-Mail: shutton@greergalloway.com

This email and any files transmitted with it are confidential and intended solely for the use of the individual or entity to whom they are addressed. If you have received this email in error, please notify the sender immediately, delete this email and its contents from your system and refrain from using, distributing or copying this email. If you are not the intended recipient, you are notified that disclosing, copying, distributing or taking any action in reliance on the contents of this information is strictly prohibited.

From: [Janet Noyes](#)
To: [Samuel Hutton](#)
Cc: [Matt Tracey](#) ; [Tony Guerrero](#)
Subject: Re: Northwest Trenton Water Capacity EA - Notice of Commencement
Date: May 12, 2022 19:34:03
Attachments: [image001.jpg](#)

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

Hello Samuel;

Thank you for circulating Lower Trent Conservation (LTC) on this EA project. There are some features along this project scope that may come under Lower Trent Conservation's jurisdiction and we have been requested by the City to conduct a site visit to confirm these features.

We appreciated being circulated on any information regarding this project and will share our information with the project team once we have completed our site visit(s).

LTC File: GD-22-156

Regards,
Janet Noyes

Janet Noyes, P.Eng. (she/her)
Manager, Development Services & Water Resources
Lower Trent Conservation
613.394.3915 x211
janet.noyes@ltc.on.ca

****COVID-19 Notice:** We're now able to accommodate in-person meetings at our office by appointment only. We also remain available to serve you virtually or by phone. To ensure your continued safety, we're not open for unscheduled meetings at this time. Please call 613-394-4829 if your message is urgent..

The Lower Trent Conservation watershed is located on the traditional territory of the Anishnabek, Huron-Wendat, and Haudenosaunee (Iroquois) First Nations, and within the context of the Williams Treaty.

Disclaimer: This communication is intended for the addressee indicated above. It may contain information that is privileged, confidential or otherwise protected from disclosure under the Municipal Freedom of Information and Privacy Protection Act. If you have received this email in error, please notify me immediately.

From: Samuel Hutton <shutton@greergalloway.com>
Sent: Wednesday, May 11, 2022 2:19 PM
To: 'ptbometis@gmail.com' <ptbometis@gmail.com>; Chief Laurie Carr <chiefcarr@hiawathafn.ca>; 'consultation@alderville.ca' <consultation@alderville.ca>; 'juliek@curvelake.ca'

<juliek@curvelake.ca>; 'kaitlinh@curvelake.ca' <kaitlinh@curvelake.ca>; 'EmilyW@curvelake.ca' <EmilyW@curvelake.ca>; Janet Noyes <janet.noyes@ltc.on.ca>; Harvey, Joseph (MHSTCI) <Joseph.Harvey@ontario.ca>; Barboza, Karla (MHSTCI) <Karla.Barboza@ontario.ca>; info@scugogfirstnation.com <info@scugogfirstnation.com>; Charlotte Gurnsey <consultation@mbq-tmt.org>; lisam@mbq-tmt.org <lisam@mbq-tmt.org>; nicoles@mbq-tmt.org <nicoles@mbq-tmt.org>; ONT.Web@pwgsc-tpsgc.gc.ca <ONT.Web@pwgsc-tpsgc.gc.ca>; Fuller, Jacqueline (MECP) <Jacqueline.Fuller@ontario.ca>; Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>; Vicki.Mitchell@ontario.ca <Vicki.Mitchell@ontario.ca>; EA Notices to ERegion (MECP) <eanotification.eregion@ontario.ca>; joseph_newbery@kprdsb.ca <joseph_newbery@kprdsb.ca>; jeffrey_stewart@kprdsb.ca <jeffrey_stewart@kprdsb.ca>; GLD-Permits <permits.gld@cn.ca>; Jack Carello <Jack_Carello@cpr.ca>

Cc: consultations@metisnation.org <consultations@metisnation.org>; inquiries@williamstreatiesfirstnations.ca <inquiries@williamstreatiesfirstnations.ca>; Tony Guerrero <tguerrera@greergalloway.com>; Matt Tracey <mattt@quintewest.ca>; 'Amy Russell (amyr@quintewest.ca)' <amyr@quintewest.ca>; Tim Colasante <timc@quintewest.ca>; Jeff Shortt <jeffs@quintewest.ca>

Subject: Northwest Trenton Water Capacity EA - Notice of Commencement

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

Hello,

Please see attached the Notice of Commencement for the Northwest Trenton Water Capacity EA project.

Please contact us if you have any questions or comments.

Thank you,

Samuel Hutton



1620 Wallbridge Loyalist Road, Belleville ON K8N 4Z5
Tel: (613) 966-3068 ext. 349; Fax: (613) 966-3087
Web Site: www.greergalloway.com
E-Mail: shutton@greergalloway.com

This email and any files transmitted with it are confidential and intended solely for the use of the individual or entity to whom they are addressed. If you have received this email in error, please notify the sender immediately, delete this email and its contents from your system and refrain from using, distributing or copying this email. If you are not the intended recipient, you are notified that disclosing, copying, distributing or taking any action in reliance on the contents of this information is strictly prohibited.

APPENDIX I: First Nations Correspondence

Government Services Building
22 Winookeedaa Road
Curve Lake, Ontario K0L1R0



Phone: 705.657.8045
Fax: 705.657.8708
www.curvelakefirstnation.ca

June 15, 2022
VIA E-MAIL

Matt Tracey
Manager Water & Wastewater Services
Public Works & Environmental Services
City of Quinte West, 7 Creswell Drive, PO
Box 490, Trenton, ON K8V 5R6
613-392-2841
MattT@quintewest.ca

CC: Mr. Tony Guerrero, P.Eng.
tguerrera@greergalloway.com

RE: Northwest Trenton Water Capacity – Class Environmental Assessment

Dear Matt Tracey and Tony Guerrero,

I would like to acknowledge receipt of correspondence, which was received on May 11th 2022, regarding the above noted project. As you may be aware, the area in which your project is proposed is situated within the Traditional Territory of Curve Lake First Nation. Our First Nation's Territory is incorporated within the Williams Treaties Territory and was the subject of a claim under Canada's Specific Claims Policy, which has now been settled. All 7 First Nations within the Williams Treaties have had their harvesting rights legally re-affirmed and recognized through this settlement.

Curve Lake First Nation is requiring a File Fee for this project in the amount of \$250.00 as outlined in our *Consultation and Accommodation Standards*. This Fee includes project updates as well as review of standard material and project overviews. Depending on the amount of documents to be reviewed by the Consultation Department, additional fees may apply. **Please make this payment to Curve Lake First Nation Consultation Department and please indicate the project name or number on the cheque.**

If you do not have a copy of *Curve Lake First Nation's Consultation and Accommodation Standards* they are available at <https://www.curvelakefirstnation.ca/services-departments/lands-rights-resources/consultation/>. Hard copies are available upon request.

Based on the information that you have provided us with respect to the Northwest Trenton Water Capacity – Class Environmental Assessment, Curve Lake First Nation may require a Special Consultation Framework for this project. Information on this Framework can be found on page 9 of our *Consultation and Accommodation Standards* document.

Government Services Building
22 Winookeedaa Road
Curve Lake, Ontario K0L1R0



Phone: 705.657.8045
Fax: 705.657.8708
www.curvelakefirstnation.ca

In order to assist us in providing you with timely input, it would be appreciated if you could provide a summary statement indicating how the project will address the following areas that are of concern to our First Nation within our Traditional and Treaty Territory: possible environmental impact to our drinking water; endangerment to fish and wild game; impact on Aboriginal heritage and cultural values; and to endangered species; lands; savannas etc.

After the information is reviewed it is expected that you or a representative will be in contact to make arrangements to discuss this matter in more detail and possibly set up a date and time to meet with Curve Lake First Nation in person (or virtually).

Although we have not conducted exhaustive research nor have we the resources to do so, there may be the presence of burial or archaeological sites in your proposed project area. Please note, that we have particular concern for the remains of our ancestors. Should excavation unearth bones, remains, or other such evidence of a native burial site or any other archaeological findings, we must be notified without delay. In the case of a burial site, Council reminds you of your obligations under the *Cemeteries Act* to notify the nearest First Nation Government or other community of Aboriginal people which is willing to act as a representative and whose members have a close cultural affinity to the interred person. As I am sure you are aware, the regulations further state that the representative is needed before the remains and associated artifacts can be removed. Should such a find occur, we request that you contact our First Nation immediately.

Furthermore, Curve Lake First Nation also has available, trained Cultural Heritage Liaisons who are able to actively participate in the archaeological assessment process as a member of a field crew, the cost of which will be borne by the proponent. **Curve Lake First Nation expects engagement at Stage 1 of an archaeological assessment** so that we may include Indigenous Knowledge of the land in the process. We insist that at least one of our Cultural Heritage Liaisons be involved in any Stage 2-4 assessments, including test pitting, and/or pedestrian surveys to full excavation.

Although we may not always have representation at all stakeholder meetings, as rights holders', it is our wish to be kept apprised throughout all phases of this project. Please note that this letter does not constitute consultation, but it does represent the initial engagement process.

Should you have further questions or if you wish to hire a Liaison for a project, please contact Julie Kapyrka or Kaitlin Hill, Lands and Resources Consultation Liaisons, at 705-657-8045 or via email at JulieK@Curvelake.ca and KaitlinH@Curvelake.ca.

Yours sincerely,

Chief Emily Whetung
Curve Lake First Nation

From: [Kayla Wright](#)
To: MattT@quintewest.ca; [Tony Guerrero](#)
Cc: ["Julie Kapyrka"](#); ["Kaitlin Hill"](#); [Katie Young-Haddlesey](#); HeidiW@curvelake.ca; ["Emily Whetung"](#); [Francis M. Chua](#); info@4directionsconservation.com; [Gary Pritchard](#)
Subject: CLFN Response Letter for Northwest Trenton Water Capacity – Class Environmental Assessment
Date: June 20, 2022 18:55:35
Attachments: [CLFN Level 2 - Northwest Trenton Water Capacity - Class Environmental Assessment - City of Quinte West.pdf](#)
[Notice of Commencement - Northwest Trenton Water Capacity.pdf](#)

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

Hello Matt and Tony,

On behalf of Curve Lake First Nation, please accept this Level 2 Letter as it pertains to this project.

Thank you,

Kayla Wright, c.Tech.
Environment & Sustainability,
Community & Indigenous Relations Advisor
Francis Chua Consulting
kayla@francischua.com

From: [Tony Guerrero](#)
To: [Samuel Hutton](#)
Subject: FW: Quinte West Watermain Project
Date: November 15, 2022 14:52:03
Attachments: [image001.jpg](#)
[image002.jpg](#)
[image003.jpg](#)

For consultation file.

From: Tony Guerrero
Sent: Tuesday, November 15, 2022 2:50 PM
To: Tiffany McLellan <TiffanyM@curvelake.ca>
Subject: RE: Quinte West Watermain Project

Hello Tiffany,

I have a draft Stage 2 report that I will forward under separate email.

The meeting this Friday was requested by Jullie for a project briefing. Not necessarily restricted to archeology – more of a discussion on the project background, preferred route, Natural Environment, Archeological study, and timing.

After the natural environment work that has been completed to date, we are now considering moving the route of the watermain to avoid some sensitive areas. We have been working with the local conservation authority and the MECP on that, but we can discuss Friday. We are trying to avoid the wetland areas and potential turtle habitat.

Once we have the final route pinned down, I will have Abacus update their report to reflect the new position. That may include additional test pitting (I assume it will).

As for the project status, the City is hoping to wrap up the Class EA process as soon as possible. The original target was the end of 2022, but this route change is likely to delay completion slightly.

Construction is anticipated in early summer, 2023.

Hope to discuss with you on Friday.

Thanks
Tony

From: Tiffany McLellan <TiffanyM@curvelake.ca>
Sent: Tuesday, November 15, 2022 2:19 PM
To: Tony Guerrero <tguerrera@greergalloway.com>
Subject: RE: Quinte West Watermain Project

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

Hi Tony,

I believe we are writing for the first time to each other. I am trying to get caught up on so many outstanding projects it is quite the monumental task. I am writing today to make sure I am up to date with this project. I have the Stage 1, looks like from Michael Berry and Abacus. I don't have a Stage 2, I just want to be correct about that. If a Stage 2 WAS sent, please resend that to me as I don't seem to have it readily available.

I would also like to clarify what this upcoming meeting is about (this coming Friday Nov 18, 10am). I have a few conflicts with this meeting and I believe Kaitlin Hill would still be available. I am not sure what the focus of the meeting will be nor do I understand any conflict or questions raised. I am looking to you for clarity on the itinerary.

I would welcome any and all information that could further clarify where you are in this project.

That being said, just to introduce myself a little bit: My name is Tiffany McLellan. I started here with Curve Lake in September of this year. New to Curve Lake organization but not new to archaeology. I have been doing archaeology since 1999 and have many contacts – I believe I may already know Michael Berry, I certainly know his entourage (Nick Gromoff, Amanda Philips, Ted Stewart etc). I have an R License – R-494 (for archaeology) and was working in PEC area all this summer with Ground Truth Archaeology. Just a little bit about me. And I hope to work closely with your organization in whatever capacity our two groups will meet and work with one another.

Thank you for anything you can contribute to my better understanding where we are today with this.

Miigwetch



Tiffany McLellan
Archaeological Program Administrator
Curve Lake First Nation Government Services Building
22 Winookeeda Road, Curve Lake, ON K0L 1R0
P: 705.657.8045 ext. 237 C: 705.957.9549 F: 705.657.8708
W: www.curvelakefirstnation.ca
E: TiffanyM@curvelake.ca

From: Tony Guerrero <tguerrera@greergalloway.com>

Sent: October 3, 2022 3:59 PM

To: Julie Kapyrka <JulieK@curvelake.ca>; Michael Berry <abacusarchservices@gmail.com>

Cc: Kaitlin Hill <KaitlinH@curvelake.ca>; Samuel Hutton <shutton@greergalloway.com>; Tiffany

McLellan <TiffanyM@curvelake.ca>

Subject: RE: Quinte West Watermain Project

Julie, I have attached the draft report for Tiffany.

I am happy to have the meeting at a time that works for you, but can we try to move ahead so that we can arrange for the Stage 2 work ASAP please? We want to get that done before the weather turns.

Do you have any windows next week for our meeting?

Thank you

Tony

From: Julie Kapyrka <JulieK@curvelake.ca>

Sent: Monday, October 3, 2022 3:50 PM

To: Tony Guerrero <tguerrera@greergalloway.com>; Michael Berry <abacusarchservices@gmail.com>

Cc: Kaitlin Hill <KaitlinH@curvelake.ca>; Samuel Hutton <shutton@greergalloway.com>

Subject: RE: Quinte West Watermain Project

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

Miigwech Tony!

Thank you for the clarification. Greatly appreciated.

Yes I think it would be a great idea to set up meeting with us to discuss. We are booking into November now.

Can you please send the archaeological report to Tiffany McLellan TiffanyM@curvelake.ca – she is our Archaeological Program Administrator and can review.

All the best,



Dr. Julie Kapyrka
Lands & Resources Consultation Liaison
Curve Lake First Nation Government Services Building
22 Winookeeda Road, Curve Lake, ON K0L 1R0
P: 705.657.8045 ext. 239 F: 705.657.8708
W: www.curvelakefirstnation.ca
E: JulieK@curvelake.ca

From: Tony Guerrero <tguerrera@greergalloway.com>

Sent: October 3, 2022 3:38 PM

To: Julie Kapyrka <JulieK@curvelake.ca>; Michael Berry <abacusarchservices@gmail.com>

Cc: Kaitlin Hill <KaitlinH@curvelake.ca>; Samuel Hutton <shutton@greergalloway.com>

Subject: RE: Quinte West Watermain Project

Hello Julie

I believe we have sent a notification previously. We received confirmation from Curve Lake, and I believe the requested fee was sent in by the City of Quinte West. I have attached the response email from Curve Lake.

The project is a watermain extension to provide increased pressure and fire flow in the north eastern part of Trenton. Most of the watermain will run in the road allowance, but there is a significant section proposed through the Tremor Lake area. We are conducting an environmental impact study in consultation with the MECP and the Lower Trent Region CA. For the cultural heritage portion, we recognize the potential for archeological resources here. We retained Abacus to undertake a Stage 1 and Stage 2 study. Michael previously reached out to Curve Lake in order to involve your crew in the Stage 2 work.

He has provided a copy of the Stage 1 report for review, as requested.

Please let us know if you would like to set up a Zoom meeting to review the route and discuss the project in detail.

Thank you

Tony Guerrero

From: Julie Kapyrka <JulieK@curvelake.ca>

Sent: Monday, October 3, 2022 9:34 AM

To: Michael Berry <abacusarchservices@gmail.com>; Tony Guerrero <tguerrera@greergalloway.com>

Cc: Kaitlin Hill <KaitlinH@curvelake.ca>

Subject: RE: Quinte West Watermain Project

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

Aaniin Michael,

Please have the proponent reach out to us regarding this project.

We cannot engage on the archaeology until we have a fulsome understanding of this project.

I had previously requested that Greer-Galloway reach out to us with notification of this project. Please send us the original notification of the project and any corresponding documentation.

Then we can move forward.

Miigwech.

Kind regards,



Dr. Julie Kapyrka
Lands & Resources Consultation Liaison
Curve Lake First Nation Government Services Building
22 Winookeeda Road, Curve Lake, ON K0L 1R0
P: 705.657.8045 ext. 239 F: 705.657.8708
W: www.curvelakefirstnation.ca
E: JulieK@curvelake.ca

From: Michael Berry <abacusarchservices@gmail.com>

Sent: September 26, 2022 11:26 AM

To: Julie Kapyrka <JulieK@curvelake.ca>; Tony Guerrero <tguerrera@greergalloway.com>

Subject: Re: Quinte West Watermain Project

Dr. Kapyrka,

As requested please find attached a copy of the Stage 1 report prepared for the Quinte West Watermain project. Kindly review and provide comments. The report recognises high potential areas within the subject property. The proponent has fairly tight deadlines due to construction scheduling and has requested we proceed with Stage 2 assessment of these areas as soon as possible. I am prepared to move ahead with this testing next week. Please let me know if you have a Cultural Heritage Liaison available during this time period. I look forward to hearing from you.

Regards,

Michael

On Wed, Aug 10, 2022 at 2:32 PM Julie Kapyrka <JulieK@curvelake.ca> wrote:

Aaniin Michael,

Thank you for your e-mail. Curve Lake First Nation would be interested in sending out a Cultural Heritage Liaison for the Stage 2 fieldwork once that is scheduled. At the moment we do not have any available liaisons, but that could change at any time. Please let me know the dates you plan on doing this work.

We would also like to receive copies of all draft reports before submission to MTCS.

Please inform Greer Galloway Group that they should be reaching out to us regarding the full nature and scope of this project – beyond archaeology. They may have already but I cannot find

anything in my files. I would appreciate that.

Miigwech.

All the best,



Dr. Julie Kapyrka
Lands & Resources Consultation Liaison
Curve Lake First Nation Government Services Building
22 Winookeeda Road, Curve Lake, ON K0L 1R0
P: 705.657.8045 ext. 239 F: 705.657.8708
W: www.curvelakefirstnation.ca
E: JulieK@curvelake.ca

From: Michael Berry <abacusarchservices@gmail.com>

Sent: August 10, 2022 9:35 AM

To: Julie Kapyrka <JulieK@curvelake.ca>; Jordon MacArthur <JordonM@curvelake.ca>

Subject: Quinte West Watermain Project

Dr. Kapyrka,

I hope you are well and not too busy this summer. I have been retained by Greer Galloway Group, Belleville, to complete a Stage 1 and likely Stage 2 assessment for the installation of a watermain within Quinte West. The proposed watermain route starts near the Walmart in Trenton, runs westward along HWY#2, and then turns north on County Rd. 40. Areas of particular interest from an archeological perspective are the portions that go through the wooded area, where it turns westward again along Tremor Lake; a water reservoir maintained by the City (route plan is attached).

I wanted to reach out to let you know about the project and get feedback on your level of interest in involvement in this project. I look forward to hearing from you.

Regards,

Michael

--

Michael Berry, PhD, CAHP
Abacus Archaeological Services
353 Shane Street
Odessa ON, K0H 2H0
p. 613-530-7944
www.abacusarchaeology.ca
Member of APA

--

Michael Berry, PhD, CAHP
Abacus Archaeological Services
353 Shane Street
Odessa ON, K0H 2H0
p. 613-530-7944
www.abacusarchaeology.ca
Member of APA

From: [Tony Guerrero](#)
To: [Samuel Hutton](#)
Subject: FW: Tremor Lake archeological report for Quinte West
Date: November 15, 2022 14:52:54
Attachments: [image001.jpg](#)
[P246-0619-2022_27October2022_RE_St1-2 Quinte West Watermain.pdf](#)

For consultation file. (email)

From: Tony Guerrero
Sent: Tuesday, November 15, 2022 2:52 PM
To: Tiffany McLellan <TiffanyM@curvelake.ca>
Subject: FW: Tremor Lake archeological report for Quinte West

Hello Tiffany, please find the draft Stage One and Two (combined) report attached.

Thank you
Tony

From: Tony Guerrero
Sent: Tuesday, November 8, 2022 12:18 PM
To: 'kaitlinh@curvelake.ca' <KaitlinH@curvelake.ca>; 'juliek@curvelake.ca' <JulieK@curvelake.ca>
Cc: Michael Berry <abacusarchservices@gmail.com>
Subject: Tremor Lake archeological report for Quinte West

Hello Julie and Kaitlin

Please find attached the draft report prepared by Abacus, for the proposed watermain route for the North-Eastern Trenton Watermain EA. This is the project we are meeting about on the 18th.

If you have any comments, please let us know. Once you have completed the review, please let us know so that we can finalize and submit the report.

Thank you
Tony

From: Michael Berry <abacusarchservices@gmail.com>
Sent: Friday, November 4, 2022 10:22 AM
To: Tony Guerrero <tguerrera@greergalloway.com>
Subject: Re: FW: Route and Arch Checklist

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

Tony,

Please find attached a draft Stage 1-2 report for your review and an invoice for this project. Kindly forward comments on the report before I circulate to CLFN and confirm receipt of the invoice.

Regards,

Michael

On Wed, Sep 21, 2022 at 8:22 AM Tony Guerrero <tguerrera@greergalloway.com> wrote:

Thanks Michael.

From: Michael Berry <abacusarchservices@gmail.com>

Sent: Wednesday, September 21, 2022 8:19 AM

To: Tony Guerrero <tguerrera@greergalloway.com>

Subject: Re: FW: Route and Arch Checklist

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

Tony,

I completed the site inspection yesterday. I will forward the Stage 1 report to CLFN as requested and await comments. I don't believe that the roadside areas require any testing but the wooded sections near Tremur Lake will need to be assessed at Stage 2. This assessment can be conducted quite quickly thereafter with Curve Lake's help. I will make every effort to move this along as fast as possible.

Regards,

Michael

On Tue, Sep 20, 2022 at 5:23 PM Tony Guerrero <tguerrera@greergalloway.com> wrote:

Hi Michael

Just checking in. I understood initially that a Stage 2 would be required, as we are close to a watercourse.

I understand you are busy. Same issue here. I need your report to close out my EA. I have a PIC on October 25th.

I need to advertise it a few weeks prior to that. I will need your report to ensure there is no heritage issue before I can confirm my route. So I am getting a bit jumpy with the timing.

Thanks
Tony

From: Michael Berry <abacusarchservices@gmail.com>

Sent: Tuesday, September 6, 2022 3:06 PM

To: Tony Guerrero <tguerrera@greergalloway.com>

Subject: Re: FW: Route and Arch Checklist

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

Tony,

I will have a Stage 1 draft prepared in approximately a week's time. Sorry for the delays, I've been under a mountain of work this season. If Stage 2 is required I'm confident it will be completed this fall prior to construction tender deadlines.

Regards,

Michael

On Tue, Sep 6, 2022 at 1:47 PM Tony Guerrero <tguerrera@greergalloway.com> wrote:

The client is telling me they want to tender in November.

Thanks

From: Tony Guerrero

Sent: Tuesday, September 6, 2022 1:43 PM

To: Michael Berry <abacusarchservices@gmail.com>

Subject: RE: FW: Route and Arch Checklist

Michael

Please let me know what the status is here.

Thanks

Tony

From: Michael Berry <abacusarchservices@gmail.com>

Sent: Wednesday, August 10, 2022 3:04 PM

To: Tony Guerrero <tguerrera@greergalloway.com>

Subject: Re: FW: Route and Arch Checklist

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

Tony,

I'm just getting onto this file but have reached out to Curve Lake about involving a liaison with any field assessment. They are interested and would like to see Greer Galloway make contact with them regarding the full project scope, that beyond the archaeology. I plan to make the site visit next week and have a draft Stage 1 prepared shortly thereafter.

Regards,

Michael

On Tue, Aug 9, 2022 at 1:53 PM Tony Guerrero <tguerrera@greergalloway.com> wrote:

Hi Michael

How is the Quinte West work coming along?

Get [Outlook for Android](#)

From: Tony Guerrero

Sent: Tuesday, July 12, 2022 4:18:29 PM

To: Michael Berry <abacusarchservices@gmail.com>

Subject: RE: FW: Route and Arch Checklist

I should add – I somehow missed your email when you sent it, so please schedule as soon as you can.

From: Tony Guerrero

Sent: Tuesday, July 12, 2022 1:21 PM

To: Michael Berry <abacusarchservices@gmail.com>

Subject: RE: FW: Route and Arch Checklist

Michael

I just got approval to do this. Please proceed.

From: Michael Berry <abacusarchservices@gmail.com>

Sent: Friday, June 24, 2022 8:56 AM

To: Tony Guerrero <tguerrera@greergalloway.com>

Subject: Re: FW: Route and Arch Checklist

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

Tony,

Thanks for the information. I would have to begin with a Stage 1 of the entire proposed route which would then identify sections requiring Stage 2 as per MHSTCI Standards and Guidelines. The costs for this is my standard Stage 1 fee of \$2825 + HST. The Stage 2 costing would have to follow the Stage 1 advice but I would expect total costs similar to that at Frankford (apx. \$5000-\$6000 in total costs). If CLFN wishes to provide monitors the costs of which would be added to the project however I am now adding 1 or 2 days of my time (@\$525/day) to allow for the professional time spent in meetings/phone calls/emails/etc. during the consultation process. They charge for time plus travel so costing this is difficult without knowing where the monitor is coming from. I am quite busy this season but would be able to fit the work in during July. I trust this suits your plans. Please let me know if you have any questions or require greater detail.

Regards,

Michael

On Wed, Jun 22, 2022 at 7:20 AM Tony Guerrero
<tguerrera@greergalloway.com> wrote:

Hi Michael

I do not need a full proposal from you, just a basic workplan and budget. As per my email last night, please allow for consultation/interaction with Curve Lake, similar to the Frankford project.

Thank you

Tony

From: Michael Berry <abacusarchservices@gmail.com>

Sent: Tuesday, June 21, 2022 7:29 PM
To: Tony Guerrero <tguerrera@greergalloway.com>
Subject: Re: FW: Route and Arch Checklist

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

Tony,

I did get your message today. Sorry for my delayed response. I will review and provide a proposal for your review. As per your question, any area of the line within 300 m of a water source (or other indicator of significance) would trigger Stage 2 assessment.

Regards,

Michael

On Tue, Jun 14, 2022 at 10:39 AM Tony Guerrero
<tguerrera@greergalloway.com> wrote:

Hello Michael

We are working on an Environmental Assessment job for the City of QW. This is similar to the job we worked together on two years ago for the watermain between Trenton and Frankford.

In this case, we are planning to put a few KM (Sam please provide distance) of watermain along a new route. This starts near the Walmart in Trenton, runs westward along HWY#2, and then turns north on County Rd. 40. The part of the route that gets more involved from an archeological perspective is the portion that goes through the wooded area, where we turn westward again along Tremor Lake. This is a water reservoir maintain by the City.

I believe this proximity to water triggers at least a Phase 1, and possible a Phase 2. Please confirm.

I would like you to price the work required (i.e. if a Phase 2 is going to be require, please include it) to me, working as a Sub to GGG.

Please let me know if you have any questions.

Thank you

Tony Guerrero

From: Samuel Hutton <shutton@greergalloway.com>
Sent: Tuesday, June 14, 2022 9:56 AM
To: Tony Guerrero <tguerrera@greergalloway.com>
Subject: Route and Arch Checklist

Hi Tony,

See attached the route map and the checklist I started to fill out (I put myself as the contact, this can be updated if need be).

Thanks,

Samuel Hutton



[1620 Wallbridge Loyalist Road, Belleville ON K8N 4Z5](#)

Tel: (613) 966-3068 ext. 349; Fax: (613) 966-3087

Web Site: www.greergalloway.com

E-Mail: shutton@greergalloway.com

This email and any files transmitted with it are confidential and intended solely for the use of the individual or entity to whom they are addressed. If you have received this email in error, please notify the sender immediately, delete this email and its contents from your system and refrain from using, distributing or copying this email. If you are not the intended recipient, you are notified that disclosing, copying, distributing or taking any action in reliance on the contents of this information is strictly prohibited.

--

Michael Berry, PhD, CAHP
Abacus Archaeological Services

353 Shane Street

Odessa ON, K0H 2H0

p. 613-530-7944
www.abacusarchaeology.ca

Member of APA

--

Michael Berry, PhD, CAHP
Abacus Archaeological Services

353 Shane Street

Odessa ON, K0H 2H0

p. 613-530-7944
www.abacusarchaeology.ca

Member of APA

--

Michael Berry, PhD, CAHP
Abacus Archaeological Services
353 Shane Street

Odessa ON, K0H 2H0
p. 613-530-7944
www.abacusarchaeology.ca
Member of APA

--

Michael Berry, PhD, CAHP
Abacus Archaeological Services
353 Shane Street
Odessa ON, K0H 2H0
p. 613-530-7944
www.abacusarchaeology.ca
Member of APA

--

Michael Berry, PhD, CAHP
Abacus Archaeological Services
353 Shane Street
Odessa ON, K0H 2H0
p. 613-530-7944
www.abacusarchaeology.ca
Member of APA

--

Michael Berry, PhD, CAHP
Abacus Archaeological Services
353 Shane Street
Odessa ON, K0H 2H0
p. 613-530-7944
www.abacusarchaeology.ca
Member of APA

--

Michael Berry, PhD, CAHP
Abacus Archaeological Services
353 Shane Street
Odessa ON, K0H 2H0
p. 613-530-7944
www.abacusarchaeology.ca
Member of APA

From: [Dave Simpson](#)
To: [Samuel Hutton](#)
Cc: [Dave Mowat](#)
Subject: RE: Northwest Trenton Water Capacity EA - Notice of Commencement
Date: May 12, 2022 09:27:57
Attachments: [image001.jpg](#)

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

I am interested to see if any archaeological study has been conducted in the area to be impacted by excavation and also if any water ways are going to be impacted. Please keep us posted as the project moves forward

Thank youi

Dave Simpson
Alderville First Nation
consultation@alderville.ca
905 375-5480

From: Samuel Hutton <shutton@greergalloway.com>
Sent: May 11, 2022 2:20 PM
To: 'ptbometis@gmail.com' <ptbometis@gmail.com>; Chief Laurie Carr <chiefcarr@hiawathafn.ca>; Dave Simpson <consultation@alderville.ca>; 'juliek@curvelake.ca' <juliek@curvelake.ca>; 'kaitlinh@curvelake.ca' <kaitlinh@curvelake.ca>; 'EmilyW@curvelake.ca' <EmilyW@curvelake.ca>; 'Janet Noyes' <janet.noyes@ltc.on.ca>; Harvey, Joseph (MHSTCI) <Joseph.Harvey@ontario.ca>; Barboza, Karla (MHSTCI) <Karla.Barboza@ontario.ca>; info@scugogfirstnation.com; Charlotte Gurnsey <consultation@mbq-tmt.org>; lisam@mbq-tmt.org; nicoles@mbq-tmt.org; ONT.Web@pwgsc-tpsgc.gc.ca; Fuller, Jacqueline (MECP) <Jacqueline.Fuller@ontario.ca>; Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>; Vicki.Mitchell@ontario.ca; EA Notices to ERegion (MECP) <eanotification.eregion@ontario.ca>; joseph_newbery@kprdsb.ca; jeffrey_stewart@kprdsb.ca; GLD-Permits <permits.gld@cn.ca>; Jack Carello <Jack_Carello@cpr.ca>
Cc: consultations@metisnation.org; inquiries@williamstreatiesfirstnations.ca; Tony Guerrero <tguerrera@greergalloway.com>; Matt Tracey <mattt@quintewest.ca>; 'Amy Russell (amyr@quintewest.ca)' <amyr@quintewest.ca>; Tim Colasante <timc@quintewest.ca>; Jeff Shortt <jeffs@quintewest.ca>
Subject: Northwest Trenton Water Capacity EA - Notice of Commencement

Hello,

Please see attached the Notice of Commencement for the Northwest Trenton Water Capacity EA project.

Please contact us if you have any questions or comments.

Thank you,

Samuel Hutton



1620 Wallbridge Loyalist Road, Belleville ON K8N 4Z5
Tel: (613) 966-3068 ext. 349; Fax: (613) 966-3087
Web Site: www.greergalloway.com
E-Mail: shutton@greergalloway.com

This email and any files transmitted with it are confidential and intended solely for the use of the individual or entity to whom they are addressed. If you have received this email in error, please notify the sender immediately, delete this email and its contents from your system and refrain from using, distributing or copying this email. If you are not the intended recipient, you are notified that disclosing, copying, distributing or taking any action in reliance on the contents of this information is strictly prohibited.

APPENDIX J: Public Correspondence

From: [Matt Tracey](#)
To: [Samuel Hutton](#)
Subject: Fwd: Northwest Trenton Water Capacity
Date: October 25, 2022 09:48:55

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

For the project file.

Matt Tracey

Manager Water and Wastewater Services
Public Works and Environmental Services
City of Quinte West

[613.392.2841](tel:613.392.2841) x4482
mattt@quintewest.ca
www.quintewest.ca

----- Forwarded message -----

From: Matt Tracey <mattt@quintewest.ca>
Date: Tue, Oct 25, 2022 at 9:26 AM
Subject: Re: Northwest Trenton Water Capacity
To: [REDACTED]
Cc: Paul Belej <paulb@quintewest.ca>, Tony Guerrero <tguerrera@greergalloway.com>

Good morning Tanya, thank you for submitting comments for the project file. This project will not affect your subdivision roads or landscaping, it is intended to provide water service for new development out to County Rd 40 and improve water service to the west end of the Telephone road service area.

In terms of fluctuating pressures we looked at our records and you should have approximately 70psi at your home for static pressure. We have a service technician going out this morning to check pressures in the area to confirm.

I look forward to speaking with you this evening.

Thanks

Matt Tracey

Manager Water and Wastewater Services
Public Works and Environmental Services
City of Quinte West

[613.392.2841](tel:613.392.2841) x4482

mattt@quintewest.ca
www.quintewest.ca

On Sun, Oct 23, 2022 at 9:11 AM [REDACTED] wrote:

Hello Matt,

As homeowners that live within the boundary of the proposed new water main, we wholeheartedly support this direction.

The water pressure in our subdivision, behind Walmart off of Little Farm Blvd, has at times been quite low and unable to support the volume needed to service our homes.

Questions/concerns:

- Will this change noticeably increase our water pressure?
- Will there be an impact to our roads and property landscaping or is it just a matter of hooking the subdivision to the new water main?
- When is the project expected to commence?

We are looking forward to learning more and hearing your responses on Tuesday. We would also welcome an email response from you.

Thank you for all that you and your fellow colleagues do to make our living experience the best that it can be!

Kind regards,

[REDACTED]

From: [Matt Tracey](#)
To: [REDACTED]
Cc: [Tony Guerrero](#); [Samuel Hutton](#)
Subject: Re: Water flow increase
Date: October 26, 2022 09:44:36

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

Good morning Paul, I have attached the link to the Website that will have the slides from the meeting available for your information later today. You are free to direct your question to my attention at any time.

In terms of who is paying for this project, it is intended for future development and in turn the costs of the project will be funded by the Development Charge by-law that is paid by the Developers. The addition of this watermain will provide a second source of water to the Telephone Rd area. This will benefit existing users as the City will have the ability to supply water in two directions in the event of a watermain break in the future. There will be a valve chamber building installed between Orchard Lane and Applecrest that will separate the pressure zones. Everyone west of Orchard Lane will now be fed water from the Walmart Tower and will have improved pressure and fireflows.

<https://quintewest.ca/council-city-administration/plans-studies-strategies/studies/>

Regards

Matt Tracey

Manager Water and Wastewater Services
Public Works and Environmental Services
City of Quinte West

[613.392.2841](tel:613.392.2841) x4482
mattt@quintewest.ca
www.quintewest.ca

On Tue, Oct 25, 2022 at 1:23 PM [REDACTED] wrote:

Good afternoon Matt

I was just told of this water flow expansion meeting. due to family emergency I won't be attending this meeting. I do have a few concerns. Who do I direct them too. I can list them with you. Who is paying for this as I believe that the developer should cover the costs and not the citizens as our water and sewage is already the highest in the area. Will it effect others east of glenburnie for flow.

Please forward to the intended recipient and if I could have my question read or get a reply to it. Thank you [REDACTED]

From: [Matt Tracey](#)
To: [Samuel Hutton](#)
Cc: [Tony Guerrero](#)
Subject: Fwd: Voicemail from [REDACTED] on Jun 1 2022 2:56 PM
Date: June 2, 2022 11:52:51
Attachments: [1654109772-0000186e.mp3](#)

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

Good morning Sam, can you add this to the EA project file. I spoke with Brian [REDACTED] who lives at [REDACTED]. He was inquiring about the project and how it would impact him. I spoke with him and said it would just be the noise and general construction that would be happening. He lives across from the Woodland Heights development and was mostly concerned about the noise. He was satisfied with my response.

Thanks

Matt Tracey

Manager Water and Wastewater Services
Public Works and Environmental Services
City of Quinte West

[613.392.2841](tel:613.392.2841) x4482
mattt@quintewest.ca
www.quintewest.ca

----- Forwarded message -----

From: [REDACTED] - Voicemail box 4482 <noreply@voicemail.goto.com>
Date: Wed, Jun 1, 2022 at 2:58 PM
Subject: Voicemail from [REDACTED] at [REDACTED] on Jun 1 2022 2:56 PM
To: <mattt@quintewest.ca>



You received a new voicemail message

 New voicemail message

Time: Wednesday, June 1 2022 2:56 PM
From: [REDACTED]
Duration: 34 seconds
Voicemail

box: 4482

Transcript: Yes, good afternoon. My name is Brian whereby just got this notice today from from your you folks about the the study commencement for the north-west Trenton Water Capacity Class Environmental Assessment, and I kind of like a little bit more information than what I can get off of the enclosed map. So if you could get back to me sometime [REDACTED] again my name is Brian [REDACTED] and I was mailed this this morning. Thank you, You.

[Rate this transcript's accuracy](#)



© 2022 GoTo Group, Inc.
333 Summer St, Boston, MA 02210, United States
Follow us on [Twitter](#), [LinkedIn](#), [Facebook](#)

APPENDIX J: Notice of Completion



City of Quinte West

NOTICE OF STUDY COMPLETION

Northwest Trenton Water Capacity – Class Environmental Assessment

The City of Quinte West has completed a Municipal Class Environmental Assessment (EA) study to determine the preferred solution to address the need for additional pressure and flow to support the water demands of future expansion in Northwest Trenton. The City intends to install a watermain of sizes 450mm to 500mm starting on Dundas Street West (Highway 2) at Walmart to the Tate Road/Telephone Road intersection through the Tremur Lake area and an additional valve chamber on Telephone Road.

This study was carried out in accordance with the requirements for a Schedule “B” Municipal Class Environmental Assessment. The planning and decision-making process - including consultation with the public and review agencies, assessment of environmental impacts of alternative solutions, and identification of the preferred solution - has been completed. The project report is available for viewing on-line on the City website in the new and notices section;

- <https://quintewest.ca/news-and-notices/news/>

The 30-day public review period will commence on **January 17th, 2023**. For more information or to provide comments please email one of the following project contacts by February 17th, 2023:

Matt Tracey, Manager Water & Wastewater Services
Public Works & Environmental Services
City of Quinte West, 7 Creswell Drive, PO Box 490,
Trenton, ON K8V 5R6
T: (613) 392-2841 ext. 4482 | F: (613) 392-7151
Email: mattt@quintewest.ca

Tony Guerrero, P. Eng.
The Greer Galloway Group Inc.
1620 Wallbridge Loyalist Road,
Belleville, ON K8N 4Z5
T: (613) 966-3068 | F: (613) 966-3087
Email: tguerrera@greergalloway.com

The public has the ability to request a higher level of assessment on a project if they are concerned about potential adverse impacts to constitutionally protected Aboriginal and treaty rights. In addition, the Minister may issue an order on his or her own initiative within a specified time period. The Director (of the Environmental Assessment Branch) will issue a Notice of Proposed Order to the proponent if the Minister is considering an order for the project within 30 days after the conclusion of the comment period on the Notice of Completion. At this time, the Director may request additional information from the proponent. Once the requested information has been received, the Minister will have 30 days within which to make a decision or impose conditions on your project.

Therefore, the proponent cannot proceed with the project until at least 30 days after the end of the comment period provided for in the Notice of Completion. Further, the proponent may not proceed after this time if:

- a Section 16 Order request has been submitted to the ministry regarding potential adverse impacts to constitutionally protected Aboriginal and treaty rights, or
- the Director has issued a Notice of Proposed order regarding the project.

Members of the public must ensure that concerns are directed to the proponent for a response, and that in the event there are outstanding concerns regarding potential adverse impacts to constitutionally protected Aboriginal and treaty rights, Section 16 Order requests on those matters should be addressed in writing to:

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

AND

**Director, Environmental Assessment Branch
Ministry of Environment, Conservation and Parks**
135 St. Clair Ave. W, 1st Floor,
Toronto ON, M4V 1P5
EABDirector@ontario.ca

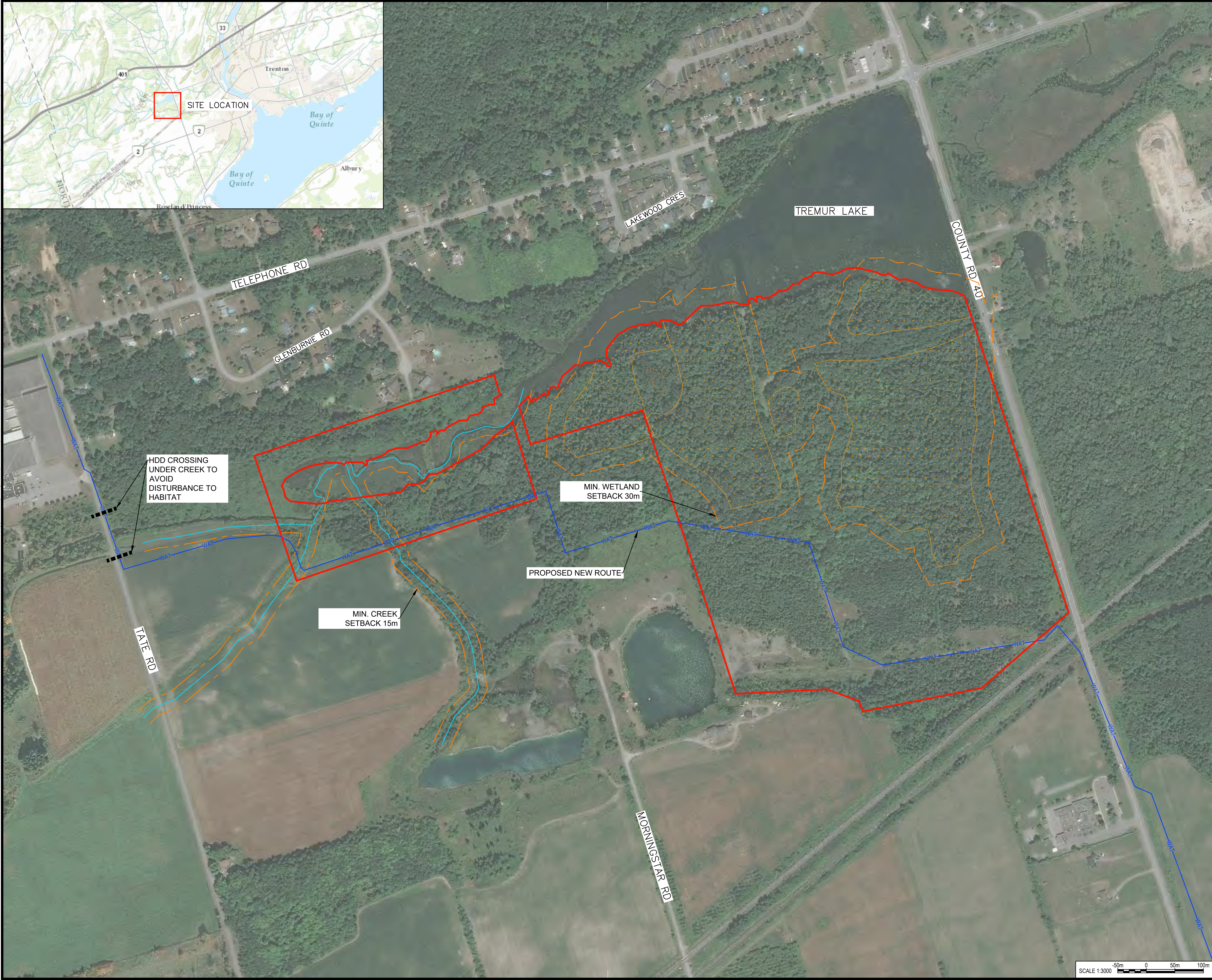
For more information on requests for orders under section 16 of the Environmental Assessment Act visit:
<https://www.ontario.ca/page/class-environmental-assessments-section-16-order>.

This notice issued **January 17th, 2023**.

Under the *Freedom of Information and Protection of Privacy Act* and the *Environmental Assessment Act*, unless otherwise stated in the submission, any personal information such as name, address, telephone number and property location included in a submission will become part of the public record files for this project and will be released, if requested, to any person.

APPENDIX L: Route Drawing

FILE PATH: \\g:\internal\greengalloway.com\Project\Belleville Project\7000\2237761 - Trenton Water Main EA Drawings\Working\22-3-7761 - Report Figures - DWG\DWG\2237761-3-7761.dwg
PLOT SCALE: 1:1
DATE PLOTTED: 2022 / 12 / 08 @ 05:08 PM
BORDER SIZE: ISO A1 (841mm x 594mm)



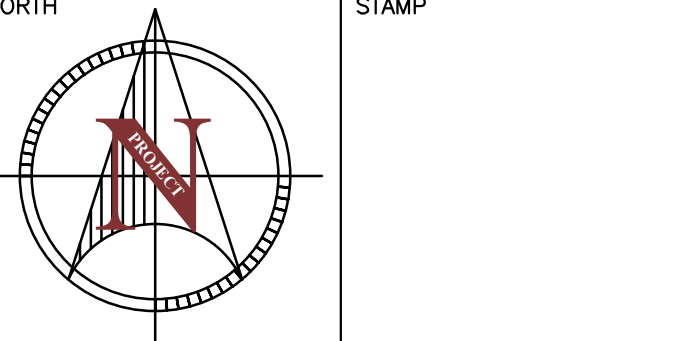
GREER GALLOWAY
CONSULTING ENGINEERS
PETERBOROUGH
BELLEVILLE
KINGSTON
1620 WALLBRIDGE LOYALIST ROAD
BELLEVILLE, ONTARIO, K8N 4Z5
PHONE: 613-966-3068
FAX: 613-966-3087

- NOTES:
1. ALL WORK SHALL BE IN ACCORDANCE WITH RELEVANT CODES AND GUIDELINES.
 2. ALL DRAWINGS AND ADDENDA ARE TO BE READ AS, AND IN CONJUNCTION WITH THE SPECIFICATIONS.
 3. ALL EQUIPMENT SHALL BE INSTALLED AS SPECIFIED OR APPROVED EQUIVALENT.
 4. CONTRACTOR MUST CHECK AND VERIFY ALL DIMENSIONS BEFORE PROCEEDING WITH WORK AND BE RESPONSIBLE FOR SAME.
 5. CONTRACTOR MUST REPORT ANY DISCREPANCIES TO ENGINEER FOR RESOLUTION BEFORE COMMENCING THE WORK.
 6. ANY CHANGES MUST BE APPROVED BY THE ENGINEER.

A A DETAIL NO.
B B DRAWING NO. - WHERE DETAILED

- LEGEND
- PROPERTY BOUNDARY
 - WATERMAIN
 - CREEK
 - WETLAND AREA
 - SETBACK - 30m
 - SETBACK - 15m

REVISION	DESCRIPTION	DATE
01	-	YY/MM/DD



PROJECT
COUNTY ROAD 40
WATERMAIN INSTALLATION

MUNICIPALITY OF QUINTE WEST

DRAWING TITLE
BLANDINGS TURTLE
WINTERING HABITAT

DESIGNED BY

DRAWN BY
R.S./I.T.

REVIEWED BY

APPROVED BY

PROJECT DATE
2022/09/08
(YY/MM/DD)

PROJECT #
22-3-7761

DRAWING #
DW1
DRAWING SCALE (ISO A1)
HOR: 1 : 3000
VER:

(METRIC SCALE - ALL DIMS IN METERS U.N.O.)