# Baden Trunk Sanitary Sewer Class EA Schedule B

## Environmental Study Report

**Project Location:**
Baden, Ontario

**Prepared for:**
Township of Wilmot
60 Snyder's Road West
Baden, ON  N3A 1A1

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*Engineers, Scientists, Surveyors.*

# Contents

**Executive Summary** ..... **1**

**1.0 Introduction** ..... **1**

1.1 Background and Context ..... 1

1.2 Environmental Study Report ..... 2

1.3 Purpose of the Project ..... 2

1.3.1 Background to Baden Trunk Sanitary Sewer EA ..... 2

1.3.2 Project Rationale ..... 4

1.4 Problem and Opportunity Statement ..... 4

**2.0 Study Approach** ..... **5**

2.1 Class Environmental Assessment (EA) Process ..... 5

2.1.1 Project Classification ..... 5

2.1.2 Scope of Environmental Assessment ..... 8

2.2 Project Organization ..... 9

2.3 Agency Steering Committee ..... 9

2.4 Communication Plan ..... 10

2.4.1 Consultation Mechanisms and Tools ..... 10

2.4.2 Consultation with Government Agencies ..... 12

2.4.3 Public Consultation ..... 13

2.4.4 First Nations Consultation ..... 14

**3.0 Existing Conditions** ..... **16**

3.1 Physical Setting & Topography ..... 16

3.2 Natural Environment ..... 16

3.2.1 Terrestrial Ecosystems ..... 16

3.2.2 Wetland Ecosystems ..... 18

3.2.3 Aquatic Ecosystems ..... 18

3.2.4 Surface Water ..... 19

3.2.5 Groundwater Resources ..... 19

3.2.6 Surface Drainage ..... 19

3.3 Socio-Cultural Environment ..... 20

3.3.1 Land Use Policy ..... 20

3.3.2 Archeological Resources ..... 21

3.3.3 Built Heritage and Cultural Landscapes ....21
3.3.4 Noise ....22
3.4 Transportation/Municipal Services and Utilities ....22
3.4.1 Transportation Network....22
3.4.2 Municipal Services and Utilities....22
3.5 Financial ....22
3.6 Technical ....22
**4.0 Assessment of Alternatives....23**
4.1 Development of Alternatives ....23
4.1.1 Alternative 1 – Do-Nothing (2014 Environmental Assessment) ....23
4.1.2 Alternative 2 - Snyder's Road West to Foundry Street ....24
4.1.3 Alternative 3 - Christian/Charlotta/Mill/Charles/Foundry ....24
4.1.4 Alternative 4 - Christian/Charlotta/Queen and Baden Creek ....24
4.1.5 Alternative 5 - Christian Street and Baden Creek....25
4.2 Evaluation Criteria....25
4.3 "Must 10" Score Methodology ....28
4.4 Supporting Technical Memorandums....28
4.5 Results of Evaluation ....29
4.6 Selection of Preferred Alternative....29
**5.0 General Description and Design Features of the Preferred Alignment ....30**
5.1 General Trunk Sewer Description ....30
5.2 Geotechnical and Groundwater Assessment ....30
5.3 Easement Requirements....30
5.4 Road Reconstruction Considerations ....31
5.5 Trenchless Crossings ....31
**6.0 Potential Environmental Effects and Proposed Mitigation....32**
6.1 Direct Impacts....32
6.2 Indirect Impacts....33
6.3 Other Potential Mitigative Measures....33
6.4 Climate Change ....34
6.4.1 Climate Change Mitigation ....34
6.4.2 Climate Change Adaptation and Resiliency ....34
6.4.3 Minimizing negative impacts during project implementation ....34

6.5 Summary of Environmental Impacts....35
**7.0 Approvals and Implementation Recommendations....35**
**8.0 Conclusion....36**

## Figures

Figure 1.0 – Primary Study Area....Enclosed
Figure 2.0 – Detailed Study Area....Enclosed
Figure 3.0 – Existing Sanitary Drainage Areas....Enclosed
Figure 4.1 – Alternative 1....Enclosed
Figure 4.2 – Alternative 1 Sanitary Drainage Areas....Enclosed
Figure 5.1 – Alternative 2....Enclosed
Figure 5.2 – Alternative 2 Sanitary Drainage Areas....Enclosed
Figure 6.1 – Alternative 3....Enclosed
Figure 6.2 – Alternative 3 Sanitary Drainage Areas....Enclosed
Figure 7.1 – Alternative 4....Enclosed
Figure 7.2 – Alternative 4 Sanitary Drainage Areas....Enclosed
Figure 8.1 – Alternative 5....Enclosed
Figure 8.2 – Alternative 5 Sanitary Drainage Areas....Enclosed

## Tables

Table 2.1 – The Five Phases of the Class EA Planning Process....6
Table 2.2 – Class EA Scope of Investigations/Review....8
Table 2.3 – Project Team....9
Table 2.4 – Agency Steering Committee....9
Table 2.5 – Summary of Government Agencies and Other Stakeholders Contacted....12
Table 2.6 – Summary of Notification Dates....13
Table 4.1 – Alignment Alternatives Evaluation Criteria....25
Table 4.2 – Summary of Evaluation Matrix....29
Table 6.1 – Summary of greenhouse gas emitting sources....34

## Appendices

Appendix A Figures Conestoga Rovers & Associates 2014 (CRA 2014)

Appendix B Notifications

Appendix C Communication – Meeting Minutes, Signed Agreements, emails

Appendix D Public Information Centre – Slides, Comments

Appendix E Technical Memos – Evaluation of Alternatives, Project Assessment Reports

Appendix F Detailed Evaluation Matrix

Appendix G Preliminary Plan and Profile Drawings

# Executive Summary

The *Wastewater Servicing Study for New Growth Areas in Baden and New Hamburg* was prepared by Conestoga Rovers & Associates (CRA) in 2014 to assist Township staff and Council in the decision-making process to address existing wastewater servicing constraints and future wastewater servicing needs associated with new growth areas. Changes to the Provincial Policy Statement (2020), the Places to Grow Plan (2020), the amended Regional Official Plan (2014) and the Township of Wilmot Official Plan (2019) have prompted the preferred wastewater management strategy to be re-evaluated.

The Township of Wilmot (herein referred to as the 'Township') has entered into a Schedule B Municipal Class Environmental Assessment (Class EA) for the Baden Trunk Sanitary Sewer. This Environmental Study Report (ESR) documents the study process and evaluation of five sanitary trunk alignments, resulting in the selection of the preferred trunk sewer alignment and preliminary design.

The following Problem and Opportunity Statement was developed for the project:

> ***The existing sanitary infrastructure lacks capacity and depth for the planned growth within the Settlement of Baden. The proposed sanitary trunk will accommodate current and future growth in the area. The study will determine the corridor servicing alignment, size and depth of the trunk sewer to facilitate growth and optimize existing Township infrastructure in the area.***

A total of five alternatives were identified, each representing a separate alignment. The alternatives were evaluated in the context of several factors/criteria that have been grouped into 5 categories including: natural environment, socio-cultural environment, transportation/municipal services and utilities, financial, and technical. Alternative 1, (the 'Do-Nothing' alternative) is representative of the previously approved alignment of the 2014 CRA report.

The five alternatives were presented to the public in the form of a virtual Public Information Centre (PIC). It consisted of a pre-recorded presentation that clearly stated the Problem and Opportunity Statement, identified the five alternative alignments being considered, listed the criteria in which the alternatives were to be evaluated, and provided the next steps in the Class Environmental Assessment process. The PIC was hosted on the Township of Wilmot website on November 24, 2021. The web-hosted PIC provided stakeholders, indigenous groups, steering committee members and the general public an opportunity to comment on the project.

The numerical evaluation ("Must 10" scoring system) approach was used for the selection of the preferred alternative. Each factor group was scored, and commentary prepared through technical memos to document the differentiating factors or impact mitigation of the proposed sanitary trunk alternatives.

The result of the evaluation revealed Alternative 5 as the preferred alternative. It was presented to the stakeholders, indigenous groups, steering committee members, and the general public in the form of second virtual PIC, which provided an opportunity to comment on the preliminary preferred alternative.

The following summarizes the principal rationale in support of Alternative 5 as the Preferred Alignment for the Baden Sanitary Trunk:

- Provides flexibility for servicing the entire Primary Study Area
- Provides timely project completion due to minimal coordination with Regional projects
- Minimal impact to road network
- Minimal impact to traffic
- Least impacts to existing businesses and residents
- Least impacts to cultural heritage
- Eliminates two (2) existing Wastewater Pumping Stations (WWPS)
- Eliminates the need for a future WWPS
- Eliminates noise and odour associated with the removal of existing WWPS
- Reduces long-term operational/maintenance cost
- Minimizes impacts to significant watercourses (Baden Creek at the Baden Creek Pond and the Huehn Award Drain)
- No impacts to locally significant wetlands
- No impacts to Species at Risk or Significant Wildlife Habitats (woodlands, Butternuts)
- Does not impact flow regime of any surface water feature
- Does not impact the aquatic habitat of Baden Creek, the Baden Creek Pond or the Huehn Award Drain
- Eliminates impacts to the coldwater fisheries tributary (Huehn Award Drain)
- Right-of-ways have been secured or committed to
- Represents the lowest cost alternative

This alternative consists of replacing the local sanitary sewer and installing a new trunk sanitary sewer along Christian Street, through the open fields adjacent to the Baden Creek Tributary ‘A’ and Baden Creek, and upgrading the sewer from the intersection of Gingerich Road and Foundry Street to the Baden WWPS. A complete reconstruction of Christian Street will be required.

The final design may explore further mitigation through establishing alignment parallel to Foundry Street and directly to the Region’s WWPS.

# 1.0 Introduction

## 1.1 Background and Context

The Township of Wilmot (Township) is a municipality situated in southwestern Ontario, within the Waterloo Region. It is responsible for the long-term operation and maintenance of the wastewater collection system for the settlement of Baden. In 2012, Conestoga Rovers & Associates commenced a study to evaluate the sanitary infrastructure needs as suggested by the 2011 *Baden and New Hamburg Water and Wastewater Master Plan Update* and to evaluate development options for the forecasted population growth. The study divided the predicted growth sanitary catchment areas into several parcels and identified them with letter designations from A to Z (**Appendix A**). *The Wastewater Servicing Study for the Growth Areas of Baden and New Hamburg,* completed in 2014 (CRA, 2014), revealed that the existing sanitary infrastructure did not support existing peak flows and lacked capacity and depth for the planned growth within the Settlement of Baden. This study identified Alternative D (**Appendix A**) as the preferred servicing alignment and was endorsed by the Township.

Changes to the Provincial Policy Statement (2020), the Places to Grow Plan (2020), the amended Regional Official Plan (2015), and the Township of Wilmot Official Plan (2019), has prompted the Township to re-evaluate the wastewater servicing strategy to better service existing residents and accommodate the anticipated future growth areas for the Settlement of Baden.

In 2019, MTE engaged in consultation with the Township with respect to updating the wastewater servicing strategy for Baden and New Hamburg resulting in three additional studies currently underway at Township and Regional planning levels.

These studies include;

- Morningside Trunk Sewer Class Environmental Assessment, GM BluePlan
- Baden / New Hamburg Water and Wastewater System Servicing Review, Stantec
- Baden Trunk Class Environmental Assessment, MTE

MTE Consultants Inc. (MTE) has been retained by the Township to carry out a Schedule B Municipal Class EA. On June 17, 2021, the Notice of Commencement was issued (**Appendix B**). The study proposed five sanitary trunk alignments that would provide sanitary services to future growth areas and improve services to the existing residents of Baden. The project team conducted studies to establish existing conditions of the natural, socio-cultural, transportation/municipal services and utilities, financial, and technical environments. Technical memorandums were prepared to assist in the evaluation of the alternative alignments. Each factor was numerically evaluated by means of the 'Must 10' scoring system and ranked accordingly. The alternative with the highest score was selected as the preferred sanitary servicing alignment. Upon Township endorsement of the preferred alignment, a preliminary design of the preferred sanitary sewer alignment was prepared. The purpose of this Environmental Study Report (ESR) is to document all activities undertaken as outlined in the Schedule B, Municipal Class EA process. The publication of this ESR represents the conclusion of the Class EA, including public and agency consultation.

## 1.2 Environmental Study Report

Municipal infrastructure projects in Ontario are subject to Ontario's Environmental Assessment Act (EA Act). The Municipal Engineers Association's Municipal Class Environmental Assessment (October 2000, as amended in 2007, 2011 and 2015) (MCEA) process for planning, design, and construction of municipal infrastructure was developed in accordance with the EA Act and is described in more detail in Section 2.1 of this report. This ESR documents the planning process conducted in accordance with the MCEA and the Planning Act for the Baden Trunk Sanitary Sewer, hereafter referred to as the "Baden Trunk".

This ESR is organized as follows:

- Section 1 introduces the study, including background and the context of the project, and introduces the rationale for the project and related study objectives.
- Section 2 summarizes the Class EA process.
- Section 3 provides an overview of existing conditions within the Primary Study Area (PSA) to establish baseline conditions against which alignment alternatives have been assessed.
- Section 4 presents the development and assessment of alignment alternatives and design solutions, including the identification of the Preliminary Preferred Alternative for the Baden Trunk. Section 4 also describes the public process and input received relative to the preliminary preferred alignment alternative.
- Section 5 describes the recommended Alternative and design features in some detail.
- Section 6 describes potential environmental effects, proposed mitigation and monitoring.
- Section 7 provides a summary of approvals required prior to construction.
- Section 8 describes the procedure to amend the ESR and includes interpretation provisions.

The Appendices attached to this ESR provide more detailed information relating to the communication record, supporting technical reports, evaluation matrix and the proposed design of the Baden Trunk alignment.

## 1.3 Purpose of the Project

### 1.3.1 Background to Baden Trunk Sanitary Sewer EA

In 2003 the Region developed a Long-Term Regional Growth Management Strategy (RGMS) to plan for and guide future population and employment growth within the Region of Waterloo (the Region). The RGMS anticipated the Region will grow to approximately 700,000 by 2041. Subsequently, the Province of Ontario identified the Region as a "Future Growth Area" in the Places to Grow Act, passed in June 2005. The RGMS helps to ensure that "Smart Growth" principles are realized in the Region. As part of this, the RGMS recommended the WWTMP (1995) be updated to provide a plan for wastewater treatment services to meet the needs of customers in a safe, efficient, cost effective and fiscally responsible manner.

In 2007, Earth Tech updated the Region's Waste Water Treatment Management Plan (WWTMP). The study identified and evaluated wastewater treatment projects, technologies, and servicing strategies to meet the long-term needs of residents and business until 2041.

The updated WWTMP provided an overall plan for the upgrade and expansion of facilities to ensure adequate wastewater treatment service capacity for the Region's wastewater treatment plants until 2041. The key goal of the proposed strategy is to ensure adequate wastewater treatment servicing to protect human health and the natural environment, meeting legislative requirements and future growth, and being fiscally responsible and sustainable. The study revealed that the average daily influent flow at the New Hamburg WWTP would increase to 5600 $m^3$/d by 2016, exceeding the rated capacity.

In 2008, the Region initiated a study to update the previous Baden/New Hamburg Wastewater Treatment Class Environmental Assessment (Class EA), and the Baden New Hamburg Water Supply Master Plan Update completed in 1997 and 1996, respectively. The goal of the Master Plan Study was to update the previous Master Plan and Class EA studies with recent works, revised population projections and policies, and changes in the environment. It identified strategies that would optimize existing systems and increase capacities of wastewater infrastructure to provide servicing into the future. The study resulted in the *Baden-New Hamburg Wastewater Master Plan Update* (BNHWWMPU) completed in 2011 (AECOM, 2011). This study revealed that the capacity of the Baden WWPS is sufficient under dry conditions however during very high wet weather flows, the station capacity was exceeded. These high flow events are resolved by contracting vacuum trucks and tankers to haul the excess wastewater directly to the New Hamburg WWTP. The BNHWWMPU recommended that Infiltration and Inflow (I/I) be reduced or additional equalization storage capacity be provided at the Baden SPS to accommodate the very high flow events.

The Baden and New Hamburg wastewater collection systems were evaluated to identify opportunities and constraints of the Region's infrastructure based on the current installed capacity and 2041 flow requirements (Low and High Scenarios). The initial analysis compared the design flow with the projected 2041 (Low and High) flows for the current service areas. Additionally, the possibility of incorporating the Foxboro Green wastewater system into the Baden and New Hamburg System was evaluated. Opportunities and constraints for the wastewater collection system are summarized below:

- Optimization of the Baden WWPS and related equalization storage requirements to handle 2041 wet weather flows need to be confirmed as part of further work. Additional pumping capacity required along with storage to address wet weather flow impacts.
- Additional pumping capacity may be required necessitating replacement of the impellers and an additional pump at the Morningside WWPS for the 2041 (High) scenario;
- New trunk sewers and pumping stations by the Township would be required to discharge wastewater to the Morningside WWPS for areas to be developed;
- Possibility for converting the Foxboro Wastewater Treatment System to a pumping station with connection to the Baden - New Hamburg collection system.

In 2014, Conestoga Rovers & Associates were retained by the Township to address the BNHWWMPU recommendations. Their study evaluated sanitary infrastructure needs, formulated development options, and evaluated the options to maximize the development of new growth areas.

### 1.3.2 Project Rationale

The purpose of this study is to identify and evaluate possible trunk sewer alternatives that can provide sanitary services to the existing residents and future growth areas of Baden. Alternatives are to be acceptable to the Township, the Region, the Grand River Conservation Authority (GRCA), and the Ministry of the Environment, Conservation and Parks (MECP).

An important objective of the EA process is to provide ample opportunity for public participation including dialogue between parties with differing interests. This approach allows the following objectives to be achieved:

1. Protection of the environment through the wise management of resources (as defined in the Environmental Assessment Act). This goal will be met through an understanding of existing conditions, extensive consultation with all affected and interested parties, monitoring, and mitigation.
2. Minimal disruption during construction to existing residents, farms, and commuters that rely on these roadways/intersections.
3. Participation of a broad range of stakeholders in the study process to allow for sharing of ideas, education, testing/analysis of solutions including consideration of alternatives.
4. Documentation of the study process in compliance with all phases of the Municipal Class EA process and the Planning Act.

## 1.4 Problem and Opportunity Statement

Based on the sanitary servicing needs outlined from previous studies, the following Problem and Opportunity Statement was developed for the Baden Trunk EA.

> ***The existing sanitary infrastructure lacks capacity and depth for the planned growth within the Settlement of Baden. The proposed sanitary trunk will accommodate current and future growth in the area. The study will determine the corridor servicing alignment, size and depth of the trunk sewer to facilitate growth and optimize existing Township infrastructure in the area.***

The Problem and Opportunity Statement was first presented at Public Information Centre (PIC) No.1 for public input. Once comments were received by all interested parties, it was finalized and presented at the subsequent PIC No. 2.

# 2.0 Study Approach

## 2.1 Class Environmental Assessment (EA) Process

This study has been conducted in accordance with the (MCEA). The Class EA process was developed in accordance with the EA Act for a 'class' of projects, including municipal road, water, wastewater, and transit projects. These types of projects are recurring, similar in nature, limited in scale, responsive to mitigation measures, and have a predictable range of environmental effects. The purpose of the Class EA is to provide input that supports the protection, conservation, and wise management of the environment. This includes the natural, social, cultural, built, and economic environment.

This study will be accomplished through comprehensive planning and informed decision-making. It allows municipalities to meet the requirements of the EA Act while following a streamlined, self-administered process.

The key principles that were taken into account throughout the planning process include:

- Consultation with affected parties early and throughout the process. Consultation occurred throughout the Planning process as detailed throughout Section 2.3 of this study,
- A reasonable range of alternatives were considered and systematically evaluated,
- Identification and consideration of the effects of each alternative on all aspects of the environment,
- The systematic evaluation of the alternatives in terms of their benefits and constraints to determine their net environmental effects,
- Provide clear and complete documentation of the planning process to ensure traceability of decision-making with respect to the project.

### 2.1.1 Project Classification

The Class EA process recognizes that potential environmental impacts may vary depending on the nature of the project and classifies projects into four schedules as follows:

Schedule A - municipal maintenance, operational and emergency activities. These projects are pre-approved and, therefore, allow the municipality to proceed without further approval under the EA Act.

Schedule A+ - the environmental effects are usually minimal. However, the public is to be advised prior to implementation. These projects are also pre-approved.

Schedule B - projects that may have minimal environmental effects on the environment. These projects are approved subject to a screening process, including consultation with directly affected public and agencies.

Schedule C - projects that may have significant environmental effects on the environment and must proceed under the full planning and documentation procedures outlined in the Municipal Class EA Document.

This study was conducted as a Schedule 'B' Class EA in accordance with the project schedule criteria in Appendix 1 of the Municipal Class EA. This classification recognizes that the Baden Sanitary Trunk is designated as a Municipal Wastewater Project and is subject to the screening

process. Schedule ‘B’ projects involve the completion of Phases 1 and 2 of the Municipal Class EA process as identified and summarized below:

**Table 2.1 – The Five Phases of the Class EA Planning Process**

| | |
|---|---|
| *Phase 1*<br>**Problem or Opportunity** | Identify the problem or opportunity. |
| *Phase 2*<br>**Alternative Solutions** | Identify alternative solutions to address the problem or opportunity by taking into consideration the existing environment, select the project Schedule, and establish the preferred solution taking into account public and review agency input. |
| *Phase 3*<br>**Alternative Design Concepts for Preferred Alternative** | Examine the alternative methods of implementing the preferred solution, based upon the existing environment, public and review agency input, anticipated environmental effects, and methods of minimizing negative effects and maximizing positive effects. |
| *Phase 4*<br>**Environmental Study Report** | Document, in an Environmental Study Report, a summary of the rationale, and the planning, design and consultation process of the project as established through the above Phases, and make such documentation available for scrutiny by review agencies and the public. |
| *Phase 5*<br>**Implementation** | Complete contract drawings and documents and proceed to construction and operation. Monitor construction for adherence to environmental provisions and commitments. Where special conditions dictate, also monitor the operation of the completed facilities. |

Successful completion of Phase 2 and endorsement of the preferred alternative by Township Council will result in an ESR that documents the Class EA process and includes the preliminary design of the preferred alternative. The Class EA process is illustrated in the following flowchart.

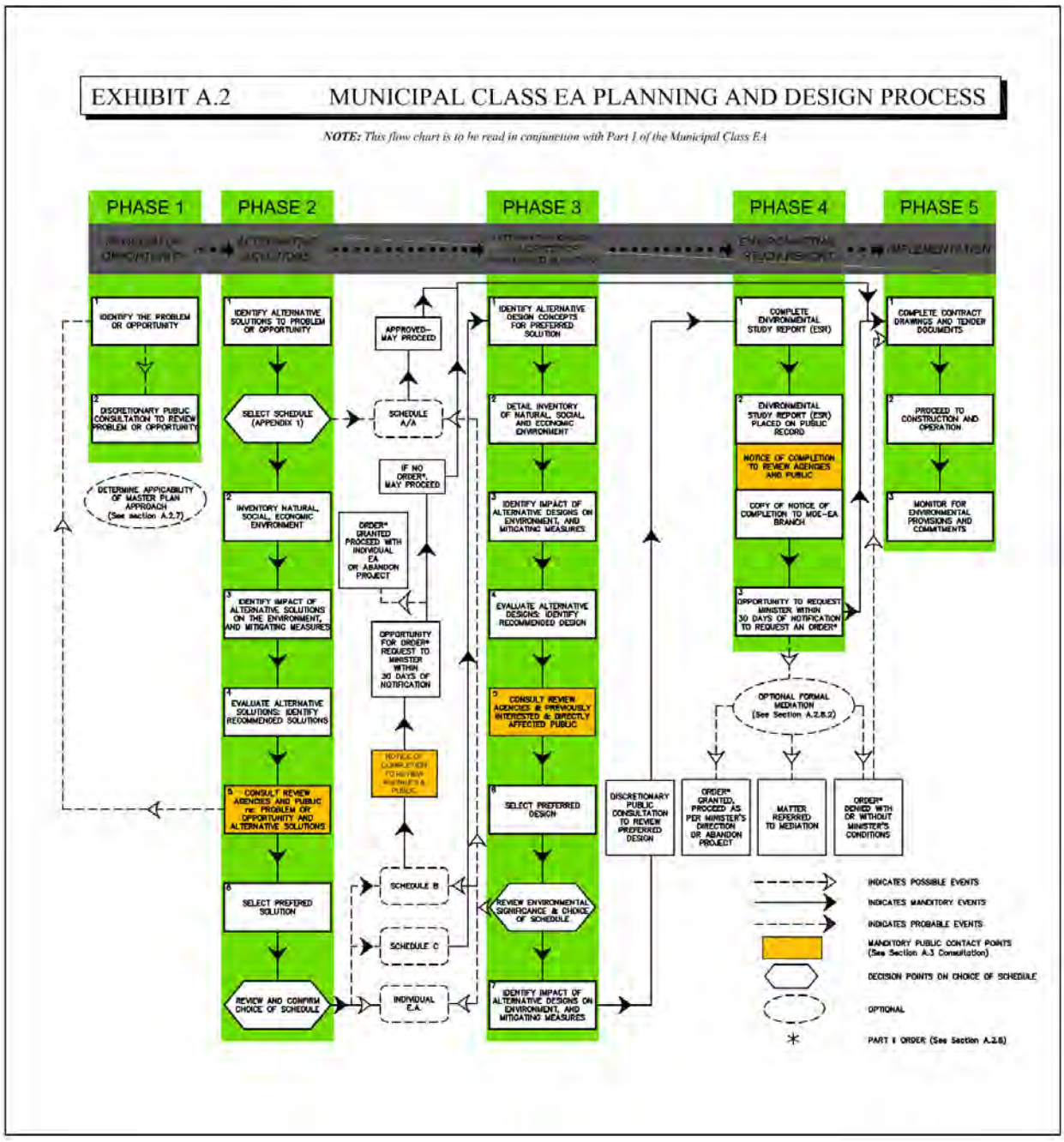


EXHIBIT A.2 MUNICIPAL CLASS EA PLANNING AND DESIGN PROCESS
NOTE: This flow chart is to be read in conjunction with Part 1 of the Municipal Class EA
PHASE 1
PHASE 2
PHASE 3
PHASE 4
PHASE 5
IDENTIFY THE PROBLEM OR OPPORTUNITY
DISCRETIONARY PUBLIC CONSULTATION TO REVIEW PROBLEM OR OPPORTUNITY
DETERMINE APPLICABILITY OF MASTER PLAN APPROACH (See section A.2.7)
IDENTIFY ALTERNATIVE SOLUTIONS TO PROBLEM OR OPPORTUNITY
SELECT SCHEDULE (APPENDIX 1)
INVENTORY NATURAL, SOCIAL, ECONOMIC ENVIRONMENT
IDENTIFY IMPACT OF ALTERNATIVE SOLUTIONS ON THE ENVIRONMENT, AND MITIGATING MEASURES
EVALUATE ALTERNATIVE SOLUTIONS; IDENTIFY RECOMMENDED SOLUTIONS
CONSULT REVIEW AGENCIES AND PUBLIC re: PROBLEM OR OPPORTUNITY AND ALTERNATIVE SOLUTIONS
SELECT PREFERED SOLUTION
REVIEW AND CONFIRM CHOICE OF SCHEDULE
APPROVED– MAY PROCEED
SCHEDULE A/A
IF NO ORDER*, MAY PROCEED
ORDER* GRANTED PROCEED WITH INDIVIDUAL EA OR ABANDON PROJECT
OPPORTUNITY FOR ORDER* REQUEST TO MINISTER WITHIN 30 DAYS OF NOTIFICATION
NOTICE OF COMPLETION TO REVIEW AGENCIES & PUBLIC
SCHEDULE B
SCHEDULE C
INDIVIDUAL E.A.
IDENTIFY ALTERNATIVE DESIGN CONCEPTS FOR PREFERRED SOLUTION
DETAIL INVENTORY OF NATURAL, SOCIAL, AND ECONOMIC ENVIRONMENT
IDENTIFY IMPACT OF ALTERNATIVE DESIGNS ON ENVIRONMENT, AND MITIGATING MEASURES
EVALUATE ALTERNATIVE DESIGNS; IDENTIFY RECOMMENDED DESIGN
CONSULT REVIEW AGENCIES & PREVIOUSLY INTERESTED & DIRECTLY AFFECTED PUBLIC
SELECT PREFERRED DESIGN
REVIEW ENVIRONMENTAL SIGNIFICANCE & CHOICE OF SCHEDULE
IDENTIFY IMPACT OF ALTERNATIVE DESIGNS ON ENVIRONMENT, AND MITIGATING MEASURES
DISCRETIONARY PUBLIC CONSULTATION TO REVIEW PREFERRED DESIGN
COMPLETE ENVIRONMENTAL STUDY REPORT (ESR)
ENVIRONMENTAL STUDY REPORT (ESR) PLACED ON PUBLIC RECORD
NOTICE OF COMPLETION TO REVIEW AGENCIES AND PUBLIC
COPY OF NOTICE OF COMPLETION TO MOE-EA BRANCH
OPPORTUNITY TO REQUEST MINISTER WITHIN 30 DAYS OF NOTIFICATION TO REQUEST AN ORDER*
OPTIONAL FORMAL MEDIATION (See Section A.2.8.2)
ORDER* GRANTED, PROCEED AS PER MINISTER'S DIRECTION OR ABANDON PROJECT
MATTER REFERRED TO MEDIATION
ORDER* DENIED WITH OR WITHOUT MINISTER'S CONDITIONS
COMPLETE CONTRACT DRAWINGS AND TENDER DOCUMENTS
PROCEED TO CONSTRUCTION AND OPERATION
MONITOR FOR ENVIRONMENTAL PROVISIONS AND COMMITMENTS
INDICATES POSSIBLE EVENTS
INDICATES MANDITORY EVENTS
INDICATES PROBABLE EVENTS
MANDITORY PUBLIC CONTACT POINTS (See Section A.3 Consultation)
DECISION POINTS ON CHOICE OF SCHEDULE
OPTIONAL
PART II ORDER (See Section A.2.8)

### 2.1.2 Scope of Environmental Assessment

The ESR includes a comprehensive set of studies prepared by a multi-disciplinary project team aimed at establishing baseline existing conditions within the PSA. These studies included inventories, impact assessments, and mitigation recommendations. The evaluation of alternatives was based on the studies, consultation with review agency staff, and stakeholders.

**Table 2.2** identifies the categories and the factors that were assessed.

**Table 2.2 – Class EA Scope of Investigations/Review**

| **Natural Environment** | **Hydrology/Hydrogeology/Geotechnical** |
|---|---|
| • Wildlife surveys<br>• Vegetation inventories<br>• Aquatic habitat and fish community assessment<br>• Establish appropriate reference habitats/communities for preparation of mitigations | • Surface water quality/quantity assessment<br>• Erosion assessment<br>• Groundwater resources assessment<br>• Geotechnical assessment |
| **Socio-Cultural Environment** | **Heritage Resources** |
| • Land use designations & policies<br>• Noise impacts | • Archaeological Assessment<br>• Heritage Resource Assessment<br>• Recommendations for further archaeological investigation |
| **Transportation** | **Municipal** |
| • Traffic operations assessment<br>• Transportation policy assessment | • Infrastructure survey & assessment<br>• Utility survey & assessment |
| **Technical** | **Financial** |
| • Constructability<br>• Complexity<br>• Serviceability<br>• Land requirement assessment | • Capital Cost<br>• Operational Cost |

## 2.2 Project Organization

This EA was completed in cooperation with a multidisciplinary team. The Project Team consisted of:

**Table 2.3 – Project Team**

| Project Team | |
|---|---|
| Detritus Consulting | Archeology – Garth Grimes |
| MHBC Planning (MHBC) | Process and Planning - Paul Britton, Pierre Chauvin |
| MTE Consultants Inc. (MTE-C) | Civil Engineering - Jeff Martens, Valentina Lazic, Alex Cressman, Carla Illman |
| MTE Consultants Inc. (MTE-H) | Geotechnical and Hydrogeology - Dan Gonser, Fraser Cummings |
| Natural Resource Solutions Inc. (NRSI) | Ecology – Ryan Archer |
| Water's Edge Environmental Solutions Team (WEEST) | Erosion Assessment & Fluvial Geomorphology Nik Gazendam |

## 2.3 Agency Steering Committee

The Steering Committee was comprised of:

**Table 2.4 – Agency Steering Committee**

| Steering Committee | |
|---|---|
| Township of Wilmot | |
| Engineering, Planning and Support Staff | Jeff Molenhuis – Director of Public Works and Engineering<br>Harold O'Krafka - Director of Development Services<br>Mark Jeffery - Engineering<br>Steve Scott - GIS Analyst, Infrastructure Services<br>Cameron Miller - Planner |
| Grand River Conservation Authority | |
| Planning | Trevor Heywood – Resource Planner |
| Regional Municipality of Waterloo | |
| Engineering | Kaoru Yajima |

## 2.4 Communication Plan

Public, regulatory agency, and other stakeholder consultation was recognized as an important component of the Baden Trunk Class EA study. The communications plan was designed to capture a full range of opinions and perspectives at milestone junctures throughout the study. It provided multiple and ongoing opportunities for feedback during the planning and design process meeting the requirements for mandatory contact prescribed by the Class EA process.

### 2.4.1 Consultation Mechanisms and Tools

The Communication Plan was implemented by employing the following mechanisms:

Notice of Commencement

Potential study participants, affected governing agencies, and stakeholders were formally notified of the study commencement via email on June 17, 2021. The Notice of Commencement also appeared in a published advertisement for the Wilmot Post and New Hamburg Independent on two separate dates; June 24, 2021 and June 30, 2021, as well as being published on the Township's website at

(https://www.wilmot.ca/en/doing-business/resources/Documents/Current_Projects/Baden-Sanitary-Trunk/48730-100-Notice-of-Commencement_June-17-2021.pdf)

for the general public (**Appendix B**). This is a mandatory contact point in the Municipal Class EA process. The notification included information on the study background, purpose, location, and opportunities/contacts for obtaining information and providing input.

To facilitate public access to the Project Team, project notifications identified the Township's representative (Jeff Molenhuis), and Project Manager (Dot Roga, MTE) as points of contact which included their mail, phone, fax, and email information.

Project Team

The Project Team had meetings with specialists, independent of the regular Project Team meetings, as required to convey information and discuss various technical matters in additional detail.

Public Information Centres (PIC)

Two PICs were held at mandatory points of contact, as indicated in the MCEA. The PICs were formally announced through advertisements in the Wilmot Post and New Hamburg Independent, postage mail, and emailed to all study participants, affected governing agencies, and stakeholders. The notification provided information on the PIC purpose, date, time, location and Project Team contacts; for obtaining information and providing input. In addition, letter invitations were distributed to property owners within the area bounded by Nafziger Road, Snyder's Road West, Foundry Street, Gingerich Road and to prescribed agencies.

As requested by the Township of Wilmot, PIC presentations were pre-recorded and uploaded to their website located at the following URL address:

(https://www.wilmot.ca/en/doing-business/current-projects.aspx#Baden-Trunk-Sanitary-Sewer)

for public viewing and comments. The website provided continuous on-line public access to the PIC, as well as the opportunity for comments and input from the public, stakeholders, and indigenous groups throughout the Class EA process.

On-line Consultation

The Township's website provided on-line public access to information and opportunities for input throughout the Class EA study at the following URL address:

(https://www.wilmot.ca/en/doing-business/current-projects.aspx#Baden-Trunk-Sanitary-Sewer)

Documents provided on the website mirrored the information and documentation provided through milestone notifications and the PICs.

Property Owner Meetings

The alignment alternatives, plan and profile drawings, and detailed information were reviewed with the landowners directly affected and/or their representatives.

Agency Consultation

Federal, Provincial, and Municipal agencies with policy or regulatory mandates that may affect the project development or implementation were identified and contacted with respect to obtaining technical information and their desire to participate in the studies. Refer to Section 2.4 of this report for additional detail.

Indigenous Communities Consultation

Selected study information was provided to First Nations with an invitation to participate throughout the Class EA process.

Notice of Completion

The final Class EA mandatory contact point is the Notice of Completion, which will also be published in the Wilmot Post and New Hamburg Independent on two separate dates. This notice will advise that the Class EA study documentation (this ESR) has been finalized and placed in the public record for a review period of 30 calendar days. The notice will also provide information on the location(s) where the ESR is available for review, the period within which the document will be available for review and comments must be submitted, the Project Team contacts for obtaining information and providing input, and the MECP contact for submitting objections to the project.

### 2.4.2 Consultation with Government Agencies

Full communication and participation by the review agencies was encouraged from the onset of the study. **Appendix C** includes a detailed listing of principal agency staff and other stakeholders that were engaged during the study. Table 2.4 provides a general summary of the agencies and stakeholders contacted for input on the project.

**Table 2.5 – Summary of Government Agencies and Other Stakeholders Contacted**

| **First Nations** |
|---|
| Six Nations of the Grand River |
| Six Nations of the Grand River Elected Council |
| Haudenosaunee Development Institute (HDI) |
| Haudenosaunee Confederacy Chiefs Council |
| Mississaugas of the Credit First Nation (MCFN) |
| Mississaugas of the New Credit First Nation |
| **Federal** |
| Environment and Climate Change Canada (ECCC) |
| Department of Fisheries and Oceans Canada (DFO) |
| Indigenous and Northern Affairs Canada (changed 2017 – Indigenous Relations and Northern Affairs Canada: Indigenous Services) |
| Transport Canada |
| **Provincial** |
| Ministry of Agriculture, Food and Rural Affairs (OMAFRA) |
| Ministry of Economic Development, Job Creation and Trade |
| Ministry of the Environment, Conservation and Parks (MECP) |
| Ministry of Indigenous Affairs |
| Ministry of Municipal Affairs and Housing (MMAH) |
| Ministry of Northern Development, Mines, Natural Resources and Forestry (MNDMNRF) |
| Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI) |
| Ministry of Transportation (MTO) |
| Ministry of Infrastructure |
| **Municipal** |
| Grand River Conservation Authority |
| Regional Municipality of Waterloo |
| Township of Wilmot |
| **Utilities** |
| Bell Canada |
| Enbridge Gas |
| Hydro One |
| Enova Power (formerly Kitchener-Wilmot Hydro) |
| PacketWorks |

| |
|---|
| Rogers Cable |
| **Railroads** |
| CN Railway |
| **Developers** |
| Nideva Properties Inc.<br>Activa<br>Schmidt Estates |
| **Consultants** |
| MHBC – Planning Consultant for Nideva and Activa<br>GSP – Planning Consultant for Schmidt Estates<br>Walter Fedy – Engineering Consultant for Schmidt Estates<br>Stantec – Engineering Consultant for the Region's BNHWWMSP<br>GM BluePlan – Engineering Consultant for the Township's Morningside Sanitary Trunk Class EA |

The aforementioned agencies and stakeholders were notified via mail or email of the following events:

- Notice of Commencement
- Public Information Centre No. 1
- Public Information Centre No. 2
- Notice of Study Completion (not yet completed)

### 2.4.3 Public Consultation

The following section summarizes all public consultation efforts including virtual PIC publication dates, the information provided, and any comments received from the public, stakeholders, or governing agencies.

**Table 2.6 – Summary of Notification Dates**

| Notification | Circulation Date | Date of Placement in Record |
|---|---|---|
| Notice of Commencement | June 17, 2021 | June 24, 2021 |
| PIC No. 1 | November 17, 2021 | November 24, 2021 |
| PIC No. 2 | September 19, 2022 | September 26, 2022 |
| Notice of Study Completion | TBD | TBD |

As previously mentioned, two PICs were conducted to provide opportunities to present the information gained and to solicit comment and input from the public and reviewing agencies. Both PICs consisted of a pre-recorded presentation hosted on the Township's website. The notices of the PICs were circulated to the steering committee, interested parties, and the public via email, direct mail and door-to-door distribution on the respective dates listed in **Table 2.6**.

Public Information Centre No. 1

PIC No. 1 was uploaded to the Township of Wilmot website on November 24, 2021. The purpose of PIC No. 1 was to describe and confirm the intent to follow the Schedule B of the Class EA process and solicit public/agency input to the problem statement and the identification of alternative solutions.

The information presented at the PIC included (see **Appendix D** for slides):

- Welcoming message
- Introduction to the objectives of PIC No. 1
- Problem and Opportunity statement
- Outline of the Class EA process
- Identification of the study area and the lands to be serviced
- Existing sanitary servicing conditions
- Introduction of the five sanitary sewer trunk alignment alternatives
- Next steps in the study process
- Proposed evaluation criteria
- The preferred evaluation method
- Project Team members contact information and information on how to submit comments/concerns

The PIC No.1 did not generate any comments from the public. Agency comments were submitted directly and can be found in **Appendix D.**

Public Information Centre No. 2

PIC No.2 was uploaded to the Township's website on September 26, 2021. The purpose of PIC No.2 was to provide a summary of the project to date, identify at what stage in the Class EA process the project was, and solicit public/agency input regarding the preliminary preferred alignment.

The information presented at the PIC included (see **Appendix D** for slides):

- Welcoming message
- Introduction to the objectives of PIC No. 2
- The final Problem and Opportunity statement
- Summary of existing environments
- Trunk sewer alignments with associated impacts
- Evaluation summary of the alignments
- The preliminary preferred alignment
- EA project timeline and next steps
- Project Team members contact information and information on how to submit comments/concerns

The PIC No. 2 did not generate any comments from the public. Agency comments were submitted directly and can be found in **Appendix D.**

To remain transparent, the PICs have remained online via the Township's website for the duration of the project.

### 2.4.4 First Nations Consultation

The Ontario Ministry of Indigenous Affairs and the Federal Department of Indigenous Relations and Northern Affairs Canada were contacted with respect to information on established or potential Indigenous and treaty rights in the vicinity of the project, and advice on consultation with First Nations communities and groups representing First Nations.

The Notice of Commencement was emailed directly to Six Nations Land & Resources, Haudenosaunee Development Institute and the Mississaugas of the Credit First Nation (MCFN) on June 17, 2021.

Copies of reports and background information were prepared and forwarded to Megan DeVries, Archaeological Operation Supervisor for the Department of Consultation and Accommodation (DOCA) and the MCFN. The following agreements were signed and can be found in **Appendix C**:

- Six Nations of the Grand River Elected Council (SNGREC) Archaeological Monitoring Agreement was signed on July 23, 2021.
- Archaeological Review Agreement between The Mississaugas of the Credit First Nation (MCFN) and Township was signed on July 23, 2021.
- Field Liaison Representative Participation Agreement between The Mississaugas of the Credit First Nation and Township was signed on July 23, 2021

Notices of Commencement, PIC notices, and Notices of Completion were directly communicated with all First Nation communities and groups representing First Nations.

# 3.0 Existing Conditions

The project team carried out detailed background studies to establish the baseline existing conditions. These studies were utilized for assessing the impacts and benefits of the Baden Trunk alternative alignments. The following sections describe the existing environments within the Detailed Study Area (DSA) and the area impacted.

## 3.1 Physical Setting & Topography

The study area is located within the physiographic region of southern Ontario known as the Waterloo Hills. This region occupies approximately 777 $km^2$, centred primarily in the Region. The PSA (**Figure 1.0**) is located within the Grand River watershed and is predominantly comprised of actively cultivated agricultural lands and regenerating fallow fields. Smaller areas of rural residential and commercial land cover also fall within the study area. The dominant natural feature within the study area is Baden Creek and its tributaries.

Baden Creek drains from a dammed pond within the northeast end of the DSA (**Figure 2.0)**, and meanders through the DSA from north to south along historically channelized alignments used to optimize agricultural land use opportunities. Baden Creek flows downstream of the study area into the Nith River, which is a tributary of the Grand River.

Three tributaries confluence with Baden Creek within the DSA: The Huehn Award Drain, which generally drains lands east of Foundry Street, and two unnamed tributaries of Baden Creek. Baden Creek Tributary A drains lands to the northwest and originates from a stormwater management pond located within a subdivision northwest of the study area. Baden Creek Tributary B drains lands to the northeast of the study area and converges with Baden Creek east of Foundry Street.

The topography of the study area is gently sloping with the high point at ~359m amsl at Snyder's Road West to ~338m at the culvert on Baden Creek at Gingerich Road.

## 3.2 Natural Environment

NRSI prepared the Natural Environment Assessment (NEA) report in 2022, which summarizes background information on natural heritage features within the study area. The field survey results were used to characterize the existing terrestrial, wetland, and aquatic ecosystems of the natural environment conditions. Information on existing conditions was also gathered from background and field data collected for the Schmidt Estate Environmental Impact Study (EIS) collected by NRSI in 2017. The EIS is still ongoing.

The terrestrial, wetland, and aquatic ecosystems detailing the existing natural features and their functions, including surveys and assessments of their ecological significance and sensitivity, are provided in the NEA report and is summarized herein.

### 3.2.1 Terrestrial Ecosystems

The Terrestrial Ecosystems being evaluated include 'Vegetation Communities and Flora' and 'Wildlife Habitat'. This group summarizes significant and sensitive natural features and habitats present within the PSA and DSA that may represent constraints to site alteration or areas requiring mitigative measures. The ecological sensitivities of these natural features vary and are described further in the NEA.

Vegetation Communities

The DSA is predominantly comprised of active agricultural fields. According to the Ecological Land Classification (ELC) system (Lee et al., 1998), there exists four distinct cultural ecosites and one Woodland ecosite within the PSA; all of which are summarized below. The delineations can be found on Map 2 and are described in Table 1 and Table 2 of the NEA report (**Appendix E**):

Cultural Ecosites:

- Mineral Cultural Meadow (CUM1)
- Mineral Cultural Woodland (CUW1)
- Mineral Cultural Thicket (CUT1)
- Meadow Marsh (MAM)

Woodland Ecosite:

- Fresh-Moist Willow Lowland Deciduous Forest (FOD7-3) - Locally significant woodlands

Of the 141 plant species inventoried, the Butternut (Junglans cinerea) was found to be the only federally and provincially significant plant species and is listed as Endangered (Government of Canada 2021, MECP 2020). As a Species At Risk (SAR), Ontario Regulation 830/21 Section 30 states that, in regards to the construction or installation of infrastructure, no permanent structure should be constructed or installed within 25m of a Butternut tree (Refer to Map 3 of the NEA for more details) unless approved by the MECP in writing.

The only regionally significant species within the PSA was the Running Serviceberry. It was observed within the CUM1 community along the rail corridor in the northwest study area.

Wildlife Habitat

The terrestrial ecosystems within the PSA provide a range of habitats for a variety of fauna species.

Of the 74 bird species reported, only two were identified as SAR; they include the Bank Swallow and the Barn Swallow. Bank Swallows are listed as Threatened both federally and provincially (Government of Canada 2021, MECP 2020). Lands representing existing foraging habitat include; existing agricultural fields, Mineral Cultural Meadows (CUM1), and the Baden Creek Pond. Though this is considered to represent evidence of possible breeding (Birds Canada 2021); habitat areas within the DSA do not provide suitable nesting habitat and are not impacted by the temporary construction of the buried infrastructure.

Four regionally significant bird species (Martin 1996) showing evidence of ‘possible’ breeding were observed within specific ecosites of the PSA, as listed below:

- Mineral Cultural Meadow (CUM1)
    - Brown Thrasher
- Fresh-Moist Willow Lowland Deciduous Forest (FOD7-3)
    - Red-breasted Nuthatch
    - Hooded Merganser
- Pond
    - Great Blue Heron within the study area.

Herpetofauna species were not observed within the PSA during the targeted snake emergence survey.

There were no federally, provincially, or regionally significant mammal species reported within a 10km radius of the PSA. However, previous NRSI surveys observed three regionally significant species, directly and indirectly within the PSA, and should be assumed to still be present. They include the American Mink and Coyote, which are also considered to be 'Scarce', and the Virginia Opossum, considered to be 'Rare' (Region of Waterloo 1985). Neither of these species may still be considered significant.

Candidate Significant Wildlife Habitat (SWH) were identified for bats and the Species of Conservation (SCC) Snapping Turtle. Although a bat habitat assessment was not completed, all wooded areas have the potential to provide suitable habitat for SAR bats and should be avoided. The SCC Snapping Turtle was not observed during field studies. However, the pond is a potential significant habitat for the SCC Snapping Turtle and a potential overwintering habitat area.

Ecological connectivity within the study area is primarily associated with the Baden Creek riparian corridor. This corridor represents the primary naturalized feature within the study area that is otherwise dominated by active agriculture. Linkages within the study area may be of minor or localized ecological significance.

### 3.2.2 Wetland Ecosystems

Wetlands

Four, previously unmapped, wetland features have been identified. Two wetland features were identified within the Mineral Cultural Meadow (CUM1) community of the DSA and are believed to be anthropogenic in origin, as they do not meet the criteria to be defined as a wetland but would require confirmation by the GRCA. Refer to Map 2 of the NEA for more details.

Within the greater extent of the PSA, northeast of the Snyder's Road East and Foundry Street intersection, two small meadow marsh wetland features, associated with Baden Creek Tributary B, have been identified. All wetland features are considered to be 'locally significant' (Township of Wilmot 2019) and represent Supporting Environmental Features.

### 3.2.3 Aquatic Ecosystems

Four prominent aquatic features exist within the PSA. These include Baden Creek, the Huehn Award Drain, and the two Baden Creek Tributaries (A and B). The study area watercourses are considered Supporting Environmental Features as described by the policies of the Township Official Plan (OP). Refer to Map 1 of the NEA for more details.

Aquatic Habitat

Baden Creek and the lower portion of the Huehn Award Drain, up to the perched culvert at Foundry Street, provide direct year-round fish habitat including suitable spawning, foraging and rearing habitats for a variety of cool and warmwater species. Baden Creek is considered a warmwater feature, but water temperatures are maintained at the lower range due to groundwater influence and the shade provided by the adjacent woodlots. The Huehn Award Drain is a coldwater feature, providing coldwater inputs within the stream and downstream of the confluence with Baden Creek, which maintains cooler water temperatures within the lower reaches of Baden Creek.

No fish were observed within Tributary B during the assessment. However, the watercourse contains suitable habitat to support fish.

The upper portion of Baden Creek Tributary A is considered ephemeral and does not support fish habitat. The lower portion of tributary A, near its confluence with Baden Creek, is considered intermittent and provides direct fish habitat seasonally when flows are elevated within the low flow channel.

### 3.2.4 Surface Water

Water quality measurements of dissolved oxygen, conductivity, pH, and total dissolved solids were taken at three locations within Baden Creek. All measurements fall within the recommended Canadian Environmental Quality Guidelines (CEQG) for the protection of aquatic life. Based on available background information, pH levels, and water temperature measurements, Baden Creek is considered to have a warmwater thermal regime.

### 3.2.5 Groundwater Resources

Mapping illustrates that neither the PSA or DSA are located within the Regional Recharge Area (RRA), a Wellhead Protection Area (WHPA), or above a Highly Vulnerable Aquifer (HVA). Small portions in the northern part of the PSA are located within a Significant Groundwater Recharge Area (SGRA) as seen in Figure 4 of *Hydrogeological Assessment of Alternatives* (HGAA) *(*MTE, 2021) in **Appendix E**.

Based on the borehole logs from the previous and current investigations, the water table is present in the DSA within the Upper Maryhill Till. As this represents a Regional aquitard, shallow groundwater flow is expected to be predominately vertical. In isolated locations where sand seams are present (at MW103-21 for example), there may be a stronger horizontal component to groundwater flow.

Using water levels collected from the previous and current investigations, a map of theoretical water table contours has been generated and is presented in Figure 7 of the HGAA. Note that this representation of the water table is theoretical only, as it has been compiled using water levels taken at different times over a 3-year period. Regional water table mapping available from the GRCA is presented in Figure 8 of the HGAA. Both figures suggest that some component of shallow groundwater flow is directed towards the Baden Creek.

### 3.2.6 Surface Drainage

Descriptions from the NEA report and the *Baden Trunk Sanitary Sewer Environmental Assessment Fluvial Geomorphological Assessment* by Water's Edge Environmental Solutions Team (2022) were used to summarize the Surface Drainage factor group along Baden Creek, its tributaries, and the Huehn Award Drain.

Baden Creek is a permanent watercourse within the DSA. The feature flows southwest from a dammed reservoir located in the northeast portion of the study area before turning east towards Foundry Street. It then flows southeast and parallel to Foundry Street, crossing Gingerich Road, and eventually exits the DSA. Baden Creek predominantly flows through actively cultivated agricultural lands, with lesser areas of fallow, regenerating fields. Small areas of rural residential land are located to the north and east, while commercial land also exists to the south. The floodplain and extent of natural vegetation is greater than 10.0m on both sides of the channel throughout the upper portion. Baden Creek appears channelized throughout its lower portion, from where the channel flows in an easterly direction to where it runs alongside Foundry Street and under Gingerich Road. Active and historical erosion was also noted, which suggests that the channel experiences high water levels and velocities at times throughout the year. The channel banks have poor to fair stability and the bank height also vary from 0.2m to over 2.5m. The high channel banks are not stable and are often found on outside meander bends with evidence of erosion.

Baden Creek Tributary A starts at a stormwater management facility just beyond the northwest corner of the PSA. The upper reach of this tributary is channelized for approximately 320m downstream of the railway tracks. It is characterized as both ephemeral and intermittent. It runs between two row crop fields and collects runoff from the fields through tile drainage. The riparian zone (approximately 10m) is exclusively composed of grasses which help protect the channel banks' loose soil. The lower reach extends from the bend in the tributary to where it confluences with Baden Creek. The channel shows significant signs of bank erosion and lateral migration. Sections along the reach are unstable and susceptible to erosion due to the shallow rooting depth of the riparian zone.

Baden Creek Tributary B enters the study area from the north and generally flows in a south/southeasterly direction before its confluence with Baden Creek approximately 120m east of Foundry Street. This watercourse primarily drains a combination of urbanized-residential and agricultural lands within the north end of Baden. The thermal regime of this watercourse has not been determined. Evidence suggests that it is a permanent watercourse feature with minimal groundwater flow inputs which is reinforced by the presence of Watercress. There is evidence of erosion, particularly upstream of the trail.

The Huehn Award Drain is a permanent watercourse that flows west through residential land and crosses Foundry Street before flowing to Baden Creek at the east side of the study area. Only a small portion (approximately 40m) of the feature located within the study area boundary. The Huehn Award Drain is considered to be a coldwater watercourse by the GRCA. Erosion and sedimentation were noted within the aquatic features on site due to their close proximity to active agricultural lands and location downstream of highly developed areas, including stormwater management facilities; which influence the natural hydrologic regimes of each feature. In addition, historical channelization along Baden Creek and Baden Creek Tributary A influence the flow regimes of the features and increase erosion and sedimentation.

The wetlands north of Snyder's Road West and Foundry Street support the year-round flow of the Baden Creek Tributary B and contributes to Baden Creek.

## 3.3 Socio-Cultural Environment

The following sections provide a summary of existing and planned land uses within the study area, as well as existing cultural and heritage resources.

The Class EA is consistent with the Provincial Policy Statement of 2020 and conforms with the policies of the Places to Grow Plan of 2020, the amended Regional Official Plan of 2015 and the Township of Wilmot Official Plan of 2019. As such, it supports an integrated approach to land use planning, infrastructure investments, and environmental protection to achieve the outcomes of the Plan, ensuring the efficient use of land and infrastructure. Municipal water and wastewater systems are to be planned, designed, constructed, or expanded to serve growth in a manner that supports achievement of the minimum intensification and density targets of the Growth Plan.

### 3.3.1 Land Use Policy

MHBC undertook a *Land Use Planning Evaluation* for the Baden Trunk Class EA to identify potential land use impacts for each alignment alternative. Refer to their report in **Appendix E** for more details. Baden is designated as a Township Urban Area in the Regional Official Plan, consisting primarily of urban residential, urban core, light industrial, and general industrial lands to the south.

Recent updates to the Township's OP have altered future growth patterns from an 'outward' development concept to an 'in-filling' development concept between Baden and New Hamburg.

The approximate west half of the Study Area is designated agricultural lands located outside the Urban Area and partially out of the Countryside Line; as defined by the approved Township OP. The Countryside Line is the long-term boundary between the existing Urban Areas and the Countryside. Future expansions of the boundaries of the Baden Urban Areas are only permitted onto lands within the Countryside Line.

The main concerns associated with temporary land use impacts include:

- Access to agricultural/livestock operations
- Disruptions to cropping and other agricultural activities
- Many residential and commercial uses along Foundry Street and Snyder's Road West
- Traffic disruption at busy intersections combined with railroad crossing
- Access to Township's Fire Hall

### 3.3.2 Archeological Resources

The Township is located on the traditional territory of the Neutral Anishnaabeg, Haudenosaunee, and Mississauga peoples and acknowledges the importance of the Dish with One Spoon Covenant; which is a peace agreement made between Indigenous groups before the arrival of Euro-Canadian settlers.

Detritus Consulting was retained to complete a Stage 1 and 2 Archeological Assessment of the DSA.

The Stage 1 investigation revealed that portions of the DSA exhibited moderate to high potential for the identification and recovery of archaeological resources. These portions corresponded with the agricultural field.

Previous Stage 1-2 assessments identified two findspots that extend into the DSA. These areas will require monitoring during construction of the Baden Trunk for Alternatives 4 and 5. Stage 3 assessments are recommended for alignments that intersect with the 20m protective buffer. Currently, no alignment traverses the 20m protective buffer. However, if the preferred alignment is within the 50m monitoring buffer of an existing findspot, the Township's Consultant will engage the First Nations agencies to arrange for monitors to attend the site during excavation.

Any additional finds during the excavation may result in needing further assessments.

### 3.3.3 Built Heritage and Cultural Landscapes

The Region has identified that Baden is a potential Cultural Heritage Landscape; Foundry Street and Snyder's Road have been identified as scenic roads. Further, the project meets the criteria of the Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes Checklist of the Ministry of Heritage, Sport, Tourism and Culture Industries. MHBC prepared a *Cultural Heritage Evaluation Report* (CHER) (**Appendix E**) to identify cultural heritage resources within the broader and detailed study area to provide input into the evaluation of the Baden Trunk alignments.

The impacts related to Built Heritage and Cultural Landscapes are associated to construction work that is both subterranean and undertaken for a limited period of time.

Eleven identified cultural heritage resources, which are included in the Township's Heritage Register, have been reviewed. No alternatives are considered likely to result in the removal of cultural heritage resources given that they are either located within the right-of-way or are sited away from identified cultural heritage resources.

The CHER recommends that a Heritage Impact Assessment be prepared should construction of the preferred alignment be coordinated with proposed road reconstruction and the design of the sewer change the profile or character of streets which are either scenic (i.e., Foundry Street and Snyder's Road) or identified heritage attributes in the forthcoming Cultural Heritage Landscape Study by the Region.

### 3.3.4 Noise

There are currently two WWPS located within Baden. The Baden West WWPS, which is maintained and operated by the Township, and the Waterloo-Oxford District WWPS, which is privately owned. A noise barrier is present along Charlotta Street to mitigate noise generated from the Baden West WWPS.

## 3.4 Transportation/Municipal Services and Utilities

### 3.4.1 Transportation Network

Snyder's Road West and Foundry Street are arterial roads in Baden. The regional roads are extensively used by commuters. Foundry Street receives traffic to and from Highway 8 while Snyder's Road West connects Kitchener to Highway 8 to the west. The intersection of Snyder's Road West and Foundry Street is bisected by a CN Railway crossing.

The intersection of Gingerich Road and Foundry Street provides access to Highway 8 along Foundry Street and access to Snyder's Road East and Kitchener along Gingerich Road.

All local roads connect to the arterial roads. The Kiwanis specialized transit and the Grand River Transit line 77 bus rely on the arterial roads. The Kiwanis specialized transit services individual residences, generally utilizing the various local roads to access the residences as requested.

### 3.4.2 Municipal Services and Utilities

The Baden sanitary sewer system is comprised of gravity sewers, trunk sewers, forcemains, and wastewater pumping stations. Two sanitary pumping stations direct flow to gravity sewers where it is conveyed to the Baden WWPS before being pumped to the Morningside WWPS and ultimately to the New Hamburg WWTP for treatment. **Figure 3.0** identifies the areas currently serviced by the existing sanitary sewer system.

Additional service infrastructure includes local watermains, storm drains, rights-of-way, and a Regionally owned 450mm diameter watermain within the local roads of Christian Street, Charlotta Street, Mill Street, Beck Street, Foundry Street, and Gingerich Road. Utilities include hydro, gas, and bell utilities. The primary utility corridors which service Baden are located within Snyder's Road West and Foundry Street.

## 3.5 Financial

Existing financial obligations stem from operational and maintenance costs associated with the Baden WWPS, local sewers, easements/rights-of-way, and traffic control required for maintenance operations.

## 3.6 Technical

There are existing obstacles that pose technical challenges during construction. They include crossing the CN Railroad, crossing Baden Creek, disruption of existing Regional and local infrastructure, narrow rights-of-way, and land acquisition.

# 4.0 Assessment of Alternatives

## 4.1 Development of Alternatives

Five alternatives were developed to potentially service the existing residents and future growth areas within Baden and to relieve stress on the existing sanitary infrastructure. Special consideration was given to the following key components:

- Integration with the Existing Community
- Avoidance or Mitigation of Environmental Impacts
- Connectivity to Existing Sanitary Sewer System
- Feasibility and Constructability

Sufficient depth will allow more lands to be serviced directly by gravity drainage, thereby decreasing costs associated with operations and maintenance of pumping stations. Special attention was given to the natural features that support SAR habitat.

Factors considered were cost, timing, capacity, topography, net benefits, and constructability. Evaluation criteria are described within Section 4.2.

### 4.1.1 Alternative 1 – Do-Nothing (2014 Environmental Assessment)

In order to establish a baseline for the assessment, MTE has defined the approved Preferred Alternative D (**Appendix A**) of the 2014 CRA report as the 'Do Nothing' Alternative. It has been endorsed by the Township and documents the preferred servicing strategy at the time the CRA report was approved.

The western portion of the alignment begins at the intersection of Christian Street and Snyder's Road West, at the previously approved obvert of 353.70m± (**Figure 4.1**). It continues east along Snyder's Road West to Foundry Street. The eastern portion of the alignment runs along the eastern boundary of the Activa Lands (Parcel O), north of Snyder's Road East, southwest along the railway to Foundry Street, where it connects to the western section. The sewer then runs south along Foundry Street and ultimately to the Baden WWPS. This alternative calls for the construction of a pumping station within Parcel O, the installation of approximately 1,555m of forcemain for the eastern portion of the alignment, approximately 1,800m of sanitary sewer for the western portion of the alignment ranging in depths from 3.0m to 5.0m and associated manholes and apertances.

Construction considerations for Alternative 1 include a trenchless railway crossing, a trenchless crossing of the Baden Creek Tributary B north of Snyder's Road East, crossing the Baden Creek upstream of the Baden Creek Pond, crossing the Huehn Award Drain, upgrading existing sewers, reconstructing large portions of existing road infrastructure, and integrating it with future road construction along the Regional Roads of Snyder's Road West and Foundry Street.

Alternative 1 will service the growth areas of Parcels BB, $O_1$, $O_2$, $P_1$, $P_2$, R, S, T, U, V, $Y_2$ through the Nideva lands at 1012 Snyder's Road West, parts of Parcel $AA_1$ to $AA_3$, and Foxboro. Refer to **Figure 4.2** for reference to the growth area Parcels and the sanitary sewer drainage areas.

### 4.1.2 Alternative 2 - Snyder's Road West to Foundry Street

Alternative 2 begins at the intersection of Snyder's Road West and Christian Street at an obvert of 349.40m (**Figure 5.1**), continues east on Snyder's Road West to Foundry Street, and south on Foundry Street to the Baden WWPS. This alignment is primarily within the existing rights-of-way for Snyder's Road West and Foundry Street. It calls for approximately 1,800m± of sanitary sewer varying in depth from 3.0m to 9.3m and associated manholes.

Construction considerations for Alternative 2 include a trenchless railway crossing, crossing the Baden Creek upstream of the Baden Creek Pond, crossing the Huehn Award Drain, upgrading existing sewers along Snyder's Road West and Foundry Street, reconstructing large portions of existing road infrastructure, and integrating with future road construction along Snyder's Road and Foundry Street.

The primary difference between Alternative 1 and Alternative 2 is that the pump station and forcemain on Activa's lands will not be required. Due to increased sewer depth, the deep sewer will provide additional sanitary services to Parcel $Y_1$, Parcel Z, and eliminates the Waterloo-Oxford District WWPS (**Figure 5.2**).

### 4.1.3 Alternative 3 - Christian/Charlotta/Mill/Charles/Foundry

Alternative 3 begins at the intersection of Snyder's Road West and Christian Street at an obvert of 349.40m (**Figure 6.1**). It lies within the existing rights-of-way along Christian Street, Charlotta Street, Mill Street, Charles Street, and Foundry Street. This alignment requires approximately 1,985m of sanitary sewer varying in depth from 3.3m to 9.3m and associated manholes.

Construction considerations for this alignment include a trenchless railway crossing, crossing the Baden Creek just upstream of the Baden Creek Pond, crossing the Huehn Award Drain, upgrading existing sewers along Christian Street, Charlotta Street, Mill Street, Charles Street, and Foundry Street, reconstructing large portions of existing road infrastructure, and integrating with future road construction along Snyder's Road and Foundry Street. As part of the development of the 1012 Snyder's Road West Subdivision, a portion of this alternative along Christian Street will be reconstructed.

This alternative will eliminate two WWPS; the Waterloo-Oxford District WWPS (private), and the Baden West WWPS (public) owned and operated by the Township, and will additionally service Parcels Q, X, and W (**Figure 6.2**).

### 4.1.4 Alternative 4 - Christian/Charlotta/Queen and Baden Creek

Alternative 4 begins at the intersection of Snyder's Road West and Christian Street at an obvert of 349.40m (**Figure 7.1**). It lies within the existing rights-of-way along Christian Street, Charlotta Street, Queen Street, through Parcels $AA_1$, $AA_2$, and $BB_2$ to Gingerich Road, and then south on Foundry Street to connect to the Baden WWPS. This alignment requires approximately 2,095m of sanitary sewer, varying in depth from 3.0m to 9.3m and associated manholes.

Construction considerations for this alignment include a trenchless railroad crossing, trenchless crossing of the Baden Creek Tributary A, trenchless crossing of Baden Creek just north of Gingerich Road, upgrading existing sewers along Christian Street, Charlotta Street and Queen Street, reconstructing a small portion of existing road infrastructure, and integrating with future road construction along Snyder's Road and Foundry Street. As part of the development of the 1012 Snyder's Road West Subdivision, a portion of this alternative along Christian Street will be reconstructed.

The existing forcemain along Queen Street will be maintained should this Alignment be selected.

This alternative benefits from following the natural topography of the Schmidt Lands and will eliminate the two WWPS as identified in Alternative 3, as well as servicing all identified growth areas (**Figures 7.2**).

### 4.1.5 Alternative 5 - Christian Street and Baden Creek

Alternative 5 begins at the intersection of Snyder's Road West and Christian Street at an obvert of 349.40m (**Figure 8.1**). It lies within the existing right-of-way along Christian Street. It runs through Parcels $AA_1$, $AA_2$, and $BB_2$ to Gingerich Road, and then south on Foundry Street to connect to the Baden WWPS. It has the potential to run along a future easement adjacent to the Schmidt Lands (parallel to Baden Creek and Tributary A), parallel to Baden Creek, east along Gingerich Road then south on Foundry Street to connect to the Baden WWPS. This alignment requires approximately 1,905m of sanitary sewer varying in depth from 3.0m to 9.3m and associated manholes.

Construction considerations for this alignment include a trenchless railroad crossing, trenchless crossing of the Baden Creek Tributary A, trenchless crossing of Baden Creek north of Gingerich Road, upgrading existing sewers along Christian Street and Charlotta Street, reconstructing a small portion of existing road infrastructure, and integrating with future road construction along Snyder's Road and Foundry Street. As part of the development of the 1012 Snyder's Road West Subdivision, a portion of this alternative along Christian Street will be reconstructed.

This alternative benefits from following the natural topography of the Schmidt Lands and will eliminate two WWPS as identified in Alternative 3 as well as servicing all identified growth areas (**Figures 8.2**).

## 4.2 Evaluation Criteria

Comprehensive evaluation criteria were developed according to the requirements of the MCEA. **Table 4.1** includes the evaluation of factors which have been grouped into five factor categories. These Factor Categories include natural environment, socio-cultural environment, transportation/municipal services and utilities, financial, and technical. Each factor category is further divided into various factor groups and factors for a more thorough evaluation.

**Table 4.1 – Alignment Alternatives Evaluation Criteria**

| Factor Category/Factor Group/Factor | Indicator/Measure |
|---|---|
| **1 NATURAL ENVIRONMENT** | |
| **1.A Terrestrial Ecosystems** | |
| • Vegetation Communities and Flora | Impact on feature and function of vegetation communities and flora<br>-ecological significance (type, size, composition, species of conservation concern)<br>-sensitivity/ susceptibility (e.g., mortality, stress, composition change). |
| • Wildlife Habitat | Impact on feature and function of wildlife habitat<br>- significance (e.g., size, presence of specialized habitat elements, species of conservation concern)<br>- sensitivity (e.g., noise, light)<br>Effects on wildlife movement corridors (e.g., habitat removal, |

| | |
|---|---|
| | fragmentation, potential increases in animal-vehicle conflicts). |
| **1.B Wetland Ecosystems** | |
| • Wetlands/watercourse | Impact on feature and function of wetlands (e.g., area, classification and quality, relative extent, function in broader wetland complex ecosystem). |
| **1.C Aquatic Ecosystems** | |
| • Aquatic Habitat | - Number of water bodies and watercourse crossings.<br>- Sensitivity of fish/fish habitat and thermal regime (warm, cool, or cold water).<br>- Extent (area) and function of riparian habitat removed.<br>- Extent and type of fish habitat (in-stream) altered/displaced in watercourse, including importance to aquatic ecosystem (e.g., spawning, nursery areas, habitat for species of conservation concern or less tolerant species). |
| **1.D Surface Water (Quality - Impact to Water Quality/Thermal/Chlorides)** | |
| • Water Quality | - Impact on water quality of surface water features (TSS, gas/oil fueling, construction operations). |
| • Thermal Regime | - Impact in the thermal regime of surface water features. |
| • Chlorides | - Impact on water quality of surface water features. |
| **1.E Groundwater Resources** | |
| • Groundwater Recharge Areas | - Encroachment into the Regional Recharge Area. (removal/disruption of function – area, depth). |
| • Groundwater Quality - Clean Water Act (WHPA, SGRA, IPZ, HVA) | - Potential for impacts to vulnerable areas (Area) as defined in Source Water Protection Areas (SWPA). |
| • Shallow Groundwater Movement/Contributions (Quality and Quantity) | - Potential for interference with existing flow patterns (baseflow) relative to proximity to significant surface water feature and significant groundwater feature discharge areas.<br>- Consider short-term impact.<br>- Regional shallow groundwater elevation 346m - 353m |
| **1.F Surface Drainage (Proximity - Erosion)** | |
| • Quantity (flows) | - Quantity Control and Flow Regime |
| • Flood Plain Function | - Impacts to Regulatory Floodplain and changes to floodplain hydrologic function.<br>(During Construction), including need for GRCA work permit |
| • Stormwater Management | - Opportunities to enhance roadway stormwater management measures, including coordination with/use of adjacent development facilities. |
| • Water Balance | Changes to the water balance due to development |
| • Erosion Assessment | - Impact on slope stability due to stream disturbances and from increased TSS during construction. |

| | |
|---|---|
| **2 SOCIO-CULTURAL ENVIRONMENT** | |
| **2.A Land Use Policy** | |
| • Land Use Designations and Policies | - Aligned with Provincial, Regional, and Township growth and development goals, objectives, or policies (high, medium, low).<br>- Upper tier and lower tier infrastructure and corridor owner.<br>- Efficiency of resulting development patterns and timing. |
| • Impact of the Sanitary Sewer on Adjacent Lands | - Impacts to residence and businesses |
| **2.B Archaeological Resources** | |
| • Known and/or Potential Archaeological Sites | - Number/type/significance of direct/indirect impacts to known archaeological resources and/or areas of high archaeological potential. |
| • **2.C Built Heritage** | |
| • Built Heritage Features | - Number/type/significance of direct/indirect impacts to built heritage resources (based on presence of built heritage resources identified by the Region). |
| • **2.D Noise** | |
| • Noise | - Noise impacts due to addition/removal of wastewater pumping stations |
| **3 TRANSPORTATION/MUNICIPAL SERVICES AND UTILITIES** | |
| **3.A Transportation Network (Roads and Pedestrians)** | |
| • Roads and Intersections | - Potential impacts to roads/intersections. |
| • Traffic Operations | - Road safety and accessibility (sight distance, turning movements).<br>- Capacity/capability to accommodate forecast traffic demand.<br>- Provides for appropriate access to existing properties.<br>- Impact on access to existing properties. |
| • Transportations Policy Initiatives | - Capability to support municipal policy initiatives (transit, active transportation, roundabouts) |
| • Railroad Crossings | - Ease of railroad crossing, approval |
| **3.B Municipal Services and Utilities** | |
| • Municipal Services<br>• (sanitary, water, storm) | - Opportunities for connections to the broader sanitary system. Impacts to existing sanitary, water, and storm infrastructure during construction. Undermines existing infrastructure. |
| • Municipal Infrastructure | Wasterwater Pump Stations<br>Noise Wall |
| • Utilities (Bell, Hydro, Gas) | Degree of exposure of utilities and/or utility conflicts with road design. |

| | |
|---|---|
| **4 FINANCIAL** | |
| • Capital Cost | - Total Construction costs |
| • Operational Cost (Sanitary sewer) | - Operational costs due to traffic during construction, pumping station |
| **5 TECHNICAL** | |
| • Constructability | - Physical constructability (adequate access to construction area).<br>- Potential conflicts with existing infrastructure (other than utilities).<br>- Depth, trenchless crossings<br>- Water table and groundwater dewatering (short-term impact). |
| • Trenchless Cost | - The complex issues associated with the construction of the trunk sewer |
| • Property Cost (Land/acquisition) | - Property requirements (number, area) and ease of acquisition |
| • Serviceability (Long-term) | Percentage of Baden to be serviced by Trunk sewer. |

## 4.3 "Must 10" Score Methodology

The Numerical Evaluation approach was selected as the preferred scoring methodology. This methodology requires a "Must 10" assessment of the five alternatives in a matrix form. For each factor, the least preferred alternative received a score of 1 and the most preferred alternative received a score of 10. All other alternatives were scored between these values with ties strongly discouraged. The factors receiving less than a 5 were deemed less desirable and were used to identify potential issues requiring additional mitigation. Each factor group was analyzed and commented on to clarify differentiating factors and commonalities between the impacts of the proposed Baden Sanitary Trunk alternatives.

## 4.4 Supporting Technical Memorandums

Technical Memorandums were prepared to provide a description of each factor being scored, the score each alternative received, and the justification for the score.

The following are the prepared Technical Memorandums which can be found in **Appendix E.**

- Natural Environment
- Geotechnical Site Characterization
- Hydrogeological Assessment
- Fluvial Geomorphological Assessment
- Socio-Cultural Environment
- Transportation/Municipal Services & Utilities
- Financial
- Technical
- Selection of Preferred Alternative

## 4.5 Results of Evaluation

The alternatives were independently evaluated according to the "Must 10" scoring methodology as described in section 4.4. The factor group score was determined by taking the average score of all the factors within the group. Scores for each factor group were then averaged to get the total category score. Final scores were calculated by summing all five category scores and ranking them accordingly. The following **Table 4.2** represents a summary of the evaluation completed by the project team and reviewed by the steering committee. The evaluation matrix can be found in **Appendix F**.

**Table 4.2 – Summary of Evaluation Matrix**

| PRELIMINARY EVALUATION CRITERIA - BADEN SANITARY TRUNK | | | | | |
|---|---|---|---|---|---|
| Factor Category / Factor Group / Factor | Alternative | | | | |
| | A1 | A2 | A3 | A4 | A5 |
| Date: August 2022 | Modified 2014 Environmental Assessment Preferred Alternative (Do Nothing) | Snyder's / Foundry | Christian / Charlotta / Mill / Charles / Foundry | Christian / Charlotta / Queen and Baden Creek | Christian and Baden Creek |
| | Score | Score | Score | Score | Score |
| 1. NATURAL ENVIRONMENT | 2.8 | 6.5 | 5.9 | 6.1 | 9.5 |
| 2. SOCIO-CULTURAL ENVIRONMENT | 3.0 | 3.8 | 6.5 | 7.0 | 8.5 |
| 3. TRANSPORTATION/MUNICIPAL SERVICES AND UTILITIES | 1.5 | 2.2 | 6.2 | 7.9 | 9.6 |
| 4. FINANCIAL | 1.0 | 6.0 | 7.0 | 8.5 | 10.0 |
| 5. TECHNICAL | 1.0 | 5.0 | 8.0 | 8.5 | 9.0 |
| GRAND TOTAL | 9 | 23 | 34 | 38 | 47 |
| % BEHIND FIRST RANKED ALTERNATIVE | 80.2% | 49.6% | 28.0% | 18.4% | 0.0% |
| FINAL RANKING | 5 | 4 | 3 | 2 | 1 |

## 4.6 Selection of Preferred Alternative

The preferred sanitary sewer trunk Alternative was selected by following a Schedule B framework outlined in the Municipal Engineers Class EA manual. Based on the preceding analysis and the outcome of the evaluation matrix, Alternative 5, with a total score of 47**,** was selected as the preferred alternative. The sanitary sewer construction of the preferred alternative has the following benefits:

- Least impacts to existing businesses and residents
- Least impacts to cultural heritage
- Provides timely project completion due to minimal Regional Road corridors
- Provides flexibility for servicing the entire PSA
- Eliminates two existing pumping stations
- Eliminates the need for a future WWPS
- Eliminates noise and odour associated with the removal of existing pumping stations
- Reduces long-term operational/maintenance cost
- Minimal impact to road network
- Minimal impact to traffic
- Minimizes impacts to significant watercourses (Baden Creek at the Baden Creek pond and the Huehn Award Drain)
- Avoids wetlands, woodlands, Butternuts
- Does not impact flow regime of any water feature
- Eliminates impacts to the coldwater fisheries tributary (Huehn Award Drain)
- Represents the lowest cost solution

# 5.0 General Description and Design Features of the Preferred Alignment

## 5.1 General Trunk Sewer Description

Based on the wastewater flow projections for the Baden Trunk service area (**Figure 8.2**), the size of the Baden Trunk was established to be in the range of 450mm to 750mm in diameter. It is approximately 2,000m in length and has three trenchless crossings. Preliminary plan and profile design drawings have been prepared for the preferred Baden Trunk alignment (**Appendix G**). The drawings illustrate the existing topographic elevations, proposed sewer depth, existing utilities (to be confirmed), and surface features including buildings, roadway, and property lines.

A preliminary sanitary sewer design sheet has been prepared with pipe diameters and slopes for Alternative 5. The design has been prepared per Township and Region (DGSSMS) standards. The design uses a previously established residential population density of 60 people per hectare (ppha), as well as institutional, commercial, and industrial zonings where appropriate. The sanitary sewer design sheet is provided in **Appendix G**.

The Baden Trunk will be a gravity trunk sanitary sewer constructed of pre-cast concrete pipe or PVC. It will begin at the intersection of Snyder's Road West and Christian Street at an obvert at 349.40m and continue down Christian Street for approximately 255m at a 1% slope to Charlotta Street. The alignment will cross Charlotta Street and make a 90degree turn and continue adjacent to the Baden West WWPS for 68m at a 1% slope. The Baden Trunk can efficiently cross under the CN Railway perpendicularly, without encroaching into potential SAR bat habitat on the other side of the railway. The alignment will cross under the Baden Creek Tributary A and continue downstream, parallel to Baden Creek, for approximately 1,300m, crossing Baden Creek immediately upstream of Gingerich Road. The alignment will again cross under Baden Creek and connect with the existing trunk sanitary sewer at the intersection of Foundry Street and Gingerich Road. The existing trunk sanitary sewer will require upsizing along Foundry Street, up to the entrance of the Baden WWPS, located west of Foundry Street between Gingerich Road and Highway 8. The final invert elevation will be at 335.92m.

## 5.2 Geotechnical and Groundwater Assessment

Further geotechnical investigations will be required down Christian Street and through the open field.

Through the final design with further geotechnical investigation, the construction of the sanitary sewer along Christian Street will be assessed, comparing an open cut with trenchless construction techniques.

The geotechnical study will also be used to estimate the amount of dewatering required during construction. This study will establish if a Permit to Take Water (PTTW) is required or if an EASR is sufficient.

## 5.3 Easement Requirements

A portion of Alternative 5 will require the dedication of an easement through the northwest portion of the Schmidt Lands where the Township has not yet secured land necessary for the implementation of the preferred Alternative. The width of the easement will depend on the depth of the Baden Trunk final design.

## 5.4 Road Reconstruction Considerations

The upstream portion of Alternative 5 has an alignment generally following the centreline of the Christian Street right-of-way. Due to the depth of the Baden Trunk, Christian Street will be completely excavated requiring a complete road reconstruction. Road reconstruction considerations include whether to maintain Christian Street as a rural road, updating it to an urban road, burying existing hydro lines and hanging transformer or leaving it alone. Attention is required during construction to prevent damage to existing underground infrastructure, including a 450mm diameter Regional watermain located along Christian Street and Gingerich Road, as well as the existing underground utilities and infrastructure at the intersection of Foundry Street and Gingerich Road. Coordination efforts are required with the Region during final design to avoid conflicts with ongoing and proposed projects.

## 5.5 Trenchless Crossings

Different trenchless technologies will be utilized depending on the crossing. The railway crossing will utilize a combination of pipe hammering (Jack and Bore) and Horizontal Directional Drilling (HDD). Christian Street may implement HDD should trenchless installation be more cost effective as compared to an open cut given existing infrastructure within the Christian Street right-of-way. Pipe hammering (Jack and Bore techniques) may be utilized for the stream crossing of Tributary A and for the shallow Baden Creek crossing at Gingerich Road.

# 6.0 Potential Environmental Effects and Proposed Mitigation

## 6.1 Direct Impacts

In the long-term, Alternative 5 does not directly impact core environmental features, watercourses (no watercourses will be crossed directly, and no in-water works are proposed) or designated heritage resources.

The direct impacts are those occurring during the construction of the sanitary trunk.

Environmental impacts include:

- Possible impact to a portion of a Mineral Cultural Woodland (CUW1) located south of Christian Street and the railroad tracks. Trees requiring removal may represent roosting habitat for SAR bats. These trees should be inspected for the presence of suitable bat habitat prior to removal. If suitable bat habitat is present, MECP consultation may be required to ensure that steps are taken to avoid or mitigate impacts to bat SAR or their habitat. At a minimum, potential bat habitat trees should be removed outside of the bat active period (April 1-September 30).
- Potential edge tree removal, or disturbance to tree root zones where the alignment passes through the Fresh-Moist Willow Lowland Deciduous Forest (FOD7-3). Trees should be inspected for the presence of suitable bat habitat prior to removal. If suitable bat habitat is present, MECP consultation may be required to ensure that steps are taken to avoid or mitigate impacts to bat SAR or their habitat. At a minimum, potential bat habitat trees should be removed outside of the bat active period (April 1-September 30). The sewer alignment should be designed to avoid direct impacts to these woodland habitats and should be offset to the extent feasible from the woodland edge.
- Direct removal of habitat for wildlife occupying CUM1 meadow will be required (e.g., small mammals, snakes, open habitat birds). However, this habitat removal will be temporary, as CUM1 meadow habitats are resilient to disturbance and will readily renaturalize. The majority of species occupying this habitat type are generally disturbance tolerant and mobile therefore they will not be negatively impacted. Vegetation removals should be timed to occur outside of the period April 1 – August 31 in order to avoid contravention of the *Migratory Birds Convention Act.* Removal within the bird nesting period may be possible subject to prior inspection of the vegetation for the presence of active nests by a qualified biologist.
- The crossing of the upstream ephemeral reach of Tributary A can occur with no impacts if done during dry conditions.
- Baden Creek provides direct fish habitat therefore any activity that may cause the Harmful Alteration, Disruption or Destruction (HADD) of fish or fish habitat is subject to the requirements of the federal Fisheries Act. Details of the proposed sewer installation activities will be subject to review by the federal Department of Fisheries and Oceans (DFO) through submission of a Request for Review prior to construction. The DFO will provide a response with recommended Best Management Practices to suitably avoid or mitigate impacts to fish and fish habitat or will determine that the proposed undertaking will require a Fisheries Act Authorization. Acquisition of an authorization under the Fisheries Act will require additional measures to provide an Overall Benefit to fish or fish habitat, such as through the restoration or enhancement of aquatic ecosystems.

- Portions of the proposed alignment will occur in close proximity to Baden Creek. Increased proximity to the watercourse may result in greater potential for construction-stage disturbances or potential future leakage of the sewer infrastructure that may affect the watercourse. To the extent possible, the sewer alignment should be maintained outside of the recommended 15.0m watercourse buffer identified in the NEA to mitigate these potential impacts. Sewer construction below the water table will be constructed with isolation collars and enhanced gaskets to ensure a water tight construction limiting inflow and infiltration (I/I).

## 6.2 Indirect Impacts

Tree removal within the Cultural Woodland (CUW1) or Forest (FOD7-3) may impact the wildlife corridor surrounding Baden Creek.

Open-cut trenching along Baden Creek and Tributary A may introduce additional sediments to the water courses resulting in increased erosion and decreasing water quality if mitigation measures are not followed.

If dewatering is required, it may impact groundwater inflow to Baden Creek and Tributary A resulting in lower baseflow and an increase in water temperature. Any de-watering measures should provide sediment removal and flows should be returned to the Creek with thermal mitigation.

With the removal of the existing two WWPS, the odour and noise associated with the WWPS will be eliminated and represent a community benefit.

## 6.3 Other Potential Mitigative Measures

Alternative 5 can be implemented with the securing of easements from the Schmidt Lands for the north portion of the alignment. The balance of the alignment is within lands already owned by the Township or within Township and Region road rights-of-way.

The lower sections of the Alternative 5 alignment cross Baden Creek twice, once upstream of Gingerich Road and the second within the Baden WWPS site. These two crossings could be eliminated entirely with an easement across the OK Tire site located on Gingerich Road (**Figure 8.1b**).

The modified alignment follows the same route as Alternative 5 however, instead of crossing Baden Creek near Gingerich Road, it will continue parallel to Baden Creek, across Gingerich Road, and connect directly to the Baden WWPS. The advantages of this alignment are the following:

- Eliminate two crossings of Baden Creek –
    - Does not require DFO approval for stream crossing
    - Reduces construction costs associated with trenchless crossing
- Does not interfere with Regional projects and infrastructure through the intersection of Foundry Street and Gingerich Road
- Eliminates upsizing the existing trunk sanitary sewer along Foundry Street to the Baden WWPS
- Will not impact traffic at busy intersection of Foundry Street and Gingerich Road

This adjusted alignment is dependent upon securing an easement from OK Tire owners.

## 6.4 Climate Change

The *Considering Climate Change in the Environmental Assessment Process* guide, produced by the MECP, is now included in the Environmental Assessment program's Guides and Codes of Practice. The directions and methods outlined in the guide, complement and support the climate-focused policies of the 2014 Provincial Policy Statement.

Even though Climate Change was not specifically included into the Evaluation Matrix, its impact on each alternative was considered during the evaluation stage.

The following sections describe the effects of climate change through climate change mitigation and climate change adaptation/resiliency.

### 6.4.1 Climate Change Mitigation

With respect to the Baden Trunk Sanitary Sewer, mitigating greenhouse gas emissions would best be achieved by reducing the existing number of pumping stations. Currently, there are three pumping stations operating in Baden. The following table summarizes the number of pumping stations required for each alternative.

**Table 6.1 - Summary of greenhouse gas emitting sources**

| Alternative | Number of pumping stations added | Number of pumping stations removed | Total number of pumping stations |
|---|---|---|---|
| Alternative 1 | 1 | 0 | 4 |
| Alternative 2 | 0 | 1 | 2 |
| Alternative 3 | 0 | 2 | 1 |
| Alternative 4 | 0 | 2 | 1 |
| Alternative 5 | 0 | 2 | 1 |

*Note: Total number of pumping stations includes the Baden WWPS

The preferred alternative, Alternative 5, reduces redundancy of infrastructure thus mitigating climate change by reducing greenhouse gas emissions.

### 6.4.2 Climate Change Adaptation and Resiliency

According to the *Localized Climate Projections for Waterloo Region (Dec 2015)*, if things progress in a business-as-usual fashion, the total annual precipitation is projected to increase by 12% by 2080.

One approach to adapting a sanitary trunk sewer to climate change is by sizing the pipes to accommodate the increased I/I from the anticipated increase in precipitation. Considering the preferred alternative is to be a new construction, there is an opportunity for the Baden Trunk to be sized to include the anticipated 12% increase in I/I without exceeding the 85% capacity requirement as identified in the DGSSMS.

Going forward with the project into Preliminary and Detailed Design, it will be important to specify efficient materials, enhanced gaskets, and sealed manholes to mitigate I/I thus increasing its resiliency to climate change.

### 6.4.3 Minimizing negative impacts during project implementation

To minimize potential effects during construction, the idling of construction equipment will be avoided, and equipment will be in good working order to reduce inefficiencies in the operation of equipment.

### 6.5 Summary of Environmental Impacts

The proposed alignment of Alternative 5 has considered the significant and sensitive natural features along the alignment in order to avoid, minimize, and mitigate potential impacts. Overall, Alternative 5 presented the least impactful alignment to the natural environment.

# 7.0 Approvals and Implementation Recommendations

Final approval of the design will be required from municipal authorities and regulatory agencies prior to commencing construction. During the detailed design stage of the project, consultation with these approval authorities will ensure that their requirements are adequately addressed on the design drawings and restrictions are included in the contract specifications.

Prior to construction, several approvals/clearances will be required to be obtained from the Township, which are described below:

**Township of Wilmot**

Construction of the Baden Trunk will occur along alignments within agricultural fields adjacent to Baden Creek and along local and Regional Roads. Reviews and approvals will be required by the respective municipality to ensure that municipal standards, guidelines, and By-laws are followed. Detailed Traffic Management Plans will be developed during the detailed design stage, including an outline of all lane closures and detour routes, which will be subject to the review and approval of the Township.

**Grand River Conservation Authority**

The preferred alignment is partially located within a GRCA regulated area. In accordance with Ontario Regulation 97/04, under Section 28 of the Conservation Authorities Act, a permit will be required from the GRCA.

**Department of Fisheries and Oceans (DFO)**

A permit may be required from DFO for stream crossings.

**Ministry of Environment, Conservation and Parks**

Tree removals may require MECP with respect to SAR bats and/or nesting birds. Tree removal should be timed to occur outside of the period April 1 – August 31 in order to avoid contravention of the *Migratory Birds Convention Act.* Removal within the bird nesting period may be possible subject to prior inspection of the vegetation for the presence of active nests by a qualified biologist.

Registration on the Environmental Activity and Sector Registry (EASR) is required for construction in the likely event that dewatering will be required. Registration replaces the need to obtain a PTTW. A hydrogeological/geotechnical investigation will determine dewatering requirements.

**CN Railway**

A crossing permit from CN Railway is required for crossing the railroad south of Charlotta Street. Following CN Railway's design criteria, the primary casing of the sewer pipe must be sufficient to withstand the loading applied by passing trains. Additional requirements include a geotechnical report that includes comments and recommendations with respect to construction methodology, a settlement monitoring program by a Geotechnical Engineer with experience in large diameter pipe installation and the name and phone number of the qualified site inspector who will be on the job site, full-time, for the duration of construction.

**Archeology**

The preferred alignment falls within a specified 50m monitoring buffer zone for two archeological findspots. Special permission, along with an appointed representative, is required to oversee construction within the 50m monitoring buffer zone.

# 8.0 Conclusion

The following conclusions and recommendations provide a summary of the key findings presented in this report:

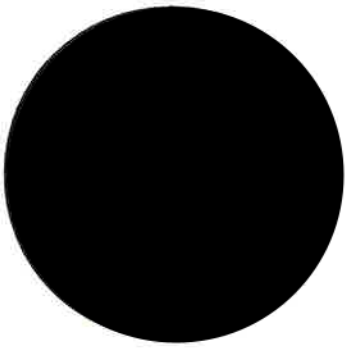
- Based on the projected population growth for the Settlement of Baden, a new trunk sanitary sewer is required to convey sanitary sewage flows from the proposed growth areas. The estimated size of the Baden Trunk ranges from 450mm to 750mm diameter (size to be confirmed during detailed design).
- The preferred alignment for the Baden Trunk is Alternative 5, as described in this report. The selection of the preferred Alternative was based on the following criteria:
    - Impacts to the Natural Environment
    - Social and cultural impacts
    - Impacts to transportation/municipal services and utilities
    - Financial impacts and
    - Technical constraints
- Alternative 5 is the least impactful to the natural, socio-cultural, and technical environments. However, the potential impacts to the natural environment trigger a need for an Environmental Mitigation Plan to develop mitigative measures for those impacts.
- The use of trenchless technology will be utilized for the railway crossing and the two stream crossings. Furthermore, certain sections of the alignment that are excessive in depth and have a narrow right-of-way may also utilize trenchless technology.
- Permanent and working easements will have to be acquired from private property owners for the construction of the Baden Trunk. A permanent easement, approximately 20m wide, through the agricultural lands, has been secured.
- Geotechnical Investigations are recommended during the detailed design stage.
- Securing an easement from OK Tire owners is recommended to mitigate the number of crossings of Baden Creek and the potential impacts associated with the construction along Gingerich Road and Foundry Street.

The conclusion of this study is that the Township of Wilmot Department of Public Works and Engineering recommends Alternative 5 as the preferred Baden Trunk Sanitary Sewer alignment alternative.

The conclusion is based on the detailed evaluation completed through the Class EA process.

All of which is respectfully submitted,

**MTE Consultants Inc.**





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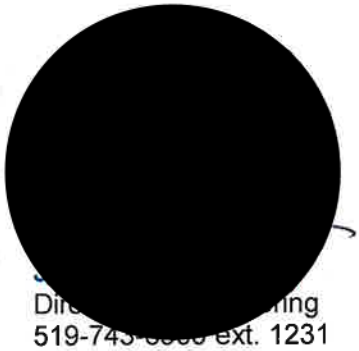

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# Figures

## LEGEND

- PROPERTY LINE
- EXISTING SANITARY TRUNK
- EXISTING SANITARY FORCEMAIN
- 326 — EXISTING 2015 GRCA CONTOURS
- POTENTIAL SERVICEABLE LANDS TO THE BADEN TRUNK
- DRAINAGE BY GRAVITY TO NAFZIGER ROAD TRUNK SEWER
- DRAINAGE TO FOREST GLEN WWPS
- DRAINAGE TO WILMOT EMPLOYMENT LANDS TRUNK SEWER
- LANDS NOT TO BE DEVELOPED
- GRCA REGULATORY FLOODPLAIN
- GRCA EXISTING WATERBODY
- TRIBUTARY "A" 10m BUFFER
- BADEN CREEK 15m BUFFER
- HUEHN AWARD DRAIN 30m BUFFER
- GRCA EXISTING WATERCOURSE
- TRENCHLESS CROSSING
- TOWNSHIP URBAN AREA
- COUNTRYSIDE LINE
- PRIMARY STUDY AREA
- DETAILED STUDY AREA
- PROPOSED WASTEWATER PUMPING STATION
- EXISTING WASTEWATER PUMPING STATION

### ALTERNATIVES

1. 2014 ENVIRONMENTAL ASSESSMENT PREFERRED ALTERNATIVE (DO NOTHING)
2. SNYDER'S/FOUNDRY
3. CHRISTIAN/CHARLOTTA/MILL/ CHARLES/FOUNDRY
4. CHRISTIAN/CHARLOTTA/QUEEN AND BADEN CREEK
5. CHRISTIAN AND BADEN CREEK

FOXBORO
Snyder's Road West
Snyder's Road East
Nafziger Road
Waterloo Street
CN Railway
Greenwich Road
Highway 7/8
Bleams Road
Isaac Street
Queen Street
Charles Street
Bell Street
Christian Street
Charlotta Street
Mill Street
Foundry Street
BADEN CREEK
BADEN CREEK POND
HUEHN AWARD DRAIN
BADEN CREEK TRIBUTARY 'A'
BADEN WWPS
WWPS
MURF

$O_2$ $O_1$ $P_2$ $P_1$ $Y_2$ $Y_1$ Z $BAD_1$ $BAD_2$ $BAD_3$ $BAD_4$ $BAD_5$ $BAD_6$ U $BB_1$ $BB_2$ $AA_1$ $AA_2$ $AA_3$ X W Q $M_1$ $L_1$ E $G_1$ $L_2$ $M_2$ $F_1$ $F_2$ $G_2$ $N_4$ $N_3$ $N_{ex}$ $N_2$ $N_1$ J S R V T

FIGURE 1.0
Date: AUG. 25/22
Scale: 1:7,500

TOWNSHIP OF WILMOT

BADEN TRUNK SANITARY SEWER EA
PRIMARY STUDY AREA

MTE
Engineers, Scientists, Surveyors

Project No.: 48730-100

## LEGEND

- PROPERTY LINE
- EXISTING SANITARY TRUNK
- EXISTING SANITARY SEWER
- EXISTING SANITARY FORCEMAIN
- EXISTING 2015 GRCA CONTOURS
- POTENTIAL SERVICEABLE LANDS TO THE BADEN TRUNK
- GRCA REGULATORY FLOODPLAIN
- GRCA EXISTING WATERBODY
- TRIBUTARY 'A' 10m BUFFER
- BADEN CREEK 15m BUFFER
- HUEHN AWARD DRAIN 30m BUFFER
- GRCA EXISTING WATERCOURSE
- TRENCHLESS CROSSING
- TOWNSHIP URBAN AREA
- COUNTRYSIDE LINE
- PRIMARY STUDY AREA
- DETAILED STUDY AREA
- EXISTING WASTEWATER PUMPING STATION

### ALTERNATIVES

1. 2014 ENVIRONMENTAL ASSESSMENT PREFERRED ALTERNATIVE (DO NOTHING)
2. SNYDER'S/FOUNDRY
3. CHRISTIAN/CHARLOTTA/MILL/ CHARLES/FOUNDRY
4. CHRISTIAN/CHARLOTTA/QUEEN AND BADEN CREEK
5. CHRISTIAN AND BADEN CREEK

Snyder's Road West
Queen Street
Miller Street
Christian Street
Charlotta Street
Mill Street
Beck Street
Charles Street
CN Railway
BADEN WEST WWPS
TRIBUTARY 'B'
Louisa Street
BADEN CREEK POND
HUEHN AWARD DRAIN
St. George Street
BADEN CREEK TRIBUTARY 'A'
BADEN CREEK
BADEN WWPS
Gingerich Road

BAD2
BAD3
BAD4
BAD5
U
T
BB1
BB2
AA1
AA2
AA3

FIGURE 2.0
Date: AUG. 25/22
Scale: 1:2,500

**TOWNSHIP OF WILMOT**

**BADEN TRUNK SANITARY SEWER EA**
**DETAILED STUDY AREA**

MTE
Engineers, Scientists, Surveyors

Project No.: 48730-100

## LEGEND

- PROPERTY LINE
- EXISTING SANITARY TRUNK
- EXISTING SANITARY SEWER
- EXISTING SANITARY FORCEMAIN
- 326 — EXISTING 2015 GRCA CONTOURS
- SANITARY DRAINAGE AREA BOUNDARY
- DRAINAGE BY GRAVITY TO NAFZIGER ROAD TRUNK SEWER
- DRAINAGE TO FOREST GLEN WWPS
- DRAINAGE TO WILMOT EMPLOYMENT LANDS TRUNK SEWER
- LANDS NOT TO BE DEVELOPED
- POTENTIAL SERVICEABLE LANDS TO THE BADEN TRUNK
- GRCA REGULATORY FLOODPLAIN
- GRCA EXISTING WATERBODY
- TRIBUTARY 'A' 10m BUFFER
- BADEN CREEK 15m BUFFER
- HUEHN AWARD DRAIN 30m BUFFER
- GRCA EXISTING WATERCOURSE
- TOWNSHIP URBAN AREA
- COUNTRYSIDE LINE
- PRIMARY STUDY AREA
- DETAILED STUDY AREA
- EXISTING WASTEWATER PUMPING STATION

FOXBORO
$O_2$
$O_1$
$P_2$
$P_1$
$Y_2$
$Y_1$
Z
$BAD_1$
$BAD_2$
$BAD_3$
$BAD_4$
$BAD_5$
$BAD_6$
Q
U
R
S
V
T
$BB_1$
$BB_2$
$AA_1$
$AA_2$
$AA_3$
W
X
E
$L_1$
$L_2$
$M_1$
$M_2$
$G_1$
$G_2$
$F_1$
$F_2$
$N_1$
$N_2$
$N_3$
$N_4$
$N_{ex}$
MURF
J
BADEN WWPS
FOREST GLEN WWPS
BADEN CREEK POND
Item road
Snyder's Road West
Snyder's Road East
Queen Street
Charles Street
Jesse Street
Bamberg Trail
CN Railway
Nafziger Road
Waterloo Street
Gingerich Road
Highway 7/8
Bleams Road
BADEN CREEK
BADEN CREEK TRIBUTARY 'A'
TRIBUTARY 'B'
HUEHN AWARD DRAIN
N

FIGURE 3.0 — Date: AUG. 25/22 — Scale: 1:7,500

TOWNSHIP OF WILMOT

EXISTING SANITARY DRAINAGE AREA

MTE Engineers, Scientists, Surveyors

Project No.: 48730-100

## LEGEND

- PROPERTY LINE
- EXISTING SANITARY TRUNK
- EXISTING SANITARY SEWER
- EXISTING SANITARY FORCEMAIN
- EXISTING 2015 GRCA CONTOURS
- POTENTIAL SERVICEABLE LANDS TO THE BADEN TRUNK
- GRCA REGULATORY FLOODPLAIN
- GRCA EXISTING WATERBODY
- BUTTERNUT 25m BUFFER
- ARCHAEOLOGICAL 50m CONSTRUCTION MONITORING BUFFER
- ARCHAEOLOGICAL 20m NO-GO BUFFER
- TRIBUTARY 'A' 10m BUFFER
- BADEN CREEK 15m BUFFER
- HUEHN AWARD DRAIN 30m BUFFER
- LOCALLY SIGNIFICANT WETLAND
- LOCAL 15m WETLAND BUFFER
- POTENTIAL BAT (SAR) HABITAT
- GRCA EXISTING WATERCOURSE
- TRENCHLESS CROSSING
- TOWNSHIP URBAN AREA
- COUNTRYSIDE LINE
- PRIMARY STUDY AREA
- DETAILED STUDY AREA
- PROPOSED WASTEWATER PUMPING STATION
- EXISTING WASTEWATER PUMPING STATION

### ALTERNATIVES

- 2014 ENVIRONMENTAL ASSESSMENT PREFERRED ALTERNATIVE (DO NOTHING)

PROPOSED WWPS
farm road
158m SAN FORCEMAIN
CN Railway
Snyder's Road East
BADEN CREEK
STREAM CROSSING
TRIBUTARY 'B'
RAILWAY CROSSING
F/G=352.15(EX)
SAN OBV.=348.45±
DEPTH=3.7m±
F/G=358.72(EX)
SAN OBV.=353.70±
DEPTH=5.0m±
Snyder's Road West
630m 450mmØ SAN TRUNK @ 0.80%
450m 450mmØ SAN TRUNK @0.80%
Queen Street
Millat Street
Christian Street
Charlotta Street
Mill Street
Beck Street
Charles Street
Brenneman Drive
BADEN WEST WWPS
WWPS
CN Railway
BADEN CREEK TRIBUTARY 'A'
BADEN CREEK POND
St.George Street
Louisa Street
Foundry Street
150m 450mmØ SAN TRUNK @2.3%
350m 450mmØ SAN TRUNK @0.65%
HUEHN AWARD DRAIN
F/G=347.50(EX)
SAN OBV.=344.18±
DEPTH=3.2m±
F/G=343.70(EX)
SAN OBV.=340.70±
DEPTH=3.0m±
F/G=341.87(EX)
SAN OBV.=338.38±
DEPTH=3.5m±
STREAM CROSSING
ROAD DRAINAGE CULVERT
240m 600mmØ SAN TRUNK @0.72%
CONNECT TO EX. MH1 @ INV.=335.92± (WALTER FEDY DRAWINGS 5.0068.68-8 DATED NOV. 1974
F/G=339.63(EX)
SAN OBV.=336.52±
DEPTH=3.1m±
BADEN WWPS
Gingerich Road
Gingerich Ro
CN Railway

$O_2$ $O_1$ $P_2$ $P_1$ $Y_2$ $Y_1$ $Z$ $Q$ $BAD_1$ $BAD_2$ $BAD_3$ $BAD_4$ $BAD_5$ $BAD_6$ $AA_1$ $AA_3$ $BB_1$ $BB_2$ $S$ $R$ $V$ $U$ $T$

# FIGURE 4.1

Date: AUG.25/22
Scale: 1:4000

## TOWNSHIP OF WILMOT

**2014 ENVIRONMENTAL ASSESSMENT PREFERRED ALTERNATIVE (DO NOTHING) ALTERNATIVE 1**

MTE
Engineers, Scientists, Surveyors

Project No.: 48730-100

November 9, 2022 — 2:16 p.m. — Plotted By: AHewson

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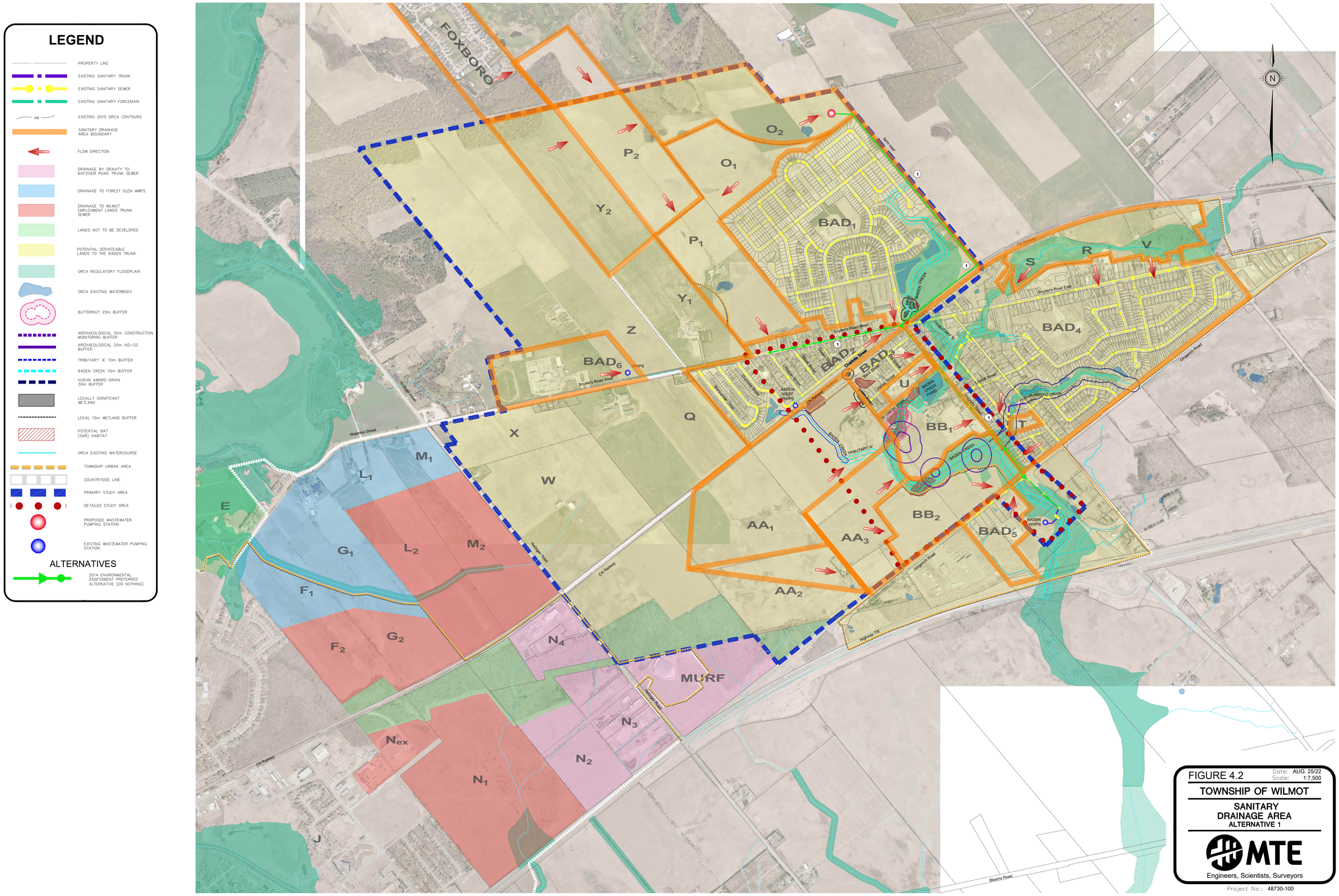


FIGURE 4.2
Date: AUG. 25/22
Scale: 1:7,500
TOWNSHIP OF WILMOT
SANITARY DRAINAGE AREA
ALTERNATIVE 1
MTE
Engineers, Scientists, Surveyors
Project No.: 48730-100

November 10, 2022 — 12:06 a.m. — Plotted By: AHewson

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## LEGEND

- PROPERTY LINE
- EXISTING SANITARY TRUNK
- EXISTING SANITARY SEWER
- EXISTING SANITARY FORCEMAIN
- EXISTING 2015 GRCA CONTOURS
- POTENTIAL SERVICEABLE LANDS TO THE BADEN TRUNK
- GRCA REGULATORY FLOODPLAIN
- GRCA EXISTING WATERBODY
- BUTTERNUT 25m BUFFER
- ARCHAEOLOGICAL 50m CONSTRUCTION MONITORING BUFFER
- ARCHAEOLOGICAL 20m NO-GO BUFFER
- TRIBUTARY 'A' 10m BUFFER
- BADEN CREEK 15m BUFFER
- HUEHN AWARD DRAIN 30m BUFFER
- LOCALLY SIGNIFICANT WETLAND
- LOCAL 15m WETLAND BUFFER
- POTENTIAL BAT (SAR) HABITAT
- GRCA EXISTING WATERCOURSE
- TRENCHLESS CROSSING
- TOWNSHIP URBAN AREA
- COUNTRYSIDE LINE
- PRIMARY STUDY AREA
- DETAILED STUDY AREA
- EXISTING WASTEWATER PUMPING STATION

### ALTERNATIVES

2 — SNYDER'S/FOUNDRY

F/G=358.72(EX)
SAN OBV.=349.40±
DEPTH=9.3m±

630m 450mmØ SAN TRUNK @ 0.50%

F/G=352.15(EX)
SAN OBV.=346.04±
DEPTH=6.1m±

450m 450mmØ SAN TRUNK @0.50%

F/G=347.50(EX)
SAN OBV.=343.61±
DEPTH=3.9m±

150m 450mmØ SAN TRUNK @2.0%

F/G=343.70(EX)
SAN OBV.=340.58±
DEPTH=3.1m±

330m 450mmØ SAN TRUNK @0.60%

F/G=341.87EX)
SAN OBV.=338.38±
DEPTH=3.5m±

240m 600mmØ SAN TRUNK @0.75%

F/G=339.63(EX)
SAN OBV.=336.52±
DEPTH=3.7m±

CONNECT TO EX. MH1
@INV.=335.92±
(WALTER FEDY DRAWINGS
5.0068.68-8 DATED NOV. 1974

RAILWAY CROSSING
STREAM CROSSING
STREAM CROSSING
ROAD DRAINAGE CULVERT

Snyder's Road West
Queen Street
Miller Street
Christian Street
Charlotta Street
Charlotta Street
CN Railway
Queen Street
Charlotta Street
Beck Street
Mill Street
Charles Street
St. George Street
Louisa Street
Foundry Street
HUEHN AWARD DRAIN
BADEN CREEK TRIBUTARY 'A'
BADEN CREEK
TRIBUTARY 'B'
BADEN CREEK POND
BADEN WEST WWPS
BADEN WWPS
Gingerich Road

$BAD_2$ $BAD_3$ $BAD_4$ $BAD_5$
$BB_1$ $BB_2$
$AA_1$ $AA_2$ $AA_3$
U T

FIGURE 5.1
Date: AUG.25/22
Scale: 1:2500

**TOWNSHIP OF WILMOT**

**SNYDER'S ROAD WEST TO FOUNDRY STREET**
**ALTERNATIVE 2**

MTE
Engineers, Scientists, Surveyors

Project No.: 48730-100

November 10, 2022 — 12:33 a.m. — Plotted By: AHewson

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## LEGEND

- PROPERTY LINE
- EXISTING SANITARY TRUNK
- EXISTING SANITARY SEWER
- EXISTING SANITARY FORCEMAIN
- 326 EXISTING 2015 GRCA CONTOURS
- SANITARY DRAINAGE AREA BOUNDARY
- FLOW DIRECTION
- DRAINAGE BY GRAVITY TO NAFZIGER ROAD TRUNK SEWER
- DRAINAGE TO FOREST GLEN WWPS
- DRAINAGE TO WILMOT EMPLOYMENT LANDS TRUNK SEWER
- LANDS NOT TO BE DEVELOPED
- POTENTIAL SERVICEABLE LANDS TO THE BADEN TRUNK
- GRCA REGULATORY FLOODPLAIN
- GRCA EXISTING WATERBODY
- BUTTERNUT 25m BUFFER
- ARCHAEOLOGICAL 50m CONSTRUCTION MONITORING BUFFER
- ARCHAEOLOGICAL 20m NO-GO BUFFER
- TRIBUTARY 'A' 10m BUFFER
- BADEN CREEK 15m BUFFER
- HUEHN AWARD DRAIN 30m BUFFER
- LOCALLY SIGNIFICANT WETLAND
- LOCAL 15m WETLAND BUFFER
- POTENTIAL BAT (SAR) HABITAT
- GRCA EXISTING WATERCOURSE
- TOWNSHIP URBAN AREA
- COUNTRYSIDE LINE
- PRIMARY STUDY AREA
- DETAILED STUDY AREA
- EXISTING WASTEWATER PUMPING STATION

### ALTERNATIVES

2 SNYDER'S/FOUNDRY

FOXBORO
Nafziger Road
Waterloo Street
CN Railway
Snyder's Road West
Snyder's Road East
Gingerich Road
Highway 7/8
Mill Street
Queen Street
Church Street
Oxford Street
Devonshire Drive
Wentworth Drive
Foundry Street
Jamie Street
Trans road
BADEN CREEK
BADEN CREEK TRIBUTARY 'A'
TRIBUTARY 'B'
HUEHN AWARD DRAIN
BADEN WEST WWPS
BADEN WWPS
BADEN CREEK POND

$O_2$ $O_1$ $P_2$ $P_1$ $Y_2$ $Y_1$ $Z$ $BAD_1$ $BAD_2$ $BAD_3$ $BAD_4$ $BAD_5$ $BAD_6$ $R$ $S$ $V$ $U$ $T$ $BB_1$ $BB_2$ $Q$ $X$ $W$ $AA_1$ $AA_2$ $AA_3$ $M_1$ $L_1$ $L_2$ $M_2$ $G_1$ $G_2$ $F_1$ $F_2$ $N_4$ $N_3$ $N_2$ $N_1$ $N_{ex}$ MURF $J$

FIGURE 5.2
Date: AUG. 25/22
Scale: 1:7,500

TOWNSHIP OF WILMOT

SANITARY DRAINAGE AREA
ALTERNATIVE 2

MTE
Engineers, Scientists, Surveyors

Project No.: 48730-100

## LEGEND

- PROPERTY LINE
- EXISTING SANITARY TRUNK
- EXISTING SANITARY SEWER
- EXISTING SANITARY FORCEMAIN
- EXISTING 2015 GRCA CONTOURS
- POTENTIAL SERVICEABLE LANDS TO THE BADEN TRUNK
- GRCA REGULATORY FLOODPLAIN
- GRCA EXISTING WATERBODY
- BUTTERNUT 25m BUFFER
- ARCHAEOLOGICAL 50m CONSTRUCTION MONITORING BUFFER
- ARCHAEOLOGICAL 20m NO-GO BUFFER
- TRIBUTARY 'A' 10m BUFFER
- BADEN CREEK 15m BUFFER
- HUEHN AWARD DRAIN 30m BUFFER
- LOCALLY SIGNIFICANT WETLAND
- LOCAL 15m WETLAND BUFFER
- POTENTIAL BAT (SAR) HABITAT
- GRCA EXISTING WATERCOURSE
- TRENCHLESS CROSSING
- TOWNSHIP URBAN AREA
- COUNTRYSIDE LINE
- PRIMARY STUDY AREA
- DETAILED STUDY AREA
- EXISTING WASTEWATER PUMPING STATION

### ALTERNATIVES

3 — CHRISTIAN/CHARLOTTA/MILL/ CHARLES/FOUNDRY

F/G=358.72(EX)
SAN OBV.=349.40±
DEPTH=9.3m±

F/G=353.40(EX)
SAN OBV.=346.05±
DEPTH=7.4m±

F/G=352.00(EX)
SAN OBV.=344.00±
DEPTH=8.0m±

F/G=347.51(EX)
SAN OBV.=342.63±
DEPTH=4.9m±

F/G=343.70(EX)
SAN OBV.=339.48±
DEPTH=4.2m±

F/G=352.50(EST)
SAN OBV.=344.78±
DEPTH=7.7m±

F/G=356.30(EX)
SAN OBV.=348.07±
DEPTH=8.2m±

F/G=341.87(EX)
SAN OBV.=338.78±
DEPTH=4.1m±

F/G=339.63(EX)
SAN OBV.=336.52±
DEPTH=3.1m±

Snyder's Road West
Queen Street
Miller Street
Christian Street
Charlotta Street
Mill Street
Beck Street
Charles Street
Foundry Street
Louisa Street
St. George Street
CN Railway
RAILWAY CROSSING
STREAM CROSSING
TRIBUTARY 'B'
HUEHN AWARD DRAIN
BADEN CREEK POND
BADEN CREEK
BADEN CREEK TRIBUTARY 'A'
ROAD DRAINAGE CULVERT
Gingerich Road

255m 450mmØ SAN TRUNK @0.50%
420m 450mmØ SAN TRUNK @0.50%
215m 450mmØ SAN TRUNK @0.50%
150m 450mmØ SAN TRUNK @0.50%
250m 450mmØ SAN TRUNK @0.50%
125m 450mmØ SAN TRUNK @2.50%
330m 600mmØ SAN TRUNK @0.50%
240m 600mmØ SAN TRUNK @0.50%

BADEN WEST WWPS
BADEN WWPS
BADEN WEST WWPS TO BE REMOVED

CONNECT TO EX. MH1
@ INV.=335.92±
(WALTER FEDY DRAWINGS
5.0068.68-8 DATED NOV. 1974

$BAD_2$ $BAD_3$ $BAD_4$ $BAD_5$
$BB_1$ $BB_2$
$AA_1$ $AA_2$ $AA_3$

FIGURE 6.1
Date: AUG.25/22
Scale: 1:2500

**TOWNSHIP OF WILMOT**

**CHRISTIAN/CHARLOTTA/MILL/ CHARLES/FOUNDRY**
**ALTERNATIVE 3**

MTE
Engineers, Scientists, Surveyors

Project No.: 48730-100

November 9, 2022 — 3:13 p.m. — Plotted By: AHewson

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## LEGEND

- PROPERTY LINE
- EXISTING SANITARY TRUNK
- EXISTING SANITARY SEWER
- EXISTING SANITARY FORCEMAIN
- 326 EXISTING 2015 GRCA CONTOURS
- SANITARY DRAINAGE AREA BOUNDARY
- FLOW DIRECTION
- DRAINAGE BY GRAVITY TO NAFZIGER ROAD TRUNK SEWER
- DRAINAGE TO FOREST GLEN WWPS
- DRAINAGE TO WILMOT EMPLOYMENT LANDS TRUNK SEWER
- LANDS NOT TO BE DEVELOPED
- POTENTIAL SERVICEABLE LANDS TO THE BADEN TRUNK
- GRCA REGULATORY FLOODPLAIN
- GRCA EXISTING WATERBODY
- BUTTERNUT 25m BUFFER
- ARCHAEOLOGICAL 50m CONSTRUCTION MONITORING BUFFER
- ARCHAEOLOGICAL 20m NO-GO BUFFER
- TRIBUTARY 'A' 10m BUFFER
- BADEN CREEK 15m BUFFER
- HUEHN AWARD DRAIN 30m BUFFER
- LOCALLY SIGNIFICANT WETLAND
- LOCAL 15m WETLAND BUFFER
- POTENTIAL BAT (SAR) HABITAT
- GRCA EXISTING WATERCOURSE
- TOWNSHIP URBAN AREA
- COUNTRYSIDE LINE
- PRIMARY STUDY AREA
- DETAILED STUDY AREA
- EXISTING WASTEWATER PUMPING STATION

### ALTERNATIVES

- 3 CHRISTIAN/CHARLOTTA/MILL/CHARLES/FOUNDRY

FOXBORO
$O_2$
$O_1$
$P_2$
$P_1$
$Y_2$
$Y_1$
Z
$BAD_1$
$BAD_6$
IWWPS
Snyder's Road West
Snyder's Road East
Nafziger Road
Waterloo Street
$L_1$
$M_1$
E
$G_1$
$L_2$
$M_2$
$F_1$
$F_2$
$G_2$
X
W
Q
$AA_1$
$AA_2$
$AA_3$
$N_4$
MURF
$N_3$
$N_{ex}$
$N_2$
$N_1$
J
CN Railway
Gingerich Road
Highway 7/8
Bleams Road
Erb Street
Arthur Street
Charles Street
Queen Street
Mill Street
Christian Street
Alexandra Street
Jesse Street
Foundry Street
Wilmot Line
Bamberg Road
Bamberg Tributary
BADEN CREEK
BADEN CREEK TRIBUTARY 'A'
TRIBUTARY 'B'
HUEHN AWARD DRAIN
BADEN CREEK POND
BADEN WWPS
$BAD_2$
$BAD_3$
$BAD_4$
$BAD_5$
$BB_1$
$BB_2$
R
S
V
U
T
O
3
N

FIGURE 6.2
Date: AUG. 25/22
Scale: 1:7,500

TOWNSHIP OF WILMOT

SANITARY DRAINAGE AREA
ALTERNATIVE 3

MTE
Engineers, Scientists, Surveyors

Project No.: 48730-100

November 10, 2022 — 12:11 a.m. — Plotted By: AHewson

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## LEGEND

- PROPERTY LINE
- EXISTING SANITARY TRUNK
- EXISTING SANITARY SEWER
- EXISTING SANITARY FORCEMAIN
- EXISTING 2015 GRCA CONTOURS
- POTENTIAL SERVICEABLE LANDS TO THE BADEN TRUNK
- GRCA REGULATORY FLOODPLAIN
- GRCA EXISTING WATERBODY
- BUTTERNUT 25m BUFFER
- ARCHAEOLOGICAL 50m CONSTRUCTION MONITORING BUFFER
- ARCHAEOLOGICAL 20m NO-GO BUFFER
- TRIBUTARY 'A' 10m BUFFER
- BADEN CREEK 15m BUFFER
- HUEHN AWARD DRAIN 30m BUFFER
- LOCALLY SIGNIFICANT WETLAND
- LOCAL 15m WETLAND BUFFER
- POTENTIAL BAT (SAR) HABITAT
- GRCA EXISTING WATERCOURSE
- TRENCHLESS CROSSING
- TOWNSHIP URBAN AREA
- COUNTRYSIDE LINE
- PRIMARY STUDY AREA
- DETAILED STUDY AREA
- EXISTING WASTEWATER PUMPING STATION

### ALTERNATIVES

4 — CHRISTIAN/CHARLOTTA/QUEEN AND BADEN CREEK

F/G=358.72(EX)
SAN OBV.=349.40±
DEPTH=9.3m±

255m 450mmØ SAN
TRUNK @0.30%

210m 600mmØ SAN
TRUNK @0.40%

335m 600mmØ SAN
TRUNK @0.50%

165m 600mmØ SAN
TRUNK @2.85%

F/G=354.35(EX)
SAN OBV.=347.14±
DEPTH=7.2m±

F/G=356.30(EX)
SAN OBV.=348.06±
DEPTH=8.2m±

F/G=348.37(EX)
SAN OBV.=345.37±
DEPTH=3.0m±

F/G=343.50(EX)
SAN OBV.=340.60±
DEPTH=2.9m±

349m 600mmØ SAN
TRUNK @0.30%

347m 600mmØ SAN
TRUNK @0.30%

F/G=342.50(EX)
SAN OBV.=339.37±
DEPTH=3.1m±

127m 600mmØ SAN
TRUNK @0.50%

164m 600mmØ SAN
TRUNK @0.35%

F/G=340.60(EX)
SAN OBV.=338.18±
DEPTH=2.4m±

F/G=341.70(EX)
SAN OBV.=337.51±
DEPTH=4.2m±

240m 675mmØ SAN
TRUNK @0.25%

F/G=341.87(EX)
SAN OBV.=337.26±
DEPTH=3.6m±

F/G=339.63EX)
SAN OBV.=336.60±
DEPTH=3.0m±

BADEN WEST WWPS TO BE REMOVED

TRIBUTARY CROSSING
CREEK BED ELEV.=342.00±
PROP SAN OBV. = 341.20±

BADEN CREEK CROSSING
UPSTREAM OF EX. CULVERT
CREEK BED ELEV.=338.00±
PROP SAN OBV. = 337.49±

CONNECT TO EX. MH1
@ INV.=335.92±
(WALTER FEDY DRAWINGS
5.0068.68-8 DATED NOV. 1974

Snyder's Road West
Christian Street
Miller Street
Queen Street
Charlotta Street
RAILWAY CROSSINGS
Beck Street
Mill Street
Charles Street
Louisa Street
Foundry Street
St. George Street
CN Railway
TRIBUTARY 'B'
BADEN CREEK POND
HUEHN AWARD DRAIN
BADEN CREEK
BADEN CREEK TRIBUTARY 'A'
Gingerich Road
BADEN WWPS

$BAD_4$ $BAD_3$ $BAD_2$ U T $BB_1$ $BB_2$ $BAD_5$ $AA_1$ $AA_3$ $AA_2$

N

FIGURE 7.1
Date: AUG.25/22
Scale: 1:2500

**TOWNSHIP OF WILMOT**

**CHRISTIAN/CHARLOTTA/ QUEEN/BADEN CREEK**
**ALTERNATIVE 4**

MTE
Engineers, Scientists, Surveyors

Project No.: 48730-100

November 9, 2022 — 3:03 p.m. — Plotted By: AHewson

P:\P\48730\100\48730-100-F3.4.dwg

## LEGEND

- PROPERTY LINE
- EXISTING SANITARY TRUNK
- EXISTING SANITARY SEWER
- EXISTING SANITARY FORCEMAIN
- 326 — EXISTING 2015 GRCA CONTOURS
- SANITARY DRAINAGE AREA BOUNDARY
- FLOW DIRECTION
- DRAINAGE BY GRAVITY TO NAFZIGER ROAD TRUNK SEWER
- DRAINAGE TO FOREST GLEN WWPS
- DRAINAGE TO WILMOT EMPLOYMENT LANDS TRUNK SEWER
- LANDS NOT TO BE DEVELOPED
- POTENTIAL SERVICEABLE LANDS TO THE BADEN TRUNK
- GRCA REGULATORY FLOODPLAIN
- GRCA EXISTING WATERBODY
- BUTTERNUT 25m BUFFER
- ARCHAEOLOGICAL 50m CONSTRUCTION MONITORING BUFFER
- ARCHAEOLOGICAL 20m NO-GO BUFFER
- TRIBUTARY 'A' 10m BUFFER
- BADEN CREEK 15m BUFFER
- HUEHN AWARD DRAIN 30m BUFFER
- LOCALLY SIGNIFICANT WETLAND
- LOCAL 15m WETLAND BUFFER
- POTENTIAL BAT (SAR) HABITAT
- GRCA EXISTING WATERCOURSE
- TOWNSHIP URBAN AREA
- COUNTRYSIDE LINE
- PRIMARY STUDY AREA
- DETAILED STUDY AREA
- EXISTING WASTEWATER PUMPING STATION

### ALTERNATIVES

- 4 — CHRISTIAN/CHARLOTTA/QUEEN AND BADEN CREEK

FOXBORO
$P_2$
$O_2$
$O_1$
$P_1$
$Y_2$
$Y_1$
Z
$BAD_1$
$BAD_6$
WWPS
Snyder's Road West
Nafziger Road
Waterloo Street
$M_1$
$L_1$
E
$G_1$
$L_2$
$M_2$
$F_1$
$F_2$
$G_2$
X
W
Q
$N_4$
MURF
$N_3$
$N_2$
$N_{ex}$
$N_1$
J
CN Railway
Huron Road
Bleams Road
Highway 7/8
Gingerich Road
Keats Road
Keats Street
Queen Street
Orchard Street
Charles Street
Jesse Street
Bruce Street
Robert Street
Mill Street
Snyder's Road East
Erb's Road
Lisbon Road
Bamberg Road
Bamberg Court
Bamberg Crescent
Bamberg Drive
Bamberg Lane
Bamberg Place
Bamberg Terrace
Bamberg Trail
Bamberg Way
Bamberg Wynd
Bamberg Circle
Bamberg Close
Bamberg Gate
Bamberg Grove
Bamberg Heights
Bamberg Hill
Bamberg Mews
Bamberg Park
Bamberg Rise
Bamberg Square
Bamberg Vale
Bamberg View
Bamberg Walk
Bamberg Wood
Bamberg Yard
Bamberg Zone
Bamberg Alley
Bamberg Avenue
Bamberg Boulevard
Bamberg Bridge
Bamberg Bypass
Bamberg Causeway
Bamberg Centre
Bamberg Circuit
Bamberg Corner
Bamberg Corso
Bamberg Cove
Bamberg Crossing
Bamberg Cul-de-sac
Bamberg Dale
Bamberg Dell
Bamberg Downs
Bamberg Esplanade
Bamberg Estates
Bamberg Expressway
Bamberg Extension
Bamberg Fairway
Bamberg Ferry
Bamberg Field
Bamberg Flats
Bamberg Ford
Bamberg Forest
Bamberg Freeway
Bamberg Gardens
Bamberg Glade
Bamberg Glen
Bamberg Green
Bamberg Grove
Bamberg Harbour
Bamberg Haven
Bamberg Highway
Bamberg Hollow
Bamberg Island
Bamberg Junction
Bamberg Key
Bamberg Knoll
Bamberg Lake
Bamberg Landing
Bamberg Lane
Bamberg Line
Bamberg Link
Bamberg Loop
Bamberg Manor
Bamberg Market
Bamberg Meadow
Bamberg Mews
Bamberg Mill
Bamberg Moor
Bamberg Mount
Bamberg Orchard
Bamberg Parade
Bamberg Park
Bamberg Parkway
Bamberg Passage
Bamberg Path
Bamberg Pathway
Bamberg Pier
Bamberg Pike
Bamberg Place
Bamberg Plaza
Bamberg Point
Bamberg Port
Bamberg Quay
Bamberg Ramp
Bamberg Ridge
Bamberg Road
Bamberg Row
Bamberg Run
Bamberg Shore
Bamberg Spur
Bamberg Square
Bamberg Stairs
Bamberg Station
Bamberg Stream
Bamberg Street
Bamberg Terrace
Bamberg Trail
Bamberg Turnpike
Bamberg Valley
Bamberg View
Bamberg Village
Bamberg Vista
Bamberg Walk
Bamberg Way
Bamberg Wharf
Bamberg Wood
Bamberg Yard
Bamberg Zone
BADEN CREEK
BADEN CREEK TRIBUTARY 'A'
BADEN CREEK TRIBUTARY 'B'
HUEHN AWARD DRAIN
BADEN CREEK POND
$BAD_2$
$BAD_3$
$BAD_4$
$BAD_5$
$BB_1$
$BB_2$
$AA_1$
$AA_2$
$AA_3$
U
R
S
V
T
BADEN WWPS
N

FIGURE 7.2 — Date: AUG. 25/22 — Scale: 1:7,500

TOWNSHIP OF WILMOT

SANITARY DRAINAGE AREA ALTERNATIVE 4

MTE
Engineers, Scientists, Surveyors

Project No.: 48730-100

## LEGEND

- PROPERTY LINE
- EXISTING SANITARY TRUNK
- EXISTING SANITARY SEWER
- EXISTING SANITARY FORCEMAIN
- EXISTING 2015 GRCA CONTOURS
- POTENTIAL SERVICEABLE LANDS TO THE BADEN TRUNK
- GRCA REGULATORY FLOODPLAIN
- GRCA EXISTING WATERBODY
- BUTTERNUT 25m BUFFER
- ARCHAEOLOGICAL 50m CONSTRUCTION MONITORING BUFFER
- ARCHAEOLOGICAL 20m NO-GO BUFFER
- TRIBUTARY 'A' 10m BUFFER
- BADEN CREEK 15m BUFFER
- HUEHN AWARD DRAIN 30m BUFFER
- LOCALLY SIGNIFICANT WETLAND
- LOCAL 15m WETLAND BUFFER
- POTENTIAL BAT (SAR) HABITAT
- GRCA EXISTING WATERCOURSE
- TRENCHLESS CROSSING
- TOWNSHIP URBAN AREA
- COUNTRYSIDE LINE
- PRIMARY STUDY AREA
- DETAILED STUDY AREA
- EXISTING WASTEWATER PUMPING STATION

ALTERNATIVES

5 — CHRISTIAN AND BADEN CREEK

F/G=358.72(EX)
SAN OBV.=349.40±
DEPTH=9.3m±

283m 450mmØ SAN TRUNK @ 1.00%

F/G=356.10(EX)
SAN OBV.=346.53±
DEPTH=9.6m±

BADEN WEST WWPS

BADEN WEST WWPS TO BE REMOVED

100m 450mmØ SAN TRUNK @ 1.00%

RAILWAY AND STREAM CROSSING

F/G=351.45EX)
SAN OBV.=345.24±
DEPTH=9.2m±

283m 450mmØ SAN TRUNK @ 1.00%

TRIBUTARY CROSSING
CREEK BED ELEV.=350.20±
SAN OBV. = 345.50±

368m 525mmØ SAN TRUNK @ 0.65%

F/G=347.56(EX)
SAN OBV.=342.23±
DEPTH=5.4m±

F/G=343.50(EX)
SAN OBV.=340.77±
DEPTH=2.7m±

F/G=343.70(EX)
SAN OBV.=339.70±
DEPTH=4.0m±

201m 675mmØ SAN TRUNK @0.25%

F/G=343.10(EX)
SAN OBV.=339.10±
DEPTH=4.0m±

347m 675mmØ SAN TRUNK @0.25%

F/G=341.14(EX)
SAN OBV.=338.11±
DEPTH=3.0m±

127m 675mmØ SAN TRUNK @0.25%

64m 675mmØ SAN TRUNK @0.25%

F/G=339.90(EX)
SAN OBV.=337.72±
DEPTH=2.2m±

BADEN CREEK CROSSING
UPSTREAM OF EX. CULVERT
CREEK BED ELEV.=338.00±
PROP SAN OBV. = 337.60±

F/G=341.07(EX)
SAN OBV.=337.47±
DEPTH=3.6m±

STREAM CROSSING

240m 750mmØ SAN TRUNK @0.30%

F/G=340.50(EX)
SAN OBV.=336.68±
DEPTH=3.9m±

CONNECT TO EX. MH1
@ INV.=335.92±
(WALTER FEDY DRAWINGS
5.0068.68-8 DATED NOV. 1974

BADEN WWPS

Snyder's Road West
Queen Street
Miller Street
Christian Street
Charlotta Street
Charlotta Street
CN Railway
Queen Street
Beck Street
Charles Street
Mill Street
St. George Street
TRIBUTARY 'B'
Louisa Street
Foundry Street
BADEN CREEK POND
HUEHN AWARD DRAIN
BADEN CREEK
TRIBUTARY 'A'
Gingerich Road

BAD2 BAD3 BAD4 BAD5
U T
BB1 BB2
AA1 AA2 AA3

FIGURE 8.1
Date: AUG.25/22
Scale: 1:2500

**TOWNSHIP OF WILMOT**

**CHRISTIAN AND BADEN CREEK ALTERNATIVE 5**

MTE
Engineers, Scientists, Surveyors

Project No.: 48730-100

November 10, 2022 — 12:31 p.m. — Plotted By: AHewson

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## LEGEND

- PROPERTY LINE
- EXISTING SANITARY TRUNK
- EXISTING SANITARY SEWER
- EXISTING SANITARY FORCEMAIN
- 326 EXISTING 2015 GRCA CONTOURS
- SANITARY DRAINAGE AREA BOUNDARY
- FLOW DIRECTION
- DRAINAGE BY GRAVITY TO NAFZIGER ROAD TRUNK SEWER
- DRAINAGE TO FOREST GLEN WWPS
- DRAINAGE TO WILMOT EMPLOYMENT LANDS TRUNK SEWER
- LANDS NOT TO BE DEVELOPED
- POTENTIAL SERVICEABLE LANDS TO THE BADEN TRUNK
- GRCA REGULATORY FLOODPLAIN
- GRCA EXISTING WATERBODY
- BUTTERNUT 25m BUFFER
- ARCHAEOLOGICAL 50m CONSTRUCTION MONITORING BUFFER
- ARCHAEOLOGICAL 20m NO-GO BUFFER
- TRIBUTARY 'A' 10m BUFFER
- BADEN CREEK 15m BUFFER
- HUEHN AWARD DRAIN 30m BUFFER
- LOCALLY SIGNIFICANT WETLAND
- LOCAL 15m WETLAND BUFFER
- POTENTIAL BAT (SAR) HABITAT
- GRCA EXISTING WATERCOURSE
- TOWNSHIP URBAN AREA
- COUNTRYSIDE LINE
- PRIMARY STUDY AREA
- DETAILED STUDY AREA
- EXISTING WASTEWATER PUMPING STATION

### ALTERNATIVES

- 5 CHRISTIAN AND BADEN CREEK

FOXBORO
$O_2$
$O_1$
$P_2$
$P_1$
$Y_2$
$Y_1$
Z
$BAD_1$
$BAD_6$
WWPS
$BAD_2$
$BAD_3$
$BAD_4$
$BAD_5$
R
S
V
U
T
$BB_1$
$BB_2$
Q
X
W
$AA_1$
$AA_2$
$AA_3$
$M_1$
$L_1$
$L_2$
$M_2$
E
$G_1$
$G_2$
$F_1$
$F_2$
$N_4$
$N_3$
$N_2$
$N_1$
Nex
MURF
J
BADEN CREEK POND
BADEN WWPS
Snyder's Road West
Snyder's Road East
Waterloo Street
Nafziger Road
Gingerich Road
Bleams Road
Jesse Street
Charles Street
Robert Street
Queen Street
Victoria Street
Bechtel Drive
CN Railway
Highway 7/8
Huehn Road
TRIBUTARY 'B'
TRIBUTARY 'A'
HUEHN AWARD DRAIN
BADEN CREEK
BADEN CREEK TRIBUTARY 'A'
5
N

FIGURE 8.2
Date: AUG. 25/22
Scale: 1:7,500

TOWNSHIP OF WILMOT

SANITARY DRAINAGE AREA
ALTERNATIVE 5

MTE
Engineers, Scientists, Surveyors

Project No.: 48730-100

November 10, 2022 — 12:18 a.m. — Plotted By: AHewson

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## LEGEND

- PROPERTY LINE
- EXISTING SANITARY TRUNK
- EXISTING SANITARY SEWER
- EXISTING SANITARY FORCEMAIN
- EXISTING 2015 GRCA CONTOURS
- POTENTIAL SERVICEABLE LANDS TO THE BADEN TRUNK
- GRCA REGULATORY FLOODPLAIN
- GRCA EXISTING WATERBODY
- BUTTERNUT 25m BUFFER
- ARCHAEOLOGICAL 50m CONSTRUCTION MONITORING BUFFER
- ARCHAEOLOGICAL 20m NO-GO BUFFER
- TRIBUTARY 'A' 10m BUFFER
- BADEN CREEK 15m BUFFER
- HUEHN AWARD DRAIN 30m BUFFER
- LOCALLY SIGNIFICANT WETLAND
- LOCAL 15m WETLAND BUFFER
- POTENTIAL BAT (SAR) HABITAT
- GRCA EXISTING WATERCOURSE
- TRENCHLESS CROSSING
- TOWNSHIP URBAN AREA
- COUNTRYSIDE LINE
- PRIMARY STUDY AREA
- DETAILED STUDY AREA
- EXISTING WASTEWATER PUMPING STATION

### ALTERNATIVES

- 5 — CHRISTIAN AND BADEN CREEK

F/G=358.72(EX)
SAN OBV.=349.40±
DEPTH=9.3m±

283m 450mmØ SAN TRUNK @ 1.00%

F/G=356.10(EX)
SAN OBV.=346.53±
DEPTH=9.6m±

BADEN WEST WWPS

BADEN WEST WWPS TO BE REMOVED

100m 450mmØ SAN TRUNK @ 1.00%

F/G=351.45EX)
SAN OBV.=345.24±
DEPTH=9.2m±

283m 450mmØ SAN TRUNK @ 1.00%

RAILWAY AND STREAM CROSSING

TRIBUTARY CROSSING
CREEK BED ELEV.=350.20±
SAN OBV. = 345.50±

368m 525mmØ SAN TRUNK @ 0.65%

F/G=347.56(EX)
SAN OBV.=342.23±
DEPTH=5.4m±

F/G=343.50(EX)
SAN OBV.=340.77±
DEPTH=2.7m±

F/G=343.70(EX)
SAN OBV.=339.70±
DEPTH=4.0m±

201m 675mmØ SAN TRUNK @0.25%

F/G=343.10(EX)
SAN OBV.=339.10±
DEPTH=4.0m±

347m 675mmØ SAN TRUNK @0.25%

F/G=341.14(EX)
SAN OBV.=338.11±
DEPTH=3.0m±

127m 675mmØ SAN TRUNK @0.25%

F/G=339.90(EX)
SAN OBV.=337.72±
DEPTH=2.2m±

238m 675mmØ SAN TRUNK @0.30%

BADEN WWPS

CONNECT TO EX. MH1
@ INV.=335.92±
(WALTER FEDY DRAWINGS
5.0068.68-8 DATED NOV. 1974

Snyder's Road West
Miller Street
Queen Street
Christian Street
Charlotta Street
Charlotta Street
CN Railway
Queen Street
Beck Street
Charles Street
Mill Street
St George Street
TRIBUTARY 'B'
Louisa Street
Foundry Street
BADEN CREEK POND
HUEHN AWARD DRAIN
BADEN CREEK
TRIBUTARY 'A'
BADEN CREEK
Gingerich Road

BAD4
BAD2
BAD3
U
BB1
T
BB2
AA1
AA3
AA2
BAD5

FIGURE 8.1b
Date: AUG.25/22
Scale: 1:2500

**TOWNSHIP OF WILMOT**

**CHRISTIAN AND BADEN CREEK**
**ALTERNATIVE 5b**

MTE
Engineers, Scientists, Surveyors

Project No.: 48730-100

November 10, 2022 — 12:37 a.m. — Plotted By: AHewson

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# Appendix A

# Figures from 2014 CRA Report

N.T.S

LEGEND

- RESIDENTIAL GROWTH 2016-2029
- UNLIKELY FOR RESIDENTIAL GROWTH (SIGNIFICANT FLOODPLAIN)
- POST 2029 RESIDENTIAL GROWTH
- INDUSTRIAL GROWTH 2016-2029
- POST 2029 INDUSTRIAL GROWTH
- FUTURE INTENSIFICATION 2016-2029

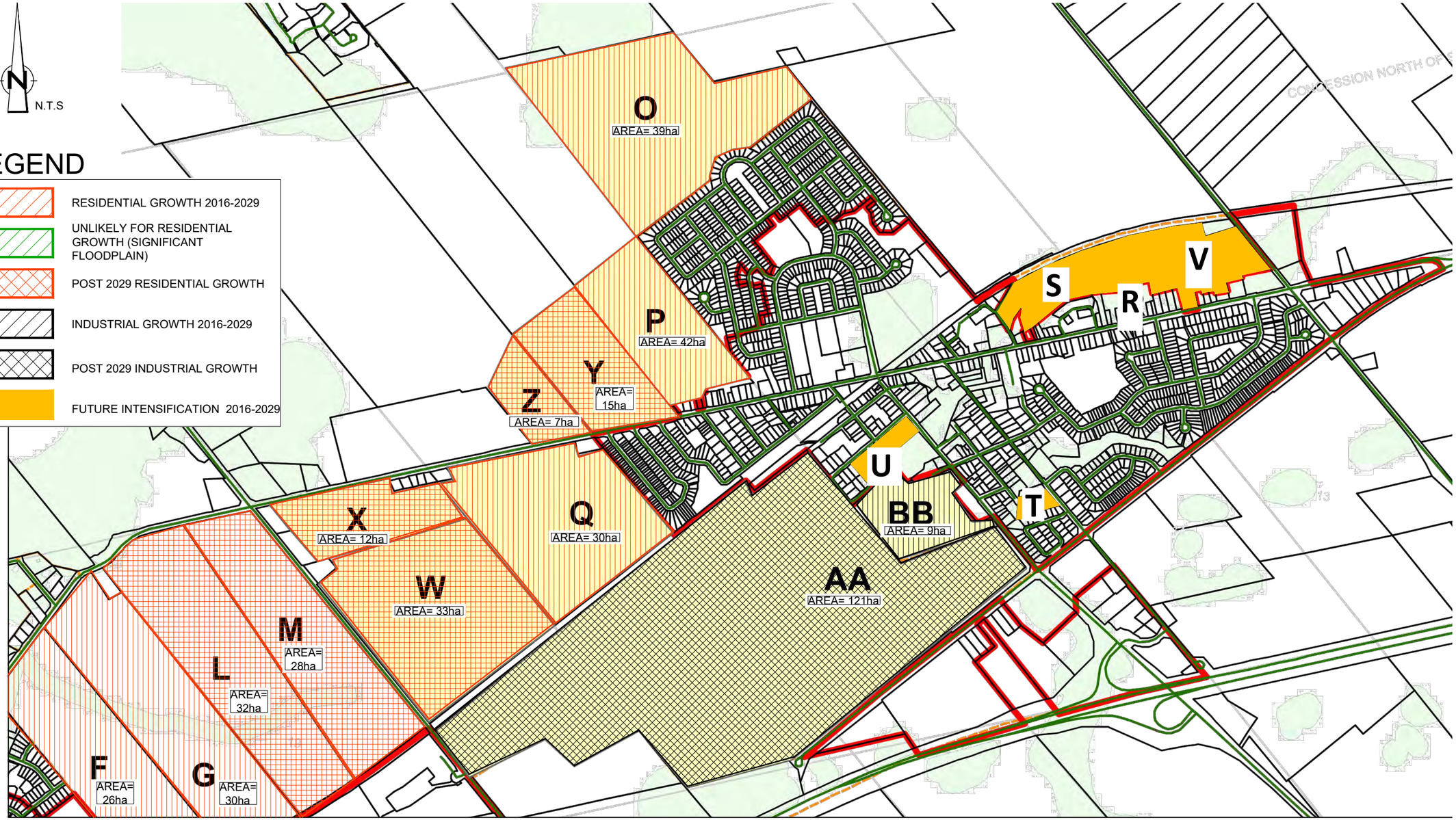



**Figure 2-15 Delineation of Growth Areas - Baden**

Wastewater Servicing Study for New Growth Areas in Baden and New Hamburg

*Township of Wilmot*

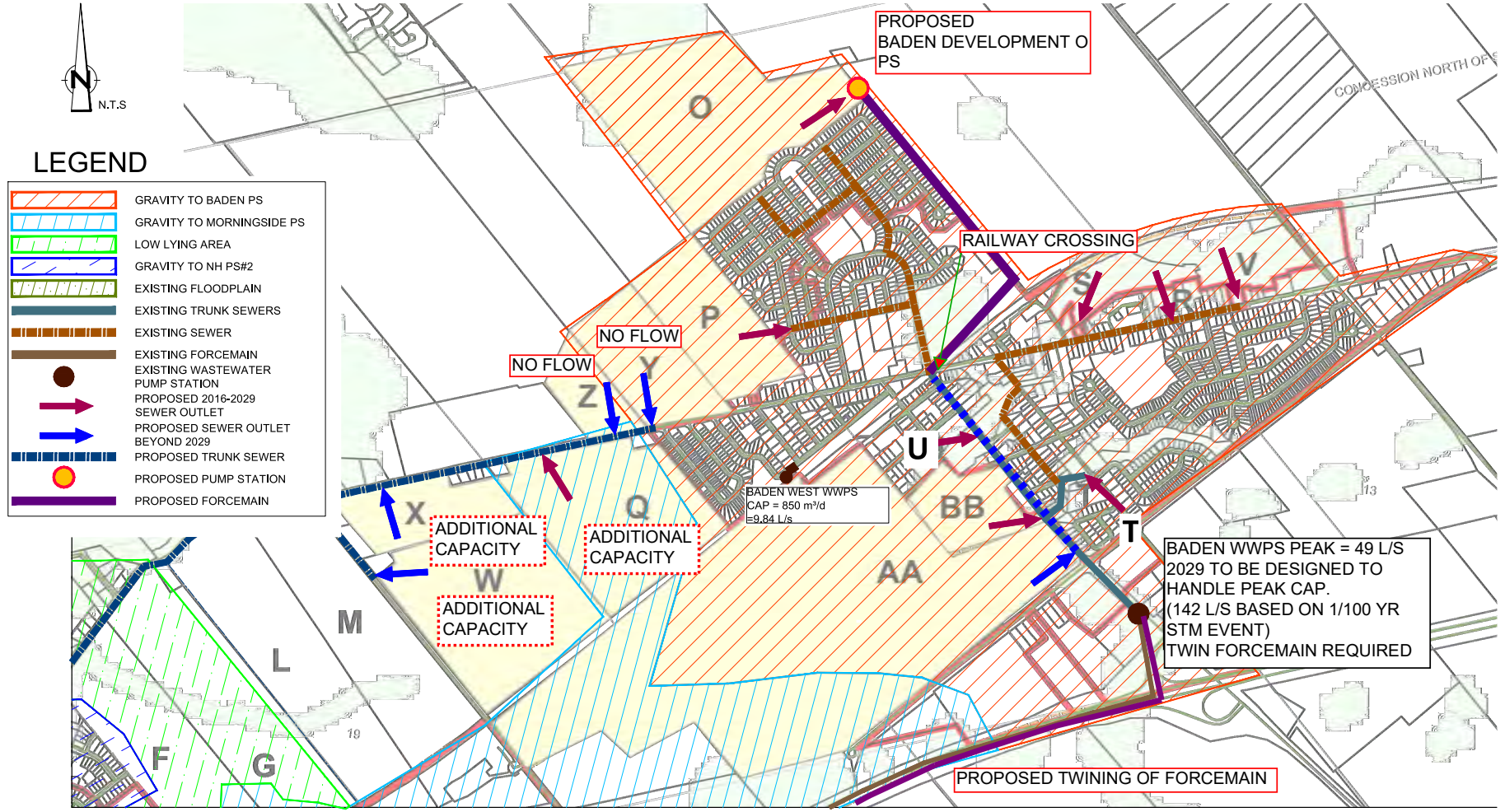



**Figure 2-23 Alternative D - Proposed Sanitary Linear Infrastructure and Pump Stations - Baden**

Wastewater Servicing Study for New Growth Areas in Baden and New Hamburg

*Township of Wilmot*

# Appendix B

# Notifications

**Notice of Study Commencement**
Municipal Class Environmental Assessment

## The Study

The Township of Wilmot has initiated a Class Environmental Assessment Study for the Baden Sanitary Trunk Main required in the settlement area of Baden. This sanitary trunk is proposed to accommodate current and future growth in the area. The study will determine the alignment and size of the trunk sewer to facilitate growth and optimize existing Township infrastructure in the area.

## The Process

This project is being carried out in accordance with the requirements of the Environmental Assessment Act by following the Municipal Class EA document (as amended in 2007, 2011, 2015 and 2020) and it is being planned under Schedule 'B' of the Municipal Class Environmental Assessment (Class EA). This process is being integrated with the Planning Act for active development applications in Baden.

MTE Consultants will undertake the study, which involves an evaluation of alternatives, selection of preferred alternative, and evaluation of environmental impacts and their mitigation measures. At the end of the study, a conceptual design will be prepared by MTE Consultants.

## Comments Invited

Public, Indigenous, and agency consultation is a key component of the Class EA process, and we value your input during the planning process. To help facilitate this input, a Public Information Centre where some of the alternative solutions will be presented is scheduled to take place later in the study. If you wish to be placed on the study mailing list to receive notices and information, or, if you wish to provide comments at any time during the Class EA process, you can do so by contacting:

**Dot Roga, C.E.T.**

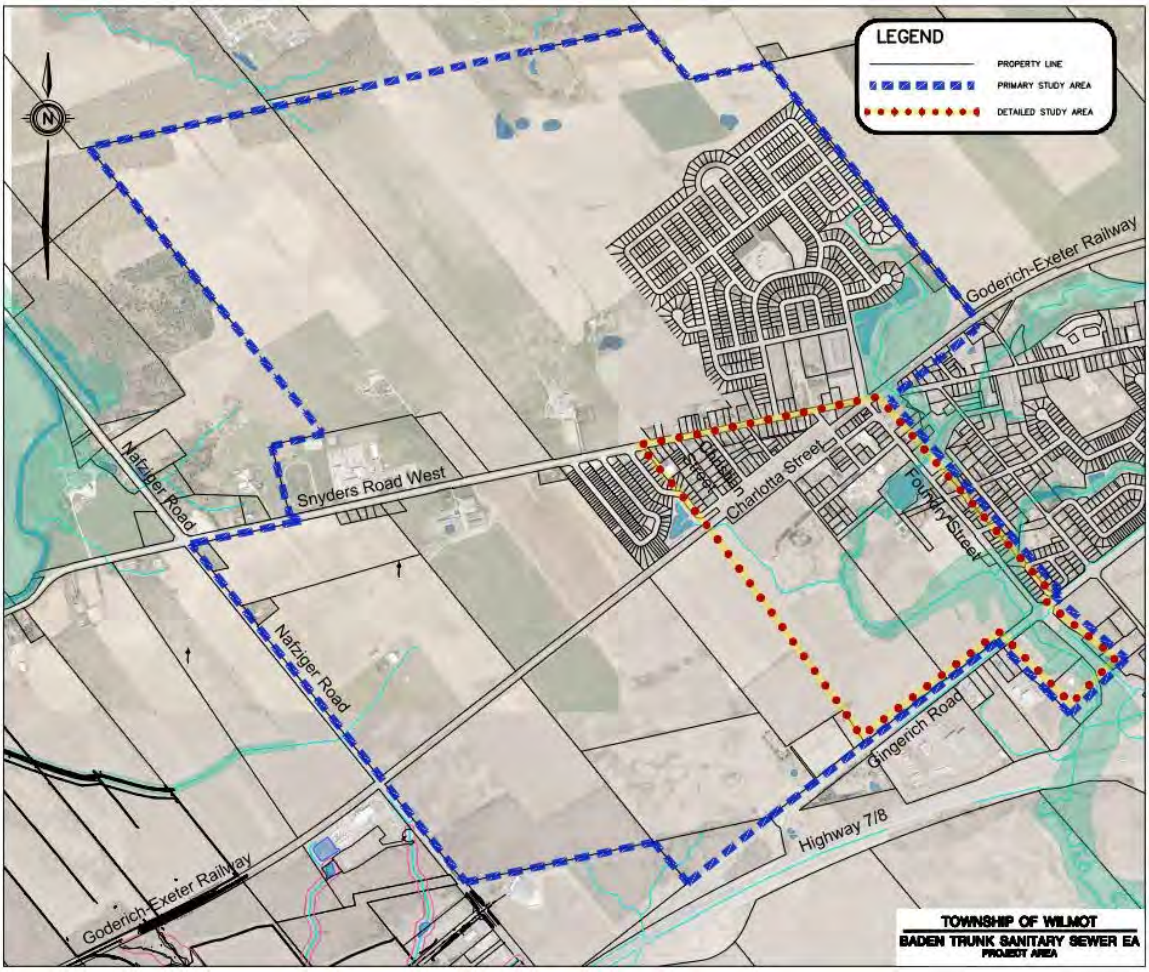
**Project Manager**
MTE Consultants Inc.
Phone: (519) 743-6500 ext. 1269
Cell Phone: (519) 505-7507
Email: droga@mte85.com

**Jeff Molenhuis, P. Eng**

**Director of Public Works & Engineering**
Township of Wilmot
Phone: (519) 634-8444
Email: jeff.molenhuis@wilmot.ca

Please note that all correspondence will be kept on file for use during the decision-making process throughout the project and will become part of the public record. Under the Municipal Freedom of Information and Protection of Privacy Act and the Environmental Assessment Act, any personal information such as name, address, and telephone number included in a submission may become part of the public record unless otherwise requested in the submission.

**Figure 1.**
This figure illustrates the limits of the primary study area and the detailed study area.




This notice first published on June 17, 2021.

November 17, 2021

Dear Resident:

**RE: Baden Sanitary Trunk Main**
**Class Environment Assessment - Notice of Public Information Centre No. 1**

The Township of Wilmot has initialized a Schedule 'B' Municipal Class Environmental Assessment (EA) Study to identify the size and alignment for the Baden Sanitary Trunk Main. The Study will review and provide recommendations including:

- Determining the system capacity requirements to appropriately size the Baden Sanitary Trunk Main; and
- Identify a route for the new sewer that minimizes impacts to the environment, optimizes existing infrastructure in the community.

Effective consultation with the public and stakeholders is key to the success of this Class EA Study. The communications and consultation plan for this Class EA has been developed to ensure that key stakeholders and the public have a voice at each step along the way to help select the sewer alignment. Your property or business is located in proximity to the existing Baden Sanitary Trunk Main or a possible future conveyance alignment.

We invite you to participate in a Virtual Public Information Centre (PIC) available on the Township's website www.wilmot.ca/en/doing-business/current-projects.aspx **November 24, 2021.** The PIC will present information about the Study including alternative sanitary conveyance alignments and evaluation methodology, and will welcome your comments and feedback. Additional information about the project and details related to the Virtual PIC are included in the attached Notice.

Please contact a member of the project team below, if you have any concerns regarding this study.

We look forward to hearing from you.

Yours truly,

**Dot Roga, C.E.T.**
Project Manager
MTE Consultants Inc.
Phone: (519) 743-6500 ext. 1269
Cell Phone: (519) 505-7507
Email: DRoga@mte85.com

**Jeff Molenhuis, P.Eng.**
Director of Public Works & Engineering
Township of Wilmot
Phone: (519) 634-8444

Email: jeff.molenhuis@wilmot.ca

November 23, 2021

**RE: Baden Sanitary Trunk Main**
**Class Environment Assessment - Notice of Public Information Centre No. 1**

The Township of Wilmot has initialized a Schedule 'B' Municipal Class Environmental Assessment (EA) Study to identify the size and alignment for the Baden Sanitary Trunk Main. The Study will review and provide recommendations including:

- Determining the system capacity requirements to appropriately size the Baden Sanitary Trunk Main; and
- Identify a route for the new sewer that minimizes impacts to the environment, optimize existing infrastructure within the community.

Effective consultation with the public and stakeholders is key to the success of this Class EA Study. The communications and consultation plan for this Class EA has been developed to ensure that key stakeholders and the public have a voice at each step along the way to help select the sewer alignment.

We invite you to participate in a Virtual Public Information Centre (PIC) available on the Township's website www.wilmot.ca/en/doing-business/current-projects.aspx **November 24, 2021**. The PIC will present information about the Study including alternative sanitary conveyance alignments and evaluation methodology, and will welcome your comments and feedback. Additional information about the project and details related to the Virtual PIC are included in the attached Notice.

Please contact a member of the project team below, if you have any concerns regarding this study.

We look forward to hearing from you.

Yours truly,

**Dot Roga, C.E.T.**
Project Manager
MTE Consultants Inc.
Phone: (519) 743-6500 ext. 1269
Cell Phone: (519) 505-7507
Email: DRoga@mte85.com

**Jeff Molenhuis, P.Eng.**
Director of Public Works & Engineering
Township of Wilmot
Phone: (519) 634-8444

Email: jeff.molenhuis@wilmot.ca

# Municipal Class Environmental Assessment (Class EA)
# Baden Sanitary Trunk Main

## Notice of Public Information Centre No. 1

The Township of Wilmot has initiated a Class Environmental Assessment Study for the Baden Sanitary Trunk Main required in the settlement area of Baden. This sanitary trunk is proposed to accommodate current and future growth in the area. The study will determine the alignment and size of the trunk sewer to facilitate growth and optimize existing Township infrastructure in the area.

This project is being carried out in accordance with the requirements of the Environmental Assessment Act by following the Municipal Class EA document (as amended in 2007, 2011, 2015 and 2020) and it is being planned under Schedule 'B' of the Municipal Class Environmental Assessment (Class EA). This process is being integrated with the Planning Act for active development applications in Baden.

MTE Consultants and the Township has undertaken the study, which involves an evaluation of alternatives, selection of preferred alternative, and evaluation of environmental impacts and their mitigation measures. MTE has identified alternative sanitary servicing solutions and conceptual design.




**Figure 1: Limits of the Primary Study Area and Detailed Study Area**

Presentation, discussion, and input on the identified alternatives will be presented at the Public Information Centre (PIC). MTE Consultants and the Township of Wilmot invite all interested parties to participate in a Virtual PIC available on the **Township's Website** **www.wilmot.ca/en/doing-business/current-projects.aspx** **on November 24, 2021.**

Please note that comments will be maintained for reference throughout the project and will become part of the public record. Under the Municipal Freedom of Information and Protection of Privacy Act and the Environmental Assessment Act, any personal information such as name, address, and telephone number included in a submission will become part of the public record unless the comments specifically request that such personal details not be included in the public record.

Project information will be made available on the Township of Wilmot's website.

This Notice was issued on November 17, 2021.

September 19, 2022

Dear Resident:

**RE: Baden Sanitary Trunk Main**
**Class Environment Assessment - Notice of Public Information Centre No. 2**

The Township of Wilmot has initialized a Schedule 'B' Municipal Class Environmental Assessment (EA) Study to identify the size and alignment for the Baden Sanitary Trunk Main. The Study will review and provide recommendations including:

- Determining the system capacity requirements to appropriately size the Baden Sanitary Trunk Main; and
- Identify a route for the new sewer that minimizes impacts to the environment, optimizes existing infrastructure in the community.

Effective consultation with the public and stakeholders is key to the success of this Class EA Study. The communications and consultation plan for this Class EA has been developed to ensure that key stakeholders and the public have a voice at each step along the way to help select the sewer alignment. Your property or business is located in proximity to the existing Baden Sanitary Trunk Main or a possible future conveyance alignment.

We invite you to participate in a Virtual Public Information Centre (PIC) available on the Township's website www.wilmot.ca/en/doing-business/current-projects.aspx **September 26, 2022.** The PIC will present information about the Study including alternative sanitary conveyance alignments and evaluation methodology, and will welcome your comments and feedback. Additional information about the project and details related to the Virtual PIC are included in the attached Notice.

Please contact a member of the project team below, if you have any concerns regarding this study.

We look forward to hearing from you.

Yours truly,

**Dot Roga, C.E.T.**
Project Manager
MTE Consultants Inc.
Phone: (519) 743-6500 ext. 1269
Cell Phone: (519) 505-7507
Email: DRoga@mte85.com

**Jeff Molenhuis, P.Eng.**
Director of Public Works & Engineering
Township of Wilmot
Phone: (519) 634-8444

Email: jeff.molenhuis@wilmot.ca

# Municipal Class Environmental Assessment (Class EA)
# Baden Sanitary Trunk Main

## Notice of Public Information Centre No. 2

The Township of Wilmot has initiated a Class Environmental Assessment Study for the Baden Sanitary Trunk Main required in the settlement area of Baden. This sanitary trunk is proposed to accommodate current and future growth in the area. The study will determine the alignment and size of the trunk sewer to facilitate growth and optimize existing Township infrastructure in the area.

This project is being carried out in accordance with the requirements of the Environmental Assessment Act by following the Municipal Class EA document (as amended in 2007, 2011, 2015 and 2020) and it is being planned under Schedule 'B' of the Municipal Class Environmental Assessment (Class EA). This process is being integrated with the Planning Act for active development applications in Baden.

MTE Consultants and the Township has undertaken the study, which involves an evaluation of alternatives, selection of preferred alternative, and evaluation of environmental impacts and their mitigation measures. MTE has identified alternative sanitary servicing solutions and conceptual design.

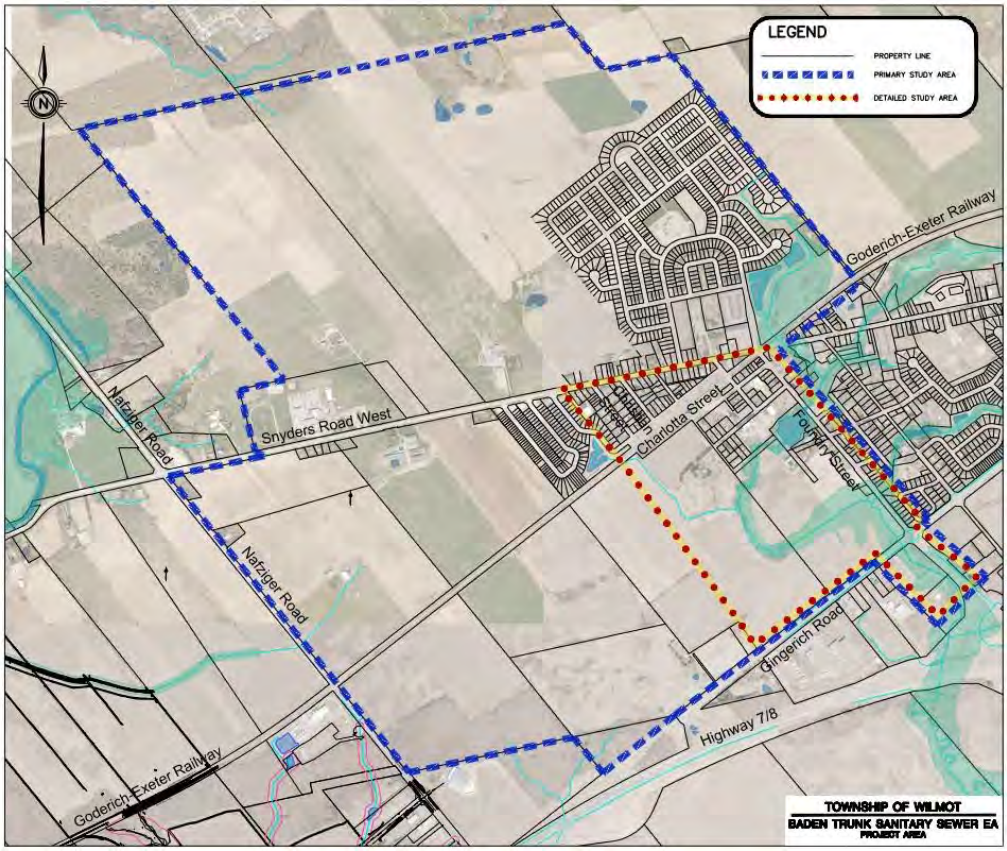



**Figure 1: Limits of the Primary Study Area and Detailed Study Area**

Presentation, discussion, and input on the identified alternatives will be presented at the Public Information Centre (PIC). MTE Consultants and the Township of Wilmot invite all interested parties to participate in a Virtual PIC available on the **Township's Website** **www.wilmot.ca/en/doing-business/current-projects.aspx** **on September 26, 2022.**

Please note that comments will be maintained for reference throughout the project and will become part of the public record. Under the Municipal Freedom of Information and Protection of Privacy Act and the Environmental Assessment Act, any personal information such as name, address, and telephone number included in a submission will become part of the public record unless the comments specifically request that such personal details not be included in the public record.

Project information will be made available on the Township of Wilmot's website.

This Notice was issued on September 19, 2022.

# Appendix C

# Communication

## Mailing List, Meeting Minutes, and Signed Agreements

# Meeting Minutes

Meeting Minutes

| | | | |
|---|---|---|---|
| **Project Name:** | Beckdale Sanitary Trunk EA | **MTE File No.:** | C48730-100 |
| **Purpose:** | Initiation Meeting | **Date:** | March 16, 2021 |
| **Time:** | 10 am | | |
| **Meeting Location:** | Teleconference | | |

| Attendees | Initials | Representation |
|---|---|---|
| Valentina Lazic | JL | MTE Consultants Inc. |
| Jeff Martens | JM | MTE Consultants Inc. |
| Dot Roga | DR | MTE Consultants Inc. |
| Amy Domartzki | AD | MTE Consultants Inc. |
| Kassandra Wallace | KW | MTE Consultants Inc. |
| Chelsea Kochany | CK | MTE Consultants Inc. |
| Paul Britton | PB | MHBC |
| Ryan Archer | RA | NRSI |
| | | |

| Item No. | Discussion | Action |
|---|---|---|
| **1.0** | **Purpose of Meeting** | |
| | Prepare to begin the EA process.<br>Confirm Project Team<br>Ryan and Garth were consultants for Schmidt Lands; their information along with our scope of work will round out the natural environment and archaeological needs of the project.<br>Initiate Studies<br>Prepare for external meeting with Township<br>Schmidt Lands is stakeholder, other developers are Activa and Nadiva Kickoff meeting to involve land owners<br>Steering committee - GRCA<br>Jeff Mollenhuis is waiting to meet – Township meeting first, then invite landowners to attend subsequent meeting | |
| **2.0** | **Studies Update** | |

| Item No. | Discussion | Action |
|---|---|---|
| | NRSI – RA will complete the necessary Natural Environment Study, confirm any sensitive areas, natural habitats, etc.<br>Was able to confirm scope in meeting.<br>Also will work with archaeologist for the Schmidt Lands<br>Do we require groundwater monitoring for the last 2 years? (Schmidt)<br>Seasonal studies are good to proceed | RA |
| | Pinchin doing drilling – access information – Steve P will collect this GSP | |
| | Delritus – Garth Grimes will complete the archaeological study for the areas of concern | |
| | MHBC – Dan Currie will complete the Cultural Heritage Review<br>ROPP and OP mapping by MHBC will be repurposed by MHBC | |
| | GRCA – to request modelling | |
| | Peto – Bill Loghrin has not been confirmed for geotechnical work as of yet but assumed | |
| | MTE – AD will complete the hydrogeo study with scope yet to be defined; broader study area, lands that could be serviced by trunk<br>MTE will gather modelling for the Trib/hydraulic modelling | AD |
| | MHBC – PB will contribute planning information and updates<br>Process flow chart for EA committed to landowner involvement<br>Staggered draft plans expected | PB |
| | PB – says to hitch the EA to this draft plan | |
| | PB et al will draft problem statement | |
| | CRA background study – 2014 – draw from that background and Region – water/wastewater study<br>Pinchin/Region for Geotech | PB |
| **3.0** | **EA Process** | |
| | In meeting, it was stated that this is Schedule ‘B’, but based on the integrated process, will be treated as Schedule ‘C’. | |
| | A Problem Statement will need to be devised and Notice of Project Commencement shared shortly. To be done before meeting with Township | |
| | Confirm stakeholders list and maintain communication plan. | PB |
| | GRCA – to be contacted | |

| Item No. | Discussion | Action |
|---|---|---|
| | Baden Creek is categorized as a warm water feature with some cold water (groundwater) input, NRSI recommended 15m buffer in the EIS for the Schmidt Lands<br>CN / GEXR leased – contact through AECOM? / Spur Line/Pestills<br>Dot to check with Peter Johnson from AECOM<br>Confirm method of Public Consultation and quantity of meetings with the public and stakeholders.<br>Share study area with Township<br>Key base plan with contours/ownership areas<br>Title block developed for consistency – logo to be added to the title block from all | VL/ALL |
| **4.0** | **Alternatives to Consider** | |
| | MTE has developed a few options for the alignment of this sanitary trunk. These options will be further developed prior to considering evaluation. We have 7 alternatives to consider at this point.<br>Technical assessment is an important component as well as the impacts to existing natural features (tributary crossings, alignment near tributary)<br>GRCA to be advised early on for buffer limits and general buy in.<br>15m in Schmidt Lands<br>Cost assessments including Capital, Operational and Maintenance cost to be evaluated<br>Payment plan – final cost sharing to Nadiva and Activa<br>Letter to Township confirming the above<br>Reimbursement to developers | |
| **5.0** | **Schedule** | |
| | Filing ESR by end of 2021 requires that these studies be initiated immediately after meeting with the Township which will be scheduled within the next couple of weeks.<br>Planning process also aiming to be completed by end of 2021 | |

Meeting Minutes

| | | | |
|---|---|---|---|
| **Project Name:** | Baden Sanitary Trunk EA | **MTE File No.:** | C48730-100 |
| **Purpose:** | Initiation Meeting | **Date:** | April 21, 2021 |
| **Time:** | 9:30AM | | |
| **Meeting Location:** | Teleconference | | |

| Attendees | Initials | Representation |
|---|---|---|
| Jeff Molenhuis | JM | Township of Wilmot |
| Harold O'Krafka | HO | Township of Wilmot |
| Bryan Bishop | BB | Township of Wilmot |
| Nick Gougoulias | NG | Nideva Properties |
| Peter Armbruster | PA | Activa |
| Hitesh Lad | HL | Stantec |
| Jeff Martens | JXM | MTE Consultants Inc. |
| Dot Roga | DR | MTE Consultants Inc. |
| Chelsea Kochany | CK | MTE Consultants Inc. |
| Paul Britton | PB | MHBC |
| Pierre Chauvin | PC | MHBC |
| Kevin Brousseau | KB | Stantec |
| | | |

| Item No. | Discussion | Action |
|---|---|---|
| **1.0** | **Cost Sharing** | |
| | • PB has received documents from JM<br>  ○ Funds available from Township<br>  ○ The Township has insufficient funds to cover entire study cost. Nideva and Activa will be responsible for shortfall. In addition, Nideva and Activa will initially upfront the Township funds that are available ($150,000.00) and will be reimbursed by the Township in proportion to their upfront contributions (Nideva – 56.5% and Activa – 45.5%)<br>• PB confirmed with Nideva and Activa developers for cost sharing<br>  ○ Without servicing outlet, project development not possible<br>• PB proposes segregated file for accounting purposes<br>• PB looks for guidance for invoices from Township<br>  ○ Send monthly?<br>  ○ Total amount included and then show breakdown on invoice for developers? | |

| Item No. | Discussion | Action |
|---|---|---|
| | ○ Developers initially share township's share, and then reimbursed from Township, with reimbursement at 2 separate milestones (80% costs incurred by PIC with EA recommendation, balance reimbursed with Notice of Study Completion)<br>○ JM, HO to weigh in for the authorization from Township to proceed, invoice preference, formalizing reimbursements<br>• JM – prefers to be kept in loop on project/payment status; if monthly invoice from MTE, provide copy to Township<br>• HO – recouping costs done as draft approval condition (preferred way due to scheduling, and can usually be done at building permit stage), could be done as DC credits (depending on status), payment at milestone stages<br>○ As agreement impacts Schmidt lands, they should be invited to the table as donation of land MAY be required<br>• PB – ensure formalized understanding and recaps<br>○ Township to receive copies of invoices<br>○ Reimbursement requires proof of payment; offset through DC funding at building permit stage<br>• NG, JM, PA in agreement | |

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Meeting Agenda

| | | | |
|---|---|---|---|
| **Project Name:** | Baden Sanitary Trunk EA | **MTE File No.:** | C48730-100 |
| **Purpose:** | Stakeholder's Meeting | **Date:** | July 20, 2022 |
| **Time:** | 3:00pm-4:30pm | | |
| **Meeting Location:** | Teleconference | | |

| Attendees | Initials | Representation |
|---|---|---|
| Jeff Molenhuis | JM | Township of Wilmot |
| Harold O'Krafka | HO | Township of Wilmot |
| Bryan Bishop | BB | Township of Wilmot |
| Nick Gougoulias | NG | Nideva Properties |
| Jeff Martens | JXM | MTE Consultants Inc. |
| Dot Roga | DR | MTE Consultants Inc. |
| Valentina Lazic | VAL | MTE Consultants Inc. |
| Joanne McDaniel | JM | MTE Consultants Inc. |
| Paul Britton | PB | MHBC |
| Pierre Chauvin | PC | MHBC |
| Hitesh Lad | HL | Stantec |
| Dan Ferguson | DF | Walter Fedy |
| | | |

| Item No. | Discussion | Action |
|---|---|---|
| **1.0** | **Purpose of Meeting** | |
| | Review the evaluation of alternative routes for the Baden Sanitary Trunk alignment.<br>Confirm next steps and prepare PIC #2 for public input. | |
| **2.0** | **EA Process** | |
| | The Problem Statement was defined as:<br>**"To determine the preferred size, alignment and drainage area of the Baden Trunk Sanitary Sewer that will outlet to the Existing Baden SPS."**<br>The Project Team completed the various studies required to properly evaluate the proposed route alternatives as outlined in the PIC #1 presentation to find a solution to the defined Problem Statement.<br>These studies included; Natural Environment, Archaeological, Hydrogeological, Geotechnical and Geomorphological as it relates to the Baden Creek. | |

| Item No. | Discussion | Action |
|---|---|---|
| **3.0** | **Studies Update** | |
| | NRSI –Completed the necessary Natural Environment Study, confirmed any sensitive areas, natural habitats, etc. and evaluated the alternatives based on their findings.<br>Delritus –Completed the archaeological study for the areas of concern. Three First Nations groups were invited to participate and after several months of delay due to wet weather conditions, the study has been completed. Final report will be sent to the First Nations for review and then that requirement is satisfied. **Post Meeting Note: adjustment to the alignment prompted additional archaeological investigation to be conducted.**<br>MHBC –Completed the Cultural Heritage Review<br>MTE – Hydrogeo Study and Geotech Investigation were completed after a review of completed studies yielded the scope of work.<br>MHBC – Has contributed planning information and updates<br>Technical Memos for each Study will be included in the Environmental Study Report that is being prepared currently with plans to publish in late August.<br>GRCA has provided buffer zones and information on areas of concern. | |
| **4.0** | **Alternatives to Consider** | |
| | MTE has developed five separate alignments of this sanitary trunk for evaluation. These alternatives were presented in the virtual PIC held in November of 2021.<br>Review and evaluation of the five alternatives….<br>The alternatives will be assessed for overall Cost including Capital, Operational and Maintenance. | |
| **5.0** | **Schedule** | |
| | We intend to go out to the public again in late July with a virtual presentation of our process to date.<br>Tech memos are being finalized and the ESR will be circulated in draft for comments in August with the intent of filing it by the end of August/early September. | |

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# SIGNED AGREEMENTS

# Six Nations of the Grand River Elected Council
# Archaeological Monitoring Agreement

The purpose of this agreement is to ensure that Six Nations of the Grand River Elected Council ("**SNGREC**") will be remunerated for the reasonable costs for **ONE** Archaeological monitor ("**Monitor**") in connection with archaeological work required for the Baden Sanitary Trunk EA project scheduled for Summer, 2021 (weather dependent). The developer/proponent is Township of Wilmot.

The Monitor mandate will be to monitor and work directly with the archaeological firm Detritus Consulting Ltd to ensure that SNGREC's perspectives and priorities are considered, and to provide any applicable feedback to SNGREC to enable SNGREC to provide timely and meaningful comment on the Project as part of its due diligence as outlined in the Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI)' standards and guidelines, and the Aboriginal Engagement Process.

Township of Wilmot and SNGREC (together, the "**Parties**") agree that MTE Consultants Inc. will provide funding for one Monitor, on the following terms and conditions:

1. The Monitor will be selected by SNGREC and will have appropriate qualifications for the required work, for example, training in archaeology and a working knowledge of field work techniques.
2. The Monitor will be responsible for his/her own personal safety equipment, such as safety boots, safety glasses, safety vest, hard hat, etc. The Monitor will attend all applicable on-site orientation/tailgate safety meetings presented by the field director/supervisor, presenting safety issues on archaeological site/s, ~~on behalf of or~~ in conjunction with Detritus Consulting Ltd.
3. Detritus's field director will coordinate site meeting locations and times directly with SNGREC's point of contact person, Tanya Hill-Montour, Archaeology Supervisor, or the Monitor once designated for the site. She may be contacted at 519-753-0665 or work email address tanyahill-montour@sixnations.ca.
4. MTE will reimburse SNGREC for the Monitor reasonable expenses incurred in connection with the monitoring work in the amount of $125.00 per hour for one monitor. This amount will cover all costs associated with this project such as: wage, mileage, and all applicable employment fees i.e. CPP etc., and hotel/meal (if applicable), the administrative fee, and a fee for reviewing and commenting on the Archaeological Assessments being sent to Ministry of Heritage, Sport, Tourism and Culture Industries.
5. MTE will provide payment to SNGREC by cheque or bank transfer within 30 days of receipt of invoice. The invoice will be addressed to Dot Roga on behalf of Township of Wilmot and the Project will be noted in the text of the invoice. The purchase order, etc. will be provided for the text of the invoice and then will be submitted electronically to the following email address: droga@mte85.com.

The foregoing accurately reflects the terms of the agreement that the Parties hereby agree to enter into and the undersigned agree to be legally bound hereby.

Accepted by Township of Wilmot this 22 of July, 2021
(Developer / Proponent) (Day) (Month)

By: Jeff Molenhuis [redacted]
(Print Name) (Si[redacted])

Title: Director of Public Works and Engineering

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Accepted by SNGREC this 23rd of July, 2021
(Day) (Month)

By: Lonny Bomberry [redacted]
(Signature)

Title: Director, Lands and Resources
Six Nations of the Grand River Elected Council

**This agreement will expire on December 31, 2021**

DEPARTMENT OF
CONSULTATION AND ACCOMMODATION

July 19,2021

**VIA EMAIL**

Chelsea Kochany
MTE
ckochany@mte85.com

Dear Chelsea Kochany,

**RE: MCFN Archaeological Review for**

Beckdale Sanitary Sewer in Waterloo

Confirmation of Receipt

I am writing in follow up to an email received from Amanda McCall of Detritus dated July 16 2021 sent to the Department of Consultation and Accommodation ("DOCA") representing the Mississaugas of the Credit First Nation ("MCFN").

Outline of MCFN Rights and Territory

In 1792 , the Crown and MCFN entered into Between the Lakes, No. 3 (1792) regarding the lands in which your project is situated.

MCFN has formed the Department of Consultation and Accommodation ("DOCA") to represent its interests in consultation and accommodation matters. In this regard, it is DOCA's mandate to ensure that we are directly involved in all planning and development that impacts the integrity of our Territory. DOCA will assess and help alleviate impacts on our rights, land claims, and ways of life by building relationships with governments and private sector proponents. We share a mutual interest in ensuring that projects in the Territory are planned, reviewed, and developed in a manner which ensures healthy communities, ecological protection, and sustainable development for present and future generations in the Territory.

MCFN has a stewardship responsibility over its Territory and asserts that our Aboriginal and treaty rights fundamentally entitle us to preserve our culture and heritage, including

archaeological materials and human burials. Our Territory is the source of our identity as a First Nation and the basis for many cultural activities and spiritual ceremonies. It is home to sacred sites, burial grounds, traditional teachings and meeting places, and sites of profound archaeological and historical significance. We assert that our Aboriginal and treaty rights fundamentally entitle us to preserve our cultural and heritage.

Too much of our cultural objects and the remains of our ancestors have been lost already through development of the most intensely urbanized lands in Canada and we have a strong interest in ensuring that no more of it becomes bulldozed and desecrated.

MCFN *Standards and Guidelines for Archaeology*

In April 2018, MCFN Chief and Council adopted the MCFN *Standards and Guidelines for Archaeology*, a document aimed to provide guidance to consultant archaeologists, proponents, governments, etc. who are conducting archaeological assessment activities within MCFN's Territory. It sets out, in MCFN's own words, what engagement with our Nation should entail for archaeology as well as technical expectations for fieldwork, in relation to the provincial regulations which were created without our input and feedback. It is important to note that MCFN holds all archaeological resources present within its Territory as of interest to the Nation as part of their cultural patrimony. Resources, regardless of size, frequency, condition, etc., should not be interpreted by non-MCFN representatives in such a way as to remove the requirement for engagement with our Nation.

We are attaching a copy for your reference. We expect compliance with these *Standards and Guidelines* as any fieldwork you will be conducting will have the potential of disturbing MCFN's cultural artifacts or its ancestors' remains.

MCFN Expectations Regarding Ancestors' Remains

MCFN has obligations under Anishinaabe law to protect burials within its Territory and MCFN maintains its right to do so. Our ancestors buried their loved ones in our Territory with the understanding that they would not be disturbed.

We would also like to draw your attention to our expectation that at any time that ancestral remains are encountered during fieldwork, we expect all activities on site to stop and that MCFN be contacted immediately to determine a proper course of action.

Technical Review

In the exercise of its stewardship responsibility, DOCA seeks to work together with project proponents and their archaeological consultants to ensure that archaeological work is done properly and respectfully. DOCA has retained technical advisers with expertise in the field of archaeology. These experts will review the technical aspects and cultural appropriateness of the archaeological assessments and strategies associated with your project. Upon completion of these reviews, MCFN will identify, if

necessary, mitigation measures to address any project impacts upon MCFN rights. For cultural materials and human remains, DOCA may advise that this includes ceremonies required by Anishinaabe law, as well as request adjustments to the proposed fieldwork strategy.

The proponent is expected to pay the costs for MCFN to engage in a technical review of the project. DOCA anticipates at this time that all archaeological review will be undertaken by in-house technical experts, but will advise the proponent if an outside peer-review is required. Please find attached the agreement that covers MCFN's in-house technical review of the archaeological assessments and strategies associated with your project. Please fill in the additional required information, highlighted in yellow, and return to us a signed copy.

Please note that capacity at DOCA is limited. We maintain the right to review all material that comes to our office as part of our consultation process. If you have specific filing deadlines, please advise us as soon as possible. However, it is MCFN's assertion that part of the process of meaningful engagement is allowing our Nation a reasonable amount of time to review, reflect upon, and respond to reports and recommendations. On average, this process can be accomplished in 4-6 weeks. It is our position that no archaeological assessment – but especially Stage 4 mitigation – should begin until DOCA has completed our review and is in agreement that with the proposed strategy for fieldwork.

<u>Request for Missing Information</u>
In order to complete our project record, we ask that you provide the following information:

1. Is an archaeological assessment required for this project? If no, why not?
2. Have any archaeological assessments already been completed for this project and/or its study area? If yes, please provide all documentation including reports, supplementary documentation, etc.
3. Has the MHSTCI issued a letter of entry into register for some or all of the study area? If yes, please provide all documentation, including letter, communications to and from MHSTCI, etc.
4. Is there any archaeological activity (e.g. assessment, excavation, monitoring) that has not yet been completed for the project?
5. If the answer to #4 is yes, please provide the following:
    a. A description of the outstanding archaeological activity/activities.
    b. Anticipated date of the activity/activities.
    c. The appropriate contact person overseeing the archaeological activity/activities.

Closing

The review of project-related archaeological assessments is only one part of the consultation process that may be required for your development. Please contact DOCA's Consultation Coordinator, Fawn Sault, if you have any questions about the process.

We ask that you respond with the above requested information and executed agreement within fourteen days following receipt of this letter. We thank you in advance for your attention to our requirements and we look forward to working with you further to shape the planning for development in our Territory.

Sincerely,

[redacted]

Megan DeVries
Archaeological Operations Supervisor
megan.devries@mncfn.ca

Attachment(s) MCFN *Standards and Guidelines for Archaeology* [2018]
DOCA Archaeological Review Agreement [2020]

**Archaeological Review Agreement between:**
**The Mississaugas of the Credit First Nation ("MCFN")**
**and**
**Township of Wilmot**

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A - Background

1. The purpose of this agreement is to provide the Mississaugas of the Credit First Nation (hereinafter, "MCFN") with capacity assistance to review reports and other materials in connection with all archaeological assessments required for the Baden Sanitary Trunk EA (hereinafter, "the Project") located at in Baden, Ontario, owned by Township of Wilmot, (hereinafter, "the Proponent").

2. The Proponent understands that MCFN wishes its designated representatives at the Department of Consultation and Accommodation (hereinafter, "DOCA") to provide timely and meaningful comment on the Project via its established review process.

3. The Proponent, or their consultant(s), will therefore provide all reports in draft form to MCFN (via DOCA) for review and comment prior to their submission to other approval or regulatory authorities. The Proponent and their consultant(s) agree to provide reasonable and adequate time for DOCA to complete its review and provide comments on draft reports. DOCA requires a minimum of three weeks to complete any review of materials and provide comments on draft reports.

4. For archaeological assessments, the Proponent agrees that their consultant(s) will provide, if applicable, both the Supplementary Documentation and the Indigenous Engagement report alongside the draft archaeological report. The Indigenous Engagement report must contain the consultant's full account of MCFN's participation in and comments on the archaeological assessment.

5. For archaeological assessments, the Proponent agrees that no new fieldwork will commence until MCFN has completed its review and has provided comments on the previous Stage of assessment.

6. MCFN agrees that MCFN representatives will have appropriate qualifications for the work required – for example, education in environmental and/or archaeological assessments – and experience in bridging Indigenous perspectives with Western approaches, as reasonably determined by MCFN.

B – Fees and Cost Structure

7. The Proponent will provide capacity funding for the designated DOCA staff representative in the amount of $150.00 per hour for all activities relating to review of Project materials. An estimate of costs is provided in Schedule B.

8. If MCFN is of the view, that designated DOCA staff are unable to complete a comprehensive technical review of Project materials, the Proponent agrees to pay costs incurred by MCFN to retain an external expert in the appropriate field to be chosen at MCFN's sole discretion. The Parties agree that a review by an external expert will commence following mutual acceptance by both Parties of an estimate of work provided by the expert.

C – Additional Conditions

9. All archaeological work in connection with any Project in the Territory will be carried out in accordance with the *Ontario Heritage Act* and its Regulations. The Archaeological work will meet or exceed the Ontario Ministry of Heritage, Sport, Tourism, and Culture Industries (hereinafter, "MHSTCI") standards and guidelines for consultant archaeologists as amended, including the *Terms and Conditions for Archaeological Licences*, *Standards and Guidelines for Consultant Archaeologists (2011)* and the Draft *Engaging Aboriginal Communities in Archaeology Technical Bulletin (2011),* (hereinafter collectively, "MHSTCI Standards 2011"), and any subsequent or updated guidelines or bulletins from MHTSCI.

10. The Proponent agrees that all archaeological work conducted for the Project will comply with the MCFN *Standards and Guidelines for Archaeology* (published April 2, 2018), (hereinafter, "MCFN Standards") as long as the MCFN Standards do not fall below MHSTCI Standards 2011. The MHSTCI Standards 2011 will be paramount in the event of a direct conflict between MCFN Standards and the MHSTCI Standards 2011.

11. The Proponent shall make best efforts to avoid and protect archaeological sites, artifacts, and/or features. The Parties agree that the preferred option for human remains that may be of Aboriginal ancestry is that the human remains stay where they are found with appropriate protections.

12. If archaeological resources are encountered at any time during construction or other Project-related activity, all excavation or other activity that could disturb the site shall

immediately cease, and the Proponent shall immediately notify MCFN's duly appointed Archaeological Operations Supervisor or designate. The Parties shall work collaboratively to minimize impacts and ensure respectful treatment of any archaeological resources in accordance with the practices and values of MCFN as identified by MCFN.

13. If human remains are encountered at any time during construction or other Project-related activity, the following steps shall be taken:
    a. All excavation or other activity that could disturb the site shall immediately cease, and the area shall be secured in a manner which protects the site location and prevents public access and trespass; and
    b. In addition to any notifications required under the *Funeral, Burial and Cremation Services Act, 2002,* SO 2002, C 33, the Proponent shall immediately contact MCFN's duly appointed Archaeological Operations Supervisor or designate; and
    c. MCFN shall be permitted to conduct any ceremonies on site in relation to the human remains that may be of Aboriginal ancestry; and
    d. MCFN shall be consulted about all steps in the investigation and any decisions or agreements to be made regarding human remains that may be of Aboriginal ancestry.

14. Nothing in this Agreement shall be interpreted or implemented so as to derogate or abrogate from any MCFN Aboriginal or Treaty right or claim, or to indicate consent to the Project.

D - Method of Payment

15. The Parties agree that the Proponent will pay the capacity funding as agreed to above by cheque or bank transfer and upon receipt of an invoice from MCFN. All invoices will be addressed directly to the Proponent, the Project will be noted in the text of each invoice, and all invoices will be prepared as per MCFN-DOCA's standard invoicing format. Invoices should be submitted electronically to the following address:

    Email address: droga@mte85.com
    Attention: Dot Roga on behalf of Township of Wilmot
    MTE Consultants Inc.
    520 Bingemens Centre Drive
    Kitchener ON N2B 3X9
    (519) 743-6500 ext 1269

16. All payment should be made to the MCFN Department of Consultation and Accommodation to the following address. For additional information, please call the office at 905-768-4260.

    Email address: DOCA.Admin@mncfn.ca
    Attention: MCFN-DOCA
    4065 Highway 6
    Hagersville, Ontario
    N0A 1H0

17. After thirty [30] days, a 5% monthly compounded interest rate will be charged on outstanding invoices. After six [6] months of non-payment, a 20% monthly compounded interest rate will be charged on outstanding invoices.

F – Disclaimer

18. The Parties agree that the capacity funding payments for the FLRs will be used only for the purposes described in this Agreement and will not be paid for the improper personal gain of any individual or for any other purpose that might violate any Canadian anti-corruption law.

19. This agreement may be executed in counterparts, including via electronic signature.

20. This agreement is legally binding on MCFN and the Proponent..

21. This agreement is effective as of the date of execution by the Parties. In the event Project-related activities continue beyond, April 1, 2023, the Parties agree to conclude a new agreement to address MCFN involvement in the Project after April 1, 2023.

[The remainder of this page is intentionally left blank.]

Signed this _____ day of _____, 2022,



Authorized Signatory on behalf of
The Proponent

[Jeff Molenhuis
Director
Public Works and Engineering
Township of Wilmot

Authorized Signatory on behalf of
Mississaugas of the Credit First Nation

Mark LaForme
Director
Dept. of Consultation and Accommodation
Mississaugas of the Credit First Nation

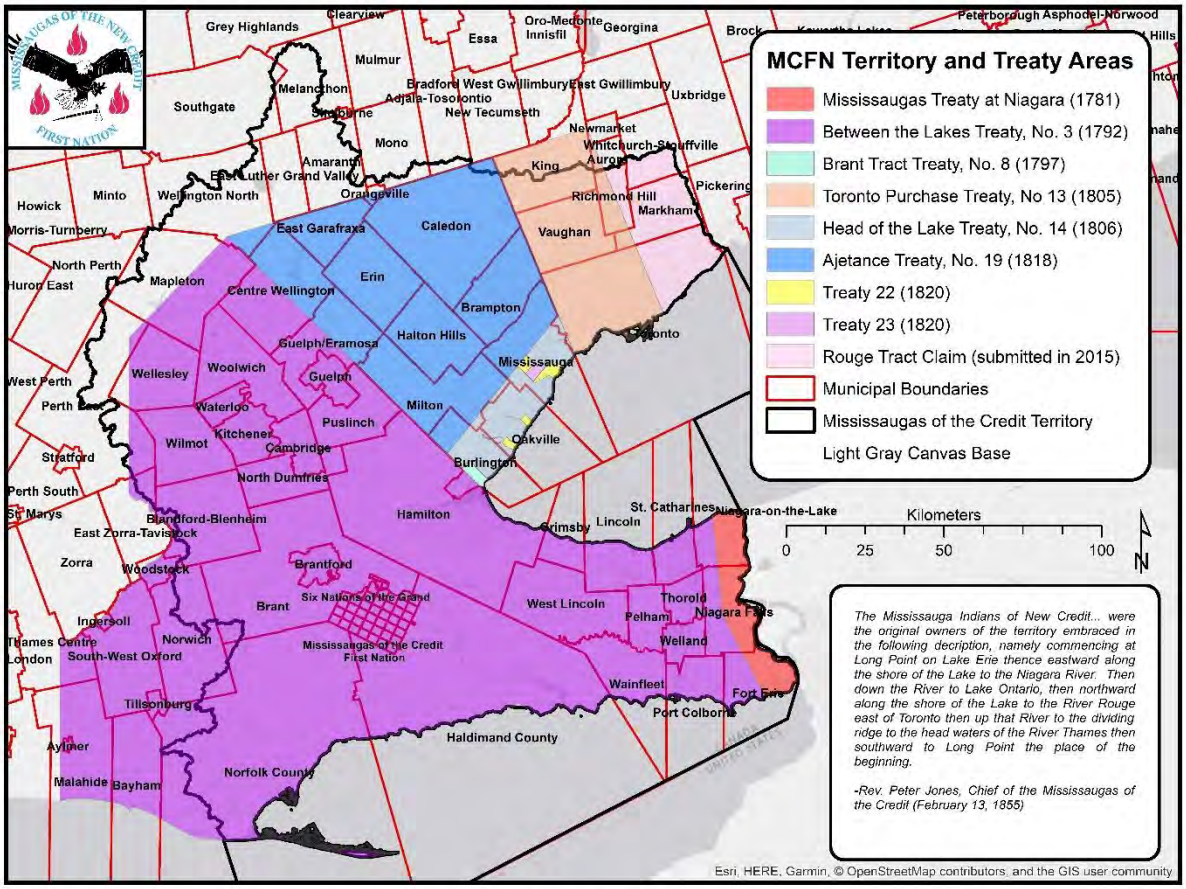
Witness

[printed name of witness]
[job title]
[department]
[name of the proponent]

Witness

Adam LaForme
Archaeological Operations Supervisor
Dept. of Consultation and Accommodation
Mississaugas of the Credit First Nation

# Schedule A




**Municipalities within Mississaugas of the Credit Treaty Lands and Territory**

Schedule B

**Approx. Quote for Technical Review (Reference Only)**

*For review of materials and communications associated with Stage 1 AAs.*

| | *Number* | | *Rate* | | *Total* |
|---|---|---|---|---|---|
| review hours | 4.0 | $ | 150.00 | $ | 600.00 |
| contingency (@ 20%) | | | | $ | 120.00 |
| **Total** | | | | **$** | **720.00** |

*For review of materials and communications associated with Stage 2 AAs.*

| | *Number* | | *Rate* | | *Total* |
|---|---|---|---|---|---|
| review hours | 4.0 | $ | 150.00 | $ | 600.00 |
| contingency (@ 20%) | | | | $ | 120.00 |
| **Total** | | | | **$** | **720.00** |

*For review of materials and communications associated with Stage 3 AAs.*

| | *Number* | | *Rate* | | *Total* |
|---|---|---|---|---|---|
| review hours | 8.0 | $ | 150.00 | $ | 1,200.00 |
| contingency (@ 20%) | | | | $ | 240.00 |
| **Total** | | | | **$** | **1,440.00** |

*For review of materials and communications associated with Stage 4 AAs.*

| | *Number* | | *Rate* | | *Total* |
|---|---|---|---|---|---|
| review hours | 8.0 | $ | 150.00 | $ | 1,200.00 |
| contingency (@ 20%) | | | | $ | 240.00 |
| **Total** | | | | **$** | **1,440.00** |

DEPARTMENT OF
CONSULTATION AND ACCOMMODATION

July 19,2021

**VIA EMAIL**

Chelsea Kochany
MTE
ckochany@mte85.com

Dear Chelsea Kochany,

**RE: MCFN FLR Participation for**

Beckdale Sanitary Sewer in Waterloo

Confirmation of Receipt

I am writing in follow up to an email received from Amanda McCall of Detritus dated July 16 2021 sent to the Department of Consultation and Accommodation ("DOCA") representing the Mississaugas of the Credit First Nation ("MCFN").

Outline of MCFN Rights and Territory

In 1792 , the Crown and MCFN entered into Between the Lakes, No. 3 (1792) regarding the lands in which your project is situated.

MCFN has formed the Department of Consultation and Accommodation ("DOCA") to represent its interests in consultation and accommodation matters. In this regard, it is DOCA's mandate to ensure that we are directly involved in all planning and development that impacts the integrity of our Territory. DOCA will assess and help alleviate impacts on our rights, land claims, and ways of life by building relationships with governments and private sector proponents. We share a mutual interest in ensuring that projects in the Territory are planned, reviewed, and developed in a manner which ensures healthy communities, ecological protection, and sustainable development for present and future generations in the Territory.

One of the ways we require proponents to engage with us is in providing transparency during the environmental survey and archaeological assessment process. The best way

to accomplish this is by having Field Liaison Representatives ("FLRs") on location while fieldwork is occurring, who can ensure that the Nation's special interests and concerns are respected and considered during fieldwork. The cultural and natural resources in question are part of MCFN's territory and heritage and it is our responsibility to ensure their protection, on behalf of the Nation. MCFN's stewardship of its territory extends through the life of any development project and beyond.

It is our expectation that no project-related fieldwork will take place without the participation of our FLRs. MCFN considers it disrespectful of our rights as Indigenous peoples if our natural and cultural heritage is interfered with without our involvement.

FLR Participation

DOCA deploys FLRs to be boots on the ground so that fieldwork by a proponent and their consultants/contractors is carried out with appropriate care, thoroughness, and respect. In the context of MCFN's Territory, where so much natural and cultural heritage has already been lost or destroyed, MCFN's monitoring of fieldwork is of utmost importance to ensure that the trail of desecration stops. FLRs are deployed to observe fieldwork, provide cultural advice, act as a direct link back to DOCA and MCFN, and assist with compliance.

FLRs are MCFN band members who have received training in environmental and archaeological assessments, traditional medicine identification and use, Anishinaabe burial practices, and more throughout their employment with DOCA.

DOCA requires, at minimum, FLR participation during the following project-related studies and/or activities:

- ecological and natural heritage technical studies
- archaeological assessments (Stages 2 through 4) and site visits
- monitoring of activities within 50m of areas of special concern (e.g. waterways and wetlands, archaeological sites, species at risk)
- post-construction remediation activities and follow-up impact monitoring

Agreement for FLR Participation

The cost for the participation of our FLRs is covered by the proponent, not the consultant, whom we view as having the ultimate responsibility to consult with, and accommodate, the Nation. Therefore, please find attached the agreement that covers MCFN's participation in the upcoming fieldwork. The costs associated with this involvement reflect a number of expenses not visible at first glance: payment for the FLRs themselves, operational costs for DOCA, and efforts to engage the community to garner feedback on development projects. If you could please fill in the additional required information, highlighted in yellow, and return to us a signed copy so that we may arrange for FLR participation on your project, that would be greatly appreciated.

Once a signed agreement is in place, DOCA generally arranges scheduling and other related matters directly with the consultant conducting the fieldwork, unless you prefer otherwise.

Please note that MCFN requires two of its FLRs to be on location whenever fieldwork is taking place within its territory. The reason for this is so that FLRs can provide support and security for each other in the field. This has become a requirement in light of uncommon, but unfortunate, occurrences when FLRs have felt pressured or intimidated from external persons while at work locations. We ask that you would respect this request.

Request for Missing Information

In order to complete our project record, we ask that you provide the following information:

1. Please provide a list of all completed technical studies for the project, their date of completion, and the contact information of the consultant who completed each study.
2. Please provide a list of all incomplete and/or upcoming technical studies for the project, the anticipated date of fieldwork for each, and the contact information for the consultant who will complete them.
3. Are there any short-term and/or long-term avoidance and protection strategies currently in place for the natural and/or cultural resources in the study area for this project? If yes, what are they?

Closing

The participation of FLRs in project fieldwork is only one part of the consultation process that may be required for your development. Please contact DOCA's Consultation Coordinator, Fawn Sault, if you have any questions about the process.

We ask that you respond with the above requested information and executed agreement within fourteen days following receipt of this letter. We thank you in advance for your attention to our requirements and we look forward to working with you further to shape the planning for development in our Territory.

Sincerely,

[redacted]

Megan DeVries
Archaeological Operations Supervisor
megan.devries@mncfn.ca

Attachment(s) MCFN *Standards and Guidelines for Archaeology* [2018]
FLR Participation Agreement [2020]

**DEPARTMENT OF CONSULTATION AND ACCOMMODATION**
Mississaugas of the Credit First Nation
4065 Hwy #6, Hagersville, Ontario N0A 1H0
Phone: (905) 768-4260

**Field Liaison Representative Participation Agreement**
**between:**
**The Mississaugas of the Credit First Nation**
**and**
**[name of the proponent]**

---

A - Background

1. The purpose of this agreement is to provide the Mississaugas of the Credit First Nation (hereinafter, "MCFN") with capacity assistance to its Field Liaison Representatives (hereinafter, "FLRs") in connection with all environmental and/or archaeological assessments required for the Baden Sanitary Trunk EA (hereinafter, "the Project") located in Baden, Ontario, owned by Township of Wilmot, (hereinafter, "the Proponent").

2. The Proponent understands that MCFN wishes to send its FLRs to participate in and monitor the assessments associated with the Project, and that the FLRs' mandate will be to ensure that MCFN's perspectives and priorities are considered and to enable MCFN to provide timely and meaningful comment on the Project.

3. All archaeological work in connection with any Project in the Territory will be carried out in accordance with the *Ontario Heritage Act* and its Regulations. The archaeological work will meet or exceed the Ontario Ministry of Heritage, Sport, Tourism, and Culture Industries (hereinafter, "MHSTCI") standards and guidelines for consultant archaeologists as amended, including the *Terms and Conditions for Archaeological Licences*, *Standards and Guidelines for Consultant Archaeologists (2011)* and the Draft *Engaging Aboriginal Communities in Archaeology Technical Bulletin (2011),* (hereinafter collectively, "MHSTCI Standards 2011"), and any subsequent or updated guidelines or bulletins from MHTSCI.

4. The Proponent agrees that all archaeological work conducted for the Project will comply with the MCFN *Standards and Guidelines for Archaeology* (published April 2, 2018), (hereinafter, "MCFN Standards") as long as the MCFN Standards do not fall below MHSTCI Standards 2011. The MHSTCI Standards 2011 will be paramount in the event of a direct conflict between MCFN Standards and the MHSTCI Standards 2011.

5. Nothing in this Agreement shall be interpreted or implemented so as to derogate or abrogate from any MCFN Aboriginal or Treaty right or claim, or to indicate MCFN's consent to the Project.

B – Fees and Cost Structure

6. The Proponent will provide capacity funding for each FLR in the amount of $85.00 per hour for all activities relating to the Project. Activities relating to the Project include, but are not limited to:
    a. Time spent on site monitoring assessment or predetermined construction-related activities;
    b. Time spent completing data or artifact processing, identification, analysis, and interpretation activities alongside their consultant(s);
    c. Actual travel time at the beginning of, during, and/or end of each day;
    d. Time completing daily notes relating to the Project;
    e. Time spent on standby at the request of the Proponent or their consultant(s); and
    f. Time completing mandatory training at the request of the Proponent or their consultant(s).

7. The Proponent will pay a supervisory fee of 3.5%, based on the number of hours charged to the Proponent, to provide MCFN with the capacity to facilitate in-field technical support for the FLRs via the Field Archaeologist.

8. The Proponent will reimburse the FLRs for reasonable mileage and meals in accordance with current Federal Canada Treasury Board guidelines, over and above the hourly rate [see Schedule B]. Mileage rates are determined using the MCFN Department of Consultation and Accommodation as the place of departure.

9. The Proponent will provide capacity funding for each FLR in the amount of $125.00 per hour for any work exceeding eight hours per day and/or forty hours per week. The above noted mileage and meal allowance remains in effect.

10. The Proponent will provide capacity funding for each FLR in the amount of $125.00 per hour for any work occurring on the following holidays: New Year's Day, Family Day, Good Friday, Victoria Day, Indigenous Solidarity Day (June 21), Canada Day, Civic Holiday, Labour Day, the National Day for Truth and Reconciliation (September 30), Thanksgiving Day, Remembrance Day, Christmas Day, and Boxing Day. The above noted mileage and meal allowance rates remain in effect.

11. The Proponent agrees that the FLRs will be paid for a minimum of three hours, plus actual travel time, mileage, and meal allowance rates as noted above, on any day when

work is cancelled by the Proponent or their consultant(s) while FLRs are en route to the work site or after the FLRs have already arrived.

12. If its use is deemed necessary by both Parties, the Proponent agrees to reimburse the FLRs for their use of the 407ETR upon receipt of a copy of the bill. This agreement will be provided in writing to MCFN's Field Coordinator.

13. If deemed reasonable by both Parties, the Proponent agrees to cover the cost of overnight accommodation for FLRs participating in environmental and/or archaeological fieldwork at locations which would otherwise require more than 90 minutes of travel time at both the beginning and end of the work day, using the MCFN Department of Consultation and Accommodation as the place of departure. An additional Incidental Allowance fee is required for any work which requires overnight accommodations, as set out in Schedule B. This agreement will be provided in writing to MCFN's Field Coordinator.

C – Additional Conditions

14. The parties acknowledge that the Project, in whole or in part, takes place within MCFN Territory and agree that the Proponent shall provide capacity funding for FLR participation on the Project for the duration of the Project.

15. The Proponent agrees that two FLRs shall be on location whenever Project-related activities are taking place within its Territory, as set out in Schedule A.

16. Furthermore, additional FLRs are required if the number of field personnel utilized by the consultant exceeds fourteen (14) individuals and the Proponent agrees to provide capacity funding for additional FLRs as required. MCFN requires one additional FLR per five additional field crew, as outlined in the chart below:

| Number of Field Personnel | Number of FLRs Required |
|---|---|
| 1 to 14 | 2 |
| 15 to 19 | 3 |
| 20 to 24 | 4 |
| 25 to 29 | 5 |
| 30 to 34 | 6 |
| 35 to 39 | 7 |
| 40+ | 8+ |

17. The Parties acknowledge that the FLRs' time and travel will be recorded and verified using the ClockShark Time Tracking Software System and that invoicing will be prepared using these records, not those of a third party.

18. If archaeological resources are encountered at any time during construction or other Project-related activity, all excavation or other activity that could disturb the site shall immediately cease, and the Proponent shall immediately notify MCFN's Archaeological Operations Supervisor or designate. The Parties shall work collaboratively to minimize impacts and ensure respectful treatment of any archaeological resources in accordance with the practices and values of MCFN as identified by MCFN.

19. If human remains are encountered at any time during construction or other Project-related activity, the following steps shall be taken:
    a. All excavation or other activity that could disturb the site shall immediately cease, and the area shall be secured in a manner which protects the site location and prevents public access and trespass; and
    b. In addition to any notifications required under the *Funeral, Burial and Cremation Services Act, 2002,* SO 2002, C 33, the Proponent shall immediately contact MCFN's duly appointed Archaeological Operations Supervisor or designate; and
    c. MCFN shall be permitted to conduct any ceremonies on site in relation to the human remains that may be of Aboriginal ancestry ("Ancestral Remains"); and
    d. MCFN shall be consulted about all steps in the investigation and any decisions or agreements to be made regarding Ancestral Remains.

D - Coordination of the FLRs

20. The Parties agree that the FLRs will follow the reasonable instructions of the Proponent and their consultant firm(s) conducting the environmental and/or archaeological work concerning safety practices, and that the FLRs will attend "tailgate" safety meetings if requested.

21. The contact person for activities relating to the environmental assessment portion of the Project is [name of contact person #1] from [name of consultant]. Contact information for this person is as follows:
    [insert contact information here]

22. The contact person for activities relating to the archaeological assessment portion of the Project is Garth Grimes from Detritus Consulting Ltd. Contact information for this person is as follows:

Detritus Consulting Ltd.
www.detcon.net (519) 744-7018

23. The Parties agree that the contact person for the consultant firm(s) will coordinate site meeting locations and times through MCFN's duly appointed Field Coordinator. Contact information for the Field Coordinator is as follows:

    Mariah Sault
    Telephone: 905-768-4260
    Cell: 905-870-2918
    Email: field.coordinator@mncfn.ca

E - Status of the FLRs

24. The FLRs selected by MCFN have appropriate qualifications for the work required – for example, training in environmental and/or archaeological monitoring – and experience in bridging Indigenous perspectives with Western approaches, as reasonably determined by MCFN.

25. The Parties agree that the FLRs are not employees, contractors, or sub-contractors of the Proponent or their consultant(s) and that the FLRs will be responsible for their own personal protective equipment, such as hard hats, safety boots, and safety vests, unless specific or otherwise unique personal protective equipment is required, which will therefore be provided or reimbursed by the Proponent.

26. FLRs take direction from MCFN. MCFN pays Workplace Safety and Insurance Board ("WSIB") contributions in respect of the FLRs and will, at its own expense, maintain for the term of this agreement a comprehensive general liability ("CGL") policy or policies with a limit of at least $5 million . MCFN will, at its own expense, maintain a policy for automobile insurance with a combined single limit of not less that $ 2 million.

27. MCFN shall provide the Proponent with evidence of such insurance above in the form of a memorandum of insurance issued by the insurer, upon request.

28. MCFN agrees that FLRs will perform their activities safely, in a good and competent manner, in compliance with all applicable laws, regulations, and guidelines.

29. MCFN expects that the Proponent will comply with the *Occupational Health and Safety Act,* R.S.O. 1990, C. 0.1, the Ontario *Human Rights Code*, R. S. O. 1990, c. H.19, and maintain a safe, harassment-free work environment.

30. The Proponent is responsible for negligence or other failure to maintain a safe and harassment-free work environment. To the extent that the Proponent is responsible for negligence or other failure to maintain a safe and harassment-free work environment, the Proponent is liable and shall indemnify MCFN claims or demands related to injury, accident, discrimination, or harassment by the Proponent's employees, agents, consultants, or other parties under the control or direction of the Proponent.

F - Method of Payment

31. The Parties agree that the Proponent will pay the capacity funding as agreed to above by cheque or bank transfer and upon receipt of an invoice from MCFN. All invoices will be addressed directly to the Proponent, the Project will be noted in the text of each invoice, and all invoices will be prepared as per MCFN-DOCA's standard invoicing format. Invoices should be submitted electronically to the following address:

    Email address: droga@mte85.com
    Attention: Dot Roga on behalf of Township of Wilmot
    MTE Consultants Inc.
    520 Bingemens Centre Drive
    Kitchener ON N2B 3X9
    (519) 743-6500 ext 1269

32. All payment should be made to the MCFN Department of Consultation and Accommodation to the following address. For additional information, please call the office at 905-768-4260.

    Email address: DOCA.Admin@mncfn.ca
    Attention: MCFN-DOCA
    4065 Highway 6
    Hagersville, Ontario
    N0A 1H0

33. After thirty [30] days, a 5% monthly compounded interest rate will be charged on outstanding invoices. After six [6] months of non-payment, a 20% monthly compounded interest rate will be charged on outstanding invoices.

G – Disclaimer

34. The Parties agree that the capacity funding payments for the FLRs will be used only for the purposes described in this Agreement and will not be paid for the improper personal gain of any individual or for any other purpose that might violate any Canadian anti-corruption law.

35. This agreement may be executed in counterparts, including via electronic signature.

36. This agreement is legally binding on MCFN and the Proponent. This agreement is signed by authorized representatives of the Parties on the date set out in this agreement below.

This agreement is effective as of the date of execution by the Parties. In the event Project-related activities continue beyond, April 1, 2023, the Parties agree to conclude a new agreement to address MCFN involvement in the Project after April 1, 2023.

[The remainder of this page is intentionally left blank.]

Signed this _____ day of _____, 2022,

[redacted]

Authorized Signatory on behalf of
The Proponent

Jeff Molenhuis
Director
Public Works and Engineering
Township of Wilmot

Authorized Signatory on behalf of
Mississaugas of the Credit First Nation

Mark LaForme
Director
Dept. of Consultation and Accommodation
Mississaugas of the Credit First Nation

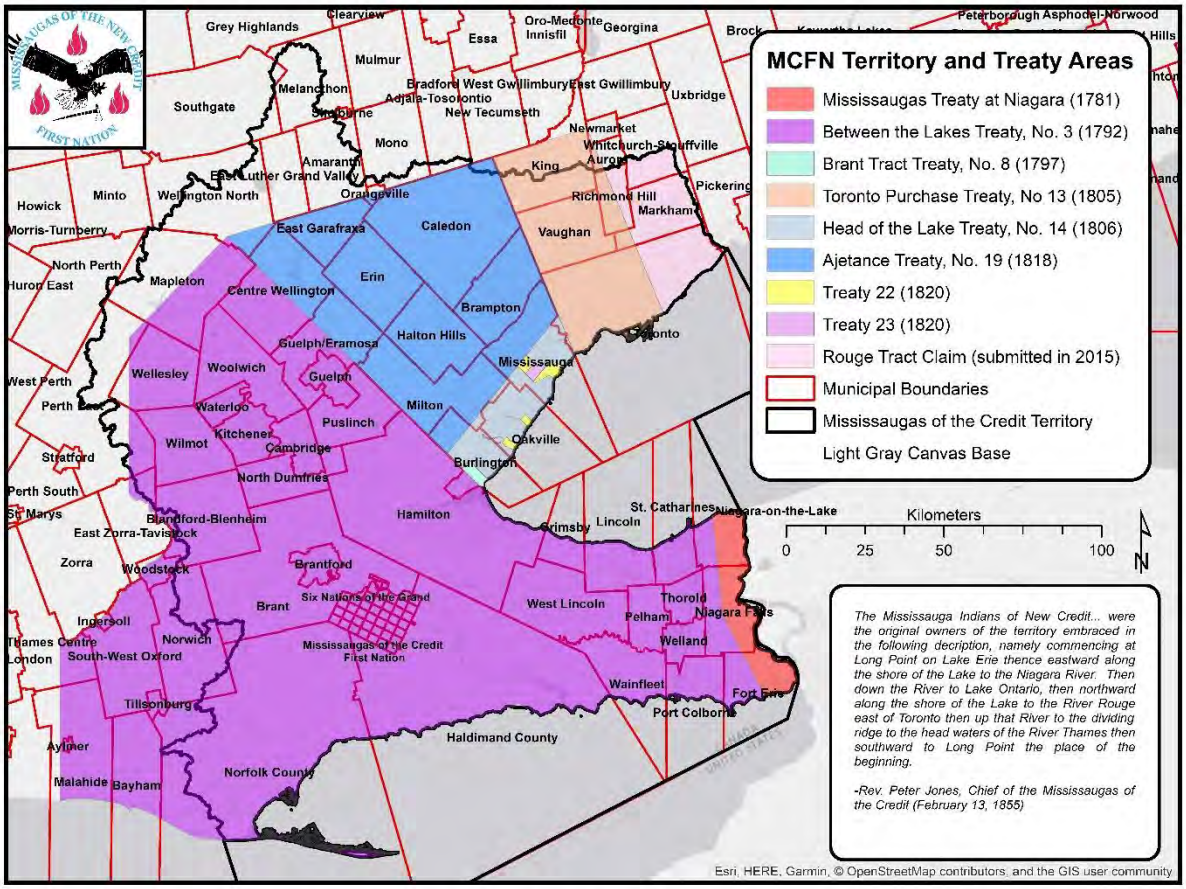
Witness

[printed name of witness]
[job title]
[department]
[name of the proponent]

Witness

Adam LaForme
Archaeological Operations Supervisor
Dept. of Consultation and Accommodation
Mississaugas of the Credit First Nation

# Schedule A




**Municipalities within Mississaugas of the Credit Treaty Lands and Territory**

Schedule B

MISSISSAUGAS OF THE CREDIT FIRST NATION MILEAGE & ALLOWANCE CHART

*EFFECTIVE APRIL 1, 2022 to MARCH 31, 2023*

| | | | |
|---|---|---|---|
| **MILEAGE** | *$ 0.575* per KM | | |
| | https://www.njc-cnm.gc.ca/directive/d10/v238/s658/en | | |
| **MEAL ALLOWANCE** | | | **not eligible if:** |
| BREAKFAST | $ | *21.90* | leave after 8am; get home before 7:30am |
| LUNCH | $ | *22.15* | leave after 1:15pm; get home before 12:15pm |
| DINNER | $ | *54.50* | leave after 7pm; get home before 6:30pm |
| INCIDENTALS | $ | *17.50* | not staying overnight |
| | https://www.njc-cnm.gc.ca/directive/d10/v238/s659/en | | |
| NIGHTTIME* | $ | *54.40* | *Applies only to nighttime surveys that would not otherwise trigger dinner or breakfast. |

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**Field Liaison Representative Participation Agreement**
**between:**
**The Mississaugas of the Credit First Nation**
**and**
**Township of Wilmot**

---

A - Background

1. The purpose of this agreement is to provide the Mississaugas of the Credit First Nation (hereinafter, "MCFN") with capacity assistance to its Field Liaison Representatives (hereinafter, "FLRs") in connection with all environmental and/or archaeological assessments required for the Baden Sanitary Trunk EA (hereinafter, "the Project") located in Baden, Ontario, owned by Township of Wilmot, (hereinafter, "the Proponent").

2. The Proponent understands that MCFN wishes to send its FLRs to participate in and monitor the assessments associated with the Project, and that the FLRs' mandate will be to ensure that MCFN's perspectives and priorities are considered and to enable MCFN to provide timely and meaningful comment on the Project.

3. All archaeological work in connection with any Project in the Territory will be carried out in accordance with the *Ontario Heritage Act* and its Regulations. The archaeological work will meet or exceed the Ontario Ministry of Heritage, Sport, Tourism, and Culture Industries (hereinafter, "MHSTCI") standards and guidelines for consultant archaeologists as amended, including the *Terms and Conditions for Archaeological Licences*, *Standards and Guidelines for Consultant Archaeologists (2011)* and the Draft *Engaging Aboriginal Communities in Archaeology Technical Bulletin (2011),* (hereinafter collectively, "MHSTCI Standards 2011").

4. The Proponent agrees that all archaeological work conducted for the Project will comply with the MCFN *Standards and Guidelines for Archaeology* (published April 2, 2018), (hereinafter, "MCFN Standards") as long as the MCFN Standards do not fall below MHSTCI Standards 2011. The MHSTCI Standards 2011 will be paramount in the event of a direct conflict between MCFN Standards and the MHSTCI Standards 2011.

5. Nothing in this Agreement shall be interpreted or implemented so as to derogate or abrogate from any MCFN Aboriginal or Treaty right or claim, or to indicate consent to the Project.

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B – Fees and Cost Structure

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    a. Time spent on site monitoring assessment or predetermined construction-related activities;
    b. Time spent completing data or artifact processing, identification, analysis, and interpretation activities alongside their consultant(s);
    c. Actual travel time at the beginning of, during, and/or end of each day;
    d. Time completing daily notes relating to the Project;
    e. Time spent on standby at the request of the Proponent or their consultant(s); and
    f. Time completing mandatory training at the request of the Proponent or their consultant(s).

7. The Proponent will pay a supervisory fee of 3.5%, based on the number of hours charged to the Proponent, to provide MCFN with the capacity to facilitate in-field technical support for the FLRs via the Field Archaeologist.

8. The Proponent will reimburse the FLRs for reasonable mileage and meals in accordance with current Federal Canada Treasury Board guidelines, over and above the hourly rate [see Schedule B]. Mileage rates are determined using the MCFN Department of Consultation and Accommodation as the place of departure.

9. The Proponent will provide capacity funding for each FLR in the amount of $125.00 per hour for any work exceeding eight hours per day and/or forty hours per week. The above noted mileage and meal allowance remains in effect.

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11. The Proponent agrees that the FLRs will be paid for a minimum of three hours, plus actual travel time, mileage, and meal allowance rates as noted above, on any day when work is cancelled by the Proponent or their consultant(s) while FLRs are en route to the work site or after the FLRs have already arrived.

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12. If its use is deemed necessary by both Parties, the Proponent agrees to reimburse the FLRs for their use of the 407ETR upon receipt of a copy of the bill. This agreement will be provided in writing to MCFN's Field Coordinator.

13. If deemed reasonable by both Parties, the Proponent agrees to cover the cost of overnight accommodation for FLRs participating in environmental and/or archaeological fieldwork at locations which would otherwise require more than 90 minutes of travel time at both the beginning and end of the work day, as determined using the MCFN Department of Consultation and Accommodation as the place of departure. An additional Incidental Allowance fee is required for any work which requires overnight accommodations, as set out in Schedule B. This agreement will be provided in writing to MCFN's Field Coordinator.

C – Additional Conditions

14. The parties acknowledge that the Project, in whole or in part, takes place within MCFN Territory and agree that the Proponent shall provide capacity funding for FLR participation on the Project for the duration of the Project.

15. The Proponent agrees that two FLRs shall be on location whenever Project-related activities are taking place within its Territory, as set out in Schedule A.

16. Furthermore, additional FLRs are required if the number of field personnel utilized by the consultant exceeds fourteen (14) individuals and the Proponent agrees to provide capacity funding for additional FLRs as required. MCFN requires one additional FLR per five additional field crew, as outlined in the chart below:

| Number of Field Personnel | Number of FLRs Required |
|---|---|
| 1 to 14 | 2 |
| 15 to 19 | 3 |
| 20 to 24 | 4 |
| 25 to 29 | 5 |
| 30 to 34 | 6 |
| 35 to 39 | 7 |
| 40+ | 8+ |

17. The Parties acknowledge that the FLRs time and travel will be recorded and verified using the ClockShark Time Tracking Software System and that invoicing will be prepared using these records, not those of a third party.

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18. If archaeological resources are encountered at any time during construction or other Project-related activity, all excavation or other activity that could disturb the site shall immediately cease, and the Proponent shall immediately notify MCFN's Archaeological Operations Supervisor or designate. The Parties shall work collaboratively to minimize impacts and ensure respectful treatment of any archaeological resources in accordance with the practices and values of MCFN as identified by MCFN.

19. If human remains are encountered at any time during construction or other Project-related activity, the following steps shall be taken:
    a. All excavation or other activity that could disturb the site shall immediately cease, and the area shall be secured in a manner which protects the site location and prevents public access and trespass; and
    b. In addition to any notifications required under the *Funeral, Burial and Cremation Services Act, 2002,* SO 2002, C 33, the Proponent shall immediately contact MCFN's duly appointed Archaeological Operations Supervisor or designate; and
    c. MCFN shall be permitted to conduct any ceremonies on site in relation to the human remains that may be of Aboriginal ancestry ("Ancestral Remains"); and
    d. MCFN shall be consulted about all steps in the investigation and any decisions or agreements to be made regarding Ancestral Remains.

D - Coordination of the FLRs

20. The Parties agree that the FLRs will follow the reasonable instructions of the Proponent and their consultant firm(s) conducting the environmental and/or archaeological work concerning safety practices, and that the FLRs will attend "tailgate" safety meetings if requested.

21. The contact person for activities relating to the environmental assessment portion of the Project is [name of contact person #1] from [name of consultant]. Contact information for this person is as follows:
    [insert contact information here]

22. The contact person for activities relating to the archaeological assessment portion of the Project is Garth Grimes from Detritus Consulting Ltd. Contact information for this person is as follows:
    Detritus Consulting Ltd.
    www.detcon.net (519) 744-7018

DocuSign Envelope ID: C71030E1-B604-4916-9622-77386B35089D

23. The Parties agree that the contact person for the consultant firm(s) will coordinate site meeting locations and times through MCFN's duly appointed Field Coordinator. Contact information for the Field Coordinator is as follows:

    Joelle Williams
    Telephone: 905-768-4260
    Cell: 905-870-2918
    Email: joelle.williams@mncfn.ca

E - Status of the FLRs

24. The FLRs selected by MCFN have appropriate qualifications for the work required – for example, training in environmental and/or archaeological monitoring – and experience in bridging Indigenous perspectives with Western approaches, as reasonably determined by MCFN.

25. The Parties agree that the FLRs are not employees, contractors, or sub-contractors of the Proponent or their consultant(s) and that the FLRs will be responsible for their own personal protective equipment, such as hard hats, safety boots, and safety vests, unless specific or otherwise unique personal protective equipment is required, which will therefore be provided or reimbursed by the Proponent.

26. FLRs take direction from MCFN. MCFN pays Workplace Safety and Insurance Board ("WSIB") contributions in respect of the FLRs and will, at its own expense, maintain for the term of this agreement a comprehensive general liability ("CGL") policy or policies with a limit of at least $1 million and shall provide the Proponent with evidence of such insurance, upon request. MCFN agrees that FLRs will perform their activities safely, in a good and competent manner, in compliance with all applicable laws, regulations, and guidelines.

27. MCFN expects that the Proponent will comply with the *Occupational Health and Safety Act,* R.S.O. 1990, C. 0.1, the Ontario *Human Rights Code*, R. S. O. 1990, c. H.19, and maintain a safe, harassment-free work environment.

28. The Proponent is responsible for negligence or other failure to maintain a safe and harassment-free work environment. To the extent that the Proponent is responsible for negligence or other failure to maintain a safe and harassment-free work environment, the Proponent is liable and shall indemnify MCFN claims or demands related to injury, accident, discrimination, or harassment by the Proponent's employees, agents, consultants, or other parties under the control or direction of the Proponent.

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F - Method of Payment

29. The Parties agree that the Proponent will pay the capacity funding as agreed to above by cheque or bank transfer and upon receipt of an invoice from MCFN. All invoices will be addressed directly to the Proponent, the Project will be noted in the text of each invoice, and all invoices will be prepared as per MCFN-DOCA's standard invoicing format. Invoices should be submitted electronically to the following address:

    Email address: droga@mte85.com
    Attention: Dot Roga on behalf of Township of Wilmot
    MTE Consultants Inc.
    520 Bingemens Centre Drive
    Kitchener ON N2B 3X9
    (519) 743-6500 ext 1269

30. All payment should be made to the MCFN Department of Consultation and Accommodation to the following address. For additional information, please call the office at 905-768-4260.

    Email address: nicole.laforme-hess@mncfn.ca
    Attention: MCFN-DOCA
    4065 Highway 6
    Hagersville, Ontario
    N0A 1H0

31. After thirty [30] days, a 5% monthly compounded interest rate will be charged on outstanding invoices. After six [6] months of non-payment, a 20% monthly compounded interest rate will be charged on outstanding invoices.

G – Disclaimer

32. The Parties agree that the capacity funding payments for the FLRs will be used only for the purposes described in this Agreement and will not be paid for the improper personal gain of any individual or for any other purpose that might violate any Canadian anti-corruption law.

33. This agreement may be executed in counterparts.

34. This agreement is legally binding on MCFN and the Proponent. This agreement is signed by authorized representatives of the Parties on the date set out in this agreement below.

DocuSign Envelope ID: C71030E1-B604-4916-9622-77386B35089D

35. The term of this agreement expires on April 1, 2022. In the event that Project-related activities requiring FLR participation continue past this termination date, a new agreement will be executed between Parties.

[The remainder of this page is intentionally left blank.]

DocuSign Envelope ID: C71030E1-B604-4916-9622-77386B35089D

Signed this _____ day of _____, 2021,

[redacted]

Authorized Signatory on behalf of
The Proponent

Jeff Molenhuis
Director
Public Works and Engineering
Township of Wilmot

[redacted] 7/23/2021

Authorized Signatory on behalf of
Mississaugas of the Credit First Nation

per

Mark LaForme
Director
Dept. of Consultation and Accommodation
Mississaugas of the Credit First Nation

[redacted]

Witness

[printed name of witness]
[job title]
[department]
[name of the proponent]

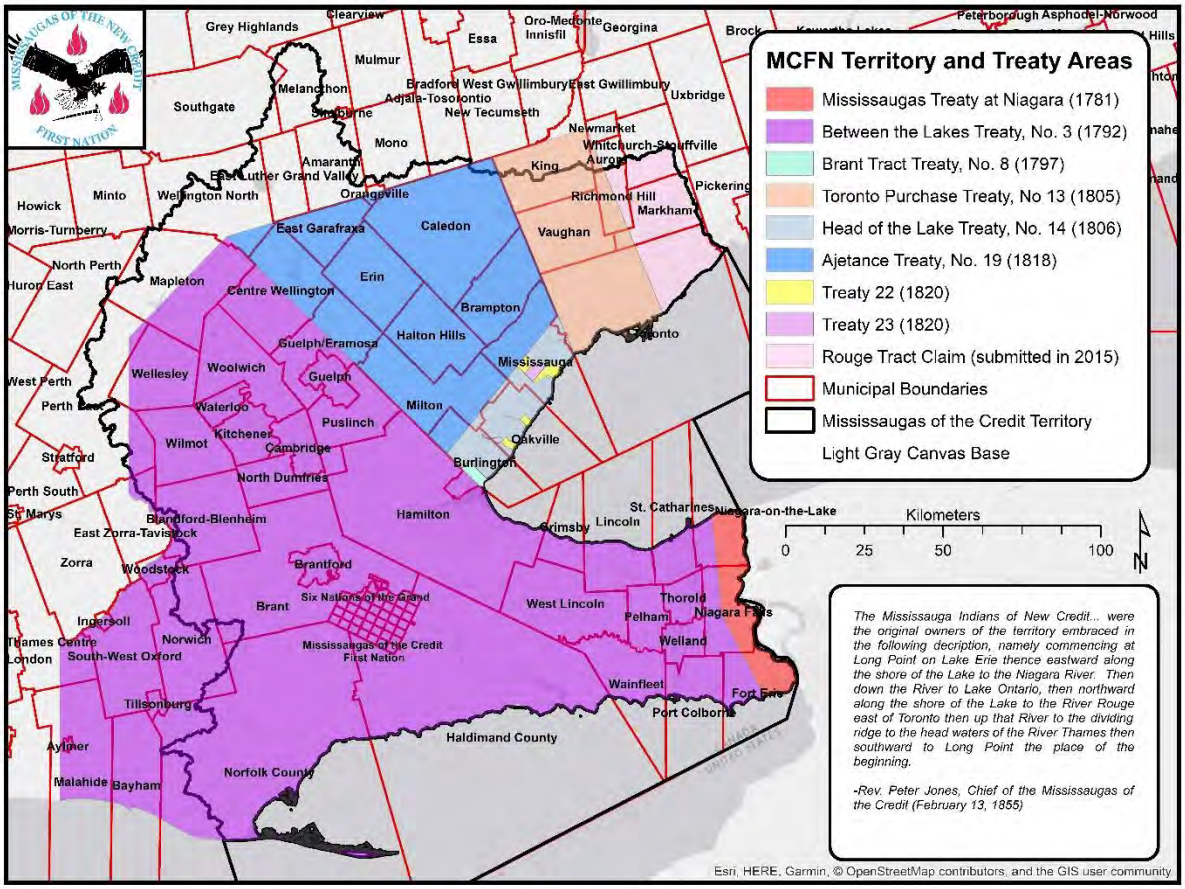
[redacted]

Witness

Megan DeVries
Archaeological Operations Supervisor
Dept. of Consultation and Accommodation
Mississaugas of the Credit First Nation

DocuSign Envelope ID: C71030E1-B604-4916-9622-77386B35089D

# Schedule A




**Municipalities within Mississaugas of the Credit Treaty Lands and Territory**

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# Schedule B

MISSISSAUGAS OF THE CREDIT FIRST NATION MILEAGE & ALLOWANCE CHART

*EFFECTIVE APRIL 1, 2021 to MARCH 31, 2022*

| | | | |
|---|---|---|---|
| **MILEAGE** | $ 0.56 per KM | | |
| | https://www.njc-cnm.gc.ca/directive/d10/v238/s658/en | | |
| **MEAL ALLOWANCE** | | | **not eligible if:** |
| BREAKFAST | $ | 21.10 | leave after 8am; get home before 7:30am |
| LUNCH | $ | 21.35 | leave after 1:15pm; get home before 12:15pm |
| DINNER | $ | 52.40 | leave after 7pm; get home before 6:30pm |
| INCIDENTALS | $ | 17.50 | not staying overnight |
| | https://www.njc-cnm.gc.ca/directive/d10/v238/s659/en | | |
| NIGHTTIME* | $ | 52.40 | *Applies only to nighttime surveys that would not otherwise trigger dinner or breakfast. |

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**Archaeological Review Agreement between:**
**The Mississaugas of the Credit First Nation ("MCFN")**
**and**
**Township of Wilmot**

---

A - Background

1. The purpose of this agreement is to provide the Mississaugas of the Credit First Nation (hereinafter, "MCFN") with capacity assistance to review reports and other materials in connection with all archaeological assessments required for the Baden Sanitary Trunk EA (hereinafter, "the Project") located at in Baden, Ontario, owned by Township of Wilmot, (hereinafter, "the Proponent").

2. The Proponent understands that MCFN wishes its designated representatives at the Department of Consultation and Accommodation (hereinafter, "DOCA") to provide timely and meaningful comment on the Project via its established review process.

3. The Proponent, or their consultant(s), will therefore provide all reports in draft form to MCFN (via DOCA) for review and comment prior to their submission to other approval or regulatory authorities. The Proponent and their consultant(s) agree to provide reasonable and adequate time for MCFN to complete its review and provide comments on draft reports. MCFN is unable to review of any material in less than one week.

4. For archaeological assessments, the Proponent agrees that their consultant(s) will provide, if applicable, both the Supplementary Documentation and the Indigenous Engagement report alongside the draft archaeological report. The Indigenous Engagement report must contain the consultant's full account of MCFN's participation in and comments on the archaeological assessment.

5. For archaeological assessments, the Proponent agrees that no new fieldwork will commence until MCFN has completed its review and has provided comments on the previous Stage of assessment.

6. MCFN agrees that MCFN representatives will have appropriate qualifications for the work required – for example, education in environmental and/or archaeological assessments – and experience in bridging Indigenous perspectives with Western approaches, as reasonably determined by MCFN.

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B – Fees and Cost Structure

7. The Proponent will provide capacity funding for the designated DOCA staff representative in the amount of $150.00 per hour for all activities relating to review of Project materials. An estimate of costs is provided in Schedule B.

8. If MCFN is of the view, that designated DOCA staff are unable to complete a comprehensive technical review of Project materials, the Proponent agrees to pay costs incurred by MCFN to retain an external expert in the appropriate field to be chosen at MCFN's sole discretion. The Parties agree that a review by an external expert will commence following mutual acceptance by both Parties of an estimate of work provided by the expert.

C – Additional Conditions

9. All archaeological work in connection with any Project in the Territory will be carried out in accordance with the *Ontario Heritage Act* and its Regulations. The Archaeological work will meet or exceed the Ontario Ministry of Heritage, Sport, Tourism, and Culture Industries (hereinafter, "MHSTCI") standards and guidelines for consultant archaeologists as amended, including the *Terms and Conditions for Archaeological Licences*, *Standards and Guidelines for Consultant Archaeologists (2011)* and the Draft *Engaging Aboriginal Communities in Archaeology Technical Bulletin (2011),* (hereinafter collectively, "MHSTCI Standards 2011").

10. The Proponent agrees that all archaeological work conducted for the Project will comply with the MCFN *Standards and Guidelines for Archaeology* (published April 2, 2018), (hereinafter, "MCFN Standards") as long as the MCFN Standards do not fall below MHSTCI Standards 2011. The MHSTCI Standards 2011 will be paramount in the event of a direct conflict between MCFN Standards and the MHSTCI Standards 2011.

11. The Proponent shall make best efforts to avoid and protect archaeological sites, artifacts, and/or features. The Parties agree that the preferred option for human remains that may be of Aboriginal ancestry is that they remain where they are found with appropriate protections.

12. If archaeological resources are encountered at any time during construction or other Project-related activity, all excavation or other activity that could disturb the site shall immediately cease, and the Proponent shall immediately notify MCFN's duly appointed Archaeological Operations Supervisor or designate. The Parties shall work

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collaboratively to minimize impacts and ensure respectful treatment of any archaeological resources in accordance with the practices and values of MCFN as identified by MCFN.

13. If human remains are encountered at any time during construction or other Project-related activity, the following steps shall be taken:
    a. All excavation or other activity that could disturb the site shall immediately cease, and the area shall be secured in a manner which protects the site location and prevents public access and trespass; and
    b. In addition to any notifications required under the *Funeral, Burial and Cremation Services Act, 2002,* SO 2002, C 33, the Proponent shall immediately contact MCFN's duly appointed Archaeological Operations Supervisor or designate; and
    c. MCFN shall be permitted to conduct any ceremonies on site in relation to the human remains that may be of Aboriginal ancestry; and
    d. MCFN shall be consulted about all steps in the investigation and any decisions or agreements to be made regarding human remains that may be of Aboriginal ancestry.

14. Nothing in this Agreement shall be interpreted or implemented so as to derogate or abrogate from any MCFN Aboriginal or Treaty right or claim, or to indicate consent to the Project.

D - Method of Payment

15. The Parties agree that the Proponent will pay the capacity funding as agreed to above by cheque or bank transfer and upon receipt of an invoice from MCFN. All invoices will be addressed directly to the Proponent, the Project will be noted in the text of each invoice, and all invoices will be prepared as per MCFN-DOCA's standard invoicing format. Invoices should be submitted electronically to the following address:

    Email address: droga@mte85.com
    Attention: Dot Roga on behalf of Township of Wilmot
    MTE Consultants Inc.
    520 Bingemens Centre Drive
    Kitchener ON N2B 3X9
    (519) 743-6500 ext 1269

16. All payment should be made to the MCFN Department of Consultation and Accommodation to the following address. For additional information, please call the office at 905-768-4260.

    Email address: nicole.laforme-hess@mncfn.ca

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Attention: MCFN-DOCA
4065 Highway 6
Hagersville, Ontario
N0A 1H0

17. After thirty [30] days, a 5% monthly compounded interest rate will be charged on outstanding invoices. After six [6] months of non-payment, a 20% monthly compounded interest rate will be charged on outstanding invoices.

F – Disclaimer

18. The Parties agree that the capacity funding payments for the FLRs will be used only for the purposes described in this Agreement and will not be paid for the improper personal gain of any individual or for any other purpose that might violate any Canadian anti-corruption law.

19. This agreement may be executed in counterparts.

20. This agreement is legally binding on MCFN and the Proponent. This agreement is legally binding on MCFN and the Proponent. This agreement is signed by authorized representatives of the Parties on the date set out in this agreement below.

21. The term of this agreement expires on April 1, 2022. In the event that Project-related activities continue past this termination date, a new agreement will be executed between Parties.

[The remainder of this page is intentionally left blank.]

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Signed this _____ day of _____, 2021,

[redacted]

Authorized Signatory on behalf of
The Proponent

Jeff Molenhuis
Director
Public Works and Engineering
Township of Wilmot

DocuSigned by:
[redacted]
7/23/2021

Authorized Signatory on behalf of
Mississaugas of the Credit First Nation

per

Mark LaForme
Director
Dept. of Consultation and Accommodation
Mississaugas of the Credit First Nation

[redacted]

Witness

[printed name of witness]
[job title]
[department]
[name of the proponent]

[redacted]

Witness

Megan DeVries
Archaeological Operations Supervisor
Dept. of Consultation and Accommodation
Mississaugas of the Credit First Nation

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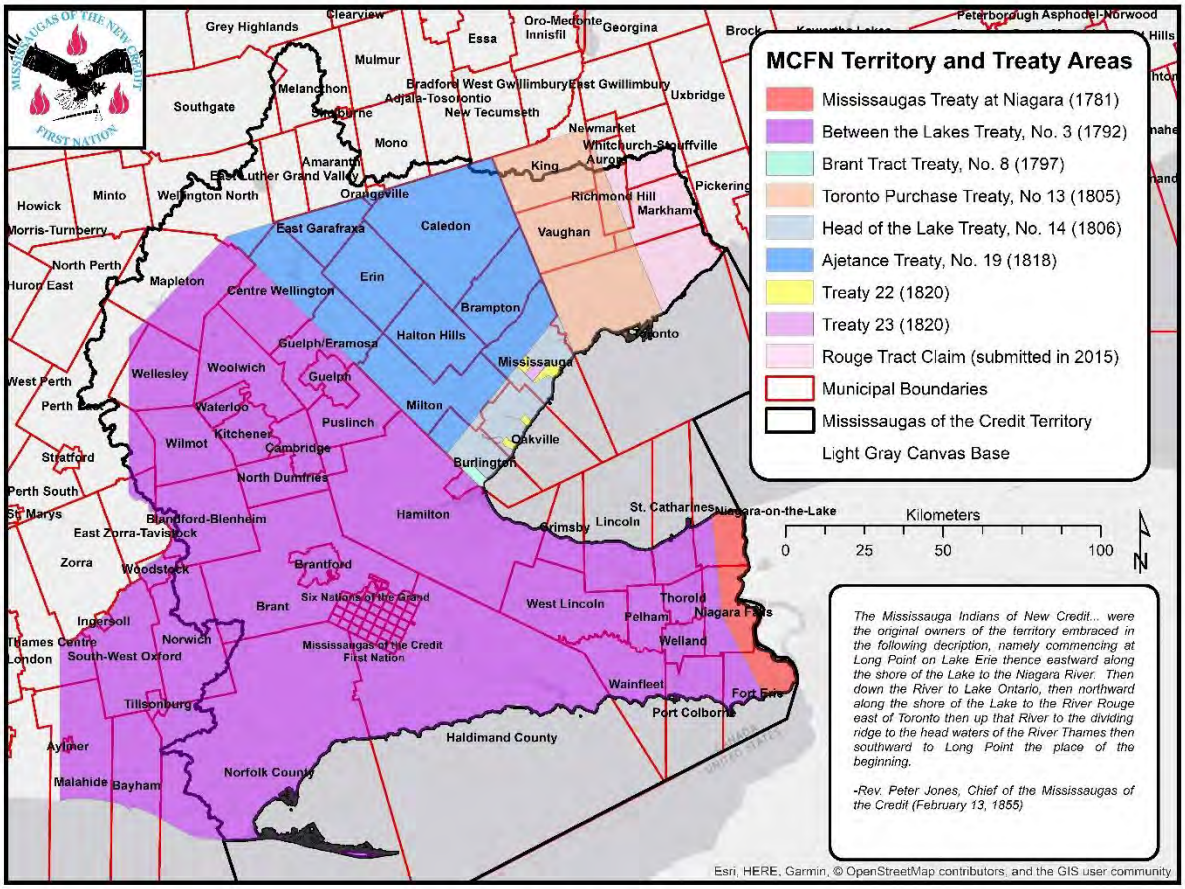
# Schedule A




**Municipalities within Mississaugas of the Credit Treaty Lands and Territory**

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Schedule B

**Approx. Quote for Technical Review (Reference Only)**

*For review of materials and communications associated with Stage 1 AAs.*

| | *Number* | | *Rate* | | *Total* |
|---|---|---|---|---|---|
| review hours | 4.0 | $ | 150.00 | $ | 600.00 |
| contingency (@ 20%) | | | | $ | 120.00 |
| **Total** | | | | **$** | **720.00** |

*For review of materials and communications associated with Stage 2 AAs.*

| | *Number* | | *Rate* | | *Total* |
|---|---|---|---|---|---|
| review hours | 4.0 | $ | 150.00 | $ | 600.00 |
| contingency (@ 20%) | | | | $ | 120.00 |
| **Total** | | | | **$** | **720.00** |

*For review of materials and communications associated with Stage 3 AAs.*

| | *Number* | | *Rate* | | *Total* |
|---|---|---|---|---|---|
| review hours | 8.0 | $ | 150.00 | $ | 1,200.00 |
| contingency (@ 20%) | | | | $ | 240.00 |
| **Total** | | | | **$** | **1,440.00** |

*For review of materials and communications associated with Stage 4 AAs.*

| | *Number* | | *Rate* | | *Total* |
|---|---|---|---|---|---|
| review hours | 8.0 | $ | 150.00 | $ | 1,200.00 |
| contingency (@ 20%) | | | | $ | 240.00 |
| **Total** | | | | **$** | **1,440.00** |

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**Field Liaison Representative Participation Agreement**
**between:**
**The Mississaugas of the Credit First Nation**
**and**
**Township of Wilmot**

---

A - Background

1. The purpose of this agreement is to provide the Mississaugas of the Credit First Nation (hereinafter, "MCFN") with capacity assistance to its Field Liaison Representatives (hereinafter, "FLRs") in connection with all environmental and/or archaeological assessments required for the Baden Sanitary Trunk EA (hereinafter, "the Project") located in Baden, Ontario, owned by Township of Wilmot, (hereinafter, "the Proponent").

2. The Proponent understands that MCFN wishes to send its FLRs to participate in and monitor the assessments associated with the Project, and that the FLRs' mandate will be to ensure that MCFN's perspectives and priorities are considered and to enable MCFN to provide timely and meaningful comment on the Project.

3. All archaeological work in connection with any Project in the Territory will be carried out in accordance with the *Ontario Heritage Act* and its Regulations. The archaeological work will meet or exceed the Ontario Ministry of Heritage, Sport, Tourism, and Culture Industries (hereinafter, "MHSTCI") standards and guidelines for consultant archaeologists as amended, including the *Terms and Conditions for Archaeological Licences*, *Standards and Guidelines for Consultant Archaeologists (2011)* and the Draft *Engaging Aboriginal Communities in Archaeology Technical Bulletin (2011),* (hereinafter collectively, "MHSTCI Standards 2011").

4. The Proponent agrees that all archaeological work conducted for the Project will comply with the MCFN *Standards and Guidelines for Archaeology* (published April 2, 2018), (hereinafter, "MCFN Standards") as long as the MCFN Standards do not fall below MHSTCI Standards 2011. The MHSTCI Standards 2011 will be paramount in the event of a direct conflict between MCFN Standards and the MHSTCI Standards 2011.

5. Nothing in this Agreement shall be interpreted or implemented so as to derogate or abrogate from any MCFN Aboriginal or Treaty right or claim, or to indicate consent to the Project.

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B – Fees and Cost Structure

6. The Proponent will provide capacity funding for each FLR in the amount of $85.00 per hour for all activities relating to the Project. Activities relating to the Project include, but are not limited to:
    a. Time spent on site monitoring assessment or predetermined construction-related activities;
    b. Time spent completing data or artifact processing, identification, analysis, and interpretation activities alongside their consultant(s);
    c. Actual travel time at the beginning of, during, and/or end of each day;
    d. Time completing daily notes relating to the Project;
    e. Time spent on standby at the request of the Proponent or their consultant(s); and
    f. Time completing mandatory training at the request of the Proponent or their consultant(s).

7. The Proponent will pay a supervisory fee of 3.5%, based on the number of hours charged to the Proponent, to provide MCFN with the capacity to facilitate in-field technical support for the FLRs via the Field Archaeologist.

8. The Proponent will reimburse the FLRs for reasonable mileage and meals in accordance with current Federal Canada Treasury Board guidelines, over and above the hourly rate [see Schedule B]. Mileage rates are determined using the MCFN Department of Consultation and Accommodation as the place of departure.

9. The Proponent will provide capacity funding for each FLR in the amount of $125.00 per hour for any work exceeding eight hours per day and/or forty hours per week. The above noted mileage and meal allowance remains in effect.

10. The Proponent will provide capacity funding for each FLR in the amount of $125.00 per hour for any work occurring on the following holidays: New Year's Day, Family Day, Good Friday, Victoria Day, Indigenous Solidarity Day (June 21), Canada Day, Civic Holiday, Labour Day, Thanksgiving Day, Remembrance Day, Christmas Day, and Boxing Day. The above noted mileage and meal allowance rates remain in effect.

11. The Proponent agrees that the FLRs will be paid for a minimum of three hours, plus actual travel time, mileage, and meal allowance rates as noted above, on any day when work is cancelled by the Proponent or their consultant(s) while FLRs are en route to the work site or after the FLRs have already arrived.

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12. If its use is deemed necessary by both Parties, the Proponent agrees to reimburse the FLRs for their use of the 407ETR upon receipt of a copy of the bill. This agreement will be provided in writing to MCFN's Field Coordinator.

13. If deemed reasonable by both Parties, the Proponent agrees to cover the cost of overnight accommodation for FLRs participating in environmental and/or archaeological fieldwork at locations which would otherwise require more than 90 minutes of travel time at both the beginning and end of the work day, as determined using the MCFN Department of Consultation and Accommodation as the place of departure. An additional Incidental Allowance fee is required for any work which requires overnight accommodations, as set out in Schedule B. This agreement will be provided in writing to MCFN's Field Coordinator.

C – Additional Conditions

14. The parties acknowledge that the Project, in whole or in part, takes place within MCFN Territory and agree that the Proponent shall provide capacity funding for FLR participation on the Project for the duration of the Project.

15. The Proponent agrees that two FLRs shall be on location whenever Project-related activities are taking place within its Territory, as set out in Schedule A.

16. Furthermore, additional FLRs are required if the number of field personnel utilized by the consultant exceeds fourteen (14) individuals and the Proponent agrees to provide capacity funding for additional FLRs as required. MCFN requires one additional FLR per five additional field crew, as outlined in the chart below:

| Number of Field Personnel | Number of FLRs Required |
|---|---|
| 1 to 14 | 2 |
| 15 to 19 | 3 |
| 20 to 24 | 4 |
| 25 to 29 | 5 |
| 30 to 34 | 6 |
| 35 to 39 | 7 |
| 40+ | 8+ |

17. The Parties acknowledge that the FLRs time and travel will be recorded and verified using the ClockShark Time Tracking Software System and that invoicing will be prepared using these records, not those of a third party.

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18. If archaeological resources are encountered at any time during construction or other Project-related activity, all excavation or other activity that could disturb the site shall immediately cease, and the Proponent shall immediately notify MCFN's Archaeological Operations Supervisor or designate. The Parties shall work collaboratively to minimize impacts and ensure respectful treatment of any archaeological resources in accordance with the practices and values of MCFN as identified by MCFN.

19. If human remains are encountered at any time during construction or other Project-related activity, the following steps shall be taken:
    a. All excavation or other activity that could disturb the site shall immediately cease, and the area shall be secured in a manner which protects the site location and prevents public access and trespass; and
    b. In addition to any notifications required under the *Funeral, Burial and Cremation Services Act, 2002,* SO 2002, C 33, the Proponent shall immediately contact MCFN's duly appointed Archaeological Operations Supervisor or designate; and
    c. MCFN shall be permitted to conduct any ceremonies on site in relation to the human remains that may be of Aboriginal ancestry ("Ancestral Remains"); and
    d. MCFN shall be consulted about all steps in the investigation and any decisions or agreements to be made regarding Ancestral Remains.

D - Coordination of the FLRs

20. The Parties agree that the FLRs will follow the reasonable instructions of the Proponent and their consultant firm(s) conducting the environmental and/or archaeological work concerning safety practices, and that the FLRs will attend "tailgate" safety meetings if requested.

21. The contact person for activities relating to the environmental assessment portion of the Project is [name of contact person #1] from [name of consultant]. Contact information for this person is as follows:
    [insert contact information here]

22. The contact person for activities relating to the archaeological assessment portion of the Project is Garth Grimes from Detritus Consulting Ltd. Contact information for this person is as follows:
    Detritus Consulting Ltd.
    www.detcon.net (519) 744-7018

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23. The Parties agree that the contact person for the consultant firm(s) will coordinate site meeting locations and times through MCFN's duly appointed Field Coordinator. Contact information for the Field Coordinator is as follows:

    Joelle Williams
    Telephone: 905-768-4260
    Cell: 905-870-2918
    Email: joelle.williams@mncfn.ca

E - Status of the FLRs

24. The FLRs selected by MCFN have appropriate qualifications for the work required – for example, training in environmental and/or archaeological monitoring – and experience in bridging Indigenous perspectives with Western approaches, as reasonably determined by MCFN.

25. The Parties agree that the FLRs are not employees, contractors, or sub-contractors of the Proponent or their consultant(s) and that the FLRs will be responsible for their own personal protective equipment, such as hard hats, safety boots, and safety vests, unless specific or otherwise unique personal protective equipment is required, which will therefore be provided or reimbursed by the Proponent.

26. FLRs take direction from MCFN. MCFN pays Workplace Safety and Insurance Board ("WSIB") contributions in respect of the FLRs and will, at its own expense, maintain for the term of this agreement a comprehensive general liability ("CGL") policy or policies with a limit of at least $1 million and shall provide the Proponent with evidence of such insurance, upon request. MCFN agrees that FLRs will perform their activities safely, in a good and competent manner, in compliance with all applicable laws, regulations, and guidelines.

27. MCFN expects that the Proponent will comply with the *Occupational Health and Safety Act,* R.S.O. 1990, C. 0.1, the Ontario *Human Rights Code*, R. S. O. 1990, c. H.19, and maintain a safe, harassment-free work environment.

28. The Proponent is responsible for negligence or other failure to maintain a safe and harassment-free work environment. To the extent that the Proponent is responsible for negligence or other failure to maintain a safe and harassment-free work environment, the Proponent is liable and shall indemnify MCFN claims or demands related to injury, accident, discrimination, or harassment by the Proponent's employees, agents, consultants, or other parties under the control or direction of the Proponent.

DocuSign Envelope ID: B1A60E09-2811-4BF0-9E7E-31F57E904ACC

F - Method of Payment

29. The Parties agree that the Proponent will pay the capacity funding as agreed to above by cheque or bank transfer and upon receipt of an invoice from MCFN. All invoices will be addressed directly to the Proponent, the Project will be noted in the text of each invoice, and all invoices will be prepared as per MCFN-DOCA's standard invoicing format. Invoices should be submitted electronically to the following address:

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    Attention: Dot Roga on behalf of Township of Wilmot
    MTE Consultants Inc.
    520 Bingemens Centre Drive
    Kitchener ON N2B 3X9
    (519) 743-6500 ext 1269

30. All payment should be made to the MCFN Department of Consultation and Accommodation to the following address. For additional information, please call the office at 905-768-4260.

    Email address: nicole.laforme-hess@mncfn.ca
    Attention: MCFN-DOCA
    4065 Highway 6
    Hagersville, Ontario
    N0A 1H0

31. After thirty [30] days, a 5% monthly compounded interest rate will be charged on outstanding invoices. After six [6] months of non-payment, a 20% monthly compounded interest rate will be charged on outstanding invoices.

G – Disclaimer

32. The Parties agree that the capacity funding payments for the FLRs will be used only for the purposes described in this Agreement and will not be paid for the improper personal gain of any individual or for any other purpose that might violate any Canadian anti-corruption law.

33. This agreement may be executed in counterparts.

34. This agreement is legally binding on MCFN and the Proponent. This agreement is signed by authorized representatives of the Parties on the date set out in this agreement below.

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35. The term of this agreement expires on April 1, 2022. In the event that Project-related activities requiring FLR participation continue past this termination date, a new agreement will be executed between Parties.

[The remainder of this page is intentionally left blank.]

DocuSign Envelope ID: B1A60E09-2811-4BF0-9E7E-31F57E904ACC

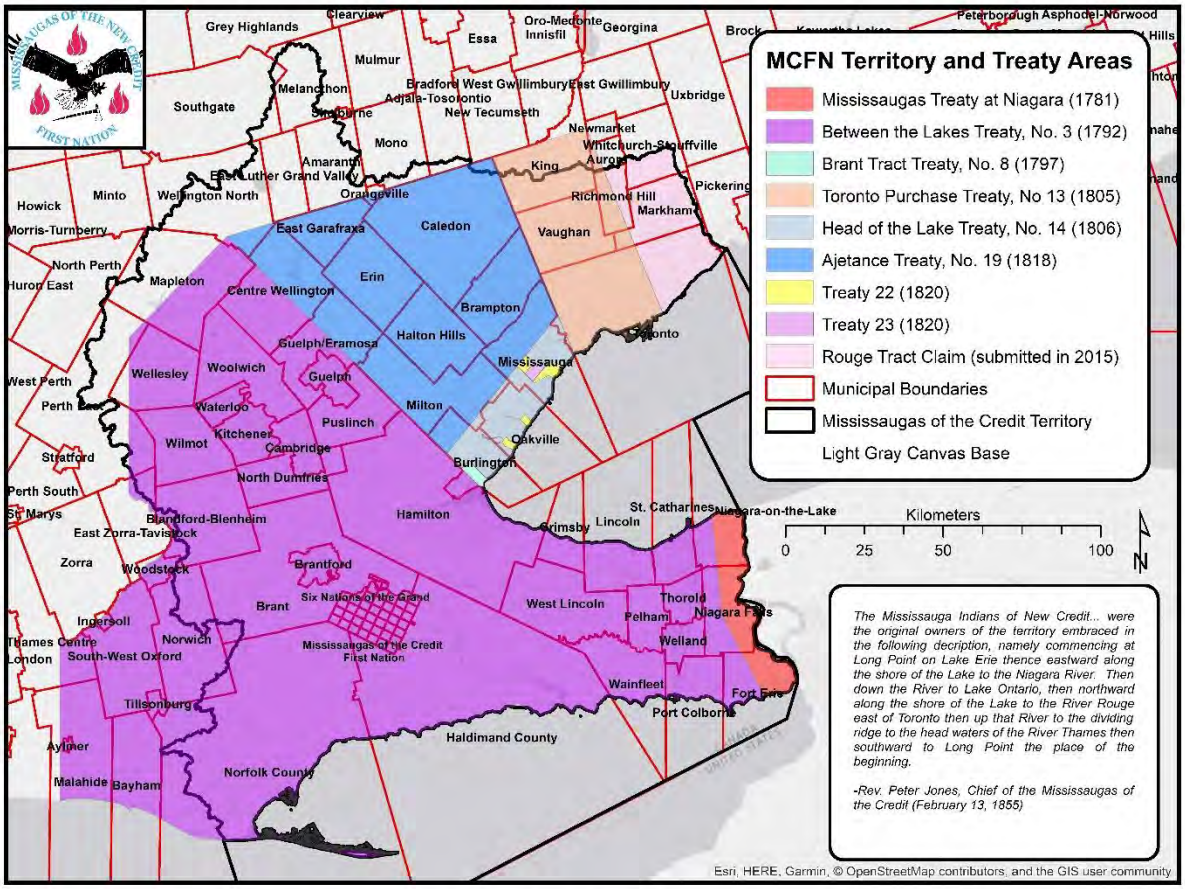
Signed this _____ day of _____, 2021,



| | |
|---|---|
| Authorized Signatory on behalf of<br>The Proponent | Authorized Signatory on behalf of<br>Mississaugas of the Credit First Nation |
| Jeff Molenhuis<br>Director<br>Public Works and Engineering<br>Township of Wilmot | Mark LaForme<br>Director<br>Dept. of Consultation and Accommodation<br>Mississaugas of the Credit First Nation |
| Witness | Witness |
| [printed name of witness]<br>[job title]<br>[department]<br>[name of the proponent] | Megan DeVries<br>Archaeological Operations Supervisor<br>Dept. of Consultation and Accommodation<br>Mississaugas of the Credit First Nation |

DocuSign Envelope ID: B1A60E09-2811-4BF0-9E7E-31F57E904ACC

# Schedule A




**Municipalities within Mississaugas of the Credit Treaty Lands and Territory**

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# Schedule B

MISSISSAUGAS OF THE CREDIT FIRST NATION MILEAGE & ALLOWANCE CHART

*EFFECTIVE APRIL 1, 2021 to MARCH 31, 2022*

| | | | |
|---|---|---|---|
| **MILEAGE** | | $ 0.56 per KM | |
| | | https://www.njc-cnm.gc.ca/directive/d10/v238/s658/en | |
| **MEAL ALLOWANCE** | | | **not eligible if:** |
| BREAKFAST | $ | 21.10 | leave after 8am; get home before 7:30am |
| LUNCH | $ | 21.35 | leave after 1:15pm; get home before 12:15pm |
| DINNER | $ | 52.40 | leave after 7pm; get home before 6:30pm |
| INCIDENTALS | $ | 17.50 | not staying overnight |
| | | https://www.njc-cnm.gc.ca/directive/d10/v238/s659/en | |
| NIGHTTIME* | $ | 52.40 | *Applies only to nighttime surveys that would not otherwise trigger dinner or breakfast. |

# Appendix D

# Public Information Centre Slides and Comments

# Township of Wilmot

Virtual Public Information Centre 1



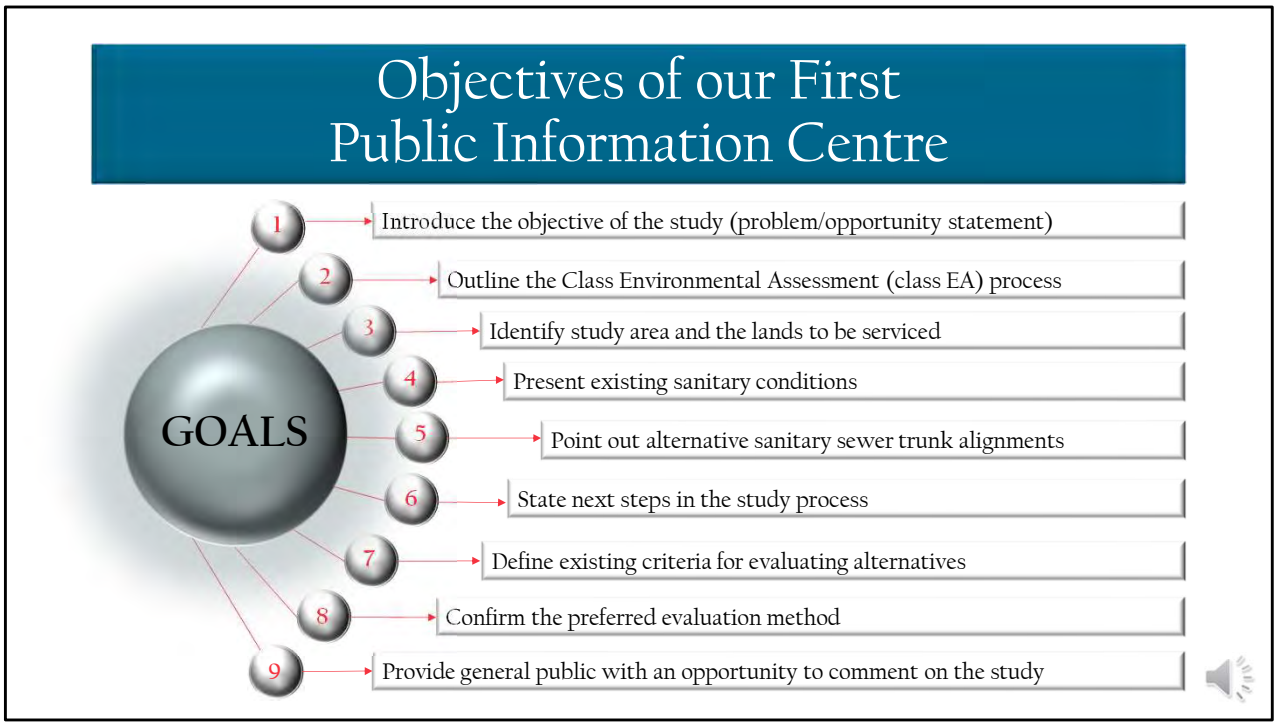
Baden Trunk Sanitary Sewer

Class Environmental Assessment

Welcome to the first Virtual Public Information Centre for the Baden Trunk Sanitary Sewer Class Environmental Assessment.

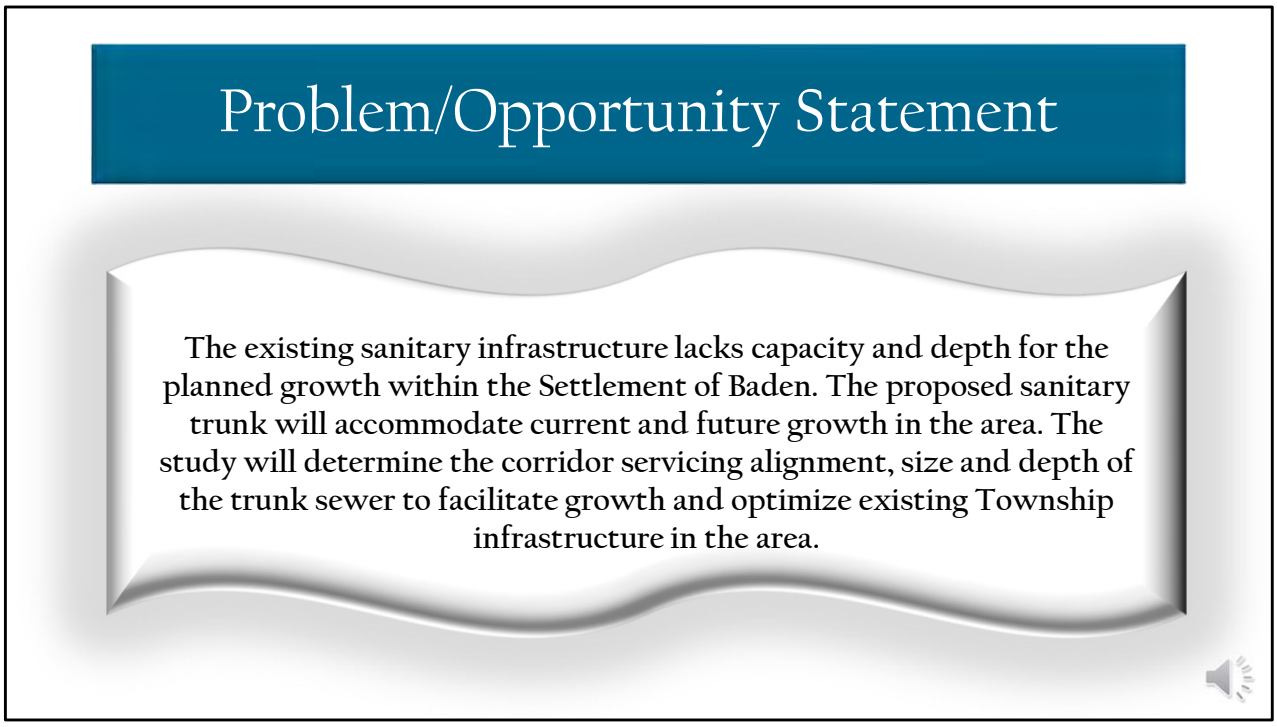
This study has been initiated by the Township of Wilmot. MTE Consultants Inc. has been retained by the Township to serve as the lead consultant on the project.

This Public Information Centre will by published virtually and will remain online.




The goals of our first Public Information Centre are:

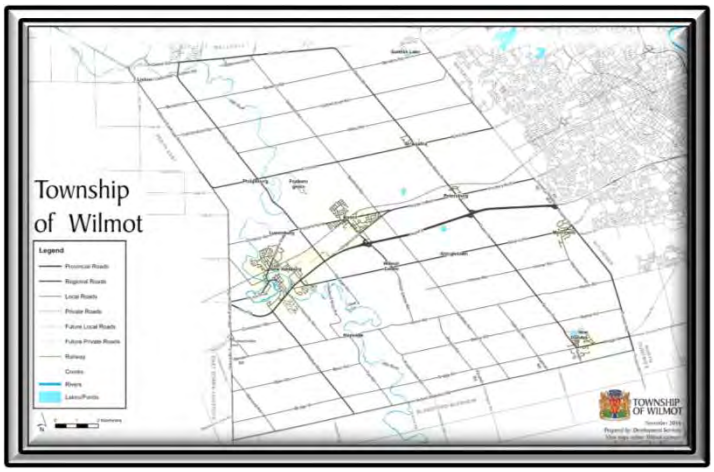
- To introduce the objective of the study by defining the problem or opportunity statement,
- To Outline the Class Environmental Assessment Process,
- Identify the study area and the lands to be serviced
- Present existing sanitary conditions
- Point out the possible sanitary sewer trunk alignments
- State the next steps in the study process
- Define the criteria used for evaluating the alternatives
- Confirm the preferred evaluation method
- And to provide the general public, Indigenous groups and stakeholders with an opportunity to review, provide comments and submit questions




The Problem/Opportunity statement for the Baden Trunk Sanitary Sewer states that

The existing sanitary infrastructure lacks capacity and depth for the planned growth within the Settlement of Baden. The proposed sanitary trunk will accommodate current and future growth in the area. The study will determine the corridor servicing alignment, size and depth of the trunk sewer to facilitate growth and optimize existing Township infrastructure in the area.

# Introduction




## Township of Wilmot

2014 - Wastewater servicing study for the growth areas of Baden and New Hamburg

2019 - Township Official Plan Update

2021 – Environmental Assessment for Baden Trunk Sanitary Sewer

June 17, 2021 – Notice of Commencement

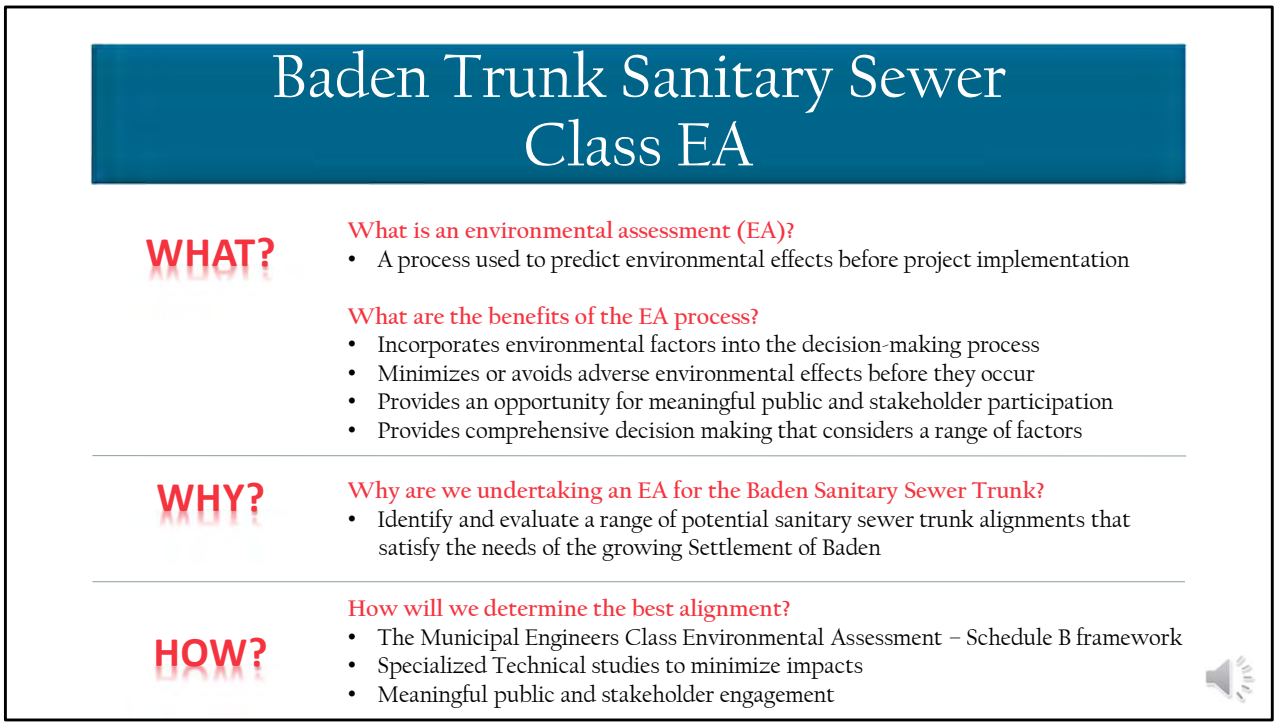
The Township of Wilmot is responsible for the long-term operation and maintenance of the wastewater collection system for the Settlement of Baden. In 2014, a wastewater servicing study for the growth areas of Baden and New Hamburg was prepared for the Township of Wilmot.

The study evaluated the sanitary infrastructure needs presented in the 2011 Baden – New Hamburg Water and Wastewater Master Plan and evaluated the development options of these new growth areas.

The additional expected growth identified in the updated 2019 Official Plan for the Township of Wilmot has prompted an overall review of the servicing strategy for the entire Baden – New Hamburg area.

The Township has entered into a Schedule B Municipal Class EA for the Baden Trunk Sanitary Sewer. The Notice of Commencement was issued on June 17, 2021

This is the first Public Information Centre for the Baden Trunk Sanitary Sewer EA. We look forward to your comments and participation




**An environmental assessment** is a process used to identify potential environmental impacts and avoid them where possible.

The **benefits of the environmental assessment process include**

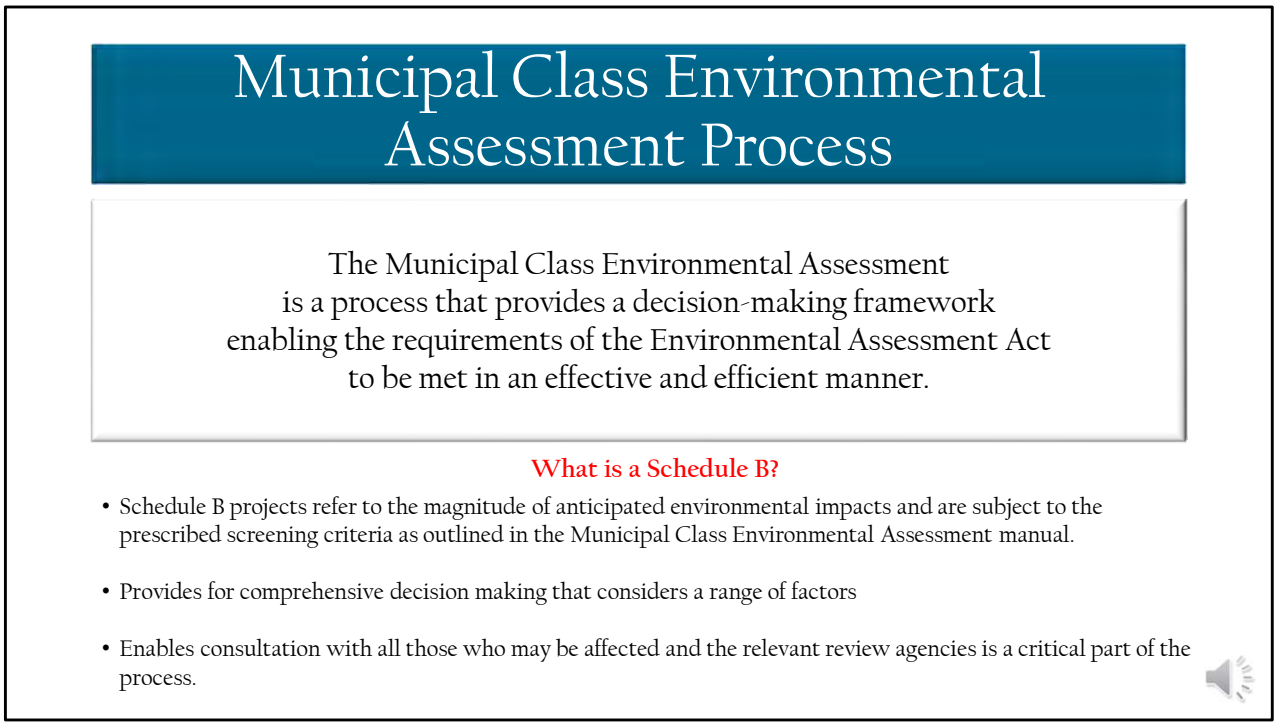
- Incorporating environmental factors into the decision-making process
- Minimizing or avoiding adverse environmental effects before the project is initiated
- Providing an opportunity for meaningful public and stakeholder participation
- Providing comprehensive decision making that considers a range of factors

**We are undertaking an EA for the Baden Trunk Sanitary Sewer to**

- Identify and evaluate a range of potential sanitary sewer trunk alignments that satisfy the needs of the growing Settlement of Baden

**It will be accomplished by**

- Following a Schedule B framework outlined in the Municipal Engineers Class Environmental Assessment manual
- Preforming and reviewing technical studies to minimize impacts
- And by having meaningful engagements with the public and stakeholders




The Municipal Class Environmental Assessment is a process that provides a decision-making framework enabling the requirements of the Environmental Assessment Act to be met in an effective and efficient manner.

Broadly defined, 'environment' includes the natural, social, cultural, built and economic environments.

It applies to municipal infrastructure projects including roads, water and wastewater projects.

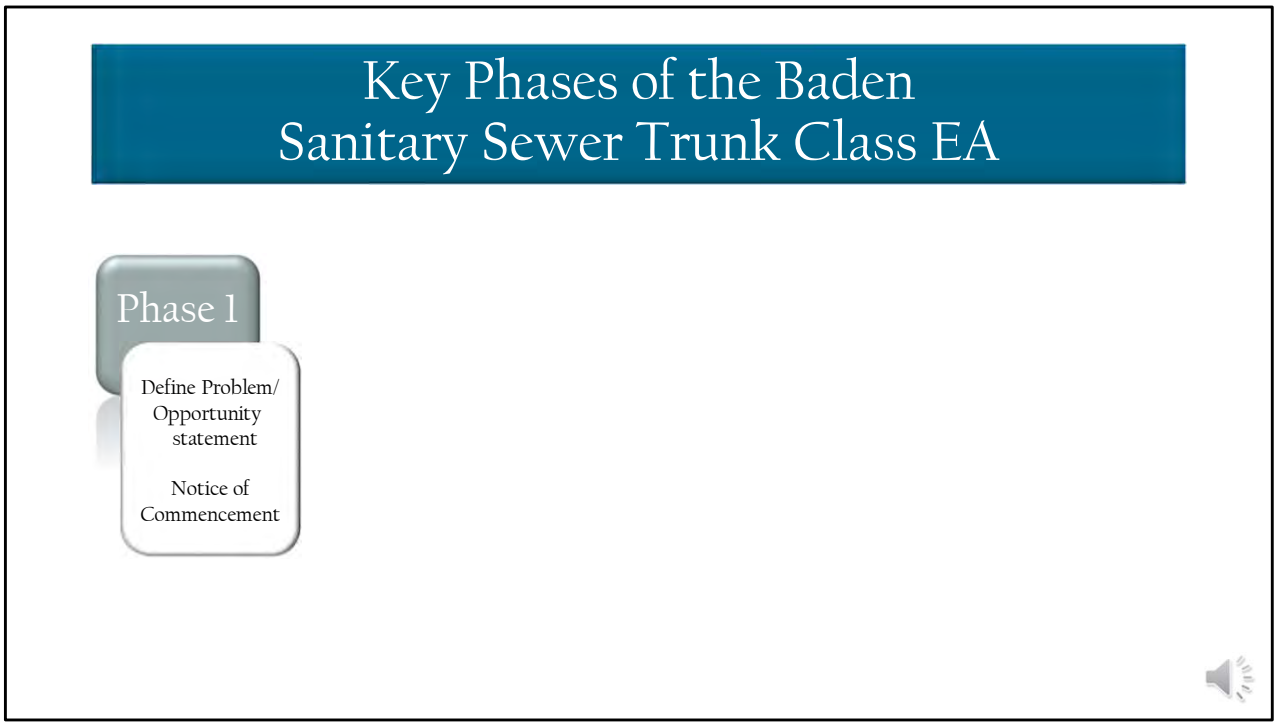
'Schedule B' projects refer to the magnitude of anticipated environmental impacts and are subject to the prescribed screening criteria as outlined in the Municipal Class Environmental Assessment manual.

It provides for comprehensive decision making that considers a range of factors

A critical part of the process is consulting with all those who may be affected and the relevant review agencies.

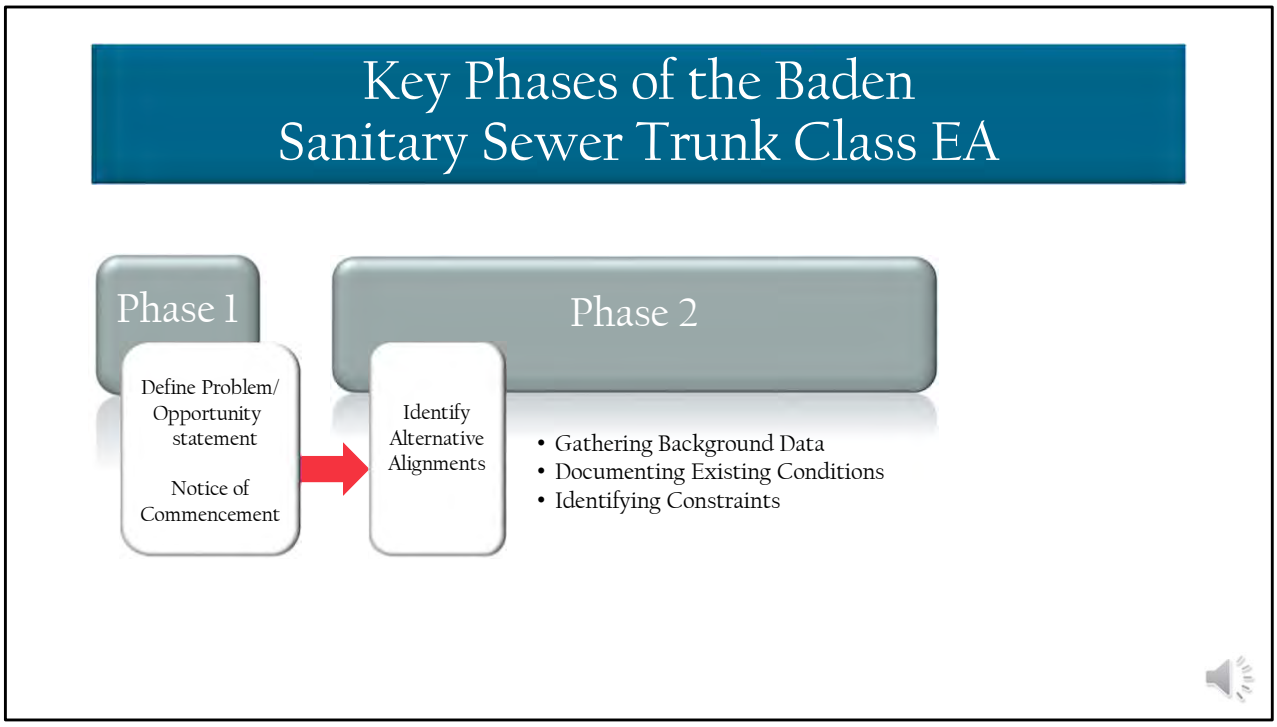



To best identify and assess possible environmental impacts, a project team was put together. Each team member will perform a detailed study in the area of their expertise. Their studies will assist in identifying which alternative best satisfies the Problem/opportunity statement during the evaluation process.




There are 3 key phases to a schedule B Class EA

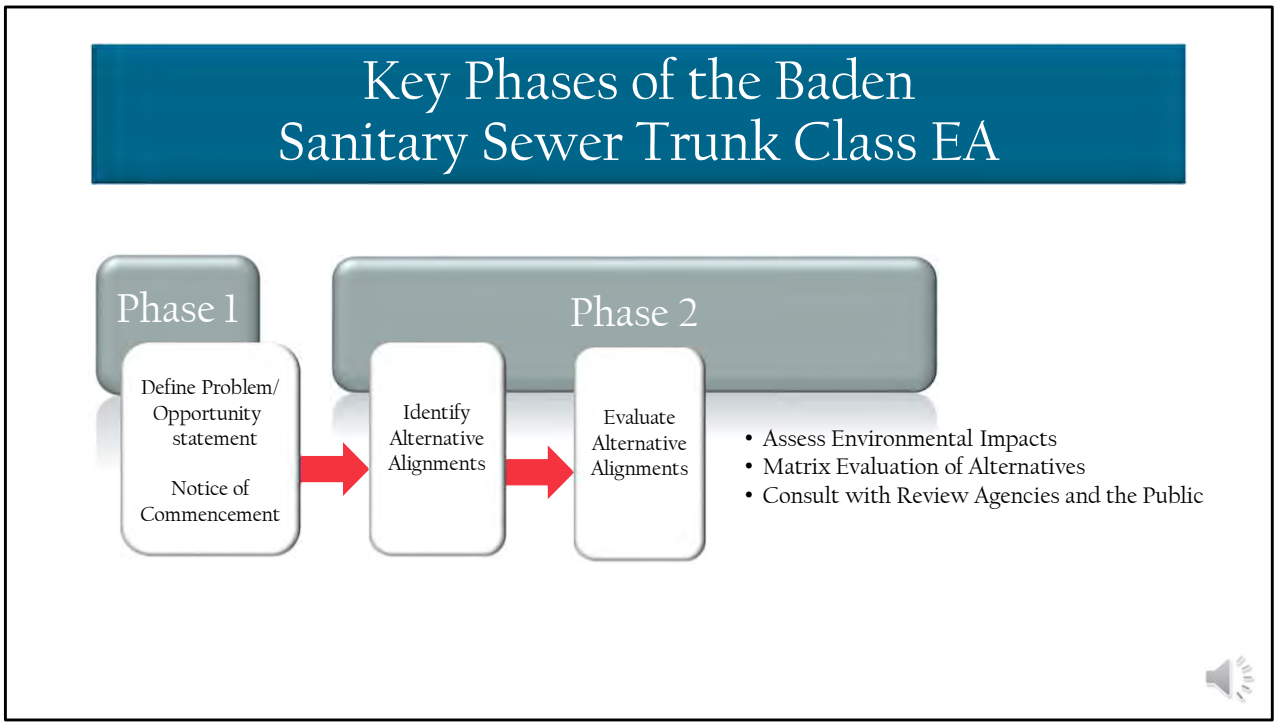
Phase 1 begins with the Notice of Commencement where problems or deficiencies, as well as opportunities are addressed and formalized into a Problem/Opportunity Statement



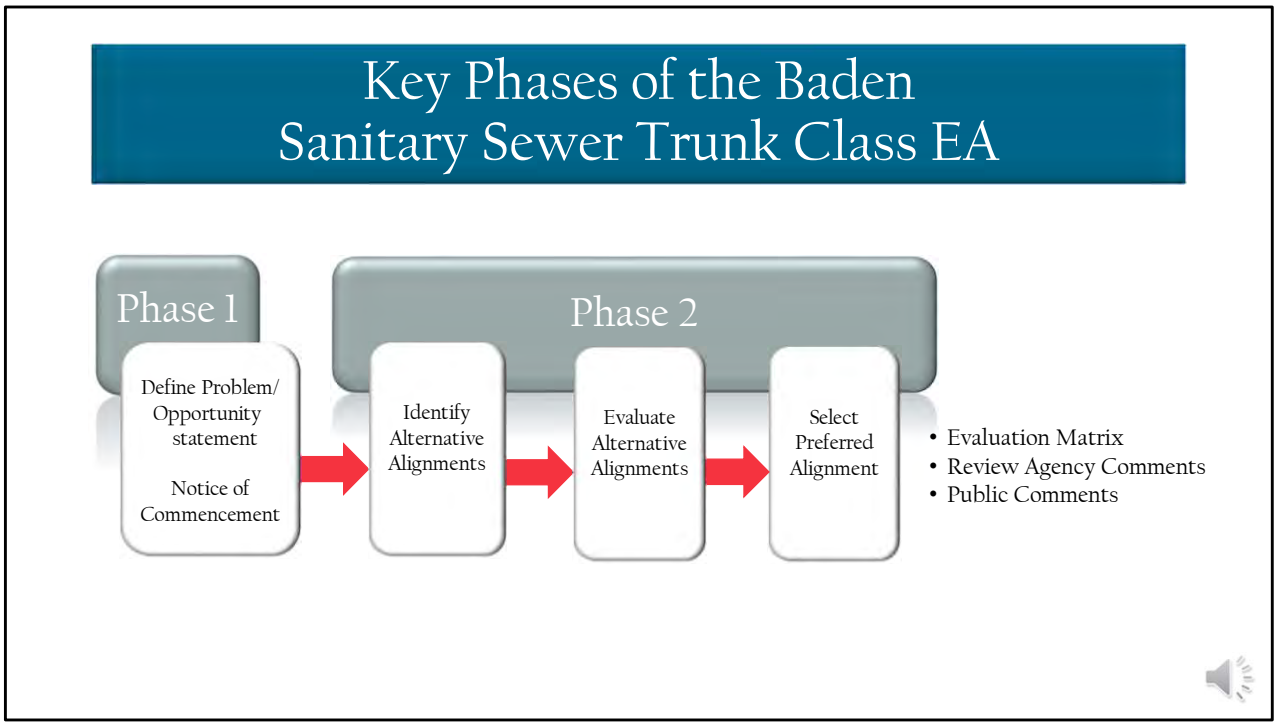

The process in Phase 2 helps to determine which schedule to use.

For this study, the first step includes identifying the Alternative Alignments, this is performed by

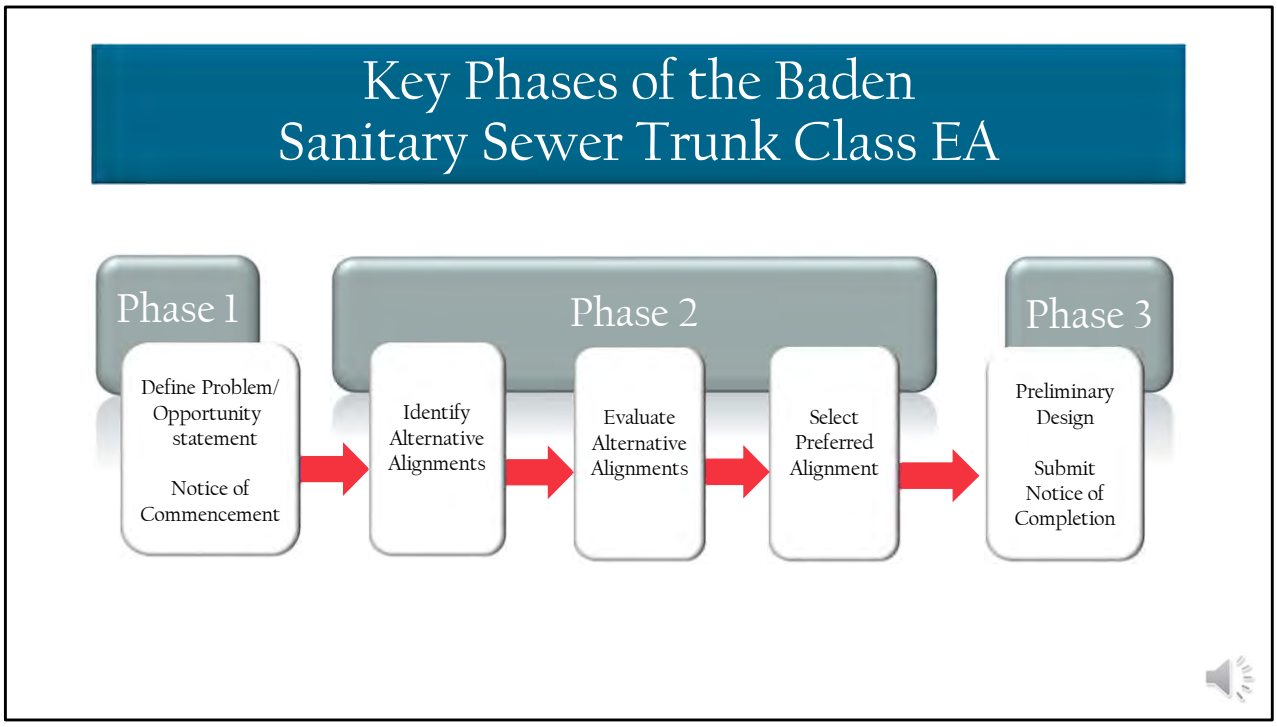
- Gathering Background Data on the natural, social and economic environments
- Documenting Existing Conditions
- Identifying constraints



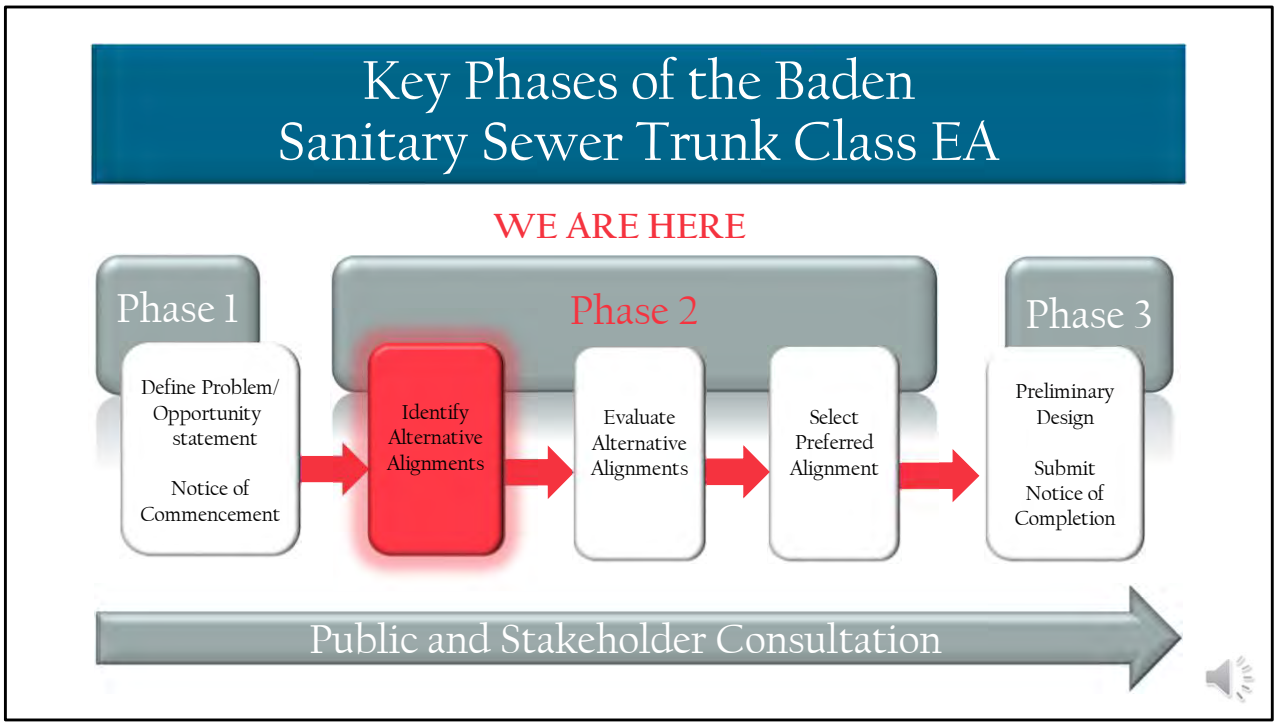

The second step evaluates the alternative alignments. Once the project teams have completed their detailed studies, their assessments become the basis for evaluating each alternative alignment in the form of an evaluation matrix. Consulting with the review agencies and the public to solicit comment and input is key.




The final step of phase 2 will be to select the preferred alignment identified from the matrix, and taking into consideration the input and comments received from the review agencies and the public.




The final phase of the Schedule B Class EA process will be to present the preliminary design of the preferred alignment and submit a Notice of Completion.




Throughout the EA process, the public and stakeholders have an opportunity to actively engage and participate in the decisions affecting their community.

Currently, we are at the beginning stage of phase 2

# Study Area



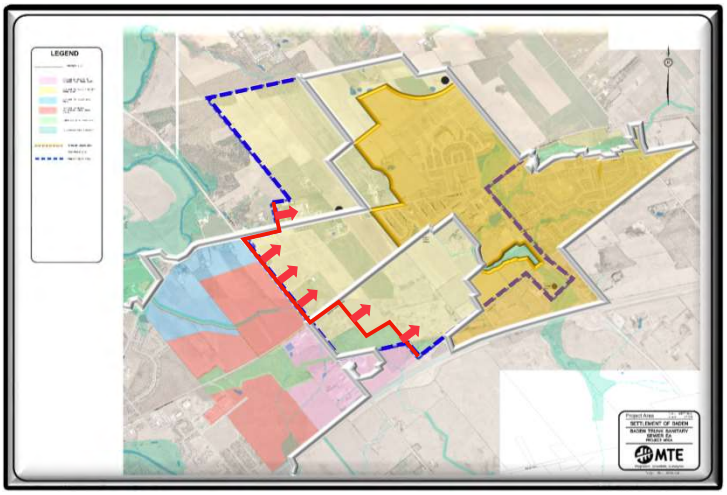

PRIMARY STUDY AREA

- Located within the Settlement of Baden
- This study takes into consideration the future development of Baden
  - Provincial Policy Statement (2020)
  - Places to Grow Plan (Growth Plan, 2020)
  - Regional Official Plan (ROP, 2015 as ammended)
  - Township Of Wilmot Official Plan (2019)

This study is located within the Settlement of Baden

It takes into consideration the future development of Baden as prescribed by the Provincial Policy Statement of 2020, the Places to Grow Plan of 2020, the amended Regional Official Plan of 2015 and the Township Of Wilmot Official Plan of 2019

# Study Area




PRIMARY STUDY AREA

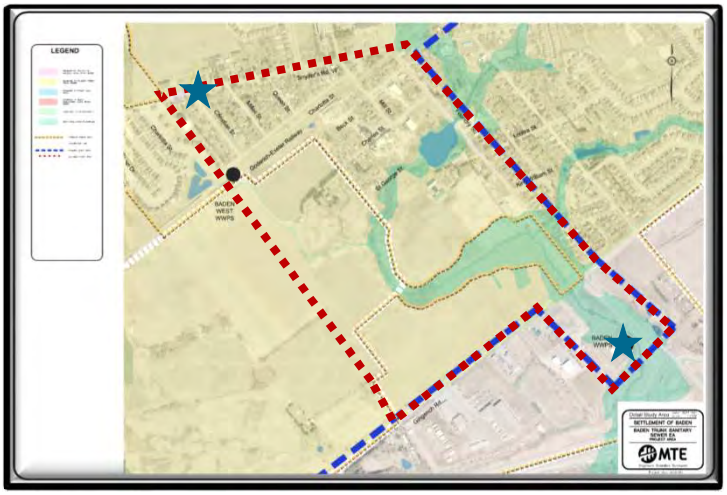
- Urban Areas support population and employment growth
- Countryside line represents future Urban Area boundary
- The Baden Trunk Sanitary Sewer will service all of Baden east of Nafziger Rd.

The Urban Areas, as seen in gold, are the primary focus for current population and employment growth

Lands located outside the urban areas are deemed countryside, however, the countryside line, as seen in silver, represents the future expansion to the Baden urban area boundary to accommodate for future growth

The proposed Baden Trunk Sanitary Sewer will service the areas east of Nafziger Rd within the countryside line.

# Study Area




DETAILED STUDY AREA

- The detailed study area defines the boundary for the proposed trunk alignment alternatives
- The Baden Trunk Sanitary Sewer will begin at the intersection of Snyder's Road West and Christian Street
- Ultimately connect to the Baden wastewater pumping station, adjacent to Foundry Street

Aside from the first alternative, The Baden Trunk alignment alternatives will begin and end within the boundaries of the detailed study area.

The alternatives located within the detailed study area, will begin at the intersection of Snyder's Road West and Christian Street, and ultimately connect to the Baden wasterwater pumping station, adjacent to Foundry Street just south of Gingerich Road.

# Existing Conditions




INFRASTRUCTURE

- Existing Baden Sanitary Sewer network is comprised of:
  - Gravity sewers
  - Pressure Sewers
  - Trunk Sewers
- Baden West Wastewater Pumping Station
- Baden Wastewater Pumping Station

The existing Baden Sanitary Sewer network is comprised of gravity sewers, pressure sewers and trunk sewers

There are 2 wastewater pumping stations.
The Baden West Wastewater Pumping Station is located on Charlotta Street,
and the Baden Wastewater Pumping Station, located adjacent to Foundry Street, just south of Gingerich Road.

The wastewater servicing study of 2014 identified that the existing sanitary sewer did not have the capacity to support future growth.

It also identified that, under existing conditions in 2012, the sanitary sewer and the Baden wastewater pumping station on Foundry Street, were over-capacity with respect to peak flows.

# Existing Conditions




CAPACITY

- Insufficient capacity for future growth (2014)
- Existing sanitary sewer and the Baden Wastewater Pumping Station were over-capacity at peak-flows (2012)

The existing Baden Sanitary Sewer network is comprised of gravity sewers, pressure sewers and trunk sewers

There are 2 wastewater pumping stations.
The Baden West Wastewater Pumping Station is located on Charlotta Street,
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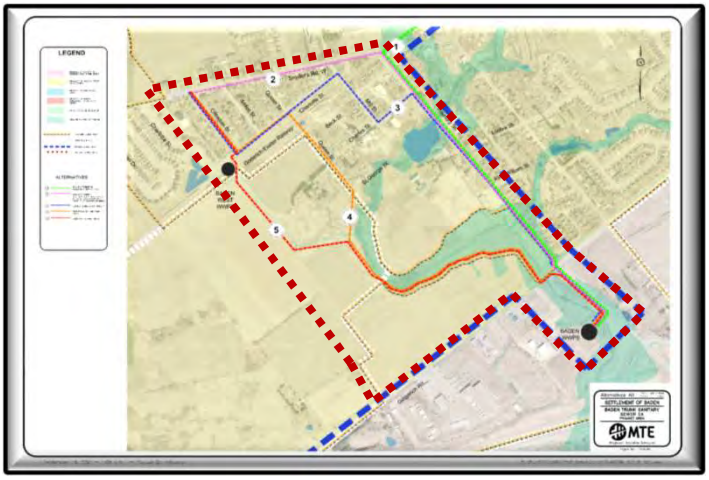
# Baden Trunk Sanitary Sewer Alternatives




**Alternatives**

- Five sanitary conveyance alignments have been identified
- The 'Do Nothing' alternative borders the eastern Urban Boundary of Baden
- The remaining alignments lie within the detailed study area

Five sanitary conveyance alignments, including a "Do Nothing" alternative, have been identified as possible alignments for the Baden Trunk sanitary sewer.

Each alternative has its own unique set of impacts

The 'Do Nothing' alternative begins outside the detailed study area, bordering the eastern boundary of Baden, and terminating within the detailed study area

The remaining 4 alternative alignments lie within the detailed study area.

# Alternative 1




Alternative 1
**Do Nothing**

- The 'Do Nothing' alternative examines what may happen if no alternative is selected
- Identified as the current wastewater servicing strategy of 2014

Alternative 1 is the 'Do-Nothing' alternative

It examines what may happen if no alternative is selected.

In this case, if none of the alternatives are selected, then the current wastewater servicing strategy of 2014 will be carried out.

This alignment begins at the north eastern urban boundary of Baden, runs southwest along the railroad and down Foundry Street to the Baden wastewater pumping station

This alternative would require constructing a pumping station, constructing a pressure sewer along the eastern Urban Boundary, crossing a railroad, upgrading existing sewer and integrating it along the Regional Rd.

# Alternative 1




Alternative 1
**Do Nothing**

- This alignment extends outside the detailed study area
- Constructing a new Pumping Station
- Constructing a new pressure sewer along the eastern Urban Boundary
- Railroad Crossing
- Upgrading existing sewer
- Integrating along a Regional Rd.

This alignment begins at the north eastern urban boundary of Baden, runs southwest along the railroad and down Foundry Street to the Baden wastewater pumping station

This alternative would require constructing a pumping station, constructing a pressure sewer along the eastern Urban Boundary, crossing a railroad, upgrading existing sewer and integrating it along the Regional Rd.

# Alternative 2




Alternative 2
**Snyder's/Foundry**

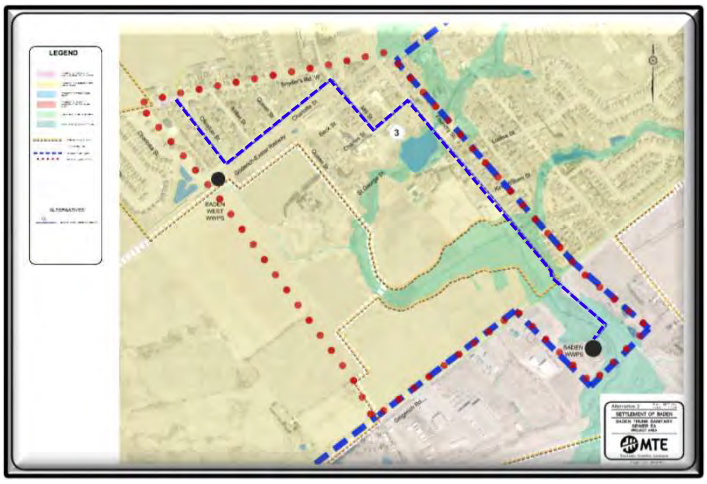
- Predominantly within the existing right-of-ways of Snyder's Road West and Foundry Street
- Requires reconstructing large portions of existing road infrastructure
- Railroad Crossing
- Upgrading existing sewers
- Upgrading and integrating along a Regional Road

Alternative 2 is predominantly lies within the existing right-of-ways of Snyder's Road West and Foundry Street

This alternative would require reconstructing large portions of existing road infrastructure, crossing a railroad,

Upgrading existing sewers as well as upgrading and integrating sewers along a Regional road

# Alternative 3




Alternative 3
**Charlotta/Mill/Charles/Foundry**

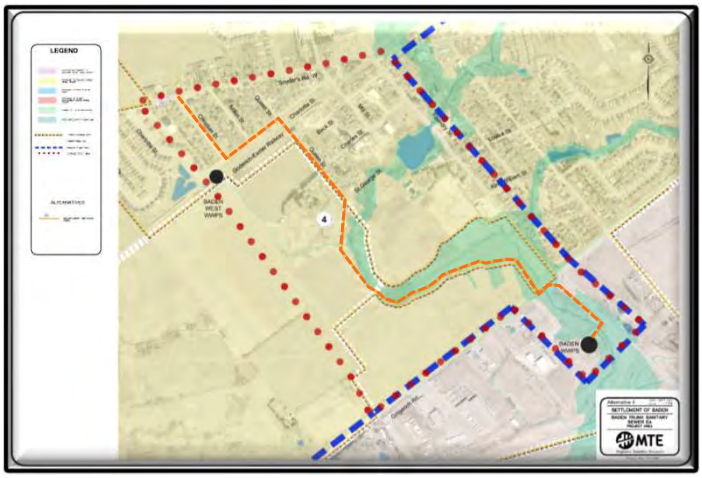
- Lies within the existing right-of-ways of Christian St, Charlotta St., Mill St, Charles St, and Foundry Street
- Requires reconstructing large portions of existing road infrastructure
- Railroad Crossing
- Upgrading existing sewer
- Upgrading and integrating into a Regional Road

Alternative 3 lies within the existing right-of-ways of Christian St, Charlotta St, Mill St, Charles St. and Foundry St

This alternative would require reconstructing large portions of existing road infrastructure, crossing a railroad

Upgrading existing sewers as well as upgrading and integrating sewers along a Regional road

# Alternative 4




Alternative 4

**Snyder's/Queen & Baden Creek**

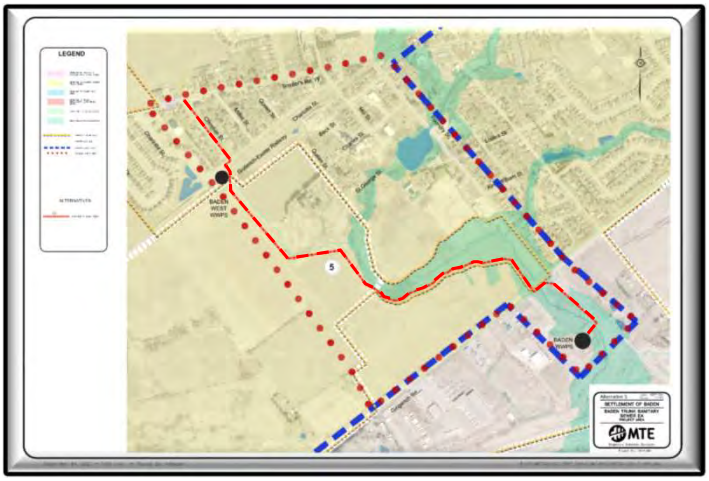
- Predominantly within the existing right-of-ways of Christian St, Charlotta St, Queen St., Foundry St
- Requires reconstructing existing road infrastructure
- Railroad Crossing
- Stream Crossings
- Constructing new sewers
- Upgrading existing sewer
- Upgrading and integrating along a Regional Road

Alternative 4 predominantly lies within the existing right-of-ways of Christian St, Charlotta St, Queen St, and Foundry St

This alternative would require reconstructing existing road infrastructure, crossing a railroad, multiple stream crossings

Constructing new sewers, upgrading existing sewers as well as upgrading and integrating sewers along a Regional road

# Alternative 5



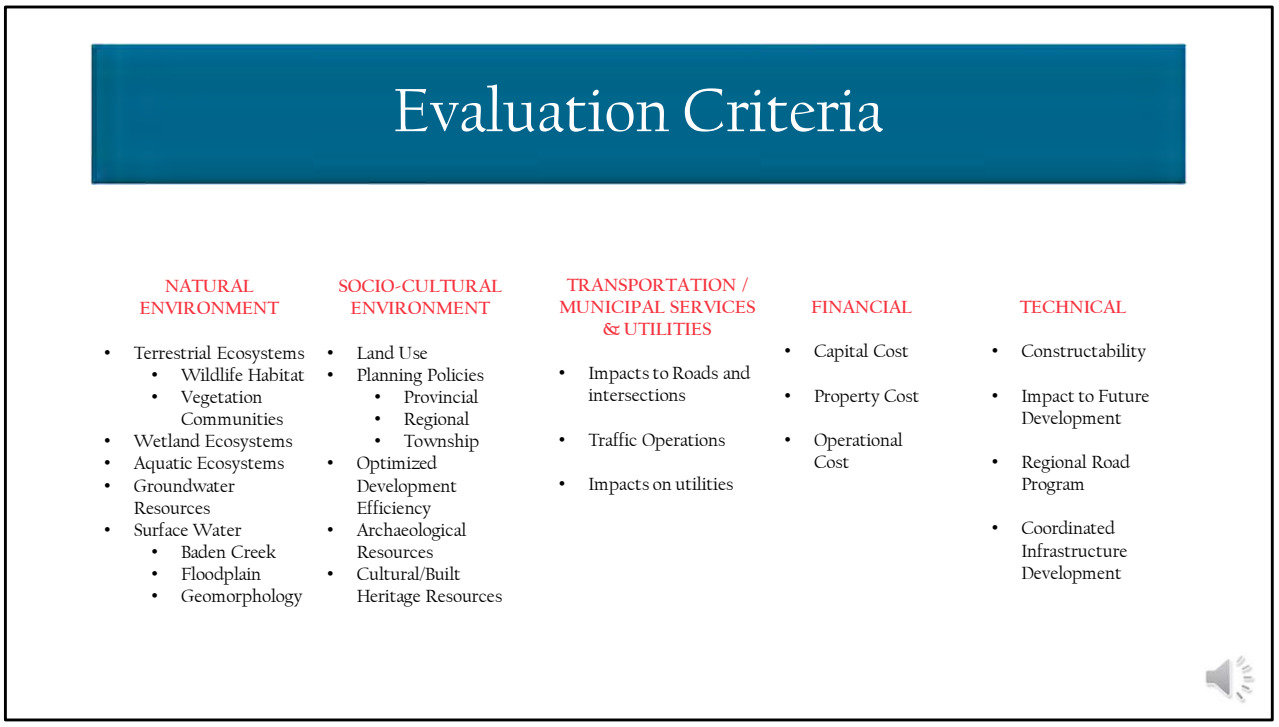

Alternative 5
**Christian to Baden Creek**

- Is within the existing right-of-way of Christian St and Foundry St
- Requires reconstructing existing road infrastructure
- Railroad Crossing
- Stream Crossing
- Constructing new sewers
- Upgrading existing sewer
- Upgrading and integrating sewers along a Regional Road

Alternative 5 affects the existing right-of-way of Christian St.

This alternative would require reconstructing existing road infrastructure, crossing a railroad, a stream crossings

Construction and upgrading existing sewers as well as upgrading and integrating sewers along a Regional road




The next step of the environmental assessment process is to evaluate the alternatives based on the following criteria:

**The impacts on the Natural Environment
**The impacts on the Socio-Cultural Environment
**The impacts on Transportation, Municipal Services & Utilities
**The Financial Impact
**Technical Impacts**

Each alignment will undergo a numerical evaluation. The Numerical Evaluation approach was selected as the preferred scoring methodology. This methodology requires a "Must 10" scoring assessment of the alternatives in a matrix form. Comments justifying the scoring will be included for each alternative.

For each factor, the least preferred alternative receives a score of 1 and the most preferred alternative receives a score of 10. All scores will fall between these 2 values. The relative score of the alternatives between the high (10) and the low (1) will be justified in the commentary utilizing the professional judgement of the project team and the reviewing agencies.

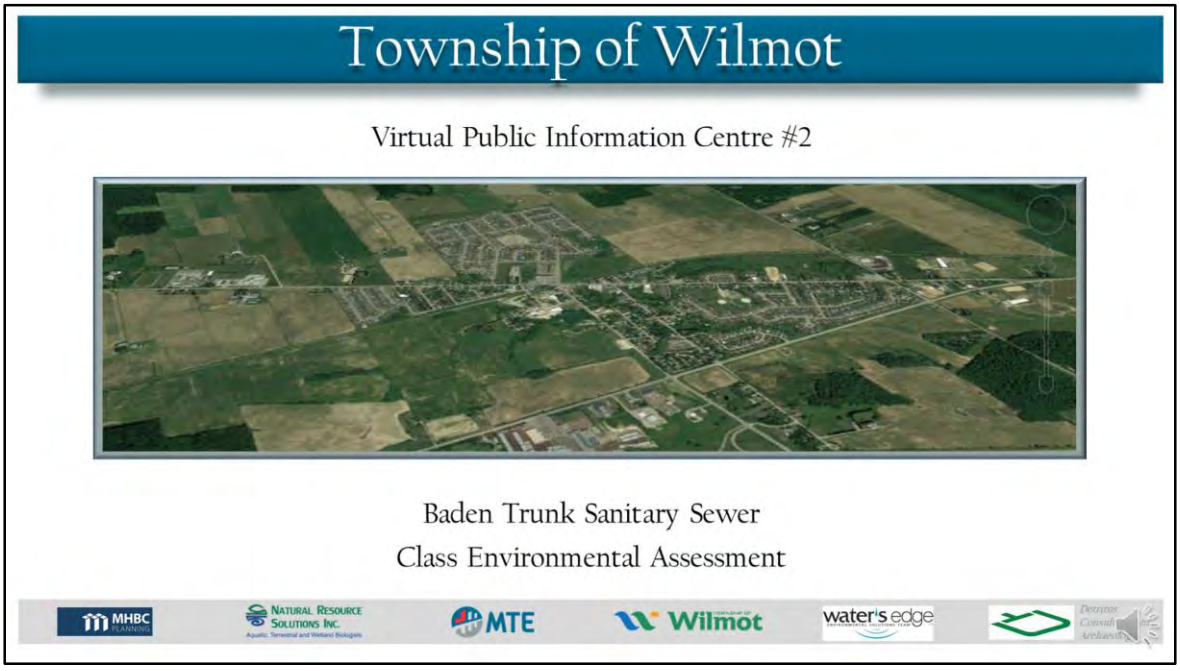
The recommended alignment will then be identified based on the highest score.




Thank you for participating in the Baden Trunk Sanitary Sewer Class (EA) Online Public Information Centre (PIC).

Any comments, questions or suggestions relevant to this study should be directed to either Jeff Molenhuis with the Township of Wilmot or to Dot Roga with MTE Consultants.

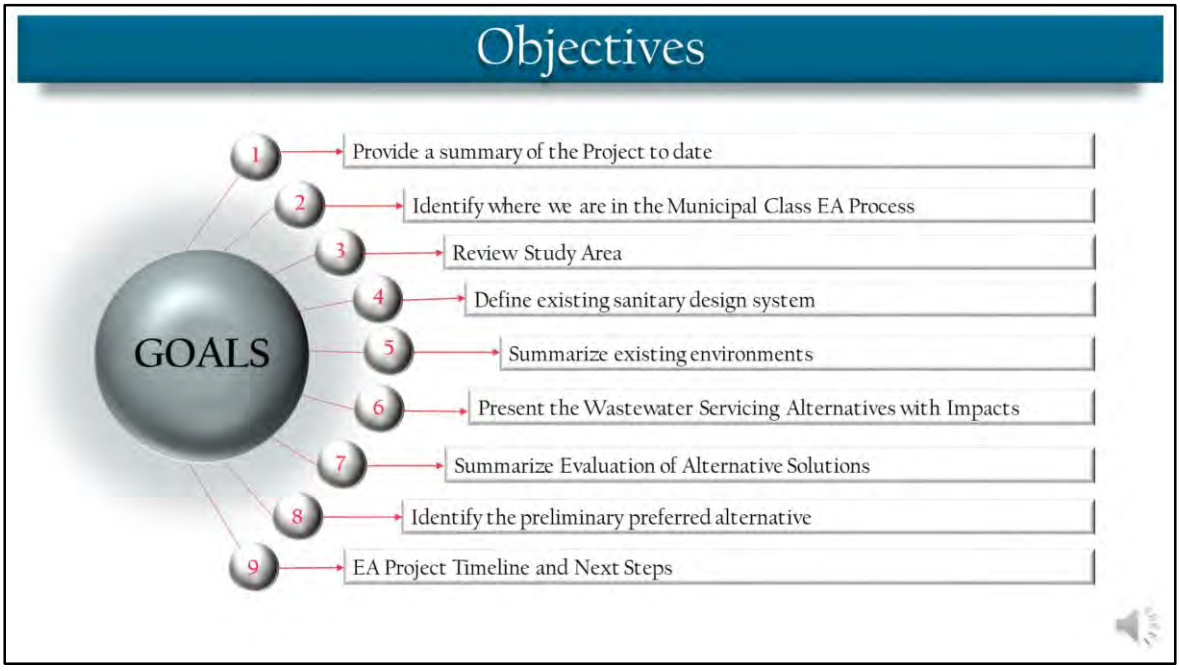
This Public Information Centre is relying on web-based communications, please feel free to fill out the comment sheet located on this website. Any comments received will be collected under the Environmental Assessment Act and, with the exception of personal information, will become part of the public record.




Welcome to the second Virtual Public Information Centre for the Baden Trunk Sanitary Sewer Class Environmental Assessment.

This study has been initiated by the Township of Wilmot. MTE Consultants has been retained by the Township to serve as the lead consultant on the project and we will be guiding you through this presentation on behalf of the Township of Wilmot and the study team.

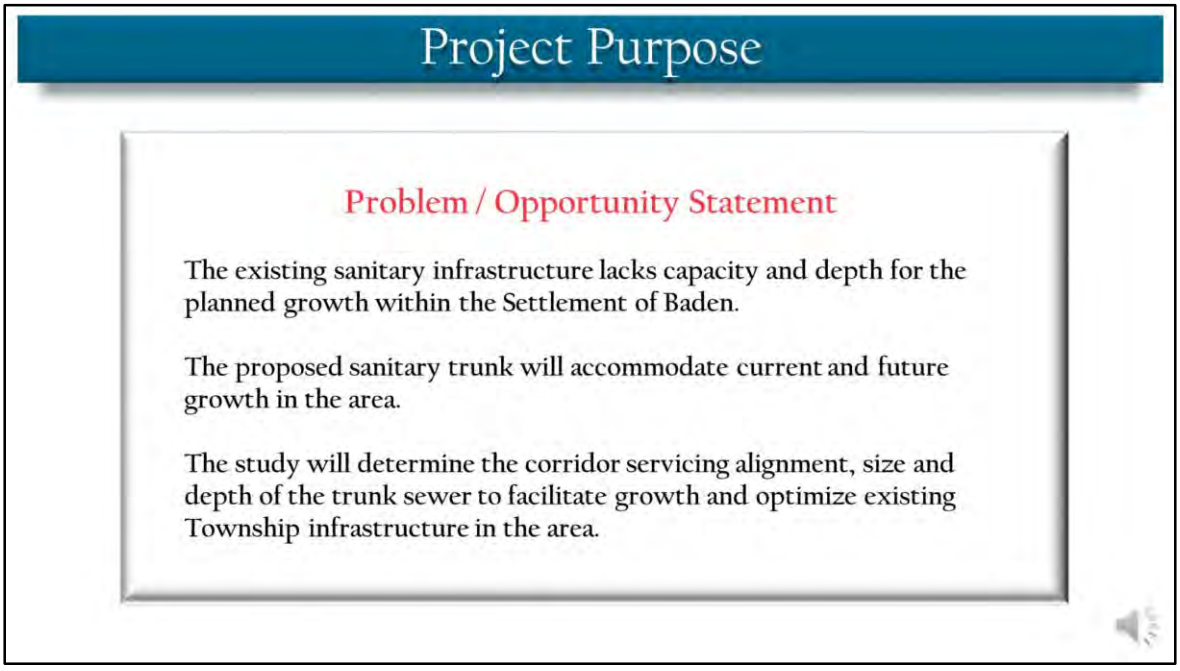
This Public Information Centre will by published virtually on the Township of Wilmot's website and will remain online for the duration of the project.



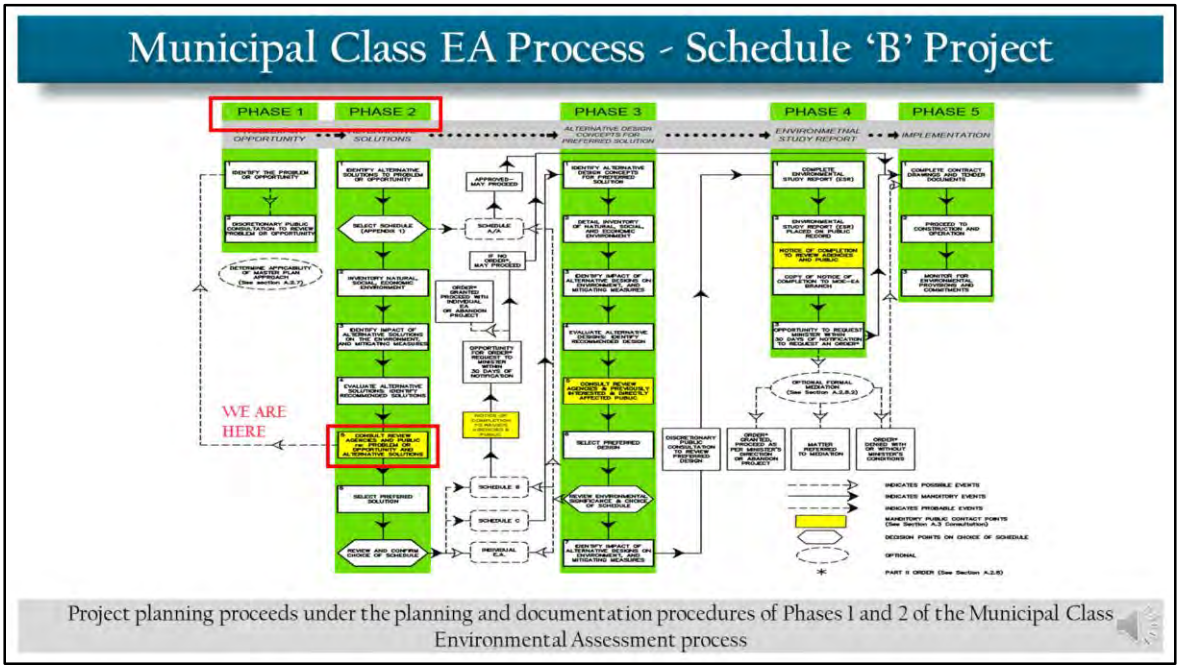

The goals of our second Public Information Centre are to:

Provide a summary of the Project to date...
Identify where we are in the Municipal Class Environmental Assessment Process...
Review the study area
Define the existing sanitary design system...
Summarize the existing natural, social, cultural/heritage, built, and economical environments...
Present the wastewater servicing alternatives and their associated impacts...
Summarize the evaluation of the alternative solutions...
Identify the preliminary preferred alternative...
And to provide a timeline for this study and the next steps.

We encourage the general public, Indigenous groups and stakeholders to review the presentation, provide comments and/or submit questions on a comment sheet available on the Township's website. Information on how to submit your comments will be provided at the end of the presentation. Your input is appreciated and will be considered by the study team in the evaluation of the alternative solution.




The Township of Wilmot has identified that the existing sanitary infrastructure lacks capacity and depth for the planned growth within the Settlement of Baden. The proposed sanitary trunk will accommodate current and future growth in the area. This study will determine the corridor servicing alignment, size and depth of the trunk sewer to facilitate growth and optimize existing Township infrastructure in the area.

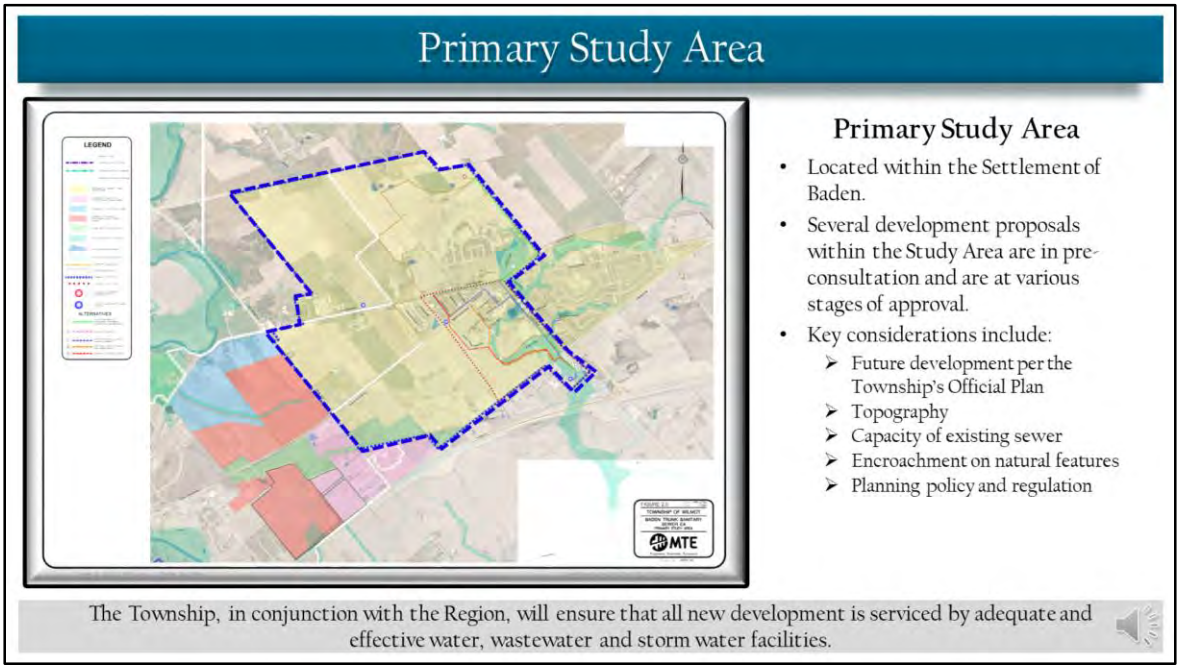



Providing sewage collection to accommodate existing and future growth of Baden will require changes to the current sewage collection system. Under the Municipal Class EA process, establishing, extending or enlarging a sewage collection system is considered a Schedule B project as defined in the Municipal Engineers Association Class EA document.

As a Schedule B project, the project planning proceeds under the planning and documentation procedures of Phases 1 and 2 of the Municipal Class Environmental Assessment process. Through this process, feasible solutions are identified and evaluated with input from agencies, Indigenous communities and stakeholders toward a recommendation for a preferred solution. At the conclusion of Phase 2, the appropriate EA planning Schedule is confirmed and, if no Part II order requests are received by the Minister, the proponent may proceed to design and implementation of the project.

An overview of the EA process is illustrated on the flow chart. The study is currently at the stage where we engage with interested parties and the public about the project and the alternative solutions, as highlighted in the yellow box under Phase 2.
We are currently midway through Phase 2 of the study. Following the confirmation

of the preferred solution, Project File Report (PFR) will be prepared to summarize the decision-making process for the public and stakeholders. Once Township council has endorsed the preferred alternative, a 30-day review period will be provided for the public and stakeholders to review and comment on the Report.




The primary study area is located within the Settlement of Baden and consists primarily of agricultural and residential land uses with some commercial and institutional land uses.

Several development proposals within the Study Area are in pre-consultation and are at various stages of approval.

Key considerations include:
Future development per the Township's Official Plan, topography, capacity of existing sewer, encroachment on natural features and planning policy and regulation.

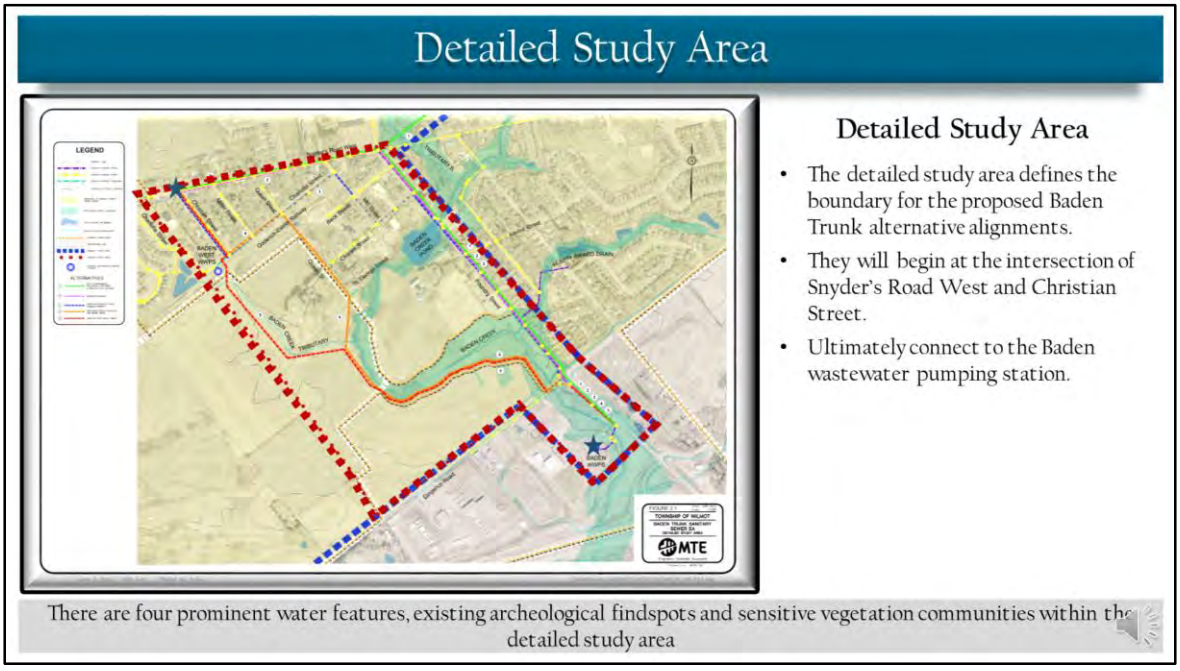
The Township, in conjunction with the Region, will ensure that all new development is serviced by adequate and effective water, wastewater and storm water facilities.

The Detailed Study Area defines the boundary for the proposed Baden trunk alternative alignments.

It is defined as the area south of Snyder's Road West, west of Foundry Street to the Baden pumping station, north of Gingerich Road and east of Christian Street including the agricultural lands it crosses.

All alternative alignments will begin at the intersection of Snyder's Road West and Christian Street and ultimately connect to the Baden wastewater pumping station.

There are four prominent water features, existing archeological findspots and sensitive vegetation communities within the detailed study area

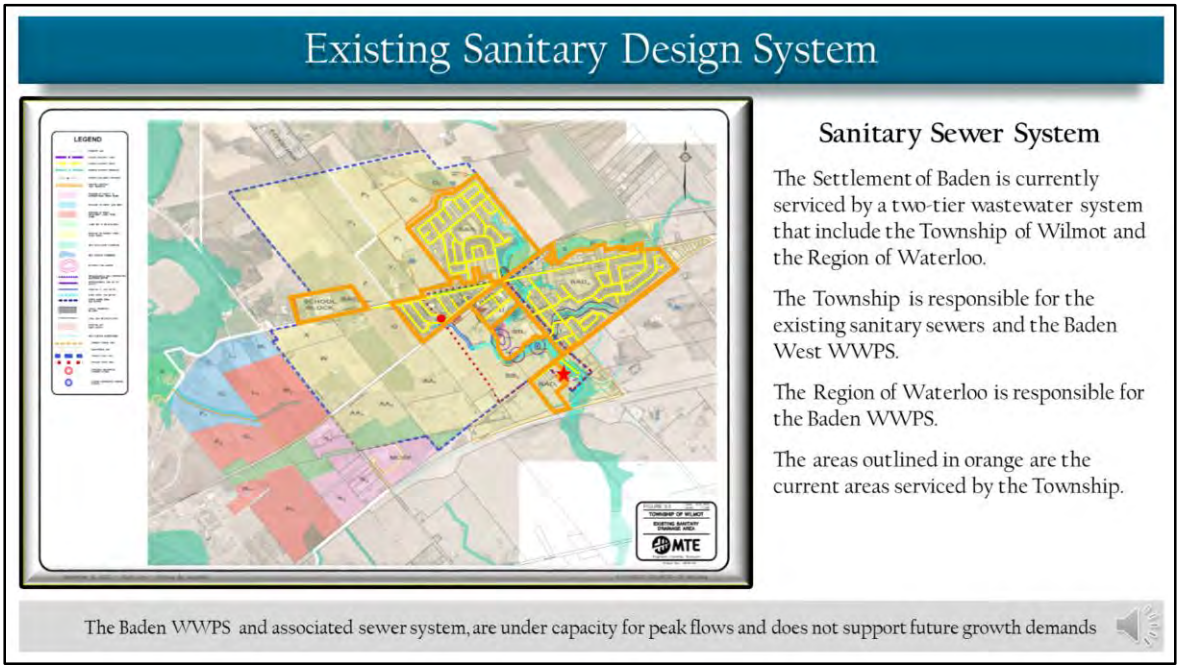



The Detailed Study Area defines the boundary for the proposed Baden trunk alternative alignments.

It is defined as the area south of Snyder's Road West, west of Foundry Street to the Baden pumping station, north of Gingerich Road and east of Christian Street including the agricultural lands it crosses.

All alternative alignments will begin at the intersection of Snyder's Road West and Christian Street and ultimately connect to the Baden wastewater pumping station.

There are four prominent water features, existing archeological findspots and sensitive vegetation communities within the detailed study area




The Settlement of Baden is currently serviced by a two-tier wastewater system by Township of Wilmot and the Region of Waterloo.

The Township is responsible for the sanitary sewers and one local pumping stations, the Baden West wastewater pumping stations. The Region of Waterloo is responsible for the Baden wastewater pumping station.

The areas outlined in orange are the current areas serviced by the Township.

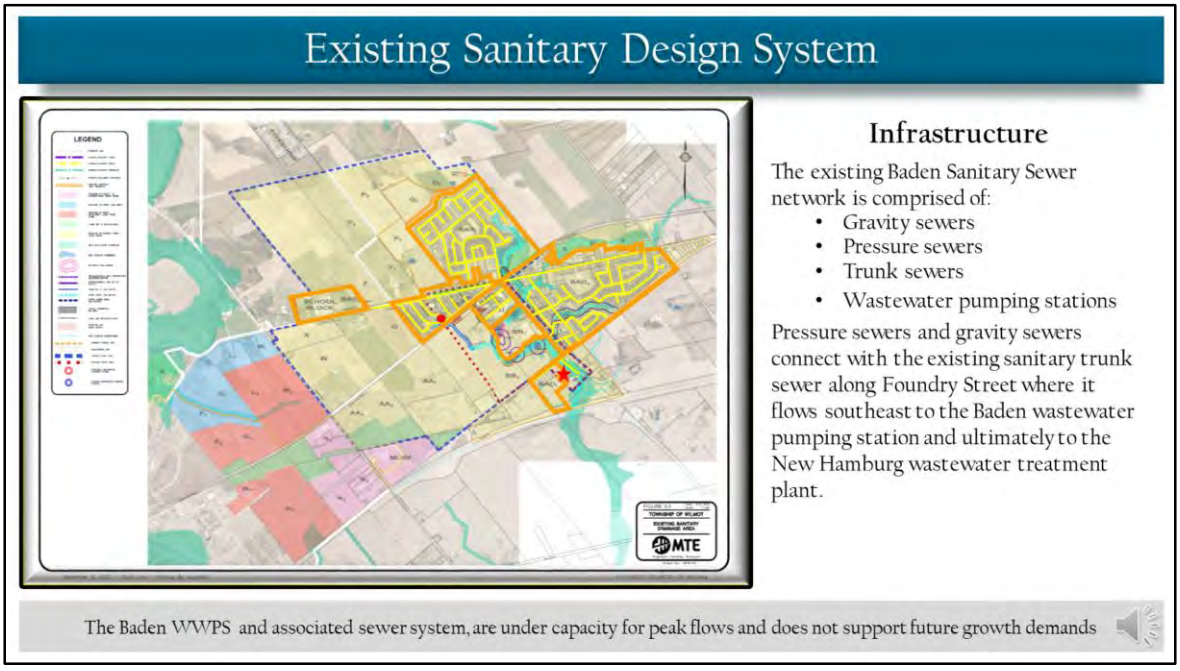
The Baden wastewater pumping station and associated sewer system, are under capacity for peak flows and do not support the future growth demands of Baden.

Areas in orange represent the current

The existing Baden Sanitary Sewer network is comprised of gravity sewers, pressure sewers, trunk sewers and wastewater pumping stations

Pressure sewers and local gravity sewers connect with existing sanitary trunk sewers along Foundry Street where it flows southeast to the Baden wastewater pumping station then pumped to the New Hamburg wastewater treatment plant.

Based on the elevations and locations of existing infrastructure, extended sanitary service to the Primary Study Area would not be achievable by gravity.

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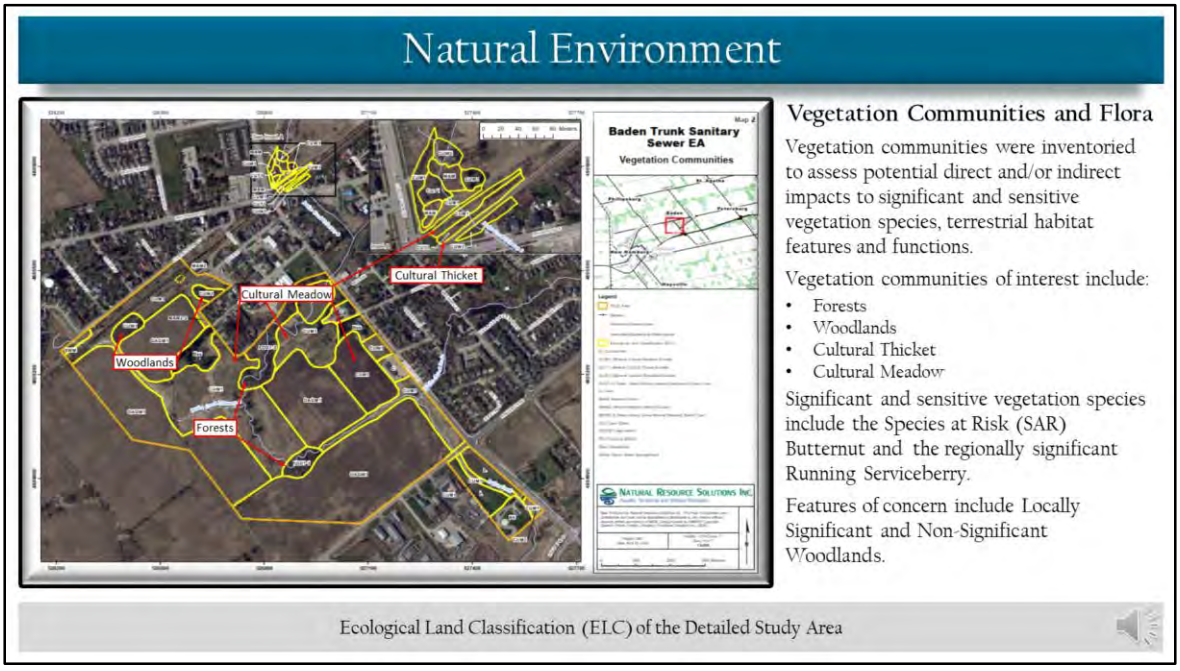
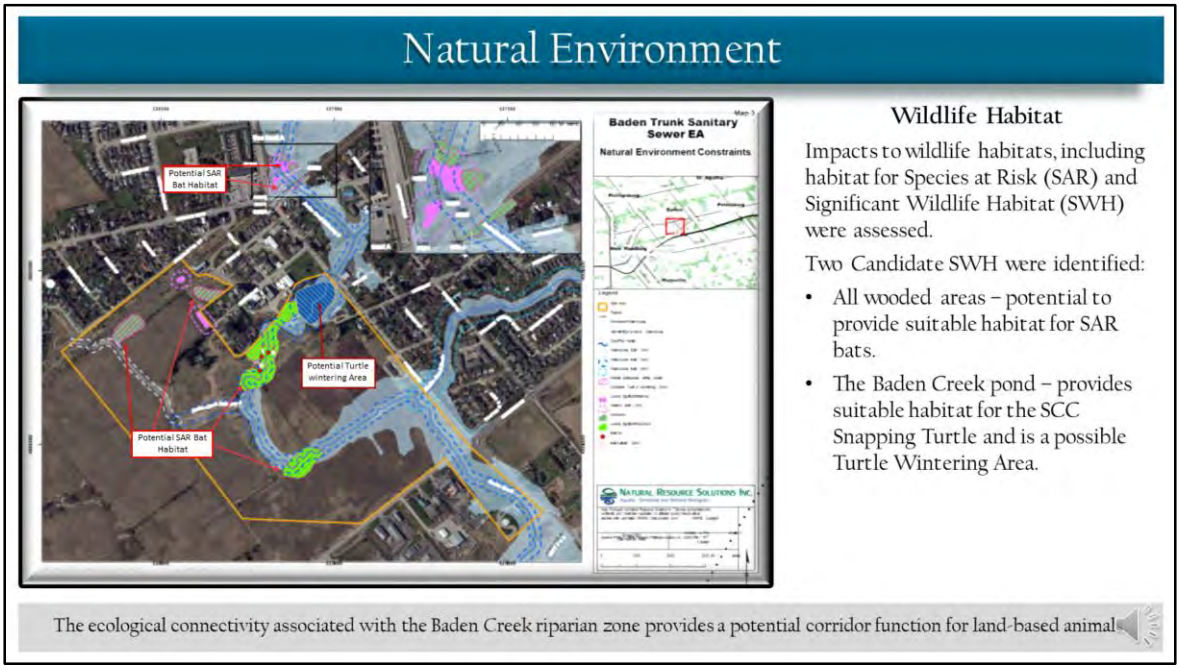



An assessment of the natural environment was completed to characterize the vegetation communities and the potential for habitat of Species at Risk.

Vegetation communities within the Detailed Study Area and along Alternative 1 were inventoried to assess potential direct and/or indirect impacts to significant and sensitive vegetation species as well as terrestrial habitat features and functions. Although the vegetation communities within the Detailed Study Area are considered to be relatively common in Ontario, there are vegetation communities of interest, these include forest, woodland, cultural thicket and cultural meadow.

The significant and sensitive vegetation species identified include the Species at Risk (SAR) Butternut and the regionally significant Running Serviceberry.

Significant natural features include Locally Significant Woodlands and non-significant woodlands.




Impacts to wildlife habitats, including habitat for Species at Risk and Significant Wildlife Habitat (SWH), were assessed.

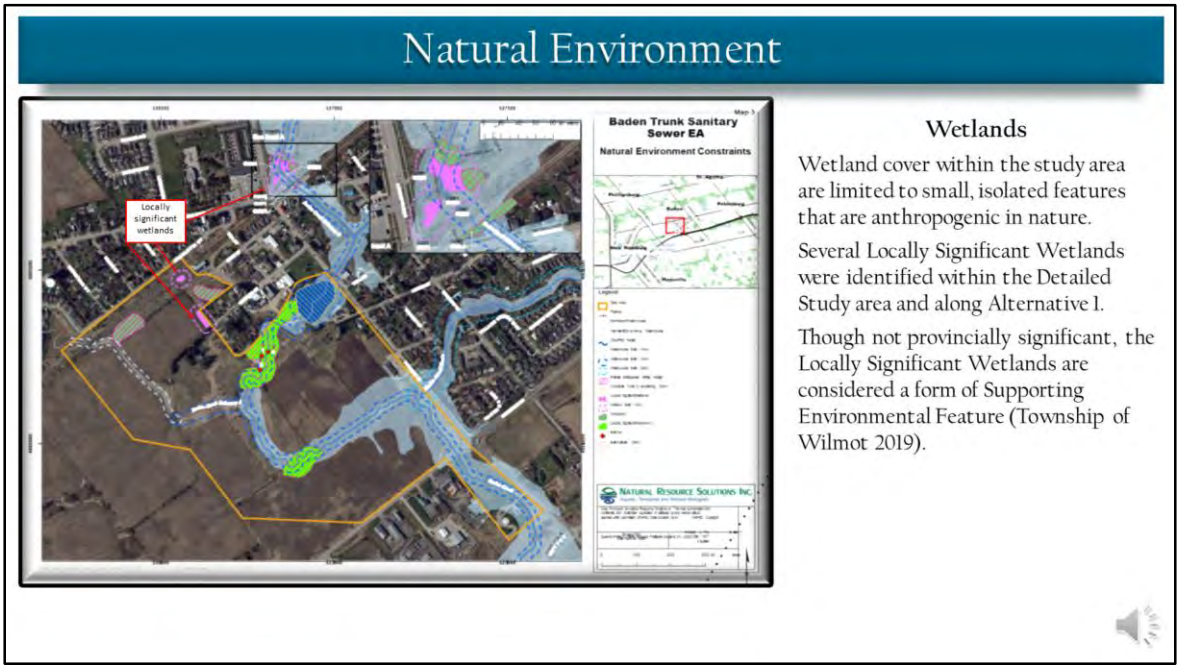
Two Candidate Significant Wildlife Habitats were identified, they include:

- All wooded areas, which have the potential to provide suitable habitat for Species at Risk bats.

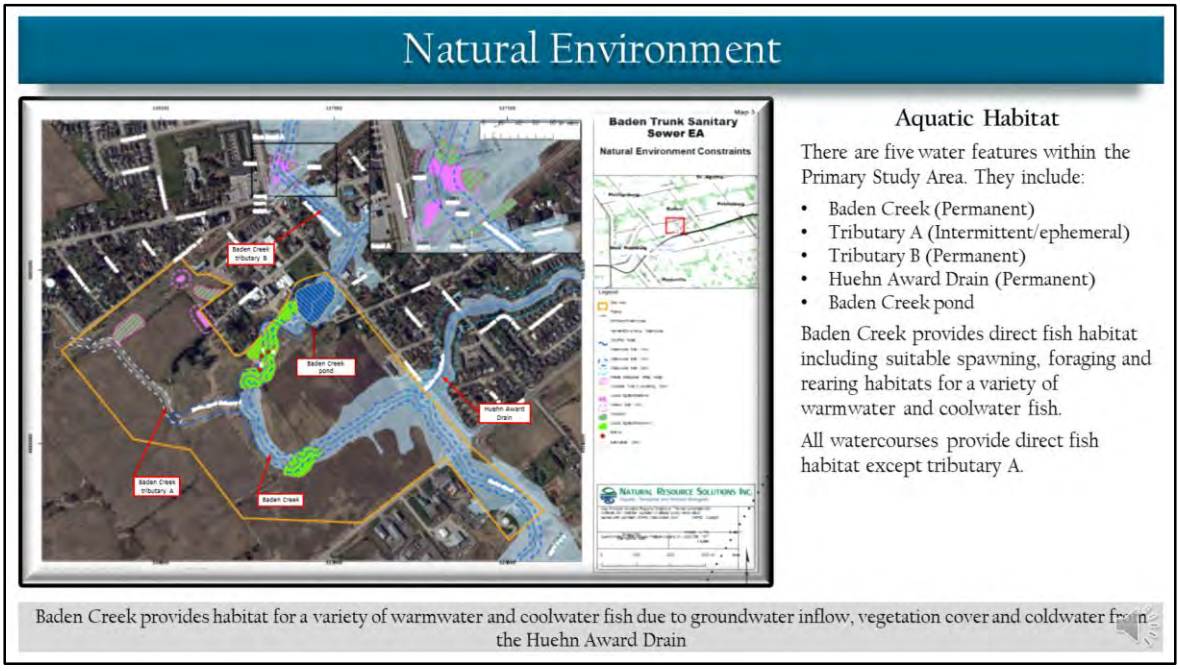
and

- The Baden Creek pond, which provides suitable habitat for the Species for Conservation Concern Snapping Turtle and is a possible Turtle Wintering Area

The ecological connectivity associated with the Baden Creek riparian zone provides a potential corridor function for land-based animals.




Wetland cover within the study area is limited to small, isolated features that are anthropogenic in nature which may have been highly altered by past land uses. Wetlands that are not provincially significant are generally considered "locally significant" in the Township. Locally Significant Wetlands are considered a form of Supporting Environmental Feature (Township of Wilmot 2019).

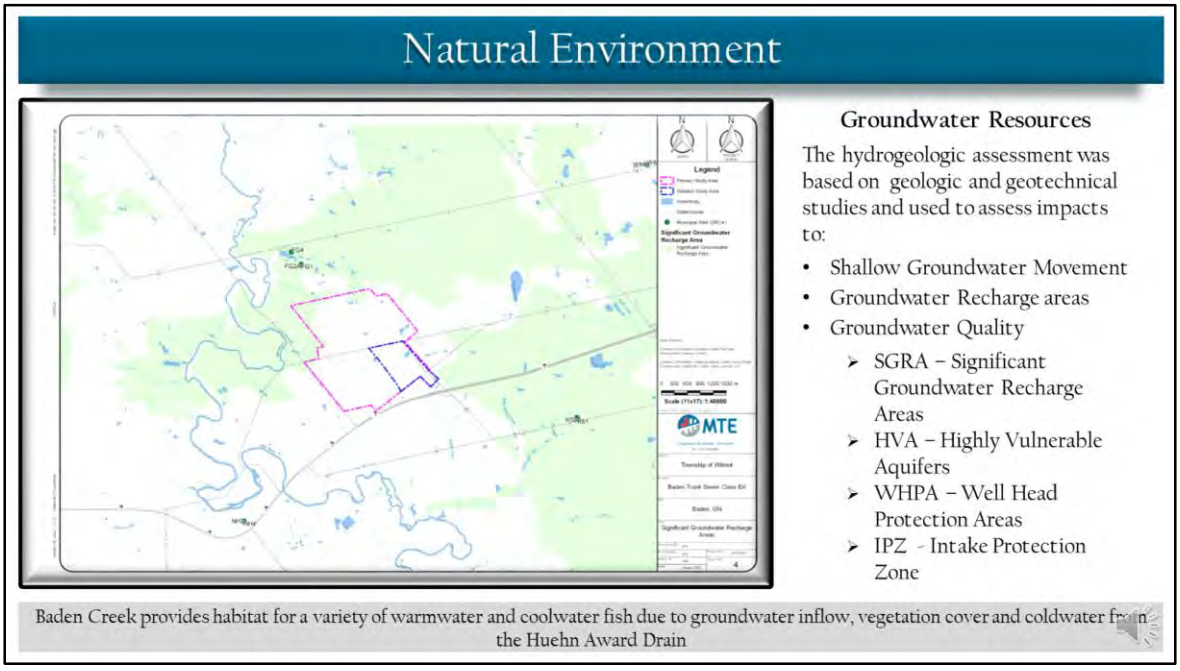



There are five main water features within the Primary Study Area, they include
Baden Creek, a permanent watercourse with groundwater inflow,
The Baden Creek tributary A, an ephemeral/intermittent stream,
The Baden Creek tributary B, a permanent watercourse with groundwater inflow,
The Huehn Award Drain, a coldwater stream and the
Baden Creek pond

Baden Creek provides direct fish habitat including suitable spawning, foraging and rearing habitats for a variety of warmwater and coolwater fish.

All watercourses provide direct fish habitat except tributary A.

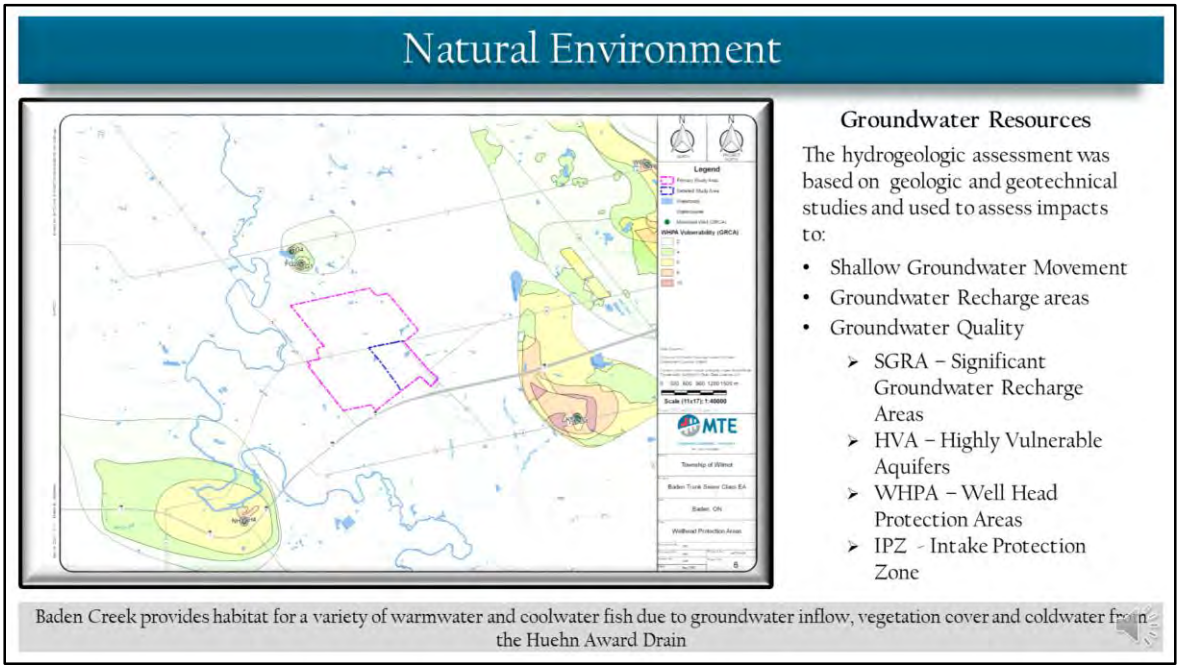
Baden Creek provides habitat for a variety of warmwater and coolwater fish due to groundwater inflow, vegetation cover and the Huehn Award Drain.




The hydrogeologic assessment was based on geologic and geotechnical information, was used to assess impacts to:

- Shallow Groundwater Movement
- Groundwater Recharge areas
- Groundwater Quality by means of
  - SGRA – Significant Groundwater Recharge Areas
  - HVA – Highly Vulnerable Aquifers
  - WHPA – Well Head Protection Areas and
  - IPZ - Intake Protection Zones

No significant impacts to groundwater resources were revealed

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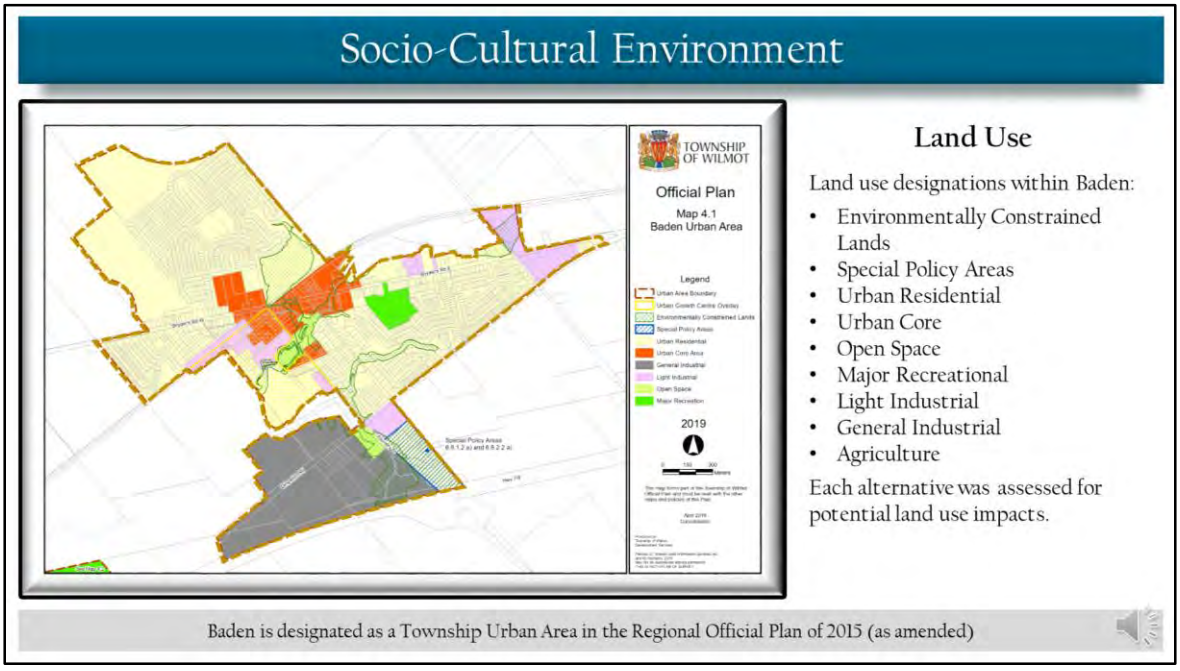
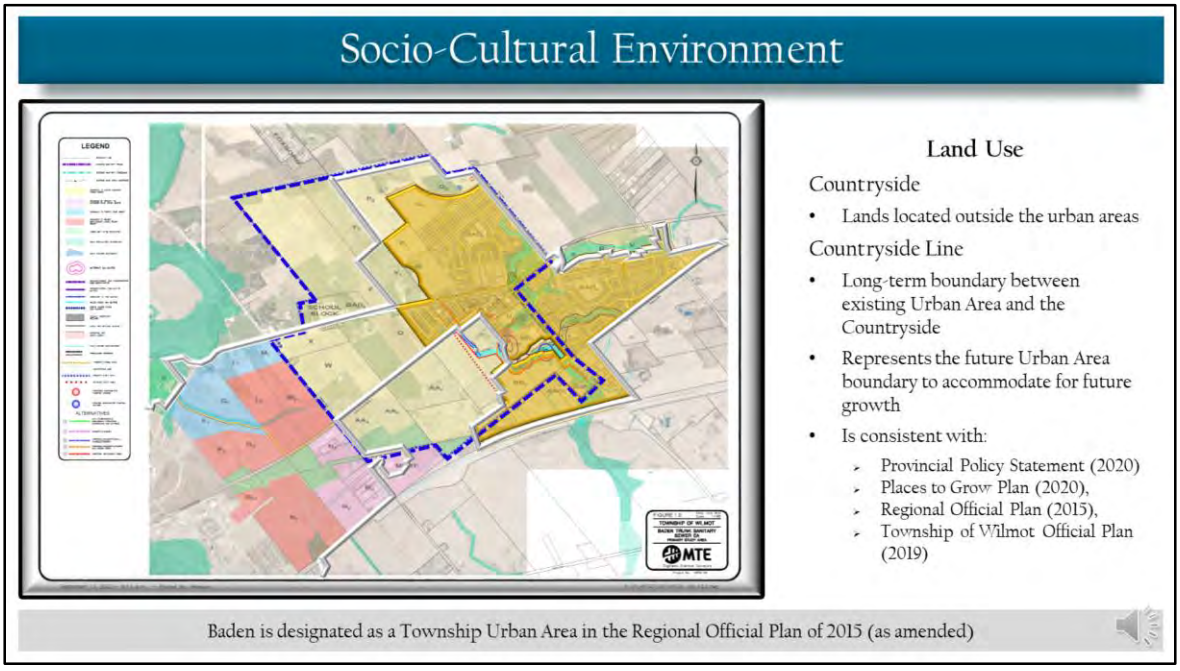



Baden is designated as a Township Urban Area according to the Regional Official Plan of 2015.

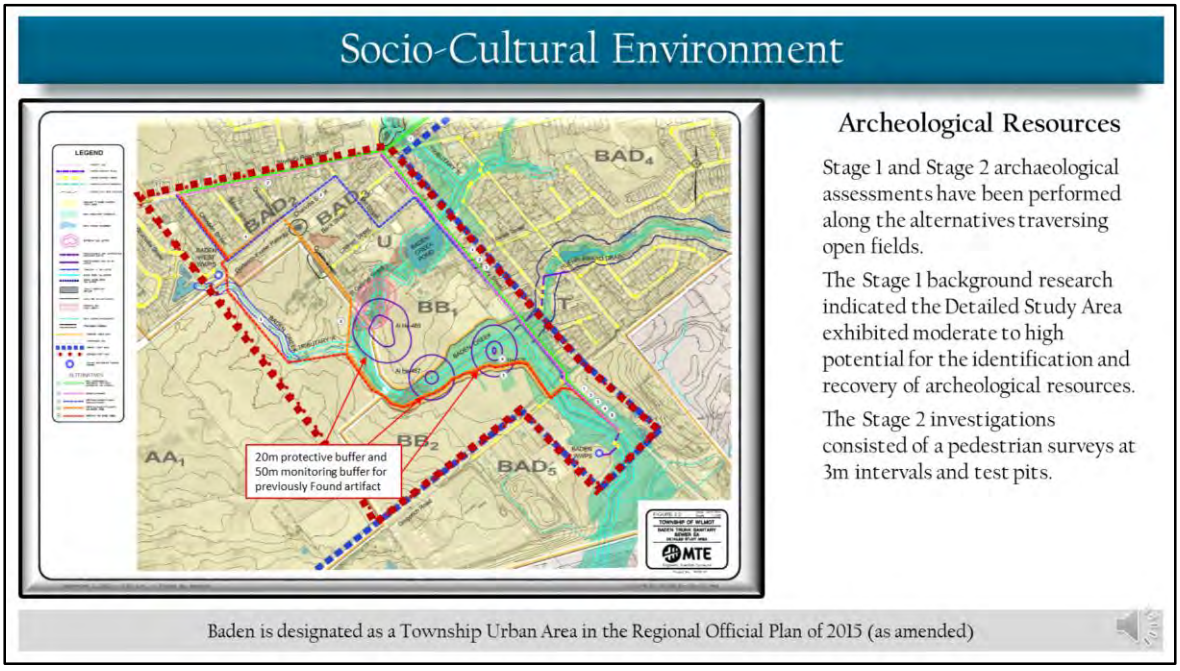
The land use designations within Baden consist of environmentally constrained Lands, urban residential, urban core, open space, major recreational, light industrial with general industrial lands to the south and agricultural lands, which are primarily located outside the Urban Area, within the Countryside.

Each alternative was assessed for potential land use impacts.




The countryside are lands located outside the urban areas.

The countryside line, as seen in silver, is the long-term growth boundary between the existing Urban Area boundaries and the Countryside. It represents the future urban area boundary to accommodate for projected growth, and is consistent with the Provincial Policy Statement of 2020, the Places to Grow Plan of 2020, the amended Regional Official Plan of 2015 and the Township Of Wilmot Official Plan of 2019.

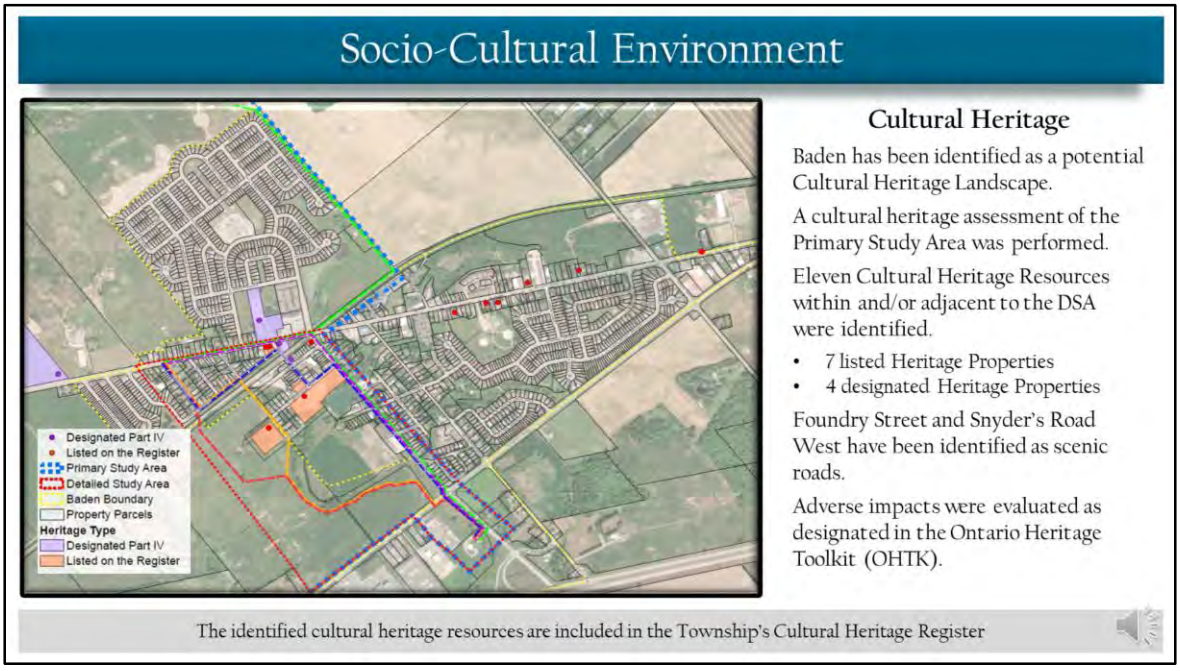



Stage 1 and Stage 2 archaeological assessments have been performed along the alternatives traversing open fields.

The Stage 1 background research indicated the Detailed Study Area exhibited moderate to high potential for the identification and recovery of archeological resources.

The Stage 2 investigations consisted of a pedestrian surveys at 3m intervals and test pits.

Archeological finds require a 20m protective buffer and a 50m monitoring buffer.



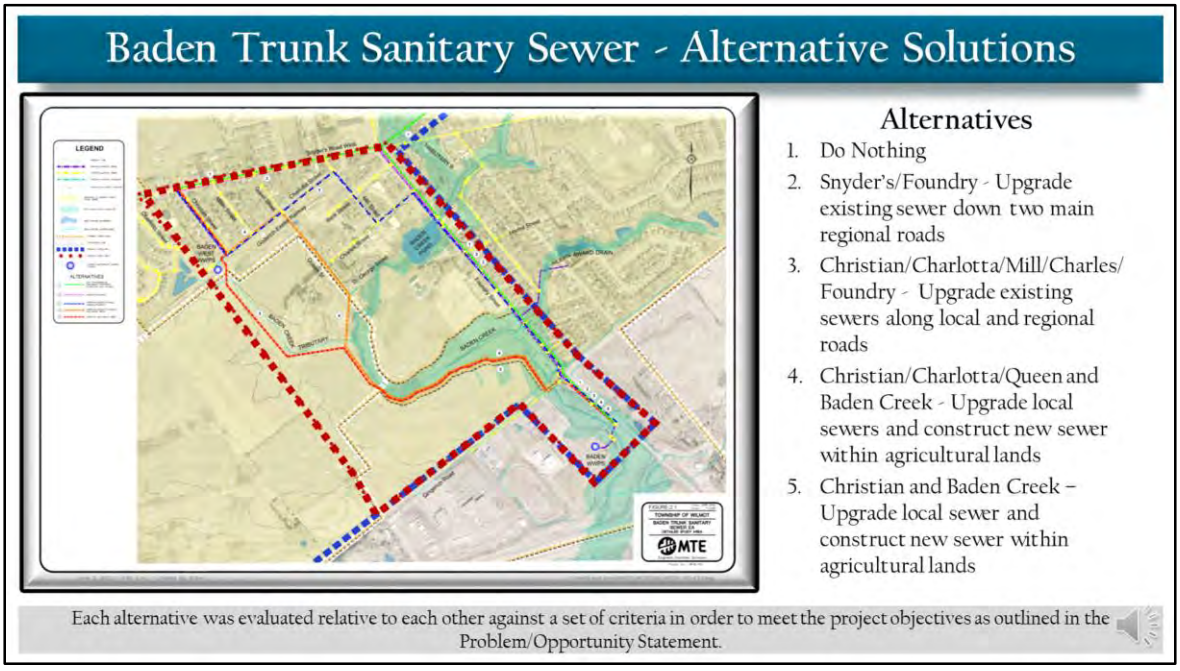

Baden has been identified as a potential Cultural Heritage Landscape.

As such, a cultural heritage assessment of the Primary Study Area was performed. Of the Eleven Cultural Heritage Resources identified within and/or adjacent to the Detailed Study Area, 7 were listed Heritage Properties and 4 were designated Heritage Properties within close proximity to the Alternatives.

In addition, Foundry Street and Snyder's Road West have been identified as scenic roads and have been included in the assessment.

Adverse impacts were evaluated as designated in the Ontario Heritage Toolkit (OHTK).

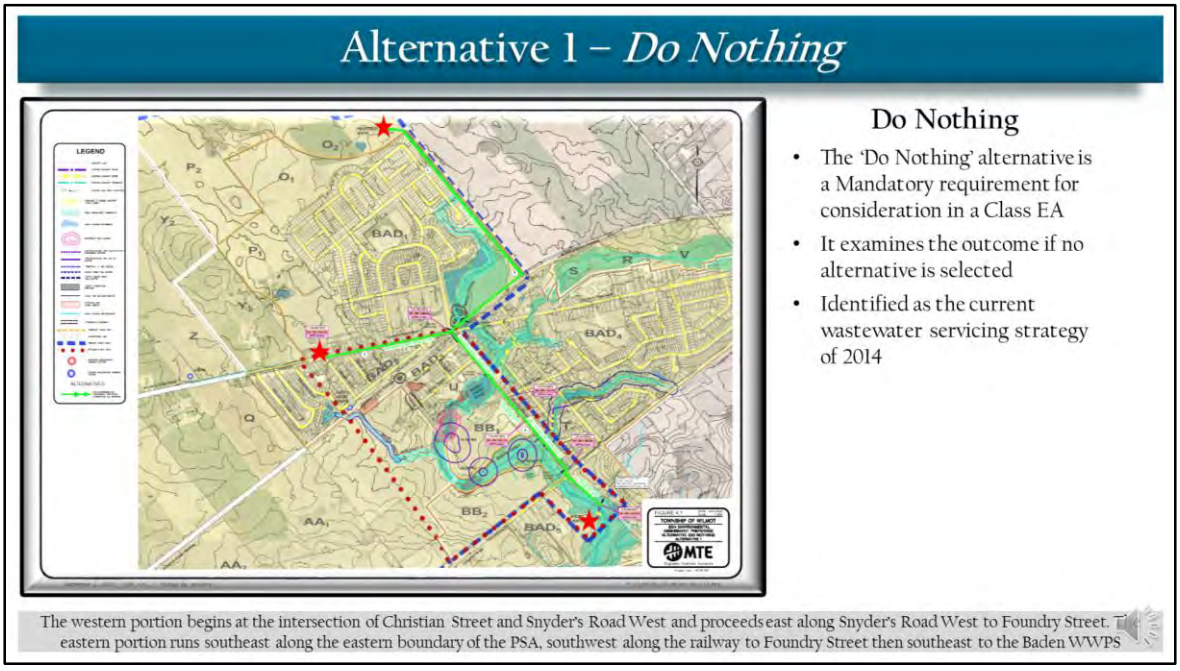
All cultural heritage resources identified are included in the Township's Cultural Heritage Register.




Five alternative alignments were selected for this study.

1. Do Nothing – 2014 preapproved alignment
2. Snyder's/Foundry – requires upgrading the existing sewers down two main regional roads
3. Christian/Charlotta/Mill/Charles/Foundry - Upgrade existing sewers along local and regional roads
4. Christian/Charlotta/Queen and Baden Creek - Upgrade local sewers and construct new sewer within agricultural lands
5. Christian and Baden Creek - Upgrade one local sewer and construct new sewer within agricultural lands

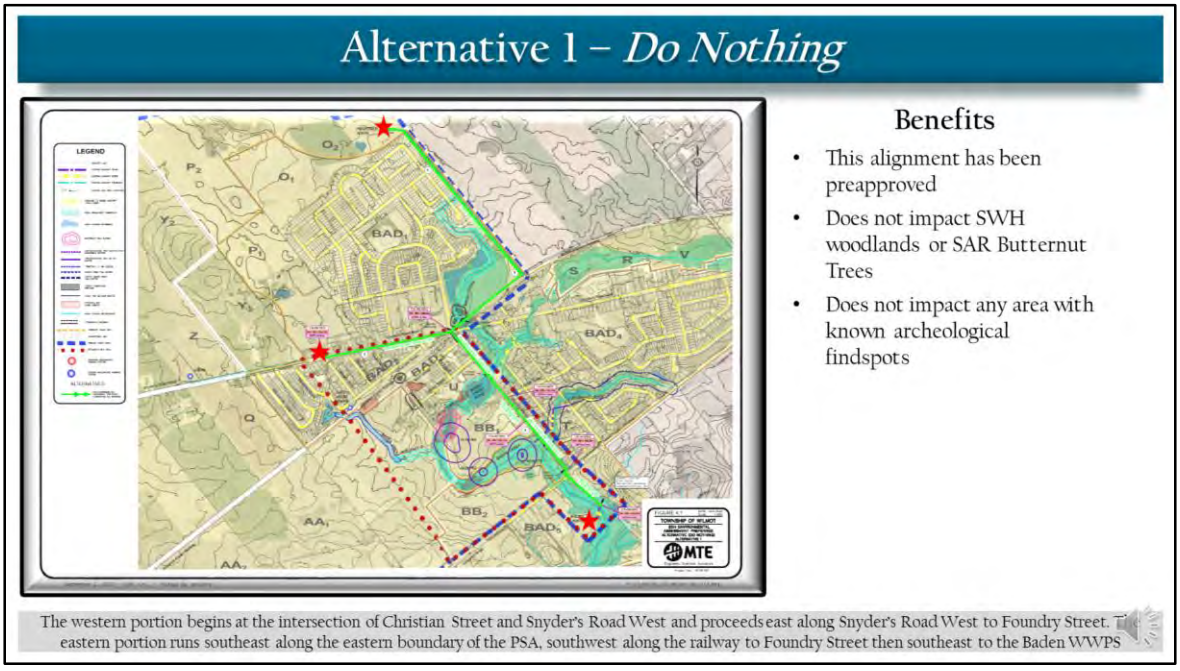
The alternatives were evaluated relative to each other against a set of criteria to meet the project objectives outline in the Problem/Opportunity Statement.



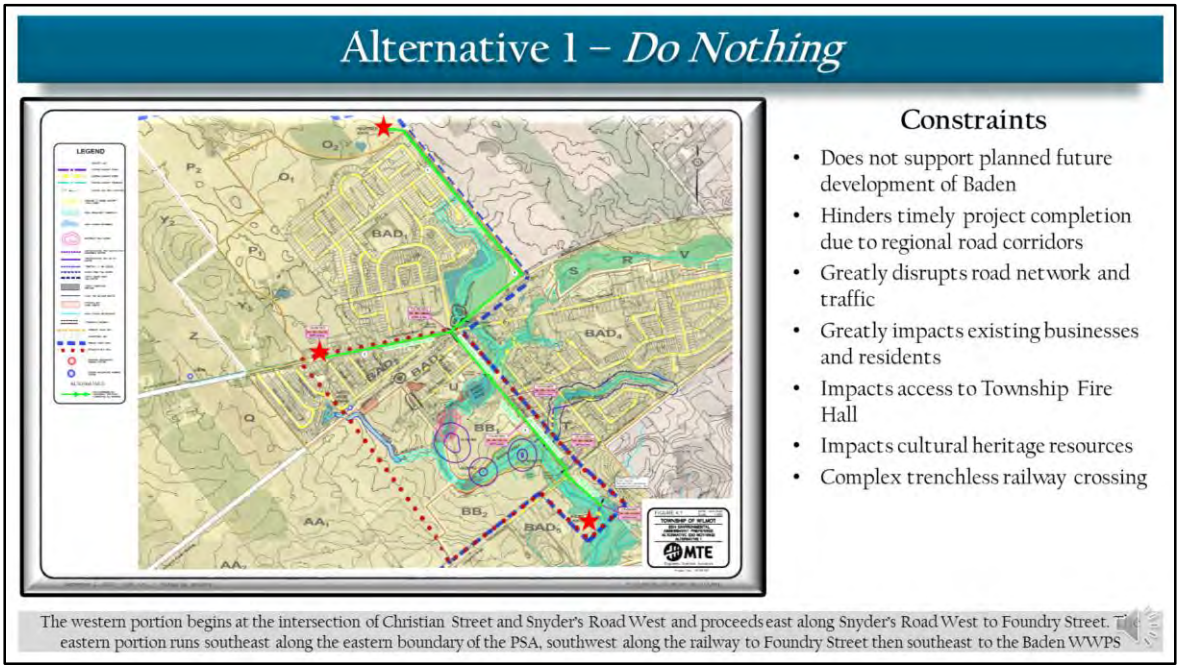

Alternative 1 is the 'Do-Nothing' alternative

The eastern portion of the alignment begins at the proposed wastewater pumping station, runs southeast along the eastern boundary of the Primary Study Area, then southwest along the railway to Foundry Street. The western portion begins at the intersection of Christian Street and Snyder's Road West, proceeds east to Foundry Street, where it connects with the eastern portion, then southeast to the Baden wastewater pumping station.

The Do-Nothing alternative is a Mandatory requirement for consideration in a Class EA. It examines what may happen if no alternative is selected. In this case, if no alternative is selected, then the approved wastewater servicing strategy of 2014 will be carried out.



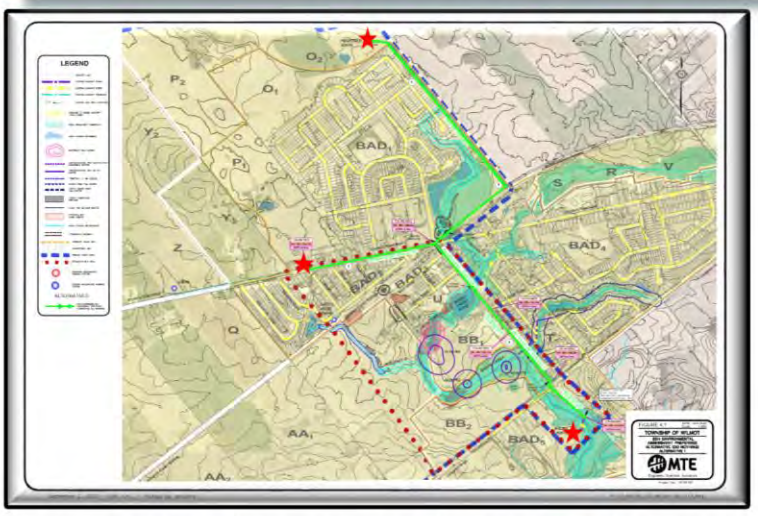

Aside from this alternative being the preapproved sanitary servicing strategy, the benefits of this alignment are that it does not impact the Significant Wildlife Habitat woodlands or the Species at Risk Butternut Trees. It also does not impact any known archeological findspots.




The constraints of this alternative are that it does not support the planned future development of Baden, it hinders timely project completion due to regional road corridors, it greatly disrupts the road network and traffic along Snyder's Road West and Foundry Street impacting access to existing businesses and residents as well as the Township Fire Hall. It will impact the largest number of cultural heritage resources during construction.

Installation of the trenchless sewer pipes under the railway will be technically complex due to the narrow right-of-way and the various connections at the busy intersection of Snyder's Road West and Foundry Street.

# Alternative 1 – *Do Nothing*



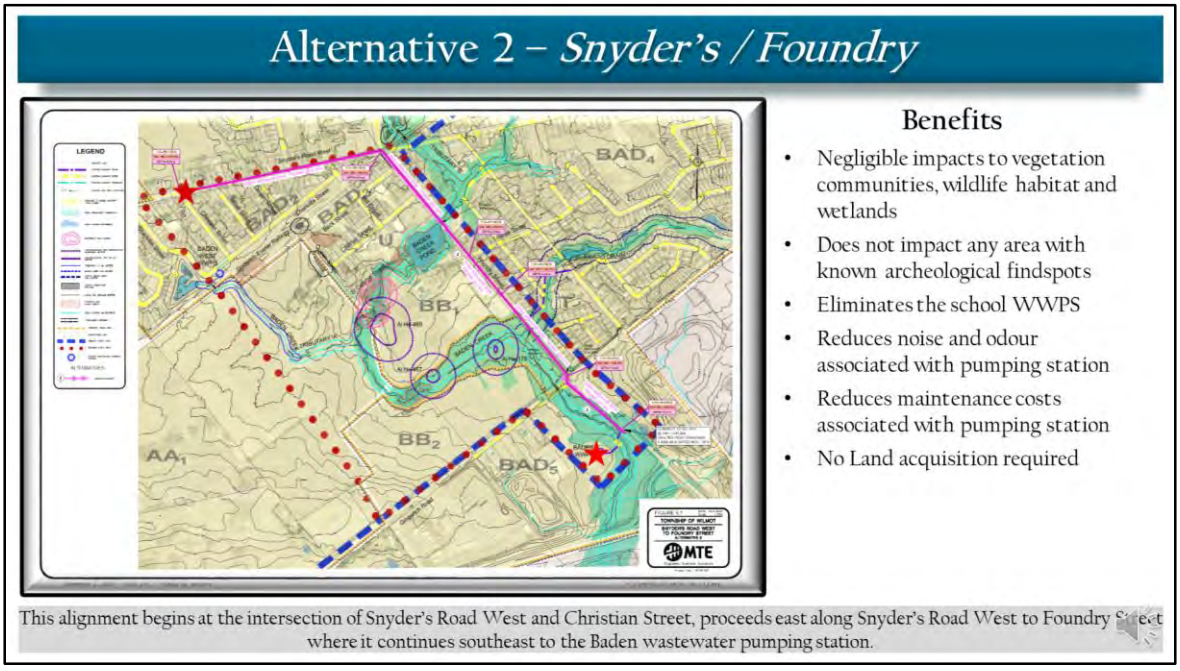

**Constraints**

- Impacts flow regime at stream crossings
- Impacts water quality and water quantity to significant water features
- Impacts the aquatic habitat of Baden Creek, pond and the Huehn Award Drain
- Increases noise and odour from additional pumping station
- Increases long-term operation and maintenance cost due to additional wastewater pumping station
- Uncertainty in securing the right-of-way
- High cost of construction

The western portion begins at the intersection of Christian Street and Snyder's Road West and proceeds east along Snyder's Road West to Foundry Street. The eastern portion runs southeast along the eastern boundary of the PSA, southwest along the railway to Foundry Street then southeast to the Baden WWPS

Impacts to flow regime at the stream crossings will lead to water quality and water quantity issues affecting the aquatic habitat of Baden Creek, the Baden Creek pond and the Huehn Award Drain.

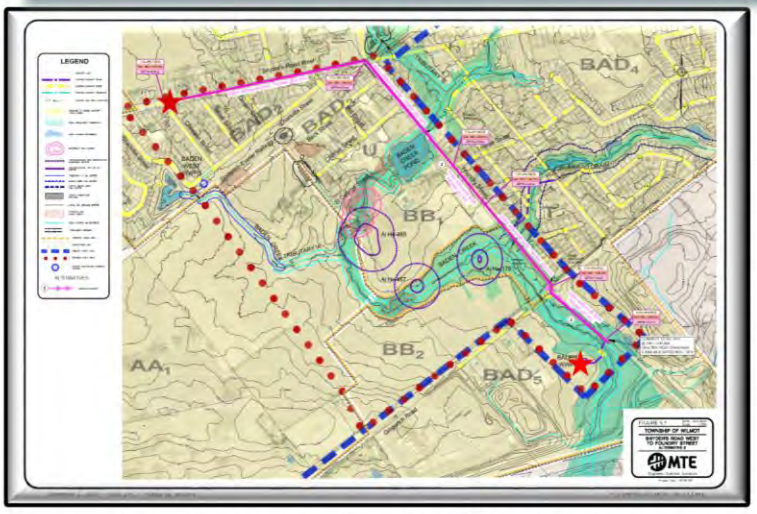
The additional pumping station required for this alternative will increase noise and odour as well as long-term operation and maintenance costs. The right-of-way to service the eastern portion of the alignment has not been secured and is currently the most costly alternative.




Alternative 2 begins at the intersection of Snyder's Road West and Christian Street, proceeds east on Snyder's Road West to Foundry Street where it continues southeast to the Baden wastewater pumping station.

This alternative has negligible impacts to vegetation communities, wildlife habitat and wetlands. It does not impact any known archeological findings. It eliminates the school WWPS which reduces the noise, odour and long-term operation and maintenance costs associated with the pumping station. No land acquisitions are required for this alternative.

## Alternative 2 – *Snyder's / Foundry*

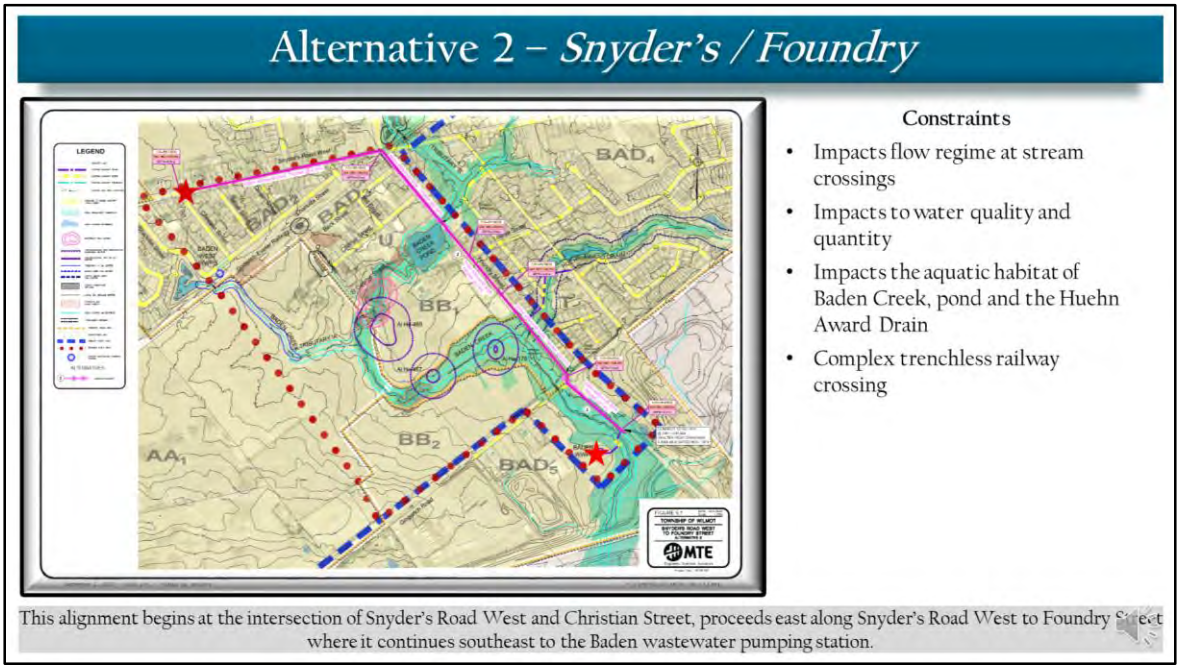



### Constraints

- Does not completely support planned future development of Baden
- Hinders timely project completion due to regional road corridors
- Greatly disrupts road network and traffic
- Greatly impacts existing businesses and residents
- Impacts access to Township Fire Hall
- Impacts to cultural heritage resources

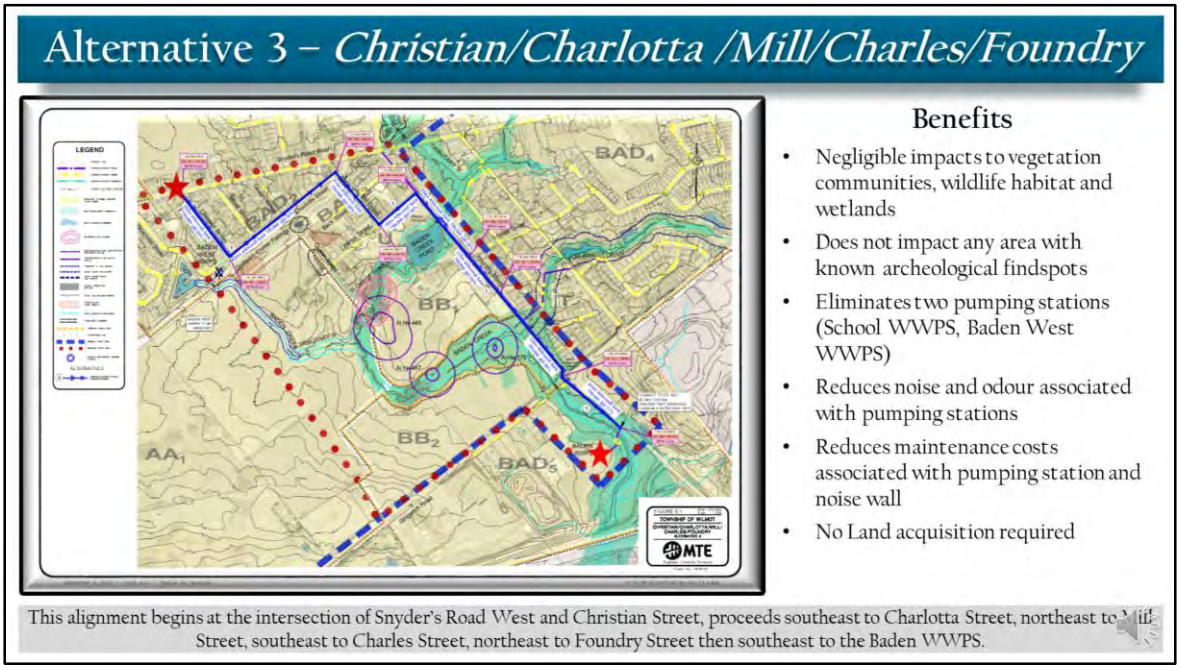
This alignment begins at the intersection of Snyder's Road West and Christian Street, proceeds east along Snyder's Road West to Foundry Street where it continues southeast to the Baden wastewater pumping station.

The constraints of this alternative are that it does not support the planned future development of Baden and hinders timely project completion due to regional road corridors. It greatly it disrupts the road network and traffic along Snyder's Road West and Foundry Street, impacting access to the existing businesses and residents as well as the Township Fire Hall. It will impact a large number of cultural heritage resources during construction.




Impacts to flow regime at the stream crossings will lead to water quality and water quantity issues which will affect the aquatic habitat of Baden Creek, the Baden Creek pond and the Huehn Award Drain.

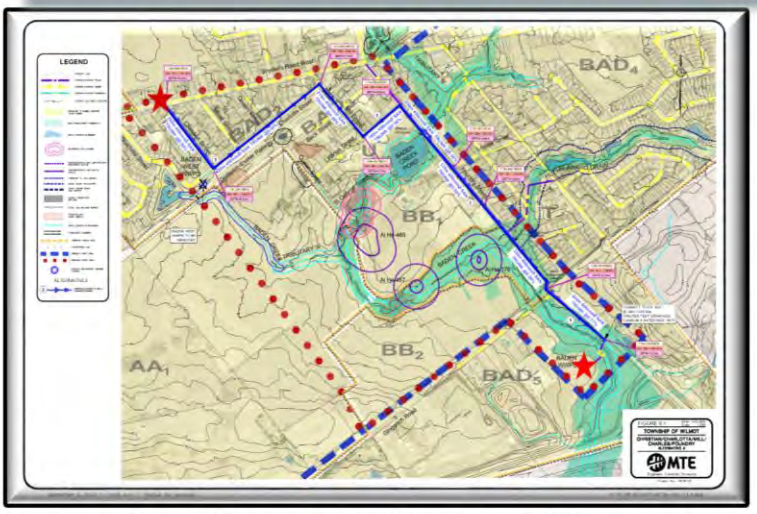
Installation of the trenchless sewer pipes under the railway will be technically complex due to the deep sewer, the narrow railway right-of-way and the various connections at the busy intersection of Snyder's Road West and Foundry Street.




This alignment begins at the intersection Snyder's Road West and Christian Street, proceeds southeast to Charlotta Street, northeast to Mill Street, southeast to Charles Street, northeast to Foundry Street then southeast to the Baden WWPS.

This alternative has negligible impacts to vegetation communities, wildlife habitat and wetlands. It does not impact any known archeological findings. It eliminates two waste water pumping stations, the school WWPS and the Baden West WWPS which will reduce noise, odour and long-term operation and maintenance costs associated with the pumping station and the Baden West noise wall. No land acquisitions are required for this alternative.

## Alternative 3 – *Christian/Charlotta /Mill/Charles/Foundry*



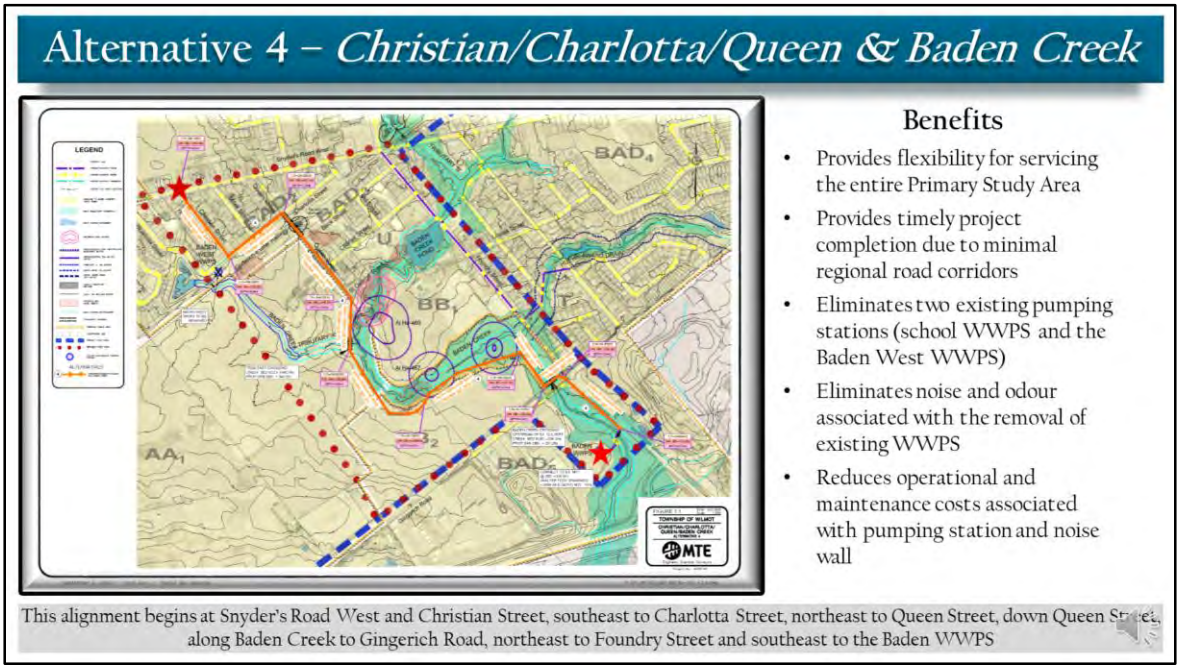

### Constraints

- Does not completely support planned future development of Baden
- Untimely project completion due to regional road corridors
- Disrupts road network and traffic
- Impacts existing businesses and residents
- Impacts access to Township Fire Hall
- Impacts to cultural heritage resources
- Impacts flow regime at stream crossings
- Impacts to water quality and quantity
- Impacts the aquatic habitat of Baden Creek, pond and the Huehn Award Drain

This alignment begins at the intersection of Snyder's Road West and Christian Street, proceeds southeast to Charlotta Street, northeast to Mill Street, southeast to Charles Street, northeast to Foundry Street then southeast to the Baden WWPS.

The constraints of this alternative are that it does not support the planned future development of Baden and hinders timely project completion due to regional road corridors. It greatly disrupts the road network and traffic along local roads and Foundry Street impacting access to the existing businesses and residents as well as the Township Fire Hall. Various cultural heritage resources are also impacted.

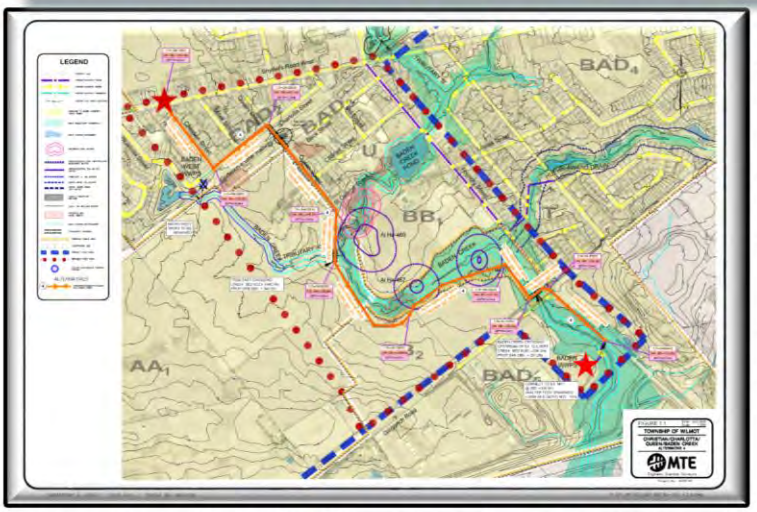
Impacts to flow regime at the stream crossings will lead to water quality and water quantity issues which affect the aquatic habitat of Baden Creek, the Baden Creek pond and the Huehn Award Drain.




This alignment begins at the intersection of Snyder's Road West and Christian Street, it proceeds southeast to Charlotta Street, northeast to Queen Street, southeast on Queen Street, along Baden Creek to Gingerich Road, northeast to Foundry Street and southeast to the Baden WWPS

This alternative provides flexibility for servicing the entire Primary Study area and allows for timely project completion due to minimal regional road corridors. It eliminates two waste water pumping stations, the school WWPS and the Baden West WWPS which will reduce noise, odour and long-term operation and maintenance costs associated with the pumping station and the Baden West noise wall.

## Alternative 4 – *Christian/Charlotta/Queen & Baden Creek*



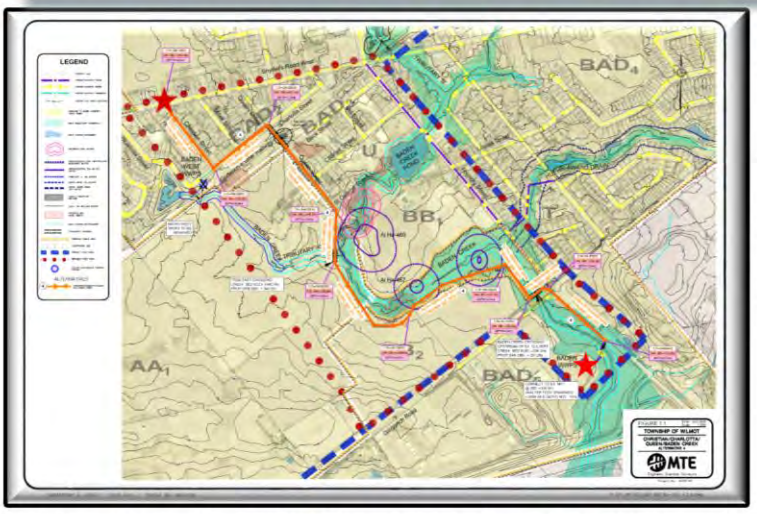

**Benefits**

- Minimal impacts to significant water features (Baden Creek, Baden Creek pond and the Huehn Award Drain)
- Does not impact flow regime of any water feature
- Does not impact the aquatic habitat of Baden Creek, pond or the Huehn Award Drain
- Minimal impacts to cultural heritage resources
- Right-of-Ways have been secured

This alignment begins at Snyder's Road West and Christian Street, southeast to Charlotta Street, northeast to Queen Street, down Queen Street, along Baden Creek to Gingerich Road, northeast to Foundry Street and southeast to the Baden WWPS

There are minimal impacts to Baden Creek, the Baden Creek pond and the Huehn Award Drain. It does not impact flow regime due to trenchless stream crossings or to the aquatic habitat of any water feature. There are minimal impacts to cultural heritage resources and the right-of-ways for this alignment have been secured.

# Alternative 4 – *Christian/Charlotta/Queen & Baden Creek*

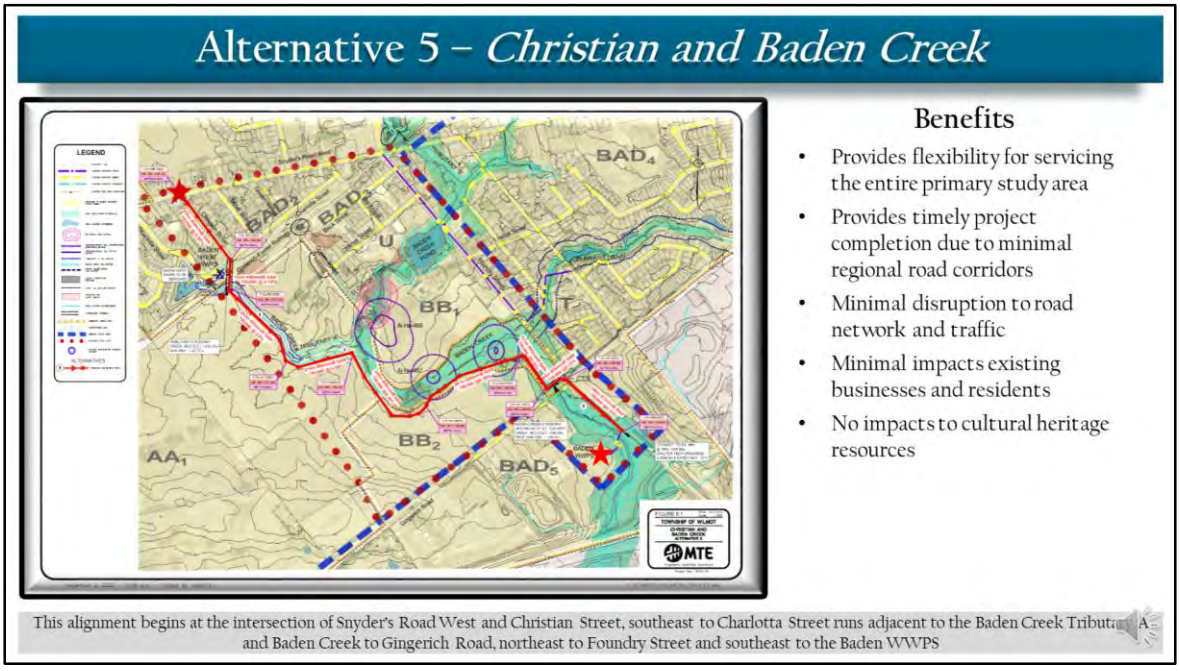



## Constraints

- Disrupts local road network and traffic along Christian Street, Charlotta Street and Queen Street
- Impacts local residents along Christian Street, Charlotta Street and Queen Street
- Impacts to archeological findspot 50m monitoring buffer
- Possible impacts significant local wetlands at trenchless railway crossing

This alignment begins at Snyder's Road West and Christian Street, southeast to Charlotta Street, northeast to Queen Street, down Queen Street, along Baden Creek to Gingerich Road, northeast to Foundry Street and southeast to the Baden WWPS

The constraints of this alternative are that it disrupts the local road network and traffic along Christian Street, Charlotta Street and Queen Street impacting access to the existing local residents. It also infringes on the 50m monitoring buffer for two archeological findspots and may impact the locally significant wetlands at the trenchless railway crossing




This alignment begins at the intersection of Snyder's Road West and Christian Street, proceeds southeast to Charlotta Street, crosses the railway and runs adjacent to Baden Creek tributary A and Baden Creek to Gingerich Road, northeast to Foundry Street and southeast to the Baden WWPS

This alternative provides flexibility for servicing the entire Primary Study area and allows for timely project completion due to minimal regional road corridors. There are minimal disruptions to the road network and traffic and impacts access to existing businesses and residents the least. There are no impacts to cultural heritage resources.

# Alternative 5 – *Christian and Baden Creek*

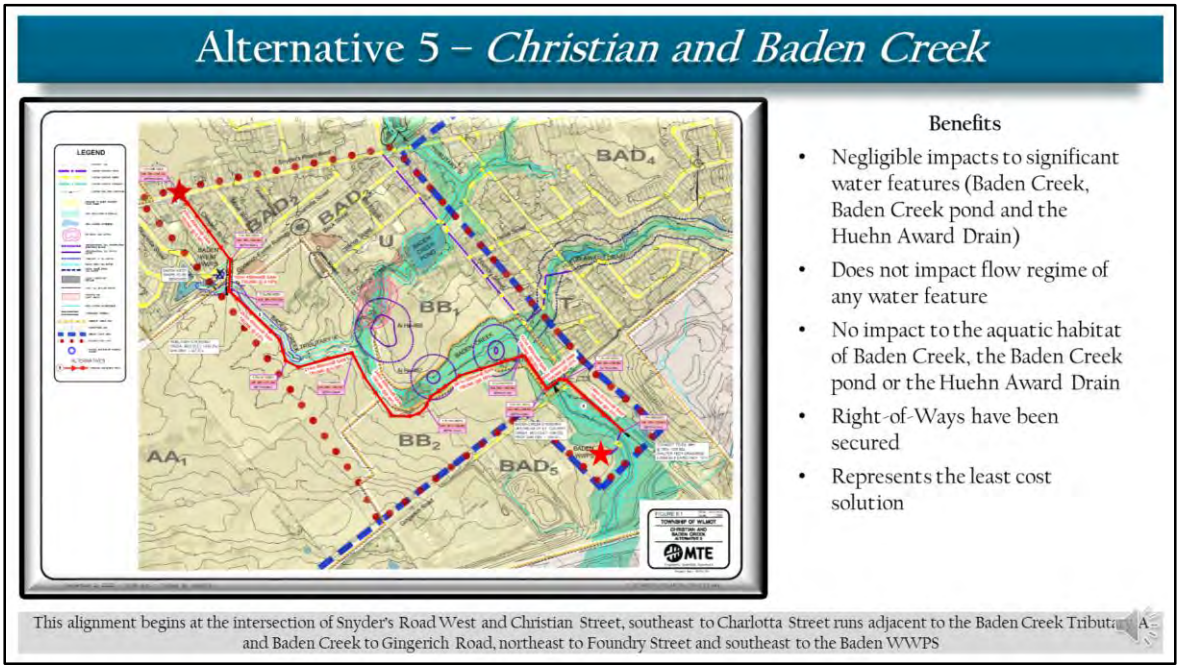



**Benefits**

- Eliminates two existing pumping stations (school WWPS and the Baden West WWPS)
- Eliminates noise and odour associated with the removal of existing pumping stations
- Reduces long-term operational and maintenance costs
- No impacts to locally significant wetlands
- No impacts to SAR or SWH

This alignment begins at the intersection of Snyder's Road West and Christian Street, southeast to Charlotta Street runs adjacent to the Baden Creek Tributa and Baden Creek to Gingerich Road, northeast to Foundry Street and southeast to the Baden WWPS

It eliminates two waste water pumping stations, the school WWPS and the Baden West WWPS which will reduce noise, odour and long-term operation and maintenance costs associated with the pumping station and the Baden West noise wall. This alternative does not impact any locally significant wetlands, Species at Risk or Significant Wildlife Habitat.




There are negligible impacts to Baden Creek, the Baden Creek pond and the Huehn Award Drain. It does not impact flow regime due to trenchless stream crossings or aquatic habitat of any water feature. The right-of-ways for this alignment have been secured and represents the least cost solution.

# Alternative 5 – *Christian and Baden Creek*




## Constraints

- Disrupts traffic along Christian Street and Charlotta Street
- Impacts existing residents along Christian Street
- Impacts archeological findspot monitoring buffer

This alignment begins at the intersection of Snyder's Road West and Christian Street, southeast to Charlotta Street runs adjacent to the Baden Creek Tributa and Baden Creek to Gingerich Road, northeast to Foundry Street and southeast to the Baden WWPS

This alternative disrupts local traffic along Christian Street and a small section of Charlotta Street impacting access to existing local residents. Will require monitoring within the 50m archeological buffer during construction.

# Evaluation of Alternative Solutions

**PRELIMINARY EVALUATION CRITERIA - BADEN SANITARY TRUNK**

| Factor Category / Factor Group / Factor | Alternative | | | | |
|---|---|---|---|---|---|
| | A1 | A2 | A3 | A4 | A5 |
| Date: August 2022 | Modified 2014 Environmental Assessment Preferred Alternative (Do Nothing) | Snyder's/Foundry | Christian/Charlotte/Mill/ Charles/Foundry | Christian/Charlotte/Queen and Baden Creek | Christian and Baden Creek |
| **4. FINANCIAL** | | | | | |
| Capital Cost | ● | ◕ | ◑ | ◔ | ○ |
| Operational Cost (Sanitary sewer) | ● | ◕ | ◑ | ◔ | ○ |
| **Summary Financial** | ● | ◕ | ◑ | ◔ | ○ |
| **5. TECHNICAL** | | | | | |
| Constructability | ● | ◕ | ◑ | ◔ | ○ |
| Trenchless (Constructability and Complexity) | ● | ◕ | ○ | ◑ | ◔ |
| Property (Land/acquisition) | ● | ○ | ◔ | ◑ | ◕ |
| Serviceability (Long-term) | ● | ◕ | ◑ | ◔ | ○ |
| **Summary Technical** | ● | ◕ | ◑ | ◔ | ○ |
| Traffic Operations | ● | ◕ | ◑ | ◔ | ○ |
| Transportation policy initiatives | ● | ◕ | ◑ | ◔ | ○ |
| Railroad Crossing | ◕ | ● | ○ | ◑ | ◔ |
| **3.B Municipal Services and Utilities** | | | | | |
| Municipal Services (sanitary, water, storm) | ◕ | ● | ◑ | ◔ | ○ |
| Municipal Infrastructure | ● | ◕ | ◑ | ◔ | ○ |
| Utilities (Bell, Hydro, Gas) | ● | ◕ | ◑ | ◔ | ○ |
| **Summary Transportation/Municipal Services & Utility** | ● | ◕ | ◑ | ◔ | ○ |

| Order of Preference | |
|---|---|
| Most Preferred | ○ |
| More Preferred | ◔ |
| Somewhat Preferred | ◑ |
| Less Preferred | ◕ |
| Least Preferred | ● |

The impacts of the Alternatives were evaluated against the inventory of the natural, social/cultural, economic and technical environment, including possible mitigating measures.

# Evaluation of Alternative Solutions

**PRELIMINARY EVALUATION CRITERIA - BADEN SANITARY TRUNK**

| Factor Category / Factor Group / Factor | Alternative | | | | |
|---|---|---|---|---|---|
| | A1 | A2 | A3 | A4 | A5 |
| Date: August 2022 | Modified 2014 Environmental Assessment Preferred Alternative (Do Nothing) | Snyder's/Foundry | Christian/Charlotta/Mill/ Charles/Foundry | Christian/Charlotta/Queen and Baden Creek | Christian and Baden Creek |
| **4. FINANCIAL** | | | | | |
| Capital Cost | ● | ◕ | ◑ | ◔ | ○ |
| Operational Cost (Sanitary sewer) | ● | ◕ | ◑ | ◔ | ○ |
| **Summary Financial** | ● | ◕ | ◑ | ◔ | ○ |
| **5. TECHNICAL** | | | | | |
| Constructability | ● | ◕ | ◑ | ◔ | ○ |
| Trenchless (Constructability and Complexity) | ● | ◕ | ○ | ◑ | ◔ |
| Property (Land/acquisition) | ● | ○ | ◔ | ◑ | ◕ |
| Serviceability (Long-term) | ● | ◕ | ◑ | ◔ | ○ |
| **Summary Technical** | ● | ◕ | ◑ | ◔ | ○ |
| Traffic Operations | ● | ◕ | ◑ | ◔ | ○ |
| Transportation policy initiatives | ● | ◕ | ◑ | ◔ | ○ |
| Railroad Crossing | ◕ | ● | ○ | ◑ | ◔ |
| **3.B Municipal Services and Utilities** | | | | | |
| Municipal Services (sanitary, water, storm) | ◕ | ● | ◑ | ◔ | ○ |
| Municipal Infrastructure | ● | ◕ | ◑ | ◔ | ○ |
| Utilities (Bell, Hydro, Gas) | ● | ◕ | ◑ | ◔ | ○ |
| **Summary Transportation/Municipal Services & Utility** | ● | ◕ | ◑ | ◔ | ○ |

| Order of Preference | |
|---|---|
| Most Preferred | ○ |
| More Preferred | ◔ |
| Somewhat Preferred | ◑ |
| Less Preferred | ◕ |
| Least Preferred | ● |

Each alternative underwent a numerical evaluation. The alternatives were then compared to each other by applying a ranking from most preferred to least preferred based on the level of anticipated impact for each factor.

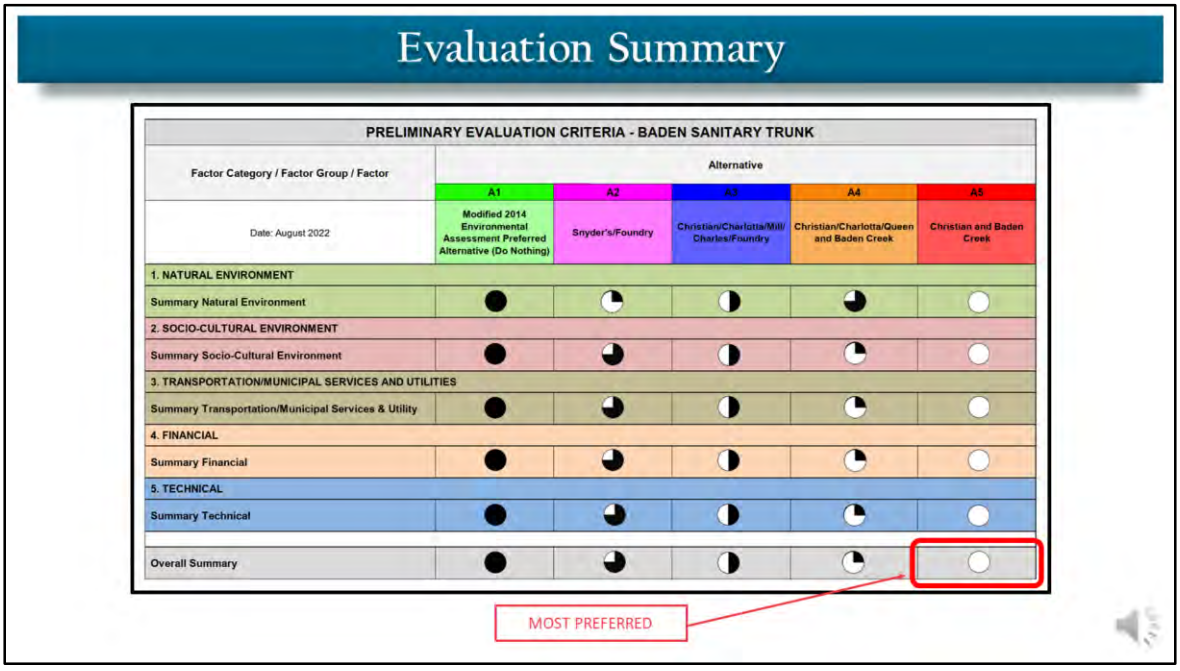
# Evaluation of Alternative Solutions

**PRELIMINARY EVALUATION CRITERIA - BADEN SANITARY TRUNK**

| Factor Category / Factor Group / Factor | Alternative | | | | |
|---|---|---|---|---|---|
| | A1 | A2 | A3 | A4 | A5 |
| Date: August 2022 | Modified 2014 Environmental Assessment Preferred Alternative (Do Nothing) | Snyder's/Foundry | Christian/Charlotta/Mill/ Charles/Foundry | Christian/Charlotta/Queen and Baden Creek | Christian and Baden Creek |
| **4. FINANCIAL** | | | | | |
| Capital Cost | ● | ◕ | ◑ | ◔ | ○ |
| Operational Cost (Sanitary sewer) | ● | ◕ | ◑ | ◔ | ○ |
| **Summary Financial** | ● | ◕ | ◑ | ◔ | ○ |
| **5. TECHNICAL** | | | | | |
| Constructability | ● | ◕ | ◑ | ◔ | ○ |
| Trenchless (Constructability and Complexity) | ● | ◕ | ○ | ◑ | ◔ |
| Property (Land/acquisition) | ● | ○ | ◔ | ◑ | ◕ |
| Serviceability (Long-term) | ● | ◕ | ◑ | ◔ | ○ |
| **Summary Technical** | ● | ◕ | ◑ | ◔ | ○ |
| Traffic Operations | ● | ◕ | ◑ | ◔ | ○ |
| Transportation policy initiatives | ● | ◕ | ◑ | ◔ | ○ |
| Railroad Crossing | ◕ | ● | ○ | ◑ | ◔ |
| **3.B Municipal Services and Utilities** | | | | | |
| Municipal Services (sanitary, water, storm) | ◕ | ● | ◑ | ◔ | ○ |
| Municipal Infrastructure | ● | ◕ | ◑ | ◔ | ○ |
| Utilities (Bell, Hydro, Gas) | ● | ◕ | ◑ | ◔ | ○ |
| **Summary Transportation/Municipal Services & Utility** | ● | ◕ | ◑ | ◔ | ○ |

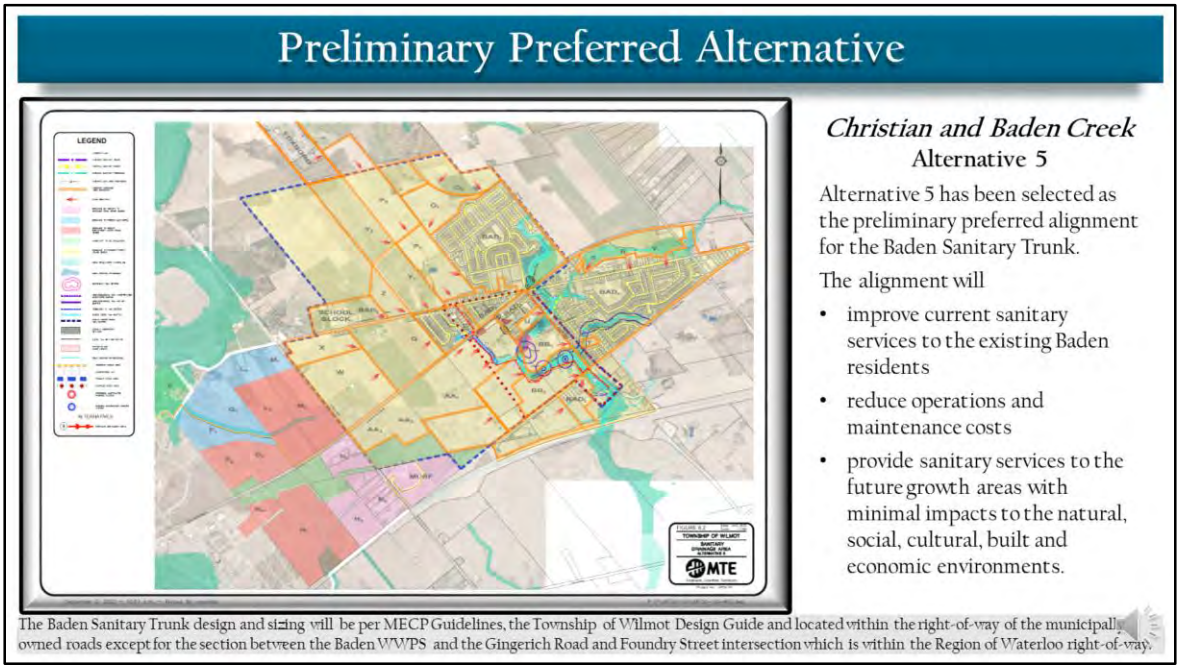
| Order of Preference | |
|---|---|
| Most Preferred | ○ |
| More Preferred | ◔ |
| Somewhat Preferred | ◑ |
| Less Preferred | ◕ |
| Least Preferred | ● |

A graphical representation of the numerical evaluation is shown to best illustrate the results of the analysis. A full pie represents the greatest anticipated impact, and therefore the least preferred. The empty pie represents the least anticipated impact, and therefore most preferred.




The table provides a summary of the Evaluation of Alternatives as an average range under each environment category.

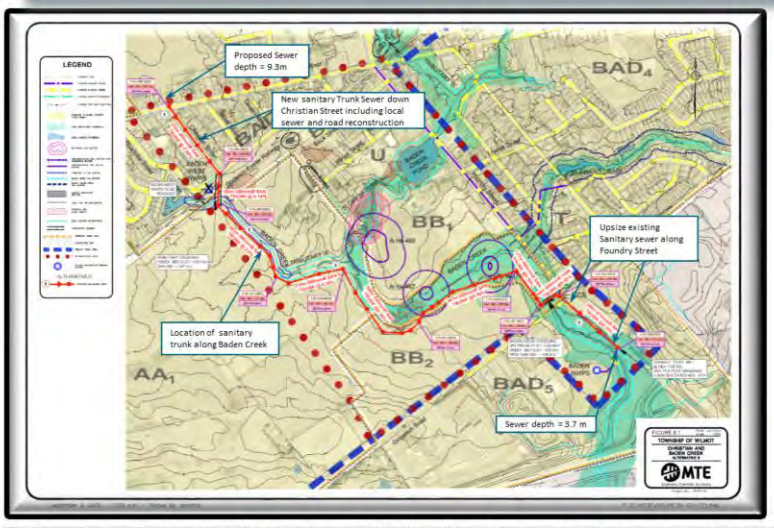
The outcome of the evaluation illustrates that Alternative 5 received the most favourable overall ranking when compared to the other alternatives.




Alternative 5 has been selected as the preliminary preferred alignment for the Baden Sanitary Trunk.

The alignment will improve current sanitary services to the existing Baden residents, reduce operations and maintenance costs and provide sanitary services to the future growth areas with minimal impacts to the natural, social, cultural, built and economic environments.

# Preliminary Preferred Alternative




*Christian and Baden Creek*
**Alternative 5**

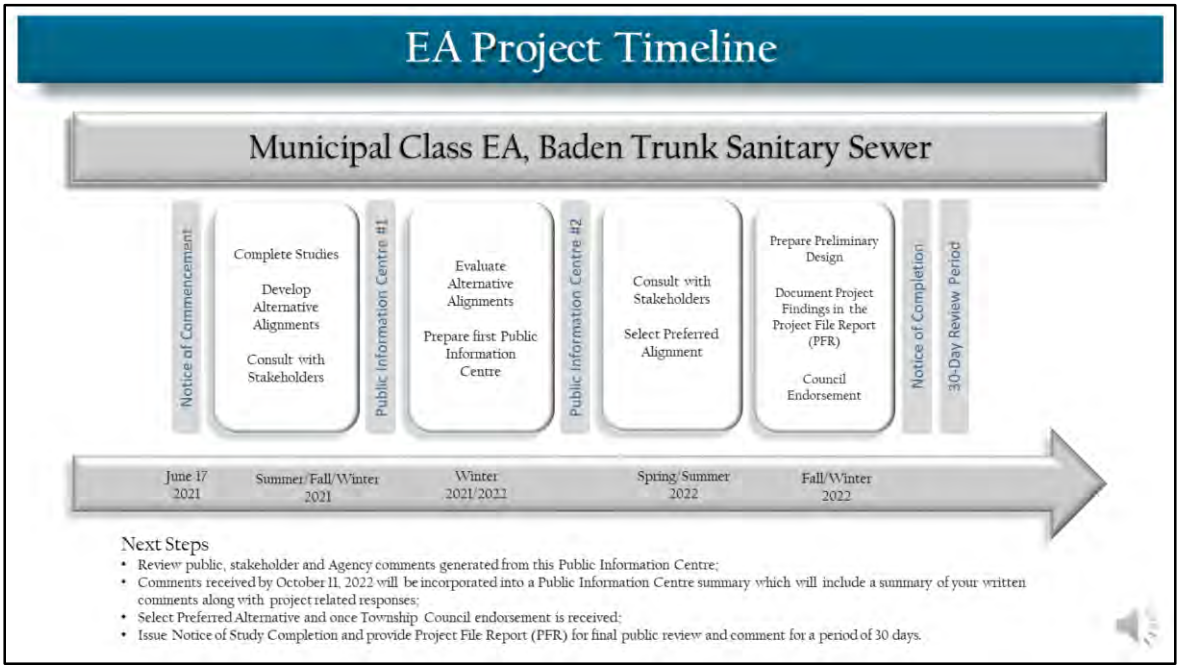
This alternative consists of

- Replacing the local sanitary sewer along Christian Street.
- Installing a new trunk sanitary sewer along Christian Street, through the open fields adjacent to the Baden Creek Tributary 'A' and Baden Creek
- Upsizing the sewer from the Gingerich Road and Foundry Street intersection to the Baden WWPS.

A complete reconstruction of Christian Street will be required.

The Baden Sanitary Trunk design and sizing will be per MECP Guidelines, the Township of Wilmot Design Guide and located within the right-of-way of the municipally owned roads except for the section between the Baden WWPS and the Gingerich Road and Foundry Street intersection which is within the Region of Waterloo right-of-way.

This alternative consists of replacing the local sanitary sewer along Christian Street, installing a new trunk sanitary sewer along Christian Street, through the open fields adjacent to the Baden Creek Tributary 'A' and Baden Creek, and upgrading the sewer from the intersection of Gingerich Road and Foundry Street to the Baden WWPS. A complete reconstruction of Christian Street will be required.




The timeline of this study is provided on this slide. Following the comments received from this PIC, the Project Team will confirm the preferred alternative. The Municipal Class Environmental Assessment process, including the input from the public, agencies, Indigenous communities and stakeholders will be documented in a Project File Report. Once council endorsement is received, the Project File Report will be made available for public review and comment for a period of 30-days following the Notice of Completion. At this time, it is anticipated that the Notice of Completion and the Project File Report will be available in the Winter of 2022.




Thank you for participating in the Baden Trunk Sanitary Sewer Class (EA) Online Public Information Centre (PIC).

Please direct any comments, questions or suggestions relevant to this study to either Jeff Molenhuis with the Township of Wilmot or to Dot Roga with MTE Consultants by October 11, 2022.

This Public Information Centre is relying on web-based communications, please feel free to fill out the comment sheet located on this website. Commenting period for this Public Information Centre will extend to Tuesday Oct 10, 2022. All comments received will be collected under the Environmental Assessment Act and, with the exception of personal information, will become part of the public record.

Administration Centre: 400 Clyde Road, P.O. Box 729 Cambridge, ON N1R 5W6
Phone: 519-621-2761 Toll free: 1-866-900-4722 Fax: 519-621-4844 www.grandriver.ca

January 29, 2021

Jeff Molenhuis
Director of Public Works and Engineering
Township of Wilmot
60 Snyder's Road West
Baden ON N3A 1A1
jeff.molenhuis@wilmot.ca

Dot Roga
Project Manager
MTE
520 Bingemans Centre Drive
Kitchener ON N2B 3X9
droga@mte85.com

**Re: Municipal Class Environmental Assessment**
**Baden Sanitary Trunk Sewer**
**Township of Wilmot**

Dear Mr. Molenhuis and Ms. Roga,

The Grand River Conservation Authority (GRCA) has received the Virtual Public Information Centre 1 materials for the above-noted Class Environmental Assessment (Class EA). We have reviewed the proposed alternatives and can offer the following comments.

1. While generally permitted, GRCA policy emphasizes exploring all feasible alternative sites for public infrastructure outside of flooding and erosion hazards. If alternatives 4 or 5 are chosen, a scoped environmental impact study (EIS) will be required to demonstrate, where unavoidable, intrusions on significant natural features or hydrologic / ecological functions are minimized, and the proposed design will adequately restore and enhance features and functions. The design should also consider maintenance and emergency repair requirements, and ensure those activities can also minimize intrusions into features / functions.

2. Any part of the preferred alternative in the flooding hazard (e.g. watercourse crossings) should ensure existing grades are generally maintained, and new hydraulic crossing obstructions are minimized.



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3. Consideration should also be given to potential erosion from Baden Creek, and demonstrate that there will be no impacts on existing and future slope stability.

4. Detailed design plans will be requested subsequent to the Class EA process in support of a GRCA permit. An erosion and sediment control plan will also be required, which should include any isolation works.

Please continue to include us on the mailing list for stakeholder consultation, and the GRCA appreciates the opportunity to comment on the preferred alternative. If you have any questions or require additional information, please contact me at 519-621-2763 ext. 2292 or theywood@grandriver.ca.

Sincerely,



Trevor Heywood
Resource Planner
Grand River Conservation Authority

Grand River Conservation Authority

Administration Centre: 400 Clyde Road, P.O. Box 729 Cambridge, ON N1R 5W6

Phone: 519-621-2761 Toll free: 1-866-900-4722 Fax: 519-621-4844 www.grandriver.ca

September 28, 2022

Jeff Molenhuis
Director of Public Works and Engineering
Township of Wilmot
60 Snyder's Road West
Baden ON N3A 1A1
jeff.molenhuis@wilmot.ca

Dot Roga
Project Manager
MTE
520 Bingemans Centre Drive
Kitchener ON N2B 3X9
droga@mte85.com

**Re: Municipal Class Environmental Assessment**
**Baden Sanitary Trunk Sewer**
**Township of Wilmot**

Dear Mr. Molenhuis and Ms. Roga,

The Grand River Conservation Authority (GRCA) has received the Draft Environmental Study Report Appendices for the above-noted Class Environmental Assessment (Class EA). We have reviewed Preferred Alternative 5 and can offer the following comments.

1. We agree with the evaluation that trenchless stream crossings will not impact Baden Creek, as long as standard erosion and sediment control measures are implemented at the drill pits.

2. The evaluation notes impacts to the floodplain may occur. We do not anticipate impacts to the floodplain if existing grades are restored. If significant grade changes are anticipated, please consult with us early during detailed design.

3. The final Class EA and/or detailed design process should:
   a. Identify and confirm the size of the wetland features and properly screen them for compliance with GRCA Policy 8.4.4 / 8.4.5;
   b. Identify and interpret the proposed construction sequencing and techniques proposed to install the trunk sewer.



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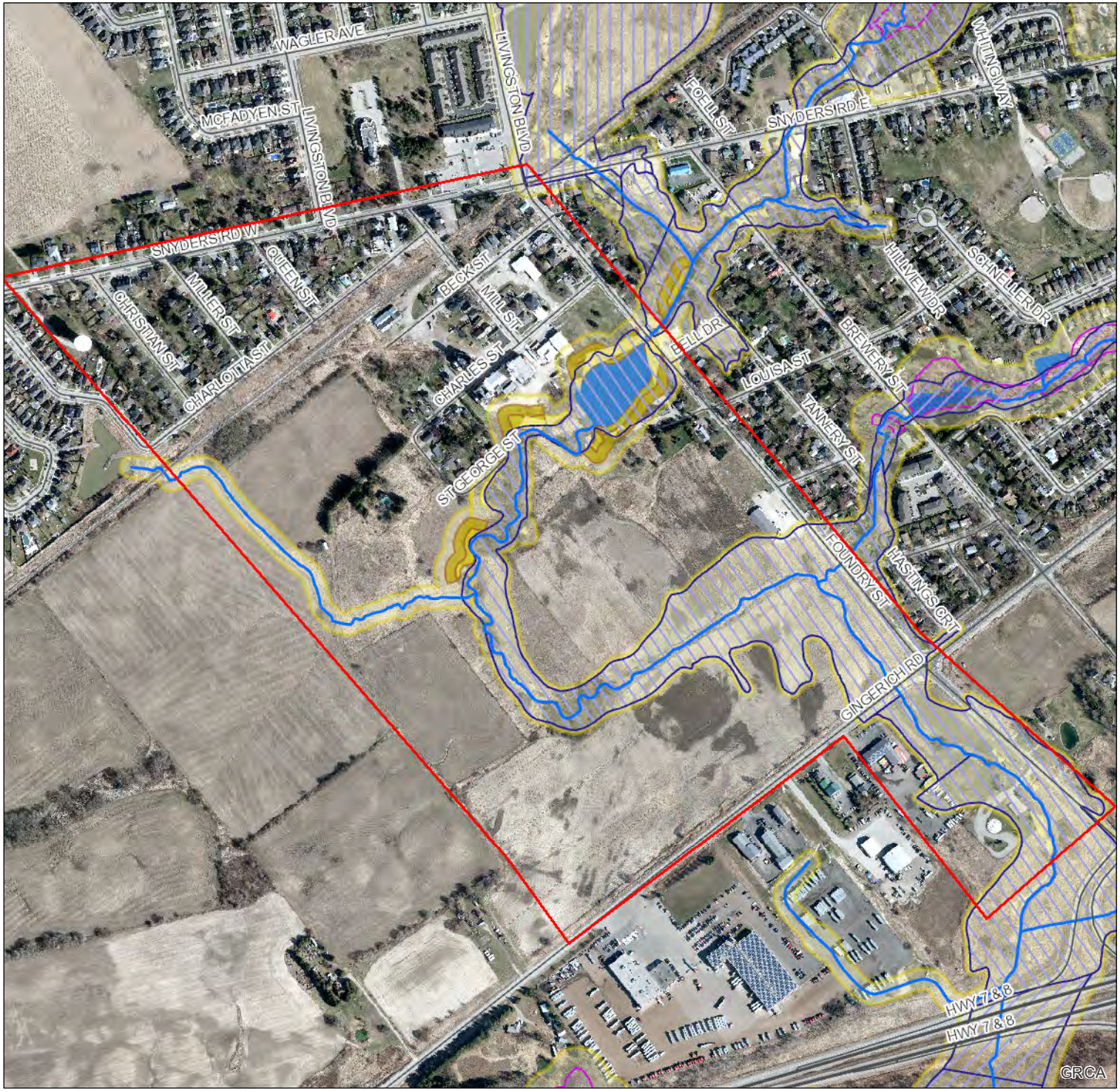
4. A GRCA permit will be required prior to construction. Detailed design and erosion / sediment control plans are requested in support of an application.

We trust this information is of assistance. If you have any questions or require additional information, please contact me at 519-621-2763 ext. 2292 or theywood@grandriver.ca.

Sincerely,



Trevor Heywood
Resource Planner
Grand River Conservation Authority




Map Centre (UTM NAD83 z17): 526,866.18 4,805,181.89

This map is not to be used for navigation | 2020 Ortho (ON)

Grand River Conservation Authority

Date: Dec 29, 2021

Author: TH

# Baden Sanitary Trunk Main Class EA

**Legend**

- Regulation Limit (GRCA)
- Regulated Watercourse (GRCA)
- Regulated Waterbody (GRCA)
- Wetland (GRCA)
- Floodplain (GRCA)
  - Engineered
  - Estimated
  - Approximate
  - Special Policy Area
- Slope Valley (GRCA)
  - Steep
  - Oversteep
  - Steep
- Slope Erosion (GRCA)
  - Oversteep
  - Toe
- Lake Erie Flood (GRCA)
- Lake Erie Shoreline Reach (GRCA)
- Lake Erie Dynamic Beach (GRCA)
- Lake Erie Erosion (GRCA)
- Parcel - Assessment (MPAC/MNRF)

This legend is static and may not fully reflect the layers shown on the map. The text of Ontario Regulation 150/06 supercedes the mapping as represented by these layers.

**Copyright Grand River Conservation Authority, 2021.**
Disclaimer: This map is for illustrative purposes only. Information contained herein is not a substitute for professional review or a site survey and is subject to change without notice. The Grand River Conservation Authority takes no responsibility for, nor guarantees, the accuracy of the information contained on this map. Any interpretations or conclusions drawn from this map are the sole responsibility of the user.
The source for each data layer is shown in parentheses in the map legend. For a complete listing of sources and citations go to: https://maps.grandriver.ca/Sources-and-Citations.pdf

0 45 90 180 270 Metres

N

NAD 1983 UTM Zone 17N

Scale: 8,095

TOWNSHIP OF Wilmot

60 Snyder's Road West, Baden, ON N3A 1A1

**Public Works and**
**Engineering Services Department**
T: 519-634-8444
F:519-634-5522

To Kim Hallman

We are in receipt of your letter dated January 9, 2023, regarding the Baden Trunk Sanitary Main Project.

We will attempt to address your concerns within this letter, however, if at any time you would like a more fulsome discussion on the proposed project and the problem statement, we would be more than happy to schedule a meeting to elaborate.

You note, no information has been presented to show how the preferred alternative addresses the capacity issue for growth.

As per the introduction of the Baden Trunk Sanitary Sewer Class EA,

> The Wastewater Servicing Study for the Growth Areas of Baden and New Hamburg, completed in 2014 (CRA, 2014), revealed that the existing sanitary infrastructure did not support existing peak flows and lacked capacity and depth for the planned growth within the Settlement of Baden.

At the time of the 2014 study, the report recommended a preferred alternative that would have seen a trunk sanitary sewer installed on Sandhills Road (Township Road 16) towards the Baden WWPS, and a second trunk sewer on Snyders Road East towards New Hamburg.

> Changes to the Provincial Policy Statement (2020), the Places to Grow Plan (2020), the amended Regional Official Plan (2015), and the Township of Wilmot Official Plan (2019), has prompted the Township to re-evaluate the wastewater servicing strategy to better service existing residents and accommodate the anticipated future growth areas for the Settlement of Baden.

The new line being proposed within this Environmental Assessment will be sized in such away to accommodate the flows from the proposed growth area. Presently the flows from Baden are directed to the existing Baden WWPS. Plans are underway with the region, and the Township to address the capacity at the pumping station to direct flows ultimately to the New Hamburg Waste Water Treatment Plant.

Of the Five proposed alternatives presented within the Baden Trunk Sewer EA, the selected Alternative 5 represents the most comprehensive solution that will provide long-term servicing for the largest anticipated growth area possible within Baden while also maintaining servicing for the existing

community. Preliminary sizing of the trunk sanitary sewer takes into account all existing drainage to the Baden wastewater pumping station (WWPS) (approximately 275 hectares) and accepts potential future drainage from approximately 380 hectares, including residential, commercial, institutional, and industrial flows.

In regard to the alignment of the proposed trunk sanitary sewer near the existing Baden Creek, we note that sanitary trunk sewers are often laid at the lowest area to maximize the gravity flows to this trunk sewer while minimizing the depth and costs for installing these services. The Ministry of the Environment has stringent requirements for the construction of sanitary sewers to prevent exfiltration of sanitary sewage. Further, while the trunk sewer will be in close proximity to the existing watercourse, it will be located away from the watercourse for ability to maintain the infrastructure as well as provide sufficient separation from any environmentally sensitive areas.

In regard to the construction on Christian Street, we note the proposal calls for a 450mm sanitary trunk sewer at a significant depth. Through detailed design we will be looking at ways to minimize the impacts on local residents during construction including investigating trenchless technologies for these works. We do note that reconstruction of Christian Street in a fulsome manner would be expected to take several months, however, these timelines and disturbances can be managed and minimized through proper contract administration and contract act requirements. These will all be investigated through the detailed design portion of this project.

In summary, we have taken a wholesome evaluation of the existing sanitary capacity constraints within the community and the proposed alternative will accommodate the sanitary growth for the foreseeable future within the current urban boundary. We also note, similar capacity and planning investigations are being undertaken for the New Hamburg growth area.

Again, if you would like to discuss this more fully, please do not hesitate to contact me at the numbers provided below.

Sincerely

Ken VanderWal P. Eng
Manager of Engineering
Infrastructure Services
Township of Wilmot
Office: 519-634-8519 x. 239
Cell: 519-778-0449

Cc: Jeff Molenhuis Township of Wilmot
Dot Roga MTE

January 9, 2023

To whom it may concern,
I received your Notice of Study Completion for the Baden Sanitary Trunk Main project in our mailbox around December 9, 2022. I am writing to provide my feedback on this report within the 30 days as requested.

After watching the online presentation and reviewing the information provided on the Township website, I don't agree with any of the proposed alternatives. The problem statement indicates that the existing infrastructure lacks capacity and depth for future planned growth. No information has been presented to show how this preferred alternative addresses the capacity issue or future growth. We know several new housing developments are under consideration, and you can see these areas have been captured in the Primary Study Area on slide 5 of the presentation, but are we to believe that this one new line will support all of this new growth? This report proposes to pump sewage all the way across town to the Baden Pumping station then to New Hamburg for treatment, even for all the new developments being considered. Are we sure this solution will adequately support the future planned growth? The preferred alternative seems a bit short sighted and lacks focus on managing capacity for future growth.

I am also concerned that we are honestly considering running sewage lines along or near any type of waterway, either creek, tributary or pond. This does not sound like a good idea, and a disaster just waiting to happen. If a pipe broker or worse, we could disrupt the entire water system which we all rely upon. Are we really going to push construction through and potentially compromise our community and our surrounding neighbors? Has there been any sort of assessment done to determine the level of risk associated with running these pipes along a waterway to the pumping station? I don't believe any of these details were provided in this report or presentation. As we continue to lose agricultural land to new housing developments, I think it's imperative that council and leaders work to preserve and protect the habitats and wildlife who call this area home. Yes, the report clearly articulates that running a new line down Christian St would be the easiest option, but is this really the best decision for our community in the long term?

I am also a resident of Christian Street, and I will go on record to say that I do not support a 'full reconstruction' of my street, because I don't feel this preferred alternative addresses the problem. Although there were no details provided as to what a total reconstruction would mean, I can assume it will be hugely disruptive, an inconvenience to every resident on the street and as previous construction projects in Baden have shown us, it will probably not be completed in a timely manner. I certainly do want to live in a construction zone for months, especially if this will not be a sound long term investment in our infrastructure. I also work at home and I believe it will be extremely challenging to do my job living in a construction zone.

My husband and I moved to Baden over a decade ago because it was a small community. We picked this street because it was quiet and not busy. We are not opposed to new developments coming into the Township but we are concerned that they're not being planned or developed in a

smart way that will benefit the community moving forward. The main street has been under construction for several years now and it is still not fully done. How will our Township handle new proposed developments especially since there is a known lack of infrastructure in place to support them. I expect a tremendous amount of disruption at Christian St and Snyder's Rd for many years to come due to these developments, but I hope this solution isn't being pushed through without proper consideration and the long term plan for Baden.

In summary, I would urge this council to reconsider the proposed recommendations and take a hard look at the long term implications. Does this preferred alternative truly address the problem statement, or will this project simply need to be redone in a few years time because proper due diligence and planning was not done properly. I know I am only one individual in this community, but please know that your decision will have a direct impact on me and our household.

Thank you for your time.
Warm Regards,
Kim Hallman

**Ministry of the Environment, Conservation and Parks**

Environmental Assessment Branch

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

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

Direction des évaluations environnementales

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

January 25, 2023

Ken VanderWal (*Via Email Only)*
Manager of Engineering – Infrastructure Services
Township of Wilmot
ken.vanderwal@wilmot.ca

Dot Roga
Project Manager
MTE Consultants Inc.
droga@mte85.com

**Re: Baden Sanitary Trunk Main**
**Township of Wilmot**
**Municipal Class Environmental Assessment – Schedule B**
**Project Review Unit Comments – Final Project File Report**

Dear Ken VanderWal and Dot Roga,

Thank you for providing the ministry with an opportunity to comment on the final Project File Report (Report) for the above noted Class Environmental Assessment (EA) project. Our understanding is that in order accommodate current and future growth in the area, the Township of Wilmot (the proponent) has determined that the preferred alternative, Alternative 5, consists of replacing the local sanitary sewer and installing a new trunk sanitary sewer along Christian Street, through the open fields adjacent to the Baden Creek Tributary 'A' and Baden Creek, and upgrading the sewer from the intersection of Gingerich Road and Foundry Street to the Baden WWPS.

The Ministry of the Environment, Conservation and Parks (ministry) provides the following comments for your consideration.

**General**

Please note schedule B projects require the completion of a Project file Report rather than an Environmental Study Report. Please refer to section A.4.1 Schedule B project file of the MECA available here: A.4.1 SCHEDULE B PROJECT FILE (municipalclassea.ca)

**Consultation Records**

Any follow-up correspondence should be included in the final Project File Report.

**Indigenous Consultation**

Further to any follow-up during the review period for the EA, the proponent should continue reaching out to all communities previously engaged if there any substantial changes to the project/process or if they are applying for subsequent permits from the ministry that may be of interest or concern to communities.

**Species at Risk**

Please note that it is the responsibility of the proponent to ensure that Species at Risk (SAR) are not killed, harmed, or harassed, and that their habitat is not damaged or destroyed through the proposed activities to be carried out on the site. If the proposed activities cannot avoid impacting protected species and their habitats, then the proponent will need to apply for an authorization under the Endangered Species Act (ESA). As is noted in the Report, if the proponent believes that their proposed activities are going to have an impact or are uncertain about the impacts, they should contact SAROntario@ontario.ca to undergo a formal review under the ESA.

**Climate Change**

Climate change considerations have not been documented in the Project File Report. The document "Considering Climate Change in the Environmental Assessment Process" (Guide) (www.ontario.ca/page/considering-climate-change-environmental-assessment-process) is now a part of the EA program's Guides and Codes of Practice. The Guide sets out the ministry's expectation for considering climate change in the preparation, execution and documentation of environmental assessment studies and processes. The guide provides examples, approaches, resources, and references to assist proponents with consideration of climate change in EA. The proponent should review this Guide in detail. The ministry expects proponents of Class EA projects to:

- Consider the project's expected production of greenhouse gas emissions and impacts on carbon sinks (climate change mitigation), as well as resilience or vulnerability of the undertaking to changing climatic conditions (climate change adaptation).
- Include a discrete section in the ESR detailing how climate change was considered in the EA.

- How climate change is considered can be qualitative or quantitative in nature and should be scaled to the project's level of environmental effect. In all instances, both a project's impacts on climate change (mitigation) and impacts of climate change on a project (adaptation) should be considered.

**Groundwater**

Current geotechnical conditions are adequately described in the report. The hydrogeological assessment provided an analysis with respect to the impacts on existing shallow flow(baseflow) and interflow patterns relative to surface water features and groundwater discharge areas. The recommended alternative 5: Christian Street and Baden Creek has minimal groundwater interaction at the stream crossing of ephemeral Tributary A and the Baden. The groundwater potentially discharged to Baden Creek (BH2, BH8, & BH13) was observed at depths of 0.25 mbgs.

MW101-21 (clayey silt), MW102-21 (silt and sand), and MW104-21(clayey silt) were drilled along Alternative 5. A shallow sand layer is present between 5.6 and 6.1 mbgs at MW102-21, which is below the proposed sanitary sewer installation of 5.4 mbgs and may indicate higher dewatering volumes at this location.

If dewatering is required, it may impact groundwater inflow to Baden Creek and Tributary A resulting in lower baseflow and an increase in water temperature. However, it can occur with no impacts if done during dry conditions and/or by securing an easement from OK Tire owners to mitigate the number of crossings of Baden Creek and the potential impacts associated with the construction along Gingerich Road and Foundry Street.

The Site is connected to the municipal drinking water system and there were no active PTTW observed within 500 m according to the database. Therefore, there are no private water users that may be impacted by dewatering requirements during construction.

A hydrogeological/geotechnical investigation during the detailed design stage will determine dewatering requirements during construction and will depend on the depth of the Baden Trunk final design. This study will establish if a Permit to Take Water (PTTW) is required or if the registration on the Environmental Activity and Sector Registry (EASR) is sufficient.

If the construction of this project requires groundwater dewatering exceeds 50,000 L/d and is <400,000 L/d, the prescribed activity will be registered as an Environmental Activity and Sector Registry (EASR) regulation O. Reg. 63/16. If EASR is required, a calculation of the amount of groundwater that is expected to be taken from the area of influence of each dewatering pit, and from any overlapping areas of influence should be provided to evaluate the level of groundwater impacts. As well, as a notification protocol that identifies water users that may be impacted, including a written notice with details of the water taking (time, location, etc.) and a contingency plan with measures to mitigate identified risks.

If the groundwater dewatering is more than 400,000 L/d, a Permit to Take Water (PTTW) should be obtained (Sections 34 and 98 Ontario Water Resources Act R.S.O. 1990 and Water Taking Regulation O. Reg. 387/04). If a PTTW is required, a hydrogeological environment assessment should be provided in detail to allow for a reasonable evaluation of the level of groundwater impacts that might occur as a result of the undertaking during sanitary trunk installation.

If a PTTW is required, an investigation should be conducted during the detailed design stage regarding potential interference due to construction with other water users along this project. The hydrogeologic investigation includes drilling and installation of monitoring wells, stream-bed mini-piezometers, groundwater levels, and water quality monitoring (O. Reg. 169/03: Ontario Water Quality Standards). This investigation should include the related monitoring and mitigation plan regarding project interference with other water users within the zone of influence of this project. As well, as impact prediction models, mitigation measures and monitoring, and compliance reporting if they are applicable.

If a PTTW is required, an environmental assessment report prepared by a qualified professional (PGO or equivalent) and a geotechnical note prepared by a geotechnical engineer should be included in the supporting documentation of the PTTW application. The geotechnical note should address potential surrounding structural damage due to settlement from the required groundwater taking and the proposed monitoring/contingency and mitigation plan.

If a PTTW is required, MECP requires a discussion of the potential impacts on the surrounding natural environment and adjacent waterbody feature(s), any risks posed to nearby structures from subsidence, and the potential for contaminated groundwater migration from construction dewatering (O. Reg. 153/04: Records of Site Conditions – Part XV.1 of the Act). PTTW applications must also provide details regarding the proposed discharge plan and discuss how the dewatering effluent/surface water (i.e., rain) will be managed and treated to meet water quality criteria based on the final discharge location (i.e., sanitary sewer or natural environment).

**Excess Material and Waste**

- Activities involving the management of excess soil should be completed in accordance with O. Reg. 406/19 and the ministry's current guidance document titled *Management of Excess Soil – A Guide for Best Management Practices*, available online at ontario.ca/page/management-excess-soil-guide-best-management-practices.
- waste generated during construction must be disposed of in accordance with ministry requirements.

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Thank you for circulating this Report for the ministry's consideration. Should you or any members of your project team have any questions regarding the material above, please contact me at joan.delvillarcuicas@ontario.ca

Sincerely,



Joan Del Villar C
Regional Environmental Planner
Project Review Unit, Environmental Assessment Branch
Ontario Ministry of the Environment, Conservation and Parks

Cc: Zenova Gentles, Administrative Assistant, MTE Consultants Inc

# Appendix E

# Technical Memo

# Table of Contents


**INTRODUCTION**

- Appendix A CRA 2014 Growth Areas
- Appendix B CRA 2014 Alternative D

**1.0 NATURAL ENVIRONMENT**

- Appendix A Natural Environmental Assessment Report (April 2022)
  Evaluation of Alternatives Natural Environment Criteria Technical Memorandum (July 11, 2022)
- Appendix B Baden Trunk EA Geotechnical Site Characterization Report (May 3, 2022)
- Appendix C Hydrogeological Assessment of Alternatives Technical Memorandum (April 26, 2022)
- Appendix D Fluval Geomorphological Assessment Technical Memorandum (August 30, 2022)

**2.0 SOCIO-CULTURAL ENVIRONMENT**

- Appendix A Land Use Planning Evaluation, Baden Trunk Sanitary Sewer EA Technical Memorandum (April 28, 2022)
- Appendix B Stage 1-2 Archaeological Assessment Baden Sanitary Sewer Replacement, Baden (November 8, 2022)
  Supplementary Documentation- Stage 1-2 Archaeological Assessment, Baden Sanitary Sewer Replacement, Baden (November 8, 2022)
- Appendix C Cultural Heritage Evaluation Report (CHER) (December 2021)

**3.0 TRANSPORTATION/MUNICIPAL SERVICES & UTILITIES**

**4.0 FINANCIAL**

- Appendix A Cost Estimate

**5.0 TECHNICAL**

**6.0 SELECTION OF THE PREFERRED ALTERNATIVE & EVALUATION MATRIX**

- Appendix A Evaluation Matrix

## Figures


Figure 1.0 Primary Study Area

Figure 2.0 Detailed Study Area

Figure 3.0 Existing Sanitary Sewer System and Drainage Areas

Figure 4.1 Alternative 1 - 2014 Environmental Assessment referred Alternative (Do Nothing)

Figure 4.2 Alternative 1 - Sanitary Drainage Area

Figure 5.1 Alternative 2 - Snyder's Road West to Foundry Street

Figure 5.2 Alternative 2 - Sanitary Drainage Area

Figure 6.1 Alternative 3 - Christian/Charlotta/Mill/Charles/Foundry

Figure 6.2 Alternative 3 - Sanitary Drainage Area

Figure 7.1 Alternative 4 - Christian/Charlotta/Queen and Baden Creek

Figure 7.2 Alternative 4 - Sanitary Drainage Area

Figure 8.1 Alternative 5 - Christian Street and Baden Creek

Figure 8.2 Alternative 5 - Sanitary Drainage Area

Technical Memorandum

| | | | |
|---|---|---|---|
| **Project Name:** | Baden Trunk Sanitary Sewer EA | **MTE File No.:** | 48730-100 |
| **To:** | Jeff Molenhuis, Township of Wilmot<br>Bryan Bishop, Township of Wilmot | **Date:** | November 6, 2022 |
| **cc:** | Trevor Heywood, GRCA<br>Kaoru Yajimi, ROW<br>Pierre Chauvin, MHBC<br>Paul Britton, MHBC | **From:** | Jeff Martens, P.Eng.<br>Carla Illman, M.Eng. |

**Re: BADEN TRUNK SANITARY SEWER CLASS B ENVIRONMENTAL ASSESSMENT**
**Introduction**

# 1.0 Introduction

The Township of Wilmot (Township) is responsible for the long-term operation and maintenance of the wastewater collection system for the communities of Baden and New Hamburg. In 2014, a Wastewater Servicing Study for the Growth Areas of Baden and New Hamburg was prepared for the Township by Conestoga Rovers & Associates (CRA) and can be found in **Appendix A**. The study evaluated the sanitary infrastructure needs presented in the 2011 Baden – New Hamburg Water and Wastewater Master Plan Update (BNHWWMPU), and evaluated the development options of these new growth areas. Of the four overall servicing strategies considered in the CRA study, it was concluded that Alternative D (**Appendix B**) was the preferred option. Growth since 2014 has generally followed the 2014 strategy with infrastructure being built from downstream to future growth areas. Recent studies regarding sanitary services to Foxboro and discussions with the Township have resulted in the expansion of the growth areas to include Parcel $P_2$ and Parcel $Y_2$ (**Figure 1.0**).

Changes to the Provincial Policy Statement of 2020, the Places to Grow Plan of 2020, the amended Regional Official Plan of 2015 and the updated Township of Wilmot Official Plan of 2019 has prompted an overall review of the servicing strategy for the entire Baden - New Hamburg area in support of the additional expected growth. As a result, the following three studies have been implemented:

- Morningside Trunk Sewer EA, GM BluePlan 2021
- Baden-New Hamburg Water and Wastewater System Servicing Review 2021
- Baden Trunk Class EA, MTE 2021

MTE Consultants Inc. (MTE) has been retained to complete a Schedule B, Municipal Class Environmental Assessment (EA) for a new sanitary trunk sewer to service the current and future growth of Baden. The study will include an evaluation of the alternatives based on their environmental impacts and mitigation measures, and the selection of a preferred alternative. At the end of the study, a conceptual design will be prepared by MTE. This proposed trunk sanitary sewer is herein referred to as the 'Baden Sanitary Trunk'.

The purpose of this technical memo is to summarize the five alternatives, identify their environmental, socio-cultural and economic impacts and to identify the preferred alternative as defined by the EA process.

# 2.0 Study Area for the Proposed Sanitary Trunk Alignment

## 2.1 Primary Study Area

The Primary Study Area (PSA) is located within the Settlement of Baden (**Figure 1.0**). The Urban Areas are the primary focus for population and employment growth per the Township's Official Plan. Lands located outside the urban areas are deemed countryside and represent the future expansion to the Baden Urban Area boundary. The proposed Baden Sanitary Trunk will service all areas east of Nafziger Road within the countryside line taking into consideration the future growth of Baden.

## 2.2 Detailed Study Area

The Detailed Study Area (DSA) (**Figure 2.0**) encompasses all alternatives except the eastern portion of Alternative 1. It is defined by the area south of Snyder's Road West, west of Foundry Street to the Baden pumping station, north of Gingerich Road and east of Christian Street including the agricultural lands it crosses. All alternative alignments will begin at the intersection of Snyder's Road West and Christian Street at a previously agreed upon sanitary sewer obvert of 353.7m± for Alternative 1 and 349.40m± for the remaining alternatives. They will ultimately connect to the manhole at the entrance of the Baden wastewater pumping station (WWPS), within the Foundry Street right-of-way, at an obvert of 335.92m±.

The DSA is comprised of various land uses within the urban boundary, agricultural fields and four prominent water features that are regulated by the Grand River Conservation Authority.

## 2.3 Existing Sanitary Drainage System

The Settlement of Baden is currently serviced by a two-tier wastewater system. The Township is responsible for the operations and maintenance of the gravity sewers, pressure sewers, trunk sewers, the School Block WWPS and the Baden West WWPS. The Region of Waterloo is responsible for the operations and maintenance of the Baden WWPS (**Figure 3.0**). Special coordination efforts and permissions are required for maintenance of Township sanitary infrastructure along the Snyder's Road West, Snyder's Road East and Foundry Street Regional roads.

# 3.0 Baden Sanitary Trunk Alignment Alternatives

The Baden Sanitary Trunk alignment alternatives were developed in accordance with the requirements of the Environmental Assessment Act by following the Municipal Class EA document (as amended in 2007, 2011, 2015 and 2020) and is being planned under Schedule 'B' of the Municipal Class Environmental Assessment.

Features common to all alternatives include a trenchless railway crossing and the section of sewer from the Baden WWPS along Foundry Street to Gingerich Road, which will require coordination and approval with the Region of Waterloo.

## 3.1 Alternative 1 – Modified 2014 Environmental Assessment Preferred Alternative

MTE has defined the approved Preferred Alternative D (**Appendix A**) of the CRA 2014 study as the 'Do Nothing' Alternative. It has been endorsed by the Township of Wilmot and as such, has been designated as the 'Do Nothing' alternative. This alignment documents the preferred servicing strategy at the time the CRA report was approved.

The western portion of the alignment begins at the intersection of Christian Street and Snyder's Road West, at the previously approved invert of 353.70m± (**Figure 4.1**). It continues east along Snyder's Road West to Foundry Street. The eastern portion of the alignment runs along the eastern boundary of the Activa MDS Lands north of Snyder's Road East, southwest along the railway to Foundry Street, where it connects to the western section. The sewer then runs south along Foundry Street and ultimately to the Baden WWPS. This alternative calls for the construction of a pumping station within Parcel O, the installation of approximately 1,555m of forcemain for the eastern portion of the alignment, approximately 1,800m of sanitary sewer for the western portion of the alignment ranging in depths from 3.0m to 5.0m and associated manholes.

Construction considerations for Alternative 1 include a trenchless railway crossing, a trenchless crossing of the Baden Creek Tributary B, north of Snyder's Road East, crossing the Baden Creek just upstream of the Baden Creek pond, crossing the Huehn Award Drain, upgrading existing sewers, reconstructing large portions of existing road infrastructure, and integrating it with future road construction along the Regional Roads of Snyder's Road West and Foundry Street.

Alternative 1 will service the growth areas of Parcels BB, $O_1$, $O_2$, $P_1$, $P_2$, R, S, T, U, V, $Y_2$ through the Nideva lands at 1012 Snyder's Road West, parts of Parcels $AA_1$ to $AA_3$ and Foxboro. Refer to **Figure 4.2** for reference to the growth area Parcels and the sanitary sewer drainage areas.

## 3.2 Alternative 2 – Snyder's Road West to Foundry Street

Alternative 2 begins at the intersection of Snyder's Road West and Christian Street at an obvert of 349.40m (**Figure 5.1**), continues east on Snyder's Road West to Foundry Street, and south on Foundry Street to the Baden WWPS. This alignment is mainly within the existing rights-of-way of Snyder's Road West and Foundry Street. It calls for approximately 1,800m± of sanitary sewer varying in depth from 3.0m to 9.3m and associated manholes.

Construction considerations for Alternative 2 include a trenchless railway crossing, crossing the Baden Creek just upstream of the Baden Creek pond, crossing the Huehn Award Drain, upgrading existing sewers along Snyder's Road West and Foundry Street, reconstructing large portions of existing road infrastructure, and integrating with future road construction along Snyder's Road and Foundry Street.

The main difference between Alternative 1 and Alternative 2 is that the pump station and forcemain on Activa's lands will not be required. The deep sewer along Snyder's Road West will provide additional sanitary services to Parcel $Y_1$, Parcel Z and the School Block, eliminating the need for the Waterloo-Oxfor School WWPS (**Figure 5.2**).

### 3.3 Alternative 3 - Christian/Charlotta/Mill/Charles/Foundry

Alternative 3 begins at the intersection of Snyder's Road West and Christian Street at an obvert of 349.40m (**Figure 6.1**). It lies within the existing right-of-ways of Christian Street, Charlotta Street, Mill Street, Charles Street, and Foundry Street. This alignment requires approximately 1,985m of sanitary sewer varying in depth from 3.3m to 9.3m and associated manholes.

Construction considerations for this alignment include a trenchless railway crossing, crossing the Baden Creek just upstream of the Baden Creek pond, crossing the Huehn Award Drain, upgrading existing sewers along Christian Street, Charlotta Street, Mill Street, Charles Street, and Foundry Street, reconstructing large portions of existing road infrastructure, and integrating with future road construction along Snyder's Road and Foundry Street. As part of the development of the 1012 Snyder's Road West Subdivision, a portion of this alternative along Christian Street will be reconstructed.

This alternative will eliminate two WWPS; the privately owned, Waterloo-Oxford District WWPS, and the Baden West WWPS owned and operated by the Township, and will additionally service Parcels Q, X, and W (**Figure 6.2**).

### 3.4 Alternative 4 - Christian/Charlotta/Queen and Baden Creek (Future Right-of-way to Schmidt Lands)

Alternative 4 begins at the intersection of Snyder's Road West and Christian Street at an obvert of 349.40m (**Figure 7.1**). It lies within the existing right-of-ways of Christian Street, Charlotta Street, Queen Street and through Parcels $AA_1$, $AA_2$, and $BB_2$ to Gingerich Road, and then south on Foundry Street to connect to the Baden WWPS. This alignment requires approximately 2,095m of sanitary sewer, varying in depth from 3.0m to 9.3m and associated manholes.

Construction considerations for this alignment include a trenchless railroad crossing, trenchless crossing of the Baden Creek Tributary A, trenchless crossing of Baden Creek just north of Gingerich Road, upgrading existing sewers along Christian Street, Charlotta Street and Queen Street, reconstructing a small portion of existing road infrastructure, and integrating with future road construction along Snyder's Road and Foundry Street. As part of the development of the 1012 Snyder's Road West Subdivision, a portion of this alternative along Christian Street will be reconstructed. The forcemain along Queen Street will remain intact.

This alternative benefits in following the natural topography of the Schmidt Lands and will eliminate the two WWPS owned and operated by the Township of Wilmot as well as servicing all identified growth areas (**Figures 7.2**).

### 3.5 Alternative 5 – Christian Street and Baden Creek

Alternative 4 begins at the intersection of Snyder's Road West and Christian Street at an obvert of 349.40m (**Figure 8.1**). It lies within the existing right-of-ways along Christian Street. It runs through portions of Charlotta Street and through Parcels $AA_1$, $AA_2$, and $BB_2$ to Gingerich Road, and then south on Foundry Street to connect to the Baden WWPS. This alignment requires approximately 1,905m of sanitary sewer varying in depth from 3.0m to 9.3m and associated manholes.

Construction considerations for this alignment include a trenchless railroad crossing, trenchless crossing of the Baden Creek Tributary A, trenchless crossing of Baden Creek just north of Gingerich Road, upgrading existing sewers along Christian Street and a small section of Charlotta Street, reconstructing a small portion of existing road infrastructure, and integrating with future road construction along Snyder's Road and Foundry Street. As part of the development of the 1012 Snyder's Road West Subdivision, a portion of this alternative along Christian Street will be reconstructed.

This alternative benefits in following the natural topography of the Schmidt Lands and will eliminate the two WWPS as identified in Alternative 3 as well as servicing all identified growth areas (**Figures 8.2**).

## 4.0 Assessment of Sanitary Trunk Alternatives

The Numerical Evaluation approach was selected as the preferred scoring methodology. This methodology requires a "must score" assessment of the five alternatives in a matrix form. Factors used to assess the Alternatives include:

- Natural Environment – Terrestrial Ecosystems, Wetland Ecosystems, Aquatic Ecosystems, Surface Water Quality, Groundwater Resources, Surface Water Drainage
- Socio-Cultural Environment – Land Use Policy, Archaeological Resources, Built Heritage, Noise
- Transportation/Municipal Services and Utilities
- Financial
- Technical

For each factor, the least preferred alternative received a score of one (1) and the most preferred alternative received a score of ten (10). All other alternatives were scored between these values with ties strongly discouraged. Those factors receiving less than a five (5) were deemed unacceptable and used to identify potential issues requiring additional mitigation. Each factor group will be analyzed and commented on to clarify differentiating factors and commonalities between the impacts of the proposed Baden Sanitary Trunk alternatives.

# Appendix A

## Wastewater Servicing Study for the Growth Areas of Baden and New Hamburg

## (CRA 2014)

N.T.S

LEGEND

- RESIDENTIAL GROWTH 2016-2029
- UNLIKELY FOR RESIDENTIAL GROWTH (SIGNIFICANT FLOODPLAIN)
- POST 2029 RESIDENTIAL GROWTH
- INDUSTRIAL GROWTH 2016-2029
- POST 2029 INDUSTRIAL GROWTH
- FUTURE INTENSIFICATION 2016-2029

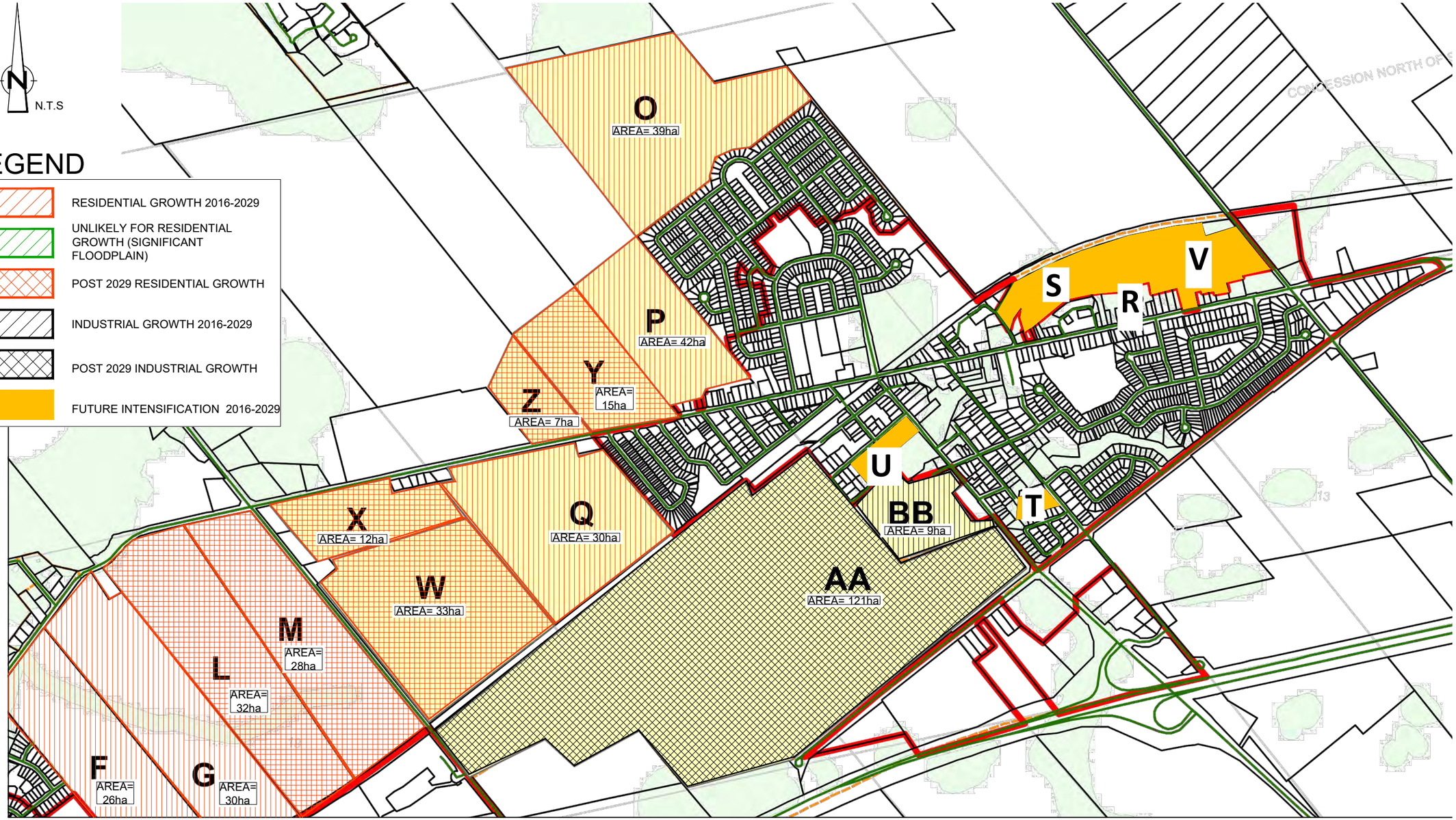


**Figure 2-15 Delineation of Growth Areas - Baden**

Wastewater Servicing Study for New Growth Areas in Baden and New Hamburg

*Township of Wilmot*

# Appendix B

## CRA 2014 - Alternative D

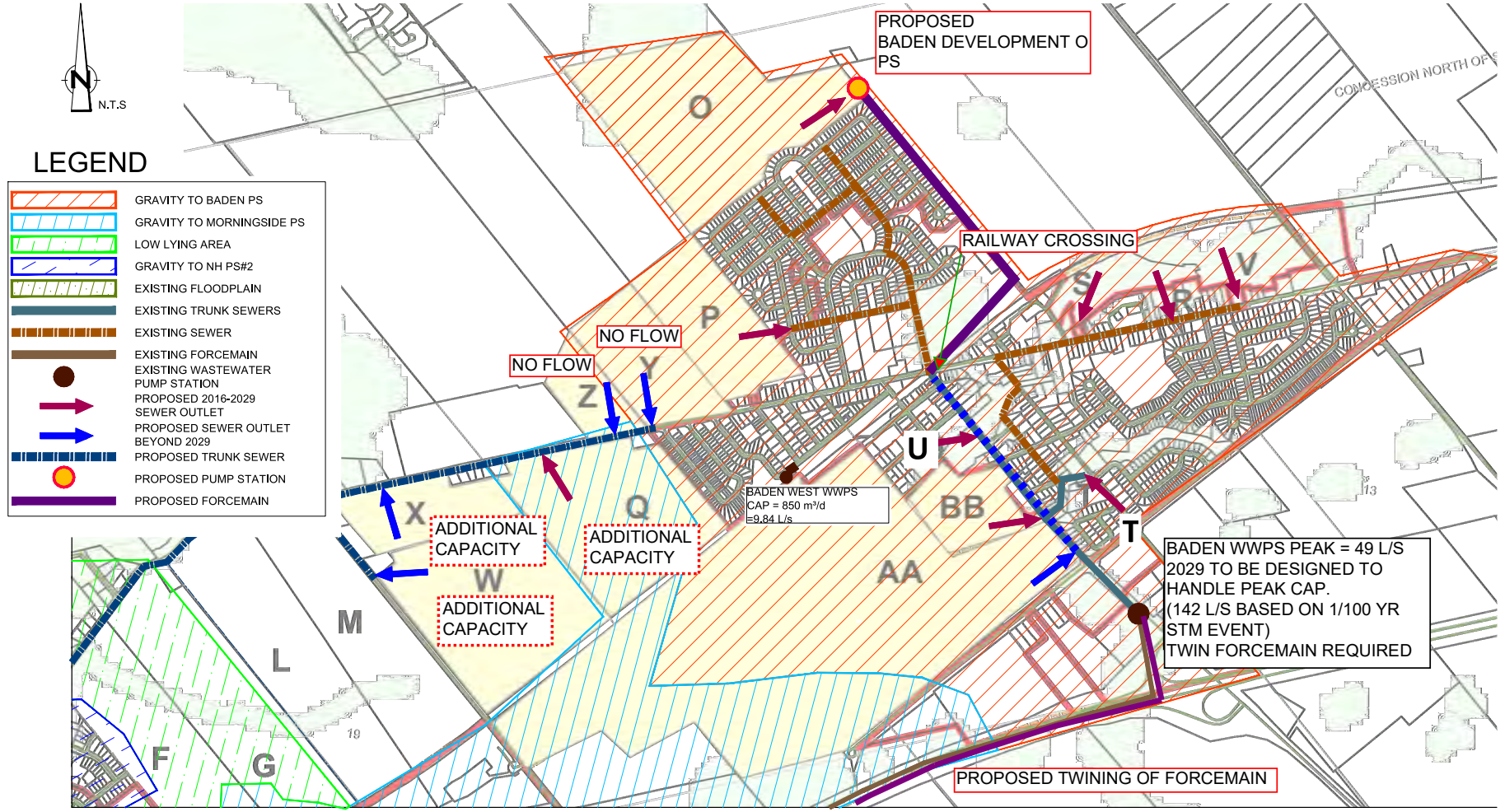


**Figure 2-23 Alternative D - Proposed Sanitary Linear Infrastructure and Pump Stations - Baden**

Wastewater Servicing Study for New Growth Areas in Baden and New Hamburg

*Township of Wilmot*

# List of Figures


- **Figure 1.0 Primary Study Area**
- **Figure 2.0 Detailed Study Area**
- **Figure 3.0 Existing Sanitary Sewer System and Drainage Areas**
- **Figure 4.1: Alternative 1 - Modified 2014 Environmental Assessment Preferred Alternative (Do Nothing)**
- **Figure 4.2: Alternative 1 - Sanitary Drainage Area**
- **Figure 5.1: Alternative 2 - Snyder's Road West to Foundry Street**
- **Figure 5.2: Alternative 2 - Sanitary Drainage Area**
- **Figure 6.1: Alternative 3 - Christian/Charlotta/Mill/Charles/Foundry**
- **Figure 6.2: Alternative 3 - Sanitary Drainage Area**
- **Figure 7.1: Alternative 4 - Christian/Charlotta/Queen and Baden Creek**
- **Figure 7.2: Alternative 4 - Sanitary Drainage Area**
- **Figure 8.1: Alternative 5 - Christian Street and Baden Creek**
- **Figure 8.2: Alternative 5 - Sanitary Drainage Area**

## LEGEND

- PROPERTY LINE
- EXISTING SANITARY TRUNK
- EXISTING SANITARY FORCEMAIN
- 326 EXISTING 2015 GRCA CONTOURS
- DRAINAGE TO BADEN SANITARY TRUNK SEWER
- DRAINAGE BY GRAVITY TO NAFZIGER ROAD TRUNK SEWER
- DRAINAGE TO FOREST GLEN WWPS
- DRAINAGE TO WILMOT EMPLOYMENT LANDS TRUNK SEWER
- LANDS NOT TO BE DEVELOPED
- GRCA REGULATORY FLOODPLAIN
- GRCA EXISTING WATERBODY
- BUTTERNUT 25m BUFFER
- ARCHAEOLOGICAL 50m CONSTRUCTION MONITORING BUFFER
- ARCHAEOLOGICAL 20m NO-GO BUFFER
- TRIBUTARY "A" 10m BUFFER
- BADEN CREEK 15m BUFFER
- HUEHN AWARD DRAIN 30m BUFFER
- LOCALLY SIGNIFICANT WETLAND
- LOCAL 15m WETLAND BUFFER
- POTENTIAL BAT (SAR) HABITAT
- GRCA EXISTING WATERCOURSE
- TRENCHLESS CROSSING
- TOWNSHIP URBAN AREA
- COUNTRYSIDE LINE
- PRIMARY STUDY AREA
- DETAILED STUDY AREA
- PROPOSED WASTEWATER PUMPING STATION
- EXISTING WASTEWATER PUMPING STATION

### ALTERNATIVES

1. 2014 ENVIRONMENTAL ASSESSMENT PREFERRED ALTERNATIVE (DO NOTHING)
2. SNYDER'S/FOUNDRY
3. CHRISTIAN/CHARLOTTA/MILL/CHARLES/FOUNDRY
4. CHRISTIAN/CHARLOTTA/QUEEN AND BADEN CREEK
5. CHRISTIAN AND BADEN CREEK

FOXBORO
$O_2$
$O_1$
$P_2$
$P_1$
$Y_2$
$Y_1$
Z
$BAD_1$
$BAD_2$
$BAD_3$
$BAD_4$
$BAD_5$
$BAD_6$
SCHOOL BLOCK
WWPS
Snyder's Road West
Snyder's Road East
Nafziger Road
Gingerich Road
Goderich-Exeter Railway
Bleams Road
Highway 7/8
Tannoy
Queen Street
Nurse Street
Charlotte Street
Christian Street
Charles Street
Colborne Street
Mill Street
Justice Street
BADEN WWPS
BADEN CREEK POND
HUEHN AWARD DRAIN
BADEN CREEK TRIBUTARY-A
BADEN CREEK
MURF
U
T
S
R
V
Q
X
W
E
$M_1$
$L_1$
$L_2$
$M_2$
$G_1$
$F_1$
$F_2$
$G_2$
$AA_1$
$AA_2$
$AA_3$
$BB_1$
$BB_2$
$N_4$
$N_3$
$N_2$
$N_1$
$N_{ex}$
J
Ai H-469
Ai Hex87
Ai Hex78
N

FIGURE 1.0
Date: AUG. 25/22
Scale: 1:7,500

**TOWNSHIP OF WILMOT**

**BADEN TRUNK SANITARY SEWER EA**
**PRIMARY STUDY AREA**

MTE
Engineers, Scientists, Surveyors

Project No.: 48730-100

## LEGEND

- PROPERTY LINE
- EXISTING SANITARY TRUNK
- EXISTING SANITARY SEWER
- EXISTING SANITARY FORCEMAIN
- EXISTING 2015 GRCA CONTOURS
- DRAINAGE TO BADEN SANITARY TRUNK SEWER
- GRCA REGULATORY FLOODPLAIN
- GRCA EXISTING WATERBODY
- BUTTERNUT 25m BUFFER
- ARCHAEOLOGICAL 50m CONSTRUCTION MONITORING BUFFER
- ARCHAEOLOGICAL 20m NO-GO BUFFER
- TRIBUTARY 'A' 10m BUFFER
- BADEN CREEK 15m BUFFER
- HUEHN AWARD DRAIN 30m BUFFER
- LOCALLY SIGNIFICANT WETLAND
- LOCAL 15m WETLAND BUFFER
- POTENTIAL BAT (SAR) HABITAT
- GRCA EXISTING WATERCOURSE
- TRENCHLESS CROSSING
- TOWNSHIP URBAN AREA
- COUNTRYSIDE LINE
- PRIMARY STUDY AREA
- DETAILED STUDY AREA
- EXISTING WASTEWATER PUMPING STATION

### ALTERNATIVES

1. 2014 ENVIRONMENTAL ASSESSMENT PREFERRED ALTERNATIVE (DO NOTHING)
2. SNYDER'S/FOUNDRY
3. CHRISTIAN/CHARLOTTA/MILL/ CHARLES/FOUNDRY
4. CHRISTIAN/CHARLOTTA/QUEEN AND BADEN CREEK
5. CHRISTIAN AND BADEN CREEK

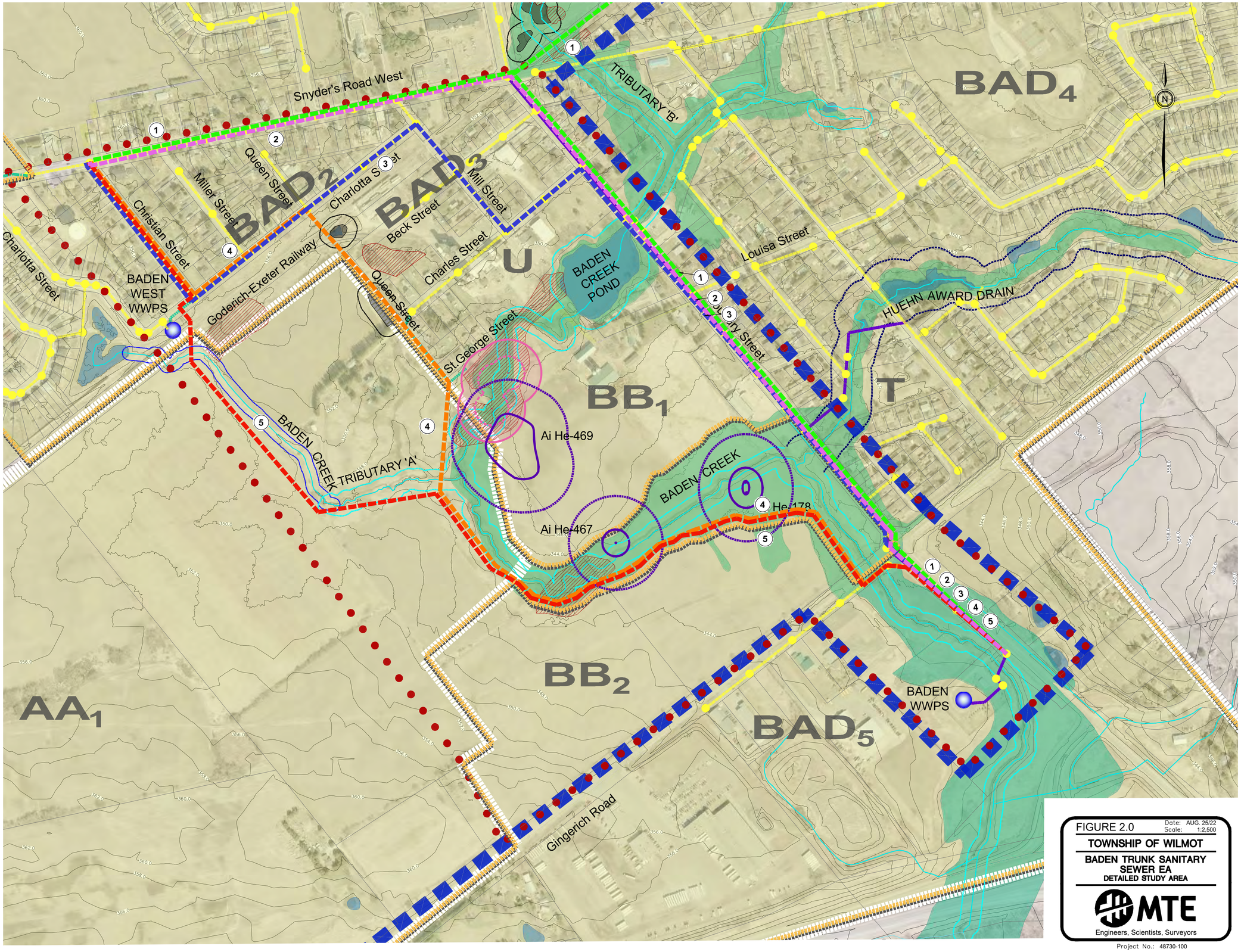


FIGURE 2.0 — Date: AUG. 25/22 — Scale: 1:2,500

**TOWNSHIP OF WILMOT**

**BADEN TRUNK SANITARY SEWER EA**

**DETAILED STUDY AREA**

MTE Engineers, Scientists, Surveyors

Project No.: 48730-100

## LEGEND

- PROPERTY LINE
- EXISTING SANITARY TRUNK
- EXISTING SANITARY SEWER
- EXISTING SANITARY FORCEMAIN
- EXISTING 2015 GRCA CONTOURS (328)
- SANITARY DRAINAGE AREA BOUNDARY
- DRAINAGE BY GRAVITY TO NAFZIGER ROAD TRUNK SEWER
- DRAINAGE TO FOREST GLEN WWPS
- DRAINAGE TO WILMOT EMPLOYMENT LANDS TRUNK SEWER
- LANDS NOT TO BE DEVELOPED
- DRAINAGE TO FOUNDRY STREET TRUNK SEWER
- GRCA REGULATORY FLOODPLAIN
- GRCA EXISTING WATERBODY
- BUTTERNUT 25m BUFFER
- ARCHAEOLOGICAL 50m CONSTRUCTION MONITORING BUFFER
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- BADEN CREEK 15m BUFFER
- HUEHN AWARD DRAIN 30m BUFFER
- LOCALLY SIGNIFICANT WETLAND
- LOCAL 15m WETLAND BUFFER
- POTENTIAL BAT (SAR) HABITAT
- GRCA EXISTING WATERCOURSE
- TOWNSHIP URBAN AREA
- COUNTRYSIDE LINE
- PRIMARY STUDY AREA
- DETAILED STUDY AREA
- PROPOSED WASTEWATER PUMPING STATION
- EXISTING WASTEWATER PUMPING STATION

FOXBORO
PROPOSED WWPS
$O_2$
$O_1$
$P_2$
$P_1$
$Y_2$
$Y_1$
Z
$BAD_1$
$BAD_6$
SCHOOL BLOCK
$BAD_2$
$BAD_3$
$BAD_4$
$BAD_5$
BADEN WEST WWPS
BADEN WWPS
Nafziger Road
Snyder's Road West
Snyder's Road East
Gingerich Road
Goderich-Exeter Railway
Queen Street
Nova Street
Columbia Street
Charles Street
Orchard Street
Mennonite Drive
HUEHN AWARD DRAIN
TRIBUTARY 'A'
BADEN CREEK
BADEN CREEK TRIBUTARY 'A'
HUEHN CREEK
HUEHN CREEK POND
Al Hs-469
Al Hs-457
Al Hs-178
Highway 78
Bleams Road
Nafziger Road
Gingerich Road
E
$L_1$
$M_1$
$G_1$
$L_2$
$M_2$
$F_1$
$F_2$
$G_2$
W
X
Q
U
T
$BB_1$
$BB_2$
$AA_1$
$AA_2$
$AA_3$
$N_4$
MURF
$N_3$
$N_2$
$N_1$
$N_{ex}$
J
R
S
V

FIGURE 3.0 — Date: AUG 25/22 — Scale: 1:7,500

**TOWNSHIP OF WILMOT**

**EXISTING SANITARY DRAINAGE AREA**

MTE
Engineers, Scientists, Surveyors

Project No.: 48730-100

## LEGEND

- PROPERTY LINE
- EXISTING SANITARY TRUNK
- EXISTING SANITARY SEWER
- EXISTING SANITARY FORCEMAIN
- EXISTING 2015 GRCA CONTOURS
- DRAINAGE TO BADEN SANITARY TRUNK SEWER
- GRCA REGULATORY FLOODPLAIN
- GRCA EXISTING WATERBODY
- BUTTERNUT 25m BUFFER
- ARCHAEOLOGICAL 50m CONSTRUCTION MONITORING BUFFER
- ARCHAEOLOGICAL 20m NO-GO BUFFER
- TRIBUTARY 'A' 10m BUFFER
- BADEN CREEK 15m BUFFER
- HUEHN AWARD DRAIN 30m BUFFER
- LOCALLY SIGNIFICANT WETLAND
- LOCAL 15m WETLAND BUFFER
- POTENTIAL BAT (SAR) HABITAT
- GRCA EXISTING WATERCOURSE
- TRENCHLESS CROSSING
- TOWNSHIP URBAN AREA
- COUNTRYSIDE LINE
- PRIMARY STUDY AREA
- DETAILED STUDY AREA
- PROPOSED WASTEWATER PUMPING STATION
- EXISTING WASTEWATER PUMPING STATION

### ALTERNATIVES

- 2014 ENVIRONMENTAL ASSESSMENT PREFERRED ALTERNATIVE (DO NOTHING)

PROPOSED WWPS
farm road
155m SAN FORCEMAIN
Goderich-Exeter Railway
Snyder's Road East
BADEN CREEK
STREAM CROSSING
TRIBUTARY 'B'
F/G=352.15(EX)
SAN OBV.=348.45±
DEPTH=3.7m±
RAILWAY CROSSING
Snyder's Road West
630m 450mmØ SAN TRUNK @ 0.80%
450m 450mmØ SAN TRUNK @0.80%
F/G=358.72(EX)
SAN OBV.=353.70±
DEPTH=5.0m±
Queen Street
Millat Street
Christian Street
Charlotta Street
Chariotta Street
Brenneman Drive
WWPS
BADEN WEST WWPS
Goderich-Exeter Railway
Beck Street
Mill Street
Charles Street
Queen Street
STREAM CROSSING
BADEN CREEK POND
Louisa Street
F/G=347.50(EX)
SAN OBV.=344.18±
DEPTH=3.2m±
HUEHN AWARD DRAIN
St.George Street
Foundry Street
150m 450mmØ SAN TRUNK @2.3%
350m 450mmØ SAN TRUNK @0.66%
F/G=343.70(EX)
SAN OBV.=340.70±
DEPTH=3.0m±
F/G=341.87(EX)
SAN OBV.=338.38±
DEPTH=3.5m±
Ai He-469
BADEN CREEK
TRIBUTARY 'A'
Ai He-178
Ai He-467
STREAM CROSSING
ROAD DRAINAGE CULVERT
240m 600mmØ SAN TRUNK @1.00%
CONNECT TO EX. MH1 @ OBV.=335.92± (WALTER FEDY DRAWINGS 5.0068.68-8 DATED NOV. 1974)
F/G=339.63(EX)
SAN OBV.=335.92±
DEPTH=3.7m±
BADEN WWPS
Gingerich Road
Goderich-Exeter Railway
Snyder's Road West

$O_2$ $O_1$ $P_2$ $P_1$ $Y_2$ $Y_1$ $Z$ $Q$ $AA_1$ $AA_2$ $BAD_1$ $BAD_2$ $BAD_3$ $BAD_4$ $BAD_5$ $BB_1$ $BB_2$ $U$ $T$ $S$ $R$ $V$

FIGURE 4.1
Date: AUG.25/22
Scale: 1:4000

**TOWNSHIP OF WILMOT**

**2014 ENVIRONMENTAL ASSESSMENT PREFERRED ALTERNATIVE (DO NOTHING) ALTERNATIVE 1**

MTE
Engineers, Scientists, Surveyors

Project No.: 48730-100

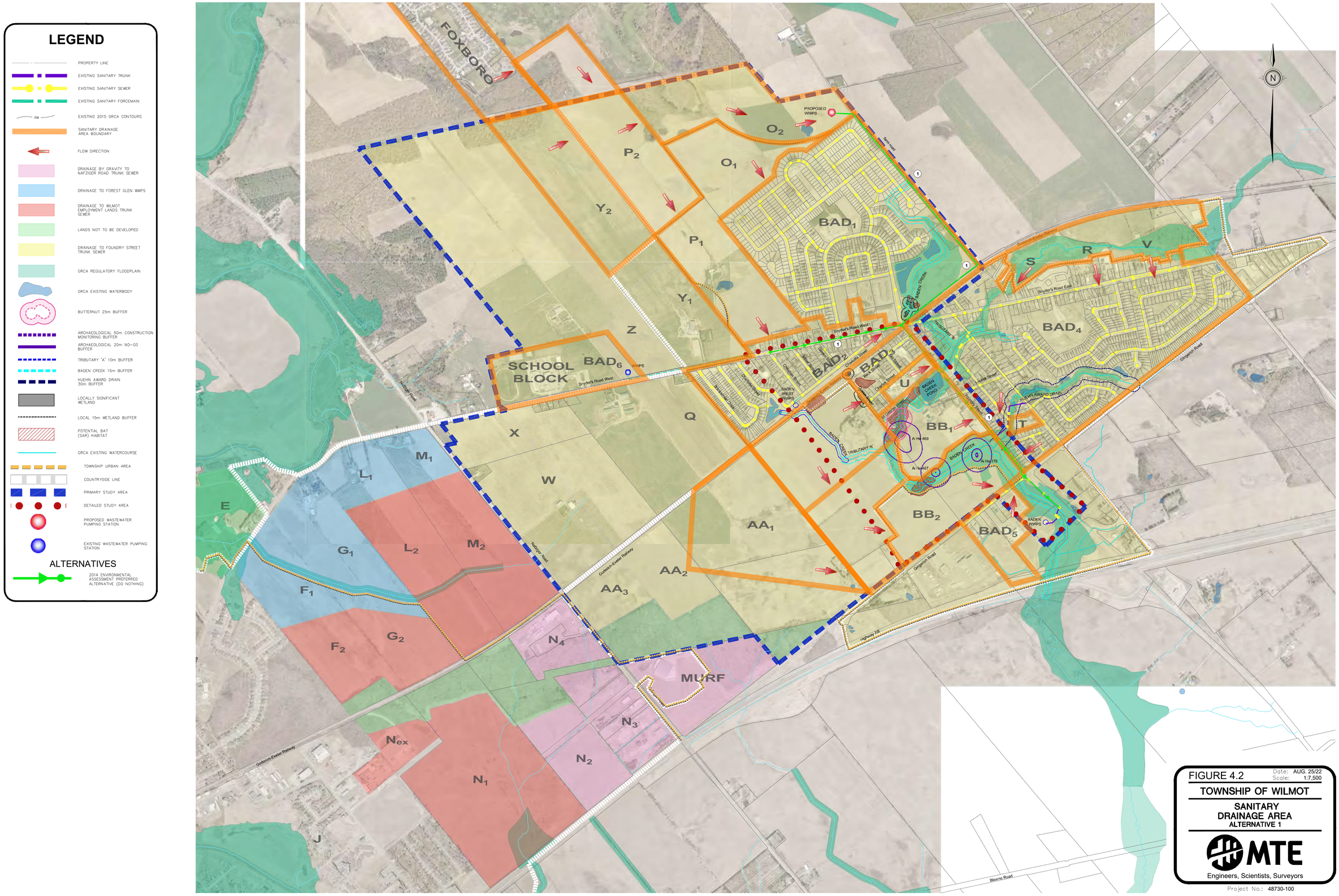


FIGURE 4.2

Date: AUG. 25/22
Scale: 1:7,500

TOWNSHIP OF WILMOT

SANITARY DRAINAGE AREA
ALTERNATIVE 1

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Project No.: 48730-100

## LEGEND

- PROPERTY LINE
- EXISTING SANITARY TRUNK
- EXISTING SANITARY SEWER
- EXISTING SANITARY FORCEMAIN
- EXISTING 2015 GRCA CONTOURS
- DRAINAGE TO BADEN SANITARY TRUNK SEWER
- GRCA REGULATORY FLOODPLAIN
- GRCA EXISTING WATERBODY
- BUTTERNUT 25m BUFFER
- ARCHAEOLOGICAL 50m CONSTRUCTION MONITORING BUFFER
- ARCHAEOLOGICAL 20m NO-GO BUFFER
- TRIBUTARY 'A' 10m BUFFER
- BADEN CREEK 15m BUFFER
- HUEHN AWARD DRAIN 30m BUFFER
- LOCALLY SIGNIFICANT WETLAND
- LOCAL 15m WETLAND BUFFER
- POTENTIAL BAT (SAR) HABITAT
- GRCA EXISTING WATERCOURSE
- TRENCHLESS CROSSING
- TOWNSHIP URBAN AREA
- COUNTRYSIDE LINE
- PRIMARY STUDY AREA
- DETAILED STUDY AREA
- EXISTING WASTEWATER PUMPING STATION

### ALTERNATIVES

- 2 — SNYDER'S/FOUNDRY

F/G=358.72(EX)
SAN OBV.=349.40±
DEPTH=9.3m±

Snyder's Road West

630m 450mmØ SAN TRUNK @ 0.50%

F/G=352.15(EX)
SAN OBV.=346.04±
DEPTH=6.1m±

RAILWAY CROSSING

TRIBUTARY 'B'

450m 450mmØ SAN TRUNK @0.50%

STREAM CROSSING

F/G=347.50(EX)
SAN OBV.=343.61±
DEPTH=3.9m±

Louisa Street

Foundry Street

150m 450mmØ SAN TRUNK @2.0%

F/G=343.70(EX)
SAN OBV.=340.58±
DEPTH=3.1m±

HUEHN AWARD DRAIN

330m 450mmØ SAN TRUNK @0.61%

ROAD DRAINAGE CULVERT

F/G=341.87EX)
SAN OBV.=338.38±
DEPTH=3.5m±

240m 600mmØ SAN TRUNK @1.0%

F/G=339.63(EX)
SAN OBV.=335.92±
DEPTH=3.7m±

CONNECT TO EX. MH1
@ OBV.=335.92±
(WALTER FEDY DRAWINGS
5.0068.68-8 DATED NOV. 1974

BADEN WWPS

BADEN WEST WWPS

Goderich-Exeter Railway

Christian Street

Miller Street

Queen Street

Charlotta Street

Beck Street

Mill Street

Charles Street

St.George Street

BADEN CREEK POND

BADEN CREEK

TRIBUTARY 'A'

Ai He-469

Ai He-467

Ai He-178

STREAM CROSSING

Gingerich Road

$BAD_2$ $BAD_3$ $BAD_4$ $BAD_5$ $BB_1$ $BB_2$ $AA_1$ U T

FIGURE 5.1
Date: AUG.25/22
Scale: 1:2500

**TOWNSHIP OF WILMOT**

**SNYDER'S ROAD WEST TO FOUNDRY STREET**
**ALTERNATIVE 2**

MTE
Engineers, Scientists, Surveyors

Project No.: 48730-100

## LEGEND

- PROPERTY LINE
- EXISTING SANITARY TRUNK
- EXISTING SANITARY SEWER
- EXISTING SANITARY FORCEMAIN
- 326 EXISTING 2015 GRCA CONTOURS
- SANITARY DRAINAGE AREA BOUNDARY
- FLOW DIRECTION
- DRAINAGE BY GRAVITY TO NAFZIGER ROAD TRUNK SEWER
- DRAINAGE TO FOREST GLEN WWPS
- DRAINAGE TO WILMOT EMPLOYMENT LANDS TRUNK SEWER
- LANDS NOT TO BE DEVELOPED
- DRAINAGE TO FOUNDRY STREET TRUNK SEWER
- GRCA REGULATORY FLOODPLAIN
- GRCA EXISTING WATERBODY
- BUTTERNUT 25m BUFFER
- ARCHAEOLOGICAL 50m CONSTRUCTION MONITORING BUFFER
- ARCHAEOLOGICAL 20m NO-GO BUFFER
- TRIBUTARY 'A' 10m BUFFER
- BADEN CREEK 15m BUFFER
- HUEHN AWARD DRAIN 30m BUFFER
- LOCALLY SIGNIFICANT WETLAND
- LOCAL 15m WETLAND BUFFER
- POTENTIAL BAT (SAR) HABITAT
- GRCA EXISTING WATERCOURSE
- TOWNSHIP URBAN AREA
- COUNTRYSIDE LINE
- PRIMARY STUDY AREA
- DETAILED STUDY AREA
- PROPOSED WASTEWATER PUMPING STATION
- EXISTING WASTEWATER PUMPING STATION

### ALTERNATIVES

2 SNYDER'S/FOUNDRY

FOXBORO
SCHOOL BLOCK
MURF
BADEN WWPS
BADEN WEST WWPS
BADEN CREEK POND
Nafziger Road
Snyder's Road West
Snyder's Road East
Gingerich Road
Goderich-Exeter Railway
Highway 7/8
Ament Line
Queen Street
Church Street
Chapel Street
Crosby Street
Forest Glen Drive
Beechwood Drive
Foundry Street
Back Street
Sauble Street
Queen's Bush Trail
Queen's Bush Trail (Historic)
HUEHN AWARD DRAIN
BADEN CREEK
BADEN CREEK TRIBUTARY 'A'
TRIBUTARY 'B'
Al Her469
Al Her487
Al Her478

$O_2$ $O_1$ $P_2$ $P_1$ $Y_2$ $Y_1$ $Z$ $BAD_1$ $BAD_2$ $BAD_3$ $BAD_4$ $BAD_5$ $BAD_6$ $S$ $R$ $V$ $U$ $T$ $BB_1$ $BB_2$ $Q$ $X$ $W$ $M_1$ $L_1$ $L_2$ $M_2$ $G_1$ $G_2$ $F_1$ $F_2$ $AA_1$ $AA_2$ $AA_3$ $N_4$ $N_3$ $N_2$ $N_1$ $N_{ex}$ $J$

FIGURE 5.2
Date: AUG. 25/22
Scale: 1:7,500

**TOWNSHIP OF WILMOT**

**SANITARY DRAINAGE AREA ALTERNATIVE 2**

MTE
Engineers, Scientists, Surveyors

Project No.: 48730-100

## LEGEND

- PROPERTY LINE
- EXISTING SANITARY TRUNK
- EXISTING SANITARY SEWER
- EXISTING SANITARY FORCEMAIN
- EXISTING 2015 GRCA CONTOURS
- DRAINAGE TO BADEN SANITARY TRUNK SEWER
- GRCA REGULATORY FLOODPLAIN
- GRCA EXISTING WATERBODY
- BUTTERNUT 25m BUFFER
- ARCHAEOLOGICAL 50m CONSTRUCTION MONITORING BUFFER
- ARCHAEOLOGICAL 20m NO-GO BUFFER
- TRIBUTARY 'A' 10m BUFFER
- BADEN CREEK 15m BUFFER
- HUEHN AWARD DRAIN 30m BUFFER
- LOCALLY SIGNIFICANT WETLAND
- LOCAL 15m WETLAND BUFFER
- POTENTIAL BAT (SAR) HABITAT
- GRCA EXISTING WATERCOURSE
- TRENCHLESS CROSSING
- TOWNSHIP URBAN AREA
- COUNTRYSIDE LINE
- PRIMARY STUDY AREA
- DETAILED STUDY AREA
- EXISTING WASTEWATER PUMPING STATION

ALTERNATIVES

- (3) CHRISTIAN/CHARLOTTA/MILL/ CHARLES/FOUNDRY

F/C=358.72(EX)
SAN OBV.=349.40±
DEPTH=9.3m±

F/C=353.40(EX)
SAN OBV.=346.05±
DEPTH=7.4m±

F/C=352.00(EX)
SAN OBV.=344.00±
DEPTH=8.0m±

F/C=352.50(EST)
SAN OBV.=344.78±
DEPTH=7.7m±

F/C=356.30(EX)
SAN OBV.=348.07±
DEPTH=8.2m±

F/C=347.51(EX)
SAN OBV.=342.63±
DEPTH=4.9m±

F/C=343.70(EX)
SAN OBV.=339.48±
DEPTH=4.2m±

F/C=341.87(EX)
SAN OBV.=338.68±
DEPTH=4.2m±

F/C=339.63(EX)
SAN OBV.=335.92±
DEPTH=3.7m±

255m 450mmØ SAN TRUNK @0.50%

420m 450mmØ SAN TRUNK @0.50%

215m 450mmØ SAN TRUNK @0.50%

150m 450mmØ SAN TRUNK @0.50%

250m 450mmØ SAN TRUNK @0.50%

125m 450mmØ SAN TRUNK @2.50%

330m 600mmØ SAN TRUNK @0.50%

240m 600mmØ SAN TRUNK @0.71%

BADEN WEST WWPS

BADEN WEST WWPS TO BE REMOVED

BADEN WWPS

CONNECT TO EX. MH1 @ OBV.=335.92± (WALTER FEDY DRAWINGS 5.0068.68-8 DATED NOV. 1974

ROAD DRAINAGE CULVERT

RAILWAY CROSSING

STREAM CROSSING

STREAM CROSSING

BADEN CREEK POND

HUEHN AWARD DRAIN

BADEN CREEK

TRIBUTARY 'A'

TRIBUTARY 'B'

Ai He-469

Ai He-467

Ai He-178

Snyder's Road West

Queen Street

Miller Street

Christian Street

Charlotta Street

Goderich-Exeter Railway

Beck Street

Mill Street

Charles Street

St.George Street

Foundry Street

Louisa Street

Gingerich Road

$BAD_2$ $BAD_3$ $BAD_4$ $BAD_5$ $BB_1$ $BB_2$ $AA_1$

FIGURE 6.1
Date: AUG.25/22
Scale: 1:2500

**TOWNSHIP OF WILMOT**

**CHRISTIAN/CHARLOTTA/MILL/ CHARLES/FOUNDRY**
**ALTERNATIVE 3**

MTE
Engineers, Scientists, Surveyors

Project No.: 48730-100

## LEGEND

- PROPERTY LINE
- EXISTING SANITARY TRUNK
- EXISTING SANITARY SEWER
- EXISTING SANITARY FORCEMAIN
- 326 — EXISTING 2015 GRCA CONTOURS
- SANITARY DRAINAGE AREA BOUNDARY
- FLOW DIRECTION
- DRAINAGE BY GRAVITY TO NAFZIGER ROAD TRUNK SEWER
- DRAINAGE TO FOREST GLEN WWPS
- DRAINAGE TO WILMOT EMPLOYMENT LANDS TRUNK SEWER
- LANDS NOT TO BE DEVELOPED
- DRAINAGE TO FOUNDRY STREET TRUNK SEWER
- GRCA REGULATORY FLOODPLAIN
- GRCA EXISTING WATERBODY
- BUTTERNUT 25m BUFFER
- ARCHAEOLOGICAL 50m CONSTRUCTION MONITORING BUFFER
- ARCHAEOLOGICAL 20m NO-GO BUFFER
- TRIBUTARY 'A' 10m BUFFER
- BADEN CREEK 15m BUFFER
- HUEHN AWARD DRAIN 30m BUFFER
- LOCALLY SIGNIFICANT WETLAND
- LOCAL 15m WETLAND BUFFER
- POTENTIAL BAT (SAR) HABITAT
- GRCA EXISTING WATERCOURSE
- TOWNSHIP URBAN AREA
- COUNTRYSIDE LINE
- PRIMARY STUDY AREA
- DETAILED STUDY AREA
- PROPOSED WASTEWATER PUMPING STATION
- EXISTING WASTEWATER PUMPING STATION

### ALTERNATIVES

3 — CHRISTIAN/CHARLOTTA/MILL/CHARLES/FOUNDRY

FOXBORO
$O_2$
$O_1$
$P_2$
$P_1$
$Y_2$
$Y_1$
Z
$BAD_1$
$BAD_2$
$BAD_3$
$BAD_4$
$BAD_5$
$BAD_6$
SCHOOL BLOCK
BADEN WWPS
BADEN WEST WWPS
BADEN CREEK POND
Item road
Snyder's Road West
Snyder's Road East
Nafziger Road
Gingerich Road
Bleams Road
Godderich-Exeter Railway
Grebel Road
Queen Street
Nafziger Road
Nice Street
Charles Street
Christian Street
Mill Street
Foundry Street
Gingerich-Exeter Railway
HUEHN AWARD DRAIN
BADEN CREEK TRIBUTARY 'A'
TRIBUTARY 'S'
BADEN CREEK
Ai Hm469
Ai Hm457
Ai Hm478
U
V
R
S
T
Q
W
X
$BB_1$
$BB_2$
$AA_1$
$AA_2$
$AA_3$
MURF
$N_1$
$N_2$
$N_3$
$N_4$
$N_{ex}$
$M_1$
$M_2$
$L_1$
$L_2$
$G_1$
$G_2$
$F_1$
$F_2$
E
J

N

FIGURE 6.2 — Date: AUG 25/22 — Scale: 1:7,500

**TOWNSHIP OF WILMOT**

**SANITARY DRAINAGE AREA ALTERNATIVE 3**

MTE
Engineers, Scientists, Surveyors

Project No.: 48730-100

September 2, 2022 — 10:45 a.m. — Plotted By: anechita

P:\P\48730\100\48730-100-MS3.dwg

## LEGEND

- PROPERTY LINE
- EXISTING SANITARY TRUNK
- EXISTING SANITARY SEWER
- EXISTING SANITARY FORCEMAIN
- EXISTING 2015 GRCA CONTOURS
- DRAINAGE TO BADEN SANITARY TRUNK SEWER
- GRCA REGULATORY FLOODPLAIN
- GRCA EXISTING WATERBODY
- BUTTERNUT 25m BUFFER
- ARCHAEOLOGICAL 50m CONSTRUCTION MONITORING BUFFER
- ARCHAEOLOGICAL 20m NO-GO BUFFER
- TRIBUTARY 'A' 10m BUFFER
- BADEN CREEK 15m BUFFER
- HUEHN AWARD DRAIN 30m BUFFER
- LOCALLY SIGNIFICANT WETLAND
- LOCAL 15m WETLAND BUFFER
- POTENTIAL BAT (SAR) HABITAT
- GRCA EXISTING WATERCOURSE
- TRENCHLESS CROSSING
- TOWNSHIP URBAN AREA
- COUNTRYSIDE LINE
- PRIMARY STUDY AREA
- DETAILED STUDY AREA
- EXISTING WASTEWATER PUMPING STATION

### ALTERNATIVES

4 — CHRISTIAN/CHARLOTTA/QUEEN AND BADEN CREEK

F/G=358.72(EX)
SAN OBV.=349.40±
DEPTH=9.3m±

F/G=354.35(EX)
SAN OBV.=347.14±
DEPTH=7.2m±

F/G=356.30(EX)
SAN OBV.=348.06±
DEPTH=8.2m±

F/G=348.37(EX)
SAN OBV.=345.37±
DEPTH=3.0m±

F/G=343.50(EX)
SAN OBV.=339.89±
DEPTH=3.6m±

F/G=340.60(EX)
SAN OBV.=337.50±
DEPTH=3.1m±

F/G=342.50(EX)
SAN OBV.=338.69±
DEPTH=3.8m±

F/G=341.70(EX)
SAN OBV.=336.83±
DEPTH=4.9m±

F/G=341.87(EX)
SAN OBV.=336.58±
DEPTH=5.3m±

F/G=339.63EX)
SAN OBV.=335.92±
DEPTH=3.7m±

255m 450mmØ SAN TRUNK @0.30%

210m 600mmØ SAN TRUNK @0.41%

335m 600mmØ SAN TRUNK @0.50%

165m 600mmØ SAN TRUNK @3.3%

349m 600mmØ SAN TRUNK @3.3%

347m 600mmØ SAN TRUNK @0.30%

127m 600mmØ SAN TRUNK @0.50%

64m 600mmØ SAN TRUNK @0.35%

240m 675mmØ SAN TRUNK @0.25%

BADEN WEST WWPS

BADEN WEST WWPS TO BE REMOVED

TRIBUTARY CROSSING
CREEK BED ELEV.=342.00±
PROP SAN OBV. = 340.55±

BADEN CREEK CROSSING
UPSTREAM OF EX. CULVERT
CREEK BED ELEV.=338.00±
PROP SAN OBV. = 337.25±

CONNECT TO EX. MH1
@ OBV.=335.92±
(WALTER FEDY DRAWINGS
5.0068.68-8 DATED NOV. 1974

BADEN WWPS

Snyder's Road West
Christian Street
Miller Street
Queen Street
Charlotta Street
Goderich-Exeter Railway
RAILWAY CROSSINGS
Beck Street
Mill Street
Charles Street
St.George Street
TRIBUTARY 'B'
Louisa Street
Foundry Street
BADEN CREEK POND
HUEHN AWARD DRAIN
BADEN CREEK
TRIBUTARY 'A'
Ai He-469
Ai He-467
Ai He-173
Gingerich Road

BAD4
BAD3
BAD2
U
T
BB1
BB2
AA1
BAD5

FIGURE 7.1
Date: AUG.25/22
Scale: 1:2500

**TOWNSHIP OF WILMOT**

**CHRISTIAN/CHARLOTTA/ QUEEN/BADEN CREEK**
**ALTERNATIVE 4**

MTE
Engineers, Scientists, Surveyors

Project No.: 48730-100

## LEGEND

- PROPERTY LINE
- EXISTING SANITARY TRUNK
- EXISTING SANITARY SEWER
- EXISTING SANITARY FORCEMAIN
- 326 EXISTING 2015 GRCA CONTOURS
- SANITARY DRAINAGE AREA BOUNDARY
- FLOW DIRECTION
- DRAINAGE BY GRAVITY TO NAFZIGER ROAD TRUNK SEWER
- DRAINAGE TO FOREST GLEN WWPS
- DRAINAGE TO WILMOT EMPLOYMENT LANDS TRUNK SEWER
- LANDS NOT TO BE DEVELOPED
- DRAINAGE TO FOUNDRY STREET TRUNK SEWER
- GRCA REGULATORY FLOODPLAIN
- GRCA EXISTING WATERBODY
- BUTTERNUT 25m BUFFER
- ARCHAEOLOGICAL 50m CONSTRUCTION MONITORING BUFFER
- ARCHAEOLOGICAL 20m NO-GO BUFFER
- TRIBUTARY 'A' 10m BUFFER
- BADEN CREEK 15m BUFFER
- HUEHN AWARD DRAIN 30m BUFFER
- LOCALLY SIGNIFICANT WETLAND
- LOCAL 15m WETLAND BUFFER
- POTENTIAL BAT (SAR) HABITAT
- GRCA EXISTING WATERCOURSE
- TOWNSHIP URBAN AREA
- COUNTRYSIDE LINE
- PRIMARY STUDY AREA
- DETAILED STUDY AREA
- PROPOSED WASTEWATER PUMPING STATION
- EXISTING WASTEWATER PUMPING STATION

### ALTERNATIVES

- 4 CHRISTIAN/CHARLOTTA/QUEEN AND BADEN CREEK

FOXBORO
$O_2$
$O_1$
$P_2$
$P_1$
$Y_2$
$Y_1$
Z
$BAD_1$
SCHOOL BLOCK
$BAD_6$
W
X
Q
$M_1$
$L_1$
E
$G_1$
$L_2$
$M_2$
$F_1$
$F_2$
$G_2$
$N_4$
MURF
$N_3$
$N_{ex}$
$N_2$
$N_1$
J
$AA_1$
$AA_2$
$AA_3$
$AD_2$
$BAD_2$
U
$BB_1$
$BB_2$
$BAD_5$
$BAD_4$
S
R
V
T
Nafziger Road
Goderich-Exeter Railway
Snyder's Road West
Snyder's Road East
Gingerich Road
Highway 7/8
Bleams Road
Isaac Street
Queen Street
Charles Street
Orchard Street
Mathilda Street
Foundry Street
Huehn Award Drain
Baden Creek Pond
Baden Creek
Baden Creek Tributary 'A'
Tributary 'A'
Baden WWPS
Baden WWPS
Al Hw469
Al Hw457
Al Hw172
4

N

FIGURE 7.2
Date: AUG. 25/22
Scale: 1:7,500

TOWNSHIP OF WILMOT

SANITARY DRAINAGE AREA
ALTERNATIVE 4

MTE
Engineers, Scientists, Surveyors

Project No.: 48730-100

## LEGEND

- PROPERTY LINE
- EXISTING SANITARY TRUNK
- EXISTING SANITARY SEWER
- EXISTING SANITARY FORCEMAIN
- EXISTING 2015 GRCA CONTOURS
- DRAINAGE TO BADEN SANITARY TRUNK SEWER
- GRCA REGULATORY FLOODPLAIN
- GRCA EXISTING WATERBODY
- BUTTERNUT 25m BUFFER
- ARCHAEOLOGICAL 50m CONSTRUCTION MONITORING BUFFER
- ARCHAEOLOGICAL 20m NO-GO BUFFER
- TRIBUTARY 'A' 10m BUFFER
- BADEN CREEK 15m BUFFER
- HUEHN AWARD DRAIN 30m BUFFER
- LOCALLY SIGNIFICANT WETLAND
- LOCAL 15m WETLAND BUFFER
- POTENTIAL BAT (SAR) HABITAT
- GRCA EXISTING WATERCOURSE
- TRENCHLESS CROSSING
- TOWNSHIP URBAN AREA
- COUNTRYSIDE LINE
- PRIMARY STUDY AREA
- DETAILED STUDY AREA
- EXISTING WASTEWATER PUMPING STATION

ALTERNATIVES

5 — CHRISTIAN AND BADEN CREEK

F/G=358.72(EX)
SAN OBV.=349.40±
DEPTH=9.3m±

255m 450mmØ SAN TRUNK @ 0.50%

Snyder's Road West

Christian Street

Miller Street

Queen Street

Charlotta Street

Charlotta Street

BAD2

BAD3

Mill Street

Beck Street

Charles Street

Goderich-Exeter Railway

Queen Street

F/G=356.30(EX)
SAN OBV.=348.06±
DEPTH=8.2m±

BADEN WEST WWPS

BADEN WEST WWPS TO BE REMOVED

RAILWAY CROSSING

STREAM CROSSING

100m 450mmØ SAN TRUNK @ 0.10%

F/G=350.50(EX)
SAN OBV.=347.03±
DEPTH=3.5m±

St.George Street

U

BADEN CREEK POND

TRIBUTARY 'B'

Louisa Street

Foundry Street

BAD4

HUEHN AWARD DRAIN

T

BB1

Ai He-469

283m 450mmØ SAN TRUNK @ 2.0%

BADEN CREEK

TRIBUTARY 'A'

TRIBUTARY CROSSING
CREEK BED ELEV.=350.20±
SAN OBV. = 347.01±

214m 600mmØ SAN TRUNK @ 0.30%

F/G=347.20(EX)
SAN OBV.=341.28±
DEPTH=5.9m±

F/G=343.50(EX)
SAN OBV.=340.58±
DEPTH=2.9m±

Ai He-467

349m 600mmØ SAN TRUNK @0.30%

BADEN-CREEK

Ai He-176

127m 600mmØ SAN TRUNK @0.50%

64m 600mmØ SAN TRUNK @0.35%

347m 600mmØ SAN TRUNK @0.50%

F/G=340.60(EX)
SAN OBV.=337.50±
DEPTH=3.1m±

F/G=341.50(EX)
SAN OBV.=336.58±
DEPTH=4.9m±

STREAM CROSSING

F/G=341.70(EX)
SAN OBV.=336.83±
DEPTH=4.9m±

240m 675mmØ SAN TRUNK @0.25%

F/G=339.63(EX)
SAN OBV.=335.92±
DEPTH=3.7m±

F/G=342.50(EX)
SAN OBV.=339.38±
DEPTH=3.1m±

BADEN CREEK CROSSING
UPSTREAM OF EX. CULVERT
CREEK BED ELEV.=338.00±
PROP SAN OBV. = 336.87±

CONNECT TO EX. MH1
@ OBV.=335.92±
(WALTER FEDY DRAWINGS
5.0068.68-8 DATED NOV. 1974

BADEN WWPS

BAD5

BB2

AA1

Gingerich Road

FIGURE 8.1
Date: AUG.25/22
Scale: 1:2500

**TOWNSHIP OF WILMOT**

**CHRISTIAN AND BADEN CREEK**
**ALTERNATIVE 5**

MTE
Engineers, Scientists, Surveyors

Project No.: 48730-100

## LEGEND

- PROPERTY LINE
- EXISTING SANITARY TRUNK
- EXISTING SANITARY SEWER
- EXISTING SANITARY FORCEMAIN
- 326 — EXISTING 2015 GRCA CONTOURS
- SANITARY DRAINAGE AREA BOUNDARY
- FLOW DIRECTION
- DRAINAGE BY GRAVITY TO NAFZIGER ROAD TRUNK SEWER
- DRAINAGE TO FOREST GLEN WWPS
- DRAINAGE TO WILMOT EMPLOYMENT LANDS TRUNK SEWER
- LANDS NOT TO BE DEVELOPED
- DRAINAGE TO FOUNDRY STREET TRUNK SEWER
- GRCA REGULATORY FLOODPLAIN
- GRCA EXISTING WATERBODY
- BUTTERNUT 25m BUFFER
- ARCHAEOLOGICAL 50m CONSTRUCTION MONITORING BUFFER
- ARCHAEOLOGICAL 20m NO-GO BUFFER
- TRIBUTARY 'A' 10m BUFFER
- BADEN CREEK 15m BUFFER
- HUEHN AWARD DRAIN 30m BUFFER
- LOCALLY SIGNIFICANT WETLAND
- LOCAL 15m WETLAND BUFFER
- POTENTIAL BAT (SAR) HABITAT
- GRCA EXISTING WATERCOURSE
- TOWNSHIP URBAN AREA
- COUNTRYSIDE LINE
- PRIMARY STUDY AREA
- DETAILED STUDY AREA
- PROPOSED WASTEWATER PUMPING STATION
- EXISTING WASTEWATER PUMPING STATION

### ALTERNATIVES

- 5 — CHRISTIAN AND BADEN CREEK

FOXBORO
$O_2$
$O_1$
$P_2$
$P_1$
$Y_2$
$Y_1$
Z
$BAD_1$
$BAD_2$
$BAD_3$
$BAD_4$
$BAD_5$
$BAD_6$
SCHOOL BLOCK
U
V
S
R
T
Q
X
W
$M_1$
$L_1$
E
$G_1$
$L_2$
$M_2$
$F_1$
$F_2$
$G_2$
$AA_1$
$AA_2$
$AA_3$
$N_4$
MURF
$N_3$
$N_2$
$N_{ex}$
$N_1$
J
$BB_1$
$BB_2$
Snyder's Road West
Snyder's Road East
Nafziger Road
Gingerich Road
Goderich-Exeter Railway
Highway 7/8
Blakerne Road
Queen Street
Charles Street
Jacob Street
Mary Street
Bridget Street
Orchard Street
Mckenzie Street
Huron Street
Isaac Street
BADEN WWPS
BADEN WEST WWPS
BADEN CREEK POND
HUEHN AWARD DRAIN
BADEN CREEK TRIBUTARY 'A'
TRIBUTARY 'A'
BADEN CREEK
Ai Hs-469
Ai Hs-657
Ai Hs-674

FIGURE 8.2

Date: AUG. 25/22
Scale: 1:7,500

TOWNSHIP OF WILMOT

SANITARY DRAINAGE AREA
ALTERNATIVE 5

MTE
Engineers, Scientists, Surveyors

Project No.: 48730-100

# Technical Memo 1
# Natural Environment

Technical Memorandum

**Project Name:** Baden Trunk Sanitary Sewer EA

**MTE File No.:** 48730-100

**To:** Jeff Molenhuis, Township of Wilmot
Bryan Bishop, Township of Wilmot
Trevor Heywood, GRCA

**Date:** November 6, 2022

**cc:** Kaoru Yajimi, ROW
Pierre Chauvin, MHBC
Paul Britton, MHBC

**From:** Jeff Martens, P.Eng.
Carla Illman, M.Eng.

**Re: BADEN TRUNK SANITARY SEWER CLASS B ENVIRONMENTAL ASSESSMENT**
**Natural Environment Assessment of Alternatives**

# 1.0 Natural Environment

The Natural Environment Factor was assessed for each alternative based on the number of sensitive environmental features crossed and/or their potential need for mitigative measures during construction and post-construction operations.

Natural Resource Solutions Inc. (NRSI) was retained on behalf of MTE to complete a Natural Environmental Assessment (NEA). The report, *Baden Trunk Sanitary Sewer Environmental Assessment*, *(April 2022*), can be found in **Appendix A**. The study details the existing natural features and their functions, including assessments of their ecological significance and sensitivity as it pertains to the terrestrial ecosystems, wetland ecosystems and aquatic ecosystems of the DSA and the potential impacted areas of the PSA. NRSI prepared a technical memorandum, *Evaluation of Alternatives – Natural Environment Criteria* (July 11, 2022) (**Appendix A**), that summarizes the potential for direct or indirect impacts to the natural environment features for each alternative and their scoring is listed below for sections 1.A – 1.C.

MTE assessed the Factor Categories pertaining to 1.D - Surface Water Quality, 1.E - Groundwater 1.F - Resources and Surface Drainage.

### 1.A Terrestrial Ecosystems

#### *Vegetation Communities and Flora*

Alternative 2 received a maximum score of 10.
Alternative 3 received a score of 8.
Alternative 5 received a score of 5.
Alternative 1 received a score of 4.
Alternative 4 received a minimum score of 1.

#### *Wildlife Habitat*

Alternative 5 received a maximum score of 10.
Alternative 2 received a score of 6.
Alternative 3 received a score of 5.
Alternative 4 received a score of 4.
Alternative 1 received a minimum score of 1.

**1.B Wetland Ecosystems – refer to NRSI technical memo for justification of scoring**

Alternative 5 received a maximum score of 10.
Alternative 3 received a score of 9.
Alternative 2 received a score of 8.
Alternative 4 received a score of 4.
Alternative 1 received a minimum score of 1.

**1.C Aquatic Ecosystems – refer to NRSI technical memo for justification of scoring**

Alternative 5 received a maximum score of 10.
Alternative 4 received a score of 7.
Alternative 2 received a score of 4.
Alternative 3 received a score of 3.
Alternative 1 received a minimum score of 1.

**1.D Surface Water (Quality - Impact to Water Quality / Thermal Regime)**

***Water Quality (TSS-oil/gas, Temperature)***

This Factor Group evaluated the potential impacts to water quality due to the Baden Sanitary Trunk construction. Factors identified to alter water quality include Total Suspended Solids (TSS), deleterious substances such as oil/gas and temperature.

The impacts stem from the possibility of additional sediments being deposited into nearby watercourses/bodies during excavation, the type of sediment (road substrate, natural soil), and the proximity of construction vehicles to watercourses/bodies with respect to gas/oil leaking and refueling during the construction phase.

Increases in TSS and turbidity results in reduced photosynthesis, reduced oxygen, increased water temperature, carries toxins, and promotes erosion and resuspension of sediment within the stream bed. Rapid sedimentation can interfere with groundwater inflow to surface water features as well as burying benthic organisms important to the lifecycle of Baden Creek.

Where dewatering is required, design Alternatives will provide enhanced TSS removal before entering back into the stream. Changes to flow regime due to water rerouting can increase turbulence and contribute to particle resuspension leading to further water quality issues. Monitoring of flow rates may be required where rerouted water re-enters Baden Creek.

The following categories were scored based on the number of sensitive environmental feature crossings, both trenchless and open-cut, and/or the potential need for mitigative measures.

It should be noted that the potential impacts are limited to the construction phase of the project. Scoring was based on the proximity to Baden Creek pond, the Huehn Award Drain, Baden Creek, the Baden Creek Tributary A, and the Baden Creek Tributary B while taking into account the sensitivity of the water feature.

Alternative 5 received a maximum score of 10. This alternative scored the highest because of the impact to Baden Creek and its tributaries. There are a total of 2 stream crossings. The combined trenchless stream/railway crossing that occurs at the Baden Creek Tributary A (**Figure 8.1**), is categorized as an ephemeral/intermittent stream with no evidence of groundwater interaction. Therefore, little to no water quality impacts are expected to occur during construction, and no dewatering would likely be required. The second trenchless stream crossing located north of Gingerich Road, is not anticipated to impact the Creek, and in turn, the water quality will not be affected.

Alternative 4 received a score of 8. This alternative is similar to Alternative 5 in that it crosses the intermittent Baden Creek tributary A. However, it crosses further downstream, just before the confluence with Baden Creek. Refer to **Figure 7.1** for alignment location.This trenchless stream crossing is located within a reach that has been identified to have possible groundwater interaction. Therefore, increased TSS contributions may occur during construction due to dewatering. The trenchless crossing north of Gingerich Road is not anticipated to impact the Creek, and in turn, the water quality will not be affected.

Alternative 2 received a score of 3. This alternative has two open-cut stream crossings located along Foundry Street. One stream crossing is next to the Baden Creek pond and the other at the Huehn Award Drain. Refer to **Figure 5.1** for alignment location. Flow rates (while rerouting during the dewatering process) would have to be established to prevent increased flow as well as provide sediment control during the dewatering process. The potential for contaminated sediments from the road (asphalt) and oil/gas getting into the surface water also exist. Mitigative measures would need to be implemented.

Alternative 3 received a score of 2. This alternative is similar to Alternative 2 with the exception that the proposed sewer at the stream crossings along Foundry Street are deeper than Alternative 2. Refer to **Figure 6.1** for alignment location.

Alternative 1 received the minimum score of 1. Aside from the same two (2) open-cut stream crossings as indicated in Alternatives 2 and 3, there is an additional trenchless stream crossing further upstream of Baden Creek, north of Snyder's Road East, with a potential to impact the water quality of the Locally Significant Wetland as well as Baden Creek. Refer to **Figure 4.1** for alignment location. This upstream reach has the potential to further increase TSS levels to Baden Creek and impacting its water quality.

***Thermal Regime***

The thermal regime of Baden Creek is based on field measurements of water temperature, taking into consideration the amount of vegetative cover and groundwater inflow. The Township recognizes that groundwater discharge to streams is a vital hydrogeological function contributing to Baden Creek's thermal regime.

Baden Creek is considered to have a warmwater thermal regime with evidence of groundwater inflow. pH levels provide further evidence of warm freshwater habitats. The Baden Creek Pond is a candidate for significant wildlife habitat for SCC Snapping Turtle with evidence of groundwater inflow as well as providing wintering conditions for the snapping turtle. Refer to the NEA report in **Appendix A** for more information.

The Huehn Award Drain, located along Foundry Street, is classified as a coldwater watercourse by the GRCA with evidence of groundwater inflow. The coldwater contribution maintain cooler water temperatures during summer months within downstream sections of Baden Creek from the confluence past the BWWPS.

The Baden Creek Tributary A is an ephemeral stream supporting seasonal flows and originating from the stormwater management facility, northwest of the detailed study area. Baseflow appears to be provided by tile drains with no signs of groundwater input.

An increase in TSS increases turbidity and can lead to an increase in water temperature as it absorbs additional heat from the sun. This can also cause dissolved oxygen levels to drop below the thermocline, creating hypoxic conditions. Scoring is based on the greatest potential for an increase to the thermal regime.

Alternative 5 received a maximum score of 10. This alternative scored the highest because it does not impact the sensitive water features of the Baden Creek pond and the Huehn Award Drain (**Figure 8.1**). The northern portion of the alignment is along the intermittent Baden Creek Tributary A, where threnchless construction will have no impact on the thermal regime of significant water features due to

no groundwater interaction. The proposed Baden Creek trenchless crossing, north of Gingerich Road, are not anticipated to impact the thermal regime due to no anticipated dewatering.

Alternative 4 received a score of 8. This alternative is similar to southern portion of Alternative 5 however, the area between Queen Street and the trenchless crossing of Tributary A, adjacent to Baden Creek, may require dewatering resulting in an increase in water temperature. The increased flow rates from rerouting may also lead to additional suspended sediments and turbidity, further impacting the thermal regime. Impacted vegetation would reduce vegetative cover and not be able to assist in regulating the temperature of Baden Creek.

Alternative 2 received a score of 3. Open-cut trenching along Foundry Street at the Baden Creek pond and the Huehn Award Drain would require water rerouting and dewatering during construction resulting in a possible increase to the water temperature. These activities along with the disruption of groundwater inflow of cold water would alter the thermal regime of the pond and Baden Creek, affecting the vegetation and cool water fish habitat. The increased flow rates from rerouting may also lead to additional suspended sediments and turbidity, further impacting the thermal regime. Impacted vegetation would reduce vegetative cover and not be able to assist in regulating the temperature of Baden Creek.

Alternative 3 received a score of 2. This alternative is similar to Alternative 2, but the proposed sewer is deeper, further increasing potential impacts to the thermal regime during construction.

Alternative 1 received the minimum score of 1. This alternative is the same as Alternative 2 except that there is an additional stream crossing north of Snyder's Road East (**Figure 4.1**) that can lead to increased flow and sediments, thus altering the temperature upstream of the Baden Creek pond.

***Chlorides***

Chlorides are not a significant issue. All Alternatives are scored as 10.

**1.E Groundwater Resources**

This Factor Group assesses the impacts related to groundwater resources based on the following factors:

- Groundwater Recharge areas: Encroachment into the Regional Recharge Area.
- Groundwater Quality: Impacts to Vulnerable Areas (IPZ, SGRA, HVA and WHPA):
    - IPZ – Intake Protection Zone;
    - SGRA – Significant Groundwater Recharge Areas;
    - HVA – Highly Vulnerable Aquifers; and
    - WHPA – Well Head Protection Areas.
- Shallow Groundwater Movement: Impacts to existing shallow flow and interflow patterns relative to surface water features and groundwater discharge areas.

For the purpose of this evaluation, the Groundwater Resources Factor Group will be comprised of Groundwater Regional Recharge Areas, Groundwater Quality - as it pertains to the Clean Water Act, and Shallow Groundwater Movement.

MTE performed a geotechnical site characterization investigation to determine the general soil and groundwater conditions within the DSA. In addition to the extensive historical geotechnical data, additional borehole samples were taken within the DSA to further characterize soils and groundwater condition. The geotechnical report, *Baden Sanitary Trunk EA, Geotechnical Site Characterization (May 3, 2022)*, is provided in **Appendix B.** This report was used to validate the hydrogeological assessment of the DSA and is summarized in the *Hydrogeological Assessment of Alternatives - Technical Memo* (April 26, 2022) (**Appendix C**) prepared by MTE.

The scoring was based on the trunk sewer being located in or in close proximity to regional recharge areas. The scoring was not based on the potential for infiltration and/or groundwater interference as those elements are covered under categories of shallow groundwater movement and shallow groundwater quality.

***Groundwater Recharge Areas (Regional Recharge Areas)***

This Factor Group was scored according to the proximity and possible encroachment to regional recharge areas due to dewatering. Baden Creek and the Huehn Award Drain both connect to the regional recharge area to the east. Refer to Figure 5 of the *Hydrogeological Assessment of Alternatives - Technical Memo (***Appendix C**) for locally mapped Regional Recharge Areas.

Alternative 5 received a maximum score of 10. Alternative 5 (**Figure 8.1**) does not impact any regional recharge areas. The two trenchless crossings occur in areas that do not require dewatering.

Alternative 4 received a score of 9. This alternative is similar to Alternative 5 however there is a possibility that the trenchless stream crossing of Baden Creek Tributary A (**Figure 7.1**) may require dewatering due to possible groundwater inflow. As stated above, there is some connectivity to the Regional Recharge Area to the east of the PSA.

Alternative 2 received a score of 7. This alternative has two open-cut crossings along Foundry Street at the Baden Creek Pond and the Huehn Award Drain (**Figure 5.1**). These water features are connected to the regional recharge area to the east. Construction of the sewer in this area may affect groundwater recharge temporarily due to dewatering.

Alternative 3 received a score of 6. This alternative is similar to Alternative 2 with respect to the open-cut stream crossing along Foundry Street (**Figure 6.1**), but the increased depth would increase the potential of impacting the Regional Recharge Area to the east.

Alternative 1 received the minimum score of 1. Though this alternative has the same open-cut stream crossings along Foundry Street as Alternatives 2 and 3 (**Figure 4.1**), it also has a proposed forcemain and pumping station, to service parcel Area O, which is in close proximity to the regional recharge area to the northeast.

***Groundwater – Clean Water Act (WHPA, SGRA)***

This Factor Group assesses the potential impact of each alternative with respect to WHPAs, HVAs and/or SGRAs as described in the Clean Water Act. The scoring was based on the proximity of the proposed Baden Trunk Alternative to a vulnerable area. The scoring was not based on the potential for infiltration and/or groundwater interference as those elements are covered under categories of shallow groundwater movement and shallow groundwater quality. Refer to Figure 4 and Figure 6 of **Appendix C** for locally mapped WHPA and SGRAs.

Alternative 5 received a maximum score of 10. This alternative scored the highest because it is the furthest alignment from the WHPAs and SGRAs located to the southeast of the PSA.

Alternative 4 received a score of 9. This alternative is similar to Alternative 5, however portions of the alignment are slightly closer to the WHPAs and SGRAs.

Alternative 3 received a score of 6. This alternative scored lower due to the proximity of the headwaters of the Baden Creek and Huehn Award Drain to the WHPAs and SGRAs located to the southeast of the PSA.

Alternative 2 received a score of 5. This alternative is similar to Alternative 3.

Alternative 1 received the minimum score of 1. Not only are the headwaters of Baden Creek and the Huehn Award Drain in close proximity to the southeastern WHPAs and SGRAs, the forcemain and

proposed pumping station in Parcel O (**Figure 4.1**) is also in close proximity to the WHPAs and SGRAs to the northeast.

***Shallow Groundwater Movement***

The evaluation of this Factor is based on the potential for interference with existing shallow groundwater flow patterns (baseflow) and its proximity to significant groundwater feature discharge areas. Short-term impact is considered. Refer to Figure 7 of the *Hydrogeological Assessment of Alternatives - Technical Memo (***Appendix C**) regarding local existing groundwater movement and contours.

Alternative 5 received a maximum score of 10. This alternative scored the highest because there is minimal groundwater interaction at the stream crossing of Tributary A. A shallow sand layer is present between 5.6m and 6.1m bgs at MW102-21, which is below the proposed obvert of 5.4m bgs, refer to Figure 1 and borehole log in **Appendix B** for further details. The soil profile at MW104-21, located at the stream crossing just north of Gingerich Road, is primarily clayey silt with no sand, implying little groundwater movement through that area. It is also furthest away from the locally significant wetlands (**Figure 8.1**).

Alternative 2 received a score of 5. This alternative does not impede shallow groundwater flow along Snyder's Road West due to the soils being predominantly silty clay till. There are some saturated sand seams located at the proposed trunk sewer depth next to the Baden Creek pond which may influence shallow groundwater movement during construction.

Alternative 3 received a score of 4. This alternative passes through a sand layer at MW103-21. Construction may impact groundwater movement to a locally significant wetland in this area. Refer to **Figure 6.1**. The increased depth of construction of this alternative may impact shallow groundwater to the Huehn Award Drain and Baden Creek pond.

Alternative 4 received a score of 2. This alternative, located below an existing sand layer at MW103-21 (between 4.0m and 5.8m bgs), could possibly impact groundwater movement to local significant wetlands during construction if dewatering is required. Refer to Figure 1 and borehole log in **Appendix B** for further details. Groundwater movement to the Baden Creek Tributary A may be temporarily impacted during trenchless construction due to potential dewatering.

Alternative 1 received the minimum score of 1. This alternative is similar to Alternative 2 with the additional shallow forcemain and stream crossing north of Snyder's Road East. Groundwater influence has been observed in this area and is associated with two meadow marsh wetland features located in this area (**Figure 4.1)**. Alternative 1 has the largest extent of construction which may influence groundwater movement during construction.

**1.F Surface Drainage (Quantity and Erosion)**

This Factor Group assess how surface drainage impacts surface water features, the hydrologic functions within the Regulatory Floodplain and the slope stability of the watercourses.

***Quantity Control and Flow Regime***

The Baden Creek flow regime is most impacted during the dewatering phase or rerouting of Baden Creek during construction. This occurs when extracted water during open-cut trenching or dewatering is returned to Baden Creek at a flow rate different than its current flow rate. The added volume and change in flow rate can impact the flow regime leading to erosion and water quality issues. Temporary damming of the Baden Creek may also result in upstream flooding if open cut trenching is used without rerouting. Mitigative measures such as flow monitoring of rerouted water and TSS removal may need to be implemented.

Scoring of this Factor is based on the number of locations that would potentially require mitigative measures.

Alternative 5 received a maximum score of 10. Given the nature of intermittent/ephemeral streams and the soil structure along Baden Creek Tributary A, it is reasonable to conclude dewatering will not be required at the trenchless railway/stream crossing (**Figure 8.1)**. The Baden Creek trenchless crossing north of Gingerich Road is also not anticipated to require dewatering due to the soil structure at that location. Therefore, no impacts to quantity of flow or flow regime within the Baden Creek are anticipated.

Alternative 4 received a score of 8. This alignment is similar to Alternative 5 with respect to the crossing of Baden Creek north of Gingerich Road however, there is a possibility of increasing volume to Baden Creek due to redirecting water if dewatering is required at the trenchless railway crossing (**Figure 7.1)**. This trenchless crossing occurs through a sand layer and is in close proximity to locally significant wetlands. The area between the trenchless crossing of Baden Creek Tributary A and Queen Street may also require dewatering resulting in an increasing water quantity to Baden Creek if significant.

Alternative 1 received a score of 7. This alternative may have additional water added to Baden Creek Tributary B during dewatering at the stream crossing north of Snyder's Road East (**Figure 4.1)**. The open cut trenches required at the Baden Creek pond and the Huehn Award Drain crossing will require flow diversion, resulting in potential increased flows. Flow regime should be monitored while rerouting to mitigate significant impacts.

Alternative 2 received a score of 6. This alternative is similar to Alternative 1 except that it does not cross Baden Creek north of Snyder's Road East. It scored lower because this alignment is deeper than Alternative 1, and would possibly require further dewatering.

Alternative 3 received the minimum score of 1. This alternative's is the similar as Alternative 2 except that the proposed alignment is much deeper resulting in increased volume and flow due to additional dewatering and flow rerouting.

***Floodplain Function***

This Factor assesses impacts to the Regulatory Floodplain and changes to the hydrologic functions of the floodplain during construction. Scoring is based on construction within the floodplain, primarily where stream crossings occur and potential impacts to the floodplain.

Alternative 2 received a score of 10. This alternative impacts the floodplain at the two open-cut stream crossings along Foundry Street (**Figure 5.1**).

Alternative 3 received a score of 9. This alternative is similar to Alternative 3 except the deeper construction will impact more of the floodplain during construction.

Alternative 1 received a score of 7. This alternative is similar to Alternative 2 except it has an additional stream crossing within the regulated floodplain north of Snyder's Road East (**Figure 4.1**).

Alternative 5 received a score of 6. This alternative runs along the floodplain boundary and impacts the GRCA regulated floodplain along the southern, horizontal section of Baden Creek and south to Gingerich Road (**Figure 8.1)**. The trenchless stream crossing at the uppermost reach of Baden Creek Tributary A, does not have a regulated floodplain and will not impact the GRCA regulated floodplain.

Alternative 4 received a score of 1. This alignment is similar to Alternative 5 except the trenchless stream crossing of Baden Creek Tributary A is close to the GRCA regulated floodplain and may be impacted during construction (**Figure 7.1**).

***Stormwater Management***

Stormwater management was not a significant issue and all Alternatives are scored as 10.

***Water Balance***

Water Balance was not a significant issue and all Alternatives are scored as 10.

***Erosion Assessment***

This Factor Group assessed each alternative based on the potential erodibility of Baden Creek and its tributaries during construction. Factors considered to contribute to bank erosion include increased TSS due to construction activities, open-cut trenching across stream and flow regime due to rerouting or dewatering.

The creek shows many signs of active bank erosion and lateral migration, particularly in grass areas where the root depth is not sufficient to protect the loose banks from eroding. Results for the rapid geomorphic assessment (RGA) show that each reach is either stressed or unstable.

The *Fluvial Geomorphological Assessment (August 30, 2022),* prepared by Water's Edge (**Appendix D**), was used to score this factor. Preliminary design of the Baden Sanitary Trunk will reflect the required erosion hazard limits.

Alternative 5 received the maximum score of 10. Two trenchless crossings at Baden Creek are proposed. There is a trenchless crossing along the intermittent/ephemeral reach of the Baden Creek Tributary A and railway, which will not require dewatering. The trenchless crossing of Baden Creek, north of Gingerich Road is not anticipated to require dewatering. The alignment should be outside the erosion hazard setback, as it is predominantly a sand system and shows obvious signs of ongoing erosion.

Alternative 4 received a score of 9. This alignment is similar to Alternative 5 except the trenchless crossing near the confluence of tributary A and Baden Creek may require dewatering due to signs of groundwater inflow. This additional proximity to Baden Creek results in a lower scoring than Alternative 5. Similar to Alternative 5, the alignment should be outside the erosion hazard setback due to the reach being either stressed or unstable.

Alternative 2 received a score of 4. This alternative has an open-cut trench at the Baden Creek pond and at the Huehn Award Drain. Flow diversion structures increase the risk of erosion during construction. Mitigation would be required at all locations to prevent an increase of TSS to Baden Creek.

Alternative 3 received a score of 3. This alternative is similar to Alternative 2 except that it requires a deeper trench through Baden Creek at the pond, leading to increased potential erosion concerns.

Alternative 1 received a score of 1. This alternative is similar to Alternative 3 except for an additional stream crossing. This alternative also requires dewatering at the trenchless crossing north of Snyder's Road West (Tributary B). The added flow diversion structure increases the risk of erosion during construction. Mitigation would be required at all locations to prevent an increase of TSS to Baden Creek.

# Appendix A

## Natural Environmental Assessment Report (April 2022)

## Evaluation of Alternatives Natural Environment Criteria Technical Memorandum (July 11, 2022)



# Baden Trunk Sanitary Sewer Environmental Assessment

## Natural Environment Assessment

Prepared for:

MTE Consultants Inc.
520 Bingemans Centre Drive
Kitchener, Ontario  N2B 3X9

Project No. 2561 | November 2022

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

**Baden Trunk Sanitary Sewer Environmental Assessment**

**Natural Environment Assessment**

## Project Team

| | |
|---|---|
| Ryan Archer | Project Manager; Senior Terrestrial and Wetland Biologist |
| Andrew Dean | Terrestrial and Wetland Biologist |
| Steve Burgin | Aquatic Biologist |
| GIS Technician | Gerry Schaus |

Report submitted on November 3, 2022



Ryan Archer, M.Sc.

Project Manager

Senior Terrestrial and Wetland Biologist

# Table of Contents


**1.0 Introduction ..... 1**
**2.0 Background Information Review and Significant Habitat Screening ..... 2**
**2.1 Background Information Secondary Sources ..... 2**
**2.2 Significant Species Habitat Screening ..... 2**
**3.0 Relevant Policies, Legislation and Regulations ..... 4**
**3.1 Waterloo Region Official Plan Policies ..... 4**
**3.2 Wilmot Township Official Plan Policies ..... 4**
**3.3 Grand River Conservation Authority Regulations and Policies ..... 5**
**3.4 Provincial Policy Statement ..... 6**
**3.5 Fisheries Act ..... 7**
**3.6 Endangered Species Act ..... 8**
**3.7 Migratory Birds Convention Act ..... 8**
**4.0 Fieldwork Methodology ..... 9**
**5.0 Existing Conditions ..... 12**
**5.1 Soils, Terrain and Drainage ..... 12**
**5.2 Terrestrial Features ..... 13**
5.2.1 Vegetation Communities ..... 13
5.2.2 Vascular Flora ..... 17
5.2.3 Birds ..... 18
5.2.4 Herpetofauna ..... 20
5.2.5 Mammals ..... 20
5.2.6 Insects ..... 21
**5.3 Aquatic Features ..... 21**
**6.0 Natural Environment Significance and Sensitivity ..... 27**
**6.1 Watercourses and Fish Habitat ..... 27**
6.1.1 Watercourse Buffers ..... 28
**6.2 Woodlands ..... 29**
**6.3 Wetlands ..... 30**
6.3.1 Wetland Buffers ..... 30
**6.4 Species at Risk ..... 31**
6.4.1 Confirmed Habitat ..... 31
6.4.2 Potential Habitat ..... 32
**6.5 Significant Wildlife Habitat ..... 33**

6.5.1 Candidate Significant Wildlife Habitat .....33
6.5.2 Significant Wildlife Habitats Considered Absent.....34
**6.6 Regionally Significant Species.....34**
**6.7 Ecological Linkages.....35**
**7.0 References.....36**

## List of Tables

Table 1. Vegetation communities present within the Primary Study Area. .....14
Table 2. Vegetation communities present within the Northeast Study Area Section. .....15
Table 3. Fish Species Identified within Baden Creek.....24

## List of Appendices

Appendix I Schmidt Estate EIS Study Area
Appendix II Plant Species Inventoried within the Study Area
Appendix III Bird Species Reported from the Study Area and Vicinity
Appendix IV Herpetofauna Species Reported from the Study Area and Vicinity
Appendix V Mammal Species Reported from the Study Area and Vicinity
Appendix VI Butterfly Species Reported from the Study Area and Vicinity
Appendix VII Odonata Species Reported from the Study Area and Vicinity
Appendix VIII Species at Risk/Species of Conservation Concern Habitat Assessment
Appendix IX Significant Wildlife Habitat Assessment

## Maps

Map 1. Natural Environment Assessment Study Area
Map 2. Vegetation Communities
Map 3. Natural Environment Constraints

## 1.0 Introduction

Natural Resource Solutions Inc. (NRSI) was retained by MTE to complete a Natural Environment Assessment (NEA) to inform the Municipal Class Environmental Assessment (EA) associated with the planned installation of a trunk sanitary sewer in the community of Baden. The sanitary sewer installation is required as part of plans to service future development lands in the west end of Baden. The sanitary sewer will extend from Snyder's Road in the north to the Baden Wastewater Pumping Station in the south. Multiple alternative alignments were considered as part of the EA. See Map 1 for the NEA study area.

The study area is predominantly comprised of actively cultivated agricultural lands, with lesser areas of fallow, regenerating fields. Smaller areas of rural residential and commercial land cover also fall within the study area. Natural feature coverage within the study area is dominated by Baden Creek and its tributaries, along with adjacent cultural meadow features. Small, isolated woodlands fall within the study area. Baden Creek passes through an anthropogenic pond located within the northeast end adjacent to Foundry Street.

This report summarizes background information on natural heritage features within the study area as well as the results of field surveys completed to accurately characterize the existing natural environment conditions. Information on existing conditions within the study area was also gathered from background and field data collected for the Schmidt Estate Environmental Impact Study (EIS) collected by NRSI in 2017 for one of the participating landowners. The Schmidt Estate lands cover a large portion of the NEA study area; see Appendix I for an illustration of the Schmidt Estate EIS study area. Although data collected for the Schmidt Estate EIS was used to inform land use constraints for the previous re-zoning of those lands, the EIS itself has not yet been completed. Additional supplementary background and field survey data was collected by NRSI in 2021 for the purposes of this study.

Existing conditions data was used to assess the significance and sensitivity of natural features and ecological functions within the study area. This analysis was completed with consideration for applicable Township and Provincial policies and legislation as well as the regulations and associated policies of the Grand River Conservation Authority (GRCA). The results of this assessment will be used to inform the evaluation of alternative alignments for the planned trunk sanitary sewer installation.

## 2.0 Background Information Review and Significant Habitat Screening

### 2.1 Background Information Secondary Sources

A review of existing natural heritage information was completed to identify key natural heritage features and species that are known or have potential to occur within the study area. Requests for background information were sent to the Ontario Ministry of Northern Development, Mines, Natural Resources and Forestry (NDMNRF) Guelph District and the GRCA. Relevant background information for the study area was received from the GRCA on May 10, 2021 and from the NDMNRF on June 18, 2021.

Background information relevant to the study area was also collected and reviewed from sources including the following:

- Land Information Ontario Natural Heritage Make-a-Map base mapping and Natural Heritage Information Centre (NHIC) online database (MNRF 2021a);
- Region of Waterloo Official Plan (2015);
- Township of Wilmot Official Plan (2019);
- GRCA online mapping (GRCA 2021);
- Background information and NRSI field data collected for the Schmidt Estate EIS in 2017;
- Department of Fisheries and Oceans Canada (DFO) Species at Risk Mapping (DFO 2021);
- Atlas of the Mammals of Ontario (Dobbyn 1994);
- Ontario Reptile and Amphibian Atlas (Ontario Nature 2019);
- Ontario Breeding Bird Atlas (BSC et al. 2008);
- eBird (eBird 2021); and,
- iNaturalist (iNaturalist 2021).

### 2.2 Significant Species Habitat Screening

Species at Risk (SAR) are those listed on the Species at Risk in Ontario List (MECP 2020). These include species identified by the Committee on the Status of Species at Risk in Ontario (COSSARO) as provincially Endangered, Threatened, or Special Concern. Species listed as Endangered or Threatened are protected under the *Endangered Species Act* (ESA), which includes protection to their habitat.

Species considered Special Concern are included in the definition of Species of Conservation Concern (SCC), which includes the following:

- species designated provincially as Special Concern,
- species that have been assigned a conservation status (S-Rank) of S1 to S3 or SH by the Natural Heritage Information Centre (MNRF 2021a), and
- species that are designated federally as Threatened or Endangered by the Committee for the Status of Endangered Wildlife in Canada (COSEWIC) but not provincially by the COSSARO. These species may be protected by the federal *Species at Risk Act* (SARA) if they are listed as Threatened or Endangered on Schedule 1 of the SARA.

Habitat for SCC is considered Significant Wildlife Habitat (SWH) (OMNR 2010), which is afforded protection under the Provincial Policy Statement (OMMAH 2020) and municipal natural heritage protection policies. For the purposes of this report, the term "SAR" will refer to provincially Threatened and Endangered species regulated under the ESA while provincial species of Special Concern will be considered SCC.

Based on NRSI's examination of background sources and federally or provincially significant species with occurrence records in the study area vicinity (within 10km), an assessment of SAR and SCC suitable habitat presence within the study area was completed. Assessments of habitat suitability in the study area were made by cross-referencing each species' known habitat preferences or requirements (e.g., OMNR 2000) with existing natural features based on review of recent satellite imagery of the study area lands and based on previous NRSI site characterization within the Schmidt Estate lands. The results of this significant species habitat screening are described in the context of SAR and SCC in Sections 6.4 and 6.5, below.

A preliminary screening for the presence of SWH was also completed for the study area. The Significant Wildlife Habitat Technical Guide (SWHTG) is a guideline document that outlines the types of habitats that the NDMNRF considers significant in Ontario as well as criteria to identify these habitats (OMNR 2000, MNRF 2015a). The SWHTG groups SWH into four broad categories: seasonal concentration areas, rare vegetation communities and specialized wildlife habitat, habitats of SCC, and animal movement corridors. This screening involved the comparison of NDMNRF criteria outlined for Ecoregion 6E, in which the study area is located, against habitats known to occur in the study area. The results of the SWH screening are described in Section 6.5.

## 3.0 Relevant Policies, Legislation and Regulations

### 3.1 Waterloo Region Official Plan Policies

Waterloo Region's environmental features and the linkages among them have been mapped as part of a broad Greenlands Network. The Greenlands Network is comprised of Landscape Level Systems, Core Environmental Features, Supporting Environmental Features, fish habitat, and the linkages among these elements (Region of Waterloo 2015). Landscape Level Systems and Core Environmental Features are mapped by the Region in its Official Plan (OP). Neither of these Greenlands Network elements are mapped within the EA study area. However, Significant Habitat of Endangered and Threatened Species, which is a category of Core Environmental Feature, is not mapped on Greenlands Network OP mapping. Regional policies associated with this habitat type will apply where applicable.

With respect to fish habitat, Section 7.D.1 of the Regional OP states that "*development and site alteration will not be permitted within fish habitat, except in accordance with Provincial and Federal requirements to the satisfaction of the Federal Department of Fisheries and Oceans, or its delegate*".

Supporting Environmental Features comprise environmental features not meeting criteria for recognition as being Regionally significant. It is the role of Area Municipalities to identify and set policies for the protection of Supporting Environmental Features (see Section 3.2). Linkages that are identified through environmental studies are also to be incorporated into site development plans in accordance with the policies and requirements of Area Municipalities.

### 3.2 Wilmot Township Official Plan Policies

Criteria that define the presence of Supporting Environmental Features are summarized in Section 8.1.5.2 of the Township OP. These include the following that may be of relevance to the study area:

- All non-provincially significant wetlands as designated by the MNRF or the GRCA;
- Locally significant woodland;
- Locally significant environmental linkage as identified by an environmental study;
- Permanent or intermittent watercourses;
- Features that provide a connection or act as a buffer or supporting area to environmental features, thus maintaining ecological connectivity between communities; and,

- Performing vital hydrogeological functions, such as groundwater recharge or discharge areas (Township of Wilmot 2019).

Development within or adjacent to (within 50m of) Supporting Environmental Features will only be permitted under Township policy where a suitable environmental study can demonstrate that adverse environmental impacts will not occur on the natural features and ecological functions, or otherwise subject to other conditions being met as outlined in Section 8.1.5.5 of the OP. Where Environmental Linkages have been identified through environmental studies and in consultation with the appropriate agencies, the Township will require that Environmental Linkages be incorporated into land use planning.

In conjunction with the GRCA, the Township has mapped the locations of Environmentally Constrained Lands, which include areas of flooding, erosion and slope hazards. For reasons of public safety and property damage/disruption, development is generally directed away from areas of Environmentally Constrained Lands. In accordance with OP Section 8.2.5, an exception to development prohibitions within these lands is made for wastewater management infrastructure provided flood flows are not affected and applicable GRCA policies are met (Township of Wilmot 2019).

## 3.3 Grand River Conservation Authority Regulations and Policies

The study area is regulated by the GRCA under the *Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation* (Ontario Regulation 150/06). Development and site alteration within the regulated lands is prohibited unless permitted by the GRCA under the policies of its regulation. Regulated features within the study area include floodplain, valley and slope erosion hazards, and their regulatory safety allowances, associated with Baden Creek and its tributaries. As described below, small, previously unmapped wetland features have also been confirmed within the study area. In accordance with the Regulation, it must be demonstrated that an undertaking will not affect the control of flooding, erosion, dynamic beaches, or pollution, or the conservation of land, in order to be permitted (GRCA 2015).

Section 8.1.15 of the GRCA's *Policies for the Administration of Ontario Regulation 150/06* (GRCA 2015) states that public infrastructure, including but not limited to sanitary sewers, may be permitted within the Riverine Flooding Hazard zone provided there is no feasible alternative outside of that zone as determined through an EA, and where various conditions are met.

These conditions include but are not limited to the limitation of adverse hydraulic or fluvial impacts with avoidance or appropriate mitigation of upstream or downstream flooding risks, no loss of flood storage where possible, and where unavoidable intrusions into significant natural features or hydrological or ecological functions occur that these features/functions can be adequately restored or enhanced. The maintenance or repair of public infrastructure within the Riverine Flooding Hazard zone may also be permitted where it can be demonstrated that unavoidable intrusions into significant natural heritage features or ecological/hydrological functions can be properly restored or enhanced.

Similarly, Section 8.2.21 states that public infrastructure such as sanitary sewers may be permitted within Riverine Erosion Hazard zones where it is determined that there is no feasible alternative outside of the regulated area as determined through an EA, and where a geotechnical or engineering study identifies a more precise hazard limit, and where additional conditions are met. These additional conditions include, but are not limited to, no impacts on existing or future slope stability occurring, no risk of creating new riverine erosion hazards, and where unavoidable intrusions into significant natural features or hydrological or ecological functions occur that these features/functions can be adequately restored or enhanced (GRCA 2015).

## 3.4 Provincial Policy Statement

The Provincial Policy Statement (OMMAH 2020) provides direction on matters of provincial interest with respect to land use planning and developments that are subject to the provincial *Planning Act*. It supports improved land use planning and management, contributing toward a more effective and efficient land use planning system while protecting resources of provincial interest including, but not limited to, the natural environment. Section 2.1 of the Provincial Policy Statement identifies policies for the protection of Natural Heritage; these policies should serve as guidance in the design of the preferred sanitary sewer alignment. Of relevance to this project and its study area natural features are the following policies:

- Section 2.1.5:
    - Development and site alteration shall not be permitted in Significant Wildlife Habitat unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.
- Section 2.1.6:

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

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

- Section 2.1.8:
  - Development and site alteration shall not be permitted on adjacent lands to the natural heritage features and areas identified in policies 2.1.5 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.

## 3.5 Fisheries Act

The *Fisheries Act* provides for the conservation and protection of fish and fish habitat and pollution prevention by prohibiting the "harmful alteration, disruption or destruction of fish habitat" and protects against the "death of fish, other than by fishing". To ensure compliance with relevant provisions included in the *Fisheries Act,* Fisheries and Oceans Canada (DFO) facilitates review of proposed works, undertaking, and activities that may affect fish and fish habitat through the Fish and Fish Habitat Protection Program. Proponents are responsible for assessing their projects for their potential to negatively impact fish and fish habitat through a self-screening process. DFO provides measures to protect fish and fish habitat and several codes of practice that may be incorporated into project design. If there is the potential to contravene the provisions within the *Fisheries Act* then the project needs to be submitted to DFO for review and approval, which may include a Letter of Advice or a *Fisheries Act* Authorization.

The study area contains several watercourses that provide, or have the potential to provide, direct fish habitat. Project design will need to consider these features and should attempt, to the extent possible, to mitigate against the harmful alteration, disruption or destruction of fish habitat and the death of fish.

## 3.6 Endangered Species Act

The *Endangered Species Act* (ESA) prohibits the killing, harming, harassing or capturing of species that are listed as Endangered or Threatened in the Species at Risk in Ontario list. It also protects the regulated or general habitats of these species from damage or destruction. Activities that would otherwise be in violation of the ESA may be permitted by the Ontario Ministry of Environment, Conservation and Parks (MECP), such as in accordance with Section 17(2)(c) of the ESA. Activities may also be authorized in accordance with Ontario Regulation 242/08, as applicable to certain SAR, certain activity types, and provided various conditions are met.

As described in Section 6.4, various SAR have potential to occur within the study area based on the results of the SAR/SCC screening described in Section 2.2.

## 3.7 Migratory Birds Convention Act

The federal *Migratory Birds Convention Act* (MBCA) protects populations of, and individual, migratory bird species as listed under the Act, as well as their eggs and nests. The MBCA enacts various prohibitions, including but not limited to the disturbance, destruction, or taking of a nest or eggs of migratory birds. In the context of this EA, this primarily applies to the removal of trees, other vegetation, or structures that may contain migratory birds or their active nests.

## 4.0 Fieldwork Methodology

NRSI terrestrial and aquatic field surveys were previously completed for a large portion of the study area (see Appendix I) in 2017 for the Schmidt Estate EIS. The results of these surveys have been considered in this study. Additional field surveys were completed between May and July 2021 to supplement and update the earlier field investigations, as well as to account for the larger EA study area. As an addition to the NEA study area, an additional terrestrial and aquatic site investigation was also completed in February 2022 for an area to the northeast of the Snyder's Road/Foundry Street/Livingston Boulevard intersection (Map 1). The following is a summary of the field tasks completed for this NEA in 2021 and 2022.

*Vegetation Community Mapping and Species Inventories*

Ecological Land Classification (ELC) (Lee et al. 1998) mapping previously completed for the Schmidt Estate lands was updated and expanded to cover the EA study area. Updates to vegetation community mapping were completed on May 17 and July 20, 2021. During each of these site visits, a comprehensive inventory of vascular flora was completed to inform the ELC vegetation community classifications. The timing of these visits corresponded to spring- and summer-season vegetation inventories. The vegetation inventory work included an emphasis on the identification of any federally, provincially, or regionally significant vegetation species within the study area. Vegetation species within the watercourse channels that were indicative of groundwater influences were also noted and mapped.

A supplementary site visit was completed on February 10, 2022 to characterize natural features within the area northeast of the Snyder's Road/Foundry Street/Livingston Boulevard intersection. The focus of this assessment was characterize the features using ELC and to identify the presence of wetland, as could be determined at that time of year in conjunction with air photo interpretation.

*Aquatic Habitat Assessment*

An NRSI aquatic biologist completed a survey on May 19, 2021 to characterize the aquatic habitats within the study area. This included an updated assessment of Baden Creek and the Huehn Award Drain within the study area, as well as a new assessment of Baden Creek Tributary A (Map 1) up to its outlet from a stormwater management facility in the north end. The description of existing conditions combines observations made during the initial aquatic habitat assessment that was completed on July 20, 2017 and the May 19, 2021 assessment.

During these assessments, the following information was recorded:

- riparian and aquatic vegetation;
- channel dimensions;
- general bank stability;
- cover type and quality;
- substrate type;
- flow conditions; and
- water temperature.

A supplementary site visit was completed on February 2, 2022 to inspect and characterize Baden Creek Tributary B where it flows northeast of the intersection of Snyder's Road, Foundry Street and Livingston Boulevard. Assessment parameters were limited to what could be observed at that time of year, but included wetted widths, water depth, bank height, vegetation species presence, and assessment of fish habitat function.

*Breeding Bird Surveys*

Two supplemental early morning breeding bird surveys were completed on June 9 and 24, 2021 in accordance with Ontario Breeding Bird Atlas (OBBA) protocol (Birds Canada 2021). Surveys were completed between a half-hour before sunrise and 10:00am and were timed to occur at least 10 days apart. Surveys were completed through comprehensive area searches of each of the study area vegetation communities. Standard breeding evidence codes were recorded based on OBBA protocol. Any observed structures were inspected for the presence of bird nesting where suitable nesting habitat existed.

*Wildlife Habitat Assessment*

Natural features within the study area were investigated for the presence of potentially significant habitats based on the screening exercise results presented in Sections 6.4 and 6.5. This included a search for potential burrows of the SAR American Badger (*Taxidea taxus*). A reptile area search was also completed under suitable conditions (warm, sunny) on May 17, 2021, timed to coincide with the period of spring reptile emergence. Observations of multiple snakes in a localized area would suggest the possible location of a nearby snake hibernaculum. The survey was targeted to suitable areas of snake basking habitat within the study area.

Assessments of other significant wildlife habitat suitability were made based on the natural feature characterization.

*Incidental Observations*

During the field work program, all incidental observations of mammals, herpetofauna, butterflies and odonates (dragonflies and damselflies) were documented during all field visits. This included direct observations of individuals, as well as signs of wildlife presence (i.e. tracks, scat, dens, nests, etc.).

# 5.0 Existing Conditions

## 5.1 Soils, Terrain and Drainage

The study area is located within a physiographic region of southern Ontario known as the Waterloo Hills (Ontario Ministry of Northern Development and Mines 2017). This region occupies approximately 777 $km^2$, centred primarily in Waterloo Region. It is dominated by sandy hills, with sandy till ridges, kames or kame moraines, and sandy outwash in the intervening hollows (Chapman and Putnam 1984). The well-drained soils of the Waterloo Hills may be characterized as mature Grey Brown Luvisolic soils (Chapman and Putnam 1984). The Waterloo Interlobate Moraine overlays the majority of Wilmot Township and contains extensive ice-contact and glaciofluvial stratified deposits either at the surface or buried beneath till units (Ontario Geological Survey and Planning and Engineering Initiatives Limited 1998).

The study area soils east of Baden Creek are characterized by the imperfectly-drained loam and loamy sand of the Grand-Kirkland soil series (Chapman and Putnam 1984). This soil series formed on recent alluvial deposits. The soils west of Baden Creek are characterized by the imperfectly draining silty-clay loam Huron-St. Clements soil series (Chapman and Putnam 1984). This soil series is formed on till or lacustrine deposits.

The topography of the study area is relatively level (~347m elevation) with a gentle, approximately 1m slope towards Baden Creek (~342m elevation).

The subject lands are located within the Grand River watershed. Baden Creek, which drains from a dammed pond within the northeast end of the study area, widely meanders (west, south, east, and again southwards) through the study area from north to south along historically channelized alignments to optimize agricultural land use opportunities. Baden Creek flows into the Nith River downstream of the study area, which is a tributary of the Grand River. Three tributaries confluence with Baden Creek within the study area: The Huehn Award Drain, which drains lands to the east, and two unnamed tributaries to Baden Creek. Baden Creek Tributary A drains lands to the northwest and originates from a stormwater management pond located within a subdivision northwest of the study area. Baden Creek Tributary B drains lands to the northeast of the study area and converges with Baden Creek east of Foundry Street.

## 5.2 Terrestrial Features

### 5.2.1 Vegetation Communities

The study area is predominantly comprised of active agricultural fields along with some fallow, early successional regenerating meadow communities. Natural feature coverage primarily comprises Baden Creek and its tributaries, along with adjacent meadow (narrowly fringing in some locations), as well as small, isolated woodland communities. A dammed open water pond, online with Baden Creek, is located in the northeast end of the study area. Small areas of existing rural residential and commercial land use exist within the study area. A smaller disjunct portion of the study area northeast of the Snyder's Road/Foundry Street/Livingston Boulevard intersection contains open culturally influenced lands including small pockets of wetland, woodland and meadow adjacent to a railway corridor and public pedestrian trail.

Vegetation communities observed within the study area are shown on Map 2 and described in Tables 1 and 2 below. For the purposes of presenting the ELC vegetation communities, the small northeastern portion of the study area as shown on Map 2 (Inset A) is referred to herein as the Northeast Study Area Section, and is separated from the remaining study area, referred to herein as the Primary Study Area. The Northeast Study Area Section was coarsely characterized through a single winter season site investigation, whereas the Primary Study Area was characterized through various multi-season field surveys as described in Section 4.0 of this report. Accordingly, vegetation communities within the Northeast Study Area Section are presented separately to reflect the relatively lower level of site characterization in comparison to the Primary Study Area.

**Table 1. Vegetation communities present within the Primary Study Area.**

| ELC Ecosite Type | ELC Description | Environmental Characteristics |
|---|---|---|
| **Cultural** | | |
| CUM1 | Mineral Cultural Meadow | An early successional community that has established on fallow, previously farmed agricultural field parcels. This community also narrowly fringes the top of bank along Baden Creek and Baden Creek Tributary A in locations where fields are actively cultivated on either side. In some areas this community occurs more broadly around the watercourses within their respective floodplains. It also occurs along the rail corridor and adjacent areas in the northwest study area.<br><br>Canopy: N/A<br>Sub-canopy: N/A<br>Understorey: Manitoba Maple (*Acer negundo*), Common Apple (*Malus pumila*), Black Walnut (*Juglans nigra*)<br>Groundcover: Various cool season grasses, Smooth Bedstraw (*Galium mollugo*), Garlic Mustard (*Alliaria petiolata*)<br><br>This community contains two small meadow marsh inclusions as shown on Map 2: a Mineral Meadow Marsh (MAM2) and a Reed Canary Grass Mineral Meadow Marsh (MAM2-2) feature, both within the north end of the study area. Both appear to have anthropogenic origins and are the result of previous earth-moving activities or water impounding. The MAM2 feature is largely dominated by Narrow-leaved Cattail (*Typha angustifolia*), and it appears to have been dug historically for the purposes of stormwater management to service the former industrial property to the northeast of the feature. The MAM2-2 feature is dominated by Reed Canary Grass (*Phalaris arundinacea*), and it appears to have been formed by water impoundment caused by the adjacent residential areas that are slightly higher in grade. |
| CUW1 | Mineral Cultural Woodland | This community occurs as two small and isolated woodland features at the north end of the study area. These are young woodland features (<50 years old) and show signs of ecological disturbance through human usage (e.g., informal walking and biking paths, scattered garbage and debris, firepit). The features are comprised of a high proportion of non-native plant species.<br><br>Canopy: Manitoba Maple<br>Sub-canopy: Manitoba Maple, Common Apple, hawthorns (*Crataegus* spp.)<br>Understorey: Hawthorns, Manitoba Maple, Choke Cherry (*Prunus virginiana*) |

| ELC Ecosite Type | ELC Description | Environmental Characteristics |
|---|---|---|
| | | Groundcover: Garlic Mustard, Woodland Forget-me-not (*Myosotis sylvatica*), Wild Strawberry (*Fragaria virginiana*) |
| **Woodland** | | |
| FOD7-3 | Fresh-Moist Willow Lowland Deciduous Forest | This community occurs in two locations along the Baden Creek corridor: downstream of the pond in the north end of the study area and as a small isolated feature at the southwest bend in the creek. Both are ecologically mid-aged features. These features, particularly the northern community, may experience periodic seasonal flooding from Baden Creek during periods of high flow.<br><br>Canopy: Crack Willow (*Salix euxina*), Manitoba Maple, Weeping Willow (*Salix alba*)<br>Sub-canopy: Manitoba Maple, Crack Willow, Black Walnut<br>Understorey: Manitoba Maple, Common Apple, Choke Cherry<br>Groundcover: Garlic Mustard, Woodland Forget-me-not, Dame's Rocket (*Hesperis matronalis*) |

**Table 2. Vegetation communities present within the Northeast Study Area Section.**

| ELC Ecosite Type | ELC Description | Environmental Characteristics |
|---|---|---|
| **Cultural** | | |
| CUM1 | Mineral Cultural Meadow | Two separate polygons of cultural meadow communities located along the pedestrian trails. Dominant species observed include: Tall Goldenrod (*Solidago altissima*), Smooth Brome (*Bromus inermis*), Wild Carrot (*Daucus carota*), Common Buckthorn (*Rhamnus cathartica*). |
| CUT1 | Mineral Cultural Thicket | Two separate polygons of cultural thicket communities located along the rail corridor, and along the Baden Creek Tributary B. Dominant species observed include: Black Walnut, Staghorn Sumac (*Rhus typhina*), Red-osier Dogwood (*Cornus sericea*), Black raspberry (*Rubus occidentalis*), Common Apple, Common Buckthorn, Tall Goldenrod. |
| CUW1 | Mineral Cultural Woodland | Three separate polygons of cultural woodland communities throughout the Northeast Study Area Section. Dominant species observed include: Manitoba |

| ELC Ecosite Type | ELC Description | Environmental Characteristics |
|---|---|---|
| | | Maple, Black Walnut, Green Ash (*Fraxinus pennsylvanica*), Balsam Poplar (*Populus tremuloides*), White Spruce (*Picea glauca*), Red-osier Dogwood. |
| MAM | Meadow Marsh | Two separate polygons of meadow marsh communities located along the Baden Creek Tributary B, and along the flow route and associated with a stormwater discharge outlet. Dominant species observed include: Red-osier Dogwood, Reed Canary Grass (*Phalaris arundinacea*), Narrow-leaved Cattail (*Typha angustifolia*), Panicled Aster (*Symphyotrichum lanceolatum*). |

### 5.2.2 Vascular Flora

In total, 141 plant species were inventoried within the study area. Of these, 57 species (40%) are classified as non-native in Ontario (MNRF 2021a). See Appendix II for a complete list of the inventoried plant species.

One federally and provincially significant plant species, Butternut (*Juglans cinerea*), was inventoried within the study area. Butternut is listed as Endangered both federally and provincially (Government of Canada 2021, MECP 2020). Butternut may be subject to the protections afforded by the ESA, depending on the health status of the individual tree as discussed further below. Three Butternut trees were documented within the Fresh-Moist Willow Lowland Deciduous Forest (FOD7-3) adjacent to Baden Creek as shown on Map 3.

These Butternuts fall within the Schmidt Estate EIS study area. As part of earlier work completed for that EIS, an NRSI certified Butternut Health Assessor completed a Butternut Health Assessment (BHA) for these three trees on October 23, 2020. Foliar aspects of the assessment could not be considered based on the timing of the survey. A conservative approach to the assessment was therefore taken to take this limitation into account, and is consistent with agency guidance for conducting BHAs (MNRF 2015b). Based on this assessment, each of the three trees were determined to represent Category 2 Butternuts. Based a field hybridity test, all were determined to be genetically pure Butternuts. A BHA Report has not yet been submitted to the MECP, so these results may be audited by the MECP to confirm these findings. For the purposes of this study, they will be assumed to represent Category 2 Butternuts.

One other provincially significant species was observed: Rhombic-leaved Sunflower (*Helianthus pauciflorus* ssp. *subrhomboideus*). This species is ranked S2S3 (“Imperiled” or “Vulnerable” in Ontario), which renders it a provincial SCC (OMNR 2010). However, this species was observed to be established as adventive growth along the railroad tracks within the north end of the study area. These individuals are far outside of their natural range (northwest Ontario) and seeds of this species may have been carried by trains. According to the NHIC, this species is considered native to the Lake of the Woods area in northwest Ontario, and is considered likely to be a non-native introduction within southern Ontario (MNRF 2020b). In this context, the Rhombic-leaved Sunflower individuals that were observed are not considered to be provincially significant and do not represent a development constraint. This species is also not listed as regionally significant.

One regionally significant species (Richardson and Martin 1999), Running Serviceberry (*Amelanchier spicata*), was observed within the study area. This species was observed within the Mineral Cultural Meadow (CUM1) community along the rail corridor in the northwest study area. Several (approximately 10-20) small colonies of this species were observed, consisting of many suckering stems. Another Regionally-listed species, Black Walnut, was also documented on-site, although, in the context of the study area it is not considered significant as the individuals are not demonstrably indigenous and suspected to be of anthropogenic origin (Richardson and Martin 1999).

The coefficient of conservatism (CC) is a value ranging from 0 (low) to 10 (high), which is based on a species' tolerance of disturbance and fidelity to a specific habitat integrity (Oldham et al. 1995). Higher values are assigned to species that have specific environmental growing requirements and are less tolerant of disturbance. Overall, the inventoried plant species on the subject lands have an average CC value of 1.79, which is low and is indicative of species that are generalist in their habitat preferences and are typically adapted to ecologically disturbed conditions. Among the vegetation communities, average CC values ranged from 2.20 for the FOD7-3 woodland and only 1.13 for the CUM1 meadow including the meadow marsh inclusions. These results generally indicate a low sensitivity of the existing vegetation species to ecological disturbance that may be caused by site alteration. The highest CC value for a particular plant species was 7 among all plant species observations; two of these were observed within the FOD7-3 woodland while one was observed within the Mineral Cultural Woodland (CUW1). Non-native/invasive species growth is widespread within the study area, with proportions of non-native species ranging from 38% of species within the FOD7-3 community to 49% for the CUM1 community including meadow marsh inclusions.

### 5.2.3 Birds

In total, 74 bird species are reported from within 10km of the study area based on the OBBA (BSC et al. 2008). Thirty-six (36) bird species were documented within the study area during site investigations. All of these species were documented with at evidence of at least possible breeding within the study area. Refer to Appendix III for a list of bird species recorded within in the study area and vicinity.

One bird SAR, Bank Swallow (*Riparia riparia*), was observed within the study area during site investigations. Bank Swallow is listed as Threatened both federally and provincially (Government of Canada 2021, MECP 2020). Multiple individuals of this species were observed

foraging over the floodplain Mineral Cultural Meadow and adjacent agricultural field at the north end of the study area, just downstream of the pond. This species was only observed during one of the breeding bird surveys (June 9, 2021). Consequently, this observation is considered to represent evidence of "possible" breeding within the study area vicinity (Birds Canada 2021). However, no suitable Bank Swallow nesting habitat exists within the study area. Although Bank Swallow was only observed during one breeding bird survey in 2021, this species was also observed during a breeding bird survey completed for the Schmidt Estate EIS. Based on this evidence and taking a precautionary approach, Bank Swallow foraging habitat is considered present within the study area.

An old shed structure that was observed on-site was inspected for the presence of SAR Barn Swallow (*Hirundo rustica*) nests. No nests were observed on the exterior, or within the interior as could be observed through an open door, and no Barn Swallow activity was observed on-site.

Five regionally significant bird species (Martin 1996) were observed within the study area. These included Cliff Swallow (*Petrochelidon pyrrhonota*) foraging over the Mineral Cultural Meadow (CUM1) and Brown Thrasher (*Toxostoma rufum*) within the CUM1 feature, Red-breasted Nuthatch (*Sitta canadensis*) within the Fresh-Moist Lowland Willow Deciduous Forest (FOD7-3), and Hooded Merganser (*Lophodytes cucullatus*) and Great Blue Heron (*Ardea herodias*) within the pond. However, Cliff Swallow is only considered significant when nesting in natural circumstances (Martin 1996). No Cliff Swallow nests were observed in the study area. All of these species were observed with evidence of "possible" breeding within the study area.

As part of previous field studies for the Schmidt Estate EIS, NRSI biologists also previously documented SAR Barn Swallow individuals foraging over that study area. Although this species was not observed during 2021 NRSI field investigations, the continued use of these lands by Barn Swallow for foraging activities cannot be ruled out. As stated above, no Barn Swallow nesting evidence was observed on-site.

Other bird species observed within the study area are relatively common, ubiquitous on the landscape, and have provincially secure populations. These include assemblages of common, generalist species that are often found in agricultural woodlots, open land/agricultural settings and in urbanized areas or developed lands.

### 5.2.4 Herpetofauna

According to the Ontario Amphibian and Reptile Atlas (Ontario Nature 2019), 14 species of herpetofauna are reported from within 10km of the study area. No herpetofauna species were observed within the study area, including during the targeted snake emergence survey.

During previous NRSI field studies for the Schmidt Estate EIS, two herpetofauna species, Eastern Gartersnake (*Thamnophis sirtalis sirtalis*) and Green Frog (*Lithobates clamitans*), were observed within that study area. Both of these species are common with secure populations in Ontario.

No features typical of good quality thermoregulatory or cover habitat, or potential snake hibernaculum habitat, were observed on site. A previously open and sun-exposed area that comprised cracked and broken concrete floor slabs associated with a previously removed barn, as observed during 2017 NRSI surveys, had completely grown over with herbaceous growth by 2021, and no longer provided good quality snake basking habitat. A complete list of herpetofauna species reported from the study area and vicinity is provided in Appendix IV.

### 5.2.5 Mammals

According to the Mammal Atlas of Ontario (Dobbyn 1994), 34 mammal species are reported from within 10km of the study area. Of these, direct observation or evidence of three mammal species was observed within the study area: Eastern Cottontail (*Sylvilagus floridanus*), Woodchuck (*Marmota monax*), and Eastern Gray Squirrel (*Sciurus carolinensus*). None of the observed species are considered federally, provincially or regionally significant. No mammal burrows that are characteristic of American Badger use (e.g., D-shaped, lateral claw marks) were observed within the study area. A complete list of mammals reported from the study area and vicinity is included in Appendix V.

An additional seven mammal species were observed directly, or evidence of their presence was observed, within the Schmidt Estate EIS study area during previous NRSI surveys. These included Virginia Opossum (*Didelphis virginiana*), Star-nosed Mole (*Condylura cristata*), Coyote (*Canis latrans*), Striped Skunk (*Mephitis mephitis*), American Mink (*Mustela vison*), Northern Raccoon (*Procyon lotor*), and White-tailed Deer (*Odocoileus virginianus*). It should be assumed that all of these species still occur within the study area. Of these observed species, American Mink, Coyote and Virginia Opossum are considered regionally significant. Specifically,

American Mink and Coyote are considered “Scarce”, while Virginia Opossum is considered “Rare” (Region of Waterloo 1985).

A bat habitat assessment was not completed as part of this study, since it is anticipated that the small woodland features will be avoided when planning the alignment of the sanitary sewer. Tree growth is absent or very sparse within the remainder of the study area. See below for further discussion about SAR bat habitat.

### 5.2.6 Insects

According to the Ontario Butterfly Atlas (McNaughton et al. 2020), 38 butterfly species are known to occur within 10km of the study area. No butterfly species were incidentally recorded during field investigations. A complete list of butterfly species reported from the study area vicinity is provided in Appendix VI.

During previous field surveys completed within the Schmidt Estate study area, two butterfly species were observed: Cabbage White (*Pieris rapae*) and European Skipper (*Thymelicus lineola*). These species should be assumed to still use the study area lands. Neither of these species is considered federally, provincially or regionally significant.

According to the Ontario Odonate Atlas (MNRF 2017), 18 odonate (dragonfly and damselfly) species are recorded within 10km of the subject property. No odonate species were incidentally recorded within the study area during site visits. As well, no odonate species were recorded during previous fieldwork for the Schmidt Estate EIS. A complete list of odonate species reported from the surrounding 10km squares vicinity is provided in Appendix VII.

## 5.3 Aquatic Features

Four prominent aquatic features exist within the study area. These include Baden Creek, Huehn Award Drain, and the Baden Creek Tributaries A and B, as shown on Map 1. Each of these is described below. Baden Creek and the lower portion of Huehn Award Drain were previously assessed on July 20, 2017 and the full length of Baden Creek Tributary A within the study area was assessed on May 19, 2021. The reach of Baden Creek Tributary B northeast of the Snyder’s Road/Foundry Street/Livingston Boulevard intersection was assessed on February 2, 2022.

Baden Creek

Baden Creek is a permanent watercourse within the study area. The feature flows southwest from a dammed reservoir located in a northeast portion of the study area before turning east towards Foundry Street. It then turns and flows southeast and parallel to Foundry Street, crossing Gingerich Road, and then eventually exiting the study area.

Baden Creek predominantly flows through actively cultivated agricultural lands within the study area, with lesser areas of fallow, regenerating fields. Small areas of rural residential land are located to the north and east while commercial land cover also occurs to the south. The floodplain and extent of natural vegetation is greater than 10m on both sides of the channel throughout the upper portion of the subject property and is comprised of a naturalized meadow and included Spotted Jewelweed (*Impatiens capensis*), Reed Canary Grass, and other various terrestrial grasses and herbaceous plants. Downstream of the dam and throughout the upper section, log jams, fallen trees, and overhanging trees across Baden Creek were found to be common, particularly within the forested area. Overhanging bank vegetation (variety of grass species) was found throughout the middle and lower sections. Aquatic vegetation was observed throughout Baden Creek including Slender Pondweed (*Potamogeton pusillus*) which was the most common and abundant growing throughout the channel in sand, silt and gravel. Arrowhead (*Sagittaria latifolia*) was observed in moderate abundance in silt and sand substrates along the banks. Watercress (*Nasturtium officinale*) and iron staining, which are generally associated with groundwater influence to a feature, were observed in low to moderate abundance along the banks and throughout shallow areas of the creek.

Baden Creek appears channelized (straightened) throughout the lower portion of the feature from where the channel flows in an easterly direction to where it runs alongside Foundry Street and under Gingerich Road. Active and historical erosion was also noted, which suggests that the channel experiences high water levels and velocities at times throughout the year. At the time of the assessment, Baden Creek was flowing, clear, had a low-medium gradient and gently meandered within the confines of the corridor. The gradient increased where the channel becomes channelized, although even within the channelized section the creek was starting to re-establish some gentle meanders. The quality and amount of shade provided through Baden Creek decreases throughout the study area from the dam to Gingerich Road. The small woodlot features provide upwards of 90% shade through mature deciduous trees. The channel banks had poor to fair stability and the bank height also varied from 0.2m to over 2.5m. The high channel banks were not stable and were often found on outside meander bends with

evidence of erosion. Riffles, shallow run habitats, deep run habitats, and pool features were all observed within Baden Creek. The wetted width of the channel also varied depending on location and type of feature present (pool, riffle, run) and ranged from 1.0m to 5.2m. The substrates throughout varied from gravel and cobble to silt and sand, to exposed hardpan clay. An old crossing (two failing corrugated steel pipes (CSP)) could act as a barrier to fish, although water was observed flowing under the structure, which may allow for fish passage. In-stream habitat and cover are provided through pools, riffles, backwater areas, undercut banks, woody debris, and cobble/boulder.

During the July 20, 2017 field assessment water quality parameters were taken at three locations within Baden Creek. Dissolved oxygen ranged from 4.67ppm (51.6%) to 10.12ppm (114.6%), conductivity ranged from 0.52mS to 0.67mS, pH ranged from 7.61 to 8.00, and total dissolved solids ranged from 0.28ppt to 0.31ppt. All of these water quality measurements fall within the recommended Canadian Environmental Quality Guidelines (CEQG) for the protection of aquatic life, and the pH level is typically seen in warm freshwater habitats (CCME 2003). Water temperature ranged from 19.5°C (air temperature 20.0°C) to 20.0°C (25.0°C). On May 19, 2021 the water temperature ranged from 21°C at the confluence with the Baden Creek Tributary to 24°C (air temperature 29°C) at the Gingerich Road culvert. Based on these field measurements and available background information, Baden Creek is considered to have a warmwater thermal regime.

Baden Creek provides direct fish habitat including suitable spawning, foraging and rearing habitats for a variety of species. This was confirmed through an electrofishing survey conducted on July 20, 2017, which utilized the single pass screening level assessment method based on the Ontario Stream Assessment Protocol (OSAP, Stanfield 2013). This survey confirmed the presence of 12 species of fish within Baden Creek in the study area, summarized in Table 2. Data provided by the NDMNRF/GRCA indicates the presence of two additional species as well. The species known from Baden Creek exhibit either cool or warmwater thermal preferences and include a combination of highly tolerant and moderately tolerant species. None of the fish species known from Baden Creek are considered to be SAR and no SAR fish or mussels were identified during background review.

**Table 3. Fish Species Identified within Baden Creek**

| Common Name | Scientific Name | Thermal Preference[1] | Tolerance[1] | NRSI (July 20, 2018) | MNRF[2] |
|---|---|---|---|---|---|
| Blacknose Dace | *Rhinichthys obtusus* | Coolwater | Intermediate | X | X |
| Bluntnose Minnow | *Pimephales notatus* | Warmwater | Intermediate | X | |
| Creek Chub | *Semotilus atromaculatus* | Coolwater | Intermediate | X | X |
| Longnose Dace | *Rhinichthys cataractae* | Coolwater | Intermediate | X | X |
| Northern Hog Sucker | *Hypentelium nigricans* | Warmwater | Intermediate | X | X |
| Fathead Minnow | *Pimephales promelas* | Warmwater | Tolerant | X | X |
| Brook Stickleback | *Culaea inconstans* | Coolwater | Intermediate | X | X |
| White Sucker | *Catostomus commersonii* | Coolwater | Tolerant | X | |
| Largemouth Bass | *Micropterus salmoides* | Warmwater | Tolerant | X | |
| Johnny Darter | *Etheostoma nigrum* | Coolwater | Tolerant | X | X |
| Common Shiner | *Luxilus cornutus* | Coolwater | Intermediate | X | |
| Central Stoneroller | *Campostoma anomalum* | Coolwater | Intermediate | X | |
| Emerald Shiner | *Notropis atherinoides* | Coolwater | Intermediate | | X |
| Rainbow Darter | *Etheostoma caeruleum* | Coolwater | Intolerant | | X |

[1]Eakins R.J. 2018
[2]GRCA Online Mapping Tool

Huehn Award Drain

The Huehn Award Drain is a permanent watercourse that flows west through residential land and crosses Foundry Street before flowing to Baden Creek at the east side of the study area. Only a small portion (approximately 40m) of the feature occurs within the study area boundary. The drain flows through a perched CSP culvert that extends under Foundry Street, which prevents any fish from moving upstream through the culvert and east of Foundry Street. However, the channel does provide fish habitat between Foundry Street and Baden Creek, confirmed based on the presence of fish with the plunge pool at the outflow from the culvert on both July 20, 2017 and May 19, 2021. Watercress was noted to be abundant both upstream and downstream from Foundry Street within the Huehn Award Drain and iron staining was also observed, suggesting groundwater input to the channel. The Huehn Award Drain is considered to be a coldwater watercourse by the GRCA.

Baden Creek Tributary A

Baden Creek Tributary A originates from a stormwater management facility just beyond the northwest corner of the study area. From the outlet of the facility the tributary crosses under the railway tracks through a perched culvert and into a small plunge pool. The perched culvert would act to prevent fish from moving upstream from the channel towards the stormwater management facility, but could facilitate downstream movement of fish that are flushed downstream from the pond. During the May 19 site visit a small standing pool of water was observed within the plunge pool. A single small, unidentified fish was observed within the pool, potentially from the stormwater pond. Downstream of this pool, the tributary is channelized and straightened for approximately 350m downstream from the railway tracks to a field crossing and cuts through active agricultural field with a narrow (approximately 10m) meadow riparian corridor. The channel is incised with bank heights ranging from 0.45 to 0.9m and bankfull width ranging from 0.8 to 1.5m. The channel was dry during the assessment, although exposed sand and gravel substrates throughout indicates seasonal flows, most likely attributed to spring freshet and large precipitation events. As such, this section of the tributary should be considered ephemeral and is not direct fish habitat.

The lower portion of Baden Creek Tributary A, downstream and east of the field crossing, becomes more incised with higher banks and a wider bankfull width. Some water was observed within this section of the tributary, originating from a tile drain outlet immediately west of the crossing, although flow was very limited. This tile drain appears to drain a large area of active agricultural land to the west. The water flows through a 0.6m diameter corrugated plastic pipe under the crossing and to the channel eastward. From the crossing to its outlet at Baden Creek the bank height ranged from 0.65 to 1.4m and bankfull width ranged from 1.25 to 5.0m. At the time of the assessment wetted widths ranged from 0.15 to 0.95m and water depths ranged from 0.02 to 0.14m. The bank and riparian areas were heavily vegetated with terrestrial grasses and forbs, which grow within, and overhang, the channel. One small-bodied fish was observed within the lower portion of the channel (approximately 20m upstream from Baden Creek) indicating that fish are able to access the lower portion of the tributary when water levels are elevated, but, overall, the tributary does not provide suitable year-round habitat. Generally, water depths were very low throughout the lower portion of the tributary, and in combination with a moderate gradient this would inhibit upstream movement and habitat for fish from Baden Creek. Further, no signs of groundwater input were noted during the assessment and it appears that baseflow to the channel may be provided by the tile drain located at the field

crossing. During the visit on May 19, 2021 the water temperature was 20°C at 13:00 with and air temperature of 29°C.

Baden Creek Tributary B

Baden Creek Tributary B enters the study area from the north and generally flows in a south/southeasterly direction before its confluence with Baden Creek approximately 120m east of Foundry Street. This watercourse primarily drains a combination of urbanized-residential and agricultural lands within the north end of Baden.

At the time of the February site investigation, the watercourse was open and flowing both upstream and downstream of the railway crossing and pedestrian trail. It featured a defined channel and sorted substrates consisting of sand, gravel, silt and some cobble, suggesting that it is a permanent watercourse feature. The wetted width was approximately 1-2m. Water depths ranges from approximately 5cm (riffles and shallow runs) to 22-30cm (pools). Bank height was approximately 0.4-1.3m and there was evidence of erosion, particularly upstream of the trail.

Small amounts of Watercress were observed, which would suggest some groundwater influence. However, due to the relatively low temperature of the water at the time of the assessment (1°C), the amount of groundwater input to the watercourse may be minimal. No fish were observed during the assessment, but the watercourse contained suitable habitat to support fish. The south (downstream) end of the culvert under Snyder's Road could not be accessed to determine whether it provides upstream passage for fish past the road, railway line and pedestrian trail. However, water depth and flows are sufficient to convey fish within the study area watercourse reach if there are no barriers to movement under those features.

Ephemeral Aquatic Habitat Features

Several other ephemeral aquatic habitat features occur across the study area, which were generally poorly-defined and occur within actively tilled agricultural fields. These would act to divert surface runoff from the surrounding landscape to Baden Creek and Baden Creek Tributary A but are generally dry and do not provide fish habitat. These would only carry water following snow melt and heavy precipitation events.

## 6.0 Natural Environment Significance and Sensitivity

Analysis of the significance of existing natural features was used to identify those features and habitats that are sensitive to disturbance based on the rarity or sensitivity of the feature or the functions/processes that contribute toward their significance. This assessment also considered the policies, legislation, and regulations that apply to the study area natural features which must be considered in the evaluation of the sanitary sewer preferred alignment. The following summarizes significant and sensitive natural features and habitats present within the study area which may represent constraints to site alteration or areas requiring mitigative measures. Policy-based constraints were identified in accordance with the Regional and Township OPs, and the GRCA regulations and policies as summarized in Section 3.0. This assessment incorporates and updates relevant findings and constraints that were identified by NRSI for the purposes of re-zoning of the Schmidt Estate lands, which comprise a large portion of the EA study area.

### 6.1 Watercourses and Fish Habitat

Baden Creek and the lower portion of the Huehn Award Drain, up to the perched culvert at Foundry Street, provide direct year-round habitat for a variety of cool and warmwater species. Baden Creek is considered a warmwater feature, but water temperatures are maintained at the lower range due to groundwater influence, evidenced by the presence of Watercress and iron staining throughout the channel. The Huehn Award Drain is a coldwater feature, providing coldwater inputs, which also helps to maintain cooler water temperatures within Baden Creek downstream from the confluence.

Baden Creek Tributary B appears to represent a permanently flowing watercourse that likely provides direct fish habitat provided there are no downstream barriers to the study area reach northeast of the Snyder's Road/Foundry Street/Livingston Boulevard intersection. The thermal regime of this watercourse has not been determined. However, there is evidence of groundwater inputs through the presence of some Watercress within the feature.

Baden Creek Tributary A appears to exhibit both ephemeral and intermittent characteristics. The upper portion of the tributary appears ephemeral, with flows largely provided by outflow from the stormwater pond and snow melt. The lower portion of the tributary, east of the field tractor crossing, appears to be intermittent with baseflow provided by a tile drain, which drains the agricultural lands to the west. No obvious seeps or springs were noted along the channel and no Watercress was observed, suggesting little to no connection to the groundwater table.

The tributary near its confluence with Baden Creek provides direct fish habitat for fish accessing from Baden Creek when flows are elevated within the channel, but this is expected to only be seasonal. Overall, Baden Creek Tributary A does not provide suitable habitat for fish due to the very low water levels and extensive portions of the channel that dry out.

The study area watercourses are considered Supporting Environmental Features as described by the policies of the Township OP. Baden Creek, Baden Creek Tributary B and the Huehn Award Drain also represent fish habitat and fall under the protections afforded by the Regional and Township OPs and the federal *Fisheries Act*. Finally, as regulated features, these four watercourses and their adjacent floodplain and slope hazards and associated allowances are subject to the GRCA's Ontario Regulation 150/06 and policies.

Erosion and sedimentation was noted within the aquatic features on site due to their close proximity to active agricultural lands and location downstream from highly developed areas, including stormwater management facilities, which influence the natural hydrologic regimes of each feature. In addition, historical channelization along Baden Creek and Baden Creek Tributary A would also influence the flow regimes of the features and increase erosion and sedimentation. Attempts should aim to manage these issues, where possible, to improve the aquatic habitats within the watercourse features on site. Further, groundwater influence has been noted within Baden Creek, Baden Creek Tributary B and the Huehn Award Drain and should be maintained and improved, if possible.

### 6.1.1 Watercourse Buffers

In recognition of the ecological sensitivity of the watercourses and fish habitat to disturbances and to mitigate potential for impacts, it is recommended that watercourse buffers be applied to the Baden Creek, Huehn Award Drain and Baden Creek tributary watercourses where they occur within the study area (Map 3). Variable-width buffers from the watercourses are recommended based on their ecological sensitivities. A 30m buffer is recommended from the Huehn Award Drain due to its status as a coldwater watercourse, while 15m buffers are proposed around the majority of the other watercourse reaches. A 10m buffer from the upper reach of Baden Creek Tributary A (upstream of the tractor crossing) is proposed since this reach is ephemeral in nature. It is recommended that this 20m wide corridor spanning the channel upstream of the tractor crossing (10m on each side) should be preserved for future restoration opportunities if possible.

Evaluation of a preferred alignment for the trunk sanitary sewer should consider options that aim to avoid the watercourse buffers, or minimize encroachment into these areas, to the extent feasible. This includes avoiding the need for watercourse crossings if possible. Establishing the trunk sanitary sewer alignment further from the watercourses lessens the potential for future impacts in the event of a leakage from the sewer into the adjacent watercourse. If encroachment into these areas cannot be avoided, proper rationale should be identified as part of an evaluation of alternative designs, such as in the consideration of other design evaluation criteria. If encroachments must occur, they should be maintained as well away from the watercourses as possible.

## 6.2 Woodlands

The study area woodlands comprise the two Fresh-Moist Willow Lowland Deciduous Forest (FOD7-3) communities and the two Mineral Cultural Woodland (CUW1) communities. The woodlands present within the study area do not meet the criteria to be considered Regionally Significant Woodlands in part due to their relatively small sizes (Region of Waterloo 2015). Section 8.1.5.2 (b) of the Township OP identifies “locally significant woodlands” as a category of Supporting Environmental Features (Township of Wilmot 2019). However, locally significant woodlands are not defined in the OP. Based on a precautionary approach, the FOD7-3 woodlands within the study area are assumed to represent Locally Significant Woodlands, and therefore would represent forms of Supporting Environmental Features (Map 3). By contrast, the CUW1 woodlands are of relatively lower ecological quality and functional value. It is therefore suggested that the CUW1 woodlands do not represent Locally Significant Woodlands, but nonetheless should be preserved to the extent feasible.

Negative impacts to these woodland communities should be avoided by selecting a preferred sewer alignment that bypasses these features. If encroachment into woodland communities is unavoidable due to other design, cost or logistical considerations, this must be demonstrated as part of the evaluation of alternatives. Furthermore, see below with respect to potential SAR bat habitat. Impacts to woodlands would require mitigative actions to minimize, restore, and compensate for areas of disturbance. In avoiding woodlands, it is further recommended that sanitary sewer alignment and associated construction zones be maintained at least 5m from the woodland edge dripline in order to minimize potential for impact to tree root zones.

## 6.3 Wetlands

Two small, previously unmapped wetland features were identified within the north end of the study area. These are shown as small inclusions to the Mineral Cultural Meadow (CUM1) communities on Map 2. These wetlands are anticipated to be of anthropogenic origin, having been created through previous earth-moving activities and water impounding. Nevertheless, as wetland features, they fall under Township OP natural heritage protection as per Section 8.1.5.2 (a), which identifies all non-provincially significant wetlands as "locally significant" wetlands (Township of Wilmot 2019).

Site investigations confirmed the presence of two small and previously unmapped meadow marsh wetland features immediately northeast of the Snyder's Road/Foundry Street/Livingston Boulevard intersection. These wetlands are associated with Baden Creek Tributary B or its floodplain, and although they may have resulted in part due to anthropogenic impounding of water caused by adjacent pedestrian trail embankments they would also be considered "locally significant". All of the observed wetlands within the study area would also therefore represent Supporting Environmental Features.

It is anticipated that the two small wetland inclusions located near the railway tracks do not meet the definition of "wetland" as defined under the *Conservation Authorities Act* and included in O. Reg. 150/06, as they do not meet the criterion of directly contributing to the hydrological function of a watershed through connection with a surface watercourse (GRCA 2015). However, this would need to be confirmed by the GRCA.

If impacts to any of the study area wetlands cannot be avoided, these wetlands may be eligible for removal in accordance with Sections 8.4.4 (if confirmed to be natural features) or 8.4.5 (if confirmed to be anthropogenic features) due to their sizes being <0.5ha (GRCA 2015). Development or interference with these wetlands may be permitted provided that a series of conditions can be met as listed under these policies, and as demonstrated to the GRCA.

### 6.3.1 Wetland Buffers

If study area wetlands are to be preserved and do not require removal to accommodate sewer installation, it is recommended that installation and construction activities be set-back from the wetland features to avoid direct or indirect disturbances. Ecological buffers of 15m are typically applied to non-provincially significant wetlands to adequately mitigate adjacent land use effects

and to provide opportunities for buffer enhancement. It is recommended that site alteration be maintained outside of these buffers to the extent feasible.

## 6.4 Species at Risk

### 6.4.1 Confirmed Habitat

Based on background information review and field surveys completed within the study area, three SAR, Butternut, Bank Swallow and Barn Swallow, have been confirmed to occur.

*Butternut*

Based on background information review and field surveys completed within the study area, one SAR, Butternut, has been confirmed to occur.

Three Butternut trees were documented in the study area as shown on Map 3. As described in Section 5.2.2, these trees were each assessed as Category 2 ("retainable") Butternuts, although these results are subject to MECP audit following the submission of a BHA report. As Category 2 trees, these Butternuts are subject to the protections of the ESA. The killing or harming of these trees is prohibited under the ESA unless permitted by the MECP. However, impact to these trees may be exempt from permitting requirements in accordance with Part V of Ontario Regulation 830/21. This regulation allows for a proponent-led process in which activities that would cause Butternut impacts are registered with the MECP, and a mitigation and compensation plan is developed and implemented.

Ontario Regulation 830/21 Section 30 also states that, in regards to the construction or installation of infrastructure, that no permanent structure should be constructed or installed within 25m of a Butternut tree that is to be retained. Twenty-five metre (25m) radius areas around each Butternut tree are shown on Map 3. In accordance with O. Reg. 830/21, if it is not possible to complete the larger servicing project without constructing or installing permanent infrastructure within 25m of a Butternut to be retained, the person or entity carrying out the activity must demonstrate to the MECP why it is not possible to avoid the 25m zone(s), and which alternative options were considered to avoid the 25m zone(s) and determined to not be feasible. MECP must approve in writing the allowance of infrastructure within 25m of the Butternuts.

*Bank Swallow and Barn Swallow*

Multiple Bank Swallows were observed foraging over the study area lands during one of the 2021 breeding bird surveys, and an individual of this species was observed during one breeding bird survey completed for the Schmidt Estate EIS. Although in each survey year this species was only observed with evidence of "possible" breeding within the study area vicinity, taken together and following a precautionary principle it is assumed that the study area provides confirmed foraging habitat for Bank Swallow.

Although no Barn Swallows were observed foraging during the 2021 breeding bird surveys, multiple Barn Swallows were observed foraging over the Schmidt Estate lands during 2017 surveys. Following a precautionary approach, it is assumed that Barn Swallows still use the study area for foraging.

All of the open study area lands are assumed to represent existing foraging habitat for Bank Swallow and Barn Swallow. This includes the existing agricultural fields, CUM1 meadow and open water pond features, but excludes the FOD7-3 and CUW1 woodland features. Due to the large expanse of these areas within the study area, they are not shown on Map 3. However, as buried infrastructure that will only require temporary construction activities along linear alignment segments, the proposed undertaking will not negatively impact foraging habitat for these species. Bank Swallow and Barn Swallow foraging habitats therefore do not represent development constraints for this project.

### 6.4.2 Potential Habitat

*Bat Species at Risk*

Detailed surveys of potential bat roosting or maternity colony habitat were not completed within the study area. All wooded areas have potential to provide suitable habitat for SAR bats. In general, it is recommended that impacts to woodlands be avoided in selecting a preferred design. If impacts to woodlands are unavoidable, additional detailed assessments of bat cavity tree presence may be required subject to MECP consultation. Since individual trees or small stands of trees outside of woodland features may also represent SAR bat roosting habitat, all trees that are ≥10cm diameter-at-breast-height should be considered potential SAR bat habitat until such time that a cavity tree assessment is undertaken to confirm or rule out habitat suitability. Impacts to individual or woodland trees (e.g., removal or pruning) without proper consideration for avoidance or mitigation measures, in consultation with the MECP, may therefore constitute contravention of the ESA. As assumed habitat for SAR, impacts to these

trees is also prohibited under Regional and Township policies except where permitted or authorized by the MECP pursuant to the ESA.

*Other Species at Risk Records*

Appendix VIII lists SAR that have occurrence records in the study area vicinity (up to 10km) based on review of background information sources. An assessment of habitat suitability was completed for these species based on a review of each species' habitat requirements (e.g., OMNR 2000) versus habitat availability within the study area as confirmed through site investigations. In addition to the SAR described above, three other SAR, American Badger, Bobolink (*Dolichonyx oryzivorus*) and Eastern Meadowlark (*Sturnella magna*) were determined to have suitable habitat within the study area. American Badger habitat suitability was based on the presence of agricultural lands within the general range of where the species is expected to occur. Based on targeted searches for burrow types that are diagnostic of the species, no evidence of badger presence was observed within the study area. Therefore, no impacts to American Badgers or their habitat are expected. The larger blocks of Mineral Cultural Meadow (CUM1) that occur within the study area have potential to provide breeding habitat for Bobolink and Eastern Meadowlark. However, neither of these species was observed during field studies. Suitable habitats for other SAR with occurrence records in the surrounding vicinity are considered absent (Appendix VIII).

## 6.5 Significant Wildlife Habitat

An assessment of SWH was completed for the study area based on the results of previous natural environment studies undertaken within the study area as well as NRSI's supplementary field surveys completed for the EA. Based on the results of this work, two forms of Candidate SWH were identified for the study area: Bat Maternity Colonies and Turtle Wintering Area. No confirmed SWH was identified within the study area. See Appendix IX for the complete SWH assessment tables.

### 6.5.1 Candidate Significant Wildlife Habitat

*Bat Maternity Colonies*

As stated above, targeted assessments of bat habitat suitability were not completed as part of this study based on the general recommendation that woodland features be avoided in the alignment of a trunk sanitary sewer. The Fresh-Moist Willow Lowland Deciduous Forest (FOD7-3) and Mineral Cultural Woodland (CUW1) communities present the potential to support bat

maternity colony habitat. SWH for this habitat function is determined based on a minimum density of suitable habitat trees occurring within the feature. In the absence of targeted surveys, these features should be considered potentially significant pending additional survey work. However, the potential for significance is greater within the larger and more ecologically mature FOD7-3 features relative to the CUW1 features.

*Turtle Wintering Area*

The large pond in the northeast end of the study area, adjacent to Foundry Street, was identified as Candidate SWH for Turtle Wintering Area. Although no turtles were observed within this feature incidentally during field surveys, this feature was not targeted for turtle overwintering survey work. Depending on its depth and substrates, it may provide an unfrozen lower water column and muddy substrates during winter to allow for turtle overwintering.

The SCC Snapping Turtle was also identified as having suitable habitat within the study area (Appendix VIII). This is in part based on the presence of the pond, as well as the Baden Creek riparian channel which may function as a movement corridor across the lands. However, the potentially significant habitat for this SCC is considered to be the pond and potential overwintering habitat area. The significance of the Baden Creek channel as a general wildlife movement corridor is further discussed below.

### 6.5.2 Significant Wildlife Habitats Considered Absent

Based on species records known from the vicinity, one additional SCC was identified as having suitable habitat within the study area: Monarch (*Danaus plexippus*). This species was not observed on site during field surveys, although it is likely that the species does use the property due to the presence of its host plant Common Milkweed (*Ascpelias syriaca*). However, the most sensitive form of this species' habitat within Ontario is considered to be its migratory stop-over habitat, which is specifically categorized as a SWH type (MNRF 2015a). Only suitable habitat areas within 5km of Lake Ontario are considered SWH within Ecoregion 6E, ruling out potential habitat significance in the study area. However, measures should be taken to minimize or mitigate Monarch habitat loss within the study area nonetheless.

## 6.6 Regionally Significant Species

In total, one regionally significant vegetation species, five regionally significant bird species, and three regionally significant mammal species were observed within the study area, either as part of field studies completed for this EA or for the previous Schmidt Estate lands study. Of the

regionally significant mammal species, Coyote and Virginia Opossum may no longer be considered significant on the basis of their being regionally “scarce” or “rare”, respectively, relative to the age of the regional mammal significance rankings (1985).

While regionally rare vegetation species in and of themselves do not represent policy-based constraints to sewer design or construction plans, their presence renders additional significance to the features in which they are located. Measures should be taken to avoid or minimize impacts to habitats that support regionally significant species. Efforts should be made to protect individual significant plants during construction where necessary. If impacts cannot be avoided, the individual plants should be relocated to an appropriate site when feasible.

## 6.7 Ecological Linkages

Ecological connectivity within the study area is primarily associated with the Baden Creek riparian corridor. This corridor represents the primary naturalized feature within the study area that is otherwise dominated by active agriculture. It therefore provides a potential corridor function for land-based wildlife that may avoid the open and sun-exposed agricultural and cultural meadow lands (e.g., amphibians).

The significance of this ecological corridor as a linkage feature may be limited to a local scale for wildlife movement purposes. Although it connects the northeast study area pond, and potentially further upstream riparian features along Baden Creek, downstream habitats are very limited due to existing land developments and ultimately the barrier presented by Highway 7/8 to the south. The study area may provide connectivity to upstream wooded and riparian wetland habitats along the Huehn Award Drain depending on the ability and inclination of wildlife to cross through the Foundry Street culvert or over top of the road. Minor upstream connectivity may also be provided along Baden Creek Tributary B, although the road, railway and pedestrian trail crossings at/adjacent to Snyder’s Road may represent a movement barrier. A minor ecological connection may also extend along the Baden Creek Tributary A corridor toward the stormwater management pond to the northwest.

Linkages within the study area may be of minor or localized ecological significance. However, efforts should be made to preserve these connections as part of future site alteration activities. Where feasible these corridors should be enhanced in size and quality to promote their functional value, such as through the enhancement of recommended watercourse buffers.

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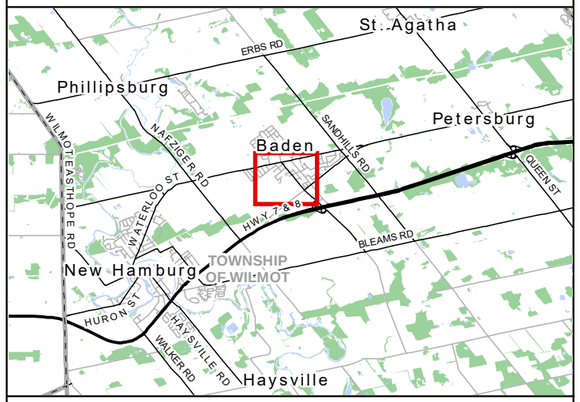
# Maps

Map 1

# Baden Trunk Sanitary Sewer EA

## Natural Environment Assessment Study Area




**Legend**

- Study Area
- Railway
- Primary Road
- Secondary Road
- Permanent Watercourse
- Intermittent/Ephemeral Watercourse
- Water Body
- Other Wetland (Non-PSW)
- Wooded Area

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Project: 2561
Date: April 25, 2022

NAD83 - UTM Zone 17
Size: 11x17"
**1:5,000**

0 100 200 300 Metres

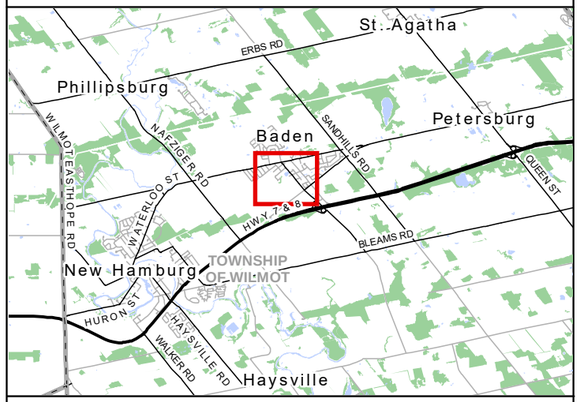
N

Path: X:\2561_Beckdale_Sanitary_Sewer_EA\NRSI_2561_Map1_NatEnvStudyArea_5K_2022_04_22_JX.mxd

Map 2

# Baden Trunk Sanitary Sewer EA

## Vegetation Communities




**Legend**

- Study Area
- Railway
- Permanent Watercourse
- Intermittent/Ephemeral Watercourse
- Ecological Land Classification (ELC)
- (C) Commercial
- (CUM1) Mineral Cultural Meadow Ecosite
- (CUT1) Mineral Cultural Thicket Ecosite
- (CUW1) Mineral Cultural Woodland Ecosite
- (FOD7-3) Fresh - Moist Willow Lowland Deciduous Forest Type
- (L) Lawn
- (MAM) Meadow Marsh
- (MAM2) Mineral Meadow Marsh Ecosite
- (MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type
- (OA) Open Water
- (OAGM1) Agriculture
- (PS) Pumping Station
- (Res) Residential
- (SWM) Storm Water Management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Project: 2561
Date: April 25, 2022

NAD83 - UTM Zone 17
Size: 11x17"
**1:5,000**

0 100 200 300 Metres

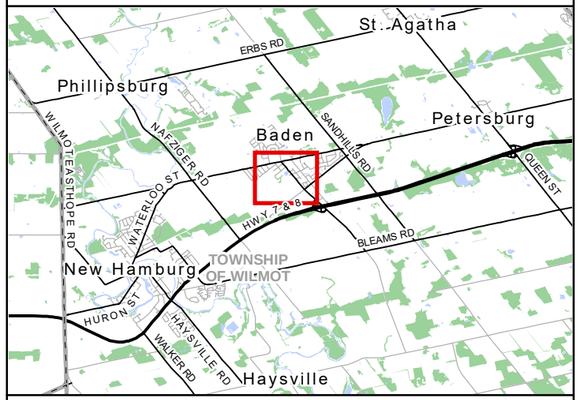
N

Path: X:\2561_Beckdale_Sanitary_Sewer_EA\NRSI_2561_Map2_ELC_5K_2022_04_25_JX.mxd

Map 3

# Baden Trunk Sanitary Sewer EA

## Natural Environment Constraints




**Legend**

- Study
- Railway
- Permanent Watercourse
- Intermittent/Ephemeral Watercourse
- Direct Fish Habitat
- Watercourse Buffer (10m)
- Watercourse Buffer (15m)
- Watercourse Buffer (30m)
- Potential Bat Species At Risk Habitat
- Candidate Turtle Overwintering SWH
- Locally Significant Wetlands
- Wetland Buffer (15m)
- Woodland
- Locally Significant Woodland
- Butternut
- Butternut Buffer (25m)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Project: 2561
Date: August 18, 2022

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**1:5,000**

0 100 200 300 Metres

N

526500 527000 527500

4805500 4805000

See Inset A

Inset A

0 20 40 60 80 Meters

WAGLER AVE
MCFADYEN ST
LIVINGSTON BLVD
SNYDERS RD W
SNYDERS RD E
FOELL ST
MILL ST
QUEEN ST
CHARLOTTA ST
BECK ST
MILLER ST
CHRISTIAN ST
CHARLES ST
BELL DR
SCHNELLEN
LOUISA ST
BREWERY ST
TANNERY ST
VILLAGE GREEN WAY
COUNTRY CREEK DR
FOUNDRY ST
HASTINGS ST
GINGERICH RD
HWY 7 & 8

Baden Creek Tributary B
Baden Creek Tributary A
Hirchy Award Drain
Baden Creek

1
2
3

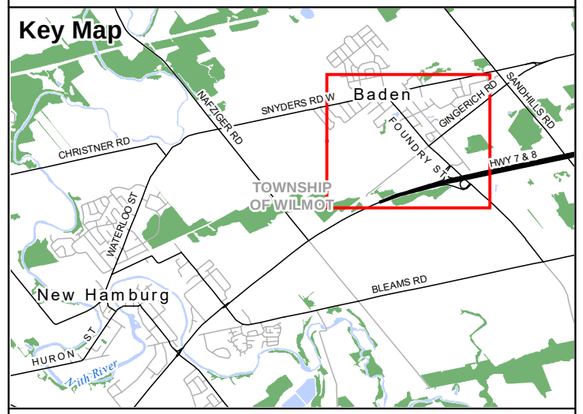
Path: X:\2561_Beckdale_Sanitary_Sewer_EA\NRSI_2561_Map3_NatEnvConstraints_5K_2022_08_18_KEF.mxd

## Appendix I
## Schmidt Estate EIS Study Area

Map 1

# Schmidt Estate EIS

## Study Area




**Legend**

- Subject Property (approximate)
- Utility Line
- Railway
- Regulation Limit (GRCA)
- Permanent Watercourse
- Water Body
- Other Wetland (Non-PSW)
- Wooded Area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| Project: 1927<br>Date: May 24, 2018 | NAD83 - UTM Zone 17<br>Size: 11x17"<br>**1:7,000** |
|---|---|

0 100 200 300 400 Metres

N

526500 527000 527500 528000

4805500 4805000 4804500

WAGLER AVE
MCFADYEN ST
LIVINGSTON BLVD
FOELL ST
SNYDERS RD E
SNYDERS RD W
QUEEN ST
MILL ST
BECK ST
MILLER ST
CHRISTIAN ST
CHARLES ST
CHARLOTTA ST
BRENNEMAN DR
BELL DR
BREWERY ST
TANNERY ST
Baden East Wetland Complex
FORLER ST
ELIZABETH ST
SCHNELLER DR
STIEFELMEYER CRES
COUNTRY CREEK DR
GINGERICH RD
HASTINGS CRT
FOUNDRY ST
Baden Creek
Area 1
Area 2
Baden East Wetland Complex
Baden Southwest Wetland Complex
HWY 7 & 8
WILMOT CENTRE RD

Path: X:\1927_SchmidtEstate_EIS\NRSI_1927_Map1_StudyArea_7K_2018_05_24_LEH.mxd

## Appendix II
## Plant Species Inventoried within the Study Area

**Plant Species Reported from the Study Area - Beckdale Sanitary Sewer EA (Project #2561)**

| Scientific Name | Common Name | CC | SRANK | SARO | COSEWIC | SARA | SARA Schedule | Waterloo Region | NRSI Observed | CUM1 (w/ MAM2 incl.) | FOD7-3 | CUW1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Oldham et al. 1998 | MNRF 2020a | MNRF 2020a | ernment of Canada | ernment of Canada | ernment of Canada | hardson & Martin 1999 | | | | |
| **Gymnosperms** | **Conifers** | | | | | | | | | | | |
| **Cupressaceae** | **Cypress Family** | | | | | | | | | | | |
| *Juniperus virginiana* | Eastern Red Cedar | 4 | S5 | | | | | | X | X | | |
| *Thuja occidentalis* | Eastern White Cedar | 4 | S5 | | | | | | X | X | | |
| **Pinaceae** | **Pine Family** | | | | | | | | | | | |
| *Picea abies* | Norway Spruce | 0 | SE3 | | | | | | X | X | | X |
| *Pinus strobus* | Eastern White Pine | 4 | S5 | | | | | | X | | | X |
| **Dicotyledons** | **Dicots** | | | | | | | | | | | |
| **Aceraceae** | **Maple Family** | | | | | | | | | | | |
| *Acer negundo* | Manitoba Maple | 0 | S5 | | | | | | X | X | X | X |
| *Acer platanoides* | Norway Maple | 0 | SE5 | | | | | | X | | | X |
| *Acer saccharinum* | Silver Maple | 5 | S5 | | | | | | X | X | | |
| **Asclepiadaceae** | **Milkweed Family** | | | | | | | | | | | |
| *Asclepias syriaca* | Common Milkweed | 0 | S5 | | | | | | X | X | | |
| **Asteraceae** | **Composite or Aster Family** | | | | | | | | | | | |
| *Ambrosia trifida* | Great Ragweed | 0 | S5 | | | | | | X | X | X | |
| *Bidens cernua* | Nodding Beggarticks | 2 | S5 | | | | | | X | | X | |
| *Erigeron annuus* | Annual Fleabane | 0 | S5 | | | | | | X | | | X |
| *Erigeron strigosus* | Rough Fleabane | 4 | S5 | | | | | | X | X | | |
| *Helianthus pauciflorus ssp. subrhomboide* | Rhombic-leaved Sunflower | 0 | S2S3 | | | | | | X | X | | |
| *Solidago altissima* | Tall Goldenrod | 1 | S5 | | | | | | X | X | | |
| *Solidago canadensis* | Canada Goldenrod | 1 | S5 | | | | | | X | X | | |
| *Solidago nemoralis* | Gray-stemmed Goldenrod | 2 | S5 | | | | | | X | X | | |
| *Sonchus arvensis* | Field Sow-thistle | 0 | SE5 | | | | | | X | X | | |
| *Symphyotrichum ericoides* | White Heath Aster | 4 | S5 | | | | | | X | X | | |
| *Symphyotrichum lanceolatum* | Panicled Aster | 3 | S5 | | | | | | X | X | | |
| *Symphyotrichum lateriflorum* | Calico Aster | 3 | S5 | | | | | | X | | | X |
| *Symphyotrichum novae-angliae* | New England Aster | 2 | S5 | | | | | | X | X | | |
| *Symphyotrichum pilosum* | Old Field Aster | 0 | S5 | | | | | | X | X | | |
| *Tragopogon pratensis* | Meadow Goat's-beard | 0 | SE5 | | | | | | X | | X | |
| *Tussilago farfara* | Colt's-foot | 0 | SE5 | | | | | | X | | X | |
| **Balsaminaceae** | **Touch-me-not Family** | | | | | | | | | | | |
| *Impatiens capensis* | Spotted Jewelweed | 4 | S5 | | | | | | X | | X | |
| **Boraginaceae** | **Borage Family** | | | | | | | | | | | |
| *Echium vulgare* | Common Viper's Bugloss | 0 | SE5 | | | | | | X | X | | |
| *Myosotis laxa* | Small Forget-me-not | 6 | S5 | | | | | | X | | X | |
| *Myosotis sylvatica* | Woodland Forget-me-not | 0 | SE4 | | | | | | X | X | X | X |
| **Brassicaceae** | **Mustard Family** | | | | | | | | | | | |
| *Alliaria petiolata* | Garlic Mustard | 0 | SE5 | | | | | | X | X | X | X |
| *Barbarea vulgaris* | Bitter Wintercress | 0 | SE5 | | | | | | X | X | X | |
| *Capsella bursa-pastoris* | Common Shepherd's Purse | 0 | SE5 | | | | | | X | X | | |
| *Erysimum cheiranthoides* | Wormseed Wallflower | 0 | S5 | | | | | | X | X | | |
| *Hesperis matronalis* | Dame's Rocket | 0 | SE5 | | | | | | X | | X | X |
| *Rorippa palustris* | Marsh Yellowcress | 3 | S5 | | | | | | X | X | | |
| **Caprifoliaceae** | **Honeysuckle Family** | | | | | | | | | | | |
| *Lonicera tatarica* | Tatarian Honeysuckle | 0 | SE5 | | | | | | X | | | X |
| *Triosteum aurantiacum* | Orange-fruited Horse-gentian | 7 | S4S5 | | | | | | X | | | X |
| *Viburnum opulus ssp. opulus* | Cranberry Viburnum | 0 | SE3? | | | | | | X | | X | |
| **Caryophyllaceae** | **Pink Family** | | | | | | | | | | | |
| *Saponaria officinalis* | Bouncing-bet | 0 | SE5 | | | | | | X | | | X |
| **Convolvulaceae** | **Morning-glory Family** | | | | | | | | | | | |
| *Calystegia sepium* | Hedge False Bindweed | 2 | S5 | | | | | | X | | X | |
| *Convolvulus arvensis* | Field Bindweed | 0 | SE5 | | | | | | X | X | | |
| **Cornaceae** | **Dogwood Family** | | | | | | | | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Cornus alternifolia* | Alternate-leaved Dogwood | 6 | S5 | | | | | | X | | X | |
| *Cornus sericea* | Red-osier Dogwood | 2 | S5 | | | | | | X | X | X | |
| **Crassulaceae** | **Stonecrop Family** | | | | | | | | | | | |
| *Penthorum sedoides* | Ditch-stonecrop | 4 | S5 | | | | | | X | | X | |
| **Cucurbitaceae** | **Gourd Family** | | | | | | | | | | | |
| *Echinocystis lobata* | Wild Mock-cucumber | 3 | S5 | | | | | | X | | X | |
| **Elaeagnaceae** | **Oleaster Family** | | | | | | | | | | | |
| *Elaeagnus umbellata* | Autumn Olive | 0 | SE3 | | | | | | X | X | | |
| **Fabaceae** | **Pea Family** | | | | | | | | | | | |
| *Melilotus albus* | White Sweet-clover | 0 | SE5 | | | | | | X | X | | |
| *Trifolium repens* | White Clover | 0 | SE5 | | | | | | X | X | | |
| *Vicia cracca* | Tufted Vetch | 0 | SE5 | | | | | | X | X | | |
| *Quercus macrocarpa* | Bur Oak | 5 | S5 | | | | | | X | | | X |
| **Geraniaceae** | **Geranium Family** | | | | | | | | | | | |
| *Geranium robertianum* | Herb-Robert | 2 | S5 | | | | | | X | | X | X |
| **Grossulariaceae** | **Currant Family** | | | | | | | | | | | |
| *Ribes americanum* | Wild Black Currant | 4 | S5 | | | | | | X | | X | X |
| *Ribes cynosbati* | Prickly Gooseberry | 4 | S5 | | | | | | X | | X | |
| *Ribes rubrum* | Northern Red Currant | 0 | SE5 | | | | | | X | | X | X |
| **Hippocastanaceae** | **Buckeye Family** | | | | | | | | | | | |
| *Aesculus hippocastanum* | Horse Chestnut | 0 | SE2 | | | | | | X | X | | |
| **Juglandaceae** | **Walnut Family** | | | | | | | | | | | |
| *Juglans cinerea* | Butternut | 6 | S2? | END | END | Endangered | Schedule 1 | | X | | X | |
| *Juglans nigra* | Black Walnut | 5 | S4? | | | | | R+* | X | X | X | X |
| **Lamiaceae** | **Mint Family** | | | | | | | | | | | |
| *Clinopodium vulgare* | Field Basil | 4 | S5 | | | | | | X | | | X |
| *Glechoma hederacea* | Ground Ivy | 0 | SE5 | | | | | | X | X | | X |
| *Lamium amplexicaule* | Common Dead-nettle | 0 | SE3 | | | | | | X | X | | |
| *Leonurus cardiaca* | Common Motherwort | 0 | SE5 | | | | | | X | | X | X |
| *Lycopus americanus* | American Water-horehound | 4 | S5 | | | | | | X | | X | |
| *Lycopus uniflorus* | Northern Water-horehound | 5 | S5 | | | | | | X | | X | |
| *Mentha canadensis* | Canada Mint | 3 | S5 | | | | | | X | | X | |
| *Mentha x piperita* | *(Mentha aquatica X Mentha spicata)* | 0 | SNA | | | | | | X | | X | |
| **Malvaceae** | **Mallow Family** | | | | | | | | | | | |
| *Malva neglecta* | Dwarf Cheeseweed | 0 | SE5 | | | | | | X | X | | |
| **Moraceae** | **Mulberry Family** | | | | | | | | | | | |
| *Morus alba* | White Mulberry | 0 | SE5 | | | | | | X | X | | |
| **Onagraceae** | **Evening-primrose Family** | | | | | | | | | | | |
| *Circaea canadensis* | Broad-leaved Enchanter's Nightshade | 2 | S5 | | | | | | X | | X | X |
| *Epilobium parviflorum* | Small-flowered Willowherb | 0 | SE4 | | | | | | X | X | | |
| **Oxalidaceae** | **Wood Sorrel Family** | | | | | | | | | | | |
| *Oxalis stricta* | Upright Yellow Wood-sorrel | 0 | S5 | | | | | | X | | | X |
| **Papaveraceae** | **Poppy Family** | | | | | | | | | | | |
| *Chelidonium majus* | Greater Celandine | 0 | SE5 | | | | | | X | X | | |
| **Plantaginaceae** | **Plantain Family** | | | | | | | | | | | |
| *Plantago lanceolata* | English Plantain | 0 | SE5 | | | | | | X | X | | |
| *Plantago major* | Common Plantain | 0 | SE5 | | | | | | X | X | | |
| **Polygonaceae** | **Smartweed Family** | | | | | | | | | | | |
| *Persicaria maculosa* | Spotted Lady's-thumb | 0 | SE5 | | | | | | X | | X | |
| *Reynoutria japonica* | Japanese Knotweed | 0 | SE5 | | | | | | X | X | | |
| *Rumex britannica* | Water Dock | 6 | S5 | | | | | | X | X | | |
| *Rumex obtusifolius* | Bitter Dock | 0 | SE5 | | | | | | X | | X | |
| **Ranunculaceae** | **Buttercup Family** | | | | | | | | | | | |
| *Caltha palustris* | Yellow Marsh Marigold | 5 | S5 | | | | | | X | | X | |
| *Ranunculus repens* | Creeping Buttercup | 0 | SE5 | | | | | | X | X | X | |
| *Ranunculus sceleratus* | Cursed Buttercup | 2 | S5 | | | | | | X | | X | |
| **Rhamnaceae** | **Buckthorn Family** | | | | | | | | | | | |
| *Rhamnus cathartica* | Common Buckthorn | 0 | SE5 | | | | | | X | | X | X |
| **Rosaceae** | **Rose Family** | | | | | | | | | | | |
| *Amelanchier spicata* | Running Serviceberry | 4 | S4 | | | | | R | X | X | | |
| *Crataegus sp.* | Hawthorn sp. | 0 | 0 | 0 | 0 | | 0 | | X | | | X |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Crataegus punctata* | Dotted Hawthorn | 4 | S5 | | | | | | X | X | | X |
| *Fragaria virginiana* | Wild Strawberry | 2 | S5 | | | | | | X | X | | X |
| *Geum canadense* | White Avens | 3 | S5 | | | | | | X | | | X |
| *Geum laciniatum* | Rough Avens | 4 | S4 | | | | | | X | X | | |
| *Geum urbanum* | Wood Avens | 0 | SE3 | | | | | | X | | X | X |
| *Geum x catlingii* | *(Geum canadense X Geum urbanum)* | 0 | SNA | | | | | | X | | | X |
| *Malus pumila* | Common Apple | 0 | SE4 | | | | | | X | X | X | X |
| *Potentilla indica* | Mock-strawberry | 0 | SE2 | | | | | | X | | X | |
| *Prunus avium* | Sweet Cherry | 0 | SE4 | | | | | | X | X | | |
| *Prunus serotina* | Black Cherry | 3 | S5 | | | | | | X | | | X |
| *Prunus virginiana* | Choke Cherry | 2 | S5 | | | | | | X | X | X | X |
| *Rosa multiflora* | Multiflora Rose | 0 | SE5 | | | | | | X | X | X | X |
| *Rubus idaeus ssp. strigosus* | Wild Red Raspberry | 2 | S5 | | | | | | X | | X | X |
| *Rubus occidentalis* | Black Raspberry | 2 | S5 | | | | | | X | | X | |
| **Rubiaceae** | **Madder Family** | | | | | | | | | | | |
| *Galium aparine* | Cleavers | 4 | S5 | | | | | | X | | X | X |
| *Galium mollugo* | Smooth Bedstraw | 0 | SE5 | | | | | | X | X | X | |
| **Salicaceae** | **Willow Family** | | | | | | | | | | | |
| *Populus balsamifera* | Balsam Poplar | 4 | S5 | | | | | | X | X | | |
| *Populus tremuloides* | Trembling Aspen | 2 | S5 | | | | | | X | X | | |
| *Salix alba* | White Willow | 0 | SE4 | | | | | | X | X | X | X |
| *Salix euxina* | Crack Willow | 0 | SE | | | | | | X | | X | |
| **Scrophulariaceae** | **Figwort Family** | | | | | | | | | | | |
| *Veronica anagallis-aquatica* | Water Speedwell | 0 | SE | | | | | | X | | X | |
| **Ulmaceae** | **Elm Family** | | | | | | | | | | | |
| *Ulmus americana* | American Elm | 3 | S5 | | | | | | X | | | X |
| **Urticaceae** | **Nettle Family** | | | | | | | | | | | |
| *Urtica dioica* | Stinging Nettle | 2 | S5 | | | | | | X | X | | |
| *Urtica dioica ssp. dioica* | European Stinging Nettle | 0 | SE2 | | | | | | X | | X | |
| **Verbenaceae** | **Vervain Family** | | | | | | | | | | | |
| *Verbena hastata* | Blue Vervain | 4 | S5 | | | | | | X | | X | |
| *Verbena urticifolia* | White Vervain | 4 | S5 | | | | | | X | | X | |
| **Violaceae** | **Violet Family** | | | | | | | | | | | |
| *Viola odorata* | English Violet | 0 | SE2 | | | | | | X | | | X |
| *Viola sororia* | Woolly Blue Violet | 4 | S5 | | | | | | X | | X | X |
| **Monocotyledons** | **Monocots** | | | | | | | | | | | |
| **Alismataceae** | **Water-plantain Family** | | | | | | | | | | | |
| *Sagittaria latifolia* | Broad-leaved Arrowhead | 4 | S5 | | | | | | X | | X | |
| **Araceae** | **Arum Family** | | | | | | | | | | | |
| *Arisaema triphyllum* | Jack-in-the-pulpit | 5 | S5 | | | | | | X | | X | |
| **Cyperaceae** | **Sedge Family** | | | | | | | | | | | |
| *Carex cristatella* | Crested Sedge | 3 | S5 | | | | | | X | | X | |
| *Carex granularis* | Limestone Meadow Sedge | 3 | S5 | | | | | | X | X | | |
| *Carex pallescens* | Pale Sedge | 5 | S4 | | | | | | X | | | X |
| *Carex spicata* | Spiked Sedge | 0 | SE5 | | | | | | X | | X | |
| *Carex stipata* | Awl-fruited Sedge | 3 | S5 | | | | | | X | X | | |
| *Carex vulpinoidea* | Fox Sedge | 3 | S5 | | | | | | X | | X | |
| *Schoenoplectus tabernaemontani* | Soft-stemmed Bulrush | 5 | S5 | | | | | | X | | X | |
| **Iridaceae** | **Iris Family** | | | | | | | | | | | |
| *Iris pseudacorus* | Yellow Iris | 0 | SE4 | | | | | | X | | X | |
| **Juncaceae** | **Rush Family** | | | | | | | | | | | |
| *Juncus articulatus* | Jointed Rush | 5 | S5 | | | | | | X | | X | |
| *Juncus tenuis* | Path Rush | 0 | S5 | | | | | | X | X | | |
| **Liliaceae** | **Lily Family** | | | | | | | | | | | |
| *Allium tricoccum* | Wild Leek | 7 | S4 | | | | | | X | | X | |
| **Poaceae** | **Grass Family** | | | | | | | | | | | |
| *Agrostis gigantea* | Redtop | 0 | SE5 | | | | | | X | X | | |
| *Agrostis stolonifera* | Creeping Bentgrass | 0 | SE5 | | | | | | X | | X | |
| *Bromus inermis* | Smooth Brome | 0 | SE5 | | | | | | X | X | | |
| *Dactylis glomerata* | Orchard Grass | 0 | SE5 | | | | | | X | X | X | X |
| *Danthonia spicata* | Poverty Oatgrass | 5 | S5 | | | | | | X | X | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Festuca rubra* | Red Fescue | 0 | S5 | | | | | | X | X | | |
| *Hordeum jubatum* | Foxtail Barley | 0 | S5? | | | | | | X | X | | |
| *Leersia oryzoides* | Rice Cutgrass | 3 | S5 | | | | | | X | | X | |
| *Lolium pratense* | Meadow Fescue | 0 | SE5 | | | | | | X | X | | |
| *Phleum pratense* | Common Timothy | 0 | SE5 | | | | | | X | X | | |
| *Phragmites australis ssp. australis* | European Reed | 0 | SE5 | | | | | | X | X | | |
| *Poa annua* | Annual Bluegrass | 0 | SE5 | | | | | | X | X | | |
| *Poa compressa* | Canada Bluegrass | 0 | SE5 | | | | | | X | X | | |
| *Poa palustris* | Fowl Bluegrass | 5 | S5 | | | | | | X | | X | |
| *Poa pratensis* | Kentucky Bluegrass | 0 | S5 | | | | | | X | X | | |
| **Potamogetonaceae** | **Pondweed Family** | | | | | | | | | | | |
| *Potamogeton nodosus* | Long-leaved Pondweed | 7 | S5 | | | | | | X | | X | |
| *Stuckenia pectinata* | Sago Pondweed | 4 | S5 | | | | | | X | | X | |
| **Typhaceae** | **Cattail Family** | | | | | | | | | | | |
| *Typha angustifolia* | Narrow-leaved Cattail | 0 | SE5 | | | | | | X | X | | |
| **Total** | | | | | | | | | **141** | **72** | **66** | **41** |

*NHIC Atlas Squares: Square #

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## Appendix III
## Bird Species Reported from the Study Area and Vicinity

**Bird Species Reported from the Study Area - Baden Sanitary Sewer EA (Project #2561)**

| Scientific Name | Common Name | SRANK | SARO | COSEWIC | SARA | SARA Schedule | Region of Waterloo Status | OBBA* | NRSI Observed: Highest Level of Breeding Evidence | Ag | CUM1 | FOD7-3 | Res. | CUW | Off-site |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MNRF 2021a | MNRF 2021a | Government of Canada 2021 | Government of Canada 2021 | Government of Canada 2021 | Martin 1996 | Cadman et al. 2007 | NRSI Results from 2021 | | | | | | |
| **Anatidae** | **Ducks, Geese & Swans** | | | | | | | | | | | | | | |
| *Anas platyrhynchos* | Mallard | S5 | | | | | | CO | **CO** | PO | PR | | | | CO |
| *Branta canadensis* | Canada Goose | S5 | | | | | | CO | **PO** | | | | | | PO |
| *Lophodytes cucullatus* | Hooded Merganser | S5 | | | | | √ | | **PO** | | | | | | PO |
| **Phasianidae** | **Partridges, Grouse & Turkeys** | | | | | | | | | | | | | | |
| *Meleagris gallopavo* | Wild Turkey | S5 | | | | | | PR | | | | | | | |
| *Phasianus colchicus* | Ring-necked Pheasant | SNA | | | | | | CO | | | | | | | |
| **Columbidae** | **Pigeons & Doves** | | | | | | | | | | | | | | |
| *Columba livia* | Rock Pigeon | SNA | | | | | | CO | **PR** | | PR | | | | PO |
| *Zenaida macroura* | Mourning Dove | S5 | | | | | | CO | **PR** | PR | PO | | PO | PO | PO |
| **Cuculiformes** | **Cuckoos & Anis** | | | | | | | | | | | | | | |
| *Coccyzus erythropthalmus* | Black-billed Cuckoo | S4S5B | | | | | √ | CO | | | | | | | |
| **Trochilidae** | **Hummingbirds** | | | | | | | | | | | | | | |
| *Archilochus colubris* | Ruby-throated Hummingbird | S5B | | | | | √ | CO | | | | | | | |
| **Charadriidae** | **Plovers & Lapwings** | | | | | | | | | | | | | | |
| *Charadrius vociferus* | Killdeer | S4B | | | | | | CO | **PO** | PO | | | | | |
| **Scolopacidae** | **Sandpipers & Allies** | | | | | | | | | | | | | | |
| *Actitis macularia* | Spotted Sandpiper | S5B | | | | | | PO | | | | | | | |
| **Ardeidae** | **Herons & Bitterns** | | | | | | | | | | | | | | |
| *Ardea herodias* | Great Blue Heron | S4 | | | | | √ | CO | **PO** | | | | | | PO |
| **Cathartidae** | **Vultures** | | | | | | | | | | | | | | |
| *Cathartes aura* | Turkey Vulture | S5B, S3N | | | | | √ | PO | | | | | | | |
| **Accipitridae** | **Hawks, Kites, Eagles & Allies** | | | | | | | | | | | | | | |
| *Buteo jamaicensis* | Red-tailed Hawk | S5 | NAR | NAR | NS | No schedule | | CO | | | | | | | |
| **Strigidae** | **Typical Owls** | | | | | | | | | | | | | | |
| *Bubo virginianus* | Great Horned Owl | S4 | | | | | | PR | | | | | | | |
| *Megascops asio* | Eastern Screech-Owl | S4 | NAR | NAR | NS | No schedule | | PR | | | | | | | |
| **Alcedinidae** | **Kingfishers** | | | | | | | | | | | | | | |
| *Megaceryle alcyon* | Belted Kingfisher | S5B, S4N | | | | | √ | PO | | | | | | | |
| **Picidae** | **Woodpeckers** | | | | | | | | | | | | | | |
| *Colaptes auratus* | Northern Flicker | S5 | | | | | | CO | | | | | | | |
| *Dryobates pubescens* | Downy Woodpecker | S5 | | | | | | CO | **PR** | | | PR | | PO | |
| *Dryobates villosus* | Hairy Woodpecker | S5 | | | | | | CO | | | | | | | |
| *Dryocopus pileatus* | Pileated Woodpecker | S5 | | | | | √ | PO | | | | | | | |
| *Melanerpes carolinus* | Red-bellied Woodpecker | S5 | | | | | √ | PR | | | | | | | |
| *Melanerpes erythrocephalus* | Red-headed Woodpecker | S3 | SC | E | E | Schedule 1 | √ | CO | | | | | | | |
| *Sphyrapicus varius* | Yellow-bellied Sapsucker | S5B, S3N | | | | | √ | CO | | | | | | | |
| **Tyrannidae** | **Tyrant Flycatchers** | | | | | | | | | | | | | | |
| *Contopus virens* | Eastern Wood-Pewee | S4B | SC | SC | SC | Schedule 1 | | PR | | | | | | | |
| *Empidonax traillii* | Willow Flycatcher | S4B | | | | | | | **PO** | PO | | | | | |
| *Myiarchus crinitus* | Great Crested Flycatcher | S5B | | | | | | PR | | | | | | | |
| *Sayornis phoebe* | Eastern Phoebe | S5B | | | | | | CO | | | | | | | |
| *Tyrannus tyrannus* | Eastern Kingbird | S4B | | | | | | CO | **PR** | | PR | | PO | | |
| **Vireonidae** | **Vireos** | | | | | | | | | | | | | | |
| *Vireo flavifrons* | Yellow-throated Vireo | S4B | | | | | √ | PO | | | | | | | |
| *Vireo gilvus* | Warbling Vireo | S5B | | | | | | PR | **PO** | | PO | PO | | PO | PO |
| *Vireo olivaceus* | Red-eyed Vireo | S5B | | | | | | PR | **PO** | | PO | PO | | | |
| **Corvidae** | **Crows & Jays** | | | | | | | | | | | | | | |
| *Corvus brachyrhynchos* | American Crow | S5 | | | | | | CO | **PO** | PO | | | | | |
| *Cyanocitta cristata* | Blue Jay | S5 | | | | | | CO | **PO** | | PO | PO | PO | | |
| **Alaudidae** | **Larks** | | | | | | | | | | | | | | |
| *Eremophila alpestris* | Horned Lark | S4 | | | | | | CO | **PR** | PR | | | | | |
| **Hirundinidae** | **Swallows** | | | | | | | | | | | | | | |
| *Hirundo rustica* | Barn Swallow | S4B | THR | SC | T | Schedule 1 | | CO | | | | | | | |
| *Petrochelidon pyrrhonota* | Cliff Swallow | S4S5B | | | | | √* | CO | **PO** | | PO | | | | |
| *Riparia riparia* | Bank Swallow | S4B | THR | T | T | Schedule 1 | | | **PO** | PO | PO | | | | |
| *Stelgidopteryx serripennis* | Northern Rough-winged Swallow | S4B | | | | | | | **PO** | | PO | | | | |
| *Tachycineta bicolor* | Tree Swallow | S4S5B | | | | | | CO | | | | | | | |
| **Paridae** | **Chickadees & Titmice** | | | | | | | | | | | | | | |
| *Poecile atricapillus* | Black-capped Chickadee | S5 | | | | | | CO | **CO** | | CO | PR | | | |

| **Sittidae** | **Nuthatches** | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sitta canadensis* | Red-breasted Nuthatch | S5 | | | | | √ | | **PO** | | | PO | | | |
| *Sitta carolinensis* | White-breasted Nuthatch | S5 | | | | | | CO | | | | | | | |
| **Certhiidae** | **Creepers** | | | | | | | | | | | | | | |
| *Certhia americana* | Brown Creeper | S5 | | | | | √ | PO | | | | | | | |
| **Troglodytidae** | **Wrens** | | | | | | | | | | | | | | |
| *Troglodytes aedon* | House Wren | S5B | | | | | | CO | **PO** | | PO | PO | | | |
| *Troglodytes hiemalis* | Winter Wren | S5B, S4N | | | | | √ | PR | | | | | | | |
| **Turdidae** | **Thrushes** | | | | | | | | | | | | | | |
| *Hylocichla mustelina* | Wood Thrush | S4B | SC | T | T | Schedule 1 | | PR | | | | | | | |
| *Sialia sialis* | Eastern Bluebird | S5B, S4N | NAR | NAR | NS | No schedule | √ | CO | | | | | | | |
| *Turdus migratorius* | American Robin | S5 | | | | | | CO | **CO** | PO | PO | PR | CO | PO | |
| **Mimidae** | **Mockingbirds, Thrashers & Allies** | | | | | | | | | | | | | | |
| *Dumetella carolinensis* | Gray Catbird | S5B, S3N | | | | | | CO | **PO** | | | PO | | | |
| *Toxostoma rufum* | Brown Thrasher | S4B | | | | | √ | PR | **PO** | | PO | | | | |
| **Sturnidae** | **Starlings** | | | | | | | | | | | | | | |
| *Sturnus vulgaris* | European Starling | SNA | | | | | | CO | **PR** | PO | | PR | | | |
| **Bombycillidae** | **Waxwings** | | | | | | | | | | | | | | |
| *Bombycilla cedrorum* | Cedar Waxwing | S5 | | | | | | CO | **PO** | | PO | | PO | PO | |
| **Passeridae** | **Old World Sparrows** | | | | | | | | | | | | | | |
| *Passer domesticus* | House Sparrow | SNA | | | | | | CO | **PO** | | | | | | PO |
| **Fringillidae** | **Finches & Allies** | | | | | | | | | | | | | | |
| *Haemorhous mexicanus* | House Finch | SNA | | | | | | CO | | | | | | | |
| *Spinus tristis* | American Goldfinch | S5 | | | | | | PR | **PR** | PR | PR | | | PO | |
| **Emberizidae** | **New World Sparrows & Allies** | | | | | | | | | | | | | | |
| *Melospiza melodia* | Song Sparrow | S5 | | | | | | CO | **PR** | PO | PR | PR | PO | PO | |
| *Passerculus sandwichensis* | Savannah Sparrow | S5B, S3N | | | | | | CO | | | | | | | |
| *Pipilo erythrophthalmus* | Eastern Towhee | S4B, S3N | | | | | | PR | | | | | | | |
| *Pooecetes gramineus* | Vesper Sparrow | S4B | | | | | √ | PO | | | | | | | |
| *Spizella passerina* | Chipping Sparrow | S5B, S3N | | | | | | PR | | | | | | | |
| *Spizella pusilla* | Field Sparrow | S4B, S3N | | | | | | CO | | | | | | | |
| **Icteridae** | **Troupials & Allies** | | | | | | | | | | | | | | |
| *Agelaius phoeniceus* | Red-winged Blackbird | S5 | | | | | | CO | **PR** | PO | PR | | PO | PO | PO |
| *Dolichonyx oryzivorus* | Bobolink | S4B | THR | T | T | Schedule 1 | | PR | | | | | | | |
| *Icterus galbula* | Baltimore Oriole | S4B | | | | | | CO | **PO** | | PO | PO | PO | PO | |
| *Molothrus ater* | Brown-headed Cowbird | S5 | | | | | | PR | **PO** | PO | | PO | | | |
| *Quiscalus quiscula* | Common Grackle | S5 | | | | | | CO | **CO** | PO | CO | | CO | | |
| *Sturnella magna* | Eastern Meadowlark | S4B, S3N | THR | T | T | Schedule 1 | | CO | | | | | | | |
| **Parulidae** | **Wood Warblers** | | | | | | | | | | | | | | |
| *Geothlypis philadelphia* | Mourning Warbler | S5B | | | | | √ | PR | | | | | | | |
| *Geothlypis trichas* | Common Yellowthroat | S5B, S3N | | | | | | PR | **PR** | | PR | | | | |
| *Seiurus aurocapilla* | Ovenbird | S5B | | | | | √ | PR | | | | | | | |
| *Setophaga pensylvanica* | Chestnut-sided Warbler | S5B | | | | | √ | PO | | | | | | | |
| *Setophaga petechia* | Yellow Warbler | S5B | | | | | | PR | **PO** | | | PO | | | |
| *Setophaga ruticilla* | American Redstart | S5B | | | | | √ | PR | | | | | | | |
| *Setophaga virens* | Black-throated Green Warbler | S5B | | | | | √ | PO | | | | | | | |
| **Cardinalidae** | **Cardinals, Grosbeaks & Allies** | | | | | | | | | | | | | | |
| *Cardinalis cardinalis* | Northern Cardinal | S5 | | | | | | CO | **CO** | | | | | | CO |
| *Passerina cyanea* | Indigo Bunting | S5B | | | | | | CO | | | | | | | |
| *Pheucticus ludovicianus* | Rose-breasted Grosbeak | S5B | | | | | | PR | | | | | | | |
| *Piranga olivacea* | Scarlet Tanager | S5B | | | | | √ | PR | | | | | | | |
| **Total** | | | | | | | | **74** | **36** | **14** | **21** | **14** | **9** | **9** | **10** |

*OBBA Atlas Square: 17NJ20

**NHIC Atlas Squares: 17NJ2605, 17NJ2705, 17NJ2604, 17NJ2704

**References**


Ministry of Natural Resources and Forestry (MNRF). 2021a. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2021-03-18. Available: https://www.ontario.ca/page/get-natural-heritage-information

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Ministry of Natural Resources and Forestry (MNRF). 2021b. Natural Heritage Information Centre (NHIC): Make a Natural Heritage Area Map Application. Published: 2014-07-17. Updated 2021-05-27. Available: https://www.ontario.ca/page/make-natural-heritage-area-map

## Appendix IV
## Herpetofauna Species Reported from the Study Area and Vicinity

**Reptile and Amphibian Species Reported from the Study Area - Beckdale Sewer EA (Project #2561)**

| Scientific Name | Common Name | SRANK | SARO | COSEWIC | SARA | SARA Schedule | Region of Waterloo Status | ORAA* | NRSI Observed |
|---|---|---|---|---|---|---|---|---|---|
| | | MNRF 2021a | MNRF 2021a | Government of Canada 2021 | Government of Canada 2021 | Government of Canada 2021 | RMOW 1985 | Ontario Nature 2019 | NRSI Results from 2021 |
| **Turtles** | | | | | | | | | |
| *Chelydra serpentina* | Snapping Turtle | S4 | SC | SC | SC | Schedule 1 | C | X | |
| *Chrysemys picta marginata* | Midland Painted Turtle | S4 | | SC | SC | Schedule 1 | C | X | |
| **Snakes** | | | | | | | | | |
| *Lampropeltis triangulum* | Milksnake | S4 | NAR | SC | SC | Schedule 1 | √ | X | |
| *Thamnophis sirtalis sirtalis* | Eastern Gartersnake | S5 | | | | | C | X | |
| **Salamanders** | | | | | | | | | |
| *Necturus maculosus* | Mudpuppy | S4 | NAR | NAR | NS | No schedule | √ | X | |
| *Notophthalmus viridescens viridescens* | Red-spotted Newt | S5 | | | | | √ | X | |
| *Plethodon cinereus* | Eastern Red-backed Salamander | S5 | | | | | C | X | |
| **Frogs and Toads** | | | | | | | | | |
| *Anaxyrus americanus* | American Toad | S5 | | | | | C | X | |
| *Hyla versicolor* | Gray Treefrog | S5 | | | | | C | X | |
| *Pseudacris crucifer* | Spring Peeper | S5 | | | | | C | X | |
| *Lithobates clamitans* | Green Frog | S5 | | | | | C | X | |
| *Lithobates palustris* | Pickerel Frog | S4 | NAR | NAR | NS | No schedule | √ | X | |
| *Lithobates pipiens* | Northern Leopard Frog | S5 | NAR | NAR | NS | No schedule | C | X | |
| *Lithobates sylvaticus* | Wood Frog | S5 | | | | | C | X | |
| **Total** | | | | | | | | **14** | **0** |

*ORAA Atlas Square: 17NJ20

**NHIC Atlas Squares: 17NJ2605, 17NJ2705, 17NJ2604, 17NJ2704

**References**


Ministry of Natural Resources and Forestry (MNRF). 2021a. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2021-03-18. Available: https://www.ontario.ca/page/get-natural-heritage-information

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## Appendix V
## Mammal Species Reported from the Study Area and Vicinity

**Mammal Species Reported from the Study Area - Beckdale Sewer EA (Project #2561)**

| Scientific Name | Common Name | SRANK | SARO | COSEWIC | SARA | SARA Schedule | Region of Waterloo Status | Ontario Mammal Atlas | NRSI Observed |
|---|---|---|---|---|---|---|---|---|---|
| | | MNRF 2021a | MNRF 2021a | Government of Canada 2021 | Government of Canada 2021 | Government of Canada 2021 | RMOW 1985 | Dobbyn 1994 | NRSI Results from 2021 |
| **Didelphimorphia** | **Opossums** | | | | | | | | |
| *Didelphis virginiana* | Virginia Opossum | S4 | | | | | R | X | |
| **Eulipotyphla** | **Shrews, Moles, Hedgehogs, and Allies** | | | | | | | | |
| *Blarina brevicauda* | Northern Short-tailed Shrew | S5 | | | | | | X | |
| *Condylura cristata* | Star-nosed Mole | S5 | | | | | | X | |
| *Sorex cinereus* | Masked Shrew | S5 | | | | | G | X | |
| *Sorex fumeus* | Smoky Shrew | S5 | | | | | R | X | |
| **Chiroptera** | **Bats** | | | | | | | | |
| *Eptesicus fuscus* | Big Brown Bat | S4 | | | | | | X | |
| *Lasiurus borealis* | Eastern Red Bat | S4 | | | | | | X | |
| *Lasiurus cinereus* | Hoary Bat | S4 | | | | | | X | |
| *Myotis lucifugus* | Little Brown Myotis | S3 | END | E | E | Schedule 1 | | X | |
| *Myotis septentrionalis* | Northern Myotis | S3 | END | E | E | Schedule 1 | | X | |
| **Lagomorpha** | **Rabbits and Hares** | | | | | | | | |
| *Lepus europaeus* | European Hare | SNA | | | | | | X | |
| *Sylvilagus floridanus* | Eastern Cottontail | S5 | | | | | | X | X |
| **Rodentia** | **Rodents** | | | | | | | | |
| *Castor canadensis* | Beaver | S5 | | | | | S | X | |
| *Erethizon dorsatum* | Porcupine | S5 | | | | | S | X | |
| *Glaucomys sabrinus* | Northern Flying Squirrel | S5 | | | | | R | X | |
| *Marmota monax* | Woodchuck | S5 | | | | | | X | X |
| *Microtus pennsylvanicus* | Meadow Vole | S5 | | | | | | X | |
| *Mus musculus* | House Mouse | SNA | | | | | | X | |
| *Ondatra zibethicus* | Muskrat | S5 | | | | | | X | |
| *Peromyscus leucopus* | White-footed Mouse | S5 | | | | | | X | |
| *Peromyscus maniculatus* | Deer Mouse | S5 | | | | | | X | |
| *Rattus norvegicus* | Norway Rat | SNA | | | | | | X | |
| *Sciurus carolinensis* | Eastern Gray Squirrel | S5 | | | | | | X | X |
| *Tamias striatus* | Eastern Chipmunk | S5 | | | | | | X | |
| *Tamiasciurus hudsonicus* | Red Squirrel | S5 | | | | | | X | |
| *Zapus hudsonius* | Meadow Jumping Mouse | S5 | | | | | | X | |
| **Canidae** | **Canines** | | | | | | | | |
| *Canis latrans* | Coyote | S5 | | | | | S | X | |
| *Vulpes vulpes* | Red Fox | S5 | | | | | | X | |
| **Mephitidae** | **Skunks and Stink Badgers** | | | | | | | | |
| *Mephitis mephitis* | Striped Skunk | S5 | | | | | | X | |
| **Mustelidae** | **Weasels and Allies** | | | | | | | | |
| *Mustela erminea* | Ermine | S5 | | | | | | X | |
| *Mustela frenata* | Long-tailed Weasel | S4 | | | | | S | X | |
| *Neovison vison* | American Mink | S4 | | | | | S | X | |
| *Taxidea taxus jacksoni* | American Badger (Southwestern Ontario p | S1 | END | E | E | Schedule 1 | | X | |
| **Procyonidae** | **Raccoons and Allies** | | | | | | | | |
| *Procyon lotor* | Northern Raccoon | S5 | | | | | | X | |
| **Total** | | | | | | | | **34** | **3** |

*Mammal Atlas Square Numbers: 17NJ20
**NHIC Atlas Squares: Square #

**References**

Ministry of Natural Resources and Forestry (MNRF). 2021a. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2021-03-18. Available: https://www.ontario.ca/page/get-natural-heritage-information
Government of Canada. 2021. Species at Risk Public Registry: Species Search. COSEWIC Last Assessment Date: 2021-05-05. Available: https://species-registry.canada.ca/index-en.html#/species?sortBy=commonNameSort&sortDirection=asc&pageSize=10
Regional Municipality of Waterloo (RMOW). 1985. Appendix 4: Mammals in Environmentally Sensitive Policy Areas Technical Appendix. Approved by Council: 1986.
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## Appendix VI
## Butterfly Species Reported from the Study Area and Vicinity

**Butterfly Species Reported from the Study Area - Beckdale Sewer EA (Project #2561)**

| Scientific Name | Common Name | SRANK | SARO | COSEWIC | SARA | SARA Schedule | Region of Waterloo Status | Ontario Butterfly Atlas* | NRSI Observed |
|---|---|---|---|---|---|---|---|---|---|
| | | MNRF 2021a | MNRF 2021a | Government of Canada 2021 | Government of Canada 2021 | Government of Canada 2021 | Linton 2012 | Macnaughton et al. 2020 | NRSI Results from 2021 |
| **Hesperiidae** | **Skippers** | | | | | | | | |
| *Carterocephalus palaemon* | Arctic Skipper | S5 | | | | | R | X | |
| *Epargyreus clarus* | Silver-spotted Skipper | S4 | | | | | UC | X | |
| *Erynnis baptisiae* | Wild Indigo Duskywing | S4 | | | | | UK | X | |
| *Euphyes conspicua* | Black Dash | S3 | | | | | UC | X | |
| *Poanes hobomok* | Hobomok Skipper | S5 | | | | | C | X | |
| *Thymelicus lineola* | European Skipper | SNA | | | | | VC | X | |
| **Papilionidae** | **Swallowtails** | | | | | | | | |
| *Papilio cresphontes* | Giant Swallowtail | S4 | | | | | UC | X | |
| *Papilio glaucus* | Eastern Tiger Swallowtail | S5 | | | | | VC | X | |
| *Papilio polyxenes* | Black Swallowtail | S5 | | | | | VC | X | |
| **Pieridae** | **Whites and Sulphurs** | | | | | | | | |
| *Colias eurytheme* | Orange Sulphur | S5 | | | | | VC | X | |
| *Colias philodice* | Clouded Sulphur | S5 | | | | | | X | |
| *Pieris rapae* | Cabbage White | SNA | | | | | VC | X | |
| **Lycaenidae** | **Harvesters, Coppers, Hairstreaks, Blues** | | | | | | | | |
| *Celastrina lucia* | Northern Spring Azure | S5 | | | | | | X | |
| *Celastrina sp.* | Azure species | SNA | | | | | | X | |
| *Cupido comyntas* | Eastern Tailed Blue | S5 | | | | | UC | X | |
| *Lycaena hyllus* | Bronze Copper | S5 | | | | | VC | X | |
| *Satyrium calanus* | Banded Hairstreak | S4 | | | | | UC | X | |
| **Nymphalidae** | **Brush-footed Butterflies** | | | | | | | | |
| *Aglais milberti* | Milbert's Tortoiseshell | S5 | | | | | UC | X | |
| *Asterocampa celtis* | Hackberry Emperor | S3 | | | | | | X | |
| *Asterocampa clyton* | Tawny Emperor | S3 | | | | | UC | X | |
| *Cercyonis pegala* | Common Wood-Nymph | S5 | | | | | VC | X | |
| *Coenonympha tullia* | Common Ringlet | S5 | | | | | C | X | |
| *Danaus plexippus* | Monarch | S2N,S4B | SC | E | SC | Schedule 1 | VC | X | |
| *Lethe anthedon* | Northern Pearly-Eye | S5 | | | | | C | X | |
| *Libytheana carinenta* | American Snout | SNA | | | | | R | X | |
| *Limenitis archippus* | Viceroy | S5 | | | | | VC | X | |
| *Limenitis arthemis astyanax* | Red-spotted Purple | S5 | | | | | C | X | |
| *Megisto cymela* | Little Wood-Satyr | S5 | | | | | VC | X | |
| *Nymphalis antiopa* | Mourning Cloak | S5 | | | | | VC | X | |
| *Nymphalis l-album* | Compton Tortoiseshell | S5 | | | | | UC | X | |
| *Phyciodes cocyta* | Northern Crescent | S5 | | | | | UC | X | |
| *Polygonia comma* | Eastern Comma | S5 | | | | | VC | X | |
| *Polygonia interrogationis* | Question Mark | S5 | | | | | VC | X | |
| *Polygonia progne* | Gray Comma | S5 | | | | | UC | X | |
| *Speyeria cybele* | Great Spangled Fritillary | S5 | | | | | VC | X | |
| *Vanessa atalanta* | Red Admiral | S5B | | | | | VC | X | |
| *Vanessa cardui* | Painted Lady | S5B | | | | | C | X | |
| *Vanessa virginiensis* | American Lady | S5 | | | | | C | X | |
| **Total** | | | | | | | | **38** | **0** |

*TEA Atlas Square: 17NJ20
**NHIC Atlas Square: Square #

**References**


Ministry of Natural Resources and Forestry (MNRF). 2021a. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2021-03-18. Available: https://www.ontario.ca/page/get-natural-heritage-information
Government of Canada. 2021. Species at Risk Public Registry: Species Search. COSEWIC Last Assessment Date: 2021-05-05. Available: https://species-registry.canada.ca/index-en.html#/species?sortBy=commonNameSort&sortDirection=asc&pageSize=10
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Ministry of Natural Resources and Forestry (MNRF). 2021b. Natural Heritage Information Centre (NHIC): Make a Natural Heritage Area Map Application. Published: 2014-07-17. Updated 2021-05-27. Available: https://www.ontario.ca/page/make-natural-heritage-area-map

## Appendix VII
## Odonata Species Reported from the Study Area and Vicinity

**Odonate Species Reported from the Study Area - Beckdale Sewer EA (Project #2561)**

| Scientific Name | Common Name | SRANK | SARO | COSEWIC | SARA | SARA Schedule | Region of Waterloo Status | Odonate Atlas* | NRSI Observed |
|---|---|---|---|---|---|---|---|---|---|
| | | MNRF 2021a | MNRF 2021a | Government of Canada 2021 | Government of Canada 2021 | Government of Canada 2021 | Region of Waterloo 1985 | OOAD 2021 | |
| **Calopterygidae** | **Broadwinged Damselflies** | | | | | | | | |
| *Calopteryx aequabilis* | River Jewelwing | S5 | | | | | X | X | |
| *Hetaerina americana* | American Rubyspot | S4 | | | | | X | X | |
| **Lestidae** | **Spreadwings** | | | | | | | | |
| *Lestes dryas* | Emerald Spreadwing | S5 | | | | | X | X | |
| *Lestes eurinus* | Amber-winged Spreadwing | S4 | | | | | Expected | X | |
| *Lestes forcipatus* | Sweetflag Spreadwing | S4 | | | | | X | X | |
| *Lestes unguiculatus* | Lyre-tipped Spreadwing | S5 | | | | | X | X | |
| **Coenagrionidae** | **Narrow-winged Damselflies** | | | | | | | | |
| *Argia apicalis* | Blue-fronted Dancer | S4 | | | | | X | X | |
| *Argia moesta* | Powdered Dancer | S5 | | | | | X | X | |
| *Coenagrion resolutum* | Taiga Bluet | S5 | | | | | X | X | |
| *Enallagma annexum* | Northern Bluet | S4 | | | | | Expected | X | |
| *Enallagma exsulans* | Stream Bluet | S5 | | | | | X | X | |
| *Ischnura verticalis* | Eastern Forktail | S5 | | | | | X | | |
| *Nehalennia irene* | Sedge Sprite | S5 | | | | | X | | |
| **Aeshnidae** | **Darners** | | | | | | | | |
| *Anax junius* | Common Green Darner | S5 | | | | | X | X | |
| **Gomphidae** | **Clubtails** | | | | | | | | |
| *Ophiogomphus rupinsulensis* | Rusty Snaketail | S4 | | | | | X | X | |
| **Libellulidae** | **Skimmers** | | | | | | | | |
| *Ladona julia* | Chalk-fronted Corporal | S5 | | | | | X | X | |
| *Leucorrhinia intacta* | Dot-tailed Whiteface | S5 | | | | | X | X | |
| *Libellula pulchella* | Twelve-spotted Skimmer | S5 | | | | | X | X | |
| *Libellula quadrimaculata* | Four-spotted Skimmer | S5 | | | | | X | X | |
| *Plathemis lydia* | Common Whitetail | S5 | | | | | X | X | |
| **Total** | | | | | | | | **18** | **0** |

**Odonate Atlas Square Numbers: 17NJ20*
***NHIC Atlas Squares: Square(s)*

**References**


Ministry of Natural Resources and Forestry (MNRF). 2021a. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2021-03-18. Available: https://www.ontario.ca/page/get-natural-heritage-information
Government of Canada. 2021. Species at Risk Public Registry: Species Search. COSEWIC Last Assessment Date: 2021-05-05. Available: https://species-registry.canada.ca/index-en.html#/species?sortBy=commonNameSort&sortDirection=asc&pageSize=10
Regional Municipality of Waterloo. 1985. Environmentally Sensitive Policy Areas. Approved by Council: 1986.
Ministry of Natural Resources and Forestry (MNRF). 2021b. Natural Heritage Information Centre (NHIC): Make a Natural Heritage Area Map Application. Published: 2014-07-17. Updated 2021-05-27. Available: https://www.ontario.ca/page/make-natural-heritage-area-map

## Appendix VIII
## Species at Risk/Species of Conservation Concern Habitat Assessment

| Scientific Name | Common Name | S-RANK[1] | SARO | COSEWIC[2] | SARA Schedule | Background Source | Habitat Preference[4,5] | Suitable Habitats within Study Area | Carried Forward to EA? | Rationale | Observed within Study Area (NRSI 2018) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Birds** | | | | | | | | | | | |
| *Riparia riparia* | Bank Swallow | S4B | THR | T | Schedule 1 | MNRF 2021, BSC et al. 2006 | Sand, clay or gravel river banks or steep riverbank cliffs; lakeshore bluffs of easily crumbled sand or gravel; gravel pits, road-cuts, grassland or cultivated fields that are close to water; nesting sites are limiting factor for species presence. | Yes (foraging habitat only) | Yes | Cultivated fields present offering forage, though limited by lack of nesting habitat. | Yes - Possible Breeding Evidence |
| *Hirundo rustica* | Barn Swallow | S4B | THR | T | Schedule 1 | BSC et al. 2006 | Farmlands or rural areas; cliffs, caves, rock niches; buildings or other man-made structures for nesting; open country near body of water. | Yes | Yes | Agricultural farmlands and cultural meadow provide suitable foraging habitat. Agricultural outbuildings may provide opportunities for nesting in proximity to foraging habitat. | Yes - Possible Breeding Evidence |
| *Chlidonias niger* | Black Tern | S3B | SC | NAR | No Schedule | MNRF 2021, BSC et al. 2006 | Breed mainly imarshes along the edges of the Great Lakes. Builds floating nests in loose colonies in shallow marshes, especially in cattails. | No | No | Suitable habitat not present in Subject Property. No shallow marshes exist within Subject Property. | No |
| *Dolichonyx oryzivorus* | Bobolink | S4B | THR | T | Schedule 1 | MNRF 2021, BSC et al. 2006 | Large, open expansive grasslands with dense ground cover; hayfields, meadows or fallow fields; marshes; requires tracts of grassland >50 ha. | Yes | Yes | Suitable habitat may be present depending on presence of suitable hayfield crop cover in agricultural fields, or if fields are fallow. | No |
| *Sturnella magna* | Eastern Meadowlark | S4B | THR | T | Schedule 1 | MNRF 2021, BSC et al. 2006 | Open, grassy meadows, farmland, pastures, hayfields or grasslands with elevated singing perches; cultivated land and weedy areas with trees; old orchards with adjacent, open grassy areas >10 ha in size. | Yes | Yes | Land use a mixture of agricultural fields, andcultural meadow with likelihood of offering singing perches.. Larger than 10 ha in size extending beyond Study Area boundaries. | No |
| *Contopus virens* | Eastern Wood-pewee | S4B | SC | SC | Schedule 1 | BSC et al. 2006 | Mid-canopy layer of forest clearings and edges of deciduous and mixed forests. Most abundant in forest stands of intermediate age and in mature stands with little understory vegetation. | No | No | Forest communities do not provide adequate habitat within or adjacent to Study Area. | No |
| *Melanerpes erythrocephalus* | Red-headed Woodpecker | S4B | SC | E | Schedule 1 | BSC et al. 2006 | Open, deciduous forest with little understory; fields or pasture lands with scattered large trees; wooded swamps; orchards, small woodlots or forest edges; groves of dead or dying trees; feeds on insects and stores nuts or acorns for winter; loss of habitat is limiting factor; requires cavity trees with at least 40 cm dbh; require about 4 ha for a territory. | No | No | Forest communities do not provide adequate habitat within or adjacent to Study Area. | No |
| *Hylocichla mustelina* | Wood Thrush | S4B | SC | T | Schedule 1 | BSC et al. 2006 | Carolinian and Great Lakes-St. Lawrence forest zones; undisturbed moist mature deciduous or mixed forest with deciduous sapling growth; near pond or swamp; hardwood forest edges; must have some trees higher than 12 m. | No | No | Required habitat not present within or adjacent to Study Area. | No |
| **Herpetofauna** | | | | | | | | | | | |
| *Chelydra serpentina serpentina* | Common Snapping Turtle | S4 | SC | SC | Schedule 1 | MNRF 2021, Ontario Nature 2019 | Permanent or semi-permanent fresh water; marshes, swamps or bogs; rivers and streams with soft muddybanks or bottoms. The species often uses soft soil or clean dry sand on south-facing slopes for nest sites and may nest at some distance from water. | Yes | Yes | Suitable travel corridor habitat may be provided by Baden Creek | No |
| **Mammals** | | | | | | | | | | | |
| *Myotis lucifungus* | Little Brown Myotis | S3 | END | E | Schedule 1 | Dobbyn 1994 | Uses caves, quarries, tunnels, hollow trees or buildings for roosting; winters in humid caves; maternity sites in dark warm areas such as attics and barns; feeds primarily in wetlands, forest edges | Yes | Yes | Presence of roosting sites potentially present within barns and other structures as well as trees. Foraging offered over wetlands and along forest edges. | No - Targeted surveys not conducted |

| Scientific Name | Common Name | S-RANK[1] | SARO | COSEWIC[2] | SARA Schedule | Background Source | Habitat Preference[4,5] | Suitable Habitats within Study Area | Carried Forward to EA? | Rationale | Observed within Study Area (NRSI 2018) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Myotis septentrionalis* | Northern Myotis | S3 | END | E | Schedule 1 | Dobbyn 1994 | Hibernates during winter in mines or caves; during summer males roost alone and females form maternity colonies of up to 60 adults; roosts in houses, man-made structures but prefers hollow trees or under loose bark; hunts within forest, below canopy | Yes | Yes | Man-made structures within Subject Property may offer suitable roosts. Potential for tree cavities and foraging habitat present within wooded areas of nearby forest communities. | No - Targeted surveys not conducted |
| *Taxidea taxus jacksoni* | American Badger | S2 | END | E | Schedule 1 | SAR Ontario | In Ontario, badgers are found in a variety of habitats, such as tall grass prairie, sand barrens and farmland. These habitats provide badgers with small prey, including groundhogs, rabbits and small rodents. Since badgers are primarily nocturnal and quite wary of people, not many people are fortunate enough to spot one in the wild. | Yes | Yes | Farmlands provide potential habitat , presence of small mammals provides forage. | No - Dens not observed |
| | | | | | | | | | | | |
| *Danaus plexippus* | Monarch | S2N, S4B | SC | E | Schedule 1 | Macnaughton et al. 2020 | Open areas with milkweed species (*Asclepias spp.* ). | Yes | Yes | Milkweed observed within Cultural Meadow in 2018. Offers suitable habitat for Monarch | No - Larval food plant (Milkweed) observed |
| **Odonates (Dragon/Damsel Flies)** | | | | | | | | | | | |
| *Lestes eurinus* | Amber-winged Spreadwing | S3 | N/A | N/A | N/A | Blust and Pfeiffer, 2015 | Associated with, but not exclusive to, bogs and other acidic wetlands and ponds with boggy shoreline. Adapted to fishless, permanent water habitats. | No | No | Suitable habitat is not present within the Study Area | No |
| **Fish** | | | | | | | | | | | |
| **Freshwater Mussels** | | | | | | | | | | | |
| **Plants** | | | | | | | | | | | |

## Appendix IX
## Significant Wildlife Habitat Assessment

**Significant Wildlife Habitat Assessment Tables**

**Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.**

| | Wildlife Species[1] | Candidate SWH | | Confirmed SWH | Study Area |
|---|---|---|---|---|---|
| | | ELC Ecosite Codes[1] | Habitat Criteria and Information Sources[1] | Defining Criteria[1] | Assessment Details |
| **Wildlife Habitat: Waterfowl Stopover and Staging Areas (Terrestrial)** | | | | | |
| Rationale:<br>Habitat important to migrating waterfowl. | American Black Duck<br>Wood Duck<br>Green-winged Teal<br>Blue-winged Teal<br>Mallard<br>Northern Pintail<br>Northern Shoveler<br>American Wigeon<br>Gadwall | CUM1<br>CUT1<br>- Plus evidence of annual spring flooding from melt water or run-off within these Ecosites. | Fields with sheet water during Spring (mid March to May).<br>• Fields flooding during spring melt and run-off provide important invertebrate foraging habitat for migrating waterfowl.<br>• Agricultural fields with waste grains are commonly used by waterfowl, these are not considered SWH unless they have spring sheet water available[cxlviii].<br><br>Information Sources<br>• Anecdotal information from the landowner, adjacent landowners or local naturalist clubs may be good information in determining occurrence.<br>• Reports and other information available from Conservation Authorities (CAs)<br>• Sites documented through waterfowl planning processes (eg. EHJV implementation plan)<br>• Field Naturalist Clubs<br>• Ducks Unlimited Canada<br>• Natural Heritage Information Centre (NHIC) Waterfowl Concentration Area | Studies carried out and verified presence of an annual concentration of any listed species, evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi]<br>• Any mixed species aggregations of 100 or more individuals required.<br>• The area of the flooded field ecosite habitat plus a 100-300m radius buffer dependent on local site conditions and adjacent land use is the significant wildlife habitat[cxlviii].<br>• Annual use of habitat is documented from information sources or field studies (annual use can be based on studies or determined by past surveys with species numbers and dates).<br>• SWHMiST[cxlix] Index #7 provides development effects and mitigation measures. | Presence of flooding in fields inadequate to support provincially significant congregations of waterfowl.<br><br>**Not SWH** |

**Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.**

| | Wildlife Species[1] | Candidate SWH | | Confirmed SWH | Study Area |
|---|---|---|---|---|---|
| | | ELC Ecosite Codes[1] | Habitat Criteria and Information Sources[1] | Defining Criteria[1] | Assessment Details |
| **Wildlife Habitat: Waterfowl Stopover and Staging Areas (Aquatic)** | | | | | |
| Rationale:<br>Important for local and migrant waterfowl populations during the spring or fall migration or both periods combined. Sites identified are usually only one of a few in the eco-district. | Canada Goose<br>Cackling Goose<br>Snow Goose<br>American Black Duck<br>Northern Pintail<br>Northern Shoveler<br>American Wigeon<br>Gadwall<br>Green-winged Teal<br>Blue-winged Teal<br>Hooded Merganser<br>Common Merganser<br>Lesser Scaup<br>Greater Scaup<br>Long-tailed Duck<br>Surf Scoter<br>White-winged Scoter<br>Black Scoter<br>Ring-necked Duck<br>Common Goldeneye<br>Bufflehead<br>Redhead<br>Ruddy Duck<br>Red-breasted Merganser<br>Brant<br>Canvasback | MAS1<br>MAS2<br>MAS3<br>SAS1<br>SAM1<br>SAF1<br>SWD1<br>SWD2<br>SWD3<br>SWD4<br>SWD5<br>SWD6<br>SWD7 | • Ponds, marshes, lakes, bays, coastal inlets, and watercourses used during migration. Sewage treatment ponds and storm water ponds do not qualify as a SWH, however a reservoir managed as a large wetland or pond/lake does qualify.<br>• These habitats have an abundant food supply (mostly aquatic invertebrates and vegetation in shallow water).<br><br>Information Sources<br>• Environment Canada<br>• Naturalist clubs often are aware of staging/stopover areas.<br>• OMNRF Wetland Evaluations indicate presence of locally and regionally significant waterfowl staging.<br>• Sites documented through waterfowl planning processes (eg. EHJV implementation plan)<br>• Ducks Unlimited projects<br>• Element occurrence specification by Nature Serve: http://www.natureserve.org<br>• Natural Heritage Information Centre (NHIC) Waterfowl Concentration Area | Studies carried out and verified presence of:<br>• Aggregations of 100[i] or more of listed species for 7 days[i], results in > 700 waterfowl use days.<br>• Areas with annual staging of ruddy ducks, canvasbacks, and redheads are SWH[cxlix]<br>• The combined area of the ELC ecosites and a 100m radius area is the SWH[cxlviii]<br>• Wetland area and shorelines associated with sites identified within the SWHTG[cxlviii] Appendix K[cxlix] are significant wildlife habitat.<br>• Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi]<br>• Annual Use of Habitat is Documented from Information Sources or Field Studies (Annual can be based on completed studies or determined from past surveys with species numbers and dates recorded).<br>• SWHMiST[cxlix] Index #7 provides development effects and mitigation measures. | The on-site watercourse is relatively small and other suitable forms of habitat are absent from the Study Area.<br><br>**Not SWH.** |

**Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.**

| | Wildlife Species[1] | Candidate SWH | | Confirmed SWH | Study Area |
|---|---|---|---|---|---|
| | | ELC Ecosite Codes[1] | Habitat Criteria and Information Sources[1] | Defining Criteria[1] | Assessment Details |
| **Wildlife Habitat: Shorebird Migratory Stopover Area** | | | | | |
| Rationale:<br>High quality shorebird stopover habitat is extremely rare and typically has a long history of use. | Greater Yellowlegs<br>Lesser Yellowlegs<br>Marbled Godwit<br>Hudsonian Godwit<br>Black-bellied Plover<br>American Golden-Plover<br>Semipalmated Plover<br>Solitary Sandpiper<br>Spotted Sandpiper<br>Semipalmated Sandpiper<br>Pectoral Sandpiper<br>White-rumped Sandpiper<br>Baird's Sandpiper<br>Least Sandpiper<br>Purple Sandpiper<br>Stilt Sandpiper<br>Short-billed Dowitcher<br>Red-necked Phalarope Whimbrel<br>Ruddy Turnstone<br>Sanderling<br>Dunlin<br>Whimbrel | BBO1<br>BBO2<br>BBS1<br>BBS2<br>BBT1<br>BBT2<br>SDO1<br>SDS2<br>SDT1<br>MAM1<br>MAM2<br>MAM3<br>MAM4<br>MAM5 | Shorelines of lakes, rivers and wetlands, including beach areas, bars and seasonally flooded, muddy and un-vegetated shoreline habitats. Great Lakes coastal shorelines, including groynes and other forms of armour rock lakeshores, are extremely important for migratory shorebirds in May to mid-June and early July to October. Sewage treatment ponds and storm water ponds do not qualify as a SWH.<br><br>Information Sources<br>• Western hemisphere shorebird reserve network.<br>• Canadian Wildlife Service (CWS) Ontario Shorebird Survey.<br>• Bird Studies Canada<br>• Ontario Nature<br>• Local birders and naturalist clubs<br>• Natural Heritage Information Center (NHIC) Shorebird Migratory Concentration Area | Studies confirming:<br>• Presence of 3 or more of listed species and > 1000 shorebird use days during spring or fall migration period. (shorebird use days are the accumulated number of shorebirds counted per day over the course of the fall or spring migration period)<br>• Whimbrel stop briefly (<24hrs) during spring migration, any site with >100 Whimbrel used for 3 years or more is significant.<br>• The area of significant shorebird habitat includes the mapped ELC shoreline ecosites plus a 100m radius area[cxlviii]<br>• Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi]<br>• SWHMiST[cxlix] Index #8 provides development effects and mitigation measures. | Suitable habitat is not present within or adjacent to the subject lands.<br><br>**Not SWH.** |

**Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.**

| | Wildlife Species[1] | Candidate SWH | | Confirmed SWH | Study Area |
|---|---|---|---|---|---|
| | | ELC Ecosite Codes[1] | Habitat Criteria and Information Sources[1] | Defining Criteria[1] | Assessment Details |
| **Wildlife Habitat: Raptor Wintering Area** | | | | | |
| Rational:<br>Sites used by multiple species, a high number of individuals and used annually are most significant | Rough-legged Hawk<br>Red-tailed Hawk<br>Northern Harrier<br>American Kestrel<br>Snowy Owl<br><br>Special Concern:<br>Short-eared Owl<br>Bald Eagle | Hawks/Owls:<br>Combination of ELC Community Series; need to have present one Community Series from each land class:<br>Forest:<br>FOD, FOM, FOC<br><br>Upland:<br>CUM, CUT, CUS, CUW | The habitat provides a combination of fields and woodlands that provide roosting, foraging and resting habitats for wintering raptors.<br><br>Raptor wintering sites need to be > 20 ha[cxlviii, cxlix] with a combination of forest and upland.[xvi, xvii, xviii, xix, xx, xxi].<br>Least disturbed sites, idle/fallow or lightly grazed field/meadow (>15ha) with adjacent woodlands[cxlix]<br><br>Field area of the habitat is to be wind swept with limited snow depth or accumulation.<br><br>Eagle sites have open water, large trees and snags available for roosting<br><br>Information Sources<br>• OMNRF Ecologist or Biologist<br>• Field Natural Clubs<br>• Natural Heritage Information Center (NHIC) Raptor Winter Concentration Area<br>• Data from Bird Studies Canada<br>• Reports and other information available from Conservation Authorities CAs. | Studies confirm the use of these habitats by:<br>• One or more Short-eared Owls or; One or more Bald Eagles or; At least 10 individuals and two listed hawk/owl species<br>• To be significant a site must be used regularly (3 in 5 years)[cxlix] for a minimum of 20 days by the above number of birds<br>• The habitat area for an Eagle winter site is the shoreline forest ecosites directly adjacent to the prime hunting area<br>• Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi]<br>• SWHMiST[cxlix] Index #10 and #11 provides development effects and mitigation measures. | Woodland habitat is too small and limiting on the subject lands and surrounding landscape to provide significant winter raptor habitat.<br><br>**Not SWH.** |

**Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.**

| | Wildlife Species[1] | Candidate SWH | | Confirmed SWH | Study Area |
|---|---|---|---|---|---|
| | | ELC Ecosite Codes[1] | Habitat Criteria and Information Sources[1] | Defining Criteria[1] | Assessment Details |
| **Wildlife Habitat: Bat Hibernacula** | | | | | |
| Rationale<br>Bat hibernacula are rare habitats in Ontario landscapes. | Big Brown Bat<br>Tri-coloured Bat | Bat Hibernacula may be found in these ecosites:<br>CCR1<br>CCR2<br>CCA1<br>CCA2<br>(Note: buildings are not considered to be SWH) | • Hibernacula may be found in caves, mine shafts, underground foundations and Karsts.<br>• Active mine sites should not be considered as SWH<br>• The locations of bat hibernacula are relatively poorly known.<br><br>Information Sources<br>• OMNRF for possible locations and contact for local experts<br>• Natural Heritage Information Center (NHIC) Bat Hibernaculum<br>• Ministry of Northern Development and Mines for location of mine shafts.<br>• Clubs that explore caves (eg. Sierra Club)<br>• University Biology Departments with bat experts. | • All sites with confirmed hibernating bats are SWH.<br>• The habitat area includes a 200m radius around the entrance of the hibernaculum[cxlviii, ccvii] for most.<br>• Studies are to be conducted during the peak swarming period (Aug. – Sept.). Surveys should be conducted following methods outlined in the "Bats and Bat Habitats: Guidelines for Wind Power Projects"[ccv]<br>• SWHMiST[cxlix] Index #1 provides development effects and mitigation measures. | Big Brown Bats have been documented in the vicinity of the study area. However, No known hibernacula are present within 200 m of the subject property.<br><br>**Not SWH.** |

**Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.**

| | Wildlife Species[1] | Candidate SWH | | Confirmed SWH | Study Area |
|---|---|---|---|---|---|
| | | ELC Ecosite Codes[1] | Habitat Criteria and Information Sources[1] | Defining Criteria[1] | Assessment Details |
| **Wildlife Habitat: Bat Maternity Colonies** | | | | | |
| Rationale:<br>Known locations of forested bat maternity colonies is extremely rare in all Ontario landscapes. | Big Brown Bat<br>Silver-haired Bat | Maternity colonies considered SWH are found in forested Ecosites.<br><br>All ELC Ecosites in ELC Community Series:<br>FOD<br>FOM<br>SWD<br>SWM | Maternity colonies can be found in tree cavities, vegetation and often in buildings[xxii, xxv, xxvi, xxvii, xxxi] (buildings are not considered to be SWH).<br>• Maternity roosts are not found in caves and mines in Ontario[xxii]<br>• Maternity colonies located in Mature deciduous or mixed forest stands[ccix, ccx] with >10/ha large diameter (>25cm dbh) wildlife trees[ccvii]<br>• Female Bats prefer wildlife tree (snags) in early stages of decay, class 1-3[ccxiv] or class 1 or 2[ccxii]<br>• Silver-haired Bats prefer older mixed or deciduous forest and form maternity colonies in tree cavities and small hollows. Older forest areas with at least 21 snags/ha are preferred[ccx]<br><br>Information Sources<br>• OMNRF for possible locations and contact for local experts<br>• University Biology Departments with bat experts. | • Maternity Colonies with confirmed use by:<br>• >10 Big Brown Bats<br>• >5 Adult Female Silver-haired Bats<br>• The area of the habitat includes the entire woodland or a forest stand ELC Ecosite or an Ecoelement containing the maternity colonies.<br>• Evaluation methods for maternity colonies should be conducted following methods outlined in the "Bats and Bat Habitats: Guidelines for wind Power Projects[ccv]<br>• SWHMiS T[cxlix] Index #12 provides development effects and mitigation measures. | Woodland features are limited within the study area, but may contain suitable concentrations of standing dead or declining trees that provide suitable bat habitat.<br><br>**Candidate SWH.** |

**Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.**

| | Wildlife Species[1] | Candidate SWH | | Confirmed SWH | Study Area |
|---|---|---|---|---|---|
| | | ELC Ecosite Codes[1] | Habitat Criteria and Information Sources[1] | Defining Criteria[1] | Assessment Details |
| **Wildlife Habitat: Turtle Wintering Area** | | | | | |
| Rationale:<br>Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant | Midland Painted Turtle<br><br>Special Concern:<br>Northern Map Turtle<br>Snapping Turtle | Snapping and Midland Painted Turtles -<br>ELC Community Classes: SW, MA, OA and SA;<br>ELC Community Series: FEO and BOO<br><br>Northern Map Turtle - Open Water areas such as deeper rivers or streams and lakes with current can also be used as over-wintering habitat. | For most turtles, wintering areas are in the same general area as their core habitat. Water has to be deep enough not to freeze and have soft mud substrates.<br>• Over-wintering sites are permanent water bodies, large wetlands, and bogs or fens with adequate Dissolved Oxygen[cix, cx, cxi, cxviii].<br>• Man-made ponds such as sewage lagoons or storm water ponds should not be considered SWH.<br>Information Sources<br>• EIS studies carried out by Conservation Authorities.<br>• Local field naturalists and experts, as well as university herpetologists may also know where to find some of these sites.<br>• OMNRF ecologist or biologist<br>• Natural Heritage Information Center (NHIC) | • Presence of 5 over-wintering Midland Painted Turtles is significant.<br>• One or more Northern Map Turtle or Snapping Turtle over-wintering within a wetland is significant.<br>• The mapped ELC ecosite area with the over wintering turtles is the SWH. If the hibernation site is within a stream or river, the deep-water pool where the turtles are over wintering is the SWH.<br>• Over wintering areas may be identified by searching for congregations (Basking Areas) of turtles on warm, sunny days during the fall (Sept. – Oct.) or spring (Mar. – May)[cvii]<br>• Congregation of turtles is more common where wintering areas are limited and therefore significant[cix, cx, cxi, cxii].<br>• SWHMiST[cxlix] Index #28 provides development effects and mitigation measures for turtle wintering habitat. | Turtle overwintering habitat may be provided by the pond located beyond limits of Study Area. However, no suitable overwintering habitat occurs on the subject lands.<br><br>**Not SWH.** |

**Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.**

| | Wildlife Species[1] | Candidate SWH | | Confirmed SWH | Study Area |
|---|---|---|---|---|---|
| | | ELC Ecosite Codes[1] | Habitat Criteria and Information Sources[1] | Defining Criteria[1] | Assessment Details |
| **Wildlife Habitat: Snake Hibernaculum** | | | | | |
| Rationale:<br>Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant | Snakes:<br>Eastern Gartersnake<br>Northern Watersnake<br>Northern Red-bellied Snake<br>Northern Brownsnake<br>Smooth Green Snake<br>Northern Ring-necked Snake<br><br>Special Concern:<br>Milksnake<br>Eastern Ribbonsnake<br><br>Lizard:<br>Special Concern (Southern Shield population):<br>Five-lined Skink | For all snakes, habitat may be found in any ecosite other than very wet ones. Talus, Rock Barren, Crevice and Cave, and Alvar sites may be directly related to these habitats.<br><br>Observations of congregations of snakes on sunny warm days in the spring or fall is a good indicator.<br><br>For Five-lined Skink, ELC Community Series of FOD and FOM and Ecosites:<br>FOC1<br>FOC3 | • For snakes, hibernation takes place in sites located below frost lines in burrows, rock crevices and other natural locations. The existence of features that go below the frost line; such as rock piles or slopes, old stone fences, and abandoned crumbling foundations assist in identifying candidate SWH.<br>• Areas of broken and fissured rock are particularly valuable since they provide access to subterranean sites below the frost line[xliv, l, li, lii, cxii.]<br>• Wetlands can also be important over-wintering habitat in conifer or shrub swamps and swales, poor fens, or depressions in bedrock terrain with sparse trees or shrubs with sphagnum moss or sedge hummock ground cover.<br>• Five-lined skink prefer mixed forests with rock outcrop openings providing cover rock overlaying granite bedrock with fissures cciii.<br><br>Information Sources<br>• In spring, local residents or landowners may have observed the emergence of snakes on their property (e.g. old dug wells).<br>• Reports and other information from CAs.<br>• Local Field naturalists and experts, as well as university herpetologists may also know where to find some of these sites. clubs<br>• Natural Heritage Information Center (NHIC)<br>• OMNRF ecologist or biologist may be aware of locations of wintering skinks | Studies confirming:<br>• Presence of snake hibernacula used by a minimum of five individuals of a snake sp. or; individuals of two or more snake spp.<br>• Congregations of a minimum of five individuals of a snake sp. or; individuals of two or more snake spp. near potential hibernacula (eg. foundation or rocky slope) on sunny warm days in Spring (Apr/May) and Fall (Sept/Oct).<br>• Note: If there are Special Concern Species present, then site is SWH<br>• Note: Sites for hibernation possess specific habitat parameters (e.g. temperature, humidity, etc.) and consequently are used annually, often by many of the same individuals of a local population [i.e. strong hibernation site fidelity]. Other critical life processes (e.g. mating) often take place in close proximity to hibernacula. The feature in which the hibernacula is located plus a 30m buffer is the SWH[i]<br>• SWHMiST[cxlix] Index #13 provides development effects and mitigation measures for snake hibernacula.<br>• Presence of any active hibernaculum for skink is significant.<br>• SWHMiST[cxlix] Index #37 provides development effects and mitigation measures for five-lined skink wintering habitat. | Potential hibernaculum features, such as south-facing slopes, rock piles, and fissured bedrock are absent on the subject lands. However, remnants of the concrete slab footprint of the former barn may provide hibernaculum access.<br><br>**Candidate SWH.** |

**Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.**

| | Wildlife Species[1] | Candidate SWH | | Confirmed SWH | Study Area |
|---|---|---|---|---|---|
| | | ELC Ecosite Codes[1] | Habitat Criteria and Information Sources[1] | Defining Criteria[1] | Assessment Details |
| **Wildlife Habitat: Colonially - Nesting Bird Breeding Habitat (Bank and Cliff)** | | | | | |
| Rationale:<br>Historical use and number of nests in a colony make this habitat significant. An identified colony can be very important to local populations. All swallow populations are declining in Ontario. | Cliff Swallow<br>Northern Rough-winged Swallow (this species is not colonial but can be found in Cliff Swallow colonies) | Eroding banks, sandy hills, borrow pits, steep slopes, and sand piles<br>Cliff faces, bridge abutments, silos, barns<br><br>Habitat found in the following ecosites:<br>CUM1 CUT1<br>CUS1 BLO1<br>BLS1 BLT1<br>CLO1 CLS1<br>CLT1 | • Any site or areas with exposed soil banks, undisturbed or naturally eroding that is not a licensed/permitted aggregate area.<br>• Does not include man-made structures (bridges or buildings) or recently (2 years) disturbed soil areas, such as berms, embankments, soil or aggregate stockpiles.<br>• Does not include a licensed/permitted Mineral Aggregate Operation.<br><br>Information Sources<br>• Reports and other information available from CAs<br>• Ontario Breeding Bird Atlas [ccv]<br>• Bird Studies Canada; *NatureCounts* http://www.birdscanada.org/birdmon/<br>• Field Naturalist clubs | Studies confirming:<br>• Presence of 1 or more nesting sites with 8[cxlvix] or more cliff swallow pairs and/or rough-winged swallow pairs during the breeding season.<br>• A colony identified as SWH will include a 50m radius habitat area from the peripheral nests[ccvii]<br>• Field surveys to observe and count swallow nests are to be completed during the breeding season Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”[ccxi]<br>• SWHMiST[cxlix] Index #4 provides development effects and mitigation measures | Cliff Swallow and Northern Rough-winged Swallow have both been idenitified in the vicinity of the subject lands. Suitable habitat not idenitified within the subject lands, but they could be located within the vicinity.<br><br>**Not SWH.** |

**Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.**

| | Wildlife Species[1] | Candidate SWH | | Confirmed SWH | Study Area |
|---|---|---|---|---|---|
| | | ELC Ecosite Codes[1] | Habitat Criteria and Information Sources[1] | Defining Criteria[1] | Assessment Details |
| **Wildlife Habitat: Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs)** | | | | | |
| Rationale:<br>Large Colonies are important to local bird population, typically sites are only known colony in area and are used annually. | Great Blue Heron<br>Black-crowned Night-heron<br>Great Egret<br>Green Heron | SWM2 SWM3<br>SWM5 SWM6<br>SWD1 SWD2<br>SWD3 SWD4<br>SWD5 SWD6<br>SWD7 FET1 | • Nests in live or dead standing trees in wetlands, lakes, islands, and peninsulas. Shrubs and occasionally emergent vegetation may also be used.<br>• Most nests in trees are 11 to 15m from ground, near the top of the tree.<br><br>Information Sources<br>• Ontario Breeding Bird Atlas[ccv], colonial nest records.<br>• Ontario Heronry Inventory 1991 available from Bird Studies Canada or NHIC (OMNR).<br>• NHIC Mixed Wader Nesting Colony<br>• Aerial photographs can help identify large heronries<br>• Reports and other information available from CAs<br>• MNRF District Offices<br>• Local naturalist clubs | Studies confirming:<br>• Presence of 5[l] or more active nests of Great Blue Heron or other listed species.<br>• The habitat extends from the edge of the colony and a minimum 300m radius or extent of the Forest Ecosite containing the colony or any island <15.0ha with a colony is the SWH [cc, ccvii]<br>• Confirmation of active heronries are to be achieved through site visits conducted during the nesting season (April to August) or by evidence such as the presence of fresh guano, dead young and/or eggshells<br>• SWHMiST[cxlix] Index #5 provides development effects and mitigation measures. | Suitable habitat is not present on the subject property.<br><br>**Not SWH.** |

**Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.**

| | Wildlife Species[1] | Candidate SWH | | Confirmed SWH | Study Area |
|---|---|---|---|---|---|
| | | ELC Ecosite Codes[1] | Habitat Criteria and Information Sources[1] | Defining Criteria[1] | Assessment Details |
| **Wildlife Habitat: Colonially - Nesting Bird Breeding Habitat (Ground)** | | | | | |
| Rationale:<br>Colonies are important to local bird populations, typically sites are only known colony in area and are used annually. | Herring Gull<br>Great Black-backed Gull<br>Little Gull<br>Ring-billed Gull<br>Common Tern<br>Caspian Tern<br>Brewer's Blackbird | Any rocky island or peninsula (natural or artificial) within a lake or large river (two-lined on a 1:50,000 NTS map).<br><br>Close proximity to watercourses in open fields or pastures with scattered trees or shrubs (Brewer's Blackbird)<br><br>MAM1 – 6<br>MAS1 – 3<br>CUM<br>CUT<br>CUS | • Nesting colonies of gulls and terns are on islands or peninsulas associated with open water or in marshy areas.<br>• Brewers Blackbird colonies are found loosely on the ground in or in low bushes in close proximity to streams and irrigation ditches within farmlands.<br><br>Information Sources<br>• Ontario Breeding Bird Atlas[ccv], rare/colonial species records.<br>• Canadian Wildlife Service<br>• Reports and other information available from CAs<br>• Natural Heritage Information Center (NHIC) Colonial Waterbird Nesting Area<br>• MNRF District Offices<br>• Field naturalist clubs | Studies confirming:<br>• Presence of >25 active nests for Herring Gulls or Ring-billed Gulls, >5 active nests for Common Tern or >2 active nests for Caspian Tern[i].<br>• Presence of 5 or more pairs for Brewer's Blackbird.<br>• Any active nesting colony of one or more Little Gull, and Great Black-backed Gull is significant.<br>• The edge of the colony and a minimum 150m area of habitat, or the extent of the ELC ecosites containing the colony or any island <3.0ha with a colony is the SWH[cc, ccvii]<br>• Studies would be done during May/June when actively nesting. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi]<br>• SWHMiST[cxlix] Index #6 provides development effects and mitigation measures. | Islands or peninsula not present within subject property.<br><br>**Not SWH.** |

**Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.**

| | Wildlife Species[1] | Candidate SWH | | Confirmed SWH | Study Area |
|---|---|---|---|---|---|
| | | ELC Ecosite Codes[1] | Habitat Criteria and Information Sources[1] | Defining Criteria[1] | Assessment Details |
| **Wildlife Habitat: Migratory Butterfly Stopover Areas** | | | | | |
| Rationale:<br>Butterfly stopovers areas are extremely rare habitats and are biologically important for butterfly species that migrate south for the winter. | Painted Lady<br>Red Admiral<br><br>Special Concern:<br>Monarch | Combination of ELC Community Series:<br>Need to have present one Community Series from each landclass:<br><br>Field:<br>CUM CUS<br>CUT<br><br>Forest:<br>FOC FOM<br>FOD CUP<br><br>Anecdotally, a candidate sight for butterfly stopover will have a history of butterflies being observed. | A butterfly stopover area will be a minimum of 10 ha in size with a combination of field and forest habitat present, and will be located within 5 km of Lake Ontario[cxlix].<br>• The habitat is typically a combination of field and forest, and provides the butterflies with a location to rest prior to their long migration south[xxxii, xxxiii, xxxiv, xxxv, xxxvi].<br>• The habitat should not be disturbed, fields/meadows with an abundance of preferred nectar plants and woodland edge providing shelter are requirements for this habitat cxlviii, cxlix.<br>• Staging areas usually provide protection from the elements and are often spits of land or areas with the shortest distance to cross the Great Lakes[xxxvii, xxxviii, xxxix, xl, xli].<br><br>Information Sources<br>• OMNRF (NHIC)<br>• Agriculture Canada in Ottawa may have list of butterfly experts.<br>• Field Naturalist Clubs<br>• Toronto Entomologists Association<br>• Conservation Authorities | Studies confirm:<br>• The presence of Monarch Use Days (MUD) during fall migration (Aug/Oct)[xliii]. MUD is based on the number of days a site is used by Monarchs, multiplied by the number of individuals using the site. Numbers of butterflies can range from 100-500/day[xxxvii], significant variation can occur between years and multiple years of sampling should occur [xl, xlii].<br>• Observational studies are to be completed and need to be done frequently during the migration period to estimate MUD<br>• MUD of >5000 or >3000 with the presence of Painted Ladies or Red Admiral's is to be considered significant.<br>• SWHMiST[cxlix] Index #16 provides development effects and mitigation measures. | Subject property not within 5 km of Lake Ontario.<br><br>**Not SWH.** |

**Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.**

| | Wildlife Species[1] | Candidate SWH | | Confirmed SWH | Study Area |
|---|---|---|---|---|---|
| | | ELC Ecosite Codes[1] | Habitat Criteria and Information Sources[1] | Defining Criteria[1] | Assessment Details |
| **Wildlife Habitat: Landbird Migratory Stopover Areas** | | | | | |
| Rationale:<br>Sites with a high diversity of species as well as high number are most significant | All migratory songbirds.<br><br>Canadian Wildlife Service Ontario website:<br>http://www.on.ec.gc.ca/wildlife_e.html<br><br>All migrant raptors species:<br><br>Ontario Ministry of Natural Resources:<br>Fish and Wildlife Conservation Act, 1997. Schedule 7: Specially Protected Birds (Raptors) | All Ecosites associated with these ELC Community Series:<br>FOC<br>FOM<br>FOD<br>SWC<br>SWM<br>SWD | Woodlots need to be >10 ha[i] in size and within 5km [iv, v, vi, vii, viii, ix, x, xi, xii, xiii, xiv, xv] of Lake Ontario.<br>• If multiple woodlands are located along the shoreline, those woodlands <2km from Lake Ontario are more significant[cxlix]<br>• Sites have a variety of habitats; forest, grassland and wetland complexes[cxlix].<br>• The largest sites are more significant[cxlix]<br>• Woodlots and forest fragments are important habitats to migrating birds[ccxviii], these features located along the shore and located within 5km of Lake Ontario are Candidate SWH[cxlviii].<br><br>Information Sources<br>• Bird Studies Canada<br>• Ontario Nature<br>• Local birders and naturalist club<br>• Ontario Important Bird Areas (IBA) Program | Studies confirm:<br>• Use of the woodlot by >200 birds/day and with >35 spp. with at least 10 bird spp. recorded on at least 5 different survey dates. This abundance and diversity of migrant bird species is considered above average and significant.<br>• Studies should be completed during spring (Apr/May) and fall (Aug/Oct) migration using standardized assessment techniques. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi]<br>• SWHMiST[cxlix] Index #9 provides development effects and mitigation measures. | Subject property not within 5 km of Lake Ontario.<br><br>**Not SWH.** |

**Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.**

| | Wildlife Species[1] | Candidate SWH | | Confirmed SWH | Study Area |
|---|---|---|---|---|---|
| | | ELC Ecosite Codes[1] | Habitat Criteria and Information Sources[1] | Defining Criteria[1] | Assessment Details |
| **Wildlife Habitat: Deer Yarding Areas** | | | | | |
| Rationale:<br>Winter habitat for deer is considered to be the main factor for northern deer populations. In winter, deer congregate in "yards" to survive severe winter conditions. Deer yards typically have a long history of annual use by deer, yards typically represent 10-15% of an areas summer range. | White-tailed Deer | Note: OMNRF to determine this habitat.<br><br>ELC Community Series providing a thermal cover component for a deer yard would include:<br>FOM, FOC, SWM and SWC.<br><br>Or these ELC Ecosites:<br>CUP2 CUP3<br>FOD3 CUT | • Deer yarding areas or winter concentration areas (yards) are areas deer move to in response to the onset of winter snow and cold. This is a behavioural response and deer will establish traditional use areas. The yard is composed of two areas referred to as Stratum I and Stratum II. Stratum II covers the entire winter yard area and is usually a mixed or deciduous forest with plenty of browse available for food. Agricultural lands can also be included in this area. Deer move to these areas in early winter and generally, when snow depths reach 20cm, most of the deer will have moved here. If the snow is light and fluffy, deer may continue to use this area until 30cm snow depth. In mild winters, deer may remain in the Stratum II area the entire winter.<br>• The Core of a deer yard (Stratum I) is located within the Stratum II area and is critical for deer survival in areas where winters become severe. It is primarily composed of coniferous trees (pine, hemlock, cedar, spruce) with a canopy cover of more than 60%[cxciv].<br>• OMNRF determines deer yards following methods outlined in “Selected Wildlife and Habitat Features: Inventory Manual"[cxcv]<br>• Woodlots with high densities of deer due to artificial feeding are not significant. | No Studies Required:<br>• Snow depth and temperature are the greatest influence on deer use of winter yards. Snow depths > 40cm for more than 60 days in a typically winter are minimum criteria for a deer yard to be considered as SWH[lvi, lvii, lviii, lix, lx, í].<br>• Deer Yards are mapped by OMNRF District offices. Locations of Core or Stratum 1 and Stratum 2 Deer yards considered significant by OMNRF will be available at local MNRF offices or via Land Information Ontario (LIO).<br>• Field investigations that record deer tracks in winter are done to confirm use (best done from an aircraft). Preferably, this is done over a series of winters to establish the boundary of the Stratum I and Stratum II yard in an "average" winter. MNRF will complete these field investigations[cxcv].<br>• If a SWH is determined for Deer Wintering Area or if a proposed development is within Stratum II yarding area then Movement Corridors are to be considered as outlined in Table 1.4.1 of this Schedule.<br>• SWHMiST[cxlix] Index #2 provides development effects and mitigation measures. | White-tailed Deer have been documented within the vicinity of the subject lands. Deer yarding habitat not identified within or adjacent to the subject lands by the MNRF.<br><br>**Not SWH.** |

**Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.**

| | Wildlife Species[1] | Candidate SWH | | Confirmed SWH | Study Area |
|---|---|---|---|---|---|
| | | ELC Ecosite Codes[1] | Habitat Criteria and Information Sources[1] | Defining Criteria[1] | Assessment Details |
| **Wildlife Habitat: Deer Winter Congregation Areas** | | | | | |
| Rationale:<br>Deer movement during winter in the southern areas of Ecoregion 6E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands to reduce or avoid the impacts of winter conditions[exlviii] | White-tailed Deer | All Forested Ecosites with these ELC Community Series:<br>FOC<br>FOM<br>FOD<br>SWC<br>SWM<br>SWD<br><br>Conifer plantations much smaller than 50ha may also be used. | • Woodlots will typically be >100 ha in size. Woodlots <100ha may be considered as significant based on MNRF studies or assessment.<br>• Deer movement during winter in the southern areas of Eco-region 6E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands[cxlviii].<br>• If deer are constrained by snow depth refer to the Deer Yarding Area habitat within Table 1.1 of this Schedule.<br>• Large woodlots > 100ha and up to 1500 ha are known to be used annually by densities of deer that range from 0.1-1.5 deer/ha[ccxxiv].<br>• Woodlots with high densities of deer due to artificial feeding are not significant.<br><br>Information Sources<br>• MNRF District Offices<br>• LIO/NRVIS | Studies confirm:<br>• Deer management is an MNRF responsibility, deer winter congregation areas considered significant will be mapped by MNRF[cxlviii].<br>• Use of the woodlot by white-tailed deer will be determined by MNRF, all woodlots exceeding the area criteria are significant, unless determined not to be significant by MNR[i].<br>• Studies should be completed during winter (Jan/Feb) when >20cm of snow is on the ground using aerial survey techniques[ccxxiv] , ground or road surveys, or a pellet count deer density survey[ccxxv].<br>• If a SWH is determined for Deer Wintering Area of if a proposed development is within Stratum II yarding area then Movement Corridors are to be considered as outlined in Table 1.4.1 of this Schedule.<br>• SWHMiST[cxlix] Index #2 provides development effects and mitigation measures. | White-tailed Deer have been documented within the vicinity of the subject lands. Deer overwintering habitat not identified within or adjacent to the subject lands by the MNRF.<br><br>**Not SWH.** |

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

# Memo

Project #2561

**To:** Carla Illman, MTE
**From:** Ryan Archer
**Date:** July 11, 2022
**Re:** Baden Trunk Sanitary Sewer Environmental Assessment
Evaluation of Alternatives – Natural Environment Criteria

## 1.0 NATURAL ENVIRONMENT

This component of the assessment of alternatives is based on the potential for direct or indirect impacts on the natural environment features including terrestrial, wetland and aquatic ecosystems. Details of the existing natural features and their functions, including assessments of their ecological significance and sensitivity, are provided in the draft Natural Environment Assessment (NEA) report (NRSI 2022).

### 1.A Terrestrial Ecosystems

The Terrestrial Ecosystems factor includes the sub-factors "Vegetation Communities and Flora" and "Wildlife Habitat", each of which were assessed and scored separately to inform the alternatives evaluation. This factor group includes assessment of potential direct or indirect impacts to terrestrial habitat features and functions, including the woodland and cultural meadow vegetation communities that were mapped within the study area. The ecological sensitivities of these natural features vary as described further in the NEA (NRSI 2022), and this has been accounted for in the evaluation scores. Significant features that were considered in this factor group include Locally Significant Woodlands, which represents a form of Supporting Environmental Feature as defined by the Township of Wilmot (Township of Wilmot 2019), as well as non-significant woodlands. Indirect impacts to these features were also considered where alternative designs are proposed on adjacent lands.

Significant and sensitive vegetation species are also considered in the assessment, including habitat for Species at Risk (SAR) (defined herein as species designated as Endangered or Threatened in Ontario (MECP 2022)). As described in the NEA, the SAR Butternut (*Juglans cinerea*) was confirmed within the study area. The regionally significant species Running Serviceberry (*Amelanchier spicata*) was also identified within cultural meadow at the north end of the study area (NRSI 2022). None of the five options will directly impact the Butternuts or require removal of their 25m radius habitat zones.

This factor group also assesses direct impacts to wildlife habitats, including habitat for SAR, and Significant Wildlife Habitat (SWH) as defined by provincial criteria (OMNR 2000, MNRF 2015). As described in the NEA, habitat for bat SAR may occur within the study area woodlands. The study area woodlands were also identified as Candidate SWH for Bat Maternity Colonies, while the mill pond was identified as Candidate SWH for Turtle Wintering Areas. Direct impacts to these and other wildlife habitats may occur where physical removal of the habitat is required.

Indirect impacts may occur where disturbances to wildlife arise through construction or operation of the infrastructure such that the habitat function is effectively eliminated, degraded or otherwise reduced in ecological value.

Where route alignment options fall within existing municipal road right-of-ways (ROW) it is anticipated that direct natural environment impacts will be limited to potential roadside construction disturbance areas. Common to all five options, a lateral connection of the infrastructure between Foundry Street and the Baden wastewater pumping station will be required. This small lateral section comprises open manicured lawn and does not provide important wildlife habitat; it is therefore not considered in the assessment below.

*1) Vegetation Communities and Flora*

Option A1 (Score 4)

Portions of this alignment occur entirely within the ROW of Snyder's Road and Foundry Street, limiting its impact on natural features along these sections other than to potential roadside construction disturbances. However, a portion of the alignment northeast of the Snyder's Road/Foundry Street/Livingston Boulevard intersection will occur off-road where it will align with the route of an existing pedestrian trail. Construction of this segment of the infrastructure may directly impact Mineral Cultural Woodland (CUW1) and Mineral Cultural Meadow (CUM1) (NRSI 2022). Indirect construction-related impacts to adjacent natural features in this northeast portion of the study area, including to areas of Mineral Cultural Thicket (CUT1) and adjacent areas of CUM1, may also occur unless appropriately mitigated (e.g., through construction and/or silt fencing to demarcate construction limits, mitigate erosion and sedimentation impacts).

Impacts to terrestrial natural features along the Foundry Street segment will be negligible and mainly confined to the ROW.

Option A2 (Score 10)

This alignment occurs entirely within the Snyder's Road and Foundry Street ROWs. Impacts to terrestrial natural features along the route of Option 2 will be negligible and mainly confined to the ROW.

Option A3 (Score 8)

This alignment occurs entirely within the ROWs of Christian Street, Charlotta Street, Mill Street, Charles Street and Foundry Street. Impacts to terrestrial natural features along the route of Option 3 will be negligible and mainly confined to the ROW. However, if roadside disturbances occur due to construction there is potential for damage or destruction of individuals of the regionally significant Running Serviceberry that was documented within the CUM1 meadow south of Charlotta Street, unless appropriately mitigated. For this reason, it is scored somewhat lower than Option A2 above.

Option A4 (Score 1)

Among the assessed options, Option A4 requires one of the largest extents of construction work within natural/naturalizing land cover. This option will require temporary construction disturbance within areas of CUM1 meadow, although this vegetation community type is already reflective of ecologically disturbed conditions and is therefore resilient to disturbance effects.

Option A4 will follow the south boundary of the Fresh-Moist Willow Lowland Deciduous Forest (FOD7-3) located at the southwest study area bend of Baden Creek. This woodland was identified as a Locally Significant Woodland in the NEA (NRSI 2022). Construction of the infrastructure in this area may potentially require edge tree removal, or disturbance to tree root zones, if not appropriately mitigated. It is recommended that the sewer alignment be located such that construction disturbances are located outside of the woodland dripline, and offset from the dripline to the extent feasible.

Option A4 will also include a segment that runs in proximity to the FOD7-3 Locally Significant Woodland that is located along Baden Creek south of Queen Street and St. George Street. However, direct impacts to this woodland are not anticipated. Indirect impacts to the adjacent woodland as caused through construction activities may occur if not appropriately mitigated (e.g., demarcation of construction limits). This option will not negatively impact the Butternut trees and is situated outside of their 25m-radius habitat zones (see NEA Map 3 (NRSI 2022)).

This option will require a small number of tree removals where the alignment passes through agricultural hedgerows and isolated tree growth. It may directly impact individuals of the regionally significant Running Serviceberry that were documented within the CUM1 meadow south of Charlotta Street.

Option A5 (Score 5)

This option has a similar alignment to Option A4 except for its northern extent, where it will extend approximately southeast from Christian Street before traversing the south side of Baden Creek. This option will traverse less CUM1 meadow and more agricultural land than Option A4.

Option A5 will follow the south boundary of the FOD7-3 woodland located at the southwest study area bend of Baden Creek. This woodland was identified as a Locally Significant Woodland in the NEA (NRSI 2022). Construction of the infrastructure in this area may potentially require edge tree removal, or disturbance to tree root zones, if not appropriately mitigated. It is recommended that the sewer alignment be located such that construction disturbances are located outside of the woodland dripline, and offset from the dripline to the extent feasible.

*2) Wildlife Habitat*

Certain wildlife habitat impacts are general in nature and apply to all five of the alternative alignment options within the study area. Impacts that are specific to individual options are presented below.

Construction of the sewer alignments may cause general disturbance to wildlife occupying the immediate area of the construction zone. However, these wildlife species are generally urban-adapted and tolerant of some degree of disturbance. Certain wildlife species may temporarily avoid the area but will return post-construction.

Vegetation removal can cause injury or mortality to birds, and damage or destruction of their nests, if not appropriately mitigated. Vegetation removals should be time to occur outside of the period April 1-August 31 in order to avoid contravention of the federal *Migratory Birds Convention Act*. Where “simple” bird habitats require removal (e.g., isolated trees or hedgerows), removal within the bird nesting period may be possible subject to prior inspection of the vegetation for the presence of active nests by a qualified biologist.

Option A1 (Score 1)

This alignment will require removal of, or disturbance to, wetland features located northeast of the Snyder's Road/Foundry Street/Livingston Boulevard intersection. These wetlands were not investigated for wildlife habitat use as part of the NEA. However, they likely provide habitat for breeding amphibians as well as other wildlife. The wetland wildlife habitats need to be considered potentially significant unless demonstrated otherwise. This alignment will therefore directly and/or indirectly impact these wildlife habitat functions.

It is NRSI's understanding that construction of the sewer within the Foundry Street ROW will require some in-water work, including isolated dewatering of Baden Creek with flow bypass. In-water construction may extend into the eastern edge of the mill pond, which is considered Candidate SWH for Turtle Wintering Areas. In-water work within this area may therefore directly impact this habitat function unless appropriately mitigated (e.g., minimizing disturbance area, maintaining work outside of turtle overwintering period where suitable habitat may be impacted). Provided appropriate measures are followed, and given the small size of the potential disturbance zone, negative impacts to turtle overwintering habitat are considered unlikely.

A small amount of tree removal may be required to accommodate the sewer installation, primarily to the northeast of the Snyder's Road/Foundry Street/Livingston Boulevard intersection where Mineral Cultural Woodland (CUW1) occurs. Trees requiring removal may represent roosting habitat for SAR bats. These trees should be inspected for the presence of suitable bat habitat prior to removal. If suitable bat habitat is present, MECP consultation may be required to ensure that steps are taken to avoid or mitigate impacts to bat SAR or their habitat. At a minimum, potential bat habitat trees should be removed outside of the bat active period (April 1-September 30).

Option A2 (Score 6)

This alignment occurs entirely within the Snyder's Road and Foundry Street ROWs. Impacts to wildlife habitats along the majority of the Option A2 route will be negligible. Under this option no woodland habitats will be impacted.

Consistent with Options A1 and A3, this option may require isolation and dewatering of an eastern edge of the mill pond that represents Candidate SWH for Turtle Wintering Areas. However, provided appropriate measures are followed, and given the small size of the potential disturbance zone, negative impacts to turtle overwintering habitat are considered unlikely.

Option A3 (Score 5)

This alignment occurs entirely within the ROWs of Christian Street, Charlotta Street, Mill Street, Charles Street and Foundry Street. Impacts to wildlife habitats along the majority of the Option A3 route will be negligible. Under this option no woodland habitats will be impacted.

Consistent with Options A1 and A2, this option may require isolation and dewatering of an eastern edge of the mill pond that represents Candidate SWH for Turtle Wintering Areas. However, provided appropriate measures are followed, and given the small size of the potential disturbance zone, negative impacts to turtle overwintering habitat are considered unlikely.

Option A4 (Score 4)

Among the assessed options, Option A4 requires one of the largest extents of construction work within natural/naturalizing land cover. This alignment will require the removal of habitat for

wildlife occupying the small, isolated wetland features located south of the railroad tracks and adjacent to Queen Street, identified as Mineral Meadow Marsh (MAM2) and Reed Canary Grass Mineral Meadow Marsh (MAM2-2) in the NEA (NRSI 2022). These wetland features may be used for amphibian breeding and as habitat for other disturbance-tolerant wetland species (e.g., Red-winged Blackbird (*Agelaius phoeniceus*)). If feasible, the alignment of the sewer should be designed to avoid these habitat features.

Option A4 will follow the south boundary of the Fresh-Moist Willow Lowland Deciduous Forest (FOD7-3) located at the southwest study area bend of Baden Creek. It will also come into proximity of the FOD7-3 Locally Significant Woodland that is located along Baden Creek south of Queen Street and St. George Street. Both of these features are identified as potential bat SAR habitat as well as Candidate SWH for Bat Maternity Colonies. The sewer alignment should be designed to avoid direct impacts to these woodland habitats, and should be offset to the extent feasible from the woodland edge to minimize potential for root zone impacts.

This option will require a small number of tree removals where the alignment passes through agricultural hedgerows and isolated tree growth. Trees requiring removal may represent roosting habitat for SAR bats. These trees, as well as any trees that may be impacted within the FOD7-3 woodlands, should be inspected for the presence of suitable bat habitat prior to removal. If suitable bat habitat is present, MECP consultation may be required to ensure that steps are taken to avoid or mitigate impacts to bat SAR or their habitat. At a minimum, potential bat habitat trees should be removed outside of the bat active period (April 1-September 30).

Direct removal of habitat for wildlife occupying CUM1 meadow will be required (e.g., small mammals, snakes, open habitat birds). However, this habitat removal will be temporary, as CUM1 meadow habitats are resilient to disturbance and will readily renaturalize. The majority of species occupying this habitat type are generally disturbance tolerant and mobile, and will not be negatively impacted.

Option A5 (Score 10)

This option has a similar alignment to Option A4 except for its northern extent, where it will extend approximately southeast from Christian Street before traversing the south side of Baden Creek. This option will traverse less Mineral Cultural Meadow (CUM1) wildlife habitat and more agricultural land than Option A4.

Option A5 will not require removal or cause indirect disturbance to wetland habitats.

This option may impact a portion of a Mineral Cultural Woodland (CUW1) located south of Christian Street and the railroad tracks. Trees requiring removal may represent roosting habitat for SAR bats. These trees should be inspected for the presence of suitable bat habitat prior to removal. If suitable bat habitat is present, MECP consultation may be required to ensure that steps are taken to avoid or mitigate impacts to bat SAR or their habitat. At a minimum, potential bat habitat trees should be removed outside of the bat active period (April 1-September 30).

### 1.B Wetland Ecosystem

Direct impacts assessed for this factor include loss of wetland habitat features and functions. Wetland cover within the study area is limited to small, isolated features that are anthropogenic in nature and/or have been highly altered by past land uses. Wetlands that are not provincially significant are generally considered “locally significant” in the Township. Locally Significant Wetlands are considered a form of Supporting Environmental Feature (Township of Wilmot

2019). Indirect impacts to these features were also considered where alternative designs are proposed on adjacent lands, including within ecological buffers to the features where these have been recommended (NRSI 2022).

This factor also includes the subfactor of "watercourses", which, for the purposes of this assessment, is integrated into the scoring under the "wetlands" factor. For the purposes of this subfactor, impacts to watercourses are addressed without consideration for aquatic ecosystems, which are addressed in a separate subfactor (see below). In the context of this subfactor, impacts are considered in the scoring relative to the number of watercourse crossings and potential for abiotic effects (e.g., changes in drainage or groundwater flow). See below (Aquatic Ecosystems) for a more fulsome description of watercourses present within the study area.

Option A1 (Score 1)

Portions of this alignment occur entirely within the ROW of Snyder's Road and Foundry Street, limiting its impact on natural features along these sections other than to potential roadside construction disturbances. However, a portion of the alignment northeast of the Snyder's Road/Foundry Street/Livingston Boulevard intersection will occur off-road where it will align with the route of an existing pedestrian trail. Construction of this segment of the infrastructure may directly impact wetland features. The wetland in this area (mapped as Meadow Marsh (MAM) (NRSI 2022)) is considered to represent Locally Significant Wetland. Indirect construction-related impacts to adjacent natural features in this northeast portion of the study area, including to areas of meadow marsh, may also occur unless appropriately mitigated (e.g., through construction and/or silt fencing to demarcate construction limits, mitigate erosion and sedimentation impacts). Construction of the infrastructure may also disrupt the drainage regime in this area, which may alter the hydrological conditions that currently support the wetland in this location.

Option A2 (Score 8)

This alignment occurs entirely within the Snyder's Road and Foundry Street ROWs. No impacts to wetlands will occur as a result of this option.

However, this alignment will require two permanent watercourse crossings: a crossing of Baden Creek within the Foundry Street ROW, and a crossing of the Huehn Award Drain within the Foundry Street ROW. These crossings will require a temporary construction-stage re-routing of flows via a bypass culvert for each watercourse. Relative to Option A5, which only requires one crossing of a permanent watercourse (see below), this alternative therefore imposes slightly more impact potential.

Option A3 (Score 9)

This alignment occurs entirely within the ROWs of Christian Street, Charlotta Street, Mill Street, Charles Street and Foundry Street. No wetland removals will be required to accommodate this alignment. Although this route occurs in proximity to a small Mineral Meadow Marsh (MAM2) wetland located south of the railroad tracks, nearby excavation for the sewer installation is not anticipated to indirectly affect this wetland's form or function since it likely results from a small surface runoff catchment.

This alignment will require two permanent watercourse crossings: a crossing of Baden Creek within the Foundry Street ROW, and a crossing of the Huehn Award Drain within the Foundry Street ROW. These crossings will require a temporary construction-stage re-routing of flows via

a bypass culvert for each watercourse. Relative to Option A5, which only requires one crossing of a permanent watercourse (see below), this alternative therefore imposes slightly more impact potential.

Option A4 (Score 4)

This option will require the removal of the small, isolated wetland features located south of the railroad tracks and adjacent to Queen Street, identified as Mineral Meadow Marsh (MAM2) and Reed Canary Grass Mineral Meadow Marsh (MAM2-2) in the NEA (NRSI 2022). If feasible, the alignment of the sewer should be designed to avoid these wetland features.

Construction that is located immediately adjacent to the wetlands may results in an alteration of the surface drainage catchments that likely sustain them, at least during the construction period. This may result in increased or decreased flows to the wetlands. Construction adjacent to the wetlands may also lead to water quality impairment, such as sedimentation and vegetation damage. This can be mitigated through measures such as construction limit demarcation and erosion and sediment control measures.

Option A5 (Score 10)

This option has a similar alignment to Option A4 except for its northern extent, where it will extend approximately southeast from Christian Street before traversing the south side of Baden Creek.

Option A5 will not require removal or cause indirect disturbance to wetland features. As described further below, it will require a crossing of Baden Creek just north of Gingerich Road, as well as a crossing of Tributary A. However, the crossing of a single permanent watercourse (Baden Creek) presents less potential for impact relative to other alternatives. The crossing of the upstream ephemeral reach of Tributary A can occur with no impacts if done during dry conditions. These considerations, in addition to the lack of wetland impacts, presents the least potential for impact within this factor.

### 1.C Aquatic Ecosystem

As described in the NEA (NRSI 2022), the study area includes the permanent watercourses Baden Creek, Huehn Award Drain and Baden Creek Tributary B. One watercourse, Baden Creek Tributary A, was characterized as an ephemeral/intermittent stream. The Huehn Award Drain is a coldwater watercourse. Baden Creek is a warmwater watercourse, but is at the cooler end of the thermal range due to localized groundwater inputs. Tributary B also shows evidence of some groundwater inputs. The study area watercourses provide direct fish habitat with the exception of Baden Creek Tributary A. The large mill pond online with Baden Creek is an anthropogenic feature resulting from historic damming of the watercourse.

Direct impacts assessed for this factor include impacts associated with watercourse crossings of the sewer alignment, including the construction activities necessary to accommodate the sewer. This is anticipated to require in-water work in certain locations of permanent watercourse flow, such as at the crossings of Baden Creek and the Huehn Award Drain along Foundry Street. It is NRSI's understanding that temporary watercourse isolation and dewatering, with flow bypass, will be required at locations where flow is present at the Foundry Street ROW watercourse crossings. At Baden Creek, this in-water work zone may also extend into the far east end of the mill pond. As described further below, trenchless construction techniques will be utilized at the crossings of Baden Creek at Gingerich Road, and at Tributary A.

Watercourse crossings and construction adjacent to watercourses is common to all five of the alternative design options. Indirect impacts are possible where construction may occur in close proximity, such that water quality impairment may result if not appropriately mitigated. Construction-stage impacts will be temporary in nature. However, longer-term impacts can result if sewer leakages occur in proximity to aquatic features.

Construction activities required for sewer installation are not anticipated to influence the thermal regime of the adjacent watercourse, since it is not going to result in additional warmwater flows into the watercourse and will not result in impounding or additional sun exposure of the water.

All five of the route options will require crossing Baden Creek between the Foundry Street ROW and the Baden wastewater pumping station, south of Gingerich Road. As such, this watercourse crossing is not considered in the evaluation of alternatives since potential impacts associated with this crossing are common to all.

Option A1 (Score 1)

This alignment will require three permanent watercourse crossings: a crossing of Baden Creek Tributary B north of Snyder's Road, a crossing of Baden Creek within the Foundry Street ROW, and a crossing of the Huehn Award Drain within the Foundry Street ROW. This represents the greatest number of watercourse crossings relative to the other alternatives, which increases the risks of potential negative impacts to the aquatic features as a result of construction activities or post-construction leakage of the infrastructure.

All three of these watercourses provide direct fish habitat. Any activities that may cause the Harmful Alteration, Disruption or Destruction (HADD) of fish or fish habitat is subject to the requirements of the federal *Fisheries Act*. Details of the proposed sewer installation activities will be subject to review by the federal Department of Fisheries and Oceans (DFO) through submission of a Request for Review prior to construction. The DFO will provide a response with recommended Best Management Practices to suitably avoid or mitigate impacts to fish and fish habitat, or will determine that the proposed undertaking will require a Fisheries Act Authorization. Acquisition of an authorization under the *Fisheries Act* will require additional measures to provide an Overall Benefit to fish or fish habitat, such as through the restoration or enhancement of aquatic ecosystems.

All three of these watercourses receive shallow groundwater inputs, potentially including within the required construction zones. Trenching and installation of sewer infrastructure may intercept the shallow groundwater level and cause alterations to the flow path that may affect the locations and volumes of groundwater inputs into the watercourses. Measures may be required to ensure that groundwater inputs to the watercourses are not altered as a result of the undertaking.

Watercourse isolation and dewatering activities will require the completion of a fish capture and relocation prior to drawdown. A portion of this isolation and dewatering zone may need to extend into the east end of the mill pond at the Baden Creek crossing. Flow bypass will be required to maintain flow volumes into downstream reaches and receiving features. Water quality control measures will be required to ensure the appropriate removal of suspended sediments prior to discharge of bypass flows.

Construction activities immediately adjacent to watercourses increases the risk of water quality degradation through inputs of sediments and other deleterious substances. This risk can be effectively mitigated through design and implementation of an acceptable Erosion and Sediment

Control Plan. This plan would include, but not be limited to, installation of silt fencing keyed into the ground, regularly inspected and repaired when necessary; limiting exposure of bare soils within the construction site; and avoiding removal of vegetation and work within natural riparian zones to the extent possible.

Option A2 (Score 4)

This alignment will require two permanent watercourse crossings: a crossing of Baden Creek within the Foundry Street ROW, and a crossing of the Huehn Award Drain within the Foundry Street ROW. This is one less watercourse crossing than is required for Option A1.

Potential impacts associated with this option are otherwise the same as Option A1, described above. These generally include the following:

- Potential impacts to fish and fish habitat, requiring DFO review and possible authorization under the *Fisheries Act*;
- Potential for alteration of shallow groundwater flow inputs to the watercourses;
- Need for watercourse isolation and de-watering, with associated fish capture and relocation; need for water quality treatment of flow bypass discharge;
- General construction-stage impact potential to adjacent watercourse features

The potential for these effects are generally lessened in comparison to Option A1 due to a lower number of required watercourse crossings.

Option A3 (Score 3)

This alignment will require two permanent watercourse crossings: a crossing of Baden Creek within the Foundry Street ROW, and a crossing of the Huehn Award Drain within the Foundry Street ROW. This is one less watercourse crossing than is required for Option A1, and the same number as Option A2. Although both Options A2 and A3 require deep sewer installation under Foundry Street, Option A3 is deeper than Option A2. It is NRSI's understanding that this may present slightly more impact potential relative to Option A2.

Option A4 (Score 7)

This alignment will require a crossing of Baden Creek just north of Gingerich Road, as well as a crossing of Tributary A just upstream of its confluence with Baden Creek.

The reach of Tributary A to be crossed, along or just east of the existing tractor crossing path, was characterized as an area of intermittent flow (NRSI 2022). During higher flow periods this reach of the watercourse may accessible to fish from Baden Creek, and therefore may function as direct fish habitat. A crossing of this watercourse, in addition to the direct fish habitat provided by Baden Creek, will be subject to review by the DFO including potential requirement for a Fisheries Act Authorization as described for Option A1. If possible, work within the Tributary A drainage channel should be done during periods of no flow/no standing water to mitigate potential impact to fish and fish habitat.

Sewer installation at the crossings of Baden Creek at Gingerich Road and at Tributary A will use trenchless methodologies. Rather than an open trench cut for installation, trenchless technologies will be employed to install a sleeve under each watercourse crossing, within which the sewer will be installed. At the Baden Creek crossing, the sewer will be installed below the elevation of the existing box culvert. No impacts to creek flows within the culvert will occur as a

result of this installation. No watercourse isolation, dewatering or fish capture/relocation will be required at these locations as a result of this construction plan.

Although Baden Creek is a warmwater watercourse, evidence of groundwater inputs was observed in the vicinity of the proposed crossing. However, the sewer installation described above is not anticipated to cause alteration to any shallow groundwater flows or to cause changes in groundwater inputs to Baden Creek. Tributary A is not connected to the shallow groundwater system; as such, no groundwater-related impacts to the watercourse will occur at this crossing.

Portions of the proposed alignment will occur in close proximity to Baden Creek. Increased proximity to the watercourse may result in greater potential for construction-stage disturbances or potential future leakage of the sewer infrastructure that may affect the watercourse. To the extent possible, the sewer alignment should be maintained outside of the recommended 15m watercourse buffer identified in the NEA (NRSI 2022) to mitigate these potential impacts.

Option A5 (Score 10)

This alignment will require a crossing of Baden Creek within the Gingerich Road ROW, as well as a crossing of Tributary A. However, the reach of Tributary A to be crossed, just south of its source at the stormwater management pond outlet, has been characterized as an ephemeral flow path (NRSI 2022). During periods of seasonal flow this reach of the tributary may represent indirect habitat for fish (e.g., by providing nutrients to downstream direct fish habitat). Provided work is undertaken outside of periods immediately following heavy precipitation or snow melt when flow may occur, no impacts to fish or fish habitat will occur at the Tributary A crossing.

The crossing of Baden Creek, which provides direct fish habitat, will be subject to review by the DFO including potential requirement for a Fisheries Act Authorization as described for Option A1.

As described for Option A4, no watercourse isolation, dewatering, or fish capture/relocation will be required for the Baden Creek crossing due to the planned trenchless installation method. These measures will also not be required for Tributary A.

Although Baden Creek is a warmwater watercourse, evidence of groundwater inputs was observed in the vicinity of the proposed crossing. However, the sewer installation described above is not anticipated to cause alteration to any shallow groundwater flows or to cause changes in groundwater inputs to Baden Creek. Tributary A is not connected to the shallow groundwater system; as such, no groundwater-related impacts to the watercourse will occur at this crossing.

Portions of the proposed alignment will occur in close proximity to Baden Creek. Increased proximity to the watercourse may result in greater potential for construction-stage disturbances or potential future leakage of the sewer infrastructure that may affect the watercourse. To the extent possible, the sewer alignment should be maintained outside of the recommended 15m watercourse buffer identified in the NEA (NRSI 2022) to mitigate these potential impacts.

## References

Natural Resource Solutions Inc. (NRSI). 2022. Baden Trunk Sanitary Sewer Environmental Assessment, Natural Environment Assessment (Draft). Prepared for MTE Consultants Inc. April 2022.

Ontario Ministry of Environment, Conservation and Parks (MECP). 2022. Species at Risk in Ontario List. https://www.ontario.ca/page/species-risk-ontario. Last updated April 1, 2022.

Ontario Ministry of Natural Resources (OMNR). 2000. Significant Wildlife Habitat Technical Guide. October 2000.

Ontario Ministry of Natural Resources and Forestry (MNRF). 2015a. Significant Wildlife Habitat Ecoregion 6E Criterion Schedule: Addendum to Significant Wildlife Habitat Technical Guide. MNRF, January 2015.

# Appendix B

## The Baden Trunk EA Geotechnical Site Characterization Report (May 3, 2022)

# Baden Sanitary Trunk EA

## Geotechnical Site Characterization

**Project Location:**
Baden, Township of Wilmot, ON

**Prepared for:**
Township of Wilmot
60 Snyder's Road West
Baden, ON

**Prepared by:**
MTE Consultants
520 Bingemans Centre Drive
Kitchener, ON  N2B 3X9

**Date:** November 8, 2022

**MTE File No.:** 48730-100



*Engineers, Scientists, Surveyors.*

# Contents

1.0 Introduction ..... 1
2.0 Previous Studies ..... 1
3.0 Field and Laboratory Program ..... 1
4.0 Soil and Groundwater Conditions ..... 2
4.1 1012 Snyder's Road West ..... 3
4.2 Snyder's Road West ..... 3
4.3 Foundry Street ..... 3
4.4 Schmidt Lands ..... 3
4.4.1 Northwest Field Area ..... 3
4.4.2 Development Portion – North of Baden Creek ..... 4
4.4.3 Development Portion – South of Baden Creek ..... 4
5.0 Limitations of Report ..... 5

## Appendices

Appendix A Figures
Appendix B Borehole Logs
Appendix C Laboratory Test Results

# 1.0 Introduction

MTE Consultants Inc. (MTE) was retained by the Township of Wilmot to conduct a geotechnical site characterization investigation for a proposed sanitary trunk sewer in Baden, Ontario. The sanitary trunk is proposed to extend from the northwest edge of Baden to the Baden wastewater pumping station, located at 1044 Foundry Street in the south portion of Baden. Multiple options are considered, as shown on **Figure 1 in Appendix A**.

The purpose of this geotechnical site characterization investigation is to determine the general soil and groundwater conditions in the area of the proposed sanitary trunk sewer options.

# 2.0 Previous Studies

In April 2021, MTE conducted a Development Hydrogeology Study for the property located at 1012 Snyder's Road West. The fieldwork included the drilling of eleven (11) monitoring wells (Monitoring Wells MW101-19 to MW106C-19, and MW201-20 to MW203-20) and one (1) mini piezometer (Mini Piezometer MP1-20).

In June 2021, MTE conducted a Phase II Environmental Site Assessment (ESA) for the property located at 1012 Snyder's Road West. The fieldwork included the drilling of five (5) boreholes (Boreholes BH303-20, BH305A-20, and BH306-20 to BH308-20) and six (6) monitoring wells (Monitoring Wells MW301-20, MW302-20, MW304-20, MW305B-20, MW309-20, and MW310-20).

In March 2021, Englobe Corporation (Englobe) conducted a Draft Soil Characterization Report along Snyder's Road. Four (4) boreholes (Boreholes BH-01-21 to BH-04-21) were conducted within the subject area of this study.

In January 2020, Pinchin Ltd. (Pinchin) conducted a Geotechnical Investigation along Snyder's Road (Pinchin File No. 244512). One (1) monitoring well (Monitoring Well BH1) and six (6) boreholes (Boreholes BH2 to BH7) were conducted within the subject area of this study.

In April 2020, Pinchin conducted a Draft Geotechnical Investigation for the property located northwast of the Foundry Street and Gingerich Road (Pinchin File No. 249839). The fieldwork included the drilling of seven (7) boreholes (Boreholes BH1, BH3, BH5 to BH7, BH9, and BH11) and six (6) monitoring wells (Monitoring Wells BH2, BH4, BH8, BH10, BH12, and BH13).

The previous studies boreholes and monitoring wells will be referenced throughout this report and are shown on **Figure 1 in Appendix A** and the logs are provided in **Appendix B**.

# 3.0 Field and Laboratory Program

The fieldwork for this investigation was carried out on August 12, September 30, and October 14, 2021 and involved the drilling of five (5) boreholes (Boreholes MW101-21 to MW105-21) to depths of 5.0 to 8.2 m. The locations of the boreholes are shown on the Site Plan, **Figure 1 in Appendix A**.

Private and public utility companies were contacted prior to the start of drilling activities in order to isolate underground utilities near the boring locations.

On August 12 and October 14, 2021 the boreholes were advanced with a Diedrich D50T track mounted drill rig equipped with continuous flight hollow stem augers, supplied and operated by London Soil Test Ltd.

On September 30, 2021, the boreholes were advanced with a Diedrich D50T track mounted drill rig equipped with continuous flight hollow stem augers, supplied and operated by Envirocore.

Representative soil samples were recovered throughout the depths explored. Standard Penetration Tests (SPT) were carried out during sampling operations in the boreholes using conventional split spoon equipment. Approximate shear strengths of the cohesive deposits were measured with a handheld pocket penetrometer. The SPT N-values and approximate shear strengths recorded are plotted on the borehole logs in **Appendix B**.

Upon completion of drilling, 50 mm diameter monitoring wells were installed in the boreholes to allow measurement of stabilized groundwater levels and groundwater sampling and testing. The installations comprised 1.5 m and 3.0 m filtered screens and bentonite seals above and below the screens. Details of the installation and groundwater observations and measurements are provided on the appended borehole logs.

The monitoring wells were installed in accordance to Ontario Regulation 468/10. The construction, maintenance and abandonment of the wells are regulated under the province's Water Resources Act. The monitoring well network located on the site must be maintained or decommissioned in accordance with regulatory requirements.

The fieldwork was monitored throughout by a member of our geotechnical engineering staff, who directed the drilling procedures; recorded SPT and approximate shear strength values; documented the soil stratigraphies; monitored the groundwater conditions and monitoring well installations; and transported the recovered soil samples to our office for further classification.

The borehole coordinates and ground surface elevations were surveyed by MTE with a Trimble Global Navigation Satellite System (GNSS) model R10 rover. The borehole locations are referenced to Canadian Spatial Reference System (CSRS 1997) coordinates. The geodetic ground surface elevations are based on GNSS and local base station telemetry and have a vertical root mean squared error of less than 20 mm.

The collected soil samples were submitted for moisture content testing with the results provided on the borehole logs in **Appendix B**. Additionally, five (5) soil samples were submitted for particle size distribution analyses and the results are provided in **Appendix C**. The remaining soil samples will be stored for a period of 1 month and will be discarded of at that time without prior request from the client to extend storage time.

# 4.0 Soil and Groundwater Conditions

For the purpose of this report the site area has been broken into four regions. The four regions and the alternatives located within the regions are as follows:

- 1012 Snyder's Road West – Alternatives 2, 3, 4, and 5
- Snyder's Road West – Alternatives 1 and 2
- Foundry Street – Alternatives 1, 2, and 3
- Schmidt Lands – Alternatives 4 and 5

Additionally, the Schmidt Lands were further divided into three subregions as follows:

- Northwest Field Area
- Development Portion – North of Baden Creek
- Development Portion – South of Baden Creek

## 4.1 1012 Snyder's Road West

MTE Boreholes BH303-20, BH305A-20, and BH306-20 to BH308-20, MTE Monitoring Wells MW101-19 to MW106C-19, MW201-21 to MW203-21, MW301-20, MW302-20, MW304-20, MW305B-20, MW309-20, and MW310-20, and MTE Mini Piezometer MP1-20 were advanced in the 1012 Snyder's Road West portion of the study area.

Topsoil overlying silt and sand deposits were encountered in the majority of the boreholes and monitoring wells with glacial till encountered in MTE Boreholes MW102-19, MW103-19, MW202-20, MW203-20, MP1-20, MW301-20, MW302-20, MW304-20 to MW305B-20, and MW310-20.

Groundwater was measured in the installed MTE monitoring wells at depths of 1.0 to 12.6 m (Elevation 351.4 to 359.6 m) on February 2, 2021. It is noted that MTE Monitoring Wells MW104-19 and MW304-20 were dry on February 2, 2021.

## 4.2 Snyder's Road West

Pinchin (File No. 244512) Monitoring Well BH1, Pinchin (File No. 244512) Boreholes BH2 to BH7, and Englobe Boreholes BH-01-21 to BH-04-21 were advanced along Snyder's Road West between Christian Street to Foundry Street.

The soil conditions encountered in the boreholes and monitoring well along Snyder's Road West typically include pavement structure and fill overlying native cohesive glacial till deposits.

Groundwater was measured in the Pinchin (File No. 244512) Monitoring Well BH1 at a depth of 5.1 m (Elevation 353.6 m) on August 21, 2019. Saturated soil conditions were encountered in Pinchin (File No. 244512) Borehole BH7 at a depth of 7.6 m (Elevation 344.6 m). Free groundwater was reportedly not encountered in the remaining Pinchin and Englobe boreholes advanced along Snyder's Road West.

## 4.3 Foundry Street

MTE Monitoring Well MW105-21 was advanced off the west side of Foundry Street at the south side of Baden Creek and fill overlying native glacial till and silt deposits was encountered.

Groundwater was measured in MTE Monitoring Well MW105-21 at a depth of 2.7 m (Elevation 345.7 m) on November 16, 2021.

## 4.4 Schmidt Lands

### 4.4.1 Northwest Field Area

MTE Monitoring Wells MW101-21 to MW103-21 were advanced in the northwest field area of the Schmidt Lands. Topsoil overlying native glacial till deposits was encountered in MTE Monitoring Wells MW101-21 and MW103-21. The glacial till in MTE Monitoring Well MW103-21 was intercepted by sand deposits at depths of 4.0 m and 7.6 m (Elevation 347.7 m and 344.1 m). Topsoil overlying native silt and sand deposits was encountered in MTE Monitoring Well MW102-21.

Groundwater was measured in the MTE monitoring wells at depths of 1.0 to 6.0 m (Elevation 344.5 to 349.3 m) on November 16, 2021.

### 4.4.2 Development Portion – North of Baden Creek

MTE Monitoring Well MW105-21, Pinchin (File No. 249839) Monitoring Wells BH10, BH12, and BH13, and Pinchin (File No. 249839) Boreholes BH9 and BH11 were advanced north of Baden Creek in the portion of the Schmidt Lands currently proposed to be developed.

Topsoil overlying cohesive native silt deposits were predominately encountered within the Pinchin (File No. 249839) boreholes and monitoring wells. Fill overlying native glacial till and silt deposits was encountered in MTE Monitoring Well MW105-21.

Groundwater was measured in Pinchin (File No. 249839) Monitoring Wells BH10, BH12, and BH13 at depths of 0.3 to 5.3 m (Elevation 341.6 to 345.0 m) on January 7, 2020.

Groundwater was measured in MTE Geotechnical Monitoring Well MW105-21 at a depth of 2.7 m (Elevation 345.7 m) on November 16, 2021.

### 4.4.3 Development Portion – South of Baden Creek

MTE Monitoring Well MW104-21, Pinchin (File No. 249839) Monitoring Wells BH2, BH4, and BH8, and Pinchin (File No. 249839) Boreholes BH1, BH3, and BH5 to BH7 were advanced south of Baden Creek in the portion of the Schmidt Lands currently proposed to be developed.

Topsoil overlying cohesive native silt deposits were predominately encountered within the Pinchin (File No. 249839) boreholes and monitoring wells and MTE Geotechnical Monitoring Well MW104-21.

Groundwater was measured in Pinchin (File No. 249839) Monitoring Wells BH2, BH4, and BH8 at depths of 0.5 to 2.0 m (Elevation 342.9 to 346.0 m) on January 7, 2020.

Groundwater was measured in MTE Monitoring Well MW104-21 at 0.7 m above the ground surface (Elevation 340.4 m) on November 16, 2021. It is noted that surface water was also observed around MTE Monitoring Well MW104-21 on November 16, 2021.

# 5.0 Limitations of Report

Services performed by MTE Consultants Inc. (MTE) were conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the Geotechnical Engineering & Consulting profession practicing under similar conditions in the same geographic area were the services are provided. No other warranty or representation expressed or implied as to the accuracy of the information, conclusions or recommendations is included or intended in this report.

This report was completed for the sole use of the Client. This report is not intended to be exhaustive in scope or to imply a risk-free site. As such, this report may not deal with all issues potentially applicable to the site and may omit aspects which are or may be of interest to the reader.

In addition, it should be recognized that a soil sample result represents one distinct portion of a site at the time it is collected, and that the findings of this report are based on conditions as they existed during the time period of the investigation. The material in the report reflects our best judgment using the information available at the time the report was written. The soil and groundwater conditions between and beyond the test holes may differ from those encountered in the test holes. Should subsurface conditions arise that are different from those in the test holes MTE should be notified to determine whether or not changes should be made as a result of these conditions.

It should be recognized that the passage of time may affect the views, conclusions and recommendations (if any) provided in this report because groundwater conditions of a property can change, along with regulatory requirements. All design details were not known at the time of submission of this report and it is recommended MTE should be retained to review the final design documents prior to construction to confirm they are consistent with our report recommendations. Should additional or new information become available, MTE recommends that it be brought to our attention in order that we may determine whether it affects the contents of this report.

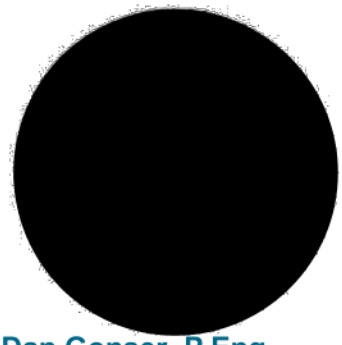
Any use which another party makes of this report, or any reliance on, or decisions to be made based upon it, are the responsibility of such parties. MTE accepts no responsibility for liabilities incurred by or damages, if any, suffered by another party as a result of decisions made or actions taken, based upon this report. Others with interest in the site should undertake their own investigations and studies to determine how or if the condition affects them or their plans. The contractors bidding on this project or undertaking the construction should make their own interpretation of the factual information and draw their own conclusions as to how subsurface conditions may affect their work.

The benchmark and elevations provided in this report are primarily established to identify differences between the test hole locations and should not be used for other purposes such as, planning, development, grading, and excavation.

All of which is respectfully submitted,

**MTE Consultants Inc.**





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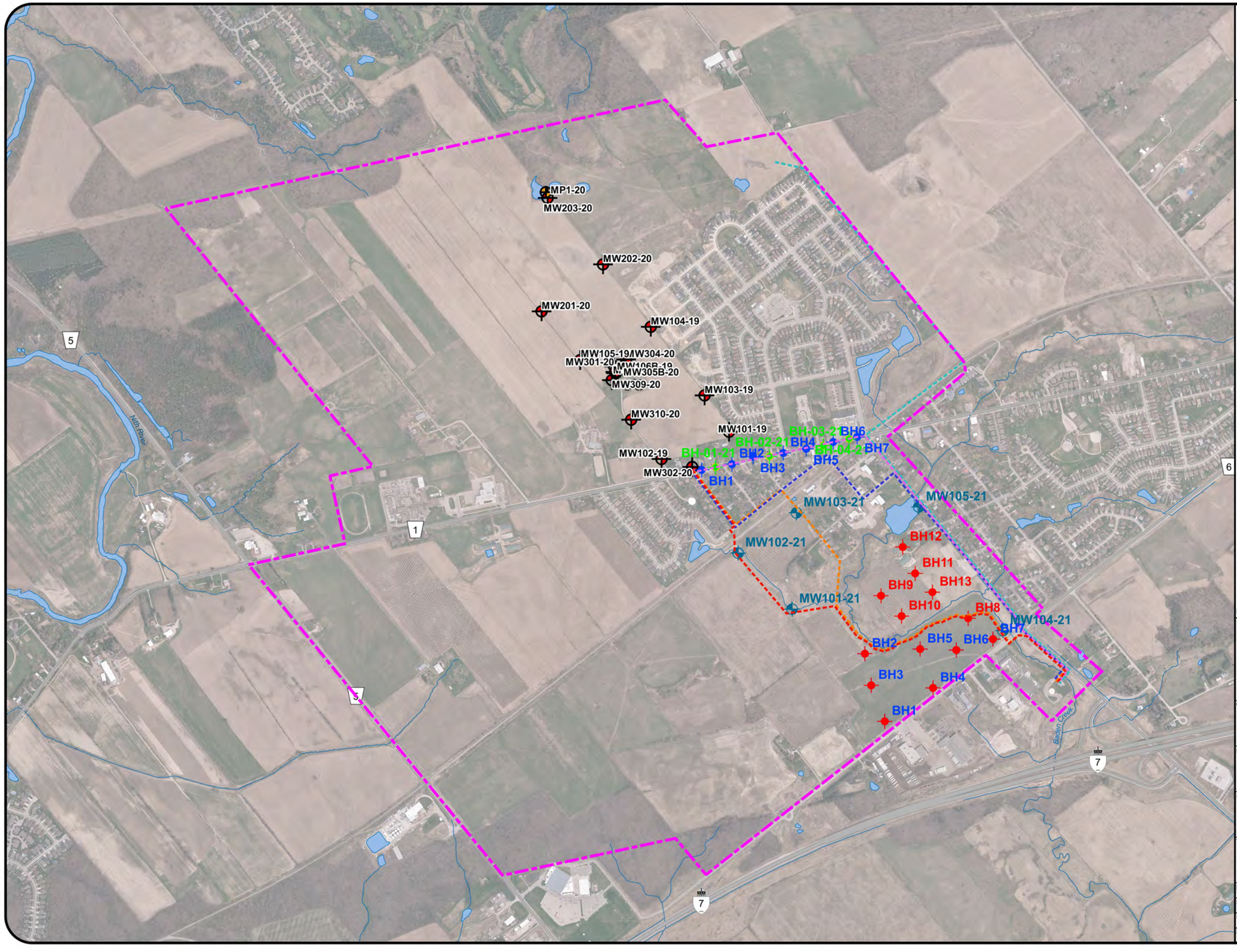
# Appendix A

# Figures

Project No: 48730-100 P:\P48730100\GIS\48730-100_geo1.qgz

GEO1.1

December 10, 2021 - 12:04 - Plotted By: SRederer




N NORTH

N PROJECT NORTH

## Legend

- Primary Study Area
- Waterbody
- Watercourse

**Investigative Locations**

- MTE Hydrogeological/Environmental Monitoring Well
- MTE Hydrogeological Minipiezometer
- MTE Geotechnical Monitoring Well
- Pinchin Geotechnical Investigation (File No. 24512)
- Pinchin Geotechnical Investigation (File No. 249839)
- Englobe Geotechnical Investigation (March, 2021)

*Data Sources:*

*Contains information licensed under the Open Government License Ontario.*

0 100 200 300 400 500 m

**Scale (11x17): 1:13000**

Project CRS: NAD83 / UTM zone 17N

MTE
Engineers,Scientists, Surveyors
Ph. (519) 743-6500

Client: Township of Wilmot

Project: Baden Sanitary Trunk EA

Site: Baden, ON

Title: Site Plan

| | | | |
|---|---|---|---|
| Reviewed By | DMG | | |
| Prepared By | BGH | Project No | 48730-100 |
| Drawn By | SAR | Figure No | 1 |
| Date | December 2021 | | |

# Appendix B

# Borehole Logs

## ID No.: MW101-21

**Project Name:** Baden Sanitary Trunk EA

**MTE File No.:** 48730-100

**Client:** Township of Wilmot

**Site Location:** Baden, ON

**Date Completed:** 8/12/2021

**Drilling Contractor:** London Soil Test Ltd.

**Drill Rig:** D50T Track Mounted

**Drill Method:** Hollow Stem Augers

**Protective Cover:** Monument Casing

| Depth (ft / m) | Symbol | Soil Description | Elevation (masl) / Depth (m) | Sample Number | Sample Type | Dynamic Cone / Standard Penetration (20 40 60 80) | Shear Strength (PP) kPa / Shear Strength (FV) kPa (50 100 150 200) | Water Content % (10 20 30) | Groundwater Observations and Standpipe Details |
|---|---|---|---|---|---|---|---|---|---|
| 0 ft / 0 m | | Ground Surface | 347.4 | | | | | | |
| 0 | | **TOPSOIL** dark brown sandy silt, some organics, very moist (610mm) | 0.0 / 346.8 | 1 | SS | 7 | | 15 | |
| 2 | | **SILT TILL** compact to dense mottled dark/light brown to brown silt, trace to some clay and sand, trace gravel, very moist | 0.6 / 345.9 | 2 | SS | 13 | | 18 | |
| 4 | | occasional wet seams | 1.5 | 3 | SS | 14 | | 19 | |
| 6 | | | | | | | | | |
| 8 | | | | 4 | SS | 20 | | 16 | |
| 10 | | grey | 3.0 | 5 | SS | 33 | | 16 | |
| 12 | | 150mm saturated silty sand seam | 343.6 | | | | | 22 | |
| 14 | | **CLAYEY SILT TILL** very stiff to hard grey clayey silt, some sand, trace gravel, DTPL to APL | 3.8 | 6 | SS | 24 | 150 | 13 | |
| 16 | | | | 7 | SS | 22 | >200 | 14 | |
| 18 | | Drilling Terminated | 342.4 / 5.0 | | | | | | |
| 20 | | | | | | | | | |
| 22 | | | | | | | | | |
| 24 | | | | | | | | | |
| 26 | | | | | | | | | |

Groundwater Observations and Standpipe Details: Concrete; Bentonite; Sand Pack; 51mm PVC Riser; 51mm Slotted Screen

**Field Technician:** B. Heinbuch

**Drafted by:** B. Heinbuch

**Reviewed by:** D. Gonser

**Sheet:** 1 of 1

**Notes:**
Water encountered at 3.3mbgs (Elevation 344.1masl) during drilling.
Water measured at 1.0mbgs (Elevation 346.4masl) on November 16, 2021.

## ID No.: MW102-21

**Project Name:** Baden Sanitary Trunk EA

**MTE File No.:** 48730-100

**Client:** Township of Wilmot

**Site Location:** Baden, ON

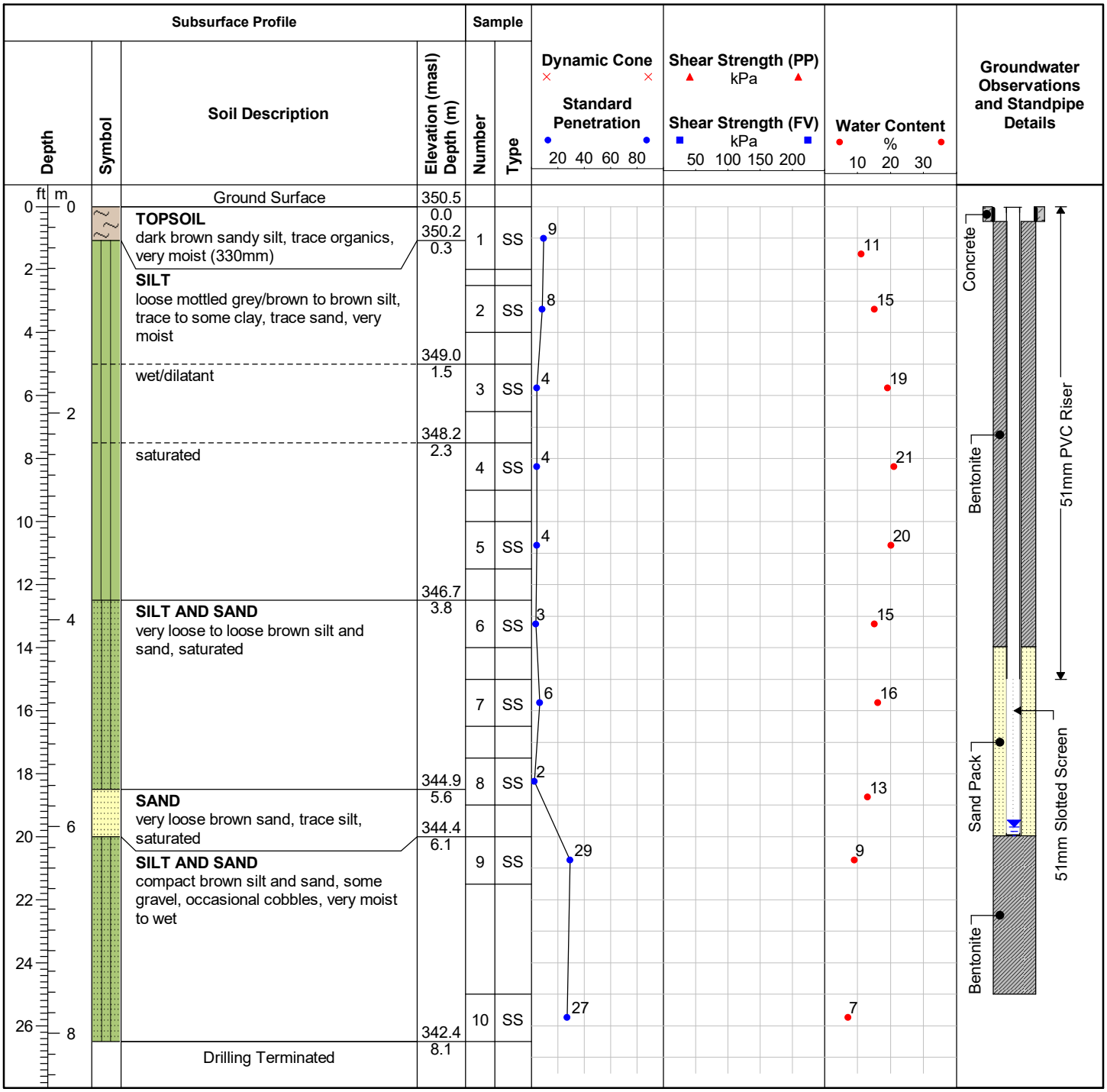
**Date Completed:** 9/30/2021

**Drilling Contractor:** Envirocore

**Drill Rig:** D50T Track Mounted

**Drill Method:** Hollow Stem Augers

**Protective Cover:** Monument Casing




**Field Technician:** B. Heinbuch

**Drafted by:** B. Heinbuch

**Reviewed by:** D. Gonser

**Sheet:** 1 of 1

**Notes:**
Water encountered at 2.3mbgs (Elevation 348.2masl) during drilling.
Water measured at 6.0mbgs (Elevation 344.5masl) on November 16, 2021.

## ID No.: MW103-21

**Project Name:** Baden Sanitary Trunk EA

**MTE File No.:** 48730-100

**Client:** Township of Wilmot

**Site Location:** Baden, ON

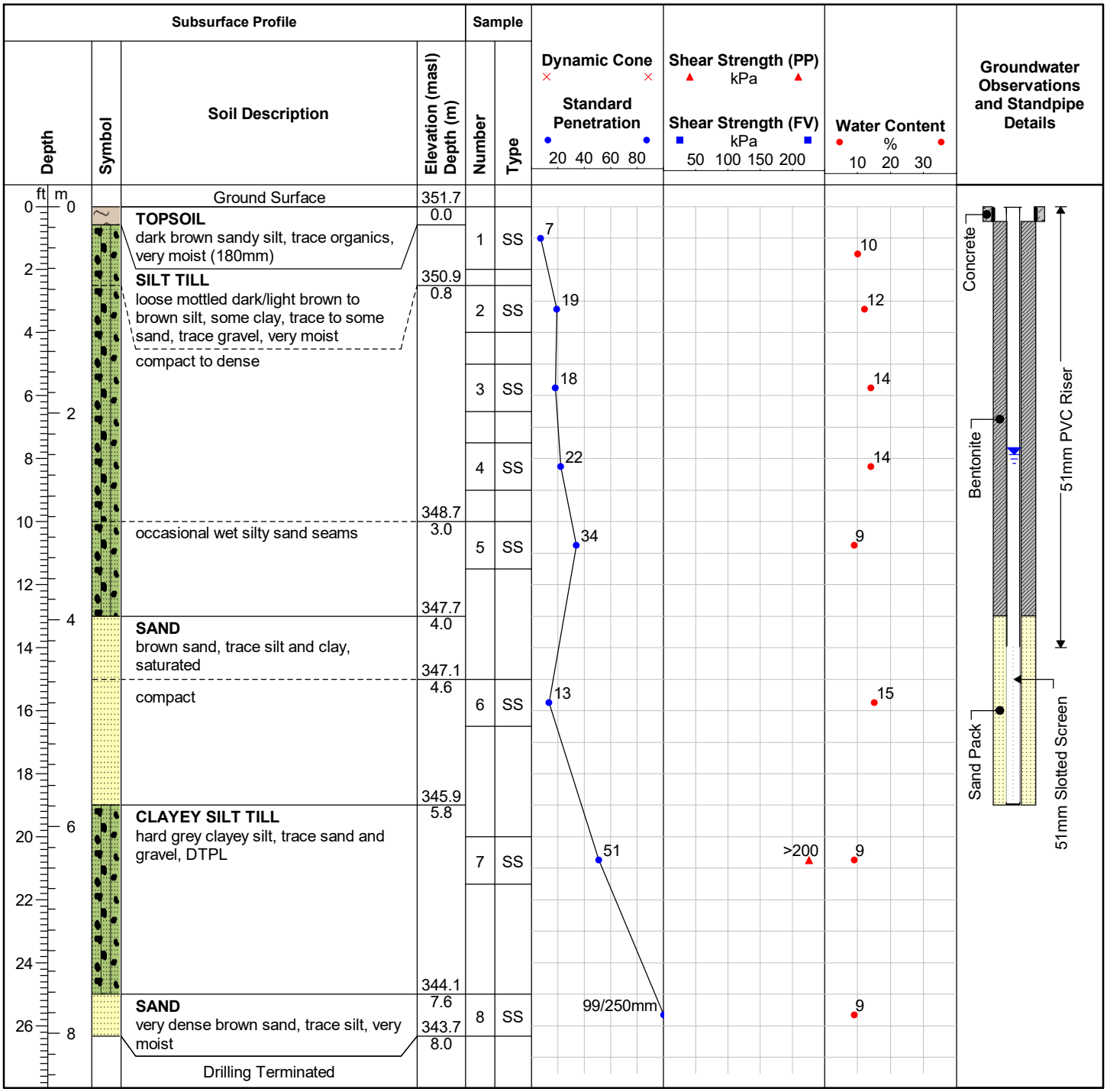
**Date Completed:** 9/30/2021

**Drilling Contractor:** Envirocore

**Drill Rig:** D50T Track Mounted

**Drill Method:** Hollow Stem Augers

**Protective Cover:** Monument Casing




**Field Technician:** B. Heinbuch

**Drafted by:** B. Heinbuch

**Reviewed by:** D. Gonser

**Sheet:** 1 of 1

**Notes:**
Water encountered at 4.0mbgs (Elevation 347.7masl) during drilling.
Water measured at 2.4mbgs (Elevation 349.3masl) on November 16, 2021.

## ID No.: MW104-21

**Project Name:** Baden Sanitary Trunk EA

**MTE File No.:** 48730-100

**Client:** Township of Wilmot

**Site Location:** Baden, ON

**Date Completed:** 10/14/2021

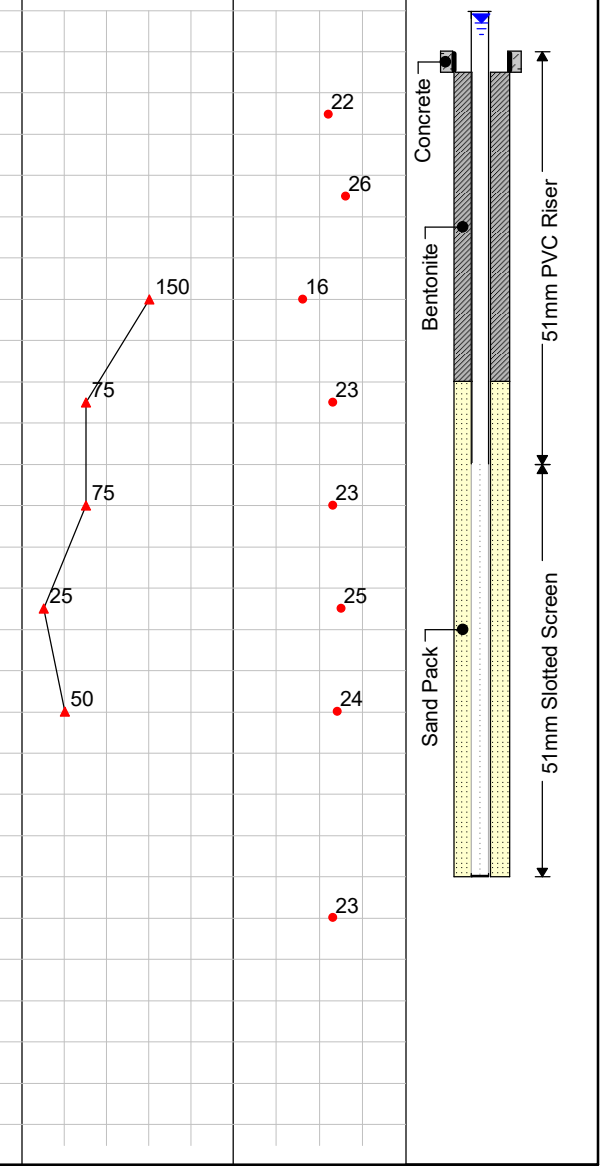
**Drilling Contractor:** London Soil Test Ltd.

**Drill Rig:** D50T Track Mounted

**Drill Method:** Hollow Stem Augers

**Protective Cover:** Monument Casing

| Depth (ft) | Depth (m) | Soil Description | Elevation (masl) / Depth (m) | Sample Number | Sample Type |
|---|---|---|---|---|---|
| | | Ground Surface | 339.7 | | |
| 0 | 0 | **TOPSOIL** dark brown sandy silt, trace to some gravel, wet (360mm) | 0.0 / 339.3 / 0.4 | 1 | SS |
| 2 | | **SANDY SILT** loose light brown sandy silt, wet | 338.9 / 0.8 | 2 | SS |
| 4 | | compact | 338.2 | | |
| 6 | 2 | **CLAYEY SILT** very stiff brown clayey silt, DTPL | 1.5 | 3 | SS |
| | | | 337.4 | | |
| 8 | | stiff, grey, occasional sand seams, WTPL | 2.3 | 4 | SS |
| 10 | | | | 5 | SS |
| 12 | | | 335.9 | | |
| 14 | 4 | soft to firm | 3.8 | 6 | SS |
| | | | 335.1 | | |
| 16 | | **CLAY AND SILT** firm to stiff grey clay and silt, numerous sand seams, WTPL | 4.6 | 7 | SS |
| 18 | | | | | |
| 20 | 6 | | | 8 | SS |
| 22 | | | 333.0 | | |
| | | Drilling Terminated | 6.7 | | |
| 24 | | | | | |
| 26 | 8 | | | | |




**Field Technician:** M. Dalgliesh

**Drafted by:** B. Heinbuch

**Reviewed by:** D. Gonser

**Sheet:** 1 of 1

**Notes:**
Water encountered at 2.3mbgs (Elevation 337.4masl) during drilling.
Water measured at 0.7mags (Elevation 340.4masl) on November 16, 2021.

## ID No.: MW105-21

**Project Name:** Baden Sanitary Trunk EA

**MTE File No.:** 48730-100

**Client:** Township of Wilmot

**Site Location:** Baden, ON

**Date Completed:** 10/14/2021

**Drilling Contractor:** London Soil Test Ltd.

**Drill Rig:** D50T Track Mounted

**Drill Method:** Hollow Stem Augers

**Protective Cover:** Monument Casing

| Depth (ft / m) | Symbol | Soil Description | Elevation (masl) / Depth (m) | Sample Number | Sample Type | Dynamic Cone / Standard Penetration | Shear Strength (PP) kPa / Shear Strength (FV) kPa | Water Content % | Groundwater Observations and Standpipe Details |
|---|---|---|---|---|---|---|---|---|---|
| | | Ground Surface | 348.4 | | | | | | |
| 0 / 0 | | **FILL (TOPSOIL)** dark brown sandy silt, very moist (150mm) | 0.0 | 1 | SS | 4 | | 24 | |
| 2 | | **FILL** loose brown clayey silt, some sand, trace to some gravel, wet | | 2 | SS | 5 | | 24 | |
| 4 | | | 346.9 | | | | | | |
| 6 / 2 | | very loose brown silt and sand, saturated | 1.5 | 3 | SS | 3 | 100 | 16 / 27 | |
| | | **CLAYEY SILT TILL** stiff to very stiff brown/grey clayey silt, trace to some gravel and sand, WTPL | 346.1 | | | | | | |
| 8 | | **SILT AND CLAY TILL** very stiff to hard brown/grey silt and clay, trace sand and gravel, DTPL to APL | 2.3 | 4 | SS | 11 | 175 | 19 | |
| 10 | | | | 5 | SS | 16 | >200 | 24 | |
| 12 / 4 | | | | | | | | | |
| 14 | | | | 6 | SS | 21 | >200 | 24 | |
| | | | 344.0 | | | | | | |
| | | grey | 4.4 | | | | | | |
| 16 | | **CLAY AND SILT TILL** very stiff grey clay and silt, trace sand and gravel, APL with occasional saturated sand seams | | 7 | SS | 23 | 125 | 24 | |
| 18 | | | | | | | | | |
| 20 / 6 | | | 342.3 | | | | | | |
| | | **CLAYEY SANDY SILT** stiff to very stiff grey clayey sandy silt, WTPL | 6.1 | 8 | SS | 13 | 100 | 21 | |
| 22 | | | | | | | | | |
| 24 | | | 340.8 | | | | | | |
| 26 / 8 | | **SANDY SILT** compact grey sandy silt, some clay, saturated | 7.6 | 9 | SS | 14 | | 26 | |
| | | | 340.2 | | | | | | |
| | | Drilling Terminated | 8.2 | | | | | | |

Groundwater Observations and Standpipe Details: Concrete; Bentonite; Sand Pack; 51mm PVC Riser; 51mm Slotted Screen

**Field Technician:** M. Dalgliesh

**Drafted by:** B. Heinbuch

**Reviewed by:** D. Gonser

**Sheet:** 1 of 1

**Notes:**
Water encountered at 1.5, 4.6, and 6.1mbgs (Elevation 346.9, 343.8, and 342.3masl) during drilling.
Water measured at 2.7mbgs (Elevation 345.7masl) on November 16, 2021.

## ID Number: MW101-19

**Project Name:** 1012 Snyder's Rd. W. Development Hydrogeology Study

**Project No:** 40777-800

**Client:** Nideva Properties Inc.

**Site Location:** 1012 Snyder's Rd. W., Baden, ON

**Date Completed:** 5/3/2019

**Drilling Contractor:** Aardvark Drilling Inc.

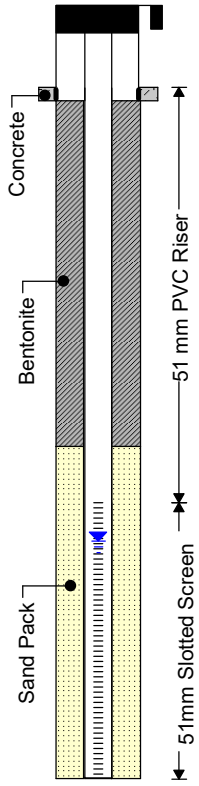
**Drill Rig:** CME75 Track

**Drill Method:** Hollow Stem Auger

**Protective Cover:** Monument

| Depth Scale (ft / m) | Soil Description | Elevation (masl) / Depth (m) | Sample Number | Type | Recovery (%) | N-Value (Blows/305mm) | Moisture Content (%) |
|---|---|---|---|---|---|---|---|
| 0 / 0 | Ground Surface | 357.6 | | | | | |
| | **TOPSOIL** dark brown, silty, clayey, moist | 0.0 | 1 | SS | 30 | 8 | 23 |
| | **CLAYEY SILT** brown, trace sand, moist | | 2 | SS | 75 | 9 | 27 |
| | | 356.1 | | | | | |
| 2 | **SANDY SILT** brown, trace clay, trace gravel, moist | 1.5 | 3 | SS | 100 | 12 | 20 |
| | | 355.3 | | | | | |
| | **SAND** brown, trace silt, moist | 2.3 | 4 | SS | 75 | 17 | 16 |
| | | | 5 | SS | 85 | 32 | 9 |
| 4 | saturated | 353.0 | | | | | |
| | | 4.6 | 6 | SS | 70 | 39 | 19 |
| 6 | | | 7 | SS | 90 | 28 | 19 |
| 8 | | 349.4 | 8 | SS | 75 | 6 | 24 |
| | Drilling Terminated | 8.2 | | | | | |
| 10 | | | | | | | |

**Well Completion Details**




**Field Technician:** TXG

**Drafted by:** TXG

**Reviewed by:** ATD

MTE

**Sheet:** 1 of 1

Notes:
Water level measured August 21, 2020.

## ID Number: MW102-19

**Project Name:** 1012 Snyder's Rd. W. Development Hydrogeology Study

**Project No:** 40777-800

**Client:** Nideva Properties Inc.

**Site Location:** 1012 Snyder's Rd. W., Baden, ON

**Date Completed:** 5/3/2019

**Drilling Contractor:** Aardvark Drilling Inc.

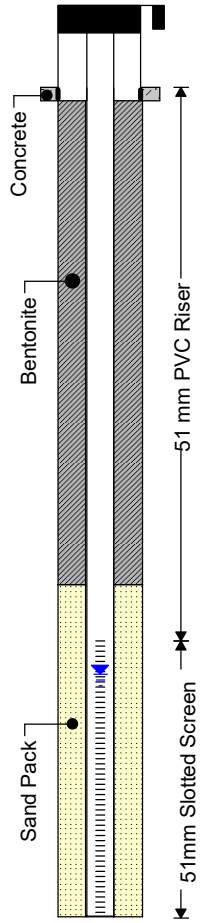
**Drill Rig:** CME75 Track

**Drill Method:** Hollow Stem Auger

**Protective Cover:** Monument

| Depth Scale (ft / m) | Soil Description | Elevation (masl) / Depth (m) | Number | Type | Recovery (%) | N-Value (Blows/305mm) | Moisture Content (%) |
|---|---|---|---|---|---|---|---|
| | Ground Surface | 358.9 / 0.0 | | | | | |
| 0 / 0 | **TOPSOIL** dark brown, silty, sandy, some clay, moist | | 1 | ss | 70 | 6 | 30 |
| 2 | **SANDY SILT** brown, some clay, moist | | 2 | ss | 50 | 12 | 21 |
| 4 | | | 3 | ss | 100 | 15 | 23 |
| 6 / 2 | | 356.6 / 2.3 | | | | | |
| 8 | **CLAYEY SILT TILL** brown, trace sand, trace gravel, moist | | 4 | ss | 90 | 10 | 24 |
| 10 | | | 5 | ss | 100 | 11 | 23 |
| 12 / 4 | | | | | | | |
| 14 | grey below 4.6m | 354.3 / 4.6 | | | | | |
| 16 | | | 6 | ss | 100 | 14 | 21 |
| 18 | | | | | | | |
| 20 / 6 | | | 7 | ss | 100 | 12 | 18 |
| 22 | | | | | | | |
| 24 | | | | | | | |
| 26 / 8 | | | 8 | ss | 100 | 16 | 16 |
| 28 | | | | | | | |
| 30 | | | 9 | ss | 100 | 16 | 14 |
| 32 / 10 | | 349.1 / 9.8 | | | | | |
| 34 | Drilling Terminated | | | | | | |
| 36 | | | | | | | |
| 38 | | | | | | | |

**Well Completion Details**




**Field Technician:** TXG

**Drafted by:** TXG

**Reviewed by:** ATD

**Sheet:** 1 of 1

Notes:
Water level measured August 21, 2020.

## ID Number: MW103-19

**Project Name:** 1012 Snyder's Rd. W. Development Hydrogeology Study

**Project No:** 40777-800

**Client:** Nideva Properties Inc.

**Site Location:** 1012 Snyder's Rd. W., Baden, ON

**Date Completed:** 5/2/2019

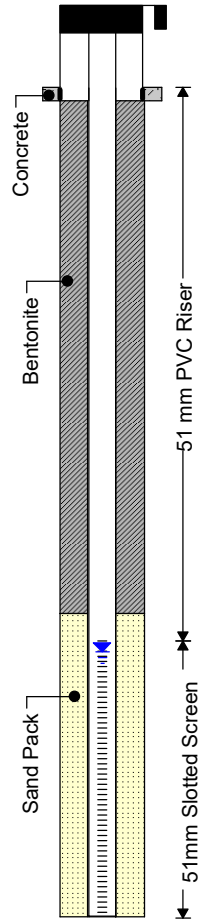
**Drilling Contractor:** Aardvark Drilling Inc.

**Drill Rig:** CME75 Track

**Drill Method:** Hollow Stem Auger

**Protective Cover:** Monument

| Depth Scale (ft / m) | Soil Description | Elevation (masl) / Depth (m) | Number | Type | Recovery (%) | N-Value (Blows/305mm) | Moisture Content (%) |
|---|---|---|---|---|---|---|---|
| | Ground Surface | 359.0 | | | | | |
| 0 / 0 | **TOPSOIL** dark brown,clayey silt, moist | 0.0 | 1 | ss | 75 | 7 | 30 |
| 2 | **SILTY CLAY** brown, some sand, moist | 358.3 0.8 | 2 | ss | 85 | 18 | 19 |
| 4 | **CLAYEY SILT TILL** brown, some sand, trace gravel, moist | | 3 | ss | 100 | 20 | 21 |
| 6 / 2 | | | 4 | ss | 100 | 13 | 21 |
| 8 | | | 5 | ss | 90 | 12 | 21 |
| 10 | | 354.5 | | | | | |
| 12 / 4 | **SANDY SILT TILL** grey, some clay, trace gravel, moist | 4.6 | 6 | ss | 100 | 12 | 16 |
| 14 | | 352.9 | | | | | |
| 16 | **CLAYEY SILT TILL** grey, some sand, trace gravel, moist | 6.1 | 7 | ss | 100 | 11 | 17 |
| 18 / 6 | | 351.4 | | | | | |
| 20 | wet below 7.6m | 7.6 | 8 | ss | 90 | 5 | 18 |
| 22 | | | | | | | |
| 24 / 8 | | | 9 | ss | 85 | 6 | 20 |
| 26 | | 349.3 | | | | | |
| 28 | Drilling Terminated | 9.8 | | | | | |
| 30 / 10 | | | | | | | |
| 32 | | | | | | | |
| 34 | | | | | | | |
| 36 | | | | | | | |
| 38 | | | | | | | |




**Field Technician:** TXG

**Drafted by:** TXG

**Reviewed by:** ATD

Notes:
Water level measured August 21, 2020.

## ID Number: MW104-19

**Project Name:** 1012 Snyder's Rd. W. Development Hydrogeology Study

**Project No:** 40777-800

**Client:** Nideva Properties Inc.

**Site Location:** 1012 Snyder's Rd. W., Baden, ON

**Date Completed:** 5/2/2019

**Drilling Contractor:** Aardvark Drilling Inc.

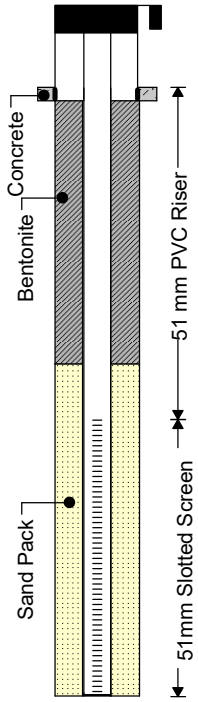
**Drill Rig:** CME75 Track

**Drill Method:** Hollow Stem Auger

**Protective Cover:** Monument

| Depth Scale (ft / m) | Soil Description | Elevation (masl) / Depth (m) | Sample Number | Sample Type | Recovery (%) | SPT N-Value (Blows/305mm) | Moisture Content (%) |
|---|---|---|---|---|---|---|---|
| | Ground Surface | 361.2 | | | | | |
| 0 / 0 | **TOPSOIL** dark brown, clayey silt, moist | 0.0 | 1 | ss | 75 | 6 | 27 |
| 2 | **CLAYEY SILT** brown, clayey, trace to some sand, moist | 360.4 / 0.8 | 2 | ss | 100 | 19 | 14 |
| 4 | **SILT** sandy, trace clay | 359.6 / 1.5 | 3 | ss | 90 | 19 | 13 |
| 6 / 2 | **SILTY SAND** brown, trace gravel, moist | | 4 | ss | 75 | 24 | 14 |
| 8 | | 358.1 | | | | | |
| 10 | **SILT** brown, some sand, trace clay, trace gravel, damp | 3.0 | 5 | ss | 50 | 23 | 15 |
| 12 / 4 | | | | | | | |
| 14 | | 356.6 | | | | | |
| 16 | grey, clayey, wet | 4.6 | 6 | ss | 95 | 19 | 20 |
| 18 | | 355.1 | | | | | |
| 20 / 6 | **SILTY SAND** brown, saturated | 6.1 | 7 | ss | 85 | 22 | 24 |
| 22 | | | | | | | |
| 24 | | 353.5 | | | | | |
| 26 / 8 | trace silt, moist | 7.6 | 8 | ss | 80 | 21 | 6 |
| 28 | | 352.9 | | | | | |
| | Drilling Terminated | 8.2 | | | | | |
| 30 | | | | | | | |
| 32 / 10 | | | | | | | |
| 34 | | | | | | | |
| 36 | | | | | | | |
| 38 | | | | | | | |

**Well Completion Details**




**Field Technician:** TXG

**Drafted by:** TXG

**Reviewed by:** ATD

MTE

**Sheet:** 1 of 1

Notes:
Well dry August 21, 2020.

## ID Number: MW105-19

**Project Name:** 1012 Snyder's Rd. W. Development Hydrogeology Study

**Project No:** 40777-800

**Client:** Nideva Properties Inc.

**Site Location:** 1012 Snyder's Rd. W., Baden, ON

**Date Completed:** 5/2/2019

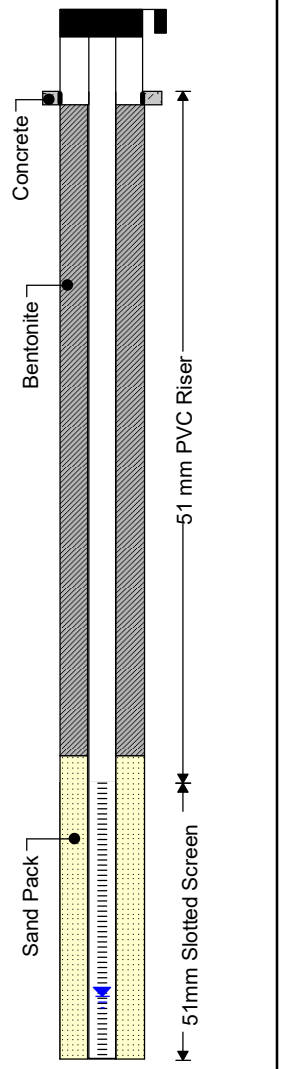
**Drilling Contractor:** Aardvark Drilling Inc.

**Drill Rig:** CME 850 Track

**Drill Method:** Hollow Stem Auger

**Protective Cover:** Monument

| Depth Scale (ft / m) | Soil Description | Elevation (masl) / Depth (m) | Number | Type | Recovery (%) | N-Value (Blows/305mm) | Moisture Content (%) |
|---|---|---|---|---|---|---|---|
| | Ground Surface | 361.8 | | | | | |
| 0 / 0 | **TOPSOIL** dark brown, silty sand, moist | 0.0 | 1 | SS | 70 | 3 | 21 |
| 2 | **SAND** brown, some silt, moist | 361.1 0.8 | 2 | SS | 65 | 5 | 24 |
| 4 | silty, trace clay | 360.3 | | | | | |
| 6 / 2 | some silt, saturated | 1.5 | 3 | SS | 80 | 3 | 26 |
| 8 | | | 4 | SS | 70 | 2 | 17 |
| 10 / 4 | trace silt, moist | 358.8 3.0 | 5 | SS | 70 | 10 | |
| 12 | | | | | | | |
| 14 | | | | | | | |
| 16 | | | 6 | SS | 100 | 36 | 6 |
| 18 | | | | | | | |
| 20 / 6 | | | 7 | SS | 95 | 39 | 3 |
| 22 | | | | | | | |
| 24 | | 354.2 | | | | | |
| 26 / 8 | wet | 7.6 | 8 | SS | 85 | 33 | 20 |
| 28 | | | | | | | |
| 30 | | | 9 | SS | 90 | 32 | 18 |
| 32 / 10 | | | | | | | |
| 34 | | 351.2 | | | | | |
| 36 | saturated | 10.7 | 10 | SS | 85 | 20 | 20 |
| 38 | Drilling Terminated | 350.6 11.3 | | | | | |




**Field Technician:** TXG

**Drafted by:** TXG

**Reviewed by:** ATD

**Sheet:** 1 of 1

Notes:
Water level measured August 21, 2020.

## ID Number: MW106A-19

**Project Name:** 1012 Snyder's Rd. W. Development Hydrogeology Study

**Project No:** 40777-800

**Client:** Nideva Properties Inc.

**Site Location:** 1012 Snyder's Rd. W., Baden, ON

**Date Completed:** 4/29/2019

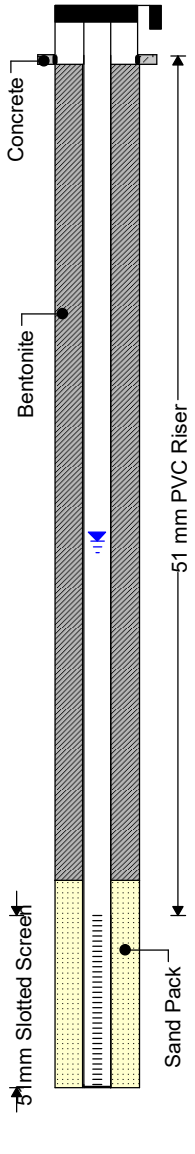
**Drilling Contractor:** Aardvark Drilling Inc.

**Drill Rig:** CME 850 Track

**Drill Method:** Hollow Stem Auger

**Protective Cover:** Monument

| Depth Scale (ft / m) | Symbol | Soil Description | Elevation (masl) / Depth (m) | Number | Type | Recovery (%) | N-Value (Blows/305mm) | Moisture Content (%) |
|---|---|---|---|---|---|---|---|---|
| | | Ground Surface | 360.7 | | | | | |
| | | **TOPSOIL** dark brown, silty sand, moist | 0.0 / 359.9 | 1 | SS | 90 | 5 | 14 |
| | | **SAND** brown, some silt, trace gravel, moist | 0.8 / 359.2 | 2 | SS | 60 | 2 | 20 |
| | | trace silt, moist | 1.5 / 358.4 | 3 | SS | 50 | 7 | 19 |
| | | wet | 2.3 / 357.6 | 4 | SS | 60 | 12 | 20 |
| | | saturated | 3.0 / 356.9 | 5 | SS | 75 | 14 | 20 |
| | | **SILT** brown, trace sand, varying degrees of clay content, saturated | 3.8 / 356.1 | 6 | SS | 75 | 11 | 20 |
| | | trace gravel, moist | 4.6 / 354.6 | 7 | SS | 100 | 12 | 24 |
| | | grey | 6.1 / 353.1 | 8 | SS | 50 | 32 | 13 |
| | | **SANDY SILT** brown, trace clay, moist | 7.6 / 351.6 | 9 | SS | 100 | 26 | 25 |
| | | **SAND** brown, trace silt, saturated | 9.1 / 350.0 | 10 | SS | 75 | 41 | 19 |
| | | coarse-grained sand, saturated | 10.7 / 348.5 | 11 | SS | 90 | 13 | 16 |
| | | medium-grained sand | 12.2 | 12 | SS | 65 | 32 | 19 |
| | | | | 13 | SS | 75 | 37 | 17 |
| | | | | 14 | SS | 65 | 48 | 22 |
| | | | | 15 | SS | 65 | 42 | 18 |
| | | | | 16 | SS | 50 | 48 | 16 |
| | | Drilling Terminated | 341.8 / 18.9 | | | | | |




**Field Technician:** TXG

**Drafted by:** TXG

**Reviewed by:**

Notes:
Water level measured August 21, 2020.

## ID Number: MW106B-19

**Project Name:** 1012 Snyder's Rd. W. Development Hydrogeology Study

**Project No:** 40777-800

**Client:** Nideva Properties Inc.

**Site Location:** 1012 Snyder's Rd. W., Baden, ON

**Date Completed:** 4/26/2019

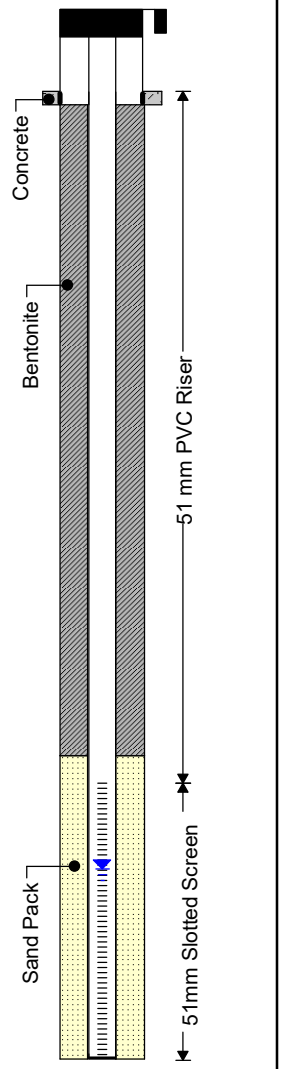
**Drilling Contractor:** Aardvark Drilling Inc.

**Drill Rig:** CME 850 Track

**Drill Method:** Hollow Stem Auger

**Protective Cover:** Monument

| Depth Scale (ft / m) | Symbol | Soil Description | Elevation (masl) / Depth (m) | Number | Type | Recovery (%) | N-Value (Blows/305mm) | Moisture Content (%) |
|---|---|---|---|---|---|---|---|---|
| | | Ground Surface | 360.6 | | | | | |
| 0 / 0 | | **TOPSOIL** dark brown, silty sand, moist | 0.0 | 1 | SS | 90 | 5 | 14 |
| | | | 359.9 | | | | | |
| 2 | | **SAND** brown, some silt, trace gravel, moist | 0.8 | 2 | SS | 60 | 2 | 20 |
| 4 | | trace silt, moist | 359.1 | | | | | |
| 6 / 2 | | wet | 1.5 | 3 | SS | 50 | 7 | 19 |
| | | | 358.3 | | | | | |
| 8 | | saturated | 2.3 | 4 | SS | 60 | 12 | 20 |
| | | | 357.6 | | | | | |
| 10 | | **SILT** brown, trace sand, varying degrees of clay content, saturated | 3.0 | 5 | SS | 75 | 14 | 20 |
| | | | 356.8 | | | | | |
| 12 / 4 | | trace gravel, moist | 3.8 | 6 | SS | 75 | 11 | 20 |
| 14 | | | 356.0 | | | | | |
| 16 | | grey | 4.6 | 7 | SS | 100 | 12 | 24 |
| 18 | | | | | | | | |
| 20 / 6 | | **SAND** brown fine-grained sand, trace silt, moist | 6.1 | 8 | SS | 50 | 32 | 13 |
| 22 | | | 353.0 | | | | | |
| 24 | | | | | | | | |
| 26 / 8 | | **SANDY SILT** brown, trace clay, moist | 7.6 | 9 | SS | 100 | 26 | 25 |
| 28 | | | 351.5 | | | | | |
| 30 | | **SAND** brown, trace silt, saturated | 9.1 | 10 | SS | 75 | 41 | 19 |
| 32 | | | | | | | | |
| 34 / 10 | | | | | | | | |
| 36 | | | 349.3 | 11 | SS | 90 | 13 | 16 |
| 38 | | Drilling Terminated | 11.3 | | | | | |




**Field Technician:** TXG

**Drafted by:** TXG

**Reviewed by:** ATD

**Sheet:** 1 of 1

Notes:
Borehole lithology, N-values and moisture contents inferred from MW106A-19.
Water level measured August 21, 2020.

## ID Number: MW106C-19

**Project Name:** 1012 Snyder's Rd. W. Development Hydrogeology Study

**Project No:** 40777-800

**Client:** Nideva Properties Inc.

**Site Location:** 1012 Snyder's Rd. W., Baden, ON

**Date Completed:** 4/26/2019

**Drilling Contractor:** Aardvark Drilling Inc.

**Drill Rig:** CME 850 Track

**Drill Method:** Hollow Stem Auger

**Protective Cover:** Monument

| Subsurface Profile | | | Sample | | | | SPT | Moisture | |
|---|---|---|---|---|---|---|---|---|---|
| Depth Scale | Symbol | Soil Description | Elevation (masl) / Depth (m) | Number | Type | Recovery (%) | N-Value Blows/305mm (20 40 60 80) | Moisture Content % (10 20 30) | Well Completion Details |
| ft / m | | Ground Surface | 360.6 | | | | | | |
| 0 / 0 | | **TOPSOIL** dark brown, silty sand, moist | 0.0 | 1 | SS | 90 | 5 | 14 | |
| | | | 359.8 | | | | | | |
| 2 | | **SAND** brown, some silt, trace gravel, moist | 0.8 | 2 | SS | 60 | 2 | 20 | |
| 4 | | trace silt, moist | 359.1 | | | | | | |
| 6 / 2 | | wet | 1.5 | 3 | SS | 50 | 7 | 19 | |
| 8 | | saturated | 358.3 | | | | | | |
| | | | 2.3 | 4 | SS | 60 | 12 | 20 | |
| 10 | | | 357.5 | | | | | | |
| | | **SILT** brown, trace sand, varying degrees of clay content, saturated | 3.0 | 5 | SS | 75 | 14 | 20 | |
| 12 / 4 | | | 356.9 | | | | | | |
| 14 | | Drilling Terminated | 3.7 | | | | | | |
| 16 | | | | | | | | | |
| 18 | | | | | | | | | |
| 20 / 6 | | | | | | | | | |
| 22 | | | | | | | | | |
| 24 | | | | | | | | | |
| 26 / 8 | | | | | | | | | |
| 28 | | | | | | | | | |
| 30 | | | | | | | | | |
| 32 / 10 | | | | | | | | | |
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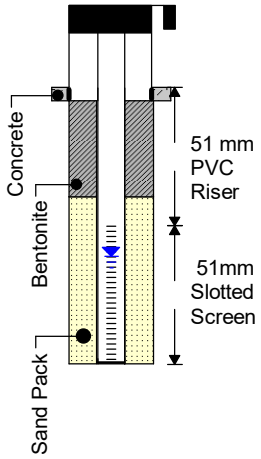



**Field Technician:** TXG

**Drafted by:** TXG

**Reviewed by:** ATD

**Sheet:** 1 of 1

Notes:
Borehole lithology, N-values and moisture contents inferred from MW106A-19.
Water level measured August 21, 2020.

## ID Number: MW201-20

**Project Name:** 1012 Snyder's Rd. W. Development Hydrogeology Study

**Project No:** 40777-800

**Client:** Nideva Properties Inc.

**Site Location:** 1012 Snyder's Rd. W., Baden, ON

**Date Completed:** 6/10/2020

**Drilling Contractor:** London Soil Test Ltd.

**Drill Rig:** D-50 Turbo

**Drill Method:** Hollow Stem Auger

**Protective Cover:** Monument

| Depth Scale (ft / m) | Soil Description | Elevation (masl) / Depth (m) | Number | Type | Recovery (%) | N-Value (Blows/305mm) | Moisture Content (%) |
|---|---|---|---|---|---|---|---|
| | Ground Surface | 363.1 | | | | | |
| 0 / 0 | **TOPSOIL** dark brown silt topsoil, moist | 0.0 | 1 | ss | 79 | 3 | 13 |
| 2 | **SAND** dark brown fine-grained sand, silty, trace gravel, moist | 361.8 | 2 | ss | 83 | 5 | 3 |
| 4 | light brown, trace to some silt, dry to moist | 1.2 | | | | | |
| 6 / 2 | | 360.9 | 3 | ss | 100 | 18 | 7 |
| 8 | brown, silty | 2.1 | | | | | |
| | wet seam at 2.6m (7.6cm) | | 4 | ss | 96 | 11 | 7 |
| 10 | | | 5 | ss | 100 | 18 | 7 |
| 12 / 4 | light brown to brown, moist | 359.4 3.7 | | | | | |
| 14 | | 358.5 | 6 | ss | 92 | 20 | |
| 16 | wet to saturated between 4.6-5.2m | 4.6 | 7 | ss | 75 | 16 | 22 |
| 18 | | 357.9 5.2 | 8 | ss | 92 | 21 | |
| 20 / 6 | | | 9 | ss | 100 | 15 | 5 |
| 22 | | | | | | | |
| 24 | | 355.4 | | | | | |
| 26 / 8 | dark brown, fine to medium-grained, trace to some silt, moist | 7.6 | 10 | ss | 100 | 29 | 6 |
| 28 | | | | | | | |
| 30 | | | 11 | ss | 83 | 22 | 7 |
| 32 / 10 | | | | | | | |
| 34 | | | | | | | |
| 36 | | 351.9 | 12 | ss | 88 | 31 | 6 |
| 38 | saturated | 11.2 | | | | | |
| 40 / 12 | Drilling Terminated | 350.3 | 13 | ss | 100 | 23 | 20 |
| 42 | | 12.8 | | | | | |

Well Completion Details: Concrete; Bentonite; Sand Pack; 51 mm PVC Riser; 51mm Slotted Screen

**Field Technician:** KLW

**Drafted by:** KLW

**Reviewed by:** ATD

MTE

**Sheet:** 1 of 1

Notes:
Water level measured August 21, 2020.

## ID Number: MW202-20

**Project Name:** 1012 Snyder's Rd. W. Development Hydrogeology Study

**Project No:** 40777-800

**Client:** Nideva Properties Inc.

**Site Location:** 1012 Snyder's Rd. W., Baden, ON

**Date Completed:** 6/10/2020

**Drilling Contractor:** London Soil Test Ltd.

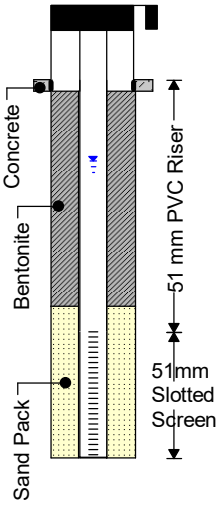
**Drill Rig:** D-50 Turbo

**Drill Method:** Hollow Stem Auger

**Protective Cover:** Monument

| Depth Scale (ft / m) | Soil Description | Elevation (masl) / Depth (m) | Sample Number | Type | Recovery (%) | SPT N-Value (Blows/305mm) | Moisture Content (%) |
|---|---|---|---|---|---|---|---|
| 0 / 0 | Ground Surface | 357.7 / 0.0 | | | | | |
| | **TOPSOIL** brown silt topsoil, moist | | 1 | ss | 100 | 6 | 29 |
| | **SILT TILL** brown silt till, some clay to clayey, minor gravel, mottled | | 2 | ss | 100 | 9 | 19 |
| | trace to some gravel | 356.2 / 1.5 | 3 | ss | 85 | 16 | 19 |
| | brownish-grey, clayey, moist to wet | 355.4 / 2.3 | 4 | ss | 100 | 7 | 25 |
| | very moist to wet | | 5 | ss | 100 | 4 | 23 |
| | | | 6 | ss | 100 | 7 | 23 |
| | | 353.1 / 4.6 | | | | | |
| | Drilling Terminated | | | | | | |

**Well Completion Details**




**Field Technician:** KLW

**Drafted by:** KLW

**Reviewed by:** ATD

Notes:
Water level measured August 21, 2020.

**Sheet:** 1 of 1

## ID Number: MW203-20

**Project Name:** 1012 Snyder's Rd. W. Development Hydrogeology Study

**Project No:** 40777-800

**Client:** Nideva Properties Inc.

**Site Location:** 1012 Snyder's Rd. W., Baden, ON

**Date Completed:** 6/10/2020

**Drilling Contractor:** London Soil Test Ltd.

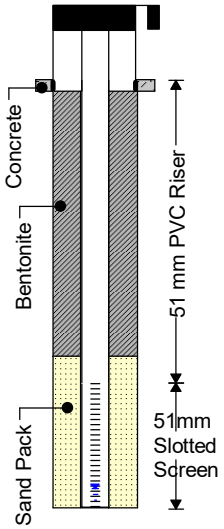
**Drill Rig:** D-50 Turbo

**Drill Method:** Hollow Stem Auger

**Protective Cover:** Monument

| Depth Scale (ft / m) | Symbol | Soil Description | Elevation (masl) / Depth (m) | Sample Number | Sample Type | Recovery (%) | SPT N-Value (Blows/305mm) | Moisture Content (%) |
|---|---|---|---|---|---|---|---|---|
| | | Ground Surface | 358.8 | | | | | |
| | | **TOPSOIL** brown silt topsoil, moist | 0.0 | 1 | ss | 100 | 18 | 18 |
| | | **SILT TILL** brown silt till, some clay to clayey, trace gravel, mottled | | 2 | ss | 88 | 25 | 18 |
| | | | 357.3 | | | | | |
| | | greyish-brown, clayey, trace to some gravel | 1.5 | 3 | ss | 100 | 28 | 17 |
| | | | 356.5 | | | | | |
| | | grey, trace gravel | 2.3 | 4 | ss | 100 | 17 | 22 |
| | | | | 5 | ss | 100 | 15 | 22 |
| | | | | 6 | ss | 100 | 14 | 18 |
| | | | 353.6 | 7 | ss | 100 | 17 | 16 |
| | | Drilling Terminated | 5.2 | | | | | |

**Well Completion Details**




**Field Technician:** KLW

**Drafted by:** KLW

**Reviewed by:** ATD

**Sheet:** 1 of 1

Notes:
Water level measured August 21, 2020.

## ID Number: MP1-20

**Project:** 1012 Snyder's Rd. W. Development Hydrogeology Study

**Project No:** 40777-800

**Client:** Nideva Properties Inc.

**Site Location:** 1012 Snyder's Rd. W., Baden, ON

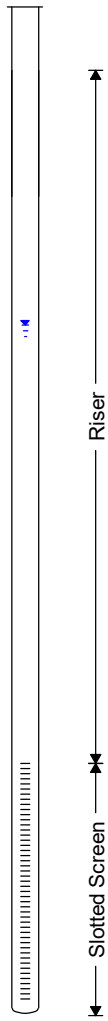
**Date:** 6/18/2020

**Construction Materials:** Stainless Steel

**Installation Method:** Drive Point

**Subsurface Profile**

| Depth (ft / m) | Symbol | Soil Description | Elevation (masl) / Depth (m) | Soil Sample Lab Analysis | Piezometer |
|---|---|---|---|---|---|
| 0 / 0 | | Ground Surface | 359.6 | | |
| | | **PEAT**<br>dark brownish-black muck/peat, saturated | 0.0<br>359.5 | | |
| | | **SILT TILL**<br>brown silt till, some clay to clayey | 0.1 | | |
| 2 | | | | | |
| | | | 358.5 | | |
| 4 | | Excavation Terminated | 1.1 | | |




**Field Technician:** KLW

**Drafted by:** KLW

**Reviewed by:** ATD

MTE

**Sheet:** 1 of 1

Notes:
Water level measured August 21, 2020.
Lithology below 0.3 mbgs inferred from MW203-20.

## ID Number: MW301-20

**Project:** Phase II ESA

**Project No:** 40777-200

**Client:** Snyders Road (Baden) Developments Inc.

**Site Location:** 1012 Snyders Road West, Baden, ON

**Drill Date:** 10/15/2020

**Drilling Contractor:** Direct Environmental Drilling Ltd

**Drill Rig:** Geoprobe

**Drill Method:** Direct Push

**Protective Cover:** Monument

| Depth (ft / m) | Soil Description | Elevation (masl) / Depth (m) | Number | Type | Recovery (%) | Soil Sample Lab Analysis | Headspace (PID ppm / Hydrocarbon ppm) |
|---|---|---|---|---|---|---|---|
| 0 / 0 | Ground Surface | 360.5 | | | | | |
| 0 | **SAND**<br>Medium brown sand with trace gravel, moist. | 0.0 | 1 | DP | 75 | Metals, As, Sb, Se, OCPs, PCBs, PAHs, PHCs F1-F4, VOCs | 6 |
| 4 / 2 | **CLAYEY SILT TILL**<br>Brown clayey silt till, moist. | 359.2<br>1.2 | 2 | DP | 100 | | |
| 8 | Till becomes wet. | 357.7<br>2.7 | | | | | |
| 10 / 3 | **SAND**<br>Medium brown fine sand, damp. | 357.4<br>3.0 | 3 | DP | 95 | | |
| 16 / 5 | | | 4 | DP | 95 | | 0 |
| 20 / 6 | | | | | | | |

Well Completion Details: Concrete; Bentonite; 32mm PVC Riser

**Field Technician:** JMS

**Drafted by:** JMS

**Reviewed by:** RMR

MTE

No odour or staining unless otherwise noted.

## ID Number: MW301-20

**Project:** Phase II ESA

**Project No:** 40777-200

**Client:** Snyders Road (Baden) Developments Inc.

**Site Location:** 1012 Snyders Road West, Baden, ON

**Drill Date:** 10/15/2020

**Drilling Contractor:** Direct Environmental Drilling Ltd

**Drill Rig:** Geoprobe

**Drill Method:** Direct Push

**Protective Cover:** Monument

| Subsurface Profile | | | Sample | | | | | Headspace | Well Completion Details |
|---|---|---|---|---|---|---|---|---|---|
| Depth | Symbol | Soil Description | Elevation (masl) Depth (m) | Number | Type | Recovery (%) | Soil Sample Lab Analysis | PID ppm 20 40 60 80 / Hydrocarbon ppm 100 200 300 400 | |
| 22 | | | | 5 | DP | 100 | | | |
| 24 | | Sand becomes wet. | 353.1 7.3 | | | | PHCs F1-F4, VOCs | | |
| 26 | 8 | | | 6 | DP | 100 | | | |
| 28 | | | | | | | | | |
| 30 | | Drilling Terminated | 351.3 9.1 | | | | | | |
| 32 | 10 | | | | | | | | |
| 34 | | | | | | | | | |
| 36 | | | | | | | | | |
| 38 | | | | | | | | | |
| 40 | 12 | | | | | | | | |

Sand Pack

Water level measured Oct. 15 2020.

32mm Slotted Screen

**Field Technician:** JMS

**Drafted by:** JMS

**Reviewed by:** RMR

MTE

No odour or staining unless otherwise noted.

## ID Number: MW302-20

**Project:** Phase II ESA

**Project No:** 40777-200

**Client:** Snyders Road (Baden) Developments Inc.

**Site Location:** 1012 Snyders Road West, Baden, ON

**Drill Date:** 11/9/2020

**Drilling Contractor:** Direct Environmental Drilling Ltd

**Drill Rig:** Geoprobe

**Drill Method:** Direct Push

**Protective Cover:** Monument

| Depth (ft / m) | Symbol | Soil Description | Elevation (masl) / Depth (m) | Number | Type | Recovery (%) | Soil Sample Lab Analysis | Headspace: PID ppm (20 40 60 80) / Hydrocarbon ppm (100 200 300 400) | Well Completion Details |
|---|---|---|---|---|---|---|---|---|---|
| 0 ft / 0 m | | Ground Surface | 358.6 | | | | | | |
| | | **TOPSOIL** Dark brown silty topsoil with trace organics and some gravel, damp. | 0.0 | | | | | 0 | |
| | | | 358.3 | | | | | | |
| | | **SILTY CLAY TILL** Medium brown silty clay till, trace gravel, damp. | 0.3 | | | | | 0 | |
| 2 ft | | | | 1 | DP | 100 | | | |
| 4 ft | | | | | | | | | |
| 6 ft / 2 m | | | | 2 | DP | 100 | | | |
| 8 ft | | | | | | | | | |
| 10 ft | | | | | | | | | |
| 12 ft / 4 m | | | | 3 | DP | 100 | | | |
| 14 ft | | | | | | | | | |
| 16 ft | | | | | | | | | |
| 18 ft | | | | 4 | DP | 100 | | | |
| 20 ft / 6 m | | Till becomes grey, wet. | 352.7 / 5.9 | | | | | | |

Concrete
Bentonite
Sand Pack
Water level measured Nov. 9, 2020.
32mm PVC Riser
32mm Slotted Screen

**Field Technician:** JMS

**Drafted by:** JMS

**Reviewed by:** RMR

No odour or staining unless otherwise noted.

## ID Number: MW302-20

**Project:** Phase II ESA

**Project No:** 40777-200

**Client:** Snyders Road (Baden) Developments Inc.

**Site Location:** 1012 Snyders Road West, Baden, ON

**Drill Date:** 11/9/2020

**Drilling Contractor:** Direct Environmental Drilling Ltd

**Drill Rig:** Geoprobe

**Drill Method:** Direct Push

**Protective Cover:** Monument

| Subsurface Profile | | | Sample | | | | | Headspace | Well Completion Details |
|---|---|---|---|---|---|---|---|---|---|
| Depth | Symbol | Soil Description | Elevation (masl) Depth (m) | Number | Type | Recovery (%) | Soil Sample Lab Analysis | PID ppm 20 40 60 80 / Hydrocarbon ppm 100 200 300 400 | |
| 22 | | | | 5 | DP | 100 | Metals, As, Sb, Se, PHC F1-F4, VOCs | 0 | |
| 24 | | | 351.0 | | | | | | |
| 26 | | Drilling Terminated | 7.6 | | | | | | |
| 28 | | | | | | | | | |
| 30 | | | | | | | | | |
| 32 | | | | | | | | | |
| 34 | | | | | | | | | |
| 36 | | | | | | | | | |
| 38 | | | | | | | | | |
| 40 | | | | | | | | | |

8 10 12

**Field Technician:** JMS

**Drafted by:** JMS

**Reviewed by:** RMR

MTE

No odour or staining unless otherwise noted.

## ID Number: BH303-20

**Project:** Phase II ESA

**Project No:** 40777-200

**Client:** Snyders Road (Baden) Developments Inc.

**Site Location:** 1012 Snyders Road West, Baden, ON

**Drill Date:** 10/19/2020

**Drilling Contractor:** Direct Environmental Drilling Ltd

**Drill Rig:** Geoprobe

**Drill Method:** Direct Push

**Protective Cover:** None

| Depth (ft / m) | Symbol | Soil Description | Elevation (masl) / Depth (m) | Sample Number | Sample Type | Recovery (%) | Soil Sample Lab Analysis | Headspace: PID ppm (20 40 60 80) / Hydrocarbon ppm (100 200 300 400) | Well Completion Details |
|---|---|---|---|---|---|---|---|---|---|
| 0 / 0 | | Ground Surface | 360.6 | | | | | | |
| | | **TOPSOIL** Dark brown topsoil with trace organics, moist. | 0.0 | | | | | | |
| | | | | 1 | DP | 100 | See Notes | 0 | |
| 2 | | | 359.6 | | | | | | |
| | | **SAND** Medium brown coarse sand moist. | 0.9 | | | | | | |
| 4 | | | | | | | | | |
| 6 / 2 | | | | 2 | DP | 100 | | | |
| 8 | | | 358.1 | | | | | | |
| | | Sand turns grey and is saturated. | 2.4 | | | | | 0 | |
| 10 | | | 357.5 | | | | | | |
| | | Drilling Terminated | 3.0 | | | | | | |
| 12 / 4 | | | | | | | | | |
| 14 | | | | | | | | | |
| 16 | | | | | | | | | |
| 18 | | | | | | | | | |
| 20 / 6 | | | | | | | | | |

Bentonite

**Field Technician:** JMS

**Drafted by:** JMS

**Reviewed by:** RMR

MTE

**Sheet:** 1 of 1

No odour or staining unless otherwise noted.
Soil sample lab analysis at 1-2': Metals, As, Sb, Se, OCPs, PCBs,

## ID Number: MW304-20

**Project:** Phase II ESA

**Project No:** 40777-200

**Client:** Snyders Road (Baden) Developments Inc.

**Site Location:** 1012 Snyders Road West, Baden, ON

**Drill Date:** 10/15/2020

**Drilling Contractor:** Direct Environmental Drilling Ltd

**Drill Rig:** Geoprobe

**Drill Method:** Direct Push

**Protective Cover:** Monument

| Depth (ft / m) | Soil Description | Elevation (masl) / Depth (m) | Sample Number | Sample Type | Recovery (%) | Soil Sample Lab Analysis | Headspace PID (ppm) | Headspace Hydrocarbon (ppm) |
|---|---|---|---|---|---|---|---|---|
| 0 / 0 | Ground Surface | 360.7 / 0.0 | | | | | | |
| | **TOPSOIL** Dark brown silty topsoil with trace organics, moist. | | | | | | | |
| 2 / | **CLAYEY SILT TILL** Medium brown clayey silt till, moist. | | 1 | DP | 75 | PHCs F1-F4, BTEX | 0 | |
| 4 / | | | | | | | | |
| 6 / 2 | | | 2 | DP | 100 | | | |
| 8 / | **SAND** Medium brown fine sand, moist. | 358.3 / 2.4 | | | | | | |
| 10 / | | | | | | | | |
| 12 / 4 | | | 3 | DP | 100 | | | |
| 14 / | | | | | | PHCs F1-F4, VOCs, PAHs | 0 | |
| | Sand becomes slightly silty, wet. | 356.2 / 4.6 | | | | | | |
| 16 / | | | | | | | | |
| 18 / | | | 4 | DP | 75 | | | |
| | Medium brown coarse sand, moist. | 355.0 / 5.8 | | | | | | |
| 20 / 6 | | | | | | | | |

**Well Completion Details:** Concrete; Bentonite; Sand Pack; 32mm PVC Riser; 32mm Slotted Screen

**Field Technician:** JMS

**Drafted by:** JMS

**Reviewed by:** RMR

MTE

**Sheet:** 1 of 2

No odour or staining unless otherwise noted.
Water level measured Oct. 15, 2020.

## ID Number: MW304-20

**Project:** Phase II ESA

**Project No:** 40777-200

**Client:** Snyders Road (Baden) Developments Inc.

**Site Location:** 1012 Snyders Road West, Baden, ON

**Drill Date:** 10/15/2020

**Drilling Contractor:** Direct Environmental Drilling Ltd

**Drill Rig:** Geoprobe

**Drill Method:** Direct Push

**Protective Cover:** Monument

| Subsurface Profile | | | Sample | | | | | Headspace | Well Completion Details |
|---|---|---|---|---|---|---|---|---|---|
| Depth | Symbol | Soil Description | Elevation (masl) Depth (m) | Number | Type | Recovery (%) | Soil Sample Lab Analysis | PID ppm 20 40 60 80 / Hydrocarbon ppm 100 200 300 400 | |
| 22 | | | | 5 | DP | 100 | | | |
| 24 | | | 353.1 | | | | | | Cave |
| 26 | | Drilling Terminated | 7.6 | | | | | | |
| 8 | | | | | | | | | |
| 28 | | | | | | | | | |
| 30 | | | | | | | | | |
| 32 | | | | | | | | | |
| 10 | | | | | | | | | |
| 34 | | | | | | | | | |
| 36 | | | | | | | | | |
| 38 | | | | | | | | | |
| 12 | | | | | | | | | |
| 40 | | | | | | | | | |

**Field Technician:** JMS

**Drafted by:** JMS

**Reviewed by:** RMR

MTE

**Sheet:** 2 of 2

No odour or staining unless otherwise noted.
Water level measured Oct. 15, 2020.

## ID Number: BH305A-20

**Project:** Phase II ESA

**Project No:** 40777-200

**Client:** Snyders Road (Baden) Developments Inc.

**Site Location:** 1012 Snyders Road West, Baden, ON

**Drill Date:** 10/15/2020

**Drilling Contractor:** Direct Environmental Drilling Ltd

**Drill Rig:** Geoprobe

**Drill Method:** Direct Push

**Protective Cover:** None

| Depth (ft / m) | Symbol | Soil Description | Elevation (masl) / Depth (m) | Sample Number | Sample Type | Recovery (%) | Soil Sample Lab Analysis | Headspace: PID ppm (20 40 60 80) / Hydrocarbon ppm (100 200 300 400) | Well Completion Details |
|---|---|---|---|---|---|---|---|---|---|
| 0 ft / 0 m | | Ground Surface | 360.6 | | | | | | Bentonite |
| | | **TOPSOIL** Dark brown silty topsoil with trace organics, moist. | 0.0 / 360.3 | | | | | | |
| | | **SAND AND GRAVEL** Medium brown sand and gravel, damp. | 0.3 | 1 | DP | 100 | PHCs F1-F4, BTEX | 0 | |
| 4 | | **CLAY TILL** Dark grey clay till, moist. | 359.2 / 1.4 | | | | | | |
| 6 / 2 | | Slight hydrocarbon-like odour noted, clay till becomes wet to saturated. | 358.7 / 1.8 | 2 | DP | 100 | PHCs F1-F4, BTEX | 0 | |
| 10 / 4 | | Drilling Terminated | 357.5 / 3.0 | | | | | | |
| 20 / 6 | | | | | | | | | |

**Field Technician:** JMS

**Drafted by:** JMS

**Reviewed by:** RMR

No odour or staining unless otherwise noted.

## ID Number: MW305B-20

**Project:** Phase II ESA

**Project No:** 40777-200

**Client:** Snyders Road (Baden) Developments Inc.

**Site Location:** 1012 Snyders Road West, Baden, ON

**Drill Date:** 11/9/2020

**Drilling Contractor:** Direct Environmental Drilling Ltd

**Drill Rig:** Geoprobe

**Drill Method:** Direct Push

**Protective Cover:** Monument

| Depth (ft / m) | Soil Description | Elevation (masl) / Depth (m) | Sample Number | Sample Type | Recovery (%) | Soil Sample Lab Analysis | Headspace: PID ppm (20 40 60 80) / Hydrocarbon ppm (100 200 300 400) |
|---|---|---|---|---|---|---|---|
| 0 / 0 | Ground Surface | 360.6 | | | | | |
| | **TOPSOIL** Dark brown silty topsoil with trace organics and some gravel, damp. | 0.0 / 360.3 | | | | | 0 |
| | **SAND AND GRAVEL** Medium brown sand and gravel, moist. | 0.3 | 1 | DP | 50 | | |
| 4 | **SILTY CLAY TILL** Medium brown silty clay till, moist. | 359.2 / 1.4 | | | | PHCs F1-F4, BTEX | 0 |
| 6 / 2 | Till becomes grey, wet. | 358.4 / 2.1 | 2 | DP | 75 | | |
| 10 | Till becomes brown-grey, damp. | 357.5 / 3.0 | 3 | DP | 90 | | |
| 14 / 4 | | | 4 | DP | 90 | | |
| 18 | **SAND** Grey coarse sand, wet. | 355.1 / 5.5 | | | | | |
| 20 / 6 | | 354.5 / 6.1 | | | | | |

Well Completion Details: Concrete; Bentonite; Sand Pack; 32mm PVC Riser; 32mm Slotted Screen

**Field Technician:** JMS

**Drafted by:** JMS

**Reviewed by:** RMR

MTE

**Sheet:** 1 of 1

No odour or staining unless otherwise noted.
Water level measured Feb. 2, 2021.

## ID Number: BH306-20

**Project:** Phase II ESA

**Project No:** 40777-200

**Client:** Snyders Road (Baden) Developments Inc.

**Site Location:** 1012 Snyders Road West, Baden, ON

**Drill Date:** 10/15/2020

**Drilling Contractor:** Direct Environmental Drilling Ltd

**Drill Rig:** Geoprobe

**Drill Method:** Direct Push

**Protective Cover:** None

| Depth (ft / m) | Symbol | Soil Description | Elevation (masl) / Depth (m) | Sample Number | Sample Type | Recovery (%) | Soil Sample Lab Analysis | Headspace: PID ppm (20 40 60 80) / Hydrocarbon ppm (100 200 300 400) | Well Completion Details |
|---|---|---|---|---|---|---|---|---|---|
| 0 / 0 | | Ground Surface | 360.7 | | | | | | Bentonite |
| | | **FILL** Sandy topsoil mixed with gravel fill, concrete, and demolition debris. | 0.0 / 360.3 | | | | See Notes, pH | 0 | |
| 2 / | | **CLAY** Medium brown clay, moist. | 0.5 | 1 | DP | 100 | See Notes | 0 | |
| 4 / | | | | | | | | | |
| 6 / 2 | | | | 2 | DP | 100 | | | |
| 8 / | | | 358.0 | | | | | | |
| | | **SAND** Medium brown fine sand, moist. | 2.7 / 357.7 | | | | | 0 | |
| 10 / | | Drilling Terminated | 3.0 | | | | | | |
| 12 / 4 | | | | | | | | | |
| 14 / | | | | | | | | | |
| 16 / | | | | | | | | | |
| 18 / | | | | | | | | | |
| 20 / 6 | | | | | | | | | |

**Field Technician:** JMS

**Drafted by:** JMS

**Reviewed by:** RMR

MTE

**Sheet:** 1 of 1

No odour or staining unless otherwise noted.

Soil sample lab analysis for 0.5-1.5' & 2-3': Metals, As, Sb, Se, PAHs, PHCs F1-F4, BTEX

## ID Number: BH307-20

**Project:** Phase II ESA

**Project No:** 40777-200

**Client:** Snyders Road (Baden) Developments Inc.

**Site Location:** 1012 Snyders Road West, Baden, ON

**Drill Date:** 10/15/2020

**Drilling Contractor:** Direct Environmental Drilling Ltd

**Drill Rig:** Geoprobe

**Drill Method:** Direct Push

**Protective Cover:** None

| Depth (ft / m) | Symbol | Soil Description | Elevation (masl) / Depth (m) | Sample Number | Sample Type | Recovery (%) | Soil Sample Lab Analysis | Headspace: PID ppm (20 40 60 80) / Hydrocarbon ppm (100 200 300 400) | Well Completion Details |
|---|---|---|---|---|---|---|---|---|---|
| 0 ft / 0 m | | Ground Surface | 360.7 | | | | | | |
| 0 | | **FILL** Silty topsoil mixed with gravel fill and demolition debris, trace organics. | 0.0 / 360.4 | | | | See notes | 0 | |
| | | **CLAY** Medium brown clay, moist. | 0.3 | 1 | DP | 100 | | | |
| 2 ft / 2 m | | | | | | | | | |
| 4 | | | | | | | | | |
| 6 | | | | 2 | DP | 100 | | | |
| 2 | | | 358.3 | | | | | | |
| 8 | | **SAND** Medium brown fine sand, moist. | 2.4 / 357.7 | | | | pH | 0 | |
| 10 | | Drilling Terminated | 3.0 | | | | | | |
| 12 | | | | | | | | | |
| 4 | | | | | | | | | |
| 14 | | | | | | | | | |
| 16 | | | | | | | | | |
| 18 | | | | | | | | | |
| 20 | | | | | | | | | |
| 6 | | | | | | | | | |

Well Completion Details: Bentonite

**Field Technician:** JMS

**Drafted by:** JMS

**Reviewed by:** RMR

MTE

**Sheet:** 1 of 1

No odour or staining unless otherwise noted.
Soil analysis at 0-1': Metals, As, Sb, Se, PHCs F1-F4, PAHs, VOCs, pH

## ID Number: BH308-20

**Project:** Phase II ESA

**Project No:** 40777-200

**Client:** Snyders Road (Baden) Developments Inc.

**Site Location:** 1012 Snyders Road West, Baden, ON

**Drill Date:** 10/15/2020

**Drilling Contractor:** Direct Environmental Drilling Ltd

**Drill Rig:** Geoprobe

**Drill Method:** Direct Push

**Protective Cover:** None

| Subsurface Profile | | | Sample | | | | | Headspace | |
|---|---|---|---|---|---|---|---|---|---|
| Depth (ft / m) | Symbol | Soil Description | Elevation (masl) / Depth (m) | Number | Type | Recovery (%) | Soil Sample Lab Analysis | PID ppm (20 40 60 80) / Hydrocarbon ppm (100 200 300 400) | Well Completion Details |
| 0 / 0 | | Ground Surface | 360.2 | | | | | | |
| | | **TOPSOIL** Dark brown topsoil with trace organics, moist. | 0.0 / 359.9 | | | | | | |
| | | **SAND** Medium brown coarse sand, moist. | 0.3 | 1 | DP | 100 | PCBs, PHCs F1-F4, BTEX | 0 | |
| 4 / 1 | | Sand becomes wet. | 359.0 / 1.2 | | | | | 0 | |
| | | Drilling Terminated | 358.7 / 1.5 | | | | | | |
| 20 / 6 | | | | | | | | | Bentonite |

**Field Technician:** JMS

**Drafted by:** JMS

**Reviewed by:** RMR

MTE

**Sheet:** 1 of 1

No odour or staining unless otherwise noted.

## ID Number: MW309-20

**Project:** Phase II ESA

**Project No:** 40777-200

**Client:** Snyders Road (Baden) Developments Inc.

**Site Location:** 1012 Snyders Road West, Baden, ON

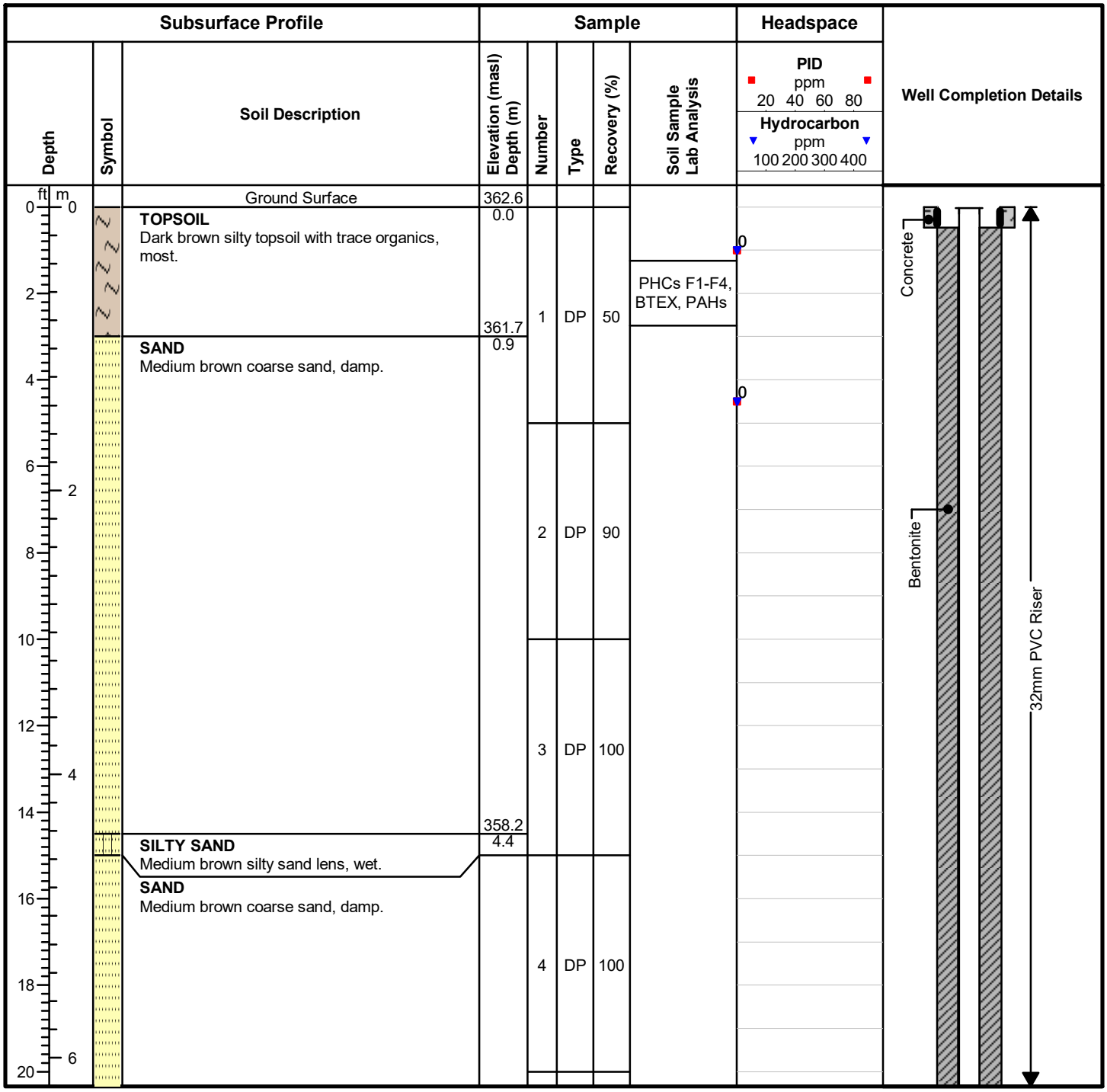
**Drill Date:** 10/19/2020

**Drilling Contractor:** Direct Environmental Drilling Ltd

**Drill Rig:** Geoprobe

**Drill Method:** Direct Push, Hollow Stem Auger

**Protective Cover:** Monument




**Field Technician:** JMS

**Drafted by:** JMS

**Reviewed by:** RMR

No odour or staining unless otherwise noted.

## ID Number: MW309-20

**Project:** Phase II ESA

**Project No:** 40777-200

**Client:** Snyders Road (Baden) Developments Inc.

**Site Location:** 1012 Snyders Road West, Baden, ON

**Drill Date:** 10/19/2020

**Drilling Contractor:** Direct Environmental Drilling Ltd

**Drill Rig:** Geoprobe

**Drill Method:** Direct Push, Hollow Stem Auger

**Protective Cover:** Monument

| Subsurface Profile | | | Sample | | | | | Headspace | Well Completion Details |
|---|---|---|---|---|---|---|---|---|---|
| Depth | Symbol | Soil Description | Elevation (masl) Depth (m) | Number | Type | Recovery (%) | Soil Sample Lab Analysis | PID ppm 20 40 60 80 / Hydrocarbon ppm 100 200 300 400 | |
| 22 | | | | 5 | DP | 100 | | 0 | |
| 24 | | | | | | | | | |
| 26 | 8 | | | | | | | | |
| 28 | | | | | | | | | |
| 30 | | | | 6 | HSA | 75 | | | |
| 32 | | | | | | | | | |
| 34 | 10 | | | | | | | | |
| 36 | | Sand becomes saturated. | 351.9 10.7 | 7 | HSA | 75 | PHCs F1-F4, BTEX, PAHs | 0 | |
| 38 | | Drilling Terminated | 351.0 11.6 | | | | | | |
| 40 | 12 | | | | | | | | |

Sand Pack

Water level measured Oct 19, 2020

32mm Slotted Screen

**Field Technician:** JMS

**Drafted by:** JMS

**Reviewed by:** RMR

MTE

No odour or staining unless otherwise noted.

## ID Number: MW310-20

**Project:** Phase II ESA

**Project No:** 40777-200

**Client:** Snyders Road (Baden) Developments Inc.

**Site Location:** 1012 Snyders Road West, Baden, ON

**Drill Date:** 10/19/2020

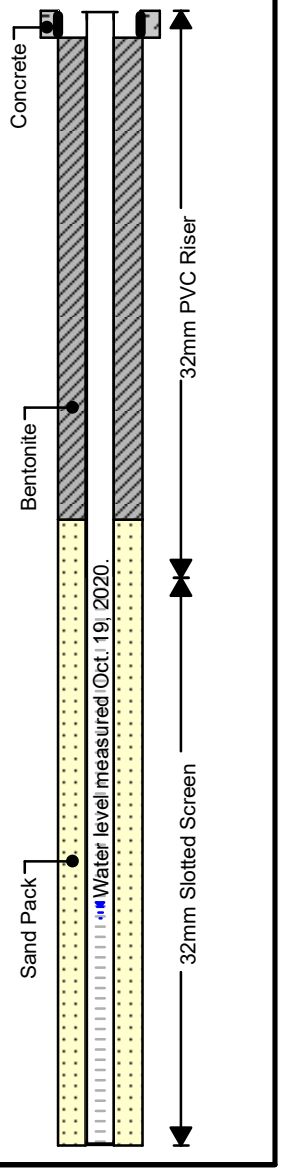
**Drilling Contractor:** Direct Environmental Drilling Ltd

**Drill Rig:** Geoprobe

**Drill Method:** Direct Push

**Protective Cover:** Monument

| Depth (ft / m) | Symbol | Soil Description | Elevation (masl) / Depth (m) | Number | Type | Recovery (%) | Soil Sample Lab Analysis | Headspace: PID ppm (20 40 60 80) / Hydrocarbon ppm (100 200 300 400) | Well Completion Details |
|---|---|---|---|---|---|---|---|---|---|
| 0 / 0 | | Ground Surface | 359.5 | | | | | | |
| | | **TOPSOIL** Dark brown silty topsoil with trace organics and some gravel, damp. | 0.0 | | | | | | |
| | | | | 1 | DP | 100 | | 0 | |
| | | | 358.5 | | | | | | |
| | | **CLAYEY SILT TILL** Medium brown silty clay till, some gravel, damp. | 1.1 | | | | | | |
| | | | | | | | | 0 | |
| | | | | 2 | DP | 100 | | | |
| | | Till becomes slightly darker brown, moist. | 356.8 / 2.7 | | | | | | |
| | | | | 3 | DP | 100 | | | |
| | | | 354.7 | | | | | | |
| | | Till turns grey, wet. | 4.9 | | | | | | |
| | | | | 4 | DP | 100 | PHC F1-F4, BTEX | 0 | |
| 20 / 6 | | | 353.4 / 6.1 | | | | | | |




**Field Technician:** JMS

**Drafted by:** JMS

**Reviewed by:** RMR

MTE

**Sheet:** 1 of 1

No odour or staining unless otherwise noted.

Englobe

**Ground Elevation:** *359.08 m*
**Northing:** *4805588.6 m*
**Easting:** *526255.1 m*

**Borehole Number:** **BH-01-21**
**Job N°:** *2100862.100*
**Drill Date:** *2021-02-23*
**Field Tech:** *D.Brenner*
**Drill Method:** *Geo-Sleeve Sampler*

**Project:** *Snyder's Road Reconstruction*

**Location:** *Cristian Street to Gingerich Road, Baden, Ontario*

| Depth (m) | Description | Symbol | Elevation (m) / Depth (m) | Type and Number | Headspace (ppm) | Environmental Testing |
|---|---|---|---|---|---|---|
| | Ground Elevation | | 359.08 | | | |
| | ***PAVEMENT STRUCTURE:*** Asphaltic Concrete: 200 mm Granular Fill: 560 mm, compact brown sand and gravel, moist, odour or staining | | 0.00<br>358.32 | SS-1 | 0/0 | - |
| 1 | ***SILT TILL:*** brown silt, some clay, trace sand, moist | | 0.76 | SS-2 | 0/0 | PHCs, BTEX, Metals, SAR, EC, pH |
| 2 | very stiff silt and clay | | 357.10<br>1.98 | SS-3 | 0/0 | - |
| | | | | SS-4 | 0/0 | - |
| 3 | | | | SS-5 | 0/0 | PHCs, BTEX, Metals, SAR, EC, pH, PAHs |
| 4 | | | | SS-6 | 0/0 | - |
| 5 | | | | SS-7 | 0/0 | - |
| | grey, wet | | 353.29<br>5.79 | SS-8 | 0/0 | - |
| 6 | | | | SS-9 | 0/0 | PHCs, BTEX, Metals, SAR, EC, pH |
| 7 | | | | SS-10 | 0/0 | - |
| | Borehole terminated at 7.62 m | | 351.46<br>7.62 | | | |
| 8 | | | | | | |

Water Content (%): WP, WL; 10 20 30 40 50 60 70

Groundwater Observations and Standpipe Details: asphaltic concrete; bentonite seal

**Reviewed by:** *D.Brenner*
**Drafted by:** *E.Ciochon*
**Sheet:** *1 of 1*

**Notes:** *Headspace readings expressed as parts per million (ppm).*

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Vertical Scale = 1 : 50.0

EQ-09-Ge-72 R.1 18.02.2011

Englobe

| | | | |
|---|---|---|---|
| **Ground Elevation:** | *358.37 m* | **Borehole Number:** | **BH-02-21** |
| **Northing:** | *4805629.6 m* | **Job N°:** | *2100862.100* |
| **Easting:** | *526462.7 m* | **Drill Date:** | *2021-02-23* |
| **Project:** | *Snyder's Road Reconstruction* | **Field Tech:** | *D.Brenner* |
| **Location:** | *Cristian Street to Gingerich Road, Baden, Ontario* | **Drill Method:** | *Geo-Sleeve Sampler* |

| SOIL PROFILE | | | | SAMPLE | | | | |
|---|---|---|---|---|---|---|---|---|
| Depth (m) | Description | Symbol | Elevation (m) / Depth (m) | Type and Number | Headspace (ppm) | Environmental Testing | Water Content (%) WP WL 10 20 30 40 50 60 70 | Groundwater Observations and Standpipe Details |
| | Ground Elevation | | 358.37 | | | | | |
| | ***PAVEMENT STRUCTURE:*** Asphaltic Concrete: 200 mm Granular Fill: 560 mm, comopact brown sand and gravel, trace silt, moist | | 0.00 | SS-1 | 0/0 | PHCs, BTEX, Metals, SAR, EC, pH | | asphaltic concrete |
| | | | 357.46 | | | | | |
| 1 | ***SILT TILL:*** stiff brown silt, trace sand, trace to some clay, moist | | 0.91 | SS-2 | 0/0 | - | | |
| | some clay | | 356.69 1.68 | SS-3 | 10/10 | PHCs, BTEX, Metals, SAR, EC, pH, PAHs | | |
| 2 | | | | SS-4 | 0/0 | - | | |
| 3 | | | | SS-5 | 0/0 | - | | bentonite seal |
| | grey silt and clay | | 354.86 3.50 | | | | | |
| 4 | | | | SS-6 | 0/0 | - | | |
| | wet | | 353.65 4.72 | SS-7 | 0/0 | PHCs, BTEX, Metals, SAR, EC, pH | | |
| 5 | | | | | | | | |
| 6 | | | | SS-8 | 0/0 | - | | |
| | | | 352.27 | | | | | |
| | Borehole terminated at 6.10 m | | 6.10 | | | | | |
| 7 | | | | | | | | |
| 8 | | | | | | | | |

**Reviewed by:** *D.Brenner* **Drafted by:** *E.Ciochon* **Sheet:** *1 of 1*

**Notes:** *Headspace readings expressed as parts per million (ppm).*

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Vertical Scale = 1 : 50.0

EQ-09-Ge-72 R.1 18.02.2011

Englobe

**Ground Elevation:** *354.00 m*
**Northing:** *4805672 .0 m*
**Easting:** *526662.8 m*

**Borehole Number:** **BH-03-21**
**Job N°:** *2100862.100*
**Drill Date:** *2021-02-23*
**Field Tech:** *D.Brenner*
**Drill Method:** *Geo-Sleeve Sampler*

**Project:** *Snyder's Road Reconstruction*

**Location:** *Cristian Street to Gingerich Road, Baden, Ontario*

| Depth (m) | Description | Symbol | Elevation (m) / Depth (m) | Type and Number | Headspace (ppm) | Environmental Testing | Water Content (%) | Groundwater Observations and Standpipe Details |
|---|---|---|---|---|---|---|---|---|
| | Ground Elevation | | 354.00 | | | | WP WL; 10 20 30 40 50 60 70 | |
| | ***PAVEMENT STRUCTURE:*** Asphaltic Concrete: 250 mm Granular Fill: 815 mm, compact brown sand and gravel, trace silt, moist | | 0.00 | SS-1 | 0/0 | - | | asphaltic concrete |
| 1 | | | 352.93 | | | | | |
| | ***SILT TILL:*** brown silt, trace sand, trace to some clay, moist | | 1.07 | SS-2 | 5/5 | PHCs, BTEX, Metals, SAR, EC, pH | | |
| 2 | | | | SS-3 | 0/0 | - | | |
| | | | | SS-4 | 0/0 | - | | bentonite seal |
| 3 | | | | SS-5 | 0/0 | PHCs, BTEX, Metals, SAR, EC, pH, PAHs | | |
| | grey, wet | | 350.34 3.66 | | | | | |
| 4 | | | | SS-6 | 0/0 | PHCs, BTEX, Metals, SAR, EC, pH | | |
| | | | 349.43 | | | | | |
| | Borehole terminated at 4.57 m | | 4.57 | | | | | |
| 5 | | | | | | | | |
| 6 | | | | | | | | |
| 7 | | | | | | | | |
| 8 | | | | | | | | |

**Reviewed by:** *D.Brenner*
**Drafted by:** *E.Ciochon*
**Sheet:** *1 of 1*

**Notes:** *Headspace readings expressed as parts per million (ppm).*

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Vertical Scale = 1 : 50.0

EQ-09-Ge-72 R.1 18.02.2011

Englobe

**Ground Elevation:** *352.69 m*
**Northing:** *4805681.2 m*
**Easting:** *526709.2 m*

**Borehole Number:** **BH-04-21**
**Job N°:** *2100862.100*
**Drill Date:** *2021-02-23*
**Field Tech:** *D.Brenner*
**Drill Method:** *Geo-Sleeve Sampler*

**Project:** *Snyder's Road Reconstruction*

**Location:** *Cristian Street to Gingerich Road, Baden, Ontario*

| Depth (m) | Description | Symbol | Elevation (m) / Depth (m) | Type and Number | Headspace (ppm) | Environmental Testing | Water Content (%) WP WL (10 20 30 40 50 60 70) | Groundwater Observations and Standpipe Details |
|---|---|---|---|---|---|---|---|---|
| | Ground Elevation | | 352.69 | | | | | |
| | ***PAVEMENT STRUCTURE:*** Asphaltic Concrete: 150 mm Granular Fill: 1070 mm, compact brown sand and gravel, trace silt and clay, moist | | 0.00 | SS-1 | 0/0 | - | | asphaltic concrete |
| 1 | | | 351.47 | SS-2 | 0/0 | PHCs, BTEX, Metals, SAR, EC, pH | | |
| | ***SILT TILL:*** stiff brown silt, some clay, trace sand, moist | | 1.22 | SS-3 | 0/0 | PHCs, BTEX, Metals, SAR, EC, pH, PAHs | | |
| 2 | | | | SS-4 | 0/0 | - | | bentonite seal |
| 3 | | | | SS-5 | 5/5 | PHCs, BTEX, Metals, SAR, EC, pH | | |
| | wet | | 348.88 3.81 | | | | | |
| 4 | | | | SS-6 | 0/0 | - | | |
| | Borehole terminated at 4.57 m | | 348.12 4.57 | | | | | |
| 5 | | | | | | | | |
| 6 | | | | | | | | |
| 7 | | | | | | | | |
| 8 | | | | | | | | |

**Reviewed by:** *D.Brenner* **Drafted by:** *E.Ciochon* **Sheet:** *1 of 1*

**Notes:** *Headspace readings expressed as parts per million (ppm).*

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Vertical Scale = 1 : 50.0

EQ-09-Ge-72 R.1 18.02.2011

# Log of Borehole: BH1

**Project #:** 244512 **Logged By:** NW

**Project:** Geotechnical Investigation

**Client:** Regional Municipality of Waterloo

**Location:** Snyder's Road, Baden, Ontario

**Drill Date:** August 15, 2019 **Project Manager:** VM

## SUBSURFACE PROFILE

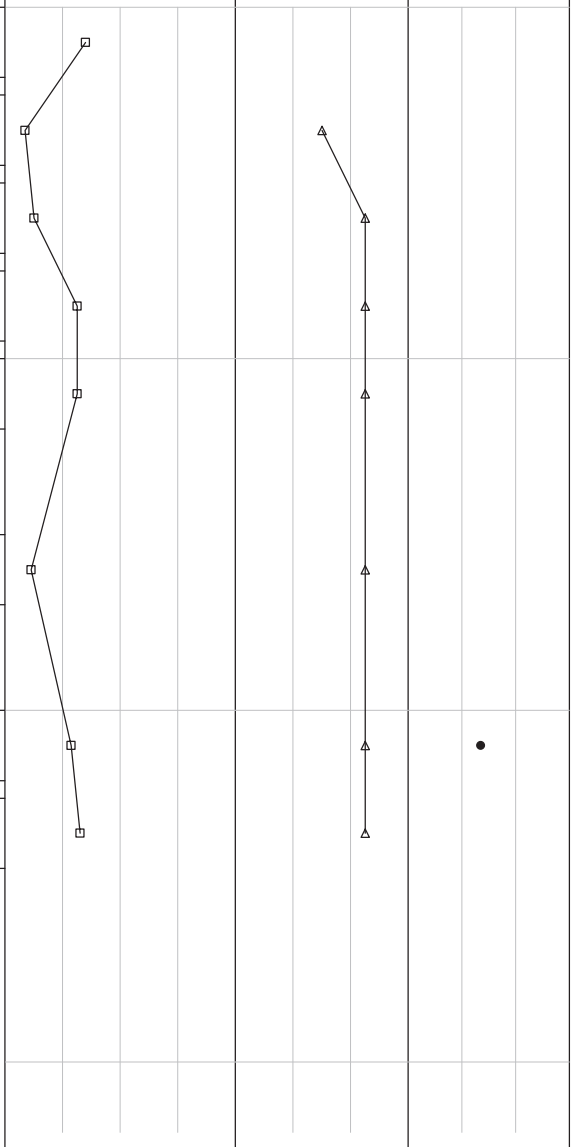
| Depth (m) | Description | Elevation (m) |
|---|---|---|
| 0 | Ground Surface | 358.67 |
| | **Pavement Structure** Asphaltic Concrete (175 mm) Granular Fill (580 mm) - Brown sand and gravel, trace silt, compact, damp | 357.91 |
| 1 | **Fill** Brown silt, some sand, trace gravel, loose, damp | 357.14 |
| 2 | **Silt Till** Dark brown clayey silt, trace sand and gravel, very stiff, DTPL | 356.38 |
| | Brown | |
| 3 | Hard | |
| 4 | Grey/brown, firm, WTPL | 354.10 |
| 5 | | |
| 6 | DTPL | 352.57 |
| 7 | | 351.20 |
| | End of Borehole | |
| 8 | Borehole terminated at 7.47 mbgs. At drilling completion dry cave observed at 6.71 mbgs. | |
| 9 | | |

Monitoring Well Details: Riser, Bentonite, Silica Sand, Screen

Water level = 5.12 mbgs, as measured on August 21, 2019

## SAMPLE

| Sample Type | Sampler # | Recovery (%) | SPT N-Value |
|---|---|---|---|
| SS | 1 | 79 | 28 |
| SS | 2 | 67 | 7 |
| SS | 3 | 79 | 10 |
| SS | 4 | 100 | 25 |
| SS | 5 | 100 | 25 |
| SS | 6 | 100 | 9 |
| SS | 7 | 100 | 23 |
| SS | 8 | 100 | 26 |




**Contractor:** Altech Drilling and Investigative Services Inc.

**Grade Elevation:** 358.67 masl

**Drilling Method:** Split Spoon/Solid Stem

**Top of Casing Elevation:** 358.60 masl

**Well Casing Size:** 51 mm

**Sheet:** 1 of 1

# Log of Borehole: BH2

**Project #:** 244512 **Logged By:** NW

**Project:** Geotechnical Investigation

**Client:** Regional Municipality of Waterloo

**Location:** Snyder's Road, Baden, Ontario

**Drill Date:** August 15, 2019 **Project Manager:** VM

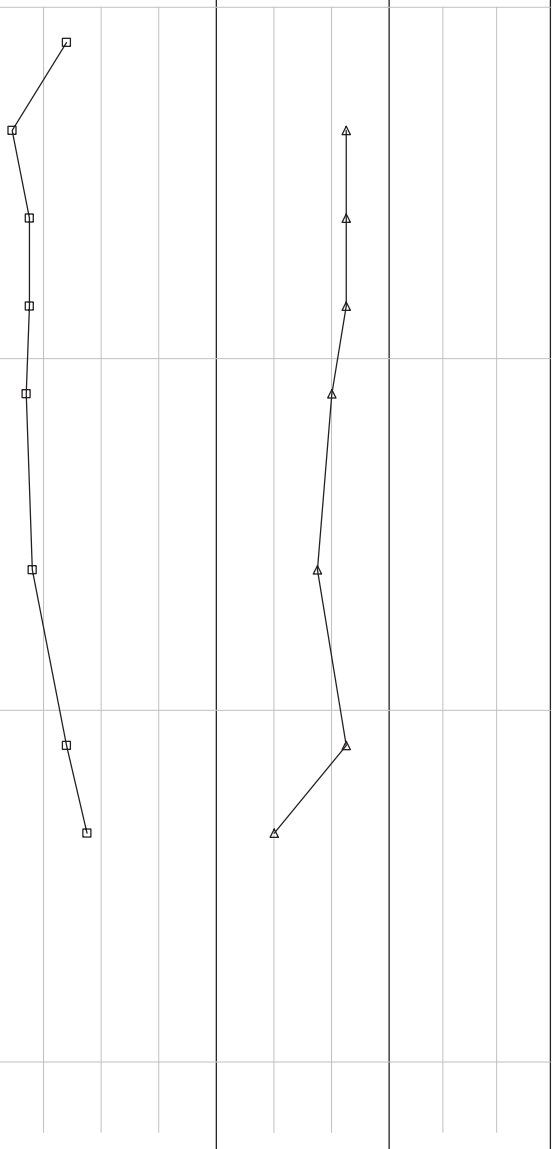
## SUBSURFACE PROFILE

| Depth (m) | Description | Elevation (m) |
|---|---|---|
| 0 | Ground Surface | 358.48 |
| | **Pavement Structure** Asphaltic Concrete (150 mm) Granular Fill (610 mm) - Brown sand and gravel, trace silt, compact, damp | 357.72 |
| 1 | **Fill** Brown silt, some gravel, loose, damp | 356.96 |
| 2 | **Silt Till** Clayey silt, trace sand and gravel, hard, DTPL | 356.20 |
| | Occasional silt seams | 355.43 |
| 3 | APL WTPL | |
| 4 | Very stiff | 353.91 |
| 5 | | |
| 6 | Grey/brown, hard, DTPL | 352.39 |
| | | 351.62 |
| 7 | Stiff Silt, trace sand and gravel, dense, moist | 351.01 |
| | End of Borehole | |
| 8 | Borehole terminated at 7.47 mbgs. At drilling completion no cave observed. | |
| 9 | | |

Monitoring Well Details: No Monitoring Well Installed

## SAMPLE

| Sample Type | Sampler # | Recovery (%) | SPT N-Value |
|---|---|---|---|
| SS | 1 | 71 | 28 |
| SS | 2 | 63 | 9 |
| SS | 3 | 100 | 15 |
| SS | 4 | 100 | 15 |
| SS | 5 | 100 | 14 |
| SS | 6 | 38 | 16 |
| SS | 7 | 100 | 28 |
| SS | 8 | 100 | 35 |




**Contractor:** Altech Drilling and Investigative Services Inc.

**Grade Elevation:** 358.48 masl

**Drilling Method:** Split Spoon/Solid Stem

**Top of Casing Elevation:** NA

**Well Casing Size:** NA

**Sheet:** 1 of 1

# Log of Borehole: BH3

**Project #:** 244512 **Logged By:** NW

**Project:** Geotechnical Investigation

**Client:** Regional Municipality of Waterloo

**Location:** Snyder's Road, Baden, Ontario

**Drill Date:** August 15, 2019 **Project Manager:** VM

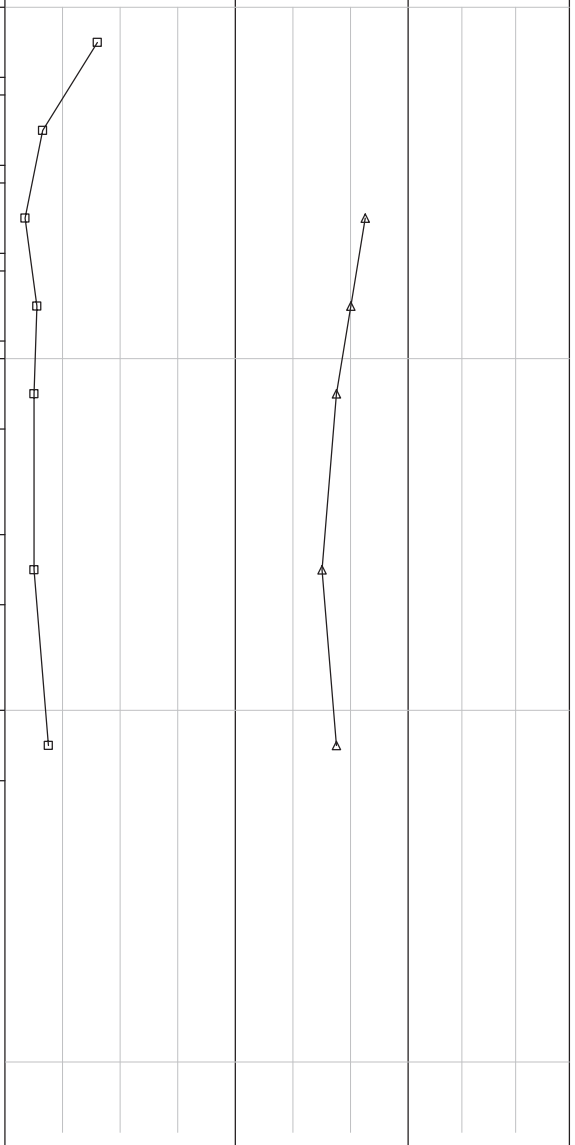
## SUBSURFACE PROFILE

| Depth (m) | Symbol | Description | Elevation (m) |
|---|---|---|---|
| 0 | | Ground Surface | 357.20 |
| | | **Pavement Structure**<br>Asphaltic Concrete (175 mm)<br>Granular Fill (1325 mm) - Brown sand and gravel, trace silt, dense to compact, damp to moist | |
| 1 | | | 355.67 |
| | | **Silt Till**<br>Clayey silt, trace sand and gravel, hard, DTPL | 354.91 |
| 2 | | Occasional saturated silt seams<br>Very stiff, APL | |
| 3 | | | |
| 4 | | | 352.63 |
| | | Grey/brown, WTPL | |
| 5 | | | |
| 6 | | | 351.10 |
| | | DTPL | 350.49 |
| 7 | | End of Borehole<br>Borehole terminated at 6.71 mbgs. At drilling completion wet cave observed at 6.55 mbgs. | |
| 8 | | | |
| 9 | | | |

Monitoring Well Details: No Monitoring Well Installed

## SAMPLE

| Sample Type | Sampler # | Recovery (%) | SPT N-Value |
|---|---|---|---|
| SS | 1 | 71 | 32 |
| SS | 2 | 50 | 13 |
| SS | 3 | 100 | 7 |
| SS | 4 | 100 | 11 |
| SS | 5 | 100 | 10 |
| SS | 6 | 100 | 10 |
| SS | 7 | 100 | 15 |




**Contractor:** Altech Drilling and Investigative Services Inc.

**Grade Elevation:** 357.20 masl

**Drilling Method:** Split Spoon/Solid Stem

**Top of Casing Elevation:** NA

**Well Casing Size:** NA

**Sheet:** 1 of 1

# Log of Borehole: BH4

**Project #:** 244512 **Logged By:** NW

**Project:** Geotechnical Investigation

**Client:** Regional Municipality of Waterloo

**Location:** Snyder's Road, Baden, Ontario

**Drill Date:** August 15, 2019 **Project Manager:** VM

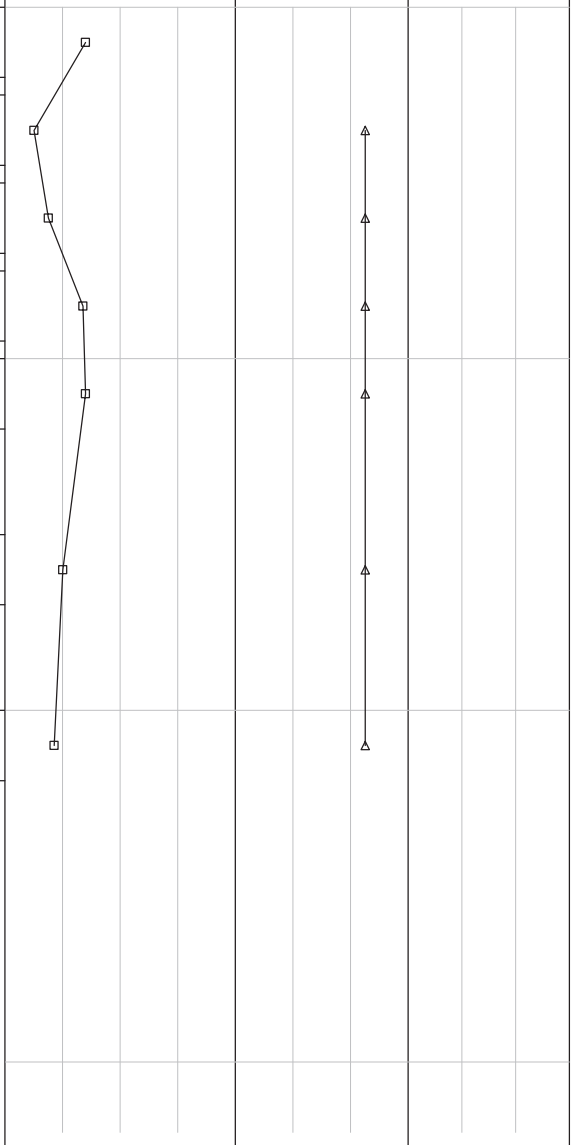
## SUBSURFACE PROFILE

| Depth (m) | Description | Elevation (m) |
|---|---|---|
| 0 | Ground Surface | 354.84 |
| | **Pavement Structure** Asphaltic Concrete (200 mm) Granular Fill (560 mm) - Brown sand and gravel, compact, trace silt, damp | 354.07 |
| 1 | **Fill** Brown sand, loose, moist | 353.31 |
| 2 | **Silt Till** Clayey silt, trace sand and gravel, hard, Occasional sand seams, APL DTPL | 352.55 |
| 3 | Silt, trace to some clay, compact, moist | 351.27 |
| 4 | Grey/brown clayey silt, hard, DTPL | 350.26 |
| 5 | | |
| 6 | | 348.13 |
| 7 | End of Borehole Borehole terminated at 6.71 mbgs. At drilling completion no cave observed. | |
| 8 | | |
| 9 | | |

Monitoring Well Details: No Monitoring Well Installed

## SAMPLE

| Sample Type | Sampler # | Recovery (%) | SPT N-Value |
|---|---|---|---|
| SS | 1 | 75 | 28 |
| SS | 2 | 63 | 10 |
| SS | 3 | 88 | 15 |
| SS | 4 | 100 | 27 |
| SS | 5 | 100 | 28 |
| SS | 6 | 100 | 20 |
| SS | 7 | 100 | 17 |




**Contractor:** Altech Drilling and Investigative Services Inc. **Grade Elevation:** 354.84 masl

**Drilling Method:** Split Spoon/Solid Stem **Top of Casing Elevation:** NA

**Well Casing Size:** NA **Sheet:** 1 of 1

# Log of Borehole: BH5

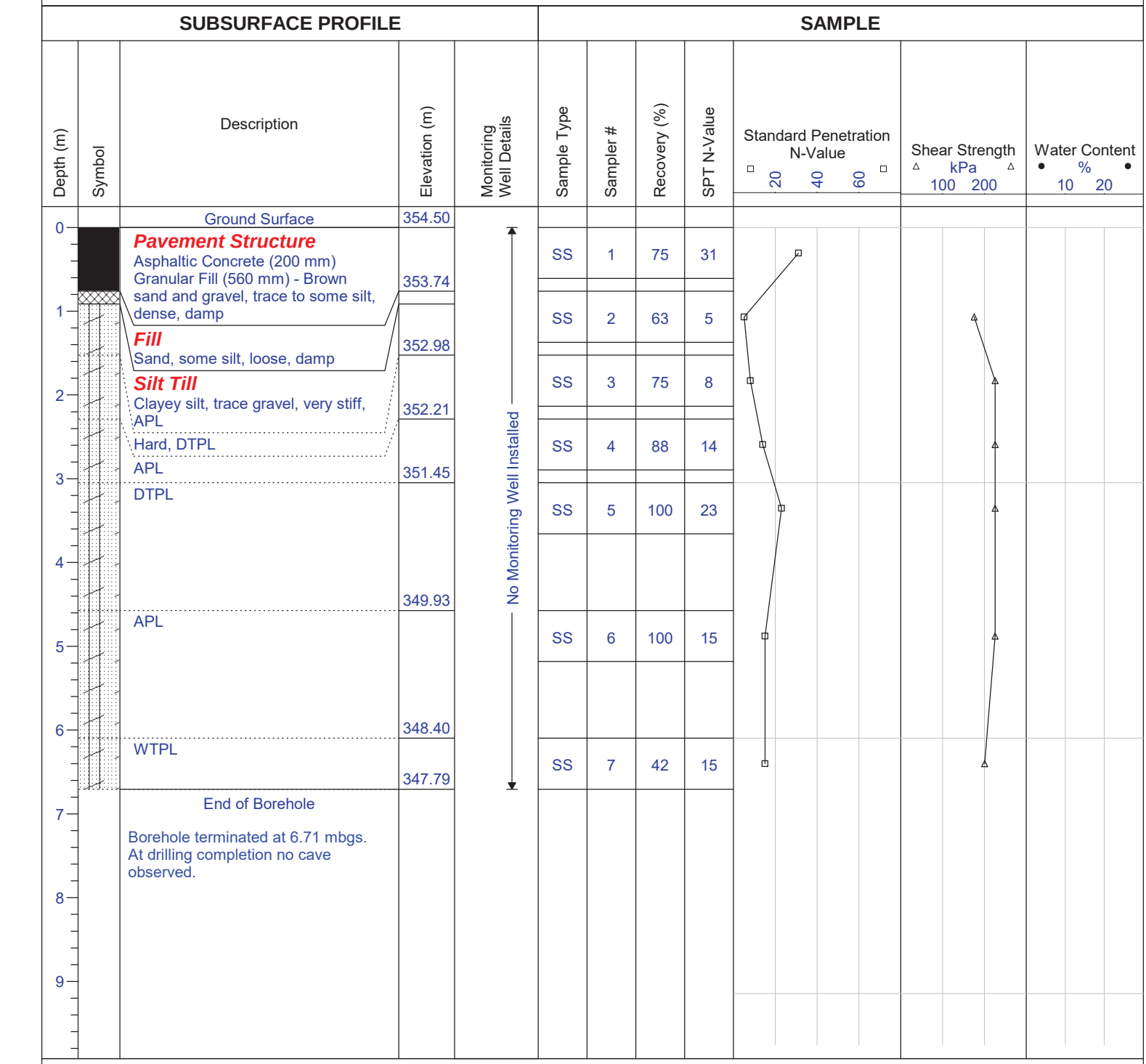
**Project #:** 244512 **Logged By:** NW

**Project:** Geotechnical Investigation

**Client:** Regional Municipality of Waterloo

**Location:** Snyder's Road, Baden, Ontario

**Drill Date:** August 16, 2019 **Project Manager:** VM




**Contractor:** Altech Drilling and Investigative Services Inc.

**Grade Elevation:** 354.5 masl

**Drilling Method:** Split Spoon/Solid Stem

**Top of Casing Elevation:** NA

**Well Casing Size:** NA

**Sheet:** 1 of 1

# Log of Borehole: BH6

**Project #:** 244512 **Logged By:** NW

**Project:** Geotechnical Investigation

**Client:** Regional Municipality of Waterloo

**Location:** Snyder's Road, Baden, Ontario

**Drill Date:** August 16, 2019 **Project Manager:** VM

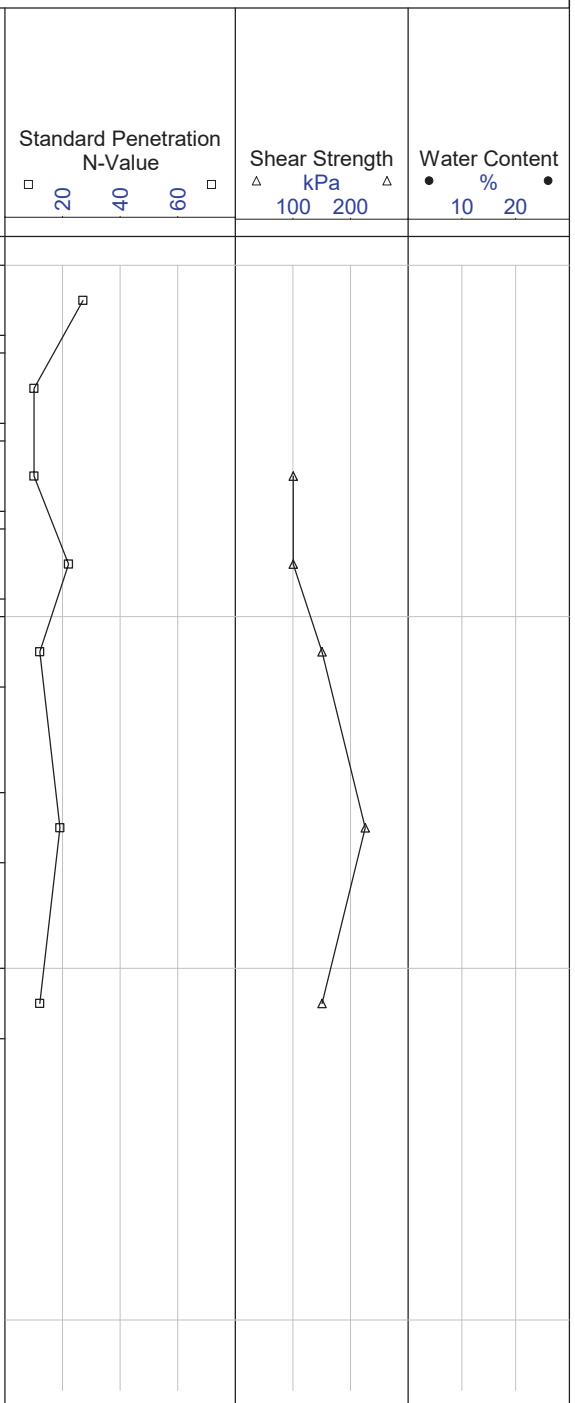
## SUBSURFACE PROFILE

| Depth (m) | Description | Elevation (m) |
|---|---|---|
| 0 | Ground Surface | 352.84 |
| | **Pavement Structure** Asphaltic Concrete (200 mm) Granular Fill (560 mm) - Brown sand and gravel, trace to some silt, compact, damp | 352.08 |
| 1 | **Fill** Brown sandy silt, trace to some gravel, loose, moist | 351.31 |
| 2 | Dark brown with black organic staining, some clay, trace gravel, occasional wood pieces | |
| | **Silt Till** Brown clayey silt, trace sand and gravel, stiff, DTPL | 349.79 |
| 3 | Very stiff to hard, WTPL to DTPL | |
| 4 | | |
| 5 | | |
| 6 | | 346.74 |
| | Grey/brown, very stiff, APL | 346.13 |
| 7 | End of Borehole | |
| | Borehole terminated at 6.71 mbgs. At drilling completion no cave observed. | |
| 8 | | |
| 9 | | |

Monitoring Well Details: No Monitoring Well Installed

## SAMPLE

| Sample Type | Sampler # | Recovery (%) | SPT N-Value |
|---|---|---|---|
| SS | 1 | 75 | 27 |
| SS | 2 | 75 | 10 |
| SS | 3 | 79 | 10 |
| SS | 4 | 100 | 22 |
| SS | 5 | 75 | 12 |
| SS | 6 | 100 | 19 |
| SS | 7 | 100 | 12 |




**Contractor:** Altech Drilling and Investigative Services Inc.

**Grade Elevation:** 352.84 masl

**Drilling Method:** Split Spoon/Solid Stem

**Top of Casing Elevation:** NA

**Well Casing Size:** NA

**Sheet:** 1 of 1

# Log of Borehole: BH7

**Project #:** 244512 **Logged By:** NW

**Project:** Geotechnical Investigation

**Client:** Regional Municipality of Waterloo

**Location:** Snyder's Road, Baden, Ontario

**Drill Date:** August 16, 2019 **Project Manager:** VM

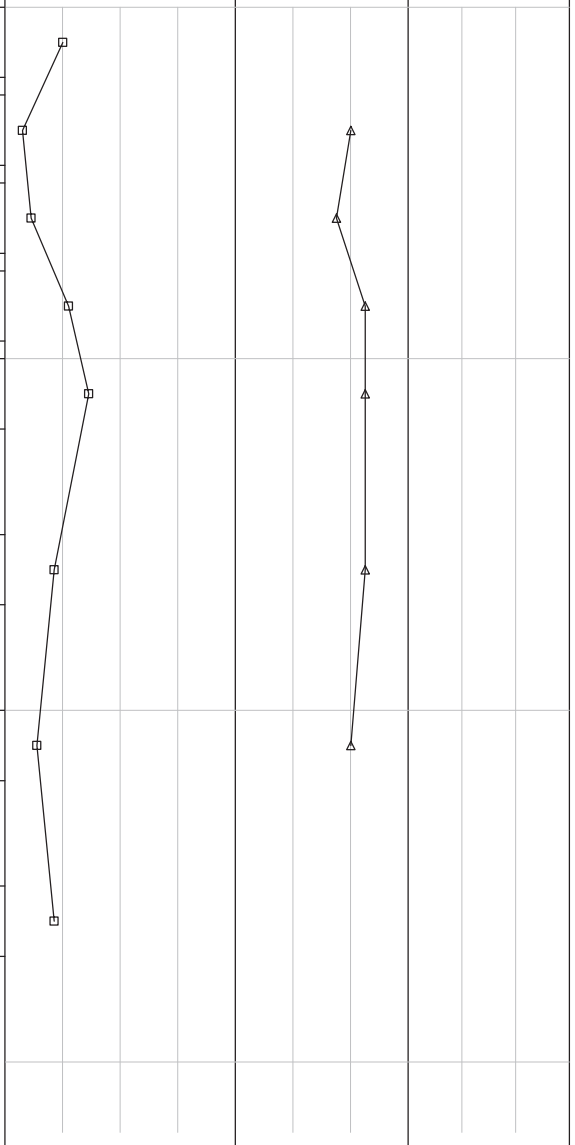
## SUBSURFACE PROFILE

| Depth (m) | Description | Elevation (m) |
|---|---|---|
| 0 | Ground Surface | 352.20 |
| | **Pavement Structure**<br>Asphaltic Concrete (330 mm)<br>Granular Fill (430 mm) - Brown sand and gravel, trace silt, compact, damp | 351.44 |
| 1 | **Silt Till**<br>Dark brown clayey silt, trace gravel, hard, DTPL | 350.67 |
| 2 | Some sand, very stiff | 349.91 |
| | Brown, hard | 349.15 |
| 3 | Silt and clay, trace sand and gravel | |
| 4 | | |
| 5 | | |
| 6 | | 346.10 |
| | Grey/brown, WTPL | |
| 7 | | 344.58 |
| | Silt, compact, saturated | |
| 8 | | 343.97 |
| | End of Borehole<br>Borehole terminated at 8.23 mbgs.<br>At drilling completion no cave observed. | |
| 9 | | |

Monitoring Well Details: No Monitoring Well Installed

## SAMPLE

| Sample Type | Sampler # | Recovery (%) | SPT N-Value |
|---|---|---|---|
| SS | 1 | 71 | 20 |
| SS | 2 | 67 | 6 |
| SS | 3 | 67 | 9 |
| SS | 4 | 100 | 22 |
| SS | 5 | 100 | 29 |
| SS | 6 | 100 | 17 |
| SS | 7 | 100 | 11 |
| SS | 8 | 71 | 17 |




**Contractor:** Altech Drilling and Investigative Services Inc.

**Grade Elevation:** 352.20 masl

**Drilling Method:** Split Spoon/Solid Stem

**Top of Casing Elevation:** NA

**Well Casing Size:** NA

**Sheet:** 1 of 1

# Log of Borehole: BH1

**Project #:** 249839 **Logged By:** NW

**Project:** Geotechnical Investigation

**Client:** Estate of Enid Schmidt c/o Kelly & Co. Barristers & Solicitors

**Location:** Foundry Street at Gingerich Road, Baden, ON

**Drill Date:** December 17, 2019 **Project Manager:** VM

| Depth (m) | Description | Elevation (m) | Monitoring Well Details | Sample Type | Sampler # | Recovery (%) | SPT N-Value |
|---|---|---|---|---|---|---|---|
| 0 | Ground Surface | 358.60 | No Monitoring Well Installed | | | | |
| 0 | **Topsoil** Dark brown sandy silt, very loose, frozen | 358.30 | | SS | 1 | 50 | 2 |
| 1 | Brown silt with grey mottling, some sand, wet | 357.84 | | SS | 2 | 60 | 12 |
| 2 | **Sand** Brown silty fine sand, compact, wet | 355.78 | | SS | 3 | 70 | 18 |
| 2 | | | | SS | 4 | 80 | 14 |
| 3 | **Silt** Grey clayey silt, trace sand, stiff, WTPL APL | 355.40 | | SS | 5 | 70 | 12 |
| 5 | End of Borehole Borehole terminated at 5.2 mbgs. | 353.42 | | SS | 6 | 70 | 10 |

Standard Penetration N-Value: 20, 40, 60

Shear Strength kPa: 100, 200

Water Content %: 10, 20

**Contractor:** Strata Drilling Group

**Grade Elevation:** 358.60 masl

**Drilling Method:** Split Spoon / Direct Push

**Top of Casing Elevation:** NA

**Well Casing Size:** NA

**Sheet:** 1 of 1

# Log of Borehole: BH2

**Project #:** 249839 **Logged By:** NW

**Project:** Geotechnical Investigation

**Client:** Estate of Enid Schmidt c/o Kelly & Co. Barristers & Solicitors

**Location:** Foundry Street at Gingerich Road, Baden, ON

**Drill Date:** December 17, 2019 **Project Manager:** VM

## SUBSURFACE PROFILE

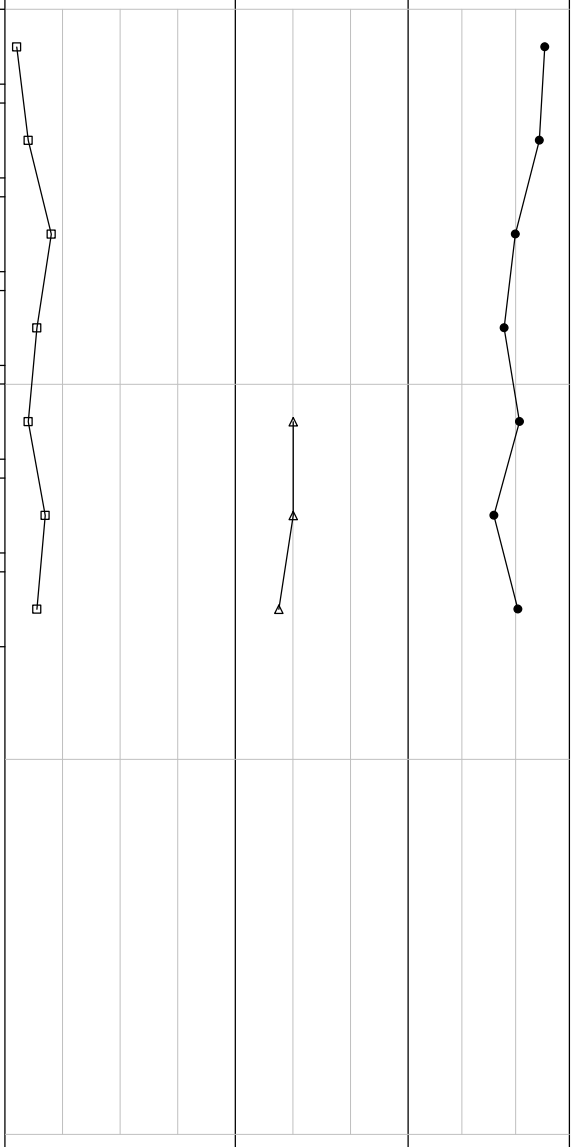
| Depth (m) | Description | Elevation (m) |
|---|---|---|
| 0 | Ground Surface | 346.03 |
| | **Topsoil** Dark brown sandy silt, very loose, frozen | 345.26 |
| | Wet | |
| 1 | **Silt** Brown silt with grey mottling, trace clay and sand, loose, wet | 344.50 |
| | Brown | |
| 2 | | |
| 3 | | 342.98 |
| | Grey clayey silt, trace sand, very stiff, APL | |
| 4 | | 341.76 |
| | WTPL | 341.45 |
| | Stiff | |
| 5 | | 340.85 |
| | End of Borehole | |
| 6 | Borehole terminated at 5.2 mbgs. | |
| 7 | | |
| 8 | | |
| 9 | | |

Monitoring Well Details: Riser, Bentonite, Screen, Silica Sand

Water level = 2.0 mbgs, as measured on Jan. 7, 2020.

## SAMPLE

| Sample Type | Sampler # | Recovery (%) | SPT N-Value |
|---|---|---|---|
| SS | 1 | 60 | 4 |
| SS | 2 | 60 | 8 |
| SS | 3 | 90 | 16 |
| SS | 4 | 100 | 11 |
| SS | 5 | 90 | 8 |
| SS | 6 | 100 | 14 |
| SS | 7 | 90 | 11 |




**Contractor:** Strata Drilling Group

**Drilling Method:** Split Spoon / Direct Push

**Well Casing Size:** 51 mm

**Grade Elevation:** 346.03 masl

**Top of Casing Elevation:** 346.80 masl

**Sheet:** 1 of 1

# Log of Borehole: BH3

**Project #:** 249839 **Logged By:** NW

**Project:** Geotechnical Investigation

**Client:** Estate of Enid Schmidt c/o Kelly & Co. Barristers & Solicitors

**Location:** Foundry Street at Gingerich Road, Baden, ON

**Drill Date:** December 17, 2019 **Project Manager:** VM

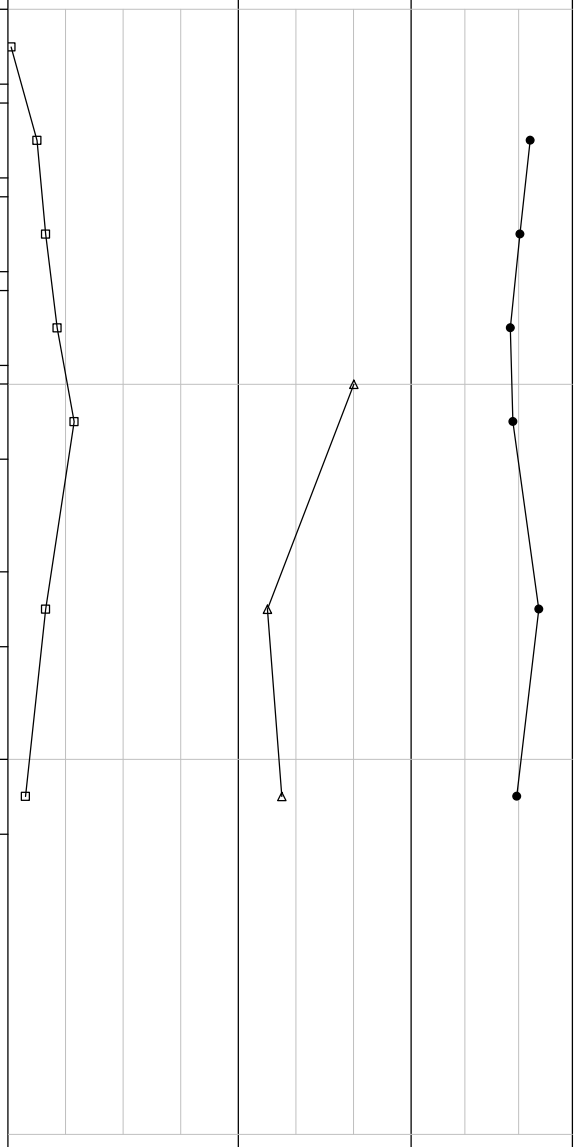
## SUBSURFACE PROFILE

| Depth (m) | Description | Elevation (m) |
|---|---|---|
| 0 | Ground Surface | 349.19 |
| | **Topsoil** Dark brown sandy silt, very loose, frozen | 348.97 |
| 1 | Brown silt with grey mottling, some sand, wet | 348.43 |
| | **Silt** Brown silt with grey mottling, trace sand and clay, compact, wet | |
| 2 | | |
| | | 346.45 |
| 3 | Grey clayey silt, trace sand, hard, APL | |
| 4 | | |
| | | 344.62 |
| 5 | Stiff, WTPL | |
| 6 | | 343.10 |
| | WTPL to APL | |
| | | 342.49 |
| 7 | End of Borehole | |
| | Borehole terminated at 6.7 mbgs. At drilling completion, a dry cave was measured at 6.1 mbgs. | |
| 8 | | |
| 9 | | |

Monitoring Well Details: No Monitoring Well Installed

## SAMPLE

| Sample Type | Sampler # | Recovery (%) | SPT N-Value |
|---|---|---|---|
| SS | 1 | 20 | 1 |
| SS | 2 | 100 | 10 |
| SS | 3 | 90 | 13 |
| SS | 4 | 80 | 17 |
| SS | 5 | 70 | 23 |
| SS | 6 | 90 | 13 |
| SS | 7 | 60 | 6 |




**Contractor:** Strata Drilling Group

**Grade Elevation:** 349.19 masl

**Drilling Method:** Split Spoon / Direct Push

**Top of Casing Elevation:** NA

**Well Casing Size:** NA

**Sheet:** 1 of 1

# Log of Borehole: BH4

**Project #:** 249839 **Logged By:** NW

**Project:** Geotechnical Investigation

**Client:** Estate of Enid Schmidt c/o Kelly & Co. Barristers & Solicitors

**Location:** Foundry Street at Gingerich Road, Baden, ON

**Drill Date:** December 18, 2019 **Project Manager:** VM

## SUBSURFACE PROFILE

| Depth (m) | Description | Elevation (m) |
|---|---|---|
| 0 | Ground Surface | 346.46 |
| | **Topsoil** Dark brown sandy silt, very loose, frozen | 346.16 |
| | Brown silt, some sand, wet | 345.70 |
| 1 | **Silt** Brown silt with grey mottling, trace sand and clay, compact, wet | 344.94 |
| 2 | Brown | |
| 3 | Grey clayey silt, trace sand, very stiff, APL | 343.41 |
| 4 | | |
| | Stiff, WTPL | 341.89 |
| 5 | | 341.28 |
| | End of Borehole | |
| 6 | Borehole terminated at 5.2 mbgs. | |
| 7 | | |
| 8 | | |
| 9 | | |

Monitoring Well Details: Riser, Bentonite, Screen, Silica Sand

Water level = 0.51 mbgs, as measured on Jan. 7, 2020.

## SAMPLE

| Sample Type | Sampler # | Recovery (%) | SPT N-Value |
|---|---|---|---|
| SS | 1 | 50 | 1 |
| SS | 2 | 80 | 10 |
| SS | 3 | 90 | 13 |
| SS | 4 | 60 | 19 |
| SS | 5 | 60 | 19 |
| SS | 6 | 70 | 7 |

Standard Penetration N-Value (20, 40, 60)

Shear Strength kPa (100, 200)

Water Content % (10, 20)

**Contractor:** Strata Drilling Group

**Grade Elevation:** 346.46 masl

**Drilling Method:** Split Spoon / Direct Push

**Top of Casing Elevation:** 347.32 masl

**Well Casing Size:** 51 mm

**Sheet:** 1 of 1

# Log of Borehole: BH5

**Project #:** 249839 **Logged By:** NW

**Project:** Geotechnical Investigation

**Client:** Estate of Enid Schmidt c/o Kelly & Co. Barristers & Solicitors

**Location:** Foundry Street at Gingerich Road, Baden, ON

**Drill Date:** December 19, 2019 **Project Manager:** VM

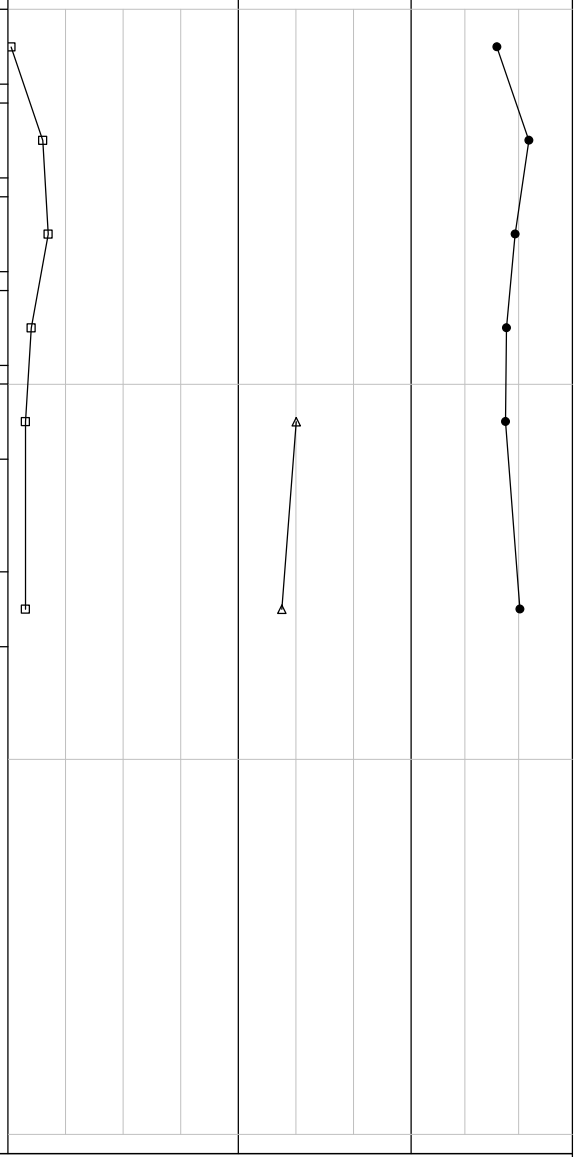
## SUBSURFACE PROFILE

| Depth (m) | Description | Elevation (m) |
|---|---|---|
| 0 | Ground Surface | 344.39 |
| | **Topsoil** Dark brown sandy silt, very loose, frozen | 344.08 |
| | Brown silt with grey mottling, some sand, wet | 343.62 |
| 1 | **Silt** Brown silt with grey mottling, trace sand and clay, compact, wet | |
| 2 | | |
| | Brown | 341.95 |
| 3 | Grey clayey silt, trace sand, very stiff, WTPL | 341.34 |
| 4 | | |
| | Stiff | 339.81 |
| 5 | End of Borehole<br>Borehole terminated at 5.2 mbgs. At drilling completion, a dry cave was measured at 4.9 mbgs. | 339.20 |
| 6 | | |
| 7 | | |
| 8 | | |
| 9 | | |

Monitoring Well Details: No Monitoring Well Installed

## SAMPLE

| Sample Type | Sampler # | Recovery (%) | SPT N-Value |
|---|---|---|---|
| SS | 1 | 40 | 1 |
| SS | 2 | 90 | 12 |
| SS | 3 | 100 | 14 |
| SS | 4 | 90 | 8 |
| SS | 5 | 70 | 6 |
| SS | 6 | 80 | 6 |




**Contractor:** Strata Drilling Group

**Grade Elevation:** 344.39 masl

**Drilling Method:** Split Spoon / Direct Push

**Top of Casing Elevation:** NA

**Well Casing Size:** NA

**Sheet:** 1 of 1

# Log of Borehole: BH6

**Project #:** 249839 **Logged By:** NW

**Project:** Geotechnical Investigation

**Client:** Estate of Enid Schmidt c/o Kelly & Co. Barristers & Solicitors

**Location:** Foundry Street at Gingerich Road, Baden, ON

**Drill Date:** December 19, 2019 **Project Manager:** VM

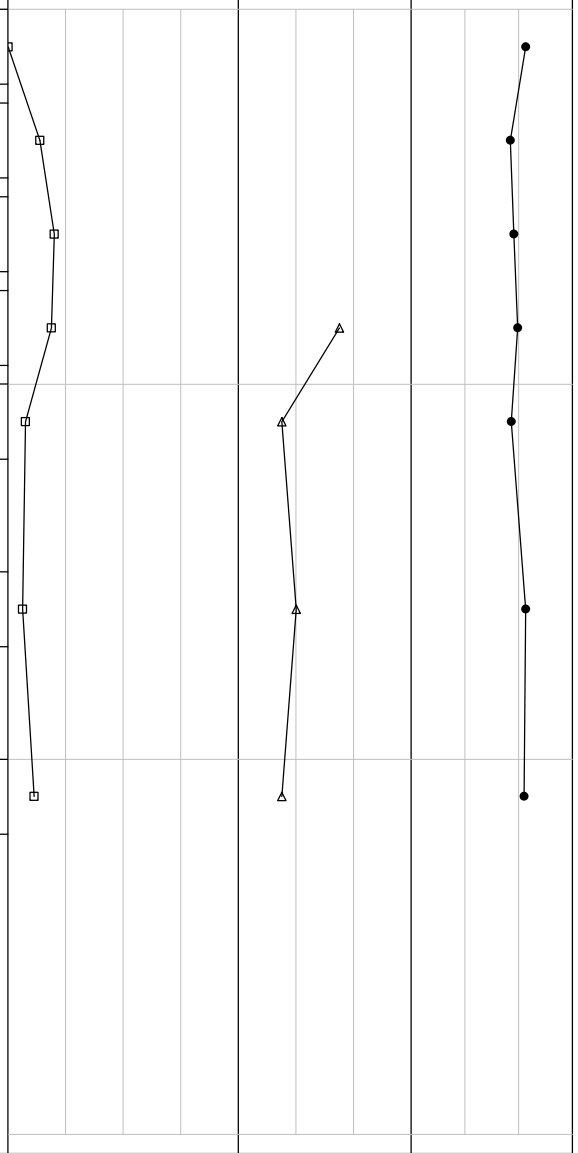
## SUBSURFACE PROFILE

| Depth (m) | Description | Elevation (m) |
|---|---|---|
| 0 | Ground Surface | 343.75 |
| | **Topsoil** Dark brown sandy silt, very loose, frozen | 343.52 |
| | Brown silt, some sand, wet | 342.99 |
| 1 | **Silt** Brown silt with grey mottling, trace sand and clay, compact, wet | |
| 2 | | 341.31 |
| | Grey clayey silt, trace sand, very stiff, APL | 340.70 |
| 3 | Stiff, WTPL | |
| 4 | | 339.18 |
| | Very stiff | |
| 5 | | |
| 6 | | 337.65 |
| | Stiff | 337.04 |
| 7 | End of Borehole | |
| | Borehole terminated at 6.7 mbgs. At drilling completion, the borehole was open and dry. | |
| 8 | | |
| 9 | | |

Monitoring Well Details: No Monitoring Well Installed

## SAMPLE

| Sample Type | Sampler # | Recovery (%) | SPT N-Value |
|---|---|---|---|
| SS | 1 | 30 | 0 |
| SS | 2 | 70 | 11 |
| SS | 3 | 90 | 16 |
| SS | 4 | 70 | 15 |
| SS | 5 | 90 | 6 |
| SS | 6 | 60 | 5 |
| SS | 7 | 80 | 9 |




**Contractor:** Strata Drilling Group

**Grade Elevation:** 343.75 masl

**Drilling Method:** Split Spoon / Direct Push

**Top of Casing Elevation:** NA

**Well Casing Size:** NA

**Sheet:** 1 of 1

# Log of Borehole: BH7

**Project #:** 249839 **Logged By:** NW

**Project:** Geotechnical Investigation

**Client:** Estate of Enid Schmidt c/o Kelly & Co. Barristers & Solicitors

**Location:** Foundry Street at Gingerich Road, Baden, ON

**Drill Date:** December 19, 2019 **Project Manager:** VM

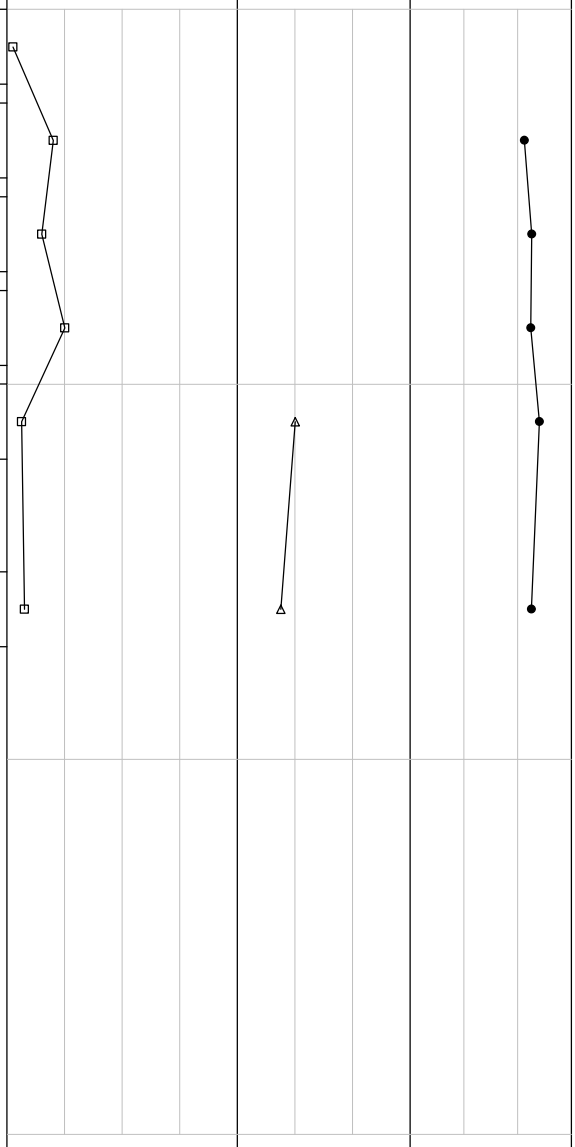
## SUBSURFACE PROFILE

| Depth (m) | Description | Elevation (m) |
|---|---|---|
| 0 | Ground Surface | 343.71 |
| | **Topsoil** Dark brown sandy silt, very loose, frozen | 343.40 |
| | Brown silt, some sand, moist | 342.95 |
| 1 | **Silt** Brown silt with grey mottling, trace sand and clay, compact, wet | |
| 2 | | |
| 3 | | 340.35 |
| | Grey clayey silt, trace sand, very stiff, WTPL | |
| 4 | | 339.14 |
| | Stiff | |
| 5 | | 338.53 |
| | End of Borehole | |
| | Borehole terminated at 5.2 mbgs. | |
| 6 | | |
| 7 | | |
| 8 | | |
| 9 | | |

Monitoring Well Details: No Monitoring Well Installed

## SAMPLE

| Sample Type | Sampler # | Recovery (%) | SPT N-Value |
|---|---|---|---|
| SS | 1 | 10 | 2 |
| SS | 2 | 100 | 16 |
| SS | 3 | 70 | 12 |
| SS | 4 | 90 | 20 |
| SS | 5 | 90 | 5 |
| SS | 6 | 90 | 6 |




**Contractor:** Strata Drilling Group

**Grade Elevation:** 343.71 masl

**Drilling Method:** Split Spoon / Direct Push

**Top of Casing Elevation:** NA

**Well Casing Size:** NA

**Sheet:** 1 of 1

# Log of Borehole: BH8

**Project #:** 249839 **Logged By:** NW

**Project:** Geotechnical Investigation

**Client:** Estate of Enid Schmidt c/o Kelly & Co. Barristers & Solicitors

**Location:** Foundry Street at Gingerich Road, Baden, ON

**Drill Date:** December 19, 2019 **Project Manager:** VM

## SUBSURFACE PROFILE

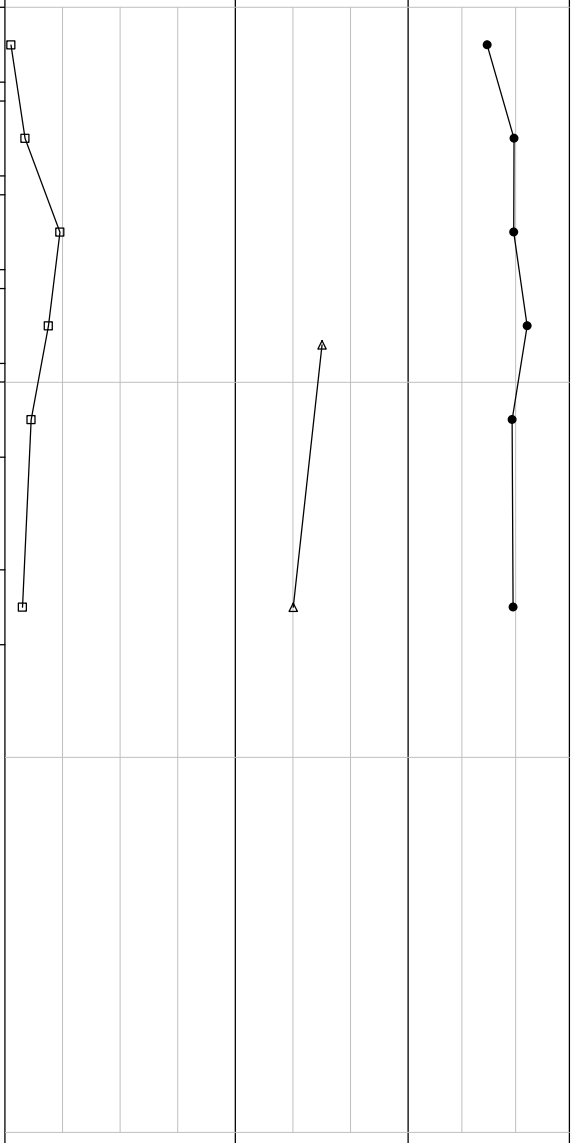
| Depth (m) | Description | Elevation (m) |
|---|---|---|
| 0 | Ground Surface | 343.41 |
| | **Topsoil** Dark brown sandy silt, very loose, frozen | 343.18 |
| | Brown silt, some sand, very moist | 342.65 |
| 1 | **Silt** Brown silt with grey mottling, trace sand and clay, loose, moist to wet | 341.89 |
| | Compact | |
| 2 | | 341.13 |
| | Wet | 340.67 |
| 3 | Grey clayey silt, trace sand, very stiff, APL | |
| 4 | | 338.84 |
| | WTPL | 338.23 |
| 5 | End of Borehole | |
| | Borehole terminated at 5.2 mbgs. | |
| 6 | | |
| 7 | | |
| 8 | | |
| 9 | | |

Monitoring Well Details: Riser, Bentonite, Screen, Silica Sand

Water level = 0.47 mbgs, as measured on Jan. 7, 2020.

## SAMPLE

| Sample Type | Sampler # | Recovery (%) | SPT N-Value |
|---|---|---|---|
| SS | 1 | 50 | 2 |
| SS | 2 | 80 | 7 |
| SS | 3 | 80 | 19 |
| SS | 4 | 100 | 15 |
| SS | 5 | 90 | 9 |
| SS | 6 | 100 | 6 |




**Contractor:** Strata Drilling Group

**Grade Elevation:** 343.41 masl

**Drilling Method:** Split Spoon / Direct Push

**Top of Casing Elevation:** 344.15 masl

**Well Casing Size:** 51 mm

**Sheet:** 1 of 1

# Log of Borehole: BH9

**Project #:** 249839 **Logged By:** NW

**Project:** Geotechnical Investigation

**Client:** Estate of Enid Schmidt c/o Kelly & Co. Barristers & Solicitors

**Location:** Foundry Street at Gingerich Road, Baden, ON

**Drill Date:** December 20, 2019 **Project Manager:** VM

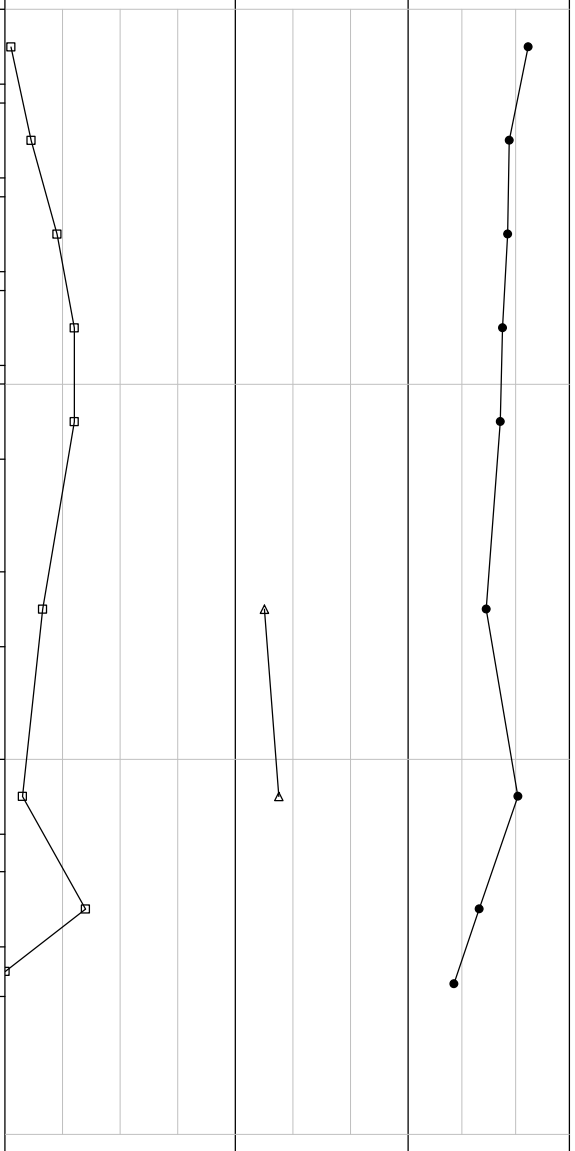
## SUBSURFACE PROFILE

| Depth (m) | Description | Elevation (m) |
|---|---|---|
| 0 | Ground Surface | 347.94 |
| | **Topsoil** Dark brown sandy silt, very loose, frozen | 347.63 |
| | Brown, silt, some sand, wet | 347.18 |
| 1 | **Silt** Brown silt with grey mottling, trace sand and clay, loose, wet | |
| 2 | | |
| 3 | | |
| 4 | | 343.37 |
| | Grey clayey silt, trace sand, stiff, WTPL | |
| 5 | | |
| 6 | | 340.93 |
| 7 | **Silt Till** Brown sandy silt, some clay, trace gravel, compact, very moist | 340.32 |
| | Very dense, moist | 339.91 |
| 8 | End of Borehole | |
| | Borehole terminated at 8.0 mbgs. | |
| 9 | | |

Monitoring Well Details: No Monitoring Well Installed

## SAMPLE

| Sample Type | Sampler # | Recovery (%) | SPT N-Value |
|---|---|---|---|
| SS | 1 | 40 | 2 |
| SS | 2 | 90 | 9 |
| SS | 3 | 100 | 18 |
| SS | 4 | 100 | 24 |
| SS | 5 | 100 | 24 |
| SS | 6 | 80 | 13 |
| SS | 7 | 80 | 6 |
| SS | 8 | 70 | 28 |
| SS | 9 | 60 | >50 |




**Contractor:** Strata Drilling Group **Grade Elevation:** 347.94 masl

**Drilling Method:** Split Spoon / Direct Push **Top of Casing Elevation:** NA

**Well Casing Size:** NA **Sheet:** 1 of 1

# Log of Borehole: BH10

**Project #:** 249839 **Logged By:** NW

**Project:** Geotechnical Investigation

**Client:** Estate of Enid Schmidt c/o Kelly & Co. Barristers & Solicitors

**Location:** Foundry Street at Gingerich Road, Baden, ON

**Drill Date:** December 20, 2019 **Project Manager:** VM

## SUBSURFACE PROFILE

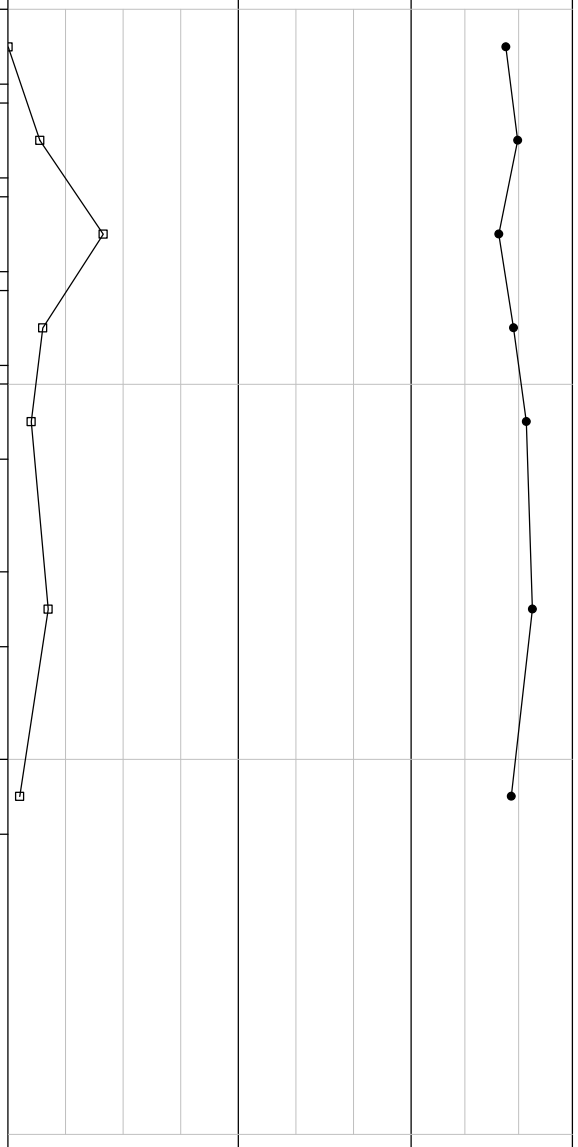
| Depth (m) | Description | Elevation (m) |
|---|---|---|
| 0 | Ground Surface | 346.58 |
| | **Topsoil** Dark brown sandy silt, very loose, frozen | 346.28 |
| | Brown silt, some sand, wet | 345.82 |
| 1 | **Silt** Brown silt with grey mottling, trace sand and clay, compact, wet | 345.06 |
| | Dense | |
| 2 | | 344.30 |
| | Brown | |
| 3 | | 343.53 |
| | Moist | |
| 4 | | 342.01 |
| | Wet | |
| 5 | | 341.40 |
| | Saturated | |
| 6 | | 340.49 |
| | Grey, very loose | |
| | | 339.88 |
| 7 | End of Borehole | |
| | Borehole terminated at 6.7 mbgs. | |
| 8 | | |
| 9 | | |

Monitoring Well Details: Riser, Bentonite, Silica Sand, Screen

Water level = 4.99 mbgs, as measured on Jan. 7, 2020.

## SAMPLE

| Sample Type | Sampler # | Recovery (%) | SPT N-Value |
|---|---|---|---|
| SS | 1 | 40 | 0 |
| SS | 2 | 100 | 11 |
| SS | 3 | 100 | 33 |
| SS | 4 | 90 | 12 |
| SS | 5 | 90 | 8 |
| SS | 6 | 20 | 14 |
| SS | 7 | 50 | 4 |




**Contractor:** Strata Drilling Group

**Drilling Method:** Split Spoon / Direct Push

**Well Casing Size:** 51 mm

**Grade Elevation:** 346.58 masl

**Top of Casing Elevation:** 347.34 masl

**Sheet:** 1 of 1

# Log of Borehole: BH11

**Project #:** 249839 **Logged By:** NW

**Project:** Geotechnical Investigation

**Client:** Estate of Enid Schmidt c/o Kelly & Co. Barristers & Solicitors

**Location:** Foundry Street at Gingerich Road, Baden, ON

**Drill Date:** December 23, 2019 **Project Manager:** VM

| Depth (m) | Description | Elevation (m) |
|---|---|---|
| 0 | Ground Surface | 346.86 |
| | **Topsoil** Dark brown sandy silt, trace rootlets and gravel, very loose, wet | 346.09 |
| 1 | **Silt** Brown silt, some sand, trace clay, compact, wet | 345.33 |
| | Brown with grey mottling | |
| 2 | | |
| 3 | | 343.81 |
| | Grey clay and silt, trace sand, hard, APL | |
| 4 | | 342.28 |
| | Clayey silt, trace sand, very stiff, WTPL | |
| 5 | | 341.67 |
| | End of Borehole | |
| | Borehole terminated at 5.2 mbgs. | |
| 6 | | |
| 7 | | |
| 8 | | |
| 9 | | |

Monitoring Well Details: No Monitoring Well Installed

| Sample Type | Sampler # | Recovery (%) | SPT N-Value |
|---|---|---|---|
| SS | 1 | 37 | 2 |
| SS | 2 | 75 | 12 |
| SS | 3 | 100 | 21 |
| SS | 4 | 100 | 19 |
| SS | 5 | 100 | 19 |
| SS | 6 | 100 | 21 |

Standard Penetration N-Value: 20, 40, 60

Shear Strength kPa: 100, 200

Water Content %: 10, 20

**Contractor:** Strata Drilling Group

**Grade Elevation:** 346.86 masl

**Drilling Method:** Split Spoon / Direct Push

**Top of Casing Elevation:** NA

**Well Casing Size:** NA

**Sheet:** 1 of 1

# Log of Borehole: BH12

**Project #:** 249839 **Logged By:** NW

**Project:** Geotechnical Investigation

**Client:** Estate of Enid Schmidt c/o Kelly & Co. Barristers & Solicitors

**Location:** Foundry Street at Gingerich Road, Baden, ON

**Drill Date:** December 23, 2019 **Project Manager:** VM

## SUBSURFACE PROFILE

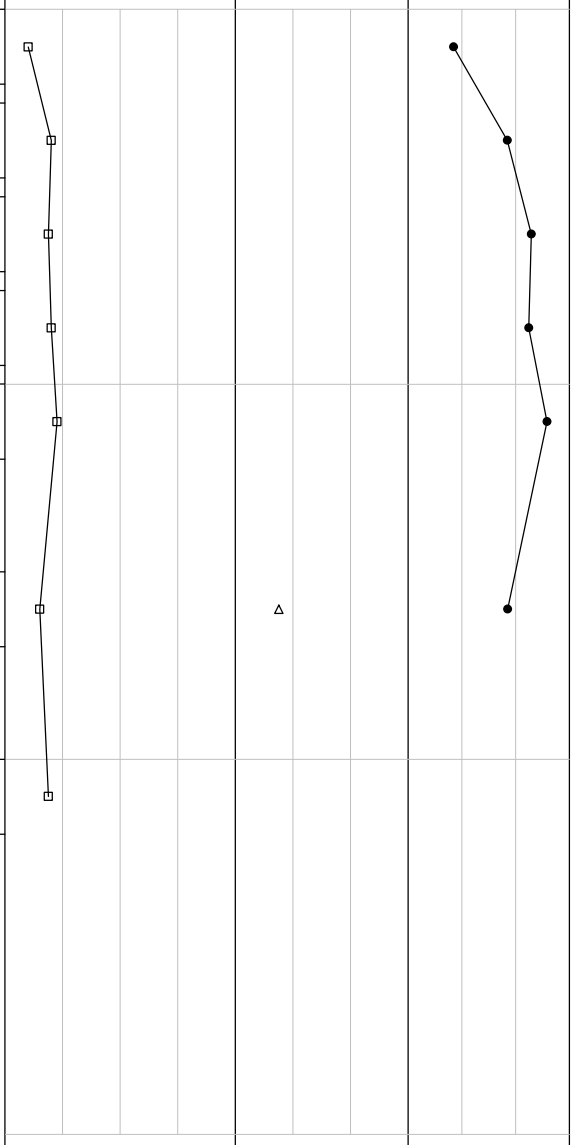
| Depth (m) | Description | Elevation (m) |
|---|---|---|
| 0 | Ground Surface | 350.28 |
| | **Topsoil** Dark brown sandy silt, trace rootlets and gravel, loose, moist | 349.97 |
| | Brown silt, some sand, compact | 349.52 |
| 1 | **Silt** Brown silt with grey mottling, trace sand and clay, compact, moist | |
| 2 | | |
| 3 | | |
| 4 | | |
| | | 345.71 |
| 5 | Grey/brown clayey silt, trace sand, stiff, WTPL | |
| 6 | | 344.18 |
| | Silt, some clay, trace sand and gravel, compact, saturated | 343.57 |
| 7 | End of Borehole<br>Borehole terminated at 6.7 mbgs. | |
| 8 | | |
| 9 | | |

Monitoring Well Details: Riser, Bentonite, Silica Sand, Screen

Water level = 5.31 mbgs, as measured on Jan. 7, 2020.

## SAMPLE

| Sample Type | Sampler # | Recovery (%) | SPT N-Value |
|---|---|---|---|
| SS | 1 | 54 | 8 |
| SS | 2 | 100 | 16 |
| SS | 3 | 68 | 15 |
| SS | 4 | 100 | 16 |
| SS | 5 | 100 | 18 |
| SS | 6 | 79 | 12 |
| SS | 7 | 100 | 15 |




**Contractor:** Strata Drilling Group

**Grade Elevation:** 350.28 masl

**Drilling Method:** Split Spoon / Direct Push

**Top of Casing Elevation:** 351.03 masl

**Well Casing Size:** 51 mm

**Sheet:** 1 of 1

# Log of Borehole: BH13

**Project #:** 249839 **Logged By:** NW

**Project:** Geotechnical Investigation

**Client:** Estate of Enid Schmidt c/o Kelly & Co. Barristers & Solicitors

**Location:** Foundry Street at Gingerich Road, Baden, ON

**Drill Date:** December 23, 2019 **Project Manager:** VM

## SUBSURFACE PROFILE

| Depth (m) | Description | Elevation (m) |
|---|---|---|
| 0 | Ground Surface | 343.72 |
| | **Topsoil** Dark brown sandy silt, trace rootlets and gravel, very loose, wet | 342.96 |
| 1 | Brown, some clay | 342.50 |
| | Silt, some clay, trace gravel | 342.20 |
| | **Silt** Brown silt, trace sand and clay, compact, wet | 341.44 |
| 2 | Grey/brown | |
| 3 | | 340.67 |
| | Clayey silt, trace sand, very stiff, WTPL | |
| 4 | | |
| 5 | | 338.69 |
| | Silt, loose, wet | |
| | End of Borehole | |
| 6 | Borehole terminated at 5.2 mbgs. | |
| 7 | | |
| 8 | | |
| 9 | | |

Monitoring Well Details: Riser, Bentonite, Silica Sand, Screen

Water level = 0.26 mbgs, as measured on Jan. 7, 2020.

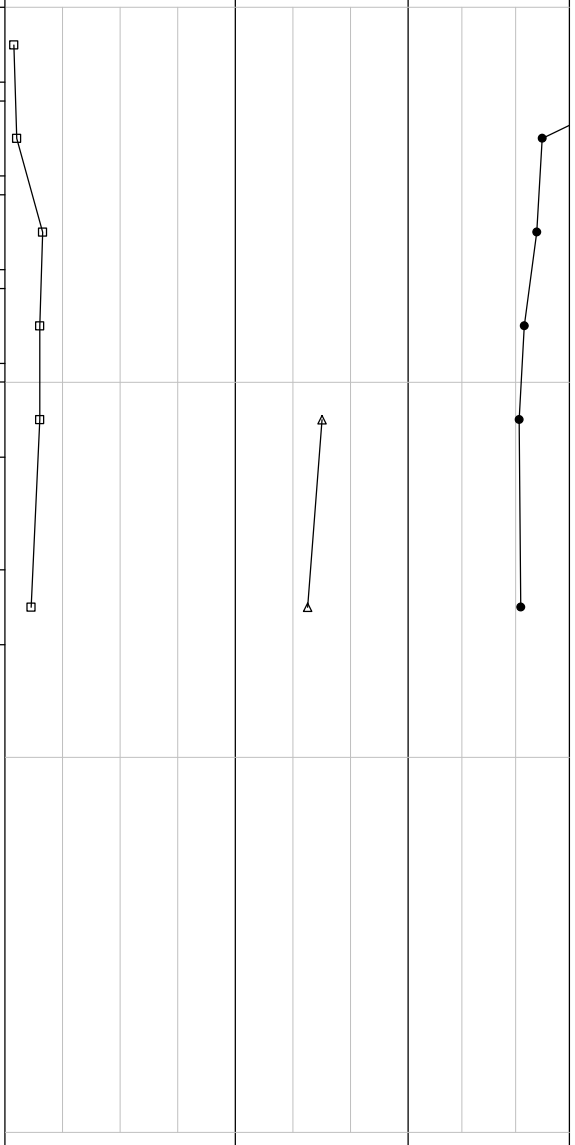
## SAMPLE

| Sample Type | Sampler # | Recovery (%) | SPT N-Value |
|---|---|---|---|
| SS | 1 | 37 | 3 |
| SS | 2 | 84 | 4 |
| SS | 3 | 100 | 13 |
| SS | 4 | 100 | 12 |
| SS | 5 | 72 | 12 |
| SS | 6 | 84 | 9 |

Standard Penetration N-Value: 20, 40, 60

Shear Strength kPa: 100, 200

Water Content %: 10, 20



**Contractor:** Strata Drilling Group

**Grade Elevation:** 343.72 masl

**Drilling Method:** Split Spoon / Direct Push

**Top of Casing Elevation:** 344.56 masl

**Well Casing Size:** 51 mm

**Sheet:** 1 of 1

# Appendix C

# Geotechnical Lab Testing

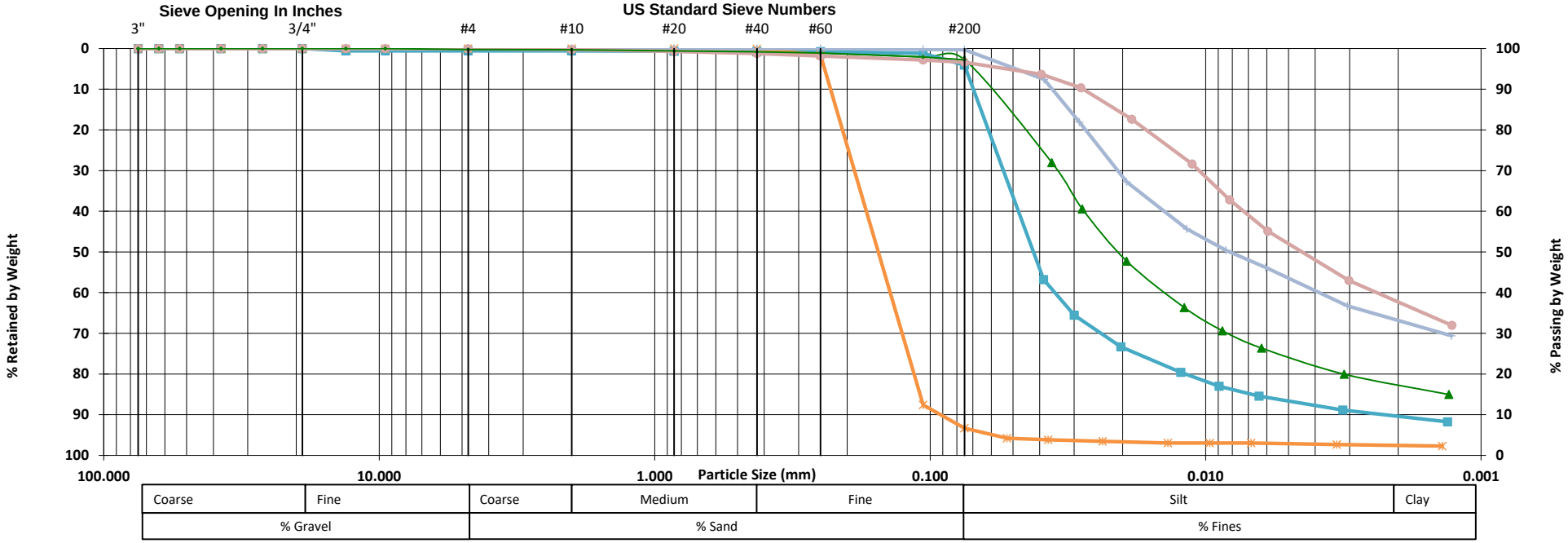
# Particle Size Distribution Analysis Test Results

**Project Name:** Baden Sanitary Trunk EA
**Client:** Township of Wilmot
**Project Location:** Baden, ON

**Date Sampled:** Aug. 12 - Oct. 14, 2021
**Date Tested:** Oct. 18 - 25, 2021

**MTE File No.:** 48730-100
**Table No:** 101

## Unified Soil Classification




| Symbol | Borehole ID | Sample # | Sample Depth | Description |
|---|---|---|---|---|
| ▲ | MW101-21 | SS-5 | 3.0-3.5 mbgs | SILT TILL, some Clay, trace Sand |
| ■ | MW102-21 | SS-4 | 2.3-2.7 mbgs | SILT, trace Clay and Sand |
| ✱ | MW103-21 | SS-6 | 4.6-5.0 mbgs | SAND, trace Silt and Clay |
| + | MW104-21 | SS-3 | 1.5-2.1 mbgs | Clayey SILT |
| ● | MW105-21 | SS-4 | 2.3-2.9 mbgs | SILT and CLAY TILL, trace Sand |

CERTIFIED BY CCIL
Canadian Council of Independent Laboratories
For specific tests as listed on www.ccil.com

**NOTES:**

**MTE File No.:** 48730-100

*Engineers, Scientists, Surveyors.*

# Appendix C

## Hydrogeological Assessment of Alternatives Technical Memorandum (April 26, 2022)

To: Dot Roga, C.E.T., MTE Consultants

MTE File No.: C48730-100

Date: June 27, 2022

From: Fraser Cummings, P. Geo.

Project Name: Baden Trunk Sewer Environmental Assessment

**Re: Baden Trunk Sewer Class B Environmental Assessment Hydrogeological Assessment of Alternatives**

## 1.0 Background

MTE Consultants Inc. has prepared this technical memorandum as input to the Baden Trunk Sewer Class B Environmental Assessment, Category 1.E – Groundwater Resources. The purpose of the Hydrogeology overview is to provide geological and hydrogeological technical information and analysis as input to assess different sewer alignment alternatives with respect to the impacts related to groundwater resources in the following factor categories:

- Groundwater Recharge areas: Encroachment into the Regional Recharge Area.
- Groundwater Quality: Impacts to Vulnerable Areas (IPZ, SGRA, HVA and WHPA):
  - IPZ – Intake Protection Zone;
  - SGRA – Significant Groundwater Recharge Areas;
  - HVA – Highly Vulnerable Aquifers; and
  - WHPA – Well Head Protection Areas.
- Shallow Groundwater Movement: Impacts to existing shallow flow and interflow patterns relative to surface water features and groundwater discharge areas.

This technical memorandum presents and discusses each of the above criteria with the aim of applying numeric scoring between 1 (least favourable) and 10 (most favourable).

The Primary and Detailed Study Areas (PSA and DSA, respectively) are presented on **Figure 1**.

### 1.1 Previous Investigations

Several hydrogeological and geotechnical investigations have been conducted in the PSA, as follows (the locations of monitoring wells installed in the PSA are presented on **Figure 1**):

- MTE Consultants. 2021a. 1012 Snyder's Road West, Development Hydrogeology Study.

  Installation of 11 monitoring wells to depths ranging from 3.0 to 18.2 metres below ground surface (mbgs) equipped with electronic water level monitors (data loggers). The Regional shallow groundwater table is located at depths ranging from 1.7 to 11.8 mbgs with shallower groundwater encountered in the central portion of the site and adjacent to surface water features. Monitoring of these locations is ongoing.

- MTE Consultants. 2021b. 1012 Snyder's Road West, Phase II Environmental Site Assessment Report.

  Drilling of 11 boreholes to a maximum depth of 12.2 mbgs; installation of monitoring wells within 6 of the boreholes. Groundwater levels in the monitoring wells ranged from 0.9 to 11.0 mbgs.

- Peto MacCallum Ltd. 2020. Geotechnical Investigation, Proposed Residential Subdivision, 1012 Snyder's Road West, Baden, Ontario.

  Drilling of 12 boreholes to a maximum depth of 8.1 mbgs.

- Pinchin Ltd. 2020a. Geotechnical Investigation - Proposed Snyder's Road Reconstruction, Christian Street to Gingerich Road, Baden, Ontario.

  Drilling of 29 boreholes to depths ranging from 5.5 to 8.4 mbgs; installation of monitoring wells within 6 of the boreholes. Groundwater levels in the monitoring wells ranged from 1.3 to 5.1 mbgs.

- Pinchin Ltd. 2020b. Geotechnical Investigation, Proposed Residential and Employment Lands Development, Foundary Street at Gingerich Road, Baden, Ontario.

  Drilling of 13 boreholes to depths ranging from 5.2 to 8.0 mbgs; installation of monitoring wells within 6 of the boreholes. Groundwater levels in the monitoring wells ranged from 0.3 to 5.3 mbgs.

### 1.2 Current investigation

To fill-in data gaps in the local geological and hydrogeologic understanding, MTE drilled five boreholes in August of 2021 and completed each as a monitoring well. The locations of the monitoring wells are presented on **Figure 1**. Details of the drilling program including borehole logs are provided in the concurrent Geotechnical Site Characterization (MTE, 2021c).

## 2.0 Regional Hydrogeological Setting

### 2.1 Physiography

The PSA is located within the physiographic region known as the Waterloo Hills. The surface is comprised of sandy hills consisting of ridges of sandy till, kames or kame moraines. The soils in the area are generally well-drained loams and loamy tills (Chapman and Putnam, 2007). Physiographic mapping of the area illustrates the PSA as largely being located within an undrumlinized till plain physiographic landform. The southern half of the DSA is located within a kame moraine landform. (**Figure 2**).

### 2.2 Quaternary Geology

Ontario Geological Survey (OGS) published map sheet (Map 2559) (**Figure 3**) shows the surficial geology of much of the PSA includes clay to silt textured till, which is characterized as the Maryhill Till and consists of clay till and clayey diamicton (OGS, 2010). Small areas consist of ice-contact sand comprised of fine to coarse sand and gravel that is poorly to well sorted. Along Baden Creek in the DSA, the surficial geology is expected to consist of gravel, sand, silt and clay stream alluvium deposits.

## 2.3 Regional Hydrostratigraphic Units

The Region of Waterloo obtains approximately 80% of its water supply from groundwater within bedrock and sedimentary aquifers, with approximately half being supplied from the Waterloo Moraine (Bajc et. al., 2014). The Waterloo Moraine is located almost entirely within the Region of Waterloo and is comprised of three separate units, which grade from coarse-grained sediments (gravel) to finer-grained sediments (silt and clay) with decreasing depth (Bajc et. al., 2014).

The fine-grained sediments of the Waterloo Moraine are referred to as the Upper, Middle, and Lower Maryhill Tills. These units represent regionally significant aquitards and will "act as a significant barrier to vertical water movement where present in a thickness greater than 5 metres" (Terraqua Ltd., 1995). The Maryhill Till consists primarily of sandy silt to silty clay and clayey silt diamictons (Bajc et. al., 2014). The Waterloo Moraine Aquifer Units are characterized by interbedded layers of silt, sand and gravels. Clay-rich glaciolacustrine deposits with gravels and pebbles are also present.

These Waterloo Moraine sediments overlie the Catfish Creek Till, characterized as a stoney to sandy diamicton, which is often over-consolidated and forms an important marker horizon within the Region of Waterloo (Karrow, 1987). The Catfish Creek Till acts as an important, relatively continuous regional aquitard that is compositionally distinct and widely distributed across the Region of Waterloo (Terraqua Ltd., 1995; Bajc and Shirota, 2007; Aquaresource Inc., 2009).

The PSA is located on the western flank of the Waterloo Moraine. The units most likely to be present in the vicinity are **bolded** in the table below (AquaResource Inc., 2012; Stantec Consulting Ltd, 2012).

**Geological Formations within the Waterloo Moraine:**

| OGS Name | Geologic Formation | Geologic Material | Regional Aquifer Name |
|---|---|---|---|
| **ATB1** | **Upper Maryhill Till, Port Stanley Till, Tavistock Till, Mornington Till Silty to clayey till** | **Silty to clayey till** | Aquitard 1 |
| **AFB1** | **Upper Waterloo Moraine stratified sediments and equivalents** | **Mainly fine sand, some gravel** | **Aquifer 1** |
| ATB2 | Middle Maryhill Till and equivalents | Silty to clayey till, silt, clay | |
| **AFB2** | **Middle Waterloo Moraine Stratified Sediments and equivalents** | **Mainly fine sand, some gravel** | |
| **ATB3** | **Lower Maryhill Till and stratified equivalents** | **Silty to clayey till, silt, clay** | **Aquitard 2** |
| AFB3 | Lower Waterloo Moraine Aquifer or Catfish Creek Till outwash | Sand and gravel | Aquifer 2 |
| **ATC1** | **Upper / Main Catfish Creek Till** | **Stoney, silty to sandy till** | **Aquitard 3** |
| AFD1 | Pre-Catfish Creek coarse-textured glacio fluvial/lacustrine deposits | Sand and gravel | Aquifer 3 |

| OGS Name | Geologic Formation | Geologic Material | Regional Aquifer Name |
|---|---|---|---|
| **ATE1** | **Canning Drift (till and associated fine-textured glaciolacustrine deposits)** | **Silty to clayey till, silt, clay** | **Aquitard 4** |
| AFF1 | Pre-Canning coarse-textured glaciofluvial/glaciolacustrine deposit | Sand and gravel | Aquifer 4 |
| ATG1 | Pre-Canning coarse-textured till | Stony, silty to sandy till | Aquitard 4 |

Regional shallow groundwater elevations, provided by the Grand River Conservation Authority (GRCA; published April 2016), indicate that the regional shallow groundwater elevations in the PSA range between approximately 346 to 353 metres above mean sea level (mAMSL). The regional shallow groundwater flow direction is south-westerly towards the Nith River.

## 2.4 Paleozoic Geology

Map sheets in publication regarding the Paleozoic geology illustrate bedrock beneath the Subject Lands consists of the upper Silurian Salina Formation which is characterized by irregularly bedded shale interbedded with thin layers of brown dolostone (Armstrong and Dodge, 2007). The bedrock is expected to be encountered at depths in the order of 40 metres below grade in the vicinity of the Subject Lands (AquaResource Inc., 2012).

## 2.5 Source Water Protection

### 2.5.1 Groundwater Recharge Areas

Groundwater recharge occurs where precipitation and snowmelt infiltrate into the ground to feed aquifers, watercourses, and wetlands. SGRAs are typically associated with coarse-grained sediments (i.e. sands and gravels) or very shallow overburden material covering upland areas on the landscape. In the Region of Waterloo two different recharge areas have been mapped; Significant Recharge Areas and Regional Recharge Areas.

Significant Groundwater Recharge Areas (SGRAs) are presented in the Lake Erie Region Source Protection Committee Assessment Report (LERSPC, 2020).GRCA mapping indicates that small portions in the north of the PSA are located within a SGRA. The SGRAs are illustrated on **Figure 4.**

The Region of Waterloo Official Plan (Region of Waterloo, 2010) includes mapping of the Regional Recharge Area (RRA) which is generated using a method which differs from that used for the SGRA delineation. Region of Waterloo mapping presented on **Figure 5** indicates that neither the PSA nor the DSA are located within the RRA.

In addition, the Source Protection Mapping (MECP, 2021) generated under the Clean Water Act to protect municipal water supplies indicates that neither the PSA nor the DSA are located above a Highly Vulnerable Aquifer.

### 2.5.2 Municipal Well Fields

The nearest municipal wellfields are Foxboro Green, located approximately 950 m north of the northern boundary of the PSA; Wilmot Centre, located approximately 3 km southeast from the southeast corner of the PSA; and New Hamburg; located approximately 3.5 km southeast of the southeast corner of the PSA.

The water supply for the Foxboro Green and New Hamburg wellfields is obtained from bedrock production wells, which are open to the Salina Formation at depths ranging from 47 to 76 mbgs. The water supply for the Wilmot Centre wellfield is obtained from production wells screened within the semi-confined Middle Waterloo Moraine Sands (AFB2) at depths ranging from 30 to 40 mbgs.

No portion of PSA or DSA are located within a wellhead protection area (WHPA) for a municipal supply well (MECP, 2021). The location of the WHPAs is illustrated on **Figure 6.**

## 3.0 Local Hydrogeological Setting

Based on the previous and current investigations outlined in **Section 1**, the surficial sediments in the DSA are consistently described as till and are interpreted to represent the Upper Maryhill Till (Regional Aquitard 1). Throughout the larger PSA, some surficial sediments are sands, which are interpreted to represent the Upper Waterloo Moraine (Aquifer 1).

Based on the borehole logs from the previous and current investigation, the water table is present in the DSA within the Upper Maryhill Till. As this represents a Regional aquitard, shallow groundwater flow is expected to be predominately vertical. In isolated locations where sand seams are present (at MW103-21, for example), there may be a stronger horizontal component to groundwater flow.

Using water levels collected from the previous and current investigations, a map of theoretical water table contours has been generated and is presented as **Figure 7**[1]. Note that this representation of the water table is theoretical only as it has been compiled using water levels taken at different times over a 3-year period. Regional water table mapping available from the GRCA is presented in **Figure 8**. Both of these figures suggest that some component of shallow groundwater flow is directed towards Baden Creek.

Mapping available from the Ministry of Natural Resources and Forestry (MNRF) through their Fish ON-Line application indicates that cold water fish species (Rainbow Trout and Largemouth Bass) have been identified in the through-pond of Baden Creek located immediately west of Foundry Street. White Suckers, a cool water species, have been identified in Baden Creek further west of the pond. These findings suggest a groundwater contribution to these surface water features.

## 4.0 Assessment of Alternatives

Commentary on each alternative, in relation to the criteria under the Class B Environmental Assessment, Category 1.E – Groundwater Resources, based on the regional and local information presented above is provided in **Table 1**.

[1] MTE acknowledges that a representative water table surface would require water levels to be measured from monitoring locations on the same date.

**Table 1: Evaluation of Alternatives**

| Alternative | Encroachment into the Regional Recharge Area | Groundwater Quality: Impacts to Vulnerable Areas | Shallow Groundwater Movement | |
|---|---|---|---|---|
| 1 Modified 2014 Environmental Assessment Preferred Alternative (Do Nothing) | None of the alternatives encroach into the Regional Recharge Area | None of the alternatives encroach into an Intake Protection Zone, Significant Groundwater Recharge Area, or Wellhead Protection Area.<br>None of the alternatives are located above a Highly Vulnerable Aquifer | Groundwater levels above ground surface were observed at MW104-21 which is located along all routes. It is MTE's opinion MW104-21 is located in fine grained material (clay and silt) and as such is not anticipated to yield significant water during excavation. | MW105-21 was drilled along this route. The absence of a sand and gravel unit suggests that dewatering volumes would be low at this location. |
| 2 Snyders/ Foundry | | | | MW105-21 was drilled along this route. The absence of a sand and gravel unit suggests that dewatering volumes would be low at this location. |
| 3 Charlotta/Mill/ Charles/ Foundry | | | | MW105-21 was drilled along this route. The absence of a sand and gravel unit suggests that dewatering volumes would be low at this location. |
| 4 Charlotta/ Queen and Baden Creek | | | | MW103-21 and MW104-21 were drilled along this route. Greater thicknesses of sand at MW103-21 compared to other locations may result in higher dewatering volumes during construction at this location. Further south, at MW104-21, no sand unit was present suggesting lower dewatering volumes at this location despite the groundwater levels being observed above surface.<br>This route passes through an area where groundwater potentially discharges to Baden Creek (in the vicinity of BH2, BH8, and BH13) and has been observed at depths as shallow as 0.25 mbgs. |
| 5 Christian and Baden Creek | | | | MW101-21, MW102-21, and MW104-21 were drilled along this route. Of the three, only MW102 contained a sand layer which may indicate higher dewatering volumes may be observed during construction at this location.<br>This route passes through an area where groundwater potentially discharges to Baden Creek (in the vicinity of BH2, BH8, and BH13) and has been observed at depths as shallow as 0.25 mbgs. MTE recommends cut-off collars be installed during construction to maintain groundwater flow towards Baden Creek post construction. |

## 5.0 References


AquaResouce Inc. 2012. Region of Waterloo Tier Three Water Budget and Local Area Risk Assessment – Rural Well Fields Characterization Report. Prepared for the Regional Municipality of Waterloo.

Armstrong, D.K. and Dodge, J.E.P. 2007. *Paleozoic geology of southern Ontario*; Ontario Geological Survey, Miscellaneous Release – Data 219.

Chapman, L.J. and Putnam, D.F. 2007. *Physiography of Southern Ontario*; Ontario Geological Survey, Miscellaneous Release – Data 228.

Lake Erie Region Source Protection Committee. 2020. Grand River Source Protection Area Approved Assessment Report.

Ministry of the Environment, Conservation and Parks (MECP). 2021. Source Protection Information Atlas. Retrieved July, 2021, from https://www.gisapplication.lrc.gov.on.ca/SourceWaterProtection/Index.html?viewer=SourceWaterProtection.SWPViewer&locale=en-US

MTE Consultants. 2021a. 1012 Snyder's Road West, Development Hydrogeology Study

MTE Consultants. 2021b. 1012 Snyder's Road West, Phase II Environmental Site Assessment Report.

MTE Consultants. 2021c. Baden Trunk Sewer Class Environmental Assessment, Geotechnical Characterization.

Ontario Geological Survey 2010: *Surficial geology of southern Ontario*; Ontario Geological Survey, Miscellaneous Release – Data 128, Revised.

Peto MacCallum Ltd. 2020. Geotechnical Investigation, Proposed Residential Subdivision, 1012 Snyder's Road West, Baden, Ontario

Pinchin Ltd. 2020a. Geotechnical Investigation - Proposed Snyder's Road Reconstruction, Christian Street to Gingerich Road, Baden, Ontario.

Pinchin Ltd. 2020b. Geotechnical Investigation, Proposed Residential and Employment Lands Development, Foundary Street at Gingerich Road, Baden, Ontario.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GWR2.1

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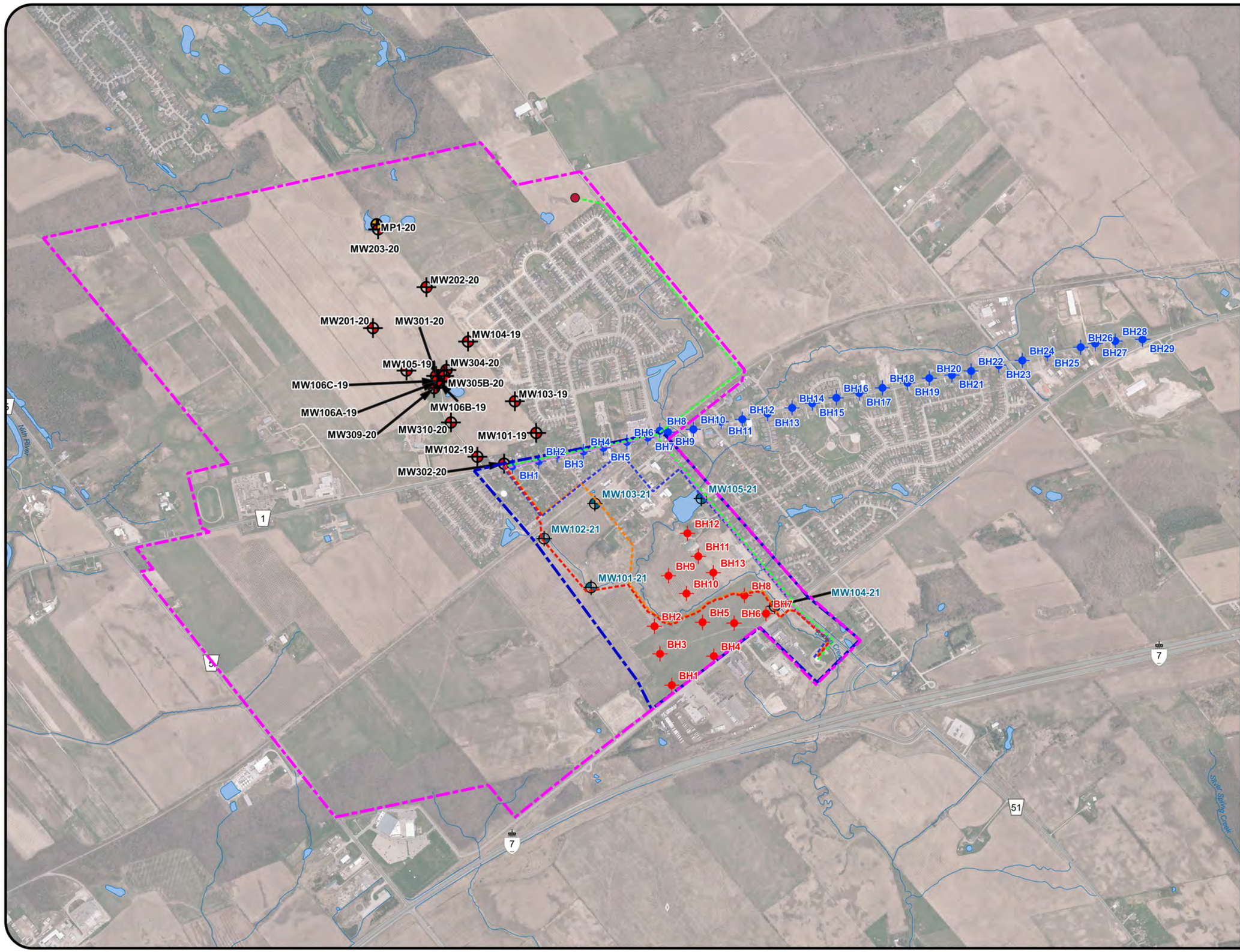


N

NORTH

N

PROJECT NORTH

## Legend

- Primary Study Area
- Detailed Study Area
- Waterbody
- Watercourse

### Investigative Locations

- MTE Hydrogeological/Environmental Monitoring Well
- MTE Hydrogeological Minipiezometer
- MTE Geotechnical Monitoring Well
- Pinchin Geotechnical Investigation (File No. 24512)
- Pinchin Geotechnical Investigation (File No. 249839)
- Proposed Wastewater Pumping Station

### Alternatives

- Modified 2014 Environmental Assessment Preferred Alternative (Do Nothing)
- Snyder's/ Foundry (with and without pump station on Activa Lands) Force Main Crossing at Snyder's/ Foundry
- Charlotta/ Mill/ Charles/ Foundry
- Charlotta/Queen and Baden Creek
- Christian and Baden Creek

*Data Sources:*

*Contains information licensed under the Open Government License Ontario.*

0 100 200 300 400 500 m

**Scale (11x17): 1:15000**

Project CRS: NAD83 / UTM zone 17N

MTE

Engineers,Scientists, Surveyors

Ph. (519) 743-6500

Client: Township of Wilmot

Project: Baden Trunk Sewer Class EA

Site: Baden, ON

Title: Existing Conditions

| | | | |
|---|---|---|---|
| Reviewed By | ATD | | |
| Prepared By | ATD | Project No | 48730-100 |
| Drawn By | SAR | Figure No | 1 |
| Date | June 2022 | | |

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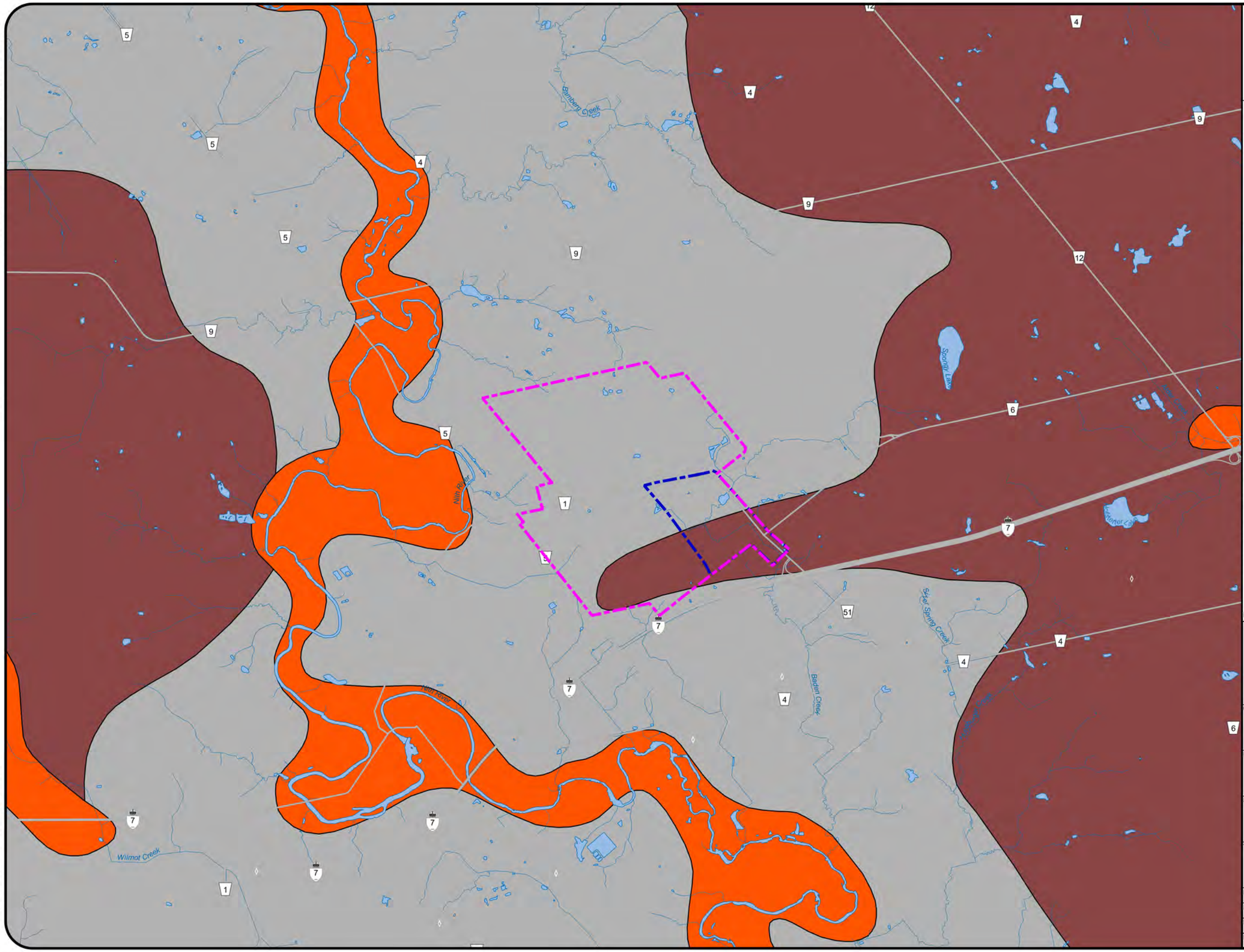
GWR2.2

May 06, 2022 - 17:53 - Plotted By: SRederer




N
NORTH

N
PROJECT NORTH

## Legend

- Primary Study Area
- Detailed Study Area
- Waterbody
- Watercourse

**Physiogrpahic Landforms**

- 3. Spillways
- 4. Kame Moraines
- 5. Till Plains (Undrumlinized)

*Data Sources:*

*Contains information licensed under the Open Government License Ontario.*

*Chapman L.J. and Putnam D.F. 2007. Physiography of southern Ontario; Ontario Geological Survey Miscellaneous Release—Data 228.*

0 300 600 900 1200 1500 m

**Scale (11x17): 1:40000**

Project CRS: NAD83 / UTM zone 17N

MTE
Engineers,Scientists, Surveyors
Ph. (519) 743-6500

Client: Township of Wilmot

Project: Baden Trunk Sewer Class EA

Site: Baden, ON

Title: Physiographic Landforms

| | | | |
|---|---|---|---|
| Reviewed By | ATD | | |
| Prepared By | ATD | Project No | 48730-100 |
| Drawn By | SAR | Figure No | 2 |
| Date | May 2022 | | |

Project No: 48730-100 P:\P\48730\100\GIS\48730-100 QGIS.qgz

GWR2.3

May 06, 2022 - 18:00 - Plotted By: SRederer

N
NORTH

N
PROJECT NORTH

## Legend

- Primary Study Area
- Detailed Study Area
- Waterbody
- Watercourse

### Quaternary Geology

Quaternary

- 20. Organic Deposits: peat, muck, marl
- 19. Modern alluvial deposits: clay, silt, sand, gravel, may contain organic remains
- 8. Fine-textured glaciolacustrine deposits: silt and clay, minor sand and gravel
  - 8a. Massive to well laminated
- 7. Glaciofluvial deposits: river deposits and delta topset facies
  - 7a. Sandy deposits
  - 7b. Gravelly deposits
- 6. Ice-contact stratified deposit: sand and gravel, minor silt, clay and till

6. Ice-contact stratified deposit: sand and gravel, minor silt, clay and till

5. Till:

- 5b. Stone-poor, sandy silt to silty sand-textured till on Paleozoic terrain
- 5d. Clay to silt-textured till (derived from glaciolacustrine deposits or shale)

Project CRS: NAD83 / UTM zone 17N

*Data Sources:*

*Contains information licensed under the Open Government License Ontario.*

*Ontario Geological Survey 2010. Surficial geology of southern Ontario: Ontario Geological Survey Miscellaneous Release-128 - Revised.*

0 300 600 900 1200 1500 m

**Scale (11x17): 1:40000**

MTE
Engineers,Scientists, Surveyors
Ph. (519) 743-6500

Client: Township of Wilmot

Project: Baden Trunk Sewer Class EA

Site: Baden, ON

Title: Quaternary Geology

| | | | |
|---|---|---|---|
| Reviewed By | ATD | | |
| Prepared By | ATD | Project No | 48730-100 |
| Drawn By | SAR | Figure No | 3 |
| Date | May 2022 | | |

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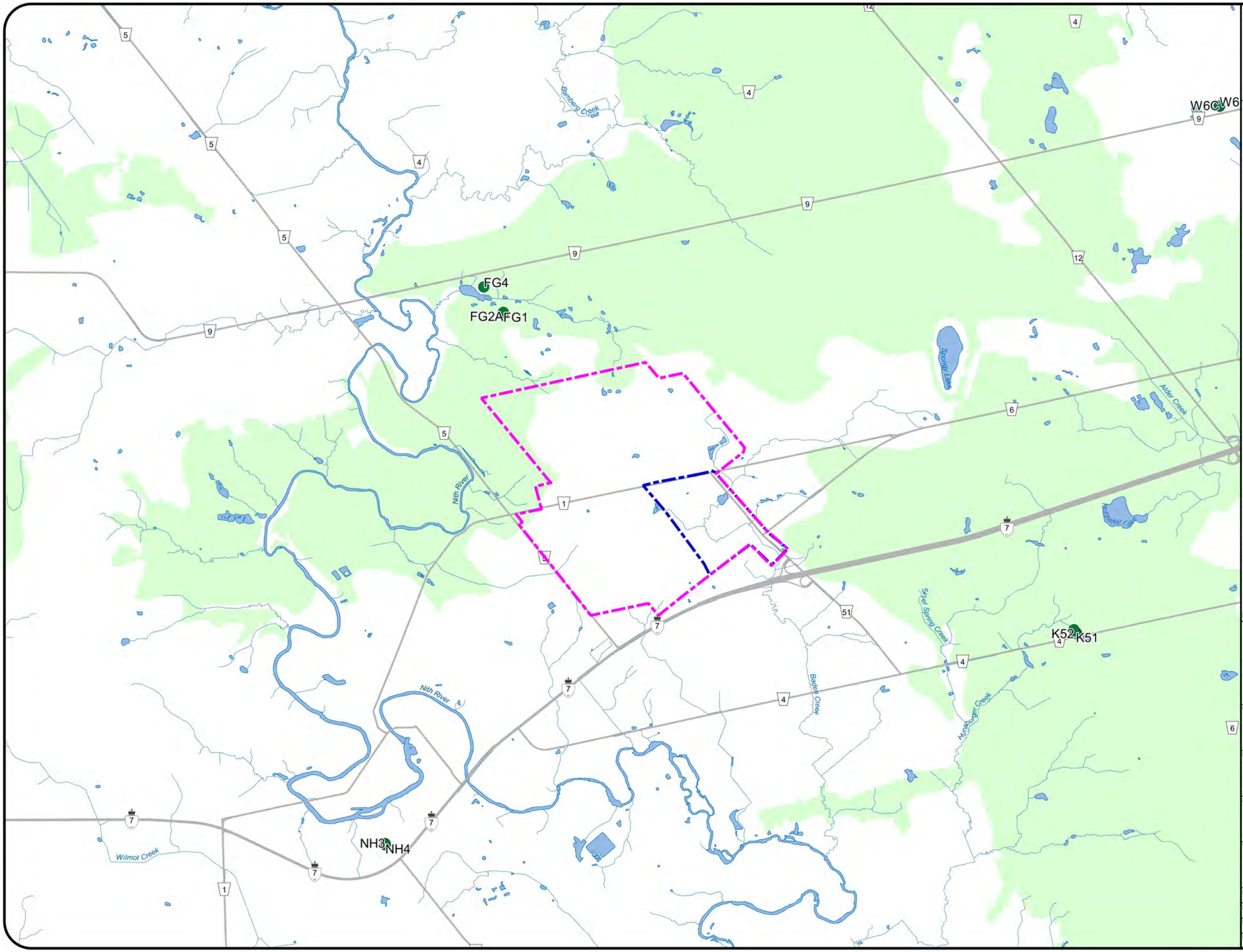
GWR2.4

May 06, 2022 - 16:08 - Plotted By: SRederer




N
NORTH

N
PROJECT NORTH

## Legend

- Primary Study Area
- Detailed Study Area
- Waterbody
- Watercourse
- Municipal Well (GRCA)
- Significant Groundwater Recharge Area

*Data Sources:*

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*Contains Information made available under Grand River Conservation Authority's Open Data Licence v2.0*

0 300 600 900 1200 1500 m

**Scale (11x17): 1:40000**

Project CRS: NAD83 / UTM zone 17N

MTE
Engineers,Scientists, Surveyors
Ph. (519) 743-6500

Client: Township of Wilmot

Project: Baden Trunk Sewer Class EA

Site: Baden, ON

Title: Significant Groundwater Recharge Areas

| | | | |
|---|---|---|---|
| Reviewed By | ATD | | |
| Prepared By | ATD | Project No | 48730-100 |
| Drawn By | SAR | Figure No | 4 |
| Date | May 2022 | | |

Project No: 48730-100 P:\P\48730\100\GIS\48730-100 QGIS.qgz

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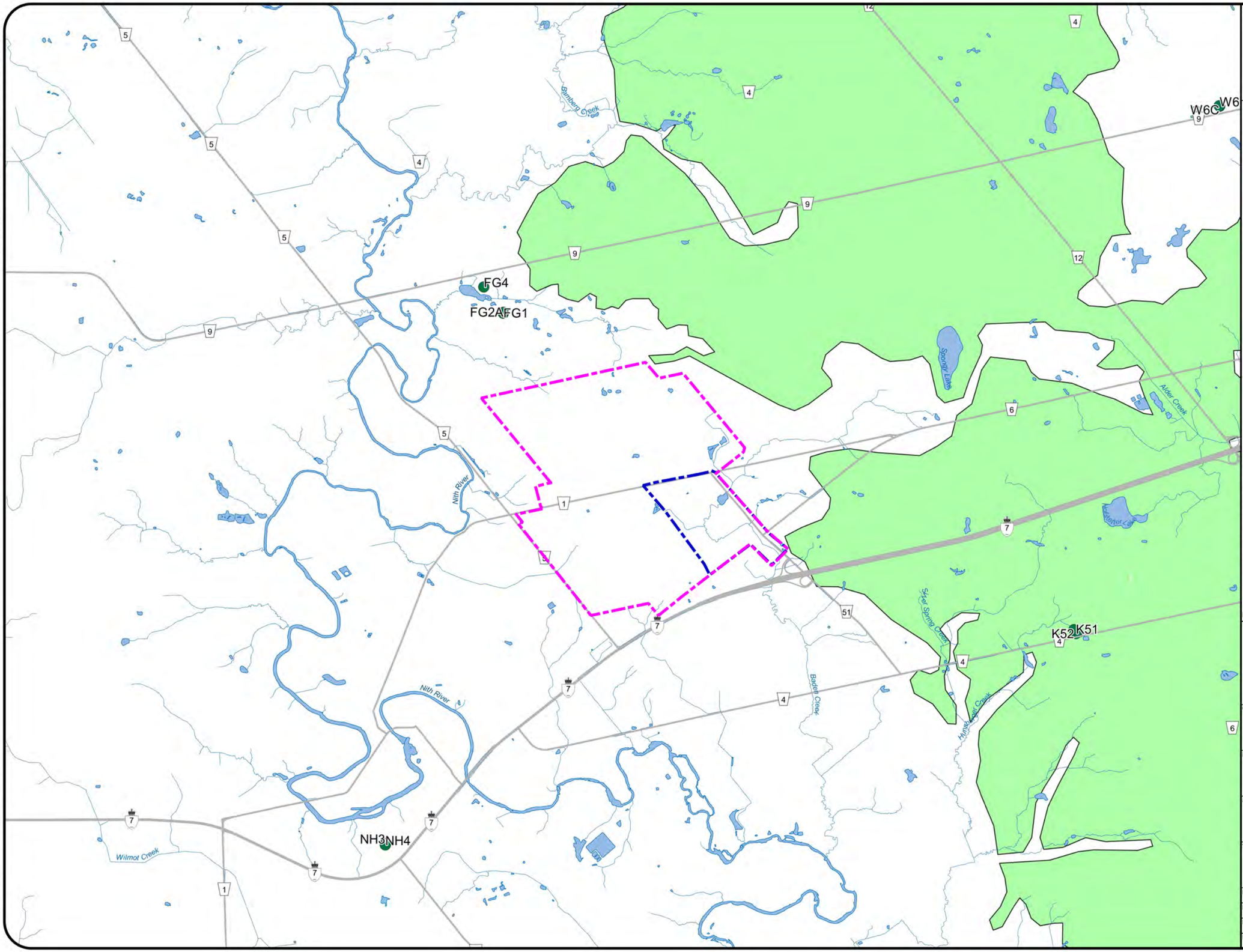
May 06, 2022 - 18:09 - Plotted By: SRederer




N
NORTH

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PROJECT NORTH

## Legend

- Primary Study Area
- Detailed Study Area
- Waterbody
- Watercourse
- Municipal Well (GRCA)
- Regional Recharge Area

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0 300 600 900 1200 1500 m

**Scale (11x17): 1:40000**

Project CRS: NAD83 / UTM zone 17N

MTE
Engineers,Scientists, Surveyors
Ph. (519) 743-6500

Client: Township of Wilmot

Project: Baden Trunk Sewer Class EA

Site: Baden, ON

Title: Regional Recharge Area

| | | | |
|---|---|---|---|
| Reviewed By | ATD | | |
| Prepared By | ATD | Project No | 48730-100 |
| Drawn By | SAR | Figure No | 5 |
| Date | May 2022 | | |

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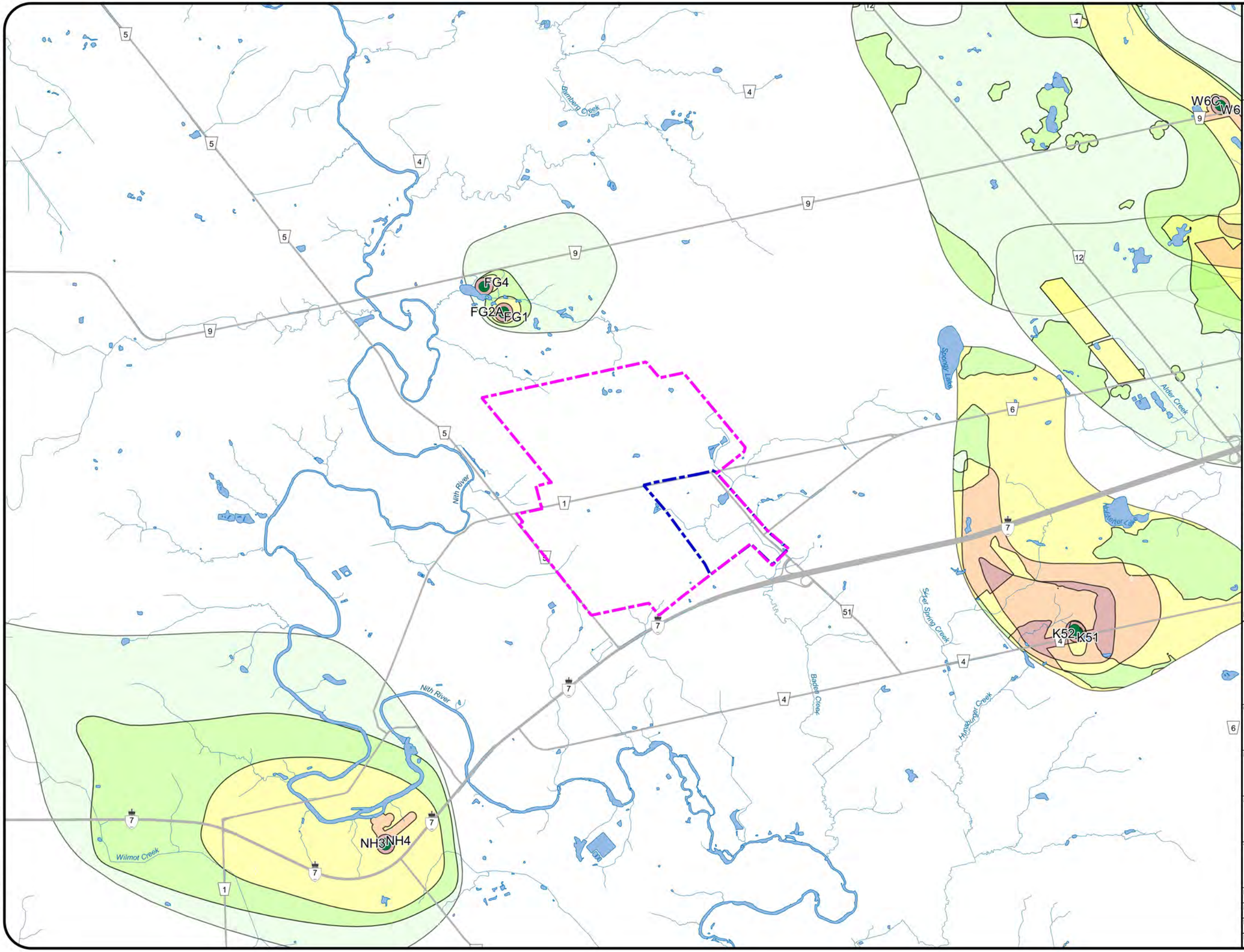
May 09, 2022 - 11:01 - Plotted By: SRederer

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## Legend

- Primary Study Area
- Detailed Study Area
- Waterbody
- Watercourse
- Municipal Well (GRCA)

**WHPA Vulnerability (GRCA)**

- 2
- 4
- 6
- 8
- 10

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0 300 600 900 1200 1500 m

**Scale (11x17): 1:40000**

Project CRS: NAD83 / UTM zone 17N


MTE
Engineers,Scientists, Surveyors
Ph. (519) 743-6500


Client: Township of Wilmot

Project: Baden Trunk Sewer Class EA

Site: Baden, ON

Title: Wellhead Protection Areas

| | | | |
|---|---|---|---|
| Reviewed By | ATD | | |
| Prepared By | ATD | Project No | 48730-100 |
| Drawn By | SAR | Figure No | 6 |
| Date | May 2022 | | |

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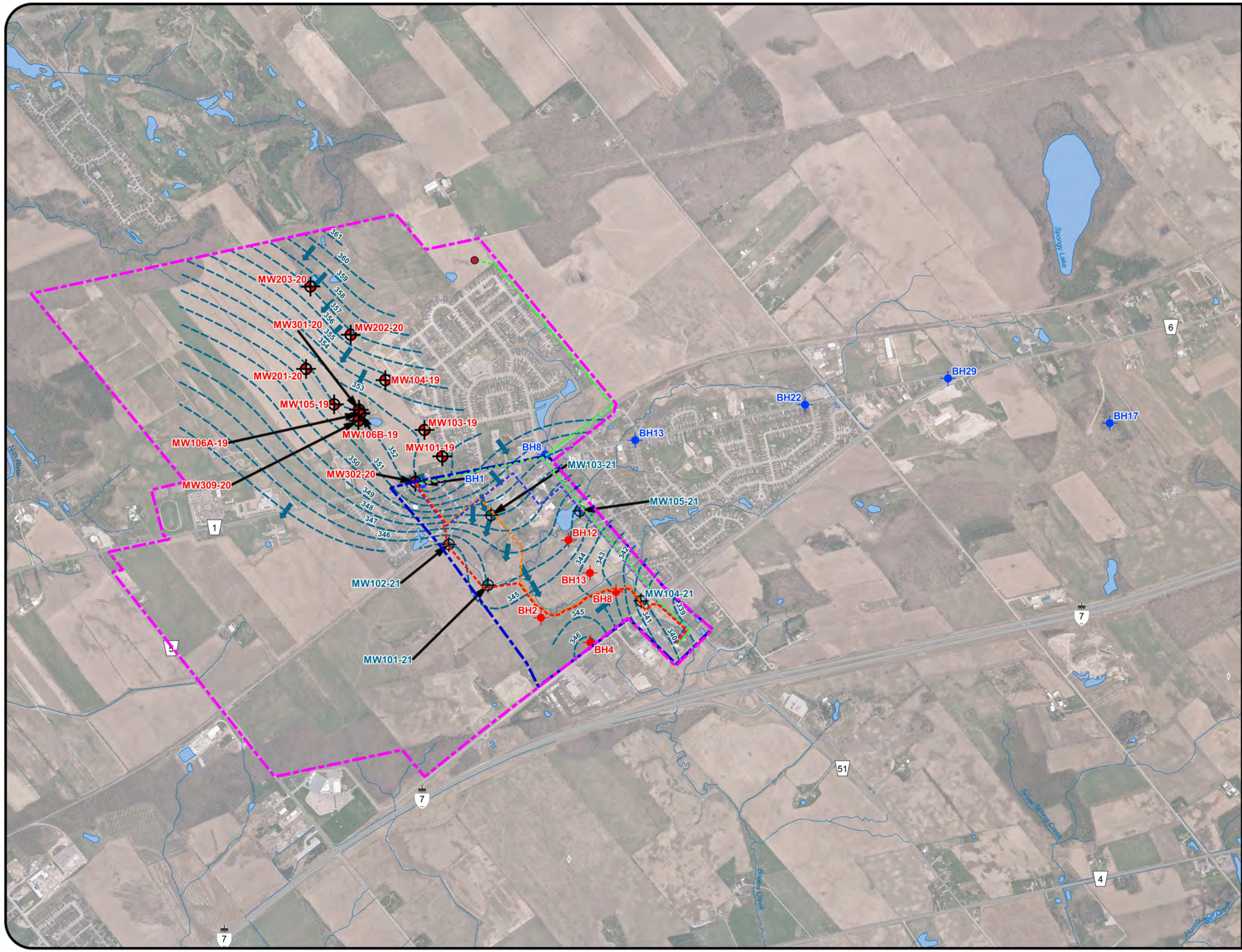
June 13, 2022 - 09:26 - Plotted By: FCummings




N
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PROJECT NORTH

## Legend

- Primary Study Area
- Detailed Study Area
- Waterbody
- Watercourse
- Groundwater Contours (1m Interval)
- Groundwater Flow Direction (Inferred)

### Monitoring Locations

- MTE Geotechnical Monitoring Well
- Pinchin Geotechnical Investigation (File No. 24512)
- Pinchin Geotechnical Investigation (File No. 249839)
- MTE Hydrogeological/Environmental Monitoring Well

### Alternatives

- Modified 2014 Environmental Assessment Preferred Alternative (Do Nothing)
- Snyder's/ Foundry (with and without pump station on Activa Lands) Force Main Crossing at Snyder's/ Foundry
- Charlotta/ Mill/ Charles/ Foundry
- Charlotta/Queen and Baden Creek
- Christian and Baden Creek

The contours represent an estimated water table using groundwater elevations measured at different points in time. They do not depict a single observed condition

*Data Sources:*

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0 100200300400500 m

**Scale (11x17): 1:18000**

Project CRS: NAD83 / UTM zone 17N

MTE
Engineers,Scientists, Surveyors
Ph. (519) 743-6500

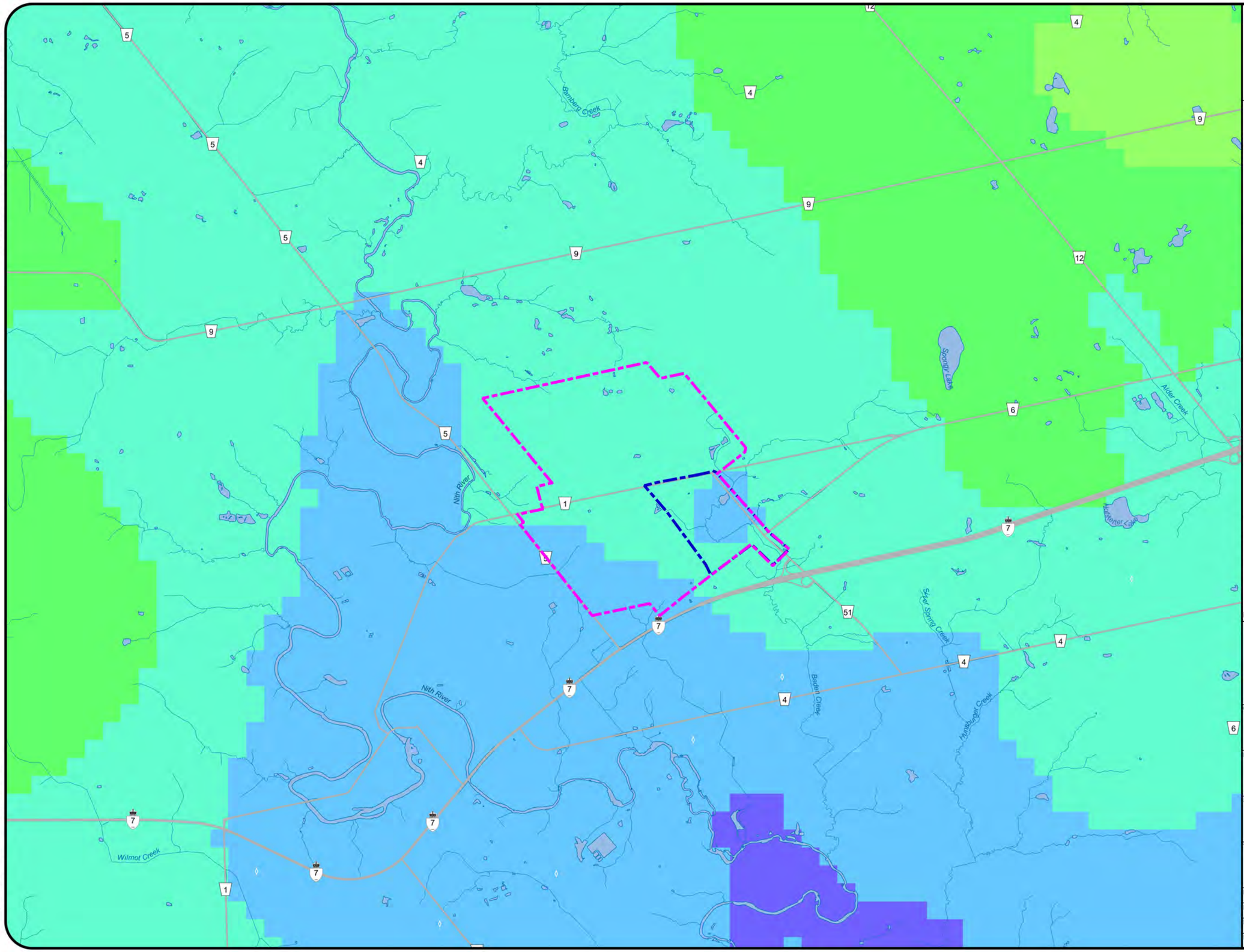
Client: Township of Wilmot

Project: Baden Trunk Sewer Class EA

Site: Baden, ON

Title: Theoretical Water Table

| | | | |
|---|---|---|---|
| Reviewed By | ATD | | |
| Prepared By | ATD | Project No | 48730-100 |
| Drawn By | SAR | Figure No | 7 |
| Date | June 2022 | | |




N
NORTH

N
PROJECT NORTH

## Legend

- Primary Study Area
- Detailed Study Area
- Waterbody
- Watercourse

**Regional Watertable (masl)**

- 300 - 320
- 320 - 340
- 340 - 360
- 360 - 380
- 380 - 400

*Data Sources:*

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0 300 600 900 1200 1500 m

**Scale (11x17): 1:40000**

Project CRS: NAD83 / UTM zone 17N

MTE
Engineers, Scientists, Surveyors
Ph. (519) 743-6500

Client
Township of Wilmot

Project
Baden Trunk Sewer Class EA

Site
Baden, ON

Title
Regional Water Table

| | | | |
|---|---|---|---|
| Reviewed By | ATD | | |
| Prepared By | ATD | Project No | 48730-100 |
| Drawn By | SAR | Figure No | 8 |
| Date | May 2022 | | |

Project No: 48730-100 P:\P\48730\100\GIS\48730-100 QGIS.qgz

GWR2.8

May 09, 2022 - 11:07 - Plotted By: SRederer

# Appendix D

## Fluvial Geomorphological Assessment Technical Memorandum (August 30, 2022)









water's edge
ENVIRONMENTAL SOLUTIONS TEAM LTD.

# Baden Trunk Sanitary Sewer Environmental Assessment

## Fluvial Geomorphological Assessment, Environmental

**Wilmot Township**

**August 30, 2022**

August 30, 2022
WE 21038

Mr. Steve Peterson, CET
Director, Land Development
MTE Consultants, Inc.
520 Bingemans Centre Dr.,
Kitchener, ON
N2B 3X9

Dear Mr. Peterson:

**RE: Baden Trunk Sanitary Sewer Environmental Assessment**
**Fluvial Geomorphological Assessment**

## 1. INTRODUCTION

Water's Edge Environmental Solutions Team (WEEST) was authorized by MTE to complete a geomorphic characterization on Baden Creek and two of it's tributaries as well as the Huehn Award Drain in the Township of Wilmot. This is to support the future location of the Baden Trunk Sanitary Sewer within the area of Snyder's Road and Gingerich Road. MTE is assessing multiple alternatives for the alignment of the trunk sewer and these alternatives could impact the noted channels. WEEST has assessed these channels in order to advise on fluvial geomorphological impacts that may occur to the channels both during construction and in the future.

This report will first characterize the existing watercourses that drain into the main branch of Baden Creek and the general watershed conditions within the study area. Relevant literature on the site was reviewed and confirmed and as necessary, updated based on a desktop analysis and synoptic geomorphic survey(s). Results from the desktop assessments were used to determine cross-sections to undertake detailed field surveys sufficient to determine channel characterization and erosion thresholds.

The subject area is located in the southwest section of the village of Baden. The main branch of Baden Creek originates the northeast corner of Baden, while one tributary collects drainage from a residential development to the north, and another one from the northwest corner. The main branch is dammed on the west side of Foundry St. but continues on as it drains generally in a southerly direction out of Baden. Downstream of Gingerich Road, Baden Creek eventually drains into the Nith River. The Huehn Award Drain drains flows from the east side of Baden and is south of the main Baden Creek branch. **Figure 1** shows the Study Area as well as the subject reaches.

We have acquired data and background information as part of our assessment of the Study Area creeks, these data sources for the analysis include:

- Physiography of Southern Ontario by Chapman & Putnam (digital data from Ministry of Northern Development and Mines (MNDM));
- Site Survey and Field Assessments; and,
- Discussions with MTE staff.

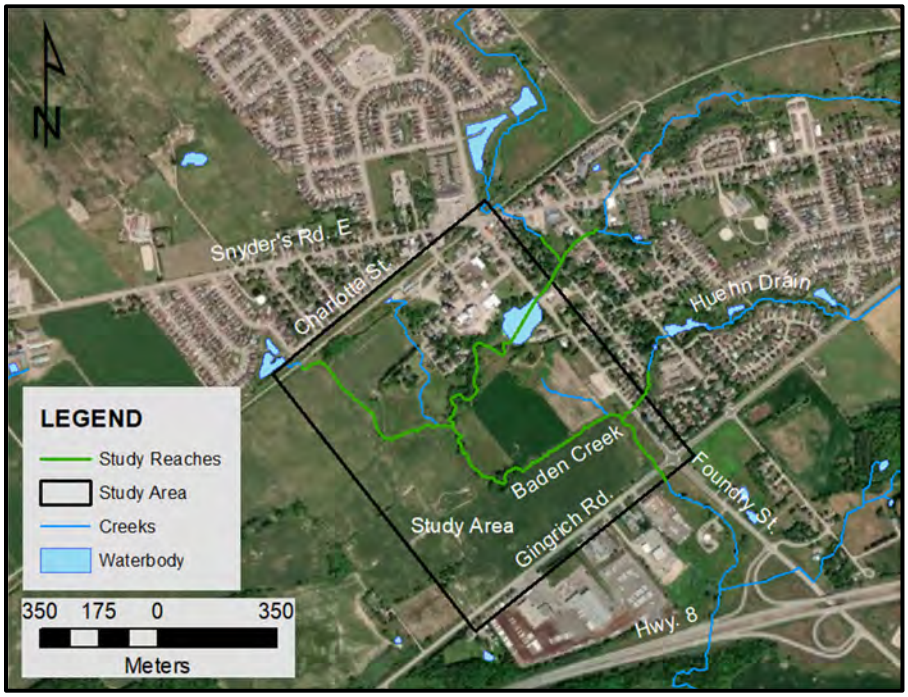


**Figure 1: Study Reaches**

## 2. BACKGROUND REVIEW

### Physiography and Surficial Geology

Understanding the surficial and underlying geology for the study area provides insight into the geological influence on channel geometry, expected rates of erosion, and helps define the quantity and type of sediment available for watercourses to transport and deposit.

The studied watercourse is located within the Waterloo Hills physiographic region. This region is known to contain sandy hills, kames, and moraines. The areas around Baden are particularly known to have large kames that are made up of gravel and sand. The physical landform which the study site is located in is split between kame moraines and till plains (shown in **Figure 2**). The surficial geology of the site is mostly till that is clay to silt textured and is from glaciolacustrine deposits or shale.

### General Stream Characteristics

The tributary of Baden Creek originates from a SWM facility on the north side of railway tracks (**Figure 1**). The SWM facility is for a residential development south of Snyder's Rd. The main branch of Baden Creek in the study area is a third order tributary to the Nith River, which it joins into roughly 5 km downstream of the site. Upstream of the study area along Baden Creek is a large pond that is controlled by a dam, this dam backwaters a large portion of Baden Creek.

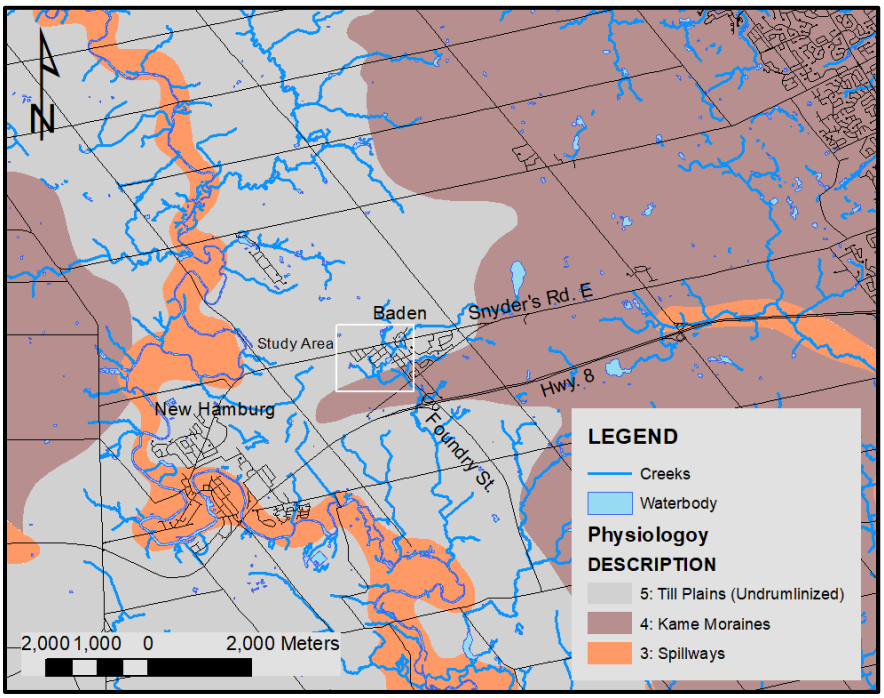


**Figure 2: Local Surficial Geology (data from MNDM)**

## 3. FIELD INVESTIGATIONS

A geomorphic assessment of Baden Creek including two tributaries and a small section of the Huehn Award Drain were completed within the Study Area. **Figure 3** shows the reach breakdown for the Study Area channels. A series of cross-sections were surveyed along with longitudinal profiles of the creeks. Bed and bank materials were recorded to come up with a general characterization of the channel. During the site visit conducted in January 2022, staff gathered a synoptic level understanding of the trends and channel condition through the application of rapid assessments. It is noted that the field investigations took place during the coldest time of the year and the site was partially obscured with ice and snow. However, a follow up investigation in June 2022 provided additional information such as substrate data. Rapid field assessments aid in determining the sensitive sections of the creek which are the focus of an erosion assessment. Locations for detailed surveys of profile, cross-section, and particle analysis were selected based at an appropriate location downstream from the SWM discharge based on distinguishing features observed within the reach.

### Reach Delineation

Channel morphology and substrate characteristics can change along a watercourse. Hence, it becomes imperative to account for this variation by delineating lengths of a watercourse that exhibit similar planform, sediment substrate, land use, local geology, valley confinement, hydrology and gradient. For this study, five separate reaches have been identified, two in the west tributary to Baden Creek (Tributary A), two along the main branch of Baden Creek, and one in the Huehn Award Drain. The west tributary is split into two reaches due to the slope change, channel size, substrate change, and entrenchment of the channel. The main branch of Baden Creek varied in the same ways from the other two reaches of the tributary, however it is split into separate reaches for discussion purposes from upstream of the dam and downstream of the dam. The results of the geomorphic survey and analysis are presented in **Table 3.3a-c.**




**Figure 3: Reach Map**

**Reach 1 – Baden Creek Tributary A**

Reach 1 extends from the railway track at the north end of the subject reach down to the farm lane crossing approximately 320 metres south. The reach runs between two row crop fields and collects runoff from the fields through tile drainage. The riparian zone along the tributary is exclusively grasses, which obscure the creek from view. The channel itself is small and generally straight, likely placed in this alignment for agricultural purposes. The tributary likely has intermittent flow although it was flowing at the time of the site visit, however it is likely dry for some of the summer months. The banks of the channel are loose soils but protected by shallow vegetation roots. The substrate of the channel is silty with some small sands and gravels. No large material was noted during the inspection. The channel characteristics from the geomorphic survey are listed in **Table 3.3a**.



**Photograph 1: View of Reach 1**

**Table 3.3a: Bankfull (Bkf) channel characteristics**

| Parameter | XS1 | XS2 | XS3 | XS4 | XS5 | Average |
|---|---|---|---|---|---|---|
| Bkf Width (m) | 0.65 | 0.80 | 0.77 | 0.48 | 1.12 | 0.76 |
| Bkf Mean Dep. (m) | 0.22 | 0.20 | 0.19 | 0.18 | 0.12 | 0.18 |
| Bkf Max Dep. (m) | 0.31 | 0.27 | 0.24 | 0.28 | 0.20 | 0.26 |
| Bkf Area ($m^2$) | 0.15 | 0.16 | 0.14 | 0.09 | 0.14 | 0.14 |
| Wetted Perim. (m) | 1.00 | 1.07 | 1.02 | 0.78 | 1.27 | 1.03 |
| Hyd. Rad. (m) | 0.15 | 0.15 | 0.14 | 0.11 | 0.11 | 0.13 |
| Width-Depth Ratio | 2.95 | 4.00 | 4.05 | 2.67 | 9.33 | 4.60 |
| Entrench. Ratio | 76.9 | 62.5 | 64.9 | 104.2 | 44.6 | 70.6 |
| Bankfull Slope (m/m) | 0.012 | | | | | |
| Riffle Slope (m/m) | 0.025 | | | | | |
| Substrate $D_{50}$ | 0.75 | | | | | |
| Substrate $D_{84}$ | 7.08 | | | | | |

**Reach 2 – Baden Creek Tributary A**

Reach 2 is part of the tributary and is 220 m in length. It is located downstream of the farm lane crossing and ties into Baden Creek. The reach is separated from the upper portion of the tributary because it has a steeper slope, it is more entrenched, and the substrate particle size is larger. The riparian area along this reach is also exclusively grasses, however the adjacent fields are grazing fields, not row crops. The channel shows significant signs of bank erosion and lateral migration. Multiple steep outer banks with heights greater than 1 metre were noted. The section of the reach upstream of the confluence with Baden Creek is particularly unstable as it is actively scouring the bed of the creek and a few small knickpoints were present. The shallow rooting depth of the riparian grasses plays a part in this erosion susceptibility. The sinuosity of the channel also increased through this reach. Substrate found in the creek are silts, sands and gravels which are sourced from the eroding banks. The channel characteristics from the geomorphic survey are listed in **Table 3.3b**.



**Photograph 2: View of Reach 2**

**Table 3.3b: Bankfull (Bkf) channel characteristics**

| Parameter | XS6 | XS7 | XS8 | Average |
|---|---|---|---|---|
| Bkf Width (m) | 1.18 | 2.08 | 0.74 | 1.33 |
| Bkf Mean Dep. (m) | 0.23 | 0.21 | 0.29 | 0.24 |
| Bkf Max Dep. (m) | 0.34 | 0.45 | 0.39 | 0.39 |
| Bkf Area ($m^2$) | 0.27 | 0.43 | 0.21 | 0.30 |
| Wetted Perim. (m) | 1.48 | 2.39 | 1.20 | 1.69 |
| Hyd. Rad. (m) | 0.18 | 0.18 | 0.18 | 0.18 |
| Width-Depth Ratio | 5.13 | 9.90 | 2.55 | 5.86 |
| Entrench. Ratio | 42.4 | 24.0 | 67.6 | 44.7 |
| Bankfull Slope (m/m) | 0.021 | | | |
| Riffle Slope (m/m) | 0.028 | | | |
| Substrate $D_{50}$ | 1.60 | | | |
| Substrate $D_{84}$ | 8.66 | | | |

**Reach 3 – Baden Creek**

Reach 3 is the main branch of Baden Creek and the study reach is 680 m long. The study reach starts at the confluence with the Baden Cr tributary and ends near Gingrich Rd. Two hundred and thirty metres of the creek were surveyed for the geomorphic and erosion assessment, although other sections such as downstream of the confluence with Huehn Award Drain were visually assessed as well. Approximately 400 m upstream from the start of the study reach is a large mill pond. The main channel of Baden Creek is approximately 4.5 m wide and meanders through agricultural grazing land. The alignment of the channel indicates historical modification for agricultural purposes. Even with those changes the current state of the creek is natural and the creek has generally re-established in its current alignment. The sinuosity of this reach is moderate at 1.25, with a straight channel being 1.0. The reach has sections that are lined with grasses similar to the tributary, but also has large pockets of wooded areas as well. The creek has many signs of active bank erosion and lateral migration, particularly in grassed areas where the root depth is not sufficient to protect the loose banks from eroding. The bed slope through the reach is very low. Substrate found within the reach ranges from silts to boulders. Typically, riffles are sands and gravels with some cobble, while pools are heavily silted.



**Photograph 3: View of Reach 3 typical conditions**

**Table 3.3c: Bankfull (Bkf) channel characteristics**

| Parameter | XS9 | XS10 | XS11 | Average |
|---|---|---|---|---|
| Bkf Width (m) | 3.68 | 5.79 | 4.41 | 4.87 |
| Bkf Mean Dep. (m) | 0.45 | 0.70 | 0.51 | 0.57 |
| Bkf Max Dep. (m) | 0.57 | 1.06 | 0.79 | 0.88 |
| Bkf Area ($m^2$) | 1.66 | 4.03 | 2.27 | 2.86 |
| Wetted Perim. (m) | 4.07 | 6.53 | 4.83 | 5.40 |
| Hyd. Rad. (m) | 0.41 | 0.62 | 0.47 | 0.52 |
| Width-Depth Ratio | 8.18 | 8.27 | 8.65 | 8.52 |
| Entrench. Ratio | 13.6 | 8.64 | 11.3 | 10.4 |
| Bankfull Slope (m/m) | 0.004 | | | |
| Riffle Slope (m/m) | 0.006 | | | |
| Substrate $D_{50}$ | 47.71 | | | |
| Substrate $D_{84}$ | 103.16 | | | |

**Reach 4 – Baden Creek (East of Foundry St.)**

Reach 4 of Baden Creek is from Foundry St. to approximately Brewery St. This reach of the main branch of Baden Creek is heavily impacted by the dam west of Foundry St. The dam backwaters the creek approximately up to Brewery St., after which it regains a typical sinuous form. This reach also includes a small tributary (Tributary B) which drains lands at the northeast corner of Baden. The tributary was not assessed north of Snyder's Rd. The short section of Baden Creek between Brewery St. and Foundry St. has a very slow flow velocity. The typical depth of water through this section was 0.3 – 0.5 m, while bankfull depth is approximately 1.5 m. The section is heavily sedimented with no distinctive channel features such as riffles. No geomorphic survey was completed of this reach, however the typical width of the channel is 12 to 15 m. From a practical fluvial geomorphological perspective this section of Baden Creek could be viewed as a pond rather than an active channel. As such no bed scour is likely to occur unless the downstream dam is removed.



**Photograph 4: View of Reach 4 typical conditions**

**Reach 5 – Heuhn Award Drain**

The Huehn Award Drain runs east to west and is approximately 1.2 kms in length. It originates south of Gingerich Rd. however after it crosses the road it collects drainage from a series of SWM ponds in the residential areas on the north side of Gingerich Rd. It crosses Foundry St. just before joining into the main Baden Creek branch upstream of Gingerich Rd. The small section between Foundry St. and Baden Creek was the only section of the drain that was assessed as the upstream section flows along private property. The length of this section is approximately 50 m. It is lined on all sides by tall grasses with mid to low rooting depth for bank protection. The bottom half of the channel banks show this as scour along the toe of the bank is present along the majority of this reach. The slope from the culvert to the confluence with the main channel is low (~0.5%). The bankfull dimensions are approximately 1.5 m in width and 0.80 m in depth. Substrate found within the reach ranges from gravels to cobbles with some silt. The underlying tills were exposed in some areas. The channel characteristics from the geomorphic survey are listed in **Table 3.3d**.



**Photograph 5: View of the Huehn Drain typical conditions**

**Table 3.3d: Bankfull (Bkf) channel characteristics**

| Parameter | Average |
|---|---|
| Bkf Width (m) | 1.55 |
| Bkf Mean Dep. (m) | 0.75 |
| Bkf Max Dep. (m) | 0.80 |
| Bkf Area ($m^2$) | 1.16 |
| Wetted Perim. (m) | 2.96 |
| Hyd. Rad. (m) | 0.39 |
| Width/Depth Ratio | 2.07 |
| Entrench. Ratio | 64.5 |
| Bankfull Slope (m/m) | 0.005 |
| Riffle Slope (m/m) | 0.012 |
| Substrate $D_{50}$ | 25.16 |
| Substrate $D_{84}$ | 55.27 |

**Rapid Assessments**

Rapid field assessments provide an indication of the channel stability and ecological stream condition, while also identifying primary processes in action (e.g. widening). The Rapid Geomorphic Assessment (RGA) and the Rapid Stream Assessment Technique (RSAT) together provide a thorough description of the existing channel conditions.

The RGA is a check sheet that documents indicators of different modes of channel adjustment: widening, aggradation, degradation, and planform adjustment. These observations are quantified to produce a value that indicates the state of channel stability: “In Regime/Stable” (<0.20), “Transitional/Stressed” (0.21-0.40), or “In Adjustment/Unstable” (>0.40).

RSAT employs a semi-quantitative approach to characterize stream conditions whereby the user assigns a score to 6 different evaluation criteria (MOE, 2003). Abiotic and biotic indicators which influence overall stream quality have been streamlined and weighted appropriately within each of the evaluation criteria. The six criteria are:

1. Channel stability;
2. Channel scouring and sediment deposition;
3. Physical in-stream habitat;
4. Water quality;
5. Riparian habitat conditions; and
6. Biological conditions

The scores are then added to communicate the final index of the stream condition. These values can describe the stream quality as “Excellent” (42-50), “Good” (30-41), “Fair” (16-29), or “Poor” (<16).

Results for the RGA (**Table 3.4**) show that each reach is either stressed or unstable. Reach 1 had poor scores in Widening and Planform Adjustment, meaning there is considerable lateral changes occurring along the reach. Indicators such as basal scour are the prime reason for this. Reach 2 had poor scores in each category, however the Widening and Planform Adjustment were again very poor. Eroding banks, fracture lines along the top of banks, basal scour, and cut-off channels are common in the reach. Reach 3 is categorized as Stressed due to the poor scores in Aggradation and Widening categories. Indicators such as accretion on point bars, siltation in pools, fallen trees, and exposed tree roots are common in this reach. Reach 4 was reviewed using the RGA form however it is not applicable due to the backwater effect of the dam on the geomorphic characteristics of the channel. Reach 5 received a score of 0.25 with most indicators within the Degradation and Widening categories.

**Table 3.4**: **Reach-averaged RGA Results**

| | Form of Adjustment | | | | Stability Index | Condition |
|---|---|---|---|---|---|---|
| | Aggradation | Degradation | Widening | Planform Adjustment | | |
| **Reach 1 (Trib A U/S)** | 0 | 0.10 | 0.30 | 0.43 | 0.21 | Transitional |
| **Reach 2 (Trib A D/S)** | 0.29 | 0.30 | 0.40 | 0.43 | 0.35 | Unstable |
| **Reach 3 (Baden Cr. D/S)** | 0.57 | 0 | 0.60 | 0 | 0.29 | Transitional |
| **Reach 4 (Baden Cr. U/S)** | NA | NA | NA | NA | NA | NA |
| **Reach 5 (Huehn Drain)** | 0 | 0.67 | 0.33 | 0 | 0.25 | Transitional |

The RSAT revealed that stream condition in Reach 1 and 2 are Fair. These low scores are attributed to poor scores in Channel Stability, Riparian Conditions, and Biological Indicators. Since these channels are small and act more as drains than year-round creeks this can be expected. Reach 3 is described as in Good condition, with generally higher than average scores in all categories. Categories that were low are bank stability and biological indicators. Reach 4 was assessed. Reach 5 received a rating of Good as well although the same issues as Reach 3 with poor scores in Bank Stability and Biological Indicators.

**Table 3.5**: **Reach-averaged RSAT Summary Results**

| Reach | Score | Condition |
|---|---|---|
| 1 | 24 | Fair |
| 2 | 22 | Fair |
| 3 | 32 | Good |
| 4 | NA | NA |
| 5 | 31 | Good |

## 4. EROSION THRESHOLD ASSESSMENT

**General**

For the purposes of an erosion threshold assessment, bankfull cross-sections were surveyed at riffle or run locations because it can be expected that channel velocities and shear stresses on the bed are greatest through these sections therefore providing the most representative values. The longitudinal profile was also surveyed to determine the local energy gradient (slope). Substrate measurements were made in order to determine the typical $D_{50}$ for each reach.

This detailed field data (cross-section, gradient, and particle distribution) is used to estimate the bankfull discharge, shear stress, and critical discharge values. Specifically, the critical discharge indicates the point at which sustained flows will tend to entrain and transport sediment. In this analysis, the median particle size ($D_{50}$) was used as an index size.

To determine the critical shear stress for particle entrainment, the methods presented by Komar (1987), Julien (1995) and Fischenich (2001) were used. These methods adapt and update the work

of Shields (1936). The Komar method is most appropriate to gravel sized material, while Fischenich also incorporates finer material (sands). Based on the critical shear stress determined by each method, a critical depth is back-calculated and a critical discharge is determined. Then, if required, this critical discharge is applied as an erosion threshold target when controlling the flow rate and timing for stormwater releases for a range of design storm events. Otherwise, the critical discharge provides an understanding on the sensitivity of the channel to erosion.

**Erosion Threshold Considerations and Discussion**

Each cross section used in the analysis was selected to provide representative erosion thresholds. Attempts were made to locate naturally formed riffles or runs for cross-sectional surveys as these provide locations where flows are concentrated, and their composition is indicative of the type of material that becomes mobilized under frequent flow conditions below and up to the bankfull discharge - before spilling onto the floodplain.

Using the data collected during the field investigations and desktop analysis, bankfull characteristics for cross-sections were summarized. The bankfull energy gradient and bed materials are also summarized (**Table 3.3a-d**). Related hydraulic parameters were determined including stream power, unit stream power, bed shear stress at each riffle cross-section. Results are presented for all four reaches (**Table 4.1**).

Estimated bankfull hydraulics reveals that under bankfull conditions, available shear stresses are not great enough to entrain particles larger than the median grainsize in Reaches 3 and 5 but they are great enough to entrain particles in Reaches 1 and 2. This suggests that bankfull conditions are highly favourable for channel erosion in Reaches 1 and 2 but not in 3 and 5.

Erosion threshold values were determined for representative cross-sections from each reach (**Table 4.2**). Essentially, flows are modeled through each cross-section until the critical depth to mobilize the median particle size ($D_{50}$) is achieved.

**Table 4.1: Summary hydraulics**

| Parameter | Cross-Sections | | | |
|---|---|---|---|---|
| | **Reach 1** (Trib A U/S) | **Reach 2** (Trib A D/S) | **Reach 3** (Baden Cr. D/S) | **Reach 5** (Huehn Drain) |
| Relative Roughness (m) | 169.6 | 103.4 | 8.7 | 15.1 |
| Shear Velocity (m/s) | 0.14 | 0.14 | 0.16 | 0.16 |
| Velocity based on ff/RR (m/s) | 2.1 | 1.99 | 1.27 | 1.54 |
| Bankfull Discharge ($m^3/s$) | 0.31 | 0.54 | 2.86 | 1.79 |
| Froude # | 1.55 | 1.32 | 0.57 | 0.57 |
| Stream Power (W/m) | 45.5 | 63.5 | 168.3 | 122.8 |
| Unit Stream Power ($W/m^2$) | 59.1 | 53.8 | 38.2 | 79.2 |
| Mean Bed Shear ($N/m^2$) | 18.7 | 19.5 | 24.4 | 26.2 |

**Table 4.2: Threshold results**

| Method | Parameter | Cross-Sections | | | |
|---|---|---|---|---|---|
| | | **Reach 1** (Trib A U/S) | **Reach 2** (Trib A D/S) | **Reach 3** (Baden Cr. D/S) | **Reach 5** (Huehn Drain) |
| Komar (1987) | Critical Shear (N/m2) | 0.55 | 1.17 | 34.75 | 18.33 |
| | Ratio of Critical Shear/Bed Shear | 34.27 | 29.25 | 0.70 | 1.02 |
| | Critical Depth (m) | 0.004 | 0.006 | 0.59 | 0.37 |
| | **Critical Flow ($m^3/s$)** | **0.001** | **0.001** | **6.89** | **1.35** |
| | Ratio of Critical Flow/Bankfull Flow | 0.004 | 0.002 | 2.41 | 0.89 |
| Julien (1995) | Critical Shear (N/m2) | 0.40 | 0.75 | 38.61 | 19.14 |
| | Ratio of Critical Shear/Bed Shear | 46.73 | 45.39 | 0.63 | 0.98 |
| | Critical Depth (m) | 0.003 | 0.004 | 0.66 | 0.39 |
| | **Critical Flow ($m^3/s$)** | **0.001** | **0.001** | **8.59** | **1.76** |
| | Ratio of Critical Flow/Bankfull Flow | 0.003 | 0.001 | 3.01 | 1.16 |
| Fischenich (2001) | Critical Shear (N/m2) | 0.44 | 0.97 | 38.88 | 19.09 |
| | Ratio of Critical Shear/Bed Shear | 42.77 | 35.11 | 0.63 | 0.98 |
| | Critical Depth (m) | 0.003 | 0.005 | 0.66 | 0.39 |
| | **Critical Flow (m3/s)** | **0.001** | **0.001** | **8.71** | **1.52** |
| | Ratio of Critical Flow/Bankfull Flow | 0.003 | 0.002 | 3.045 | 1.005 |

Overall, the different methods (Komar, Julien, and Fischenich) produce nearly the same result. For both reaches in the tributary a value of 0.001 $m^3/s$ or 1 L/s was calculated. For the main branch of Baden Creek, the average result is 8.06 $m^3/s$ or 8,060 L/s while the short section of Heuhn Award Drain produces 1.54 $m^3/s$ or 1,540 L/s. The very low critical flow of the tributaries reflects the sensitive nature of the reaches, particularly the sandy substrate. The larger particles found within the main branch of Baden Creek as well as in the study reach of Huehn Award drain are large enough to protect the channel bed from constant erosion. However, the banks of the Baden Creek and Huehn Award Drain are still susceptible to erosion due to the bank composition and riparian vegetation. The provided critical flow values can be used as the target flow for any further erosion threshold assessments.

## 5. TRUNK SEWER ALIGNMENT ALTERNATIVE REVIEW

In order to aid in assessing the alternatives for the trunk sewer alignment a background review, geomorphic assessment, rapid field assessments, and an erosion threshold analysis were completed. Five alternatives have been provided by the study team, each with a slight variation in the trunk sewer alignment. Since the wastewater pumping station is located south of Gingerich Rd. all of the alternatives require the crossing of Baden creek near the facility. Therefore, this is not considered when comparing the alternatives.

After crossing Gingerich Rd. the alignments for Alternatives 1, 2, and 3 run along Foundry St. and then along Snyder's Rd. This alignment requires the crossing of Huehn Award Drain and Baden Creek at the pond. In addition, Alternative 1 runs east along Snyder's Rd. and would also require crossing of Tributary B. All of these crossings would require open-cut construction activity to install the trunk sewer. This activity would require diversion of the watercourse during construction and rehabilitation of the channel. The disturbed section could create weaknesses in the bed and banks of the creek and lead to erosion if not properly rehabilitated. Erosion and sediment controls would

be required for any channel modifications and be properly installed and maintained in order to avoid any excessive sediment loads from entering the watercourse.

The locations of the crossings for Alternatives 1-3 through Heuhn Award Drain and Baden Creek were not identified as sensitive by the erosion threshold analysis. The substrate of Huehn Award Drain is gravels and cobbles and is therefore better equipped for dealing with bed scour. The Baden Creek crossing was not assessed with the erosion threshold analysis because it is a pond, and therefore no bed scour is likely to occur. However, the depth of the trunk sewer is a concern, and should be placed at a depth that the channel is not able to scour to even if creek conditions change in the future. Therefore, a minimum depth of 2 times the bankfull depth should be the goal. For the Heuhn Award Drain this would be 1.5 m below the creek bed and for Baden Creek this would be approximately 3 m below the creek bed.

The alignments for Alternatives 4 and 5 generally follow along Baden Creek through the open space between Gingerich Rd. and Snyder's Rd. They both cross Baden Creek immediately north of Gingerich Rd. by way of a trenchless crossing. Alternative 5 follows along Tributary A and crosses it near the railway by way of a trenchless crossing. Alternative 4 cuts to the east and crosses Tributary A near the confluence with the main branch of Baden Creek. This is a trenchless crossing as well, however the location of the crossing is a highly sensitive section of the creek with knick-pointing and bed scour actively occurring. Due to this, if selected, the depth of the trenchless crossing at this location should be supported by a detailed bed scour analysis.

Baden Creek and Tributary A are noted to be actively migrating laterally. Since Alternatives 4 and 5 generally follow the alignment of the creeks it is important to offset the trunk sewer at a distance that will ensure the creek will not be able to meander to it in the future. The MNR Technical Guide – River and Stream Systems notes that for unconfined systems a meander hazard of 20 times the bankfull width centred over the channel is acceptable without a detailed study. For Baden Creek this would result in an almost 100 metre total beltwidth or 50 m on either side of the creek. This is seen as excessive, and it is unlikely that Baden Creek would ever meander this far. The existing beltwidth of Baden Creek is approximately 25 m and considering the topography as well as the ongoing lateral migration an additional 25 m buffer for a total beltwidth of 75 m is likely to be sufficient if not conservative for an erosion hazard offset. However, a detailed meander beltwidth study may be required to confirm the historical and future meander beltwidth of Baden Creek. Tributary A has a narrower beltwidth (~10 m) and would require an offset of 10 m based on 100% of the overall preliminary beltwidth.

With all this considered, the alternative that is likely to cause the least disruption to creek form and function is Alternative 5. This alternative has only 2 crossings of a watercourse and it is via trenchless installation. Lateral proximity to the creeks is a concern but if a satisfactory offset can be achieved then Alternative 5 has the least erosion potential associated with it and should be the preferred alternative as it has the least immediate impact from construction activity as well as a low likelihood of future impact to the creek.

Respectfully submitted,





Ed Gazendam, Ph.D., P.Eng.,
President, Sr. Geomorphologist
**Water's Edge Environmental Solutions Team Ltd.**

Nik Gazendam, C.Tech. CAN-CISEC
Project Manager and Senior Technician

**APPENDICES:**

**Appendix A: Photo Inventory**

**REFERENCES:**

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# APPENDIX A:

# Photo Inventory

## BADEN CREEK - TRIBUTARY A – REACH 1



**PHOTOGRAPH NO.: 1**
FROM: Left side of creek at north end of Reach 1
LOOKING: Upstream towards railway tracks. Creek crosses to the left.



**PHOTOGRAPH NO.:2**
FROM: Left bank of creek at top end of Reach 1.
LOOKING: Downstream at Reach 1 which is well vegetated and is between two fields.



**PHOTOGRAPH NO.: 3**
FROM: Centre of creek, middle of Reach 1.
LOOKING: At uncovered portion of creek. Creek typically hidden by grasses.



**PHOTOGRAPH NO.: 4**
FROM: Centre of creek at lower end of Reach 1.
LOOKING: Downstream towards farm crossing. Bed slope has increased.

## BADEN CREEK - TRIBUTARY A – REACH 2



**PHOTOGRAPH NO.: 5**
FROM: On top of farm crossing between Reach 1 and 2.
LOOKING: Downstream over Reach 2.



**PHOTOGRAPH NO.: 6**
FROM: Centre of creek, in middle of Reach 2.
LOOKING: At the substrate composition in Reach 2.



**PHOTOGRAPH NO.: 7**
FROM: Middle of Reach 2.
LOOKING: Channel knickpointing into undisturbed tills at a few locations.



**PHOTOGRAPH NO.: 8**
FROM: Left side of creek at lower end of Reach 2.
LOOKING: Downstream at heavily eroded bank.



**PHOTOGRAPH NO.: 9**
FROM: End of Reach 2.
LOOKING: Downstream at confluence with main channel of Baden Creek.

**BADEN CREEK – REACH 3**



**PHOTOGRAPH NO.: 10**
FROM: Right bank at top end of Reach 3.
LOOKING: Upstream at typical channel conditions.



**PHOTOGRAPH NO.: 11**
FROM: Middle of creek at upper portion of Reach 3.
LOOKING: At channel substrate composition. Mostly sands with some gravel/cobble.



**PHOTOGRAPH NO.: 12**
FROM: Right bank at upper portion of Reach 3.
LOOKING: Downstream at open section of creek, high right bank, low left bank.



**PHOTOGRAPH NO.: 13**
FROM: Left bank of creek in middle of Reach 3.
LOOKING: Upstream at typical channel conditions. Steep eroding right bank.



**PHOTOGRAPH NO.: 14**
FROM: Left bank near middle of Reach 3.
LOOKING: Downstream towards open section of channel, steep eroding banks throughout.

## BADEN CREEK – REACH 4



**PHOTOGRAPH NO.: 15**
FROM: Roadside culvert on Brewery St.
LOOKING: Upstream at typical channel conditions, backwater ends at top of view.



**PHOTOGRAPH NO.: 16**
FROM: Centre of channel between Brewery St. and Foundry St.
LOOKING: Downstream at typical backwatered conditions, heavy siltation.



**PHOTOGRAPH NO.: 17**
FROM: Centre of channel between Brewery St. and Foundry St.
LOOKING: Across channel at confluence with Tributary B.



**PHOTOGRAPH NO.: 18**
FROM: Top of culvert at Foundry St.
LOOKING: Downstream at pond.

**HEUHN AWARD DRAIN – REACH 5**



**PHOTOGRAPH NO.: 19**
FROM: Sidewalk on Foundry St.
LOOKING: Upstream at Heuhn Award Drain, running through private property.



**PHOTOGRAPH NO.: 20**
FROM: Edge of road on Foundry St.
LOOKING: Downstream at channel and confluence with the Baden Creek.



**PHOTOGRAPH NO.: 21**
FROM: Centre of channel
LOOKING: Downstream at typical channel conditions, scoured banks and tall grasses.



**PHOTOGRAPH NO.: 22**
FROM: Centre of channel
LOOKING: At bed of channel with cobbles, gravels and exposed underlying till.

# Technical Memo 2
# Socio-Cultural Environment

Technical Memorandum

| | | | |
|---|---|---|---|
| **Project Name:** | Baden Trunk Sanitary Sewer EA | **MTE File No.:** | 48730-100 |
| **To:** | Jeff Molenhuis, Township of Wilmot<br>Bryan Bishop, Township of Wilmot<br>Trevor Heywood, GRCA | **Date:** | November 6, 2022 |
| **cc:** | Kaoru Yajimi, ROW<br>Pierre Chauvin, MHBC<br>Paul Britton, MHBC | **From:** | Jeff Martens, P.Eng.<br>Carla Illman, M.Eng. |

**Re: BADEN TRUNK SANITARY SEWER CLASS B ENVIRONMENTAL ASSESSMENT**
**Socio-Cultural Assessment of Alternatives**

# 2.0 Socio-Cultural Environment

### 2.A Land Use Policy

This Factor Group reviews the degree of consistency with the Provincial Policy Statement (PPS) of 2020 and conformity with A Place to Grow – Growth Plan for the Greater Horseshoe (2020), the amended Regional Official Plan (2015) and the Township of Wilmot Official Plan (2019). It supports the coordination and integration of planning for infrastructure with growth management and land use planning, and provision of infrastructure in an efficient manner.

There are a number of policies that implement the vision and underlying objectives of the PPS. Some of the relevant policies include:

- Focus growth and development within the settlement of Baden.
- Manage and direct land use to achieve efficient and resilient development and land use patterns.
- Direct the efficient provision of infrastructure, public service facilities and sewage water.
- Require infrastructure and public service facilities to be integrated and coordinated with land use planning.
- Support energy conservation, air quality and consider the impacts of a changing climate.
- Require that provincially significant natural features and areas are to be protected for the long term.
- Direct the protection, improvement or restoration of the quality and quantity of water.

***Land Use Designation and Policies***

MHBC was retained by MTE to undertake a Land Use Planning Evaluation for the Municipal Class EA. The technical memo (dated April 28, 2022) was prepared to provide input into the evaluation of the five alternatives presented, and identify the potential land use impacts these alternatives have on adjacent properties. Refer to the *Technical Memo – Land Use Planning Evaluation, Baden Trunk Sanitary Sewer EA (April 28, 2022)* in **Appendix A.**

This Factor Group evaluates the degree to which each alternative is aligned with Provincial, Regional and Township growth, taking into account development goals, objectives or policies (high, medium, low), and input from the MHBC technical memo. This was performed by identifying upper and lower tier infrastructure as this is a limiting factor with respect to development patterns and timing.

Alternative 4 received a maximum score of 10. This alternative scored the highest due to its autonomy to implement infrastructure improvement without upper tier regulations, formulating development and growth independently. The location and depth of sewer would provide serviceability to all lands within the Primary Study Area and help facilitate the Township's long-term vision of growing New Hamburg and Baden together. Timing of construction requires coordination to avoid impacting the growing season for areas located on agricultural lands just north of Gingerich Road.

Alternative 5 received a score of 8. This alternative is similar to Alternative 4 except a larger portion of the alignment is located on agricultural land outside of the urban boundary. Disruptions to cropping or other agricultural activities would require mitigation by avoiding construction during the growing season. Following construction, the below grade sewer would not impact agricultural activities/uses. The location and depth of sewer would provide serviceability to all lands within the Primary Study Area and help facilitate the Township's long-term vision of growing New Hamburg and Baden together.

Alternative 3 received a score of 4. This alternative has a low degree of compatibility due to the timing and prioritization of combined regional and local projects. This alignment consists of one (1) regional project and one (1) local project. This alignment would not provide sanitary services to all lands west of Baden and would not facilitate the Township's long-term vision of growing New Hamburg and Baden together.

Alternative 2 received a score of 2. This alternative is similar to Alternative 3 except it is entirely dependent upon the timing and prioritization of regional projects. This alignment consists of two (2) separate regional projects. This alignment also would not provide sanitary services to all lands west of Baden and would not facilitate the Township's long-term vision of growing New Hamburg and Baden together.

Alternative 1 received the minimum score of 1. This alternative is the least compatible due to the timing and prioritization of this alignment. It consists of two (2) regional projects and one (1) local project. It would also be a temporary disturbance to the access for the agricultural/livestock operation along existing farm lane during construction. This alignment would not provide sanitary services to all lands west of Baden and would not facilitate the Township's long-term vision of growing New Hamburg and Baden together.

***Impact of Sanitary Sewer on Adjacent Lands***

This Factor Group assess the impacts of the sanitary sewer construction on the existing land uses, residences and business utilizing the right-of-ways.

Alternative 5 received a maximum score of 10. This alternative impacts the fewest residences due to the alignment traversing along only Christian Street (**Figure 8.1)**. Coordination is required within the Schmidt Lands to reduce the impact on cropping activities.

Alternative 4 received a score of 8. This alternative is similar to Alternative 5 except it impacts the additional residential properties along Charlotta Street and Queen Street (**Figure 7.1**). Coordination is required within the Schmidt Lands to reduce the impact on cropping activities.

Alternative 3 received a score of 4. This alternative significantly impacts many residential properties along Christian Street, Charlotta Street, Mill Street, and Charles Street (**Figure 6.1**). In addition, businesses and residential properties along Foundry Street would be significantly impacted.

Alternative 2 received a score of 2. This alternative would significantly impact businesses and residential properties along Snyder's Road West and Foundry Street (**Figure 5.1**). Local residences that utilize Snyder's Road West and Foundry Street for access would also need to be rerouted.

Alternative 1 received the minimum score of 1. This alternative is similar to Alternative 2 except it would also impact farming operations along the private farm road north of Snyder's Road East (**Figure 4.1**).

**2.B Archaeological Resources**

Detritus Consulting Ltd. was retained by MTE Consultants Inc. to conduct a Stage 1-2 archaeological assessment for the Municipal Class EA. The Stage 1 background research indicated that the Detailed Study Area (DSA) exhibited moderate to high potential for the identification and recovery of archaeological resources. The Stage 2 investigation consisted of a pedestrian survey at 3m intervals of most of the agricultural land throughout the DSA, and a test pit assessment of the grassy and treed areas, and the seasonal creek extending from Baden Creek to the west.

The various road allowances throughout the Study Area, the Canadian National Railway bed, and the pumping house driveway were evaluated as having no find potential based on the identification of extensive and deep land alteration that has severely damaged the integrity of archaeological resources.

Their report, *Stage 1-2 Archaeological Assessment Baden Trunk Sanitary Sewer Replacement, Baden (July 19, 2022)* along with its supplemental document (**Appendix B**), was used to evaluate each of the five alternatives and their impacts according to the archeological findspots and their buffers. Refer to Tile 3, Tile 7 and Tile 8 of the supplemental document in **Appendix B**.

This Factor Group was assessed based on the proximity of the alignment in relation to the archeological fndspot's 20m protective buffer, 50m monitoring buffer or if further archeological investigation is required.

Alternative 2 received a maximum score of 10. This alternative scored the highest due to it be located entirely within an existing right-of-way and surrounded by previously disturbed areas. No archeological assessment is required (**Figure 5.1**).

Alternative 3 received a score of 9. This alternative is similar to Alternative 2 in that the entirety of the alignment is within previously disturbed areas. No archeological assessment is required (**Figure 6.1**).

Alternative 1 received a score of 8. This alternative is similar to Alternative 2 along Snyder's Road West and Foundry Street. However, the forcemain portion of the alignment to service Parcel O could potentially bring about another find (**Figure 4.1**).

Alternative 5 received a score of 5. This alternative is within the 50m construction monitoring buffer of archeological findspots along the Baden Creek. Archeological monitoring would be required during construction (**Figure 8.1**).

Alternative 4 received the minimum score of 1. This alternative is similar to Alternative 5 however it is in close proximity to another 50m construction monitoring buffer of Findspot AiHe-469 along the Baden Creek, just south of Queen Street. (**Figure 7.1**).

## 2.C Built Heritage

MHBC completed a *Cultural Heritage Evaluation Report for the Municipal Class EA (December 2021)* on behalf of MTE (**Appendix C**). This report was prepared to provide input into the evaluation of the five alternatives with respect to their impact to local Cultural Heritage Resources. Eleven Cultural Heritage Resources were identified as a result of this evaluation:

Listed Heritage Properties:

- 1316 Snyder's Road West
- 53 Snyder's Road West
- 55 Snyder's Road West
- 8 Foundry Street
- 76 Mill Street
- 75 Charles Street
- 130 Queen Street

Designated Heritage Properties:

- 44 Beck Street
- 60 Snyder's Road West
- 1138 Snyder's Road West
- 39 Snyder's Road West

Baden has also been identified as a potential Cultural Heritage Landscape by the Region of Waterloo as well as identifying Foundry Street and Snyder's Road as scenic roads. Adverse impacts are designated in the Ontario Heritage Toolkit (OHTK). It states that impacts may be direct or indirect, occurring over the short term or long term, and occurring during a pre-construction phase, construction phase or post-construction phase.

This Factor Group was evaluated based on the potential for adverse impacts on designated heritage properties identified in the Township Heritage Register and in accordance with the Ontario Heritage Act (OHA), and as described within the MHBC Cultural Heritage Evaluation Report

Though none of the Alternatives would likely result in the removal of identified cultural heritage resources, scoring is based on the potential to impact listed and designated heritage properties.

Each alternative impact assessment is related to construction work, which is both subterranean and will be undertaken for a limited period of time. It assesses the potential impacts due to land disturbances and vibrations and are therefore based on proximity to listed properties. Refer to Figure 2 of the *Cultural Heritage Evaluation Report for the Municipal Class EA (December 2021)* in **Appendix C** for Heritage locations.

Alternative 5 received a maximum score of 10. This alternative scored the highest because it had the least impact on built heritage. It is sited furthest away from one (1) listed property, 130 Queen Street.

Alternative 4 received a score of 9. This alternative is similar to Alternative 5 except that it is closer in proximity to 130 Queen Street.

Alternative 3 received a score of 5. This alternative is adjacent to four (4) listed and two (2) designated properties. Construction would affect the scenic route along Foundry Street during construction.

Alternative 1 received a score of 2. This alternative is similar to Alternative 3 except it would also impact the scenic route along Snyder's Road West as well as Foundry Street during construction.

Alternative 2 received the minimum score of 1. This alternative is the same as Alternative 1 except that it would impact the scenic route for a longer period of time due to sewer depth. Both Alternative 1 and 2 affect the road immediately in front of the Castle Kilbride.

**2.D Noise/Odour**

This Factor Group was evaluated based on the potential noise impacts during construction and the generated noise and odour associated with wastewater pumping stations.

Alternative 5 received a maximum score of 10. This Alternative would eliminate the noise and odour associated with the removal of two (2) existing pumping stations. Construction noise would be limited to residences along Christian Street (**Figure 8.1**).

Alternative 4 received a score of 9. This Alternative is similar to Alternative 5 except that construction noise would impact additional residences along Charlotta Street and Queen Street (**Figure 7.1**).

Alternative 3 received a score of 8. This Alternative is similar to Alternative 4 except construction noise would impact additional residences and businesses along Mill Street, Charles Street and Foundry Street (**Figure 6.1**).

Alternative 2 received a score of 2. This Alternative would eliminate the noise and odour associated with the removal of one (1) pumping station located at the school along Snyder's Road West, however, a large number of business and residences would be impacted by construction noise along Snyder's Road West and Foundry Street (**Figure 5.1**).

Alternative 1 received the minimum score of 1. This alternative would increase noise and odour due to the additional pumping station required to service Parcel O. Construction noise would impact the greatest number of business and residences along Snyder's Road West, Foundry Street and the farm road (**Figure 4.1**).

# Appendix A

## Land Use Planning Evaluation, Baden Trunk Sanitary Sewer EA Technical Memorandum (April 28, 2022)

MHBC
PLANNING
URBAN DESIGN
& LANDSCAPE
ARCHITECTURE

# MEMO

KITCHENER
WOODBRIDGE
LONDON
KINGSTON
BARRIE
BURLINGTON

| | |
|---|---|
| **To:** | **Jeff Martens, Dot Roga, Carla Illman** |
| **From:** | **Pierre Chauvin** |
| **Date:** | **April 28, 2022** |
| **File:** | **0941CD** |
| **Subject:** | **Technical Memo – Land Use Planning Evaluation, Baden Trunk Sanitary Sewer EA** |

## INTRODUCTION

MHBC was retained by MTE to undertake a Land Use Planning Evaluation for the Baden Trunk Sanitary Sewer Municipal Class Environmental Assessment. The study area is located in the Town of Baden, in the general area located east of Nafziger Road, west of Foundry Street on either side of Snyder's Road West.

The purpose of this technical memo is to provide input into the evaluation of each of the five Alternatives of the Baden Trunk Sanitary Sewer through the identification of potential land use impacts within the Detailed Study Areas and provide a preliminary evaluation of the proposed Alternatives. This information will feed into the Environmental Assessment process along with other technical reports so that a Preferred Alternative can be selected.

The purpose of the waste water/sanitary sewer line is to provide municipal services for growth areas within the community of Baden. There are currently 5 alignment Alternatives proposed. The attached figure prepared by MTE, identifies the location of the Alternative routes. **Figures 1** and **2** illustrate the Alternative routes in relation to the Township Official Plan Land Use and Countryside Schedules.

A wastewater servicing study for the growth areas of Baden and New Hamburg was prepared in 2014. This study evaluated sanitary infrastructure needs which were part of the 2011 Baden and New Hamburg Water and Waste Water Master Plan. The anticipated growth for the Township of Wilmot prompted a servicing strategy for Baden and New Hamburg. As a result, the Township initiated a Schedule B Municipal Class Environmental Assessment for the Baden Trunk Sanitary Sewer, which commenced in June 2021. The existing sanitary infrastructure lacks the capacity and depth for the anticipated growth within Baden. The proposed sanitary trunk will accommodate current and future growth while optimizing existing infrastructure which consists of trunk sewers, gravity sewers, and pressure sewers.

## POLICY CONTEXT

The Places to Grow Act, 2005 provides for the development and approval of Regional Growth Plans that are to guide government investments, land use planning policies and decisions. Waterloo Region is located within the Greater Golden Horseshoe and **A Place to Grow - Growth Plan for the Greater Golden Horseshoe (2020)** applies as does the 2020 Provincial Policy Statement (PPS).

The Growth Plan (2020) builds upon the initial Growth Plan (2006) and subsequent policy amendments. The Growth Plan (2020) came into effect on August 28, 2020. All decisions in respect of the exercise of any authority that affects a planning matter are to conform with the Growth Plan. The Growth Plan includes a growth concept as well as a policy framework relating to: "Where and How to Grow"; infrastructure planning; climate change; and the protection of water resources, the natural environment, hydrologic features and areas, public open space, agricultural systems, as well as cultural heritage and aggregate resources. The Growth Plan directs the vast majority of growth to settlement areas and prioritizes intensification both generally and in strategic growth areas as the basis to focus investments in transit, other types of infrastructure and public service facilities.

The policies of the Growth Plan support an integrated approach to land use planning, infrastructure investments, and environmental protection to achieve the outcomes of the Plan, which among other matters supports the achievement of complete communities and ensuring the efficient use of land, and infrastructure. Municipal water and wastewater systems are to be planned, designed, constructed, or expanded to serve growth in a manner that supports achievement of the minimum intensification and density targets of the Growth Plan.

The **2020 Provincial Policy Statement (PPS)** was issued by the Province of Ontario in accordance with Section 3 of the Planning Act and replaces the PPS that was issued on April 30, 2014. The Provincial Policy Statement (PPS) has similar policy thrusts and provides overall policy direction on matters of provincial interest related to land use and development in Ontario. The PPS applies province-wide except where the PPS or another provincial plan provide otherwise.

The PPS provides policy direction on matters of provincial interest related to land use planning and development. All decisions affecting planning matters are to be consistent with the PPS. Similar to the Growth Plan, the PPS is to be read in its entirety and the relevant policies are to be applied to each situation.

The PPS outlines a vision for Ontario's land use planning system which among other matters: focuses growth and development within urban and rural settlement areas; provides for the management of land use change; directs the achievement of appropriate development that meets current and future needs; contemplates efficient development patterns; and provides for the protection of significant or sensitive resources.

Development patterns are to optimize the use of land, resources and public investment in infrastructure and public service facilities. The province's long-term prosperity, environmental health and social well-being depend on wisely managing change and promoting efficient land use and development patterns. There are a number of policies that implement the vision and underlying objectives of the PPS. Some of the relevant policies include:

- Focus growth and development within settlement areas.
- Manage and direct land use to achieve efficient and resilient development and land use patterns.
- Direct the efficient provision of infrastructure and public service facilities, sewage water and stormwater services.

- Require infrastructure and public service facilities to be integrated and coordinated with land use planning.
- Support energy conservation, air quality and consider the impacts of a changing climate.
- Require that provincially significant natural features and areas are to be protected for the long term.
- Direct the protection, improvement or restoration of the quality and quantity of water.

The **Regional Official Plan (ROP)** was approved in June of 2015 and as an implementation of the 2006 Places to Grow – Growth Plan. The ROP is currently being reviewed to implement the 2020 PPS and Growth Plan. An overarching goal of the ROP is to promote balanced growth by directing new growth to occur within the Urban Area and Township Urban Area designations.

The ROP outlines policies to address the Region's infrastructure needs for servicing, stormwater management and transportation. Urban Areas, such as Baden, are a top priority for servicing in the Region. Further priority is given to areas that are currently serviced or can be extended at minimal costs. Full municipal water and sanitary sewage systems are the preferred form of servicing within the Region.

The **Township of Wilmot Official Plan (OP)** was adopted by Township Council on July 21, 2003 and approved with modifications by the Regional Municipality of Waterloo on August 5, 2004 The Township OP is deemed to be consistent with the PPS and implements/conforms to the policies of the Growth Plan and ROP. Similar to the ROP, the OP policies prioritize the utilization and extension of municipal wastewater services to service growth and development.

The proposed EA is consistent with the PPS and conforms with the policies of the Growth Plan, ROP and OP, all of which, support the coordination and integration of planning for infrastructure with growth management and land use planning, and provision of infrastructure in an efficient manner.

**PROPOSED ALTERNATIVES**

The Broader Study Area extends from Erbs Road to the north towards Gingerich Road and the Baden Wastewater Pumping Station to the south. The Broader Study Area extends from Nafziger Road to the west to Foundry Street, and extends along the railway corridor turning north near Erhhardt Wagner Place and Kropf Drive. The only Alternative which extends into the broader study area is Alternative 1 (do nothing). The detailed study area can be defined as those lands located along Snyder's Road West between Christian Street to the west and Foundry Street to the east. The detailed study area extends south to Gingerich Road and terminates at the Baden Waste Water Pumping Station at 1044 Foundry Street (see Figure 1).

The following table summarizes the land use impacts and considerations relative to each Alternative.

| **Alternatives and Descriptions** | **Land Use Considerations** |
|---|---|
| **Alternative 1**<br>*Modified 2014 Environmental Assessment Preferred Alternative (Do Nothing)*<br>• This Alternative examines what may happen if no alternative is selected;<br>• If no alternatives are selected, then the current wastewater strategy of 2014 will be carried out; | • Sewer alignment is on east side of Baden along an existing farm lane, which serves as a secondary access to an existing agricultural/livestock operation. Construction of the sewer would be a temporary disturbance to the access to the agricultural/livestock operation. |

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| • This Alternative begins at the north east urban boundary of Baden and runs south west along the railroad and down Foundry Street to the Baden Waste Water Pumping Station. It will also service Snyder's Road West from Foundry to Christian Street;<br>• This Alternative would require the following:<br>o A pumping station, and a pressure sewer along the eastern Urban Boundary;<br>o A sewer which crosses the railroad at the intersection of Foundry Street and Snyder's Road West; and<br>o Upgrading existing sewer and integrating it along the Regional Road. | • Location of sewer would not provide for servicing of lands to the west of Baden and would not facilitate the Township's long-term vision of growing New Hamburg and Baden together.<br>• Alignment of sewer would cross the Goderich-Exeter railway at the intersection of Snyder's Road West and Foundry Street, creating a temporary disruption at a very busy intersection in the community with an at-grade rail-crossing.<br>• A number of residential and commercial uses along Foundry Street, including the Township's Fire Hall, would be directly impacted by the temporary construction activities, and require alternative access arrangements. There may be potential disruptions to emergency services. |
| **Alternative 2**<br>*Snyder's/Foundry Force main Crossing at Snyder's/Foundry*<br>• Predominantly lies within the existing right-of-way of Snyder's Road West and Foundry Street.<br>• This Alternative would require the following:<br>o Reconstructing large portions of existing road infrastructure;<br>o Crossing the railroad;<br>o Upgrading existing sewers; and<br>o Upgrading and integrating along a Regional Road. | • Alignment of sewer would cross the Goderich-Exeter railway at the intersection of Snyder's Road West and Foundry Street, creating a temporary disruption at a very busy intersection in the community with an at-grade rail-crossing.<br>• A number of residential and commercial uses along Foundry Street, including the Township's Fire Hall, would be directly impacted by the temporary construction activities, and require alternative access arrangements. There may be potential disruptions to emergency services.<br>• Location and depth of sewer would provide for the servicing of lands to the west of Baden and would help facilitate the Township's long-term vision of growing New Hamburg and Baden together. |
| **Alternative 3**<br>*Christian/Charlotta/Mill/Charles/Foundry*<br>• Lies within the existing right-of-ways of Christian Street, Charlotta Street, Mill St., Charles Street and Foundry Street.<br>• This Alternative would require the following:<br>o Reconstructing large portions of existing road infrastructure;<br>o Crossing a railroad;<br>o Upgrading existing sewers; and<br>o Upgrading and integrating sewers along a Regional Road. | • Location and depth of sewer would provide for the servicing of lands to the west of Baden and would help facilitate the Township's long-term vision of growing New Hamburg and Baden together.<br>• A number of residential uses on Christian Street, Charlotta Street, Mill Street, Charles Street and Foundry Street and some commercial uses along Foundry Street would be directly impacted by the temporary construction activities, and require alternative access arrangements. Access to the Township's Fire Hall may also |

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|---|---|
| | be temporarily disrupted which may lead to delays to emergency services response times.<br>• Alignment of sewer would cross the Goderich-Exeter railway at Mill Street, where there is an existing at-grade crossing. |
| **Alternative 4**<br>*Christian/Charlotta/Queen and Baden Creek*<br>• Predominantly lies within the existing right of ways of Christian Street, Charlotta St., Queen Street and Foundry Street.<br>• This Alternative would require the following:<br>o Reconstructing existing Road infrastructure;<br>o Crossing a railroad;<br>o Multiple stream crossings;<br>o Constructing new sewers;<br>o Upgrading existing sewers; and<br>o Upgrading and integrating sewers along a Regional Road. | • Some residential uses on Christian Street, Charlotta Street and Queen Street would be directly impacted by the temporary construction activities, and require alternative access arrangements.<br>• A portion of the alignment is outside of the settlement area and on agricultural land. Depending on the timing of construction disruptions to cropping or other agricultural activities would need to be mitigated by avoiding construction during the growing season. Following construction, the sewer would not impact agricultural activities/uses.<br>• Location and depth of sewer would provide for the servicing of lands to the west of Baden and would help facilitate the Township's long-term vision of growing New Hamburg and Baden together.<br>• Alignment of sewer would cross the Goderich-Exeter railway at the terminus of Queen Street, through an open area along the railway, and not impact a railway/road crossing. |
| **Alternative 5**<br>*Christian and Baden Creek*<br>• Predominantly lies within the existing right of ways of Christian Street and Foundry Street.<br>• This Alternative would require the following:<br>o Reconstructing existing road infrastructure;<br>o Crossing a railroad;<br>o A stream crossing;<br>o Constructing new sewers;<br>o Upgrading existing sewers; and<br>o Upgrading and integrating sewers along a Regional Road. | • Some residential uses on Christian Street would be directly impacted by the temporary construction activities, and require alternative access arrangements.<br>• A portion of the alignment is outside of the settlement area and on agricultural land. Depending on the timing of construction disruptions to cropping or other agricultural activities would need to be mitigated by avoiding construction during the growing season. Following construction, the sewer is below grade and would not impact agricultural activities/uses.<br>• Location and depth of sewer would provide for the servicing of lands to the west of Baden and would help facilitate the Township's long-term vision of growing New Hamburg and Baden together. |

| | |
|---|---|
| | • Alignment of sewer would cross the Goderich-Exeter railway at the terminus of Christian Street, where there is an existing pumping station and open space lands, and will not impact a railway/road crossing. |

**EVALUATION OF ALTNERNATIVES**

None of the proposed Alternatives are anticipated to result in the removal of any buildings or structures (other than the Charlotta Pumping Station) or have significant land use planning impacts. Alternatives 1, 2, and 3 are primarily located along right-of-ways and will result in temporary construction disturbances for the various uses fronting the right-of-ways. Alternatives 1 and 2 are the least preferred as they have the most disruption to the downtown core of Baden as their alignments would interrupt the main intersection in the Village (Snyder's Road and Foundry Street). From a broader growth management perspective, Alternative 1 is the least preferred as it would not provide for sanitary servicing to lands west of Baden, where the Township's vision is to grow the communities of Baden and New Hamburg together and where lands are available within the Regional Countryside Line.

Alternatives 4 and 5 would have the least impact on existing land uses. Fewer residents and businesses would be impacted by the construction activity with these Alternatives and the crossing of the railway are in locations that would not disrupt vehicular traffic crossings. Additional measures will need to be taken to mitigate any impacts on the agricultural lands, but in the end, there would be no loss of agricultural lands as a result of the project. Construction will need to take place during periods of time that avoid the loss of crops or disrupt cropping activities (late fall/winter), and soils will need to be properly managed/handled in order to ensure the disturbed lands are properly restored to generally the same pre-construction agricultural soil capability.

Respectfully submitted,

**MHBC**



Pierre J. Chauvin, BSc(Agr), MA, MCIP, RPP
Partner

Figure 1:
Sewer Alternatives Overlaid on
Township of Wilmot Official Plan (2019):
**Map 4.1 Baden Urban Area**

**Township of Baden**
Township of Wilmot
Region of Waterloo

**LEGEND**

Sewer Alternatives

- Alternative 1: Modified 2014 Environmental Assessment Preferred Alternative (Do Nothing)
- Alternative 2: Snyder's / Foundry (with and without pump station on Activa Lands) Force Main Crossing at Snyder's / Foundry
- Alternative 3: Christain/ Charlotta / Mill / Charles / Foundry
- Alternative 4: Christian/ Charlotta/ Queen and Baden Creek
- Alternative 5: Christain and Baden Creek

- Urban Area Boundary
- Urban Growth Centre Overlay
- Environmentally Constrained Lands
- Special Policy Areas
- Urban Residential
- Urban Core Area
- General Industrial
- Light Industrial
- Open Space
- Major Recreation

SANDHILLS ROAD
Snyder's Rd E
Gingerich Rd
CANADIAN NATIONAL RAILWAY
Special Policy Areas
6.8.1.2 a) and 6.8.2.2 a)
Gingerich Rd
Hwy 7/8
HWY 7/8
WILMOT CENTRE ROAD
See Map 4.2

**Notes:**
• For information purposes only
• Source: Parcel data from Region of Waterloo and Teranet Land Information Services and its licensors (2019); Map from Township of Wilmot (2019), Sewer Alternatives from Township of Wilmot (2022)

**DATE:** May 2, 2022
**FILE:** 0941CD
**SCALE:** 1: 10,000
**DRAWN:** CCF

north

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Figure 2:
Sewer Alternatives Overlaid on
Township of Wilmot Official Plan (2019):
**Map 10 The Countryside**

**Township of Baden**
Township of Wilmot
Region of Waterloo

**LEGEND**

Sewer Alternatives

- Alternative 1: Modified 2014 Environmental Assessment Preferred Alternative (Do Nothing)
- Alternative 2: Snyder's / Foundry (with and without pump station on Activa Lands) Force Main Crossing at Snyder's / Foundry
- Alternative 3: Christain/ Charlotta / Mill / Charles / Foundry
- Alternative 4: Christian/ Charlotta/ Queen and Baden Creek
- Alternative 5: Christain and Baden Creek

- Countryside Line
- Protected Countryside
- Rural Areas*
- Prime Agricultural
- Urban Areas / Rural Settlement Areas

**Notes:**
• For information purposes only
• Source: Parcel data from Region of Waterloo and Teranet Land Information Services and its licensors (2019); Map from Township of Wilmot (2019), Sewer Alternatives from Township of Wilmot (2022)

**DATE:** May 2, 2022

**FILE:** 0941CD

**SCALE:** 1: 10,000

**DRAWN:** CCF

north

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# Appendix B

## Stage 1-2 Archaeological Assessment Beckdale Sanitary Sewer Replacement, Baden

**(November 8, 2022)**

## Supplementary Documentation

### Stage 1-2 Archaeological Assessment Beckdale Sanitary Sewer Replacement, Baden

**(November 8, 2022)**

# Stage 1-2 Archaeological Assessment Baden Sanitary Sewer Replacement, Baden

Part of Lots 15 and 16, German Block South of Snyder Road; Part of Lots 15 and 16, German Block North of Snyder Road; and Part of the Snyder Road Allowance between Lot 16 German Block South of Snyder Road and Lot 16 German Block North of Snyder Road, Geographic Township of Wilmot, Historical County of Waterloo, now the Regional Municipality of Waterloo, Ontario

**Submitted to:**
MTE Consultants Inc.
520 Bingeman's Centre Drive,
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and

Ontario's Ministry of Heritage, Sport, Tourism and Culture Industries

**Submitted by:**

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archaeology · heritage

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PIF Number: P389-0551-2021
CP Number: 2021-048

**ORIGINAL REPORT**

November 8, 2022

## Executive Summary

Detritus Consulting Ltd. was retained by MTE Consultants Inc. (the 'Proponent') to conduct a Stage 1-2 archaeological assessment on part of Lots 15 and 16, German Block South of Snyder Road, and part of the Snyder Road Allowance between Lot 16 South of Snyder Road and Lot 16 North of Snyder Road within the within the Geographic Township of Wilmot and historical County of Waterloo, now the Regional Municipality of Waterloo, Ontario (Figure 1). This investigation was conducted in advance of the proposed Baden sanitary sewer replacement along a winding, narrow corridor (the 'Study Area') running north of Michael Myers Road in the northwest to the Baden Wastewater Pumping Station at 1044 Foundry Street to the southeast within the community of Baden (Figure 3).

An archaeological assessment was triggered by the Provincial Policy Statement ('PPS') that is informed by the *Planning Act* (Government of Ontario 1990a), which states that decisions affecting planning matters must be consistent with the policies outlined in the larger *Ontario Heritage Act* (Government of Ontario 1990b). According to Section 2.6.2 of the PPS, "development and site alteration shall not be permitted on lands containing archaeological resources or areas of archaeological potential unless significant archaeological resources have been conserved." To meet this condition, a Stage 1-2 assessment of the Study Area was conducted during the pre-approval phase of the development under archaeological consulting license P389 issued to Dr. Walter McCall by the Ministry of Heritage, Sport, Tourism and Culture Industries ('MHSTCI') and adheres to the archaeological license report requirements under subsection 65 (1) of the *Ontario Heritage Act* (Government of Ontario 1990b) and the MHSTCI's *Standards and Guidelines for Consultant Archaeologists* ('*Standards and Guidelines*'; Government of Ontario 2011a).

The Study Area is a long, narrow corridor measuring approximately 2.9 kilometres ('km') long and 10m wide (Figure 3 and Tile 3 in the Supplementary Documentation). The northwestern end begins approximately 154 metres ('m') to the northwest of the residential lot at 105 Michael Myers Road, in the southwestern corner of the large unassigned parcel to the southeast of the Foxwood Country Club. The corridor turns sharply to the southwest before accessing the large adjacent agricultural property at 1012 Snyder's Road West. It then travels the length of the property until it meets Snyder's Road West to the southeast. At this point, the Study Area crosses over Snyder's Road West and carries on for the length of Christian Street. It then turns to the southwest to follow Charlotta Street for approximately 35m, before veering again to the southwest to cross over the small unassigned parcel to the northeast of 193 Charlotta Street, and the Canadian National Railway line. From here, the Study Area winds a path to Gingerich Road, generally following the course of Baden Creek, which traverses the unassigned agricultural land to the southwest of Foundry Street. At Gingerich Road it turns to the northeast to meet Foundry Street. Finally, the Study Area extends down Foundry Street for 228m until it meets the Baden Wastewater Pumping Station at 1044 Foundry Street.

Most of the Study Area consists of either agricultural land that was accessible to ploughing or overgrown grass to the west of Baden Creek. The southeastern end of 1012 Snyder's Road West featured a small swathe of manicured lawn between the houses at 182 and 186 Snyder's Road West. Another small grassy area was observed between Charlotta Street and the Canadian National Railway line. Finally, an area of woodlot was encountered at the bend in the Study Area, where it veers to the northeast to approach Foundry Street. The remainder of the Study Area included all or portions of the Snyder's Road West, Christian Street, Charlotta Street, Gingerich Road, and Foundry Street road allowances; the Canadian National Railway railbed; and the paved driveway of the Baden Wastewater Pumping Station. Baden Creek transects the southeastern end of the Study Area from southeast to northwest adjacent to Foundry Street and under the driveway of the Baden Wastewater Pumping Station.

The Stage 1 background research indicated that the Study Area exhibited moderate to high potential for the identification and recovery of archaeological resources. This investigation also revealed that portions of the Study Area overlap areas that were subject to a previous Stage 1-2 assessment conducted by Detritus in 2020 (Detritus 2020). This earlier investigation was conducted on two large irregular parcels of primarily agricultural land located to the southwest of

Foundry Street and to the northwest of Gingerich Road. The two parcels were generally separated by Baden Creek.

This investigation resulted in the documentation of one pre-contact Aboriginal site, AiHe-469, as well as 19 pre-contact Aboriginal findspots, and one Euro Canadian findspot (Tile 3 of the Supplementary Documentation). Seven of the pre-contact Aboriginal findspots were located within 5om of the current Study Area, including five to the northwest of the long stretch running parallel to Gingerich Road and another two to the southeast.

Among the latter group, Findspot 16 (AiHd-178) extends into the current Study Area (Tile 3 of the Supplementary Documentation). Findspot 16 (AiHd-178) comprised a single chert flake and a projectile point fragment, both manufactured from Onondaga chert. Although fragmentary, the point fragment was identified as a Late Archaic Crawford Knoll variety. Findspot 18 (AiHe-467) to the northeast of the Study Area, meanwhile, comprised an isolated projectile point fragment that shared characteristics common among varieties from the Late Paleo-Indian period. Both sites were recommended for a Stage 3 assessments, neither of which had been completed at the time of this investigation. Although Findspot 18 (AiHe-467) does not extend into the current Study Area, a portion of its surrounding 20m protective buffer overlaps it.

The remaining findspots that were identified within 50m of the Study Area yielded isolated chert flakes, including eight from Findspot 9, Findspot 10, Findspot 12, and Findspot 19 (AiHd-177) to the northwest of the Study Area corridor, and another four from Findspot 11 (AiHe-470) to the southwest.

The Stage 2 field survey of the Study Area was conducted between August 16th and 18th, 2021 and on May 26, 2022. This investigation consisted of a pedestrian survey at a 3m interval of most of the agricultural land throughout the Study Area, and a test pit assessment of the grassy and treed areas, and the seasonal creek extending from Baden Creek to the west. Prior to the completion of the Stage 2 assessment, the Proponent adjusted the development area to exclude the portions of the Study Area corridor to the northwest of Snyder's Road West.

The various road allowances throughout the Study Area, the Canadian National Railway bed, and the pumping house driveway were evaluated as having no potential based on the identification of extensive and deep land alteration that has severely damaged the integrity of archaeological resources, as per Section 2.1, Standard 2b of the *Standards and Guidelines* (Government of Ontario 2011a). As mentioned above Baden Creek transects the southeastern portion of the Study Area. This area was determined to retain no archaeological potential due to the identification of physical features of low archaeological potential, including a permanently wet area, as per Section 2.1, Standards 2.a.i of the *Standards and Guidelines* (Government of Ontario 2011a). Additionally, a grass area on the southern side of the driveway to the Baden Wastewater Pumping Station was determined to be steeply sloping. This area was determined to retain no archaeological potential due to the identification of physical features of low archaeological potential, including steep slopes greater than 20 degrees, as per Section 2.1, Standards 2.a.iii of the *Standards and Guidelines* (Government of Ontario 2011a). The previously disturbed, permanently wet, and steeply sloped areas, as confirmed during a Stage 2 property inspection, were mapped and photo documented in accordance with Section 2.1, Standard 6 and Section 7.8.1, Standards 1a and 1b of the *Standards and Guidelines* (Government of Ontario 2011a).

The Stage 2 field survey resulted in the documentation of two pre-contact Aboriginal findspots: Findspot 1 and Findspot 2. Findspot 1 is an Onondaga chert thinning flake recovered during the test pit assessment of the lawn area between 182 and 186 Snyder's Road West prior to its removal from the development area. Although eight cardinal test pits were excavated around the positive test pit, all of which were sterile, no 1m unit was excavated over it. Findspot 2, meanwhile, comprises one Onondaga chert thinning flake. The eight cardinal test pits and a single 1m test unit yielded no additional artifacts.

Based on the available evidence, Findspot 1 and Findspot 2 have been identified as isolated pieces of debitage that likely originated from one of the larger sites or findspots identified during the earlier Stage 2 assessment of the agricultural land located to the southwest of Foundry Street and to the northwest of Gingerich Road.

The Stage 2 assessment of Findspot 1, however, remains incomplete. Therefore, **Findspot 1 is recommended for additional Stage 2 investigation** in the form of a 1m metre test unit, excavated above the positive test unit, as per Section 2.1.3, Section 2a of the *Standards and Guidelines* (Government of Ontario 2011a). This test unit will be excavated by hand in systematic levels and into the first five centimetres ('cm') of subsoil as per Section 3.2, Standards 3 to 5 of the *Standards and Guidelines* (Government of Ontario 2011a).

Given the isolated nature of the non-diagnostic artifact, Findspot 2, which was subject to full intensification, does not fulfill any of the criteria for a Stage 3 site specific assessment as per Section 2.2 of the *Standards and Guidelines* (Government of Ontario 2011a); therefore **Findspot 2 is not recommended for a Stage 3 assessment**.

Additionally, according to the results of the previous Stage 1-2 assessment conducted by Detritus in 2020, **the portion of Findspot 16 (AiHd-178) that extends into the current Study Area is recommended for Stage 3 assessment** (Detritus 2020). Likewise, the **portion of the 20m protective buffer surrounding Findspot 18 (AiHe-467) that intersects the Study Area is also recommended for Stage 3 assessment** (Detritus 2020).

Typically, a Stage 3 assessment begins with an intensive controlled surface pickup ('CSP') across the Stage 2 limits of the sites, conducted as per Section 3.2.1 of the *Standards and Guidelines* (Government of Ontario 2011a). The Stage 2 pedestrian survey at the sites, however, consisted of an intensive surface collection across the entire limits of each site. All artifacts were mapped digitally and collected for laboratory analysis. Thus, the conditions for a Stage 3 CSP were met during the Stage 2 assessment.

Given that it is not yet evident that the level of cultural heritage value or interest will result in a recommendation to proceed to Stage 4, the Stage 3 assessments at Findspot 16 (AiHd-178) and the protective buffer around Findspot 18 (AiHe-467) will consist of the hand excavation of 1m square test units every 5m in systematic levels and into the first 5cm of subsoil as per Table 3.1, Standard 1 of the *Standards and Guidelines* (Government of Ontario 2011a). Additional 1m test units, amounting to 20% of the grid total, will be placed in areas of interest within the site extent as per Table 3.1, Standard 2 of the *Standards and Guidelines* (Government of Ontario 2011a). All excavated soil will be screened through six-millimetre mesh; all recovered artifacts will be recorded by their corresponding grid unit designation and collected for laboratory analysis. If a subsurface cultural feature is encountered, the plan of the exposed feature will be recorded and geotextile fabric will be placed over the unit before backfilling the unit.

Additionally, **the Stage 1 investigation revealed that portions of the Study Area exhibited moderate to high potential for the identification and recovery of archaeological resources. These portions corresponded with the agricultural field, and the grass area surrounding the silo to the northwest of Snyder's Road West, which were not assessed as part of the Stage 2 assessment. All active agricultural land that retains archaeological potential and is accessible for ploughing will be subject to a typical Stage 2 pedestrian survey at a 5m interval**, conducted according to Section 2.1.1 of the *Standards and Guidelines* (Government of Ontario 2011a). The fields will be ploughed until 80% surface visibility is attained, then allowed to weather prior to assessment. As per Section 2.1.1, Standard 7 of the *Standards and Guidelines* (Government of Ontario 2011a), if archaeological resources are found, the survey transects will be decreased to 1m intervals over a 20m radius around each find to determine whether it is an isolated find or part of a larger scatter. All formal artifact types and diagnostic categories will be collected for laboratory analysis and cataloguing, including all refined ceramic sherds for 19th century archaeological sites.

The grass area, which is inaccessible for ploughing, will be subject to a typical Stage 2 test pit assessment at a 5m interval, conducted according to Section 2.1.2 of the *Standards and Guidelines* (Government of Ontario 2011a). The test pit survey will be conducted until test pits show evidence of disturbance according to Section 2.1.2, Standard 4 of the *Standards and Guidelines* (Government of Ontario 2011a). Each test pit must be approximately 30 centimetres ('cm') in diameter and excavated 5cm into sterile subsoil. The soil and test pits will then be examined for stratigraphy, cultural features, or evidence of fill. All soil will be screened through

six-millimetre mesh hardware cloth to facilitate the recovery of small artifacts and then used to backfill the pit.

In accordance with Section 2.1.3 Standard 1 of the *Standards and Guidelines* (Government of Ontario 2011a), if archaeological resources are encountered during the Stage 2 test pit survey, the test pit excavation will continue on the survey grid to determine the extent of further positive test pits. If insufficient archaeological resources are found through a continued survey of the grid to meet the criteria for continuing to Stage 3, the survey coverage will be intensified around the positive test pits using either Option A or Option B of Section 2.1.3, Standard 2 of the *Standards and Guidelines* (Government of Ontario 2011a). Universal Transverse Mercator ('UTM') coordinates will then be recorded for all positive test pit in addition to a fixed reference landmark using a Garmin eTrex 10 GPS unit with a minimum accuracy 1-2.5m (North American Datum 1983 ('NAD83') and UTM Zone 17T). All artifacts will be collected and recorded according to their associated positive test pit or 1m test unit.

Lastly, if any of the areas recommended for Stage 2 assessment are determined to be previously disturbed, or permanently wet during the course of the Stage 2 assessment, they will be photo documented as per Section 2.1, Sections 2a and 2b and Section 6 of the *Standards and Guidelines* (Government of Ontario 2011a).

*The Executive Summary highlights key points from the report only; for complete information and findings, the reader should examine the complete report.*

# Table of Contents


Executive Summary ..... ii

1.0 Project Context ..... 1

1.1 Development Context ..... 1

1.2 Historical Context ..... 2

1.2.1 Post-Contact Aboriginal Resources ..... 2

1.2.2 Euro-Canadian Resources ..... 3

1.3 Archaeological Context ..... 4

1.3.1 Property Description and Physical Setting ..... 4

1.3.2 Pre-Contact Aboriginal Land Use ..... 5

1.3.3 Previous Identified Archaeological Work ..... 5

1.3.4 Archaeological Potential ..... 8

2.0 Field Methods ..... 10

3.0 Record of Finds ..... 12

3.1 Cultural Material ..... 12

3.2 Findspot 1 ..... 13

3.3 Findspot 2 ..... 13

4.0 Analysis and Conclusions ..... 14

5.0 Recommendations ..... 15

6.0 Advice on Compliance with Legislation ..... 16

7.0 Bibliography and Sources ..... 17

8.0 Maps ..... 19

9.0 Images ..... 27

9.1 Field Photos ..... 27

9.2 Artifact Photos ..... 31

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| Mapping and GIS: | Amanda McCall, R470 |
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# Acknowledgments

Generous contributions by the following individuals and agencies made this report possible.

- Chelsea Kochany, MTE Consultants Inc.

# 1.0 Project Context

## 1.1 Development Context

Detritus Consulting Ltd. was retained by MTE Consultants Inc. (the 'Proponent') to conduct a Stage 1-2 archaeological assessment on part of Lots 15 and 16, German Block South of Snyder Road, and part of the Snyder Road Allowance between Lot 16 South of Snyder Road and Lot 16 North of Snyder Road within the within the Geographic Township of Wilmot and historical County of Waterloo, now the Regional Municipality of Waterloo, Ontario (Figure 1). This investigation was conducted in advance of the proposed Baden sanitary sewer replacement along a winding, narrow corridor (the 'Study Area') running north of Michael Myers Road in the northwest to the Baden Wastewater Pumping Station at 1044 Foundry Street to the southeast within the community of Baden (Figure 3).

An archaeological assessment was triggered by the Provincial Policy Statement ('PPS') that is informed by the *Planning Act* (Government of Ontario 1990a), which states that decisions affecting planning matters must be consistent with the policies outlined in the larger *Ontario Heritage Act* (Government of Ontario 1990b). According to Section 2.6.2 of the PPS, "development and site alteration shall not be permitted on lands containing archaeological resources or areas of archaeological potential unless significant archaeological resources have been conserved." To meet this condition, a Stage 1-2 assessment of the Study Area was conducted during the pre-approval phase of the development under archaeological consulting license P389 issued to Dr. Walter McCall by the Ministry of Heritage, Sport, Tourism and Culture Industries ('MHSTCI') and adheres to the archaeological license report requirements under subsection 65 (1) of the *Ontario Heritage Act* (Government of Ontario 1990b) and the MHSTCI's *Standards and Guidelines for Consultant Archaeologists* ('*Standards and Guidelines*'; Government of Ontario 2011a).

The purpose of the Stage 1 assessment is to compile all available information about the known and potential archaeological heritage resources within the Study Area and to provide specific direction for the protection, management and/or recovery of these resources. In compliance with the *Standards and Guidelines* (Government of Ontario 2011a), the objectives of the following Stage 1 assessment were as follows:

- To provide information about the Study Area's geography, history, previous archaeological fieldwork and current land conditions;
- to evaluate in detail, the Study Area's archaeological potential which will support recommendations for Stage 2 survey for all or parts of the property; and
- to recommend appropriate strategies for Stage 2 survey.

To meet these objectives Detritus archaeologists employed the following research strategies:

- A review of relevant archaeological, historic and environmental literature pertaining to the Study Area;
- a review of the land use history, including pertinent historic maps; and
- an examination of the Ontario Archaeological Sites Database ('ASDB') to determine the presence of known archaeological sites in and around the Study Area.

The purpose of the Stage 2 assessment is to provide an overview of any archaeological resources within the Study Area, and to determine whether any of the resources might be archaeological sites with cultural heritage value or interest ('CHVI'), and to provide specific direction for the protection, management and/or recovery of these resources. In compliance with the *Standards and Guidelines* (Government of Ontario 2011a), the objectives of the following Stage 2 Property Assessment were as follows:

- To document all archaeological resources within the Study Area;
- to determine whether the Study Area contains archaeological resources requiring further assessment; and
- to recommend appropriate Stage 3 assessment strategies for archaeological sites identified.

The licensee received permission from the Proponent to enter the land and conduct all required archaeological fieldwork activities, including the recovery of artifacts.

## 1.2 Historical Context

### 1.2.1 Post-Contact Aboriginal Resources

Prior to the arrival of European settlers, much of the central and southern Ontario was occupied by Iroquoian speaking linguistic groups that had united to form confederacies, including the Huron-Wendat, the Neutral (or Attawandaran), and the Petun in Ontario, as well as the Five Nations Iroquois Confederacy in Upper New York State (Birch 2010; Warrick 2013). Of these groups, the Huron-Wendat established themselves to the east of the Niagara escarpment and the Neutral, to the west (Warrick 2000).

Throughout the middle of the 17th century, the Iroquois Confederacy sought to expand upon their territory and to monopolize the fur trade between the European markets and the tribes of the western Great Lakes region. A series of bloody conflicts followed known as the Beaver Wars or the French and Iroquois Wars, contested between the Iroquois Confederacy and the Algonkian speaking communities of the Great Lakes region. Many communities were destroyed including the Huron, Neutral, Susquehannock and Shawnee leaving the Iroquois as the dominant group in the region. By 1653 after repeated attacks, the Niagara peninsula and most of Southern Ontario had been vacated (Heidenreich 1990).

At this same time, the Anishinaabeg Nation, an Algonkian-speaking community situated inland from the northern shore of Lake Huron, began to challenge the Haudenosaunee for dominance in the Lake Huron and Georgian Bay region in order to advance their own role in the fur trade (Gibson 2006). The Algonkian-speaking groups that settled in the area bound by Lake Ontario, Lake Erie, and Lake Huron were referred to by the English as the Chippewas or Ojibwas. By 1680, the Ojibwa began expanding into the evacuated Huron-Wendat territory, and eventually into Southern Ontario. By 1701, the Haudenosaunee had been driven out of Ontario completely and were replaced by the Ojibwa (Gibson 2006; Schmaltz 1991).

The late 17th and early 18th centuries also mark the arrival of an Ojibwa band known as the Mississaugas into Southern Ontario and, in particular, the watersheds of the lower Great Lakes. 'The Mississaugas' is the name that the Jesuits had used in 1840 for the Algonquin community living near the Mississagi River on the northwestern shore of Lake Huron (Smith 2002). The oral traditions of the Mississaugas, as recounted by Chief Robert Paudash and recorded in 1904, suggest that the Mississaugas defeated the Mohawk Nation, who retreated to their homeland south of Lake Ontario. Following this conflict, a peace treaty was negotiated between the two groups (Praxis Research Associates n.d.).

From the beginning of the 18th century until the end of the Seven Year War in 1763, the Ojibwa nation, including the Mississaugas, experienced a golden age in trade holding no alliance with either the French or the British (Schmaltz 1991). At the end of the 17th century, the Mississaugas' settled permanently in Southern Ontario (Praxis Research Associates n.d.). Around this same time, in 1722, the Five Nation Iroquois Confederacy adopted the Tuscarora in New York becoming the Six Nations (Pendergast 1995).

The Study Area first entered the Euro-Canadian historical record on December 7th, 1792 as part of Treaty No. 3, which included land acquired in the 'Between the Lakes Purchase' dating to May 22, 1784. According to the terms of the treaty, the Mississaugas ceded to the Crown approximately 3,000,000 acres of land between Lake Huron, Lake Erie, and Lake Ontario in return for trade goods valued at £1180.

The limits of the Treaty 3 lands are documented as comprising,

> *Lincoln County excepting Niagara Township; Saltfleet, Binbrook, Barton, Glanford and Ancaster Townships, in Wentworth County; Brantford, Onondaga, Tusc[a]r[o]ra, Oakland and Burford Townships in Brant County; East and West Oxford, North and South Norwich, and Dereham Townships in Oxford County; North Dorchester Township in Middlesex County; South Dorchester, Malahide*

> *and Bayham Township in Elgin County; all Norfolk and Haldimand Counties; Pelham, Wainfleet, Thorold, Cumberland and Humberstone Townships in Welland County.*
>
> Morris 1943: 17-18

One of the stated objectives of the Between the Lakes Purchase was "to procure for that part of the Six Nation Indians coming into Canada a permanent abode" (Morris 1943: 17). Shortly after the transaction had been finalised in May of 1784, Sir Frederick Haldimand, the Governor of Québec, made preparations to grant a portion of land to those Six Nations who remained loyal to the Crown during the American War of Independence. More specifically, Haldimand arranged for the purchase of approximately 550,000 acres of land adjacent to the Treaty 3 limits from the Mississaugas. This tract of land, referred to as either the Haldimand Tract or the 1795 Crown Grant to the Six Nations, was provided for in the Haldimand Proclamation of October 25th, 1784 and was intended to extend a distance of six miles on each side of the Grand River from mouth to source (Weaver 1978). By the end of 1784, representatives from each constituent nation of the Six Nations, as well as other allies, relocated to the Haldimand Tract with Joseph Brant (Weaver 1978; Tanner 1987).

Throughout southern Ontario, the size and nature of the pre-contact settlements and the subsequent spread and distribution of Aboriginal material culture began to shift with the establishment of European settlers. By 1834 it was accepted by the Crown that losses of portions of the Haldimand Tract to Euro-Canadian settlers were too numerous for all lands to be returned. Lands in the Lower Grand River area were surrendered by the Six Nations to the British Government in 1832, at which point most Six Nations people moved into Tuscarora Township in Brant County and a narrow portion of Oneida Township (Page & Co. 1879; Weaver 1978; Tanner 1987). Following the population decline and the surrender of most of their lands along the Credit River, the Mississaugas were given 6000 acres of land on the Six Nations Reserve, establishing the Mississaugas of New Credit First Nation, now the Mississaugas of the Credit First Nation ('MCFN'), in 1847 (Smith 2002).

Despite the encroachment of European settlers on previously established Aboriginal territories, "written accounts of material life and livelihood, the correlation of historically recorded villages to their archaeological manifestations, and the similarities of those sites to more ancient sites have revealed an antiquity to documented cultural expressions that confirms a deep historical continuity to Iroquoian systems of ideology and thought" (Ferris 2009: 114). As Ferris observes, despite the arrival of a competing culture, First Nations communities throughout Southern Ontario have left behind archaeologically significant resources that demonstrate continuity with their pre-contact predecessors, even if they have not been recorded extensively in historical Euro-Canadian documentation.

### 1.2.2 Euro-Canadian Resources

The Study Area is located in the Geographic Township of Wilmot in the Regional Municipality of Waterloo Ontario.

On July 24, 1788, Sir Guy Carleton, the Governor-General of British North America, divided the Province of Québec into the administrative districts of Hesse, Nassau, Mecklenburg and Lunenburg (Archives of Ontario 2012-2015). Further change came in December 1791 when the Province of Québec was rearranged into Upper Canada and Lower Canada under the Constitutional Act. Colonel John Graves Simcoe was appointed as Lieutenant-Governor of Upper Canada; he initiated several initiatives to populate the province including the establishment of shoreline communities with effective transportation links between them (Coyne 1895:33).

In July 1792, Simcoe divided Upper Canada into 19 counties, including Waterloo County, stretching from Essex in the west to Glengarry in the east. Later that year, the four districts originally established in 1788 were renamed as the Western, Home, Midland and Eastern Districts (Archives of Ontario 2012-2015).

The township of Wilmot was surveyed in 1842. Mennonites from Waterloo County and the Amish from Europe began claiming lots and clearing roadways and farms. The first three roads of the

township were Upper Street, Middle Street, and Lower Street, now referred to as Erb's Road, Snyder's Road and Bleams Road. Most early settlers of the area were of German descent, although some Scottish, English and Irish were also amongst the first settlers. The village of Baden was founded and established in 1855 and was originally names Weissenburg, after a bachelor living in the area. Baden is the home of Adam Beck, the founder of Ontario's public hydro-electric system (The Corporation of the Township of Wilmot 2015).

The *Illustrated Historical Atlas of Waterloo and Wellington Counties* ('*Historical Atlas*'), demonstrates the extent to which Wilmot Township had been settled by 1877 (Walker & Miles 1877; Figure 2). An increasing population throughout the late 19th century is evident from the number of villages and small towns indicated, the town lots for the early communities of Baden, New Hamburg, and Petersburg, as well as a branch of the Grand Trunk Railway, which transect the township from east to west.

The *Historical Atlas* map of Wilmot lists no landowners and illustrates no structures for Lots 15 and 16 German Block South of Snyder Road or for Lots 15 and 16 German Block North of Snyder Road. Additionally, the early community of Baden is illustrated to the east and northeast of the Study Area. The Grand Trunk Railway is illustrated transecting the Study Area from southwest to northeast, connecting the early communities of Baden and New Hamburg, which is located to the southwest of the Study Area. It should be recognized that historical county atlases were funded by subscriptions fees and were produced primarily to identify factories, offices, residences and landholdings of subscribers. Landowners who did not subscribe were not always listed on the maps (Caston 1997:100). Moreover, associated structures were not necessarily depicted or placed accurately (Gentilcore and Head 1984).

## 1.3 Archaeological Context

### 1.3.1 Property Description and Physical Setting

The Study Area is a long, narrow corridor measuring approximately 2.9 kilometres ('km') long and 10m wide (Figure 3 and Tile 3 in the Supplementary Documentation). The northwestern end begins approximately 154 metres ('m') to the northwest of the residential lot at 105 Michael Myers Road, in the southwestern corner of the large unassigned parcel to the southeast of the Foxwood Country Club. The corridor turns sharply to the southwest before accessing the large adjacent agricultural property at 1012 Snyder's Road West. It then travels the length of the property until it meets Snyder's Road West to the southeast. At this point, the Study Area crosses over Snyder's Road West and carries on for the length of Christian Street. It then turns to the southwest to follow Charlotta Street for approximately 35m, before veering again to the southwest to cross over the small unassigned parcel to the northeast of 193 Charlotta Street, and the Canadian National Railway line. From here, the Study Area winds a path to Gingerich Road, generally following the course of Baden Creek, which traverses the unassigned agricultural land to the southwest of Foundry Street. At Gingerich Road it turns to the northeast to meet Foundry Street. Finally, the Study Area extends down Foundry Street for 228m until it meets the Baden Wastewater Pumping Station at 1044 Foundry Street.

Most of the Study Area consists of either agricultural land that was accessible to ploughing or overgrown grass to the west of Baden Creek. The southeastern end of 1012 Snyder's Road West featured a small swathe of manicured lawn between the houses at 182 and 186 Snyder's Road West. Another small grassy area was observed between Charlotta Street and the Canadian National Railway line. Finally, an area of woodlot was encountered at the bend in the Study Area, where it veers to the northeast to approach Foundry Street. The remainder of the Study Area included all or portions of the Snyder's Road West, Christian Street, Charlotta Street, Gingerich Road, and Foundry Street road allowances; the Canadian National Railway railbed; and the paved driveway of the Baden Wastewater Pumping Station.

The majority of the region surrounding the Study Area has been subject to European-style agricultural practices for over 100 years, having been settled by Euro-Canadian farmers by the mid-19th century. Much of the region today continues to be used for agricultural purposes.

The Study Area is located within the Waterloo Hills physiographic region (Chapman and Putnam 1984). This is a region of sandy hills and ridges broken by the alluvial terrace system of the Grand River spillway.

The closest source of potable water is Baden Creek, which runs adjacent to the northeast of the Study Area and transects the southeastern end of the Study Area.

### 1.3.2 Pre-Contact Aboriginal Land Use

This portion of Southwestern Ontario was occupied by people as far back as 11,000 years ago as the glaciers retreated. For the majority of this time, people were practicing hunter gatherer lifestyles with a gradual move towards more extensive farming practices. Table 1 provides a general outline of the cultural chronology of Wilmot Township (Ellis and Ferris 1990).

**Table 1: Cultural Chronology for the Wilmot Township**

| Time Period | Cultural Period | Comments |
|---|---|---|
| 9500 – 7000 BC | Paleo-Indian | first human occupation<br>hunters of caribou and other extinct Pleistocene game<br>nomadic, small band society |
| 7500 - 1000 BC | Archaic | ceremonial burials<br>increasing trade network<br>hunter gatherers |
| 1000 - 400 BC | Early Woodland | large and small camps<br>spring congregation/fall dispersal<br>introduction of pottery |
| 400 BC – AD 800 | Middle Woodland | kinship based political system<br>incipient horticulture<br>long distance trade network |
| AD 800 - 1300 | Early Iroquoian<br>(Late Woodland) | limited agriculture<br>developing hamlets and villages |
| AD 1300 - 1400 | Middle Iroquoian<br>(Late Woodland) | shift to agriculture complete<br>increasing political complexity<br>large palisaded villages |
| AD 1400 - 1650 | Late Iroquoian | regional warfare and<br>political/tribal alliances<br>destruction of Huron and Neutral |

### 1.3.3 Previous Identified Archaeological Work

In order to compile an inventory of archaeological resources, the registered archaeological site records were consulted. In Ontario, information concerning archaeological sites stored in the ASDB (Government of Ontario n.d.) is maintained by the MHSTCI. This database contains archaeological sites registered according to the Borden system. Under the Borden system, Canada is divided into grid blocks based on latitude and longitude. A Borden Block is approximately 13km east to west and approximately 18.5km north to south. Each Borden Block is referenced by a four-letter designator and sites within a block are numbered sequentially as they are found. The Study Area under review is within Borden Blocks AiHe and AiHd.

Information concerning specific site locations is protected by provincial policy, and is not fully subject to the *Freedom of Information and Protection of Privacy Act* (Government of Ontario 1990c). The release of such information in the past has led to looting or various forms of illegally conducted site destruction. Confidentiality extends to all media capable of conveying location, including maps, drawings, or textual descriptions of a site location. The MHSTCI will provide information concerning site location to the party or an agent of the party holding title to a property, or to a licensed archaeologist with relevant cultural resource management interests.

An examination of the ASDB has shown that there are 26 archaeological sites registered within a 1km radius of the Study Area (Table 2). Of the 26 sites, 19 are pre-contact Aboriginal, 2 of which date to the Early Archaic period, and 6 are Euro-Canadian. No information is available for the remaining site.

**Table 2: Registered Archaeological Sites within 1km of the Study Area**

| Borden Number | Site Name | Time Period | Affinity | Site Type |
|---|---|---|---|---|
| AiHe-38 | Castle Kilbride | Post-Contact | Euro-Canadian | farmstead |
| AiHe-44 | AiHe-44 | Archaic, Early | Aboriginal | findspot |
| AiHe-45 | | Pre-Contact | Aboriginal | scatter |
| AiHe-46 | | Post-Contact | Euro-Canadian | homestead, midden |
| AiHe-47 | | Post-Contact | Euro-Canadian | privy, homestead, midden |
| AiHe-463 | | Archaic | Aboriginal | findspot |
| AiHe-464 | | Woodland, Early | Aboriginal | camp / campsite |
| AiHe-465 | | Archaic, Late, Archaic, Middle | Aboriginal | camp / campsite |
| AiHe-466 | | Woodland, Early | Aboriginal | camp / campsite |
| AiHe-467 | Kwaya-si | Paleo-Indian, Late | Aboriginal | findspot |
| AiHe-468 | | Archaic, Middle | Aboriginal | hunting loss |
| AiHe-469 | Asyeh | Archaic, Late, Woodland, Late | Aboriginal | short term |
| AiHe-470 | | Pre-Contact | Aboriginal | scatter |
| AiHe-471 | | Post-Contact | Euro-Canadian | dump |
| AiHe-472 | | Archaic, Early | Aboriginal | scatter |
| AiHe-473 | | Archaic, Early | Aboriginal | scatter |
| AiHe-474 | | Pre-Contact | Aboriginal | scatter |
| AiHd-17 | Spongy Lake | Woodland | Aboriginal | camp/campsite |
| AiHd-2 | Baden | - | - | - |
| AiHd-20 | Wolf | Woodland, Late | Iroquoian | village |
| AiHd-69 | Schout | Pre-Contact | Aboriginal | - |
| AiHd-91 | Baden Brewery | Post-Contact | Euro-Canadian | brewery, creamery |
| AiHd-110 | Michel | Archaic, Early | Aboriginal | findspot |
| AiHd-162 | | Post-Contact | Euro-Canadian | dump |
| AiHd-177 | | Pre-Contact | Aboriginal | scatter |
| AiHd-178 | Skiwa | Archaic, Late | Aboriginal | findspot |

Portions of the Study Area overlap areas that were subject to a previous Stage 1-2 assessment conducted by Detritus in 2020 (Detritus 2020). This earlier investigation was conducted on two large irregular parcels of primarily agricultural land located to the southwest of Foundry Street and to the northwest of Gingerich Road. The two parcels were generally separated by Baden Creek.

This investigation resulted in the documentation of one pre-contact Aboriginal site, AiHe-469, as well as 19 pre-contact Aboriginal findspots, and one Euro Canadian findspot (Tile 3 of the Supplementary Documentation). Seven of the pre-contact Aboriginal findspots were located within 5om of the current Study Area, including five to the northwest of the long stretch running parallel to Gingerich Road and another two to the southeast.

Among the latter group, Findspot 16 (AiHd-178) extends into the current Study Area (Tile 3 of the Supplementary Documentation). Findspot 16 (AiHd-178) comprised a single chert flake and a projectile point fragment, both manufactured from Onondaga chert. Although fragmentary, the point fragment was identified as a Late Archaic Crawford Knoll variety. Findspot 18 (AiHe-467) to the northeast of the Study Area, meanwhile, comprised an isolated projectile point fragment that shared characteristics common among varieties from the Late Paleo-Indian period. Both sites were recommended for a Stage 3 assessments, neither of which had been completed at the time of this investigation. Although Findspot 18 (AiHe-467) does not extend into the current Study Area, a portion of its surrounding 20m protective buffer overlaps it.

The remaining findspots that were identified within 50m of the Study Area yielded isolated chert flakes, including eight from Findspot 9, Findspot 10, Findspot 12, and Findspot 19 (AiHd-177) to the northwest of the Study Area corridor, and another four from Findspot 11 (AiHe-470) to the southwest.

The Stage 2 assessment of AiHe-469 resulted in the documentation of eleven lithic artifacts including nine pieces of chipping detritus and two projectile points. The artifacts were scattered across an area of approximately 62m northwest-southeast by 38m northeast-southwest, in the northwestern corner of the northern agricultural field within the assessment area. One of the projectile points is reminiscent of a Hind type variety dating to the Late Archaic period. The remaining projectile point is reminiscent of a Nanticoke Triangular variety dating to the Late Woodland period. Morphological analysis of the chipping detritus suggests that late stages of lithic reduction occurred at the site a propensity towards formal tool preparation, and maintenance, as supported by the presence of two projectile points. Given the results of the Stage 2 assessment, AiHe-469 was interpreted as a medium size activity area of unknown function, occupied seasonally by Aboriginal people during the Late Archaic and Late Woodland periods, and characterised by late stages of lithic reduction. AiHe-469 fulfilled the criteria for a Stage 3 archaeological investigation. To further evaluate the site's CHVI, a Stage 3 archaeological assessment was recommended for AiHe-469.

The Stage 2 assessment of Findspot 1 resulted in the documentation of two pieces of chipping detritus manufactured from Onondaga and Haldimand chert, discovered along the western edge of the southern agricultural field. The Stage 2 assessment of Findspot 2 resulted in the documentation of one multi-tool manufactured from Onondaga chert, discovered along the southeastern edge of the Study Area in the southern agricultural field. The Stage 2 assessment of Findspot 3 resulted in the documentation of three pieces of chipping detritus manufactured from Onondaga and Haldimand chert, discovered along the northwestern edge of the southern agricultural field. The Stage 2 assessment of Findspots 4 and 5 each resulted in the documentation of a single piece of Onondaga chert chipping detritus, discovered in the southern agricultural field. The Stage 2 assessment of Findspot 6 resulted in the documentation of three pieces of chipping detritus manufactured from Onondaga chert, discovered in the central portion of the southern agricultural field. The Stage 2 assessment of Findspot 7 (AiHe-468) resulted in the documentation of a single Brewerton side-notched projectile point manufactured from Onondaga chert, discovered along the northwestern edge of the southern agricultural field. The Stage 2 assessment of Findspot 8 resulted in the documentation of two pieces of Onondaga chert chipping detritus and a biface manufactured from Onondaga chert, discovered along the northeastern edge of the northern agricultural field. The Stage 2 assessment of Findspot 13 resulted in the documentation of three pieces of Onondaga chert chipping detritus, discovered in the southern half of the northern agricultural field. The Stage 2 assessment of Findspots 14 and 15 each resulted in the documentation of a single piece of Onondaga chert chipping detritus, discovered in the northern agricultural field. The Stage 2 assessment of Findspot 17 resulted in the documentation of a single piece of Onondaga chert chipping detritus, discovered in the northcentral portion of the northern agricultural field. Given the isolated nature of the artifacts, the CHVI of Findspots 1-6, 7 (AiHe-468), 8, 13 to 15, and 17 is judged to be sufficiently documented. Findspots 1-6, 7 (AiHe-468), 8, 13 to 15, and 17 did not fulfill the criteria for a Stage 3 archaeological investigations. Therefore, no further archaeological assessment was recommended for Findspots 1-6, 7 (AiHe-468), 8, 13 to 15, and 17.

Lastly, H1 was identified during the test pit assessment of an overgrown grassy clearing located north of the northern agricultural field, in the northern portion of the assessment area. The Stage 2 assessment of the site resulted in the documentation of 31 Euro-Canadian artifacts from six test pit and a test unit, spanning an area of approximately 5m by 5m. The Stage 2 artifact assemblage comprised 13 structural artifacts, 8 ceramic sherds, 7 household artifacts, 2 pieces of recent material, and 1 piece of undetermined metal. Analysis of the assemblage has suggested a period of occupation at the site spanning the late 19$^{th}$ to 20$^{th}$ century. This conclusion is supported by ceramic assemblage, which was dominated by sherds of red earthenware (n=4; 50%), and also featured 2 pieces of refined white earthenware, 1 piece of ironstone, and 1 piece of porcelain. Furthermore, the nails within the Stage 2 assemblage were entirely wire nails and all of the window glass shards are greater than 1.6mm suggesting a post-1845 date of occupation. The piece

of plastic, the piece of aluminum foil, and the piece of porcelain indicate 20th century occupation. Based on the results of the Stage 2 investigation, H1 was interpreted as a small size, late 19th to 20th century domestic scatter. Given the presence of less than 20 artifacts that date the period of use to before 1900, H1 does not meets the criteria for a Stage 3 Site Specific Assessment and retains no CHVI.

It was recommended that the Stage 3 archaeological assessments for AiHe-469, Findspot 16 (AiHd-178), and Findspot 18 (AiHe-467) will be conducted according to the procedures outlined in the *Standards and Guidelines* (Government of Ontario 2011a). Typically, a Stage 3 assessment begins with an intensive controlled surface pickup ('CSP') across the Stage 2 limits of the sites, conducted as per Section 3.2.1 of the *Standards and Guidelines* (Government of Ontario 2011a). The Stage 2 pedestrian survey, however, consisted of an intensive surface collection across the entire site limits within the agricultural fields; all artifacts were mapped digitally and collected for laboratory analysis. Thus, the conditions for a Stage 3 CSP were met during the Stage 2 assessment.

Given that it is not yet evident that the level of CHVI at the sites will result in a recommendation to proceed to Stage 4 (see Section 4.19), the Stage 3 assessment of AiHe-469, Findspot 16 (AiHd-178), and Findspot 18 (AiHe-467) will consist of the hand excavation of 1m square test units every 5m in systematic levels and into the first 5cm of subsoil as per Table 3.1, Standard 1 of the *Standards and Guidelines* (Government of Ontario 2011a). Additional 1m test units, amounting to 20% of the grid total, will be placed in areas of interest within the sites extents as per Table 3.1, Standard 2 of the *Standards and Guidelines* (Government of Ontario 2011a). All excavated soil will be screened through six-millimetre mesh; all recovered artifacts will be recorded by their corresponding grid unit designation and collected for laboratory analysis. If a subsurface cultural feature is encountered, the plan of the exposed feature will be recorded and geotextile fabric will be placed over the unit before backfilling the unit.

To the best of Detritus' knowledge, no additional assessments have been conducted adjacent to the Study Area, nor are any sites registered within 50m.

### 1.3.4 Archaeological Potential

Archaeological potential is established by determining the likelihood that archaeological resources may be present on a subject property. Detritus applied archaeological potential criteria commonly used by the MHSTCI to determine areas of archaeological potential within Study Area. According to Section 1.3.1 of the *Standards and Guidelines* (Government of Ontario 2011a), these variables include proximity to previously identified archaeological sites, distance to various types of water sources, soil texture and drainage, glacial geomorphology, elevated topography, and the general topographic variability of the area.

Distance to modern or ancient water sources is generally accepted as the most important determinant of past human settlement patterns and, when considered alone, may result in a determination of archaeological potential. However, any combination of two or more other criteria, such as well-drained soils or topographic variability, may also indicate archaeological potential. When evaluating distance to water it is important to distinguish between water and shoreline, as well as natural and artificial water sources, as these features affect site locations and types to varying degrees. As per Section 1.3.1 of the *Standards and Guidelines* (Government of Ontario 2011a), water sources may be categorized in the following manner:

- Primary water sources, lakes, rivers, streams, creeks;
- secondary water sources, intermittent streams and creeks, springs, marshes and swamps;
- past water sources, glacial lake shorelines, relic river or stream channels, cobble beaches, shorelines of drained lakes or marshes; and
- accessible or inaccessible shorelines, high bluffs, swamp or marshy lake edges, sandbars stretching into marsh.

As was discussed above, the closest source of potable water is Baden Creek, which runs adjacent to the northeast of the Study Area.

Soil texture is also an important determinant of past settlement, usually in combination with other factors such as topography. The primary soils within the Study Area have been documented as being suitable for pre-contact Aboriginal practices. Considering also the length of occupation of Wilmot Township prior to the arrival of Euro-Canadian settlers and the 19 pre-contact Aboriginal sites registered within 1km, and the pre-contact and post-contact Aboriginal archaeological potential of the Study Area is judged to be moderate to high.

For Euro-Canadian sites, archaeological potential can be extended to areas of early Euro-Canadian settlement, including places of military or pioneer settlements; early transportation routes; and properties listed on the municipal register or designated under the *Ontario Heritage Act* (Government of Ontario 1990b) or property that local histories or informants have identified with possible historical events.

*Historical Atlas* (Walker & Miles 1877) demonstrates that Wilmot Township was occupied by Euro-Canadian farmers by the late 19th century. Much of the established road system and agricultural settlement from that time is still visible today. The early communities of Baden and Petersburg are illustrated to the east of the Study Area and New Hamburg to the west. Furthermore, the Grand Trunk Railway is illustrated transecting the Study Area from southwest to northeast. Considering also the six Euro-Canadian sites registered within 1km of the Study Area, the archaeological potential for Euro-Canadian sites is deemed to be moderate to high.

Finally, despite the factors mentioned above, extensive land disturbance can eradicate archaeological potential within a Study Area, as per Section 1.3.2 of the *Standards and Guidelines* (Government of Ontario 2011a). Current aerial imagery of the Study Area identified a number of potential disturbance areas within the Study Area, including all or portions of the Snyder's Road West, Christian Street, Charlotta Street, Gingerich Road, and Foundry Street road allowances; the Canadian National Railway railbed; and the paved driveway of the Baden Wastewater Pumping Station. It is recommended that these areas be subject to a Stage 2 property inspection, conducted according Section 2.1.8, Standard 1 of the *Standards and Guidelines* (Government of Ontario 2011a), to confirm and document the disturbed areas.

# 2.0 Field Methods

The Stage 2 assessment was conducted between August 16, 2021 and May 26, 20221, under archaeological consulting license P389 issued to Dr. Walter McCall by the MHSTCI. The limits of the Study Area were determined using mapping provided by the Proponent and a handheld GPS unit.

During the Stage 2 field work, assessment conditions were excellent and at no time were the field, weather, or lighting conditions detrimental to the recovery of archaeological material. Table 3 displays the field and weather conditions. Photos 1 to 24 demonstrate the land conditions throughout the Study Area, including areas that met the requirements for a Stage 2 archaeological assessment, as per Section 7.8.6, Standards 1a and b of the *Standards and Guidelines* (Government of Ontario 2011a). Figures 4 to 8 provides an illustration of the Stage 2 assessment methods as well as photograph locations and directions. Figure 9 provides an illustration of the Stage 2 assessment methods in relation to the development.

**Table 3: Field and Weather Conditions**

| Date | Activity | Weather | Field Conditions |
|---|---|---|---|
| August 16, 2021 | test pit survey | sunny, high 25˚C | soil dry and screens easily |
| August 17, 2021 | test pit survey | cloudy, high 20˚C | soil dry and screens easily |
| August 18, 2021 | test pit survey and test unit excavation | cloudy, high 27˚C | soil dry and screens easily |
| May 26, 2022 | pedestrian, test pit survey | cloudy, high 17˚C | soil visibility 90%; soil dry and screens easily |

Approximately 30% of the Study Area consisted of grassy areas, treed areas, and a dry seasonal creek bed running west of Baden Creek, all of which were deemed inaccessible for ploughing. The majority of these areas were subject to a typical Stage 2 test pit survey, conducted at 5m intervals in accordance with Section 2.1.2, Standards 1 and 2 of the *Standards and Guidelines* (Government of Ontario 2011a; Photos 6 to 12). The remainder of these areas was subject to a test pit survey at 10m intervals. The test pits in these areas were excavated to greater than 60cm deep and no subsoil was encountered. The test pits contained rounded pebbles and silty sand, which is indicative of a creek bed (Photos 13, 14, 15, 16). Additionally, the woodlot within the Study Area was densely covered and test pits were excavated at 10m intervals or wherever possible as per Section 2.1.2, Guideline 1 of the *Standards and Guidelines* (Government of Ontario 2011a).

The test pit survey was conducted to within 1m of the built structures (intact or ruins) or until disturbance was encountered according to Section 2.1.2, Standard 4 of the *Standards and Guidelines* (Government of Ontario 2011a). Each test pit was at least 30 centimetres ('cm') in diameter and excavated 5cm into sterile subsoil as per Section 2.1.2, Standards 5 and 6 of the *Standards and Guidelines* (Government of Ontario 2011a). The soils were examined for stratigraphy, cultural features, or evidence of fill.

The test pits ranged in depth from 33cm to 64cm. All test pits contained a single stratigraphic layer. Considering that each test pit was excavated 5cm into sterile subsoil, this observed soil layer ranged in depth from 28cm to 59cm. All soil was screened through six-millimetre mesh hardware cloth to facilitate the recovery of small artifacts and then used to backfill the pit as per Section 2.1.2, Standards 7 and 9 of the *Standards and Guidelines* (Government of Ontario 2011a).

When archaeological resources were encountered, the test pit excavation was continued on the survey grid, as per Section 2.1.3, Standard 1 of the *Standards and Guidelines* (Government of Ontario 2011a). Given that insufficient resources were recovered through the continued survey on the grid, the survey coverage was intensified to determine whether a Stage 3 assessment could be supported using Section 2.1.3, Standard 2, Option A of the *Standards and Guidelines* (Government of Ontario 2011a). After the excavation of cardinal test pits, insufficient resources were produced to support a recommendation to carry out a Stage 3 assessment, therefore a stage 2 test unit was excavated on top of the positive test pit at Findspot 2 (Photos 23, 24). The test unit produced no artifacts; therefore, it was determined that the findspot did not support a recommendation to carry out a Stage 3 assessment and no additional assessment methods were

employed. The test pit survey at Findspot 1 resulted in a single positive test pit producing a single pre-contact Aboriginal artifact. No test unit was excavated.

All artifacts were recorded with reference to their associated test pit and test unit and were retained for laboratory analysis. In accordance with Section 5, Standard 2b of the *Standards and Guidelines* (Government of Ontario 2011a) a Universal Transverse Mercator ('UTM') coordinate was recorded for each positive test pit. All coordinates were taken using a Garmin eTrex 10 GPS unit with a minimum accuracy 1-2.5m (North American Datum 1983 ('NAD83') and UTM Zone 17T) and are presented in the Supplementary Documentation to this report.

Approximately 15% of the Study Area comprised active agricultural land that was accessible for ploughing (Photos 10, 17 to 19). As per Section 2.1.1, Standards 2 and 3 of the *Standards and Guidelines* (Government of Ontario 2011a), the agricultural land had been ploughed and allowed to weather prior to assessment. The ploughing was deep enough to provide total topsoil exposure, and provided a minimum of 80% surface visibility, as per Section 2.1.1, Standards 4 and 5 of the *Standards and Guidelines* (Government of Ontario 2011a). The ploughed area was subject to a pedestrian survey at 3m intervals, conducted in accordance with Section 2.1.1, Standard 6 of the *Standards and Guidelines* (Government of Ontario 2011a). No artifacts were observed during the pedestrian survey; therefore, no further survey methods were employed.

Approximately 20% of the Study Area comprised areas identified in the aerial photography of the Study Area as being previously disturbed. These areas were subject to a Stage 2 property inspection, conducted according to Section 2.1.8, Standard 1 of the *Standards and Guidelines* (Government of Ontario 2011a). All or portions of the Snyder's Road West, Christian Street, Charlotta Street, Gingerich Road, and Foundry Street road allowances; the Canadian National Railway railbed; and the paved driveway of the Baden Wastewater Pumping Station were evaluated as having no potential based on the identification of extensive and deep land alteration that has severely damaged the integrity of archaeological resources, as per Section 2.1, Standard 2b of the *Standards and Guidelines* (Government of Ontario 2011a). All of the visibly disturbed areas documented within the Study Area were mapped and photo documented in accordance with Section 2.1, Standard 6 and Section 7.8.1, Standard 1b of the *Standards and Guidelines* (Government of Ontario 2011a).

The remaining 35% of the Study Area comprised agricultural field that was not subject to assessment following a decision by the Proponent to exclude the area north of Snyder's Road from the current development.

# 3.0 Record of Finds

The Stage 2 archaeological assessment was conducted employing the methods described in Section 2.0 above. This investigation resulted in the documentation of two pre-contact Aboriginal findspots (see below). An inventory of the documentary record generated by fieldwork is provided in Table 4 below.

**Table 4: Inventory of Document Record**

| Document Type | Current Location of Document Type | Additional Comments |
|---|---|---|
| 4 Pages of Field Notes | Detritus' office | Stored digitally in project file |
| 3 Maps provided by the Proponent | Detritus' office | Stored digitally in project file |
| 6 Field Maps | Detritus' office | Stored digitally in project file |
| 103 Digital Photographs | Detritus' office | Stored digitally in project file |

All of the material culture collected during the Stage 2 survey is contained in one box and will be temporarily housed in the offices of Detritus until formal arrangements can be made for its transfer to Her Majesty the Queen in right of the Province of Ontario or another suitable public institution acceptable to the MHSTCI.

## 3.1 Cultural Material

As was discussed above, two pre-contact Aboriginal findspots, were identified within the Study Area. Photographs of the artifacts recovered from the Stage 2 assessment is depicted in Section 9.2 of this report.

The pre-contact Aboriginal findspots produced lithic artifacts manufactured from Onondaga chert. Chert type identifications were accomplished visually using reference materials located online or in personal collections.

Onondaga formation chert is from the Middle Devonian age, with outcrops occurring along the north shore of Lake Erie between Long Point and the Niagara River (Eley and von Bitter 1989). Primary outcrops have also been reported along the banks of the Grand River (Ellis and Ferris 1990). It is a high-quality raw material frequently utilized by pre-contact people and often found at archaeological sites in southern Ontario. Onondaga chert occurs in nodules or irregular thin beds. It is a dense non-porous rock that may be light to dark grey, bluish grey, brown or black and can be mottled with a dull to vitreous or waxy lustre (Eley and von Bitter 1989).

Furthermore, all pieces of chipping detritus were subject to morphological analysis following the classification scheme described by Lennox, Dodd and Murphy for the Wiacek Site (Lennox *et al.* 1986) and expanded upon by Fisher for the Adder Orchard site (Fisher 1997). The flake types that were identified during the analysis of current Stage 2 assemblage include thinning flakes.

Primary and secondary flakes, along with cortical removal flakes, are a product of percussion flaking undertaken during the initial reduction phases of raw material into blanks, bifaces and preforms. These early-stage reduction flakes tend to exhibit minimal dorsal flake scarring, and are often characterized by the presence of cortex, or the original unflaked chert exterior, on their dorsal surfaces and proximal ends. For cortical removal flakes, over half of the dorsal surface comprises cortex; for primary flakes, less than half. Secondary flakes, meanwhile, may not contain any cortex. Thinning flakes are produced during the latter stages of lithic reduction, when blanks, bifaces, and preforms are shaped into projectile points and formal tools. They are the result of pressure flaking, where the maker uses a softer material such as antler, wood or bone to apply direct pressure onto a specific part of the tool. Pressure flaking generally produces smaller, thinner flakes than does percussion flaking. Thinning flakes also exhibit more flake scars on their dorsal surface than do primary or secondary flakes. Fragmentary flakes are flakes that may have some identifiable flake characteristic, but cannot be classified with certainty into a specific category.

## 3.2 Findspot 1

Findspot 1 comprises one piece of chipping detritus from a single test pit in the lawn area between 182 and 186 Snyder's Road West, prior to its removal from the development area. The piece of chipping detritus was identified as an Onondaga chert thinning flake.

Table 5 provides a complete catalogue of the Stage 2 artifact assemblage from Findspot 1. Given the isolated nature of the artifact, it is difficult to draw any useful conclusions regarding site function.

**Table 5: Findspot 1 Stage 2 Artifact Catalogue**

| Cat # | Context | Artifact | Morphology | Freq. | Chert Type |
|---|---|---|---|---|---|
| 1 | PTP1 | chipping detritus | Thinning | 1 | Onondaga |

## 3.3 Findspot 2

Findspot 2 comprised one piece of Onondaga chert chipping detritus, discovered between the Canadian National Rail Tracks and Gingerich Road, approximately 188m to the southwest of St. George Street. Table 6 provides a complete catalogue of the Stage 2 artifact assemblage from Findspot 2. Given the isolated nature of the artifact, it is difficult to draw any useful conclusions regarding site function.

**Table 6: Findspot 2 Stage 2 Artifact Catalogue**

| Cat # | Context | Artifact | Frequency | Chert Type |
|---|---|---|---|---|
| 1 | PTP2 | chipping detritus | 1 | Onondaga |

# 4.0 Analysis and Conclusions

Detritus was retained by the Proponent to conduct a Stage 1-2 archaeological assessment in advance of a proposed Baden sanitary sewer replacement within the community of Baden.

The Stage 1 background research indicated that the Study Area exhibited moderate to high potential for the identification and recovery of archaeological resources. This investigation also revealed that portions of the Study Area overlap areas that were subject to a previous Stage 1-2 assessment conducted by Detritus in 2020 (Detritus 2020). This earlier investigation was conducted on two large irregular parcels of primarily agricultural land located to the southwest of Foundry Street and to the northwest of Gingerich Road. The two parcels were generally separated by Baden Creek.

This investigation resulted in the documentation of one pre-contact Aboriginal site, AiHe-469, as well as 19 pre-contact Aboriginal findspots, and one Euro Canadian findspot (Tile 3 of the Supplementary Documentation). Seven of the pre-contact Aboriginal findspots were located within 5om of the current Study Area, including five to the northwest of the long stretch running parallel to Gingerich Road and another two to the southeast.

Among the latter group, Findspot 16 (AiHd-178) extends into the current Study Area (Tile 3 of the Supplementary Documentation). Findspot 16 (AiHd-178) comprised a single chert flake and a projectile point fragment, both manufactured from Onondaga chert. Although fragmentary, the point fragment was identified as a Late Archaic Crawford Knoll variety. Findspot 18 (AiHe-467) to the northeast of the Study Area, meanwhile, comprised an isolated projectile point fragment that shared characteristics common among varieties from the Late Paleo-Indian period. Both sites were recommended for a Stage 3 assessments, neither of which had been completed at the time of this investigation. Although Findspot 18 (AiHe-467) does not extend into the current Study Area, a portion of its surrounding 20m protective buffer overlaps it.

The remaining findspots that were identified within 50m of the Study Area yielded isolated chert flakes, including eight from Findspot 9, Findspot 10, Findspot 12, and Findspot 19 (AiHd-177) to the northwest of the Study Area corridor, and another four from Findspot 11 (AiHe-470) to the southwest.

The Stage 2 field survey of the Study Area was conducted between August 16th and 18th, 2021 and on May 26, 2022. This investigation consisted of a pedestrian survey at a 3m interval of most of the agricultural land throughout the Study Area, and a test pit assessment of the grassy and treed areas, and the seasonal creek extending from Baden Creek to the west. Prior to the completion of the Stage 2 assessment, the Proponent adjusted the development area to exclude the portions of the Study Area corridor to the northwest of Snyder's Road West.

The various road allowances throughout the Study Area, the Canadian National Railway bed, and the pumping house driveway were evaluated as having no potential based on the identification of extensive and deep land alteration that has severely damaged the integrity of archaeological resources, as per Section 2.1, Standard 2b of the *Standards and Guidelines* (Government of Ontario 2011a). The previously disturbed areas, as confirmed during a Stage 2 property inspection, were mapped and photo documented in accordance with Section 2.1, Standard 6 and Section 7.8.1, Standards 1a and 1b of the *Standards and Guidelines* (Government of Ontario 2011a).

The Stage 2 field survey resulted in the documentation of two pre-contact Aboriginal findspots: Findspot 1 and Findspot 2. Findspot 1 is an Onondaga chert thinning flake recovered during the test pit assessment of the lawn area between 182 and 186 Snyder's Road West prior to its removal from the development area. Although eight cardinal test pits were excavated around the positive test pit, all of which were sterile, no 1m unit was excavated over it. Findspot 2, meanwhile, comprises one Onondaga chert thinning flake. The eight cardinal test pits and a single 1m test unit yielded no additional artifacts.

Based on the available evidence, Findspot 1 and Findspot 2 have been identified as isolated pieces of debitage that likely originated from one of the larger sites or findspots identified during the

earlier Stage 2 assessment of the agricultural land located to the southwest of Foundry Street and to the northwest of Gingerich Road.

# 5.0 Recommendations

The Stage 2 assessment of Findspot 1, however, remains incomplete. Therefore, **Findspot 1 is recommended for additional Stage 2 investigation** in the form of a 1m metre test unit, excavated above the positive test unit, as per Section 2.1.3, Section 2a of the *Standards and Guidelines* (Government of Ontario 2011a). This test unit will be excavated by hand in systematic levels and into the first five centimetres ('cm') of subsoil as per Section 3.2, Standards 3 to 5 of the *Standards and Guidelines* (Government of Ontario 2011a).

Given the isolated nature of the non-diagnostic artifact, Findspot 2, which was subject to full intensification, does not fulfill any of the criteria for a Stage 3 site specific assessment as per Section 2.2 of the *Standards and Guidelines* (Government of Ontario 2011a); therefore **Findspot 2 is not recommended for a Stage 3 assessment**.

Additionally, according to the results of the previous Stage 1-2 assessment conducted by Detritus in 2020, **the portion of Findspot 16 (AiHd-178) that extends into the current Study Area is recommended for Stage 3 assessment** (Detritus 2020). Likewise, the **portion of the 20m protective buffer surrounding Findspot 18 (AiHe-467) that intersects the Study Area is also recommended for Stage 3 assessment** (Detritus 2020).

Typically, a Stage 3 assessment begins with an intensive controlled surface pickup ('CSP') across the Stage 2 limits of the sites, conducted as per Section 3.2.1 of the *Standards and Guidelines* (Government of Ontario 2011a). The Stage 2 pedestrian survey at the sites, however, consisted of an intensive surface collection across the entire limits of each site. All artifacts were mapped digitally and collected for laboratory analysis. Thus, the conditions for a Stage 3 CSP were met during the Stage 2 assessment.

Given that it is not yet evident that the level of cultural heritage value or interest will result in a recommendation to proceed to Stage 4, the Stage 3 assessments at Findspot 16 (AiHd-178) and the protective buffer around Findspot 18 (AiHe-467) will consist of the hand excavation of 1m square test units every 5m in systematic levels and into the first 5cm of subsoil as per Table 3.1, Standard 1 of the *Standards and Guidelines* (Government of Ontario 2011a). Additional 1m test units, amounting to 20% of the grid total, will be placed in areas of interest within the site extent as per Table 3.1, Standard 2 of the *Standards and Guidelines* (Government of Ontario 2011a). All excavated soil will be screened through six-millimetre mesh; all recovered artifacts will be recorded by their corresponding grid unit designation and collected for laboratory analysis. If a subsurface cultural feature is encountered, the plan of the exposed feature will be recorded and geotextile fabric will be placed over the unit before backfilling the unit.

Additionally, **the Stage 1 investigation revealed that portions of the Study Area exhibited moderate to high potential for the identification and recovery of archaeological resources. These portions corresponded with the agricultural field to the northwest of Snyder's Road West, which were not assessed as part of the Stage 2 assessment. All active agricultural land that retains archaeological potential and is accessible for ploughing will be subject to a typical Stage 2 pedestrian survey at a 5m interval**, conducted according to Section 2.1.1 of the *Standards and Guidelines* (Government of Ontario 2011a). The fields will be ploughed until 80% surface visibility is attained, then allowed to weather prior to assessment. As per Section 2.1.1, Standard 7 of the *Standards and Guidelines* (Government of Ontario 2011a), if archaeological resources are found, the survey transects will be decreased to 1m intervals over a 20m radius around each find to determine whether it is an isolated find or part of a larger scatter. All formal artifact types and diagnostic categories will be collected for laboratory analysis and cataloguing, including all refined ceramic sherds for 19$^{th}$ century archaeological sites.

# 6.0 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*.

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.

Archaeological sites recommended for further archaeological fieldwork or protection remain subject to Section 48 (1) of the *Ontario Heritage Act* and may not be altered, or have artifacts removed from them, except by a person holding an archaeological license.

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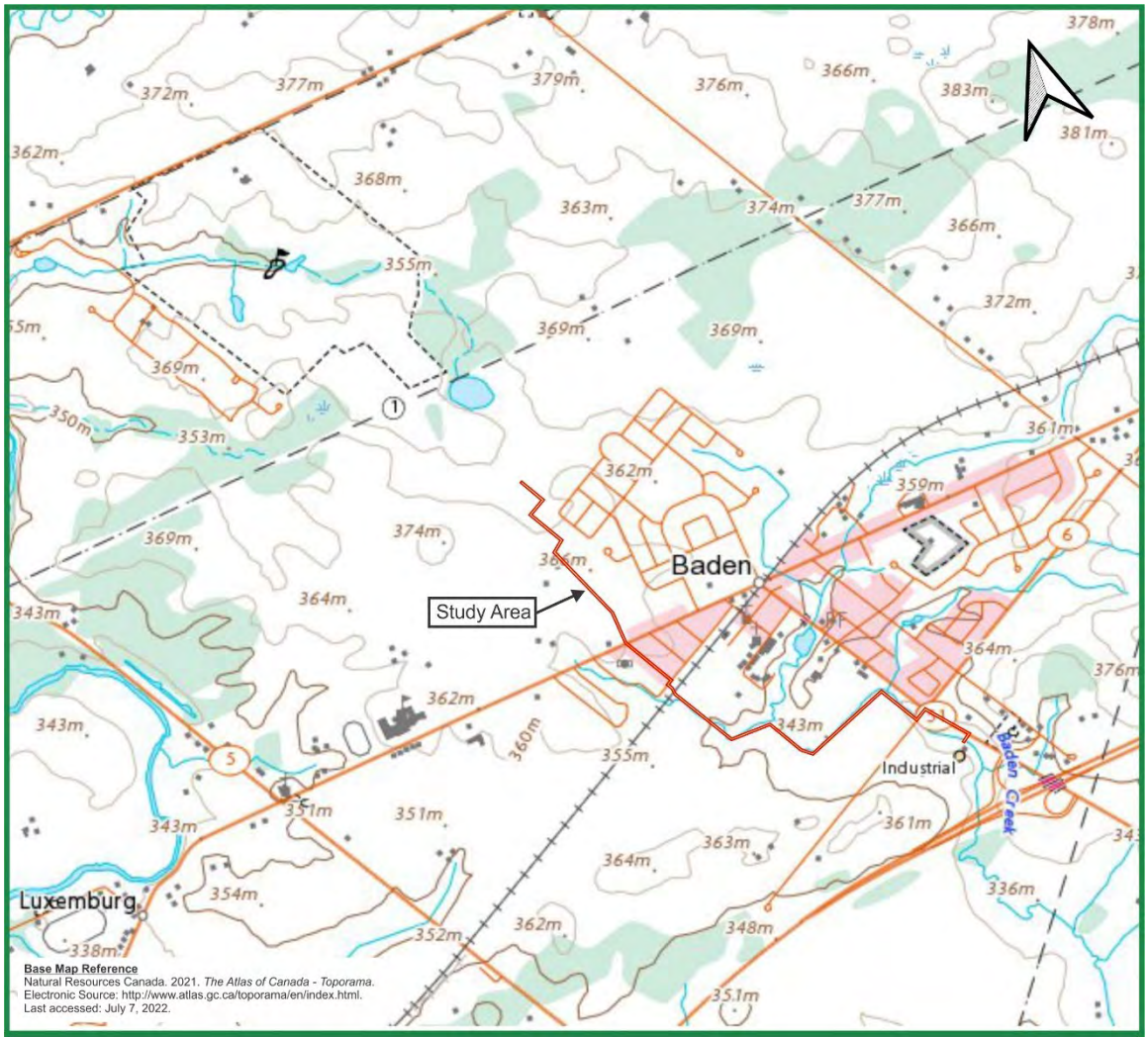
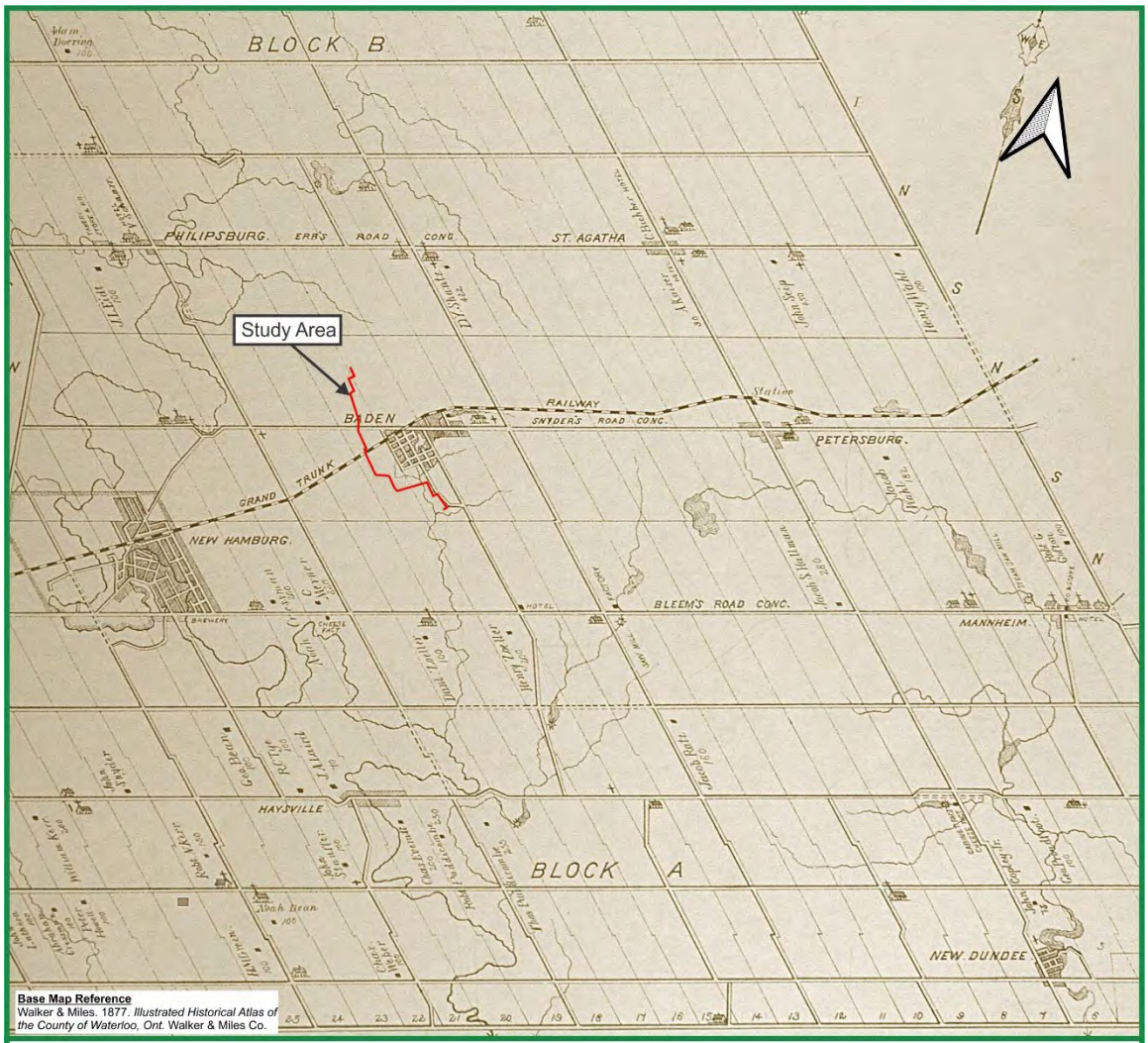
# 8.0 Maps


Baden
Study Area
Luxemburg
Industrial
Baden Creek
Base Map Reference
Natural Resources Canada. 2021. The Atlas of Canada - Toporama.
Electronic Source: http://www.atlas.gc.ca/toporama/en/index.html.
Last accessed: July 7, 2022.
Scale 1:30 000
Figure 1: Study Area




Not to Scale

Figure 2: Portion of the 1877 *Historical Atlas* Map of Wilmot Township

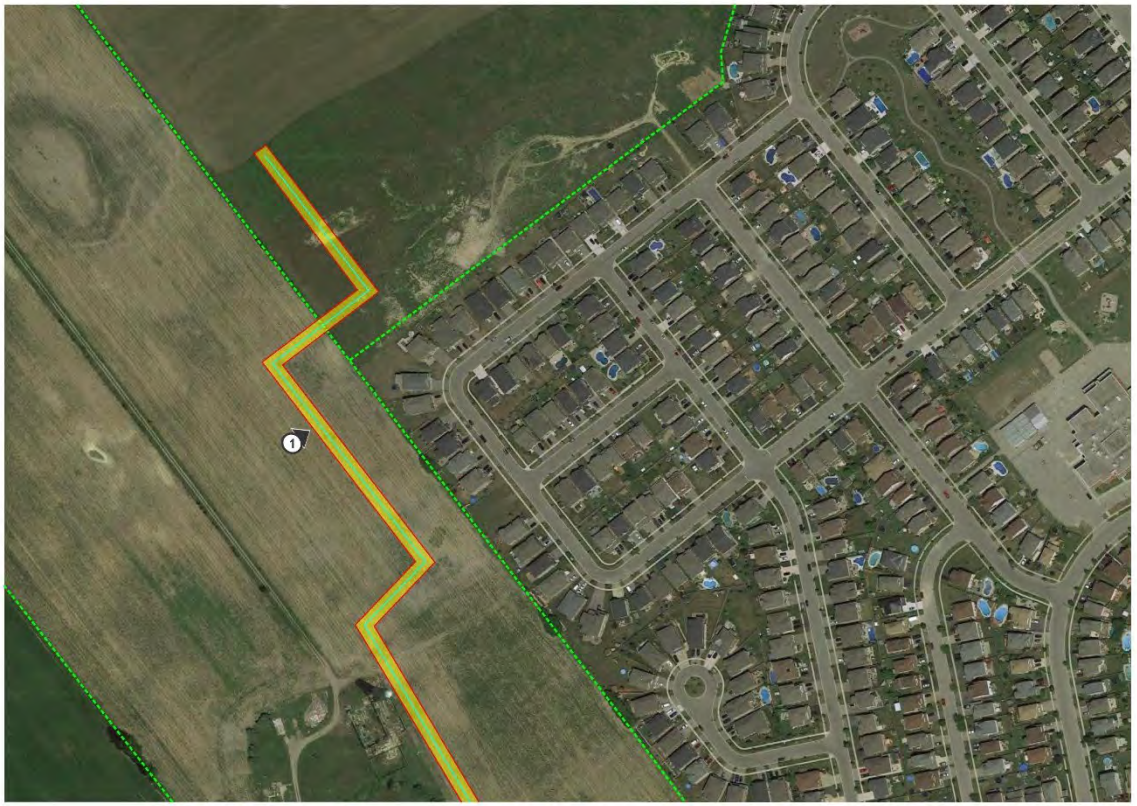


Legend

Property Boundary
Study Area
Sewer Line

0 250 500 m

Figure 3: Study Area and Property Boundaries




Legend

Property Boundary
Study Area
Not Assessed, Stage 2 Recommended
Photo Location and Direction

0 75 150 m

Figure 4: Stage 2 Survey Methods; Map 1

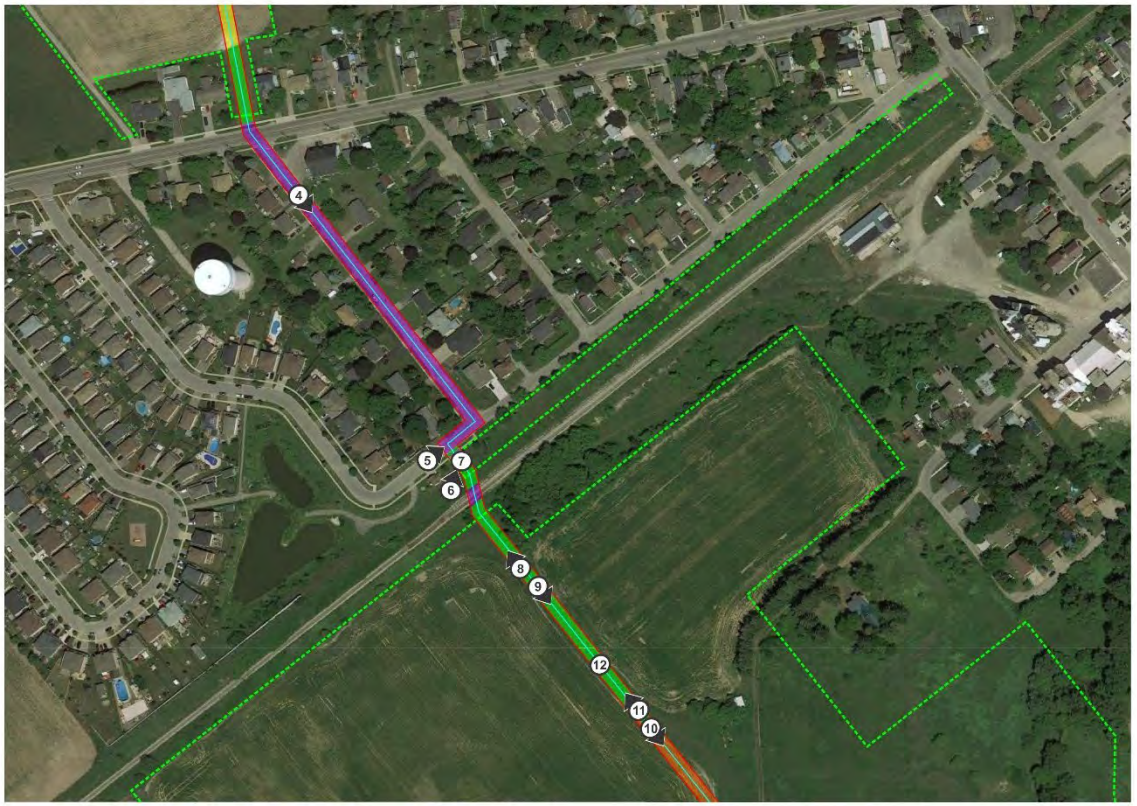



Legend

- Property Boundary
- Study Area
- Test Pit Survey at 5m Intervals
- Not Assessed, Stage 2 Recommended
- Previously Disturbed, Not Assessed
- Photo Location and Direction

0 75 150 m

Figure 5: Stage 2 Survey Methods; Map 2




Legend

Property Boundary
Study Area
Test Pit Survey at 5m Intervals
Not Assessed, Stage 2 Recommended
Previously Disturbed, Not Assessed
Photo Location and Direction

0 75 150 m

Figure 6: Stage 2 Survey Methods; Map 3




Legend

- Property Boundary
- Study Area
- Test Pit Survey at 5m Intervals
- Test Pit Survey at 10m Intervals
- Pedestrian Survey at 3m Intervals
- Permanently Wet, Not Assessed
- Photo Location and Direction

0 75 150 m

Figure 7: Stage 2 Survey Methods; Map 4




Legend

Property Boundary
Study Area
Test Pit Survey at 10m Intervals
Pedestrian Survey at 3m Intervals
Previously Disturbed, Not Assessed
Photo Location and Direction

0 75 150 m

Figure 8: Stage 2 Survey Methods; Map 5

# 9.0 Images

## 9.1 Field Photos

**Photo 1: Agricultural Field Not Assessed, Stage 2 Recommended, facing northeast**



**Photo 2: Grass Test Pit Surveyed at 5m Intervals, facing southwest**



**Photo 3: Typical Test Pit in Grass North of Snyder's Road West**



**Photo 4: Disturbed Christian Street and Right-of-Way Not Assessed, facing southeast**



**Photo 5: Disturbed Charlotta Street Not Assessed, facing northeast**



**Photo 6: Grass Test Pit Surveyed at 5m Intervals, facing northeast**



**Photo 7: Typical Test Pit in Grass South of Charlotta Street**



**Photo 8: Overgrown Grass Test Pit Surveyed at 5m Intervals, facing northwest**



**Photo 9: Grass Test Pit Surveyed at 5m Intervals, facing southeast**



**Photo 10: Pedestrian Survey at 3m Intervals, facing southeast**



**Photo 11: Grass Test Pit Surveyed at 5m Intervals, facing northwest**



**Photo 12: Typical Test Pit in Grass Southeast of the Canadian National Railway**



**Photo 13: Grass Covered Dry Seasonal Creek extending from Baden Creek to the Southeast Test Pit Surveyed at 10m Intervals, facing southeast**



**Photo 14: Typical Test Pit Containing No Subsoil of the Grass Covered Dry Seasonal Creek extending from Baden Creek to the Southeast**



**Photo 15: Grass Test Pit Surveyed at 5m Intervals, facing northwest**



**Photo 16: Woodlot Test Pit Surveyed at 10m Intervals, facing northeast**



**Photo 17: Pedestrian Survey at 3m Intervals, facing southwest**



**Photo 18: Pedestrian Survey at 3m Intervals, facing northwest**



**Photo 19: Pedestrian Survey at 3m Intervals, facing southeast**



**Photo 20: Disturbed Gingerich Road Not Assessed, facing northeast**



**Photo 21: Disturbed Foundry Street, facing northwest**



**Photo 22: Disturbed Baden Wastewater Pumping Station Paved Driveway, facing southwest**



**Photo 23: Test Unit Excavation at Findspot 2, facing east**



**Photo 24: Test Unit Excavation at Findspot 2, facing north**



## 9.2 Artifact Photos

**Plate 1: Chipping Detritus Recovered from Findspot 1 (left) and Findspot 2 (right)**



# SUPPLEMENTARY DOCUMENTATION
# Stage 1-2 Archaeological Assessment
# Baden Sanitary Sewer Replacement, Baden

Part of Lots 15 and 16, German Block South of Snyder Road; Part of Lots 15 and 16, German Block North of Snyder Road; and Part of the Snyder Road Allowance between Lot 16 German Block South of Snyder Road and Lot 16 German Block North of Snyder Road, Geographic Township of Wilmot, Historical County of Waterloo, now the Regional Municipality of Waterloo, Ontario

**Submitted to:**
MTE Consultants Inc.
520 Bingeman's Centre Drive,
Kitchener, ON  N2B 3X9

and

Ontario's Ministry of Heritage, Sport, Tourism and Culture Industries

**Submitted by:**

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PIF Number: P389-0551-2021
CP Number: 2021-048

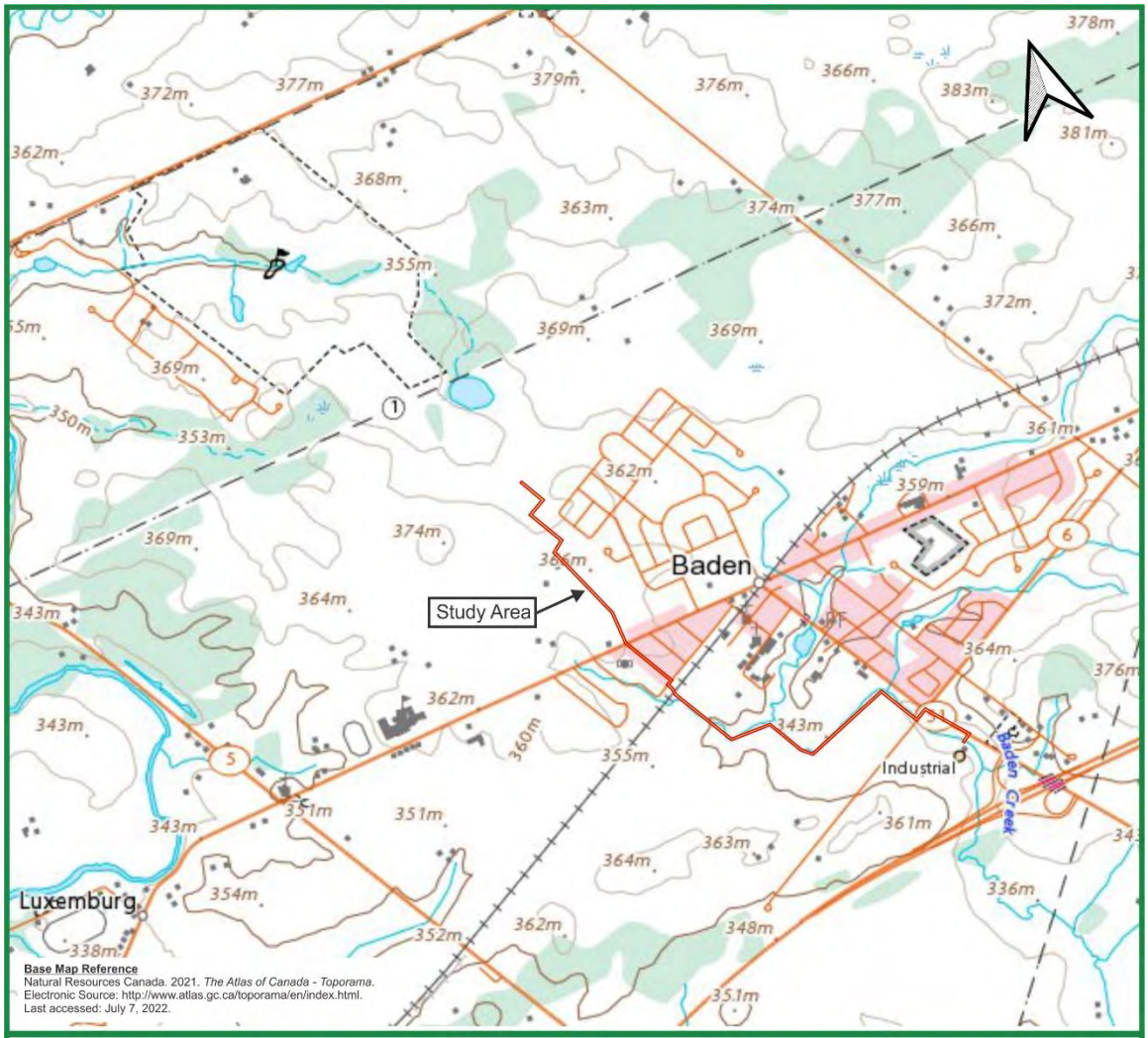
**ORIGINAL SUPPLEMENTARY DOCUMENTATION**

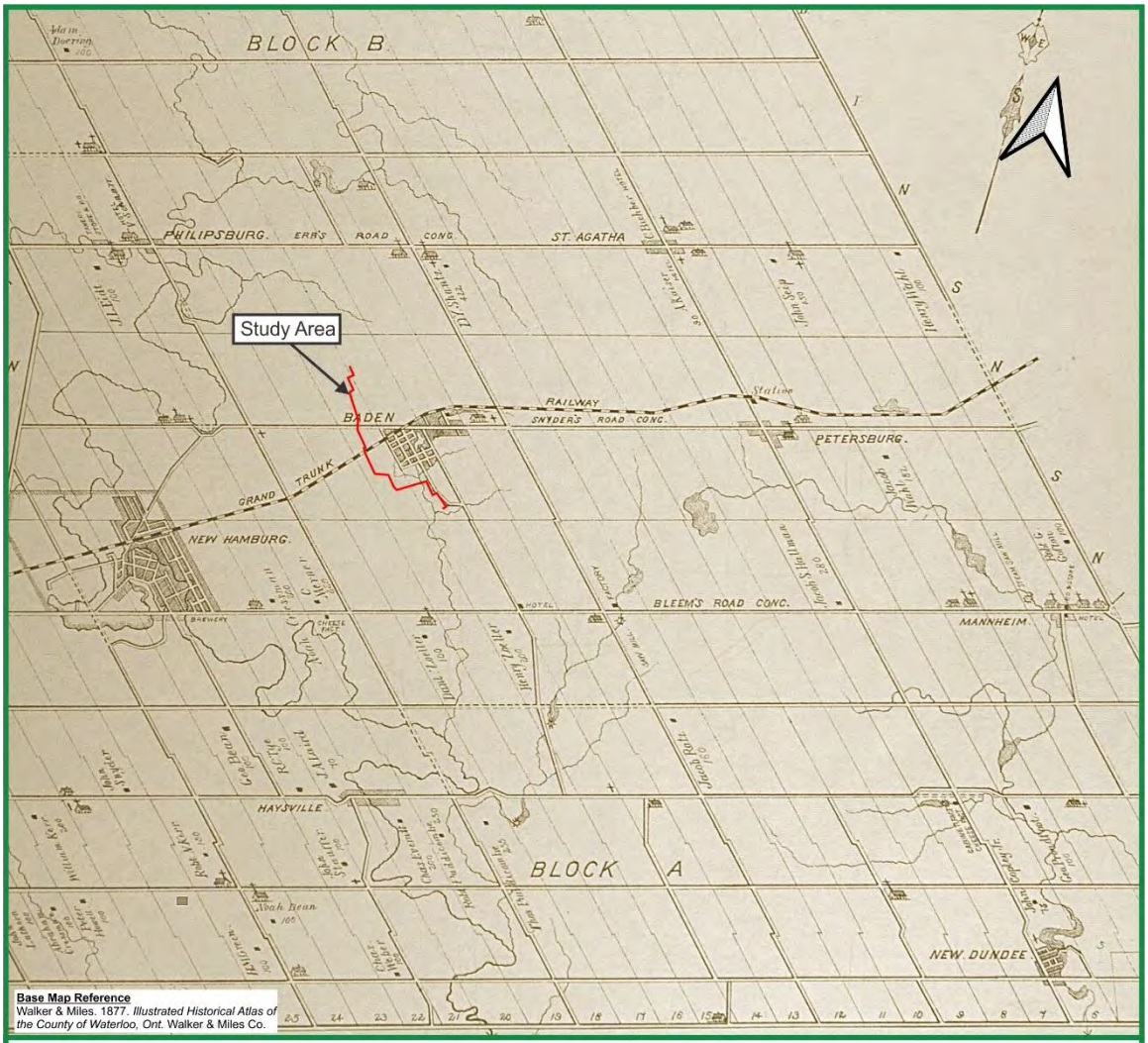
November 8, 2022

# Table of Contents

1.0 Maps....3
2.0 Universal Transverse Mercator....11
3.0 Aboriginal Engagement....12
4.0 Email Communications....13
4.1 Email 1....13

# 1.0 Maps


Baden
Study Area
Industrial
Baden Creek
Luxemburg
Base Map Reference
Natural Resources Canada. 2021. The Atlas of Canada - Toporama.
Electronic Source: http://www.atlas.gc.ca/toporama/en/index.html.
Last accessed: July 7, 2022.
Scale 1:30 000
Tile 1: Study Area




Tile 2: Portion of the 1877 *Historical Atlas* Map of Wilmot Township

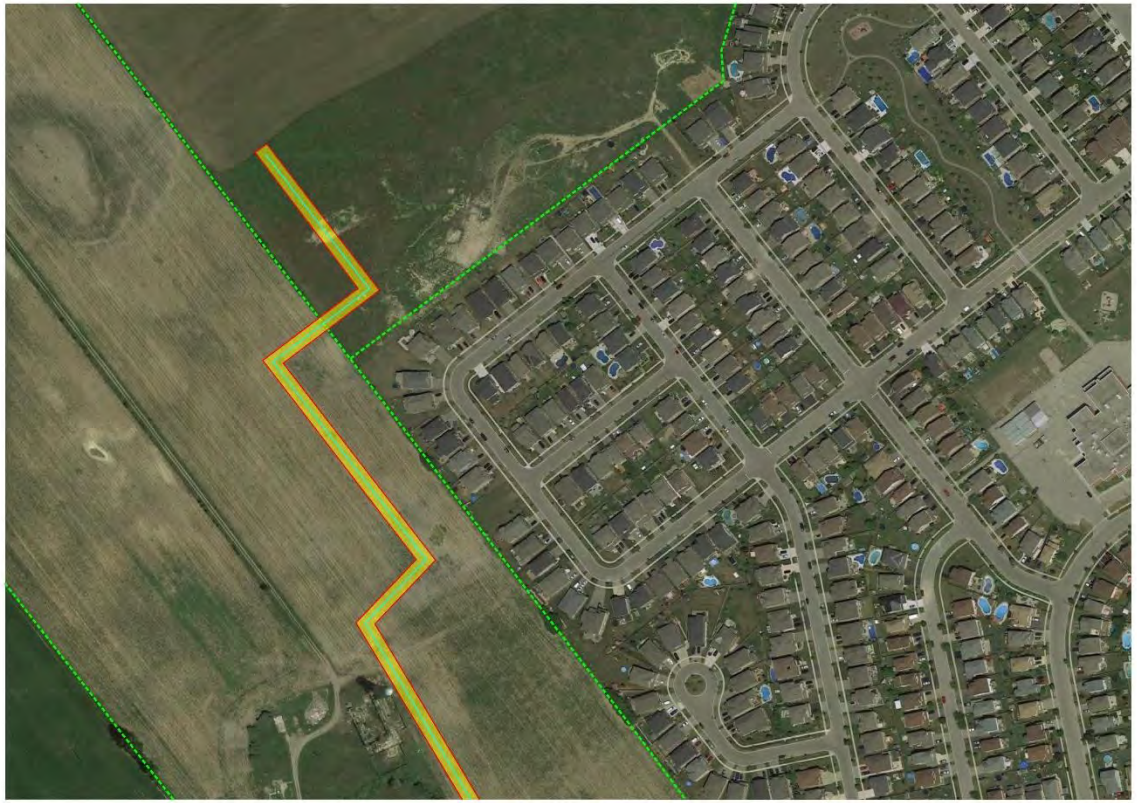



Legend

Property Boundary
Study Area
Sewer Line
Previously Assessed (Detritus 2020)

0 250 500 m

Tile 3: Study Area, Property Boundaries, and Previous Assessment and Results



Legend

Property Boundary
Study Area
Not Assessed, Stage 2 Recommended

0 75 150 m

Tile 4: Stage 2 Survey Methods and Results; Map 1




Legend

- Property Boundary
- Study Area
- Test Pit Survey at 5m Intervals
- Not Assessed, Stage 2 Recommended
- Previously Disturbed, Not Assessed

0 75 150 m

Tile 5: Stage 2 Survey Methods and Results; Map 2

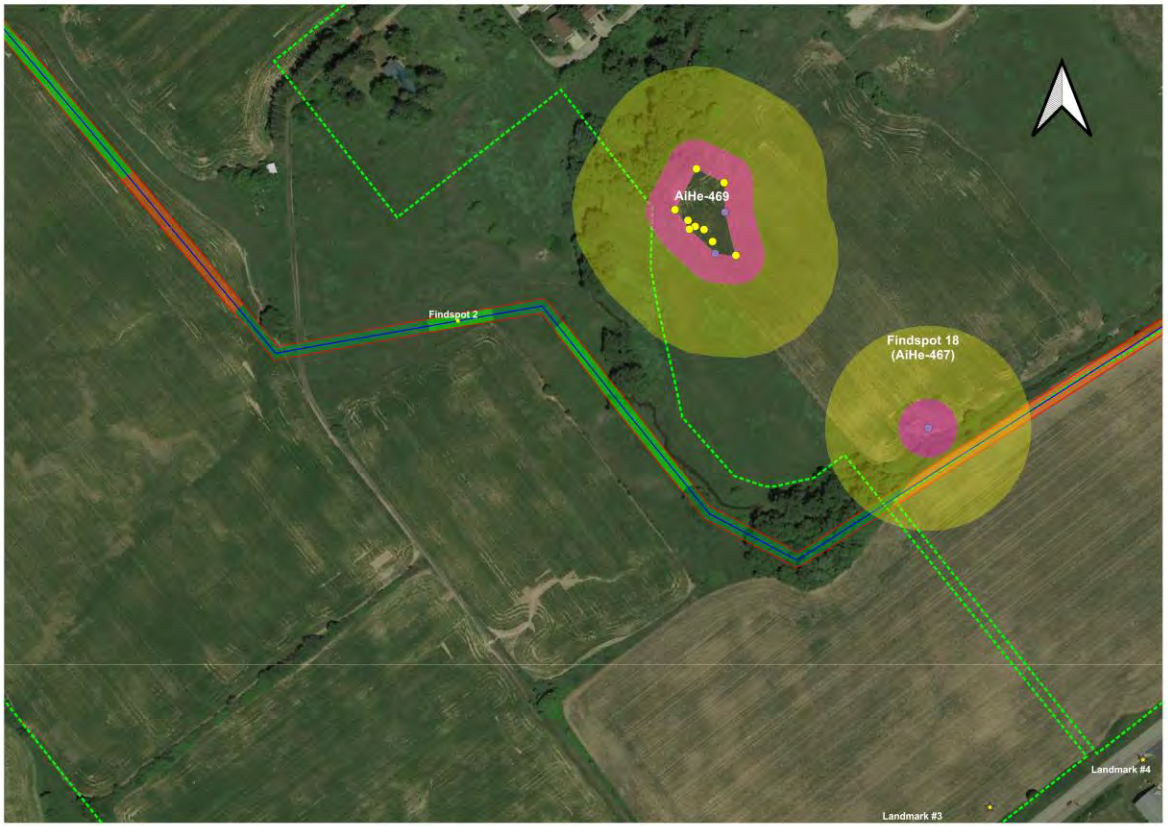



Legend

- Property Boundary
- Study Area
- Test Pit Survey at 5m Intervals
- Not Assessed, Stage 2 Recommended
- Previously Disturbed, Not Assessed

0 75 150 m

Tile 6: Stage 2 Survey Methods and Results; Map 3




Legend

- Property Boundary
- Study Area
- Test Pit Survey at 5m Intervals
- Test Pit Survey at 10m Intervals
- Pedestrian Survey at 3m Intervals
- Stage 2 Surface Find - Projectile Point (Detritus 2020)
- Stage 2 Findspot - Chipping Detritus
- 20m No-Go Buffer
- 50m Construction Monitoring Buffer

0 75 150 m

Tile 7: Stage 2 Survey Methods and Results; Map 4




Legend

- Property Boundary
- Study Area
- Test Pit Survey at 10m Intervals
- Pedestrian Survey at 3m Intervals
- Steeply Sloped, Not Assessed
- Previously Disturbed, Not Assessed
- Permanently Wet, Not Assessed
- 20m No-Go Buffer
- Stage 2 Surface Find - Chipping Detritus (Detritus 2020)
- Stage 2 Surface Find - Projectile Point (Detritus 2020)
- 50m Construction Monitoring Buffer

0 75 150 m

Tile 8: Stage 2 Survey Methods and Results; Map 5

# 2.0 Universal Transverse Mercator

The Universal Transverse Mercator ('UTM') coordinates recorded during the Stage 2 assessment are provided below. The UTM coordinates were recorded using a Garmin eTrex Touch 30x GPS unit with a minimum accuracy 3m (North American Datum 1983 ('NAD83') and UTM Zone 17T). The UTM coordinates for the archaeological findspots are presented in Table 1 below. Landmark UTM coordinates are found in Table 1 below.

**Table 1: UTM Coordinates for the Archaeological Sites and Findspots recovered during the Stage 2 assessment**

| Findspot | Description | UTM Coordinates |
|---|---|---|
| Findspot 1 | PTP1 | 17T 526171mE 4805626mN |
| Findspot 1 | Landmark #1 – Telephone Pole South Side of Snyder's Road West | 17T 526169mE 4805566mN |
| Findspot 1 | Landmark #2 – Telephone Pole South Side of Snyder's Road West | 17T 526208mE 4805574mN |
| Findspot 2 | PTP2 | 17T 526647mE 4805077mN |
| Findspot 2 | Landmark #1 – Telephone Pole South Side of Gingerich Road | 17T 527077mE 4804751mN |
| Findspot 2 | Landmark #2 – Telephone Pole South Side of Gingerich Road | 17T 527119mE 4804783mN |

# 3.0 Aboriginal Engagement

According to Section 3.5, Standard 1 of the *Standards and Guidelines for Consultant Archaeologists* ('*Standards and Guidelines*'; Government of Ontario 2011a) and Section 1.1, Standard 2c of the *Engaging Aboriginal Communities in Archaeology* draft technical bulletin (Government of Ontario 2011b), Aboriginal communities must be engaged following a Stage 3 assessment when formulating Stage 4 mitigation strategies for the following types of Aboriginal archaeological sites:

a. rare Aboriginal archaeological sites
b. sites identified as sacred or known to contain human remains
c. Woodland Aboriginal sites
d. Aboriginal sites where topsoil stripping is being contemplated
e. undisturbed Aboriginal sites
f. sites previously identified as being of interest to the Aboriginal community

This section of the Supplementary Documentation provides a description of the engagement practices that were conducted following the Stage 2 assessment of the Study Area. No additional documentation arose from the engagement process.

The Stage 2 assessment was conducted between August 16th and 18th, 2021 and on May 26, 2022. This investigation consisted of a pedestrian survey of the recently ploughed and weathered agricultural land, and a typical test pit survey of the grass and treed areas, conducted at five-metre intervals and in some areas at 10m intervals. This investigation resulted in the documentation of two pre-contact Aboriginal findspots.

Prior to conducting the Stage 2 fieldwork, on July 16, 2021, Mississaugas of the Credit First Nation ('MCFN'), Six Nations of the Grand River First Nation ('Six Nations'), and Haudenosaunee Development Institute ('HDI') were contacted by Detritus to inform them that fieldwork was set to begin at the end of July. Additionally, Detritus passed along the Proponent contact information so that monitoring agreements could be put in place prior to the commencement of the fieldwork.

During the course of the field investigation, representatives from MCFN, Six Nations, and HDI participated as on-site monitors (Table 2). No fieldwork was conducted without the knowledge of all three communities.

**Table 2: Fieldwork Dates and Communities Represented during the Fieldwork**

| Date | Field Director | First Nations Monitors |
|---|---|---|
| August 16, 2021 | Jon Cousins, R296 | Jessica Williams and Wayne Hill (HDI), Davis Jacobs (Six Nations), Eric Laforme (MCFN) |
| August 17, 2021 | Jon Cousins, R296 | Steve Markle (HDI), Davis Jacobs (Six Nations), Eric Laforme (MCFN) |
| August 18, 2021 | Jon Cousins, R296 | Steve Markle (HDI), Davis Jacobs (Six Nations), Eric Laforme (MCFN) |
| May 26, 2022 | Jon Cousins, R296 | Danton Miller, Owen Greene (HDI) |

# 4.0 Email Communications

## 4.1 Email 1

The following is email correspondence from the MHSTCI.

From: Horne, Malcolm (MHSTCI) <Malcolm.Horne@ontario.ca>
Date: Mon, Aug 23, 2021 at 4:48 PM
Subject: Recommendations for Incomplete Stage 2 Assessment, Beckdale Sanitary Sewer, Wilmot, P389-0551-2021,MHSTCI File 0014639
To: waltermccall.arch@gmail.com <waltermccall.arch@gmail.com>
Cc: Archaeology (MHSTCI) <archaeology@ontario.ca>

Hi, Walt. I understand from the below that the part of the original project area which was north of Snyder's Road has now been removed from the project area. However, some archaeological assessment has already been completed in this area but not completed. And, an archaeological site that was identified was not assessed to standard.

To address this situation you have suggested:

1. "The Stage 1 identified the entire Study Area as having potential; a Stage 2 was recommended for the entire original Study Area.
2. The Area south of Snyder's Road will have typical recommendations for any artifacts we recover (so far we have identified two areas of artifacts in the test pit portion; we are still awaiting ploughing and weathering for the rest)
3. The portion of the corridor north of Snyder's Road East will be recommended for Stage 2 pedestrian survey of all agricultural land, as well as a recommendation for intensification for the findspot (which will have a specific findspot designation) according to Section 2.1.3, Standard 2 Option A or B."

This is a valid approach and these recommendations will be acceptable.

Please include a PDF copy of this advice as supplementary documentation to your project report package.

As a standard part of all advice provided to licensees, please note that this advice has been provided by this ministry under the assumption that the information submitted by the licensed archaeologist is complete and accurate. The advice provided applies only to the project in question and is not to be used as a precedent for future projects. Further measures may need to be taken in the event that additional artifacts or archaeological sites are identified or if the information provided by the licensed archaeologist is otherwise found to be inaccurate, incomplete, misleading, or fraudulent.

Sincerely,

Malcolm Horne

Archaeology Review Officer

Archaeology Program Unit

Ministry of Heritage, Sport, Tourism and Culture Industries

**Mobile: 437-339-8861**

Email: Malcolm.Horne@ontario.ca

**From:** Walter McCall <waltermccall.arch@gmail.com>
**Sent:** August 19, 2021 4:04 PM
**To:** Hadlari, Wai (MHSTCI) <Wai.Hadlari@Ontario.ca>; Archaeology (MHSTCI) <archaeology@ontario.ca>
**Subject:** Stage 2 assessment, Beckdale Sanitary Sewer Stage 1-2

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

Good afternoon Wai,

I am contacting you regarding a Stage 1-2 assessment that Detritus has been retained to conduct in advance of the Beckdale Sanitory Sewer installation on the western edge of the community of Baden in the Region of Waterloo (P389-0551-2021). As I understand it, Garth has already been in touch with you regarding a strategy of test-pitting the entire corridor. If this is not the case, can you please direct my inquiry to whomever did provide this advice.

In any case, representatives from 6 Nations, MCFN, and HDI I believe have been in attendance during the fieldwork. They have requested that all areas that can be ploughed, be subject to a Stage 2 pedestrian survey rather than test pitting. We have no issues with this, and have informed the clients accordingly. This pedestrian survey hasn't happened yet, but it is planned for the near future.

A small situation has arisen, however, that requires a bit of guidance.

The original Study Area was based on a map provided by the client (attached here, called Original Study Area). We have just learned that only the portion of the corridor south of Snyder's Road E, that main thoroughfare through Baden, had been cleared for development. Normally in this situation, I would simply contact the MHSTCI to have the mapping from our original PIF request adjusted to match the revised Study Area. However, we conducted the test pitting portion of the stretch north of th Snyder's Road East. As the mapping shows, this test pit area was not extensive since most of the corridor on this side crosses agricultural land. Nevertheless, we found a single positive test pit north of Snyder's Road East containing one chert flake. The test pit was located next to an area to be ploughed. Because the positive test may be part of a larger scatter in the adjacent field that could require Stage 3, our FD did not intensify around the positive test pit.

There are no plans to return to the area north of Snyder's Road East, and it is unclear if the client actually has permission to access the fields in question. With this in mind, I am wondering how I document this flake. We have found other artifacts within the revised Study Area to the south, which have been intensified accordingly allowing us to make valid recommendations. This single flake, however, was never intensified. Even if it was, it is unknown if artifacts extend into the agricultural land to the north, which will not be assessed.

Technically, therefore, I will have a Stage 1 that covers the entire original Study Area; a completed Stage 2 assessment south of Snyder's Road East; and a partial Stage 2 assessment on the portion to the north of the road. Therefore, I am assuming my recommendations will be;

1. The Stage 1 identified the entire Study Area as having potential; a Stage 2 was recommended for the entire original Study Area.

2. The Area south of Snyder's Road will have typical recommendations for any artifacts we recover (so far we have identified two areas of artifacts in the test pit portion; we are still awaiting ploughing and weathering for the rest)

3. The portion of the corridor north of Snyder's Road East will be recommended for Stage 2 pedestrian survey of all agricultural land, as well as a recommendation for intensification for the findspot (which will have a specific findspot designation) according to Section 2.1.3, Standard 2 Option A or B.

I have not encountered this before, so I am unsure how to deal with it. Is this approach valid, or is there another way forward?

Thank you in advance for your help.

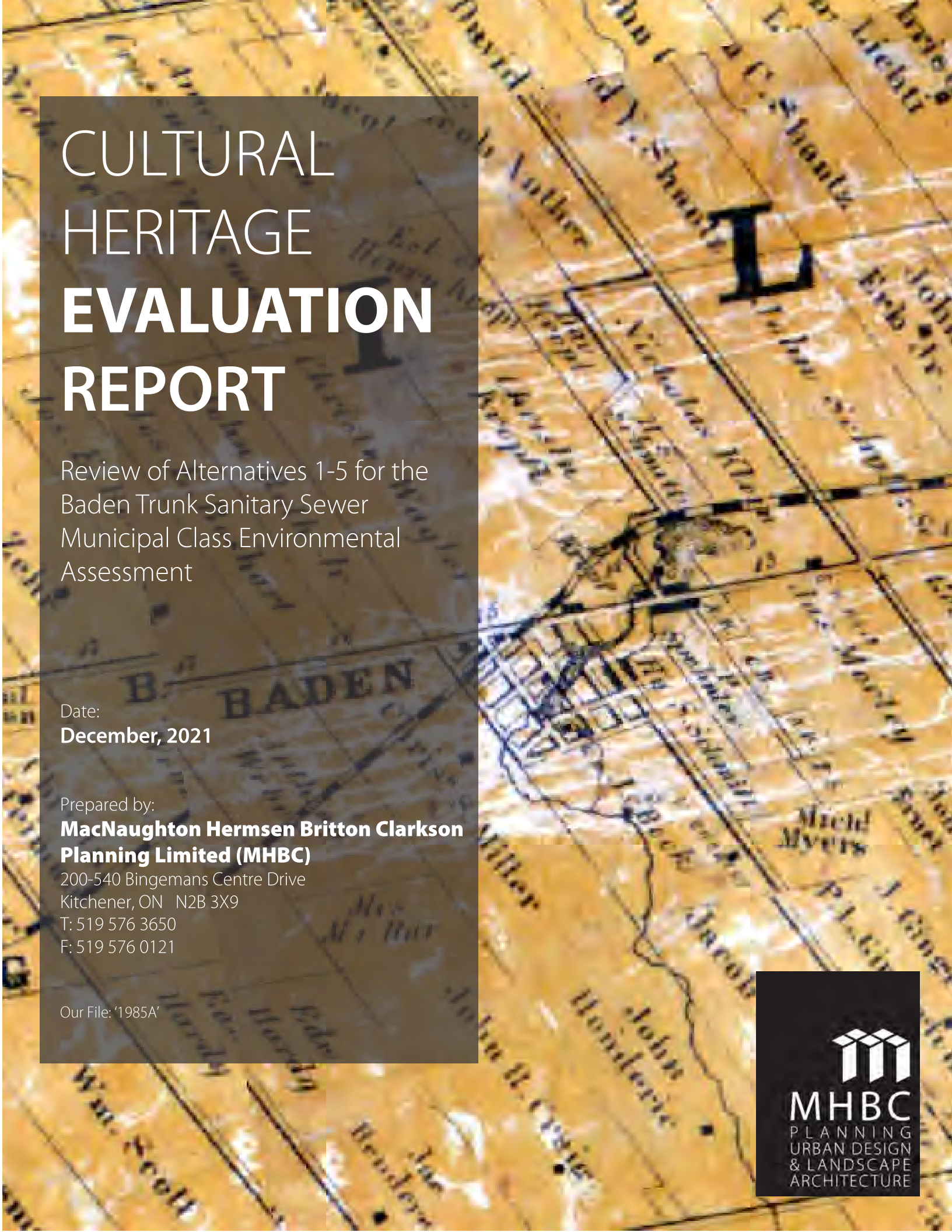
Cheers,

Walter McCall, PhD
Company Director
Consulting Archaeologist P389
www.detcon.net (226) 922-0297

Detritus
CONSULTING LTD.
archaeology · heritage

# Appendix C

## Cultural Heritage Evaluation Report (CHER)
## (December 2021)



# CULTURAL HERITAGE **EVALUATION REPORT**

Review of Alternatives 1-5 for the Baden Trunk Sanitary Sewer Municipal Class Environmental Assessment

Date:
**December, 2021**

Prepared by:
**MacNaughton Hermsen Britton Clarkson Planning Limited (MHBC)**
200-540 Bingemans Centre Drive
Kitchener, ON N2B 3X9
T: 519 576 3650
F: 519 576 0121

Our File: '1985A'

MHBC
PLANNING
URBAN DESIGN
& LANDSCAPE
ARCHITECTURE

# Table of Contents

**Project Personnel** ..... **iv**

**Acknowledgements** ..... **iv**

**Glossary of Abbreviations** ..... **v**

**1.0 Executive Summary** ..... **6**

**2.0 Introduction** ..... **8**

2.1 Location of Study Area ..... 8

2.2 Heritage Status ..... 9

**3.0 Policy context** ..... **13**

3.1 The Planning Act and PPS 2020 ..... 13

3.2 Environmental Assessment Act ..... 14

3.3 Ontario Heritage Act ..... 15

3.4 Region of Waterloo Official Plan ..... 15

3.4.1 Region of Waterloo Scenic Roads and Special Character Streets Resource Document (2011) ..... 16

3.5 Township of Wilmot Official Plan ..... 19

**4.0 Historical overview** ..... **21**

4.1 Indigenous Settlement ..... 21

4.1 Baden, Wilmot Township, Waterloo County ..... 21

**5.0 Description of Proposed Baden Trunk Sanitary Sewer Alternatives** ..... **27**

5.1 Proposed Alternatives ..... 27

**6.0 Evaluation of Proposed Alternative Routes** ..... **31**

6.1 Evaluation Criteria ..... 31

6.2 Evaluation of Alternatives and Identified Cultural Heritage Resources ..... 32

6.3 Evaluation of Alternatives and the proposed Cultural Heritage Landscape and Scenic Roads (Snyder's Road and Foundry Street) ..... 34

**7.0 Conclusions and recommendations ..... 36**

7.1 Summary of Conclusions and Mitigation Recommendations: ..... 36

**8.0 References ..... 37**

**Appendix A – Map of Broader and Local Study Area and Alternatives ..... 38**

**Appendix B – Map of Cultural Heritage Properties identified by the Township of Wilmot in Relation to the Broader and Local Study Areas ..... 39**

**Appendix C - Ministry of Tourism, Culture and Sport Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes Checklist ..... 40**

**Appendix D – Photo Map ..... 41**

**Appendix E – Excerpts of the Township of Wilmot Heritage Register (properties located within the Broader Study Area) ..... 42**

**Appendix F - Curriculum Vitae ..... 43**

# Project Personnel

| | | |
|---|---|---|
| Dan Currie, MA, MCIP, RPP, CAHP | *Managing Director of Cultural Heritage* | Project Manager |
| Vanessa Hicks, MA, CAHP | *Heritage Planner* | Author, Field Assessment |

# Acknowledgements

This report acknowledges the work of the following organizations. These studies and reports are related to this CHSR and are acknowledged accordingly.

| | | |
|---|---|---|
| AMICK Consultants Ltd. | *1012 Snyder's Road West, Stage 1-2 Archaeological Property Assessment* | July 30, 2019 |
| MTE | *1012 Snyder's Road West: Update to Phase I Environmental Site Assessment Report* | June 25, 2020 |
| MTE | *1012 Snyder's Road West: Phase II Environmental Site Assessment Report* | June 11, 2021 |
| MTE | *1012 Snyder's Road West Baden, Ontario: Functional Servicing Report* | April 12, 2021 |
| MTE | *Technical Memorandum RE Baden – New Hamburg Wastewater Servicing Strategy Sanitary Sewer Design for the Snyder's Road Reconstruction* | September 6, 2019 |
| MHBC | *Planning Report: Snyder's Road (Baden) GP Inc.* | April 2021 |

# Glossary of Abbreviations

| | |
|---|---|
| EA | *Environmental Assessment* |
| EAA | *Environmental Assessment Act* |
| CHL | *Cultural Heritage Landscape* |
| CHER | *Cultural Heritage Evaluation Report* |
| HCD | *Heritage Conservation District* |
| MHBC | *MacNaughton Hermsen Britton Clarkson Planning Limited* |
| MHSTCI | *Ministry of Heritage, Sport, Tourism and Culture Industries* |
| OHA | *Ontario Heritage Act* |
| OHTK | *Ontario Heritage Toolkit* |
| O-REG 9/06 | *Ontario Regulation 9/06 for determining cultural heritage significance* |
| PPS 2020 | *Provincial Policy Statement (2020)* |

# 1.0 Executive Summary

MHBC was retained to undertake a Cultural Heritage Evaluation Report for the Baden Trunk Sanitary Sewer Municipal Class Environmental Assessment. The study area is located in the Town of Baden, in the general area located east of Nafziger Road, west of Foundry Street on either side of Snyder's Road West.

The purpose of this report is to provide input into the evaluation of each of the five Alternatives of the Baden Trunk Sanitary Sewer through the identification of cultural heritage resources within the Broader and Detailed Study Areas. Also, to provide a preliminary evaluation of the proposed Alternatives and identify preliminary preferred routes in terms of the conservation of Cultural Heritage Resources. This report has reviewed the location of cultural heritage resources identified by the Region of Waterloo as well as the Township of Wilmot. Here, each alternative was evaluated based on potential sources of adverse impacts which are outlined in the Ontario Heritage Toolkit. This report will feed into the Environmental Assessment process along with other technical reports so that a Preferred Alternative can be selected going forward which takes into consideration a range of factors which are considered under the Environmental Assessment Act. The scope of this report does not include an analysis of buried archaeological resources.

**Conclusions on Evaluation of Baden Trunk Sanitary Sewer Alternatives (1 – 5)**

- Eleven identified cultural heritage resources which are included on the Township of Wilmot Heritage Register have been reviewed as part of this report. A map noting the location of these resources in relation to each of the Alternatives for the Baden Trunk Sanitary Sewer is provided in **Appendix B** of this report;
- None of the Alternatives considered in this report are likely to result in the removal of cultural heritage resources given that they are either located within the right-of-way, or are sited away from identified cultural heritage resources; and
- The Region of Waterloo has identified that Baden is a potential Cultural Heritage Landscape, and Foundry Street and Snyder's Road have been identified as scenic roads. Further, the project meets the criteria of the Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes Checklist of the Ministry of Heritage, Sport, Tourism and Culture Industries (see Appendix C).
- As a result of the aforementioned, it is recommended that a Heritage Impact Assessment be prepared should construction of the preferred sewer alignment be coordinated with

road reconstruction and the design of the sewer has the effect of changing the profile or character of streets and roads which are either scenic (i.e. Foundry Street and Snyder's Road) or heritage attributes identified in the forthcoming Cultural Heritage Landscape Study of the Region of Waterloo.

# 2.0 Introduction

MHBC was retained to undertake a Cultural Heritage Evaluation Report (CHER) to identify whether or not the five proposed alternative routes are likely to result in adverse impacts to cultural heritage resources which have been identified by the Township of Wilmot.

The purpose of the waste water/sanitary sewer line is to provide municipal services for growth areas within the community of Baden. There are currently 5 alignment Alternatives proposed (A map indicating the location of the Alternative routes in relation to these identified Cultural Heritage Resources is provided in **Appendix B**).

A wastewater servicing study for the growth areas of Baden and new Hamburg was prepared in 2014. This study evaluated sanitary infrastructure needs which were part of the 2011 Baden and New Hamburg Water and Waste Water Master Plan. The anticipated growth for the Township of Wilmot prompted a servicing strategy for Baden and New Hamburg. As a result, the Township initiated a Schedule B Municipal Class Environmental Assessment for the Baden Trunk Sanitary Sewer, which commenced in June 2021. The existing sanitary infrastructure lacks the capacity and depth for the anticipated growth within Baden. The proposed sanitary trunk will accommodate current and future growth while optimizing existing infrastructure which consists of trunk sewers, gravity sewers, and pressure sewers.

## 2.1 Location of Study Area

The study area is located in the Town of Baden, in the general area located east of Nafziger Road, west of Foundry Street on either side of Snyder's Road West. The main thoroughfare through Baden is Snyder's Road East. The Detailed and Broader study area boundaries are provided below (see **Figure 1** below).

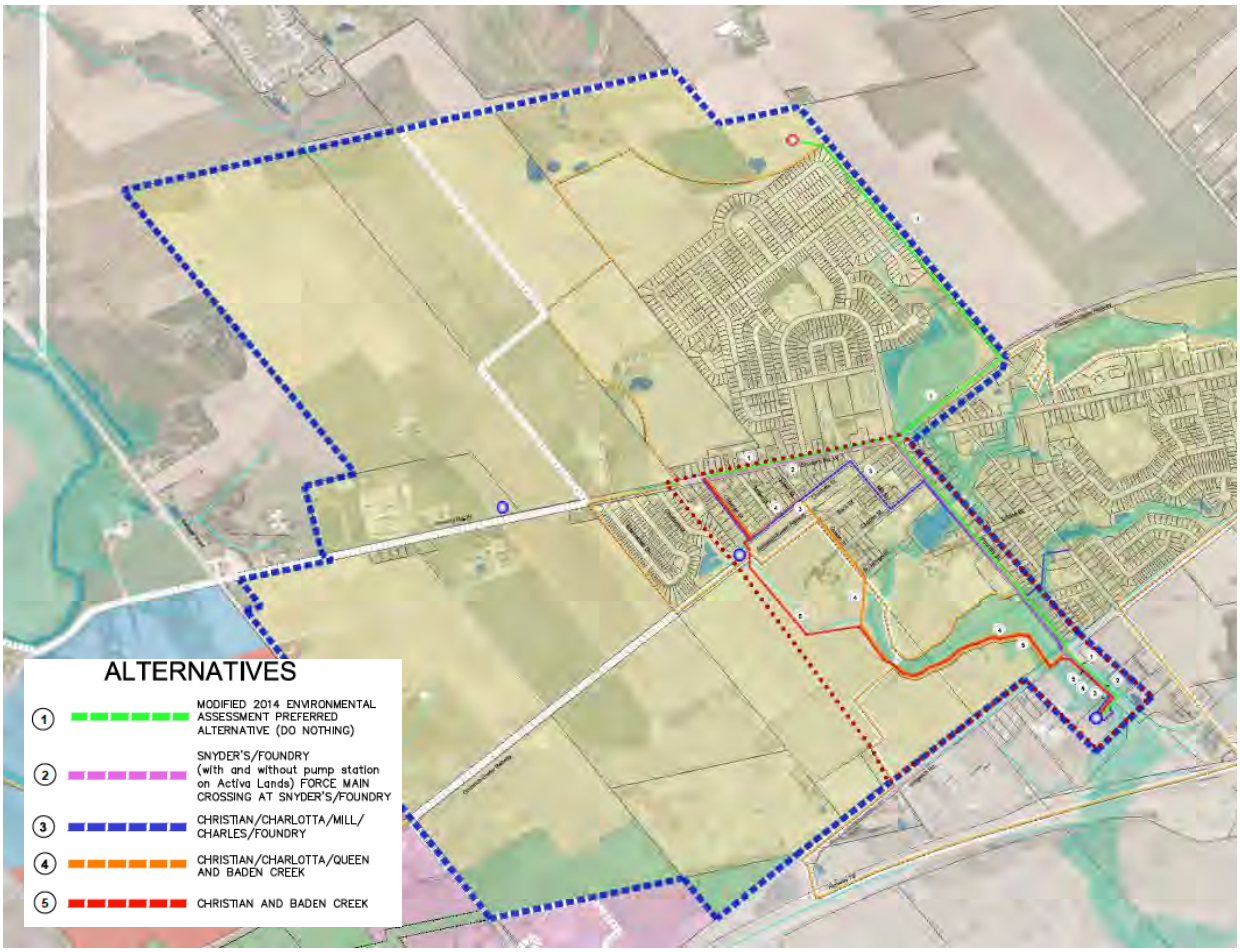



**Figure 1:** Broader Study Area (dashed blue line) and Detailed Study Area (red dotted line) (See **Appendix A**) (Source: MHBC, 2021)

## 2.2 Heritage Status

The broader study area includes eleven properties which have been identified as cultural heritage resources by the Township of Wilmot and are included in the Township's Cultural Heritage Register. These are identified on the map provided below, and are also available in **Appendix B**.

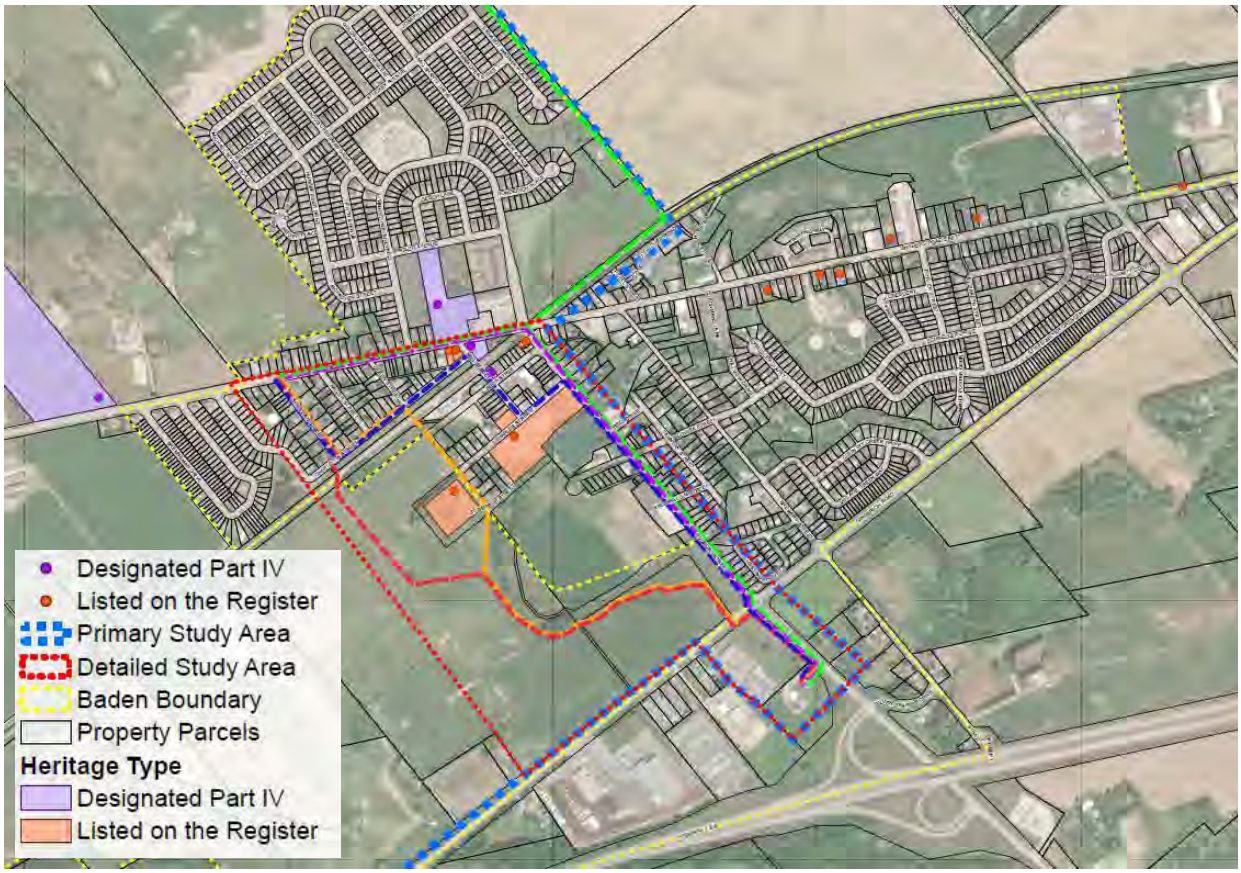



**Figure 2:** Broader Study Area (dotted blue line) and Wastewater (Sewer) Alternative Routes noting the location of listed and designated heritage resources (See **Appendix B**) (Source: MHBC, 2021)

The following provides a list of these properties located within the broader study area which are either listed under Section 27 or designated under Part IV of the *Ontario Heritage Act*:

| **Address** | **Heritage Status** | **Located Adjacent to Alignment(s) No:** |
|---|---|---|
| *Listed Heritage Properties:* | | |
| 1316 Snyder's Road West | Listed | • Not located Adjacent to any Alternatives |
| 53 Snyder's Road West | Listed | • Alternative No. 2<br>• Alternative No. 3<br>• Alternative No. 1 |
| 55 Snyder's Road West | Listed | • Alternative No. 2<br>• Alternative No. 3<br>• Alternative No. 1 |
| 8 Foundry Street | Listed | • Alternative No. 1<br>• Alternative No. 2 |

| | | |
|---|---|---|
| 76 Mill Street | Listed | • Alternative No 1<br>• Alternative No. 2<br>• Alternative No. 3 |
| 75 Charles Street | Listed | • Alternative No. 3 |
| 130 Queen Street | Listed | • Alternative No. 4<br>• Alternative No. 5 |
| *Designated Heritage Properties:* | | |
| 44 Beck Street | Designated Part IV | • Alternative No. 3 |
| 60 Snyder's Road West | Designated Part IV | • Alternative No. 2<br>• Alternative No. 1 |
| 1138 Snyder's Road West | Designated Part IV | • Not located Adjacent to any Alternatives |
| 39 Snyder's Road West | Designated Part IV | • Alternative No. 2<br>• Alternative No. 3<br>• Alternative No. 1 |

It is important to note that the community of Baden has been identified as a potential Cultural Heritage Landscape in the Region of Waterloo Cultural Heritage Landscape Study in Wilmot and North Dumfries Townships. This study was launched in the summer of 2020 and a draft report is anticipated in winter/spring 2022. While the community of Baden has been acknowledged as a potential CHL, the attributes of the landscape which contribute to its heritage character have yet to be determined.

Snyder's Road and Foundry Street are identified as a scenic road within the Region of Waterloo Scenic Roads and Special Character Streets Resource Document (2011). Scenic roads are defined in this document as follows:

> *Scenic roads and special character streets are transportation corridors which have been recognized for the quality and quantity of natural, cultural heritage and recreational features that contribute to their scenic value or special character.*




**Figure 3:** Excerpt of the Region of Waterloo Scenic Roads and Special Character Streets Resource Document, 2011 (Source: Region of Waterloo, accessed 2021)

Additional information regarding the guidelines for conserving scenic roads are provided in Section 3.4 of this report.

Baden has also been identified as a destination on the Township of Wilmot Nith Valley Trail, which is part of the Region of Waterloo Historic Countryside Tour (See **Figure 4** below).




**Figure 4:** Excerpt of the Township of Wilmot Nith Valley Trail Historic Countryside Tour (Source: Region of Waterloo, accessed 2021)

# 3.0 Policy context

## 3.1 The Planning Act and PPS 2020

The *Planning Act* makes a number of provisions respecting cultural heritage, either directly in Section 2 of the Act or in Section 3 respecting policy statements and provincial plans. In Section 2, the *Planning Act* outlines 18 spheres of provincial interest that must be considered by appropriate authorities in the planning process. One of the intentions of *The Planning Act* is to "encourage the co-operation and co-ordination among the various interests". Regarding cultural heritage, Subsection 2(d) of the Act provides that:

> *The Minister, the council of a municipality, a local board, a planning board and the Municipal Board, in carrying out their responsibilities under this Act, shall have regard to, among other matters, matters of provincial interest such as, […]*
>
> *(d) the conservation of features of significant architectural, cultural, historical, archaeological or scientific interest;*

The *Planning Act* therefore provides for the overall broad consideration of cultural heritage resources through the land use planning process.

In support of the provincial interest identified in Subsection 2 (d) of the *Planning Act*, and as provided for in Section 3, the Province has refined policy guidance for land use planning and development matters in the *Provincial Policy Statement, 2014* (PPS). The PPS is "intended to be read in its entirety and the relevant policy areas are to be applied in each situation". This provides a weighting and balancing of issues within the planning process. When addressing cultural heritage planning, the PPS provides for the following:

> *2.6.1 Significant built heritage resources and significant Cultural Heritage Landscapes shall be conserved.*

The following terms are defined by PPS 2020 as follows:

> ***Significant***: *e) in regard to cultural heritage and archaeology, resources that have been determined to have cultural heritage value or interest. Processes and criteria for determining*

*cultural heritage value or interest are established by the Province under the authority of the Ontario Heritage Act.*

***Built heritage resource:*** *means a building, structure, monument, installation or any manufactured or constructed part or remnant that contributes to a property's cultural heritage value or interest as identified by a community, including an Indigenous community. Built heritage resources are located on property that may be designated under Parts IV or V of the Ontario Heritage Act, or that may be included on local, provincial, federal and/or international registers.*

***Cultural Heritage Landscape:*** *means a defined geographical area that may have been modified by human activity and is identified as having cultural heritage value or interest by a community, including an Indigenous community. The area may include features such as buildings, structures, spaces, views, archaeological sites or natural elements that are valued together for their interrelationship, meaning or association. Cultural heritage landscapes may be properties that have been determined to have cultural heritage value or interest under the Ontario Heritage Act, or have been included on federal and/or international registers, and/or protected through official plan, zoning by-law, or other land use planning mechanisms.*

## 3.2 Environmental Assessment Act

The *Environmental Assessment Act* (EAA) applies to municipal infrastructure projects in Ontario, including roads, water, wastewater and transit projects. The purpose of the *Environmental Assessment Act* (R.S.O 1990) is to provide for:

> *"...the betterment of the people of the whole or any part of Ontario by providing for the protection, conservation and wise management in Ontario of the environment."*

Environment is defined in a broad manner in the *Environmental Assessment Act* to mean the "natural, social, cultural, built and economic environments".

Part I (Interpretation and Application) of the *Environmental Assessment Act* provides that the environment means (including, but not limited to),

> *(c) the social, economic and cultural conditions that influence the life of humans or a community*

As such, the Province recognizes that culture is an important aspect of the environment and is therefore an integral part of an Environmental Assessment (EA).

## 3.3 Ontario Heritage Act

The *Ontario Heritage Act*, R.S.O, 1990, c.0.18 remains the guiding legislation for the conservation of significant cultural heritage resources in Ontario. This Cultural Heritage Evaluation Report has been guided by the criteria provided with *Regulation 9/06* of the *Ontario Heritage Act* which outlines the mechanism for determining cultural heritage value or interest. The regulation sets forth categories of criteria and several sub-criteria.

## 3.4 Region of Waterloo Official Plan

Section 3.G of the Region of Waterloo Official Plan provides policies regarding the management of cultural heritage resources. The following provides a selection of these policies which are related to the scope of this report.

> *Identification of Cultural Heritage Resources*
>
> *3.G.1 The Region and Area Municipalities will ensure that cultural heritage resources are conserved using the provisions of the Heritage Act, the Planning Act, the Environmental Assessment Act, the Cemeteries Act and the Municipal Act.*
>
> *3.G.2 The Region will prepare and update a Regional Implementation Guideline for Conserving Regionally Significant Cultural Heritage Resources. In accordance with the Ontario Heritage Act, this guideline will outline the criteria and processes the Region will follow to identify and conserve cultural heritage resources of Regional interest including regional roads that have cultural heritage value or interest.*
>
> *3.G.3 Area Municipalities will identify cultural heritage resources by establishing and maintaining a register of properties that are of cultural heritage value or interest. Area Municipalities will include on their register properties designated under Part IV, V or VI of the Heritage Act, and will consider including, but not be limited to, the following additional cultural heritage resources of cultural heritage value or interest:*
>
> *(a) properties that have heritage conservation easements or covenants registered against title;*
>
> *(b) cultural heritage resources of Regional interest; and*
>
> *(c) cultural heritage resources identified by the Grand River Conservation Authority and the Federal or Provincial governments.*

*3.G.4 The Region will coordinate and maintain a region-wide inventory of cultural heritage resources that are:*

*(a) listed on registers established and maintained by Area Municipalities;*

*(b) identified by the Federal or Provincial governments, and the Grand River Conservation Authority;*

*(c) identified through research by the Region, Area Municipalities, postsecondary institutions or local historical societies;*

*(d) of Regional interest; or*

*(e) owned by the Region.*

*3.G.6 Area Municipalities will designate Cultural Heritage Landscapes in their official plans and establish associated policies to conserve these areas. The purpose of this designation is to conserve groupings of cultural heritage resources that together have greater heritage significance than their constituent elements or parts.*

*Scenic Roads 3.G.27 The Region recognizes that many Regional Roads are characterized by natural, cultural heritage and recreational features that contribute to the scenic value of Regional Roads. During any construction or upgrades, the Region will, wherever feasible, endeavour to protect and/or enhance the scenic value of such features along Regional Roads.*

*3.G.28 Area Municipalities are encouraged to establish policies in their official plans to protect the scenic values of Regional Roads, including the view from the road to prominent heritage buildings or natural landscape features.*

*3.G.29 Area Municipalities are encouraged to protect the scenic values of roads under their jurisdiction.*

### 3.4.1 Region of Waterloo Scenic Roads and Special Character Streets Resource Document (2011)

Snyder's Road and Foundry Street are identified as scenic roads in Section 4.4.1.1 of the Region of Waterloo Scenic Roads and Special Character Streets Resource Document (2011). Section 4.1 of

the Scenic Roads document provides the following guidelines for conserving the character of these transportation routes and their identified features:

- *Priority should be given to maintaining those features which are special or scenic and preserve the character of the street. This includes, built form, heritage planting, scenic road configurations such as bends or valleys, and open space connectivity. •*
- *Priority should be given to maintaining scenic or special features on all Regional Transportation Corridors, or Regional Transportation Corridor segments. Conserve the historic urban fabric along the road corridor to maintain diversity and enrich the experience of corridor users. This will often require specific and idiosyncratic design approaches to building setbacks and the width of the road corridor;*
- *Avoid narrowing sidewalks and removing on-street parking and/or landscaping. The presence of slow moving through-traffic, on-street parking and a quality public realm are all required to preserve and enhance existing retail uses;*
- *Only consider a by-pass of a hamlet or village after market feasibility study, which can be included within the Environmental Assessment process, having regard for the provisions of the Regional Official Plan. The creation of by-pass roads around settlements can deaden the retail environment along historic main streets by removing much of the through traffic;*
- *Examine unique design initiatives, such as higher order landscaping and streetscaping, for places of historic, cultural, or natural importance, in consultation with the public; and*
- *Integrate the design of the road edge with that of the adjacent open spaces, where arterial roads cross or are adjacent to significant natural areas and open spaces. The design of the road edge should be consistent aesthetically and uphold the same environmental standards.*

Additional guidance is provided as it relates to heritage buildings located adjacent to the Right of Way or road improvements:

Historic Buildings adjacent to the Right of Way

- *Minimize temporary and permanent negative impacts to historic buildings during and following corridor improvements. Potential negative impacts include, but are not limited to: demolition, alteration, encroachment, isolation, visual disturbances, shadows, and changes in noise and/or air emissions.*
- *Restrict access to vacant heritage resources during construction. Cultural heritage planning staff are available to develop a stewardship and re-use plan for Region-owned heritage resources left unoccupied during or following a road improvement project.*

- *Consult with cultural heritage staff if a built heritage resource must be removed. It may be recommended that the Region try to relocate the building. If relocation is not possible, it may be recommended that prior to demolition specific building materials be salvaged and/or that the Region collect and preserve documentation describing the interior and exterior of the resource including photographs, measured drawings and historical records. Following demolition, the site may warrant commemoration with interpretive signage.*

*Historic Road Attributes and Alignments*

*When possible, maintain the existing historical road patterns and alignment. Historic road alignments are important for understanding how homes, commercial, industrial and institutional buildings were originally situated in relation to each other. Many Regional roads have been in use since the area was settled in the early 1800s (see Appendix B – County of Waterloo Map (1885).*

*Cultural heritage staff are available to assist with the research, recognition and to provide interpretation of the corridor if it or any of its structural features are associated with: - the development of an important construction technique or technology; - a significant period of transportation or community development; and/or a prominent person, location or event.*

*Corridor Width*

*The character of an area may be enhanced by maintaining a road width and speed that corresponds to the scale and massing of the adjacent buildings and landscape (e.g. narrower, slower road where buildings are close to the street). Existing features of scenic roads and special character streets may provide traffic calming measures.*

*When necessary, undertake selective widening by determining the scope of improvements needed, identifying where improvements will be most effective, and then blending the improvements into the surrounding landscape. The Regional Transportation Master Plan includes a Road Network Plan that has been developed to assist in prioritizing road network improvements, and has taken into consideration the impacts of road widening on cultural heritage resources, mature neighbourhoods and the natural environment.*

*Trees*

*When possible, preserve mature trees and replant appropriate roadside or street trees where mature trees must be or have been removed. Consider planting and maintaining a variety of species and differently aged trees. A list of appropriate tree species is available*

*from Environmental Planning staff. Consider conserving or recreating tree-lined streets that produce a canopied effect by ensuring the eventual mature tree canopy is tall and broad enough to create a natural canopy over the new road width.*

*Utilities*

*It may be possible to minimize the visual impact of utilities by partnering with utility providers to: - bury utilities where practical; - minimize overhead road crossings; - minimize the number of poles by maximizing joint use of utility poles (eg. Queen St. New Dundee); - encourage the full use of existing infrastructure such as pedestals and underground vaults or by co-locating utilities within existing poles; and - work to eliminate areas that may attract graffiti and have a maintenance and removal plan in place.*

## 3.5 Township of Wilmot Official Plan

Chapter 9 of the Township of Wilmot Official Plan provides the following policies which is related to the scope of this Cultural Heritage Evaluation Report:

*Chapter 9: Cultural Heritage Resource Management*
*The Township of Wilmot has a rich and diverse cultural heritage, including a range of built heritage resources and cemeteries, unique Cultural Heritage Landscapes and diverse archaeological sites. The Township recognizes the importance of these cultural heritage resources to foster a sense of place and benefit the community, particularly in strategic growth areas. The policies of this Chapter therefore seek to identify, protect and manage the township's cultural heritage resources in a manner that retains their heritage values, attributes and integrity.*

*9.1 General Policies*

*9.1.1 The Township will set an example to the community by conserving and enhancing cultural heritage resources using the provisions of the Ontario Heritage Act, the Planning Act, the Environmental Assessment Act, the Funeral, Burial and Cremation Act and the Municipal Act.*

*9.1.2 The Township will establish and maintain a Municipal Heritage Committee (Heritage Wilmot) to provide consultation and recommendations regarding the designation, restoration, demolition, or alteration of buildings, structures, landscapes and sites of architectural, cultural, or historic value, interest or significance.*

*9.2 Heritage Register*
*The Township, in consultation with Heritage Wilmot, will prepare, publish, and periodically update a Register of the Township's cultural heritage resources. The Heritage Register will include:*

*a) properties that are designated under the Ontario Heritage Act;*
*b) properties that are protected by a heritage easement or covenant under the Ontario Heritage Act;*
*c) properties that are identified by the Grand River Conservation Authority or in Region al, provincial or federal heritage inventories;*
*d) non-designated properties that have been identified as having cultural heritage value or interest.*

*9.5 Cultural Heritage Impact Assessments*

*9.5.8 The Township will assess the impact of proposed road construction, improvements and other public works abutting cultural heritage resources identified in the Heritage Registry, and provide in the project design for the mitigation of any negative impacts.*

# 4.0 Historical overview

## 4.1 Indigenous Settlement

This report acknowledges that the Township of Wilmot is located on the traditional territory of the Neutral, Anishnaabeg, Haudenosaunee and Mississauga peoples (Heritage Wilmot, accessed online at https://www.wilmot.ca/en/living-here/History-of-Wilmot-Township.aspx). The Heritage Wilmot website also acknowledges the importance of the Dish with One Spoon Covenant, which is a peace agreement made between Indigenous groups before the arrival of Euro-Canadian settlers.

## 4.1 Baden, Wilmot Township, Waterloo County

The subject lands are located in Waterloo County where pioneer settlement commenced in the late eighteenth century. In 1784, General Haldimand, then Governor of Quebec, acquired six miles of land on each side of the Grand River from the Mississauga Indians (Bloomfield 19, 2006). A tract of land 12 miles wide along the course of the Grand River were granted to the Six Nations Indians by the British in recognition of their support during the American Revolution. The land was later divided into four blocks.

Wilmot Township was a Crown Reserve subsequent to the Canada Act of 1791. The Township was surveyed and Mennonites from Waterloo Township and Amish settlers from Europe settled lots, clearing lands for farms and roads. Three main roads were cleared from one settlement to the other, this includes the roads now known as Erb's Road, Snyder's Road, and Bleams Road (Heritage Wilmot, accessed online at https://www.wilmot.ca/en/living-here/History-of-Wilmot-Township.aspx).

Wilmot Township had become home to several settling Euro-Canadian families by 1830. This includes members of the Biehn, Bowman, Cressman, Detweiler, Eby, Schantz, Schneider, Goldschmidts, Schwartzentrubers, Brennemans, and Kropfs families (Hayes, 1997). Other families include the Honderichs, Gingerichs, Benders, Jutizis, and Litwillers. The Township was surveyed by M.C. Schofield in 1855 (Sutherland, 1864). Wilmot Township was divided into the German Block (mid. block), as well as Block B (north), and Block A (south) (Hayes, 1997).

Baden was settled in the mid. 1820s by Amish Mennonites from Bavaria and Pennsylvania (Baden Walking Tour, Heritage Wilmot). The settlement was originally named Weissenburg after an "old bachelor" who resided in the area". Early settlers included Jacob Beck, of German descent, who renamed the Village Baden in 1854. Jacob Beck dammed Spring Creek to create a mill pond for a foundry and grist mill. The pond was located on both sides of Foundry Street. Baden was the birthplace of Sir Adam Beck, who was the founder of the public hydro-electric system in Ontario (Heritage Wilmot, accessed online at https://www.wilmot.ca/en/living-here/History-of-Wilmot-Township.aspx). The Grand Trunk Railway was constructed through Wilmot Township with a stop in Baden available by the mid. 19th century.

The detailed study area for the Baden Trunk Sanitary Sewer is located on Lot 15, German Block, South of Snyder's Road. The land registry records confirm that all 50 acres of Lot 15 was patented by the Crown to Abraham Huntzlinger in 1835. Jacob Beck acquired lands in Lot 15 as early as 1854. Jacob Beck registered a Plan of Subdivision by the mid. 19th century.




**Figure 5:** Excerpt of the Plan of Baden by Jacob Beck, Esq. (Source: Image Provided Courtesy of the Township of Wilmot Archives)

The Tremaine Map indicates that the south portion of Lot 15 was owned by J. Beck.

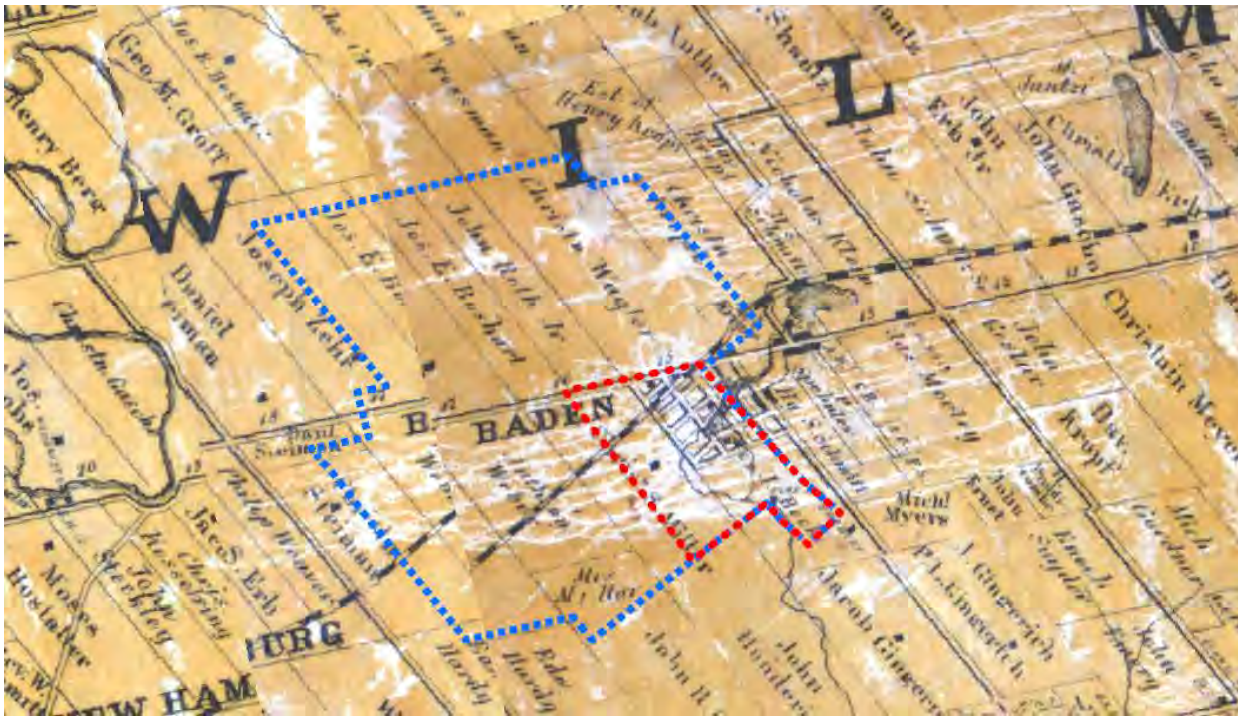



**Figure 6:** Excerpt of the Tremaine Map of Wilmot Township, 1861. Broader study area noted in blue, detailed study area noted in red. (Source: University of Toronto Digital Map Library, accessed 2021)

According to the 1864 Gazeteer of Waterloo County, Baden is described as a village situated on Spring Creek (now Baden Creek), a tributary of the river Nith. The Gazeteer notes that at this time, Baden had several businesses and establishments, including a grist mill (J. Beck), flax mill (Perine Brothers), and an iron foundry (J. Beck). The settlement also included a steam grist mill (Crombie), two saw mills, four general stores, a brewery, a Lutheran Church, and a school. The population in the year 1864 was 400 persons.



ALPHABETICAL LIST OF PROFESSIONS, TRADES, &c.

Arkel, Arthur, miller.
Bauer, Lewis, brewery.
BECK, JACOB, proprietor of Baden flouring mills and iron foundry.
Boe, Ernest, jr., tailor.
Boe, Charles, sr., laborer.
Boe, Charles, jr., tobacconist.
Bounely, David porter at station.
Craig, Henry blacksmith.
Dellinger, George mason.
Klaesser, Gotlieb, laborer.
Emmerich, Charles saddler.
Erbach, Philip cooper.
Flauns, Conrad, laborer.
FORD, HENRY, station master.
Gabel, George, wagon-maker
Gabel, Jacob, hotel-keeper.
Gerlugr George, carpenter.
Gistel, Adolph, finisher.
Heiss, Christian, blacksmith.
Herring, John Adam, tailor.
Hoffle, John, mason.
Ido, Wm. laborer.
Kannaman, Fred., mason.
Kaufman, Adam, hotel-keeper.
Koch, Ernst, carpenter.
Kopf, F. W., merchant.
Kraus, Christ, hotel-keeper.
Kropf, David, farmer.
Kropf, Christian, farmer.
Lang, Henry, laborer.
Liersch, Henry, farmer.
Licht, August, farmer.
Miller, Charles, miller.
Miller, John, laborer.
MORLEY, MICHAEL, steam saw mills, and proprietor of pail & stave factory.
Mosser, Fred., laborer.
Myers, Michael, township clerk.
PERINE, J. S., Perine Brothers.
PERINE BROTHERS, Sax mills.
Rannals, John, miller.
Ross, Jacob, painter.
Schiedel, Isaac, general merchant.
Schiedel, Noah, general merchant.
Schunk, Theodore, general merch't.
Seible, Jacob, weaver.
Shuhmaker, John, laborer.
Shultz, John, jr. farmer.
Stattleberger, Henry, tinsmith.
Stepler, Adolf, carpenter.
Streichert, Jacob, laborer.
Stueber, John, mason.
Stulz, Wieand, blacksmith.
Wagler, Christian, sen., farmer.
Wagner, Henry, shoemaker.
Walden, Robert S., clerk.
Waugh, Sam., moulder.
Wehe, John, wood turner.
Weiler, John, carpenter.
Witte, Charles, carpenter.
Zarnski, Wm., cooper.
Zinn, George, carpenter.

**Figure 7:** Excerpt of the Sutherland County of Waterloo Gazeteer and Directory, 1864 noting professions and trades for Baden, Wilmot Twp. (Source: Kitchener Public Library)

According to the Illustrated Historical Atlas of Waterloo County, the main roads and settlement areas of the community of Baden which were established by the Jacob Beck Plan continued to form the basis of the urban fabric.

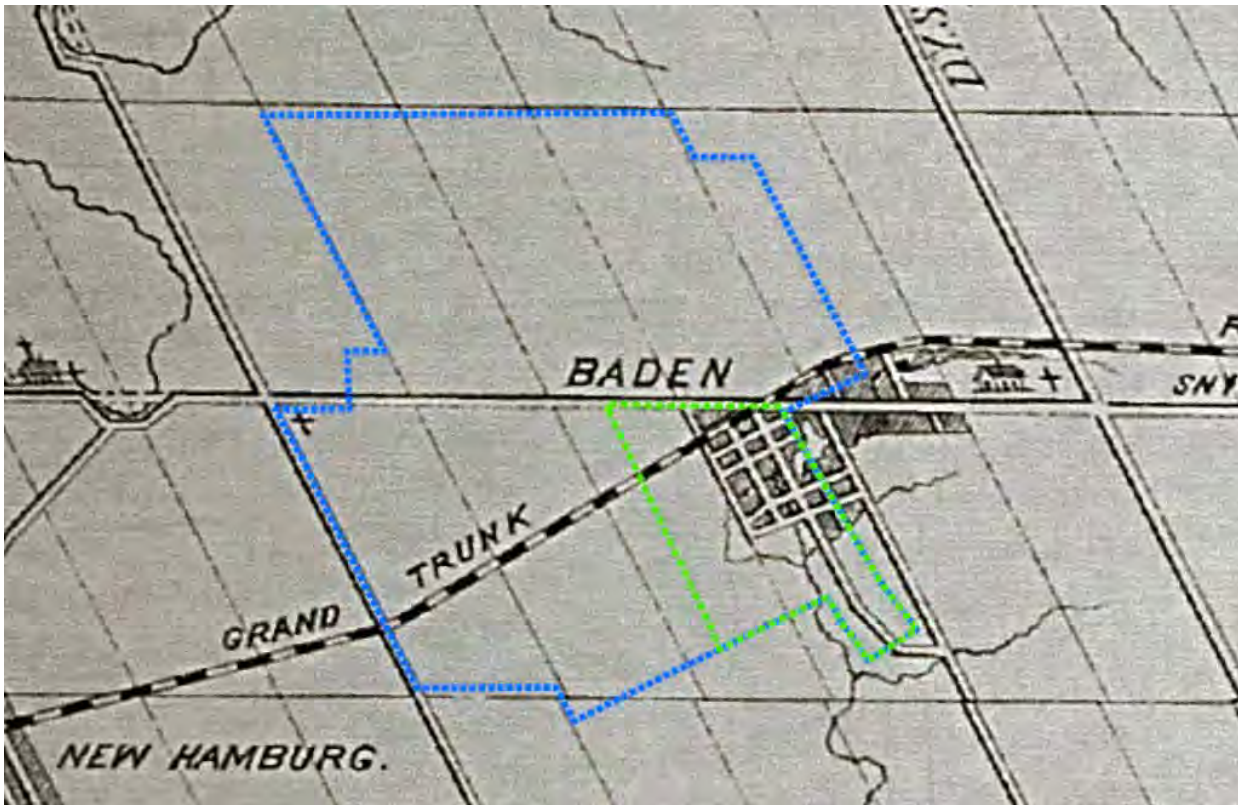



**Figure 8:** Excerpt of Illustrated Historical Atlas of Waterloo County, Wilmot Township. Outline of broader study area noted in blue, detailed study area outlined in green (Source: McGill University, accessed 2021)

According to the 1954 aerial photo of Baden and surrounding areas, the settlement patterns which were historically established by the Jacob Beck Plan continue to the 20th century. Additional developments are seen on the north side of Snyder's Road and along Snyder's Road, east of Foundry Street.




**Figure 9:** Excerpt of the 1954 aerial photo of Baden and surrounding area. Broader study area noted in blue, detailed study area noted in green. (Source: University of Toronto Digital Map Library, accessed 2021)

# 5.0 Description of Proposed Baden Trunk Sanitary Sewer Alternatives

## 5.1 Proposed Alternatives

The Broader Study Area extends from Erbs Road to the north towards Gingerich Road and the Baden Wastewater Pumping Station to the south. The Broader Study Area extends from Nafziger Road to the west to Foundry Street, and extends along the railway corridor turning north near Erhhardt Wagner Place and Kropf Drive. The only Alternative which extends into the broader study area is Alternative 1 (do nothing). The detailed study area can be defined as those lands located along Snyder's Road West between Charlotta Street to the west and Foundry Street to the east. The detailed study area extends south to Gingerich Road and terminates at the Baden Waste Water Pumping Station at 1044 Foundry Street (See Figure below).

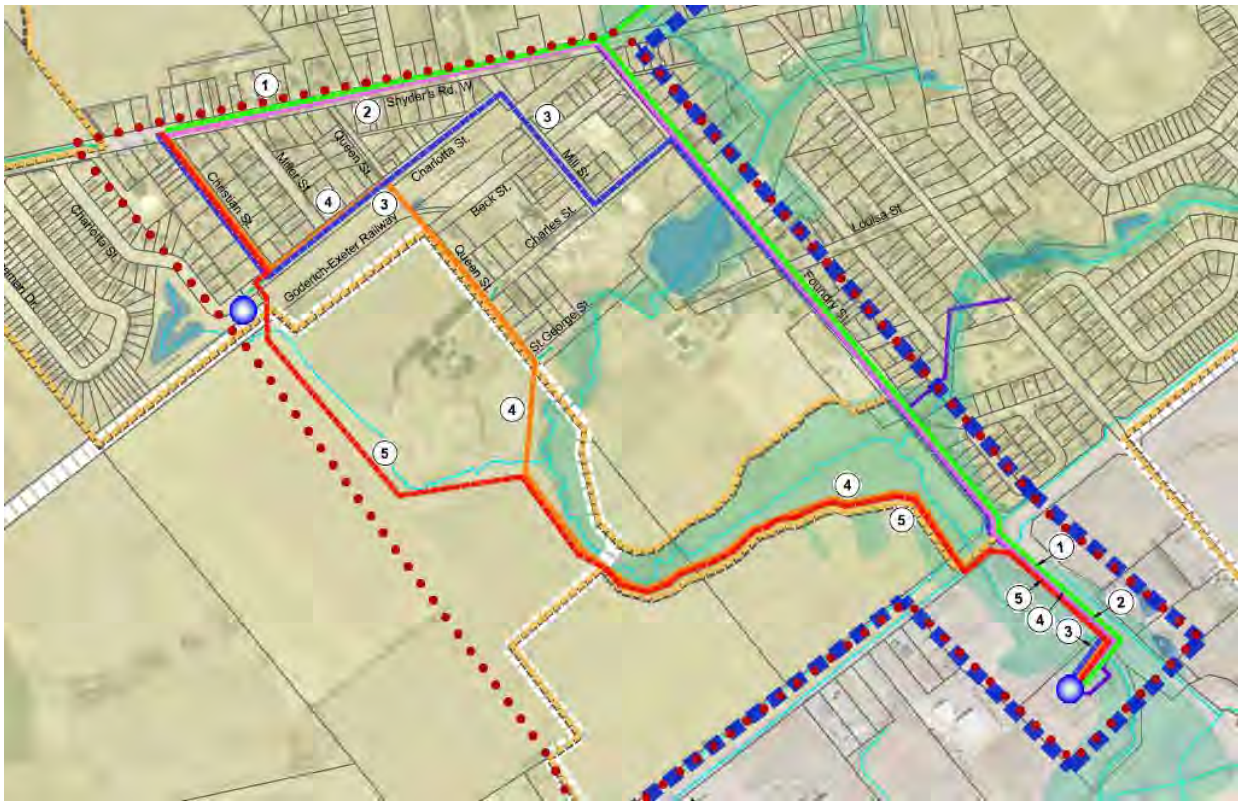



**Figure 10:** Excerpt of Baden Sewer Trunk Alternatives Map, noting "Detailed Study Area" with red dotted line (Source: MTE, 2021)

A map noting the location of the proposed Alternatives for the Baden Trunk Sanitary Were in relation to identified cultural heritage resources is provided in **Appendix B** of this report. The proposed Alternatives for the Baden Trunk Sanitary Sewer are as follows:

| **Alternatives and Descriptions** | **Adjacent to Identified Heritage Resources Located at:** |
|---|---|
| **Alternative 1**<br>*Modified 2014 Environmental Assessment Preferred Alternative (Do Nothing)*<br>• This Alternative examines what may happen if no alternative is selected;<br>• If no alternatives are selected, then the current wastewater strategy of 2014 will be carried out;<br>• This Alternative begins at the north east urban boundary of Baden and runs south west along the railroad and down Foundry Street to the Baden Waste Water Pumping Station. It will also service Snyder's Road West from Foundry Street to Christian Street. | • 76 Mill Street (listed)<br>• 8 Foundry Street (listed)<br>• 60 Snyder's Road W. (Part IV)<br>• 39 Snyder's Road W. (Part IV)<br>• 53 Snyder's Road W. (listed)<br>• 55 Snyder's Road W. (listed) |

| | |
|---|---|
| • This Alternative would require the following:<br>  ○ A pumping station, and a pressure sewer along the eastern Urban Boundary;<br>  ○ A sewer which crosses the railroad at the intersection of Foundry Street and Snyder's Road; and<br>  ○ Upgrading existing sewer and integrating it along the Regional Road. | |
| **Alternative 2**<br>*Snyder's/Foundry (with and without pump station on Activa Lands) Force Main Crossing at Snyder's/Foundry*<br>• Predominantly lies within the existing right-of-way of Snyder's Road West and Foundry Street.<br>• This Alternative would require the following:<br>  ○ Reconstructing large portions of existing road infrastructure;<br>  ○ Crossing the railroad;<br>  ○ Upgrading existing sewers; and<br>  ○ Upgrading and integrating along a Regional Road. | • 60 Snyder's Road West (Part IV)<br>• 39 Snyder's Road West (Part IV)<br>• 55 Snyder's Road West (listed)<br>• 53 Snyder's Road West (listed)<br>• 8 Foundry Street (listed)<br>• 76 Mill Street (listed) |
| **Alternative 3**<br>*Christian/Charlotta/Mill/Charles/Foundry*<br>• Lies within the existing right-of-ways of Christian Street, Charlotta Street, Mil St., Charles Street and Foundry Street.<br>• This Alternative would require the following:<br>  ○ Reconstructing large portions of existing road infrastructure;<br>  ○ Crossing a railroad;<br>  ○ Upgrading existing sewers; and<br>  ○ Upgrading and integrating sewers along a Regional Road. | • 39 Snyder's Road West (Part IV)<br>• 44 Beck Street (Part IV)<br>• 55 Snyder's Road West (listed)<br>• 53 Snyder's Road West (listed)<br>• 75 Charles Street (listed)<br>• 76 Mill Street (listed) |
| **Alternative 4**<br>*Christian/Charlotta/Queen and Baden Creek*<br>• Predominantly lies within the existing right of ways of Christian Street, Charlotta St., Queen Street and Foundry Street.<br>• This Alternative would require the following:<br>  ○ Reconstructing existing Road infrastructure; | • 130 Queen Street (listed) |

| | |
|---|---|
| ○ Crossing a railroad;<br>○ Multiple stream crossings;<br>○ Constructing new sewers;<br>○ Upgrading existing sewers; and<br>○ Upgrading and integrating sewers along a Regional Road. | |
| **Alternative 5**<br>*Christian and Baden Creek*<br>• Predominantly lies within the existing right of ways of Christian Street and Foundry Street.<br>• This Alternative would require the following:<br>○ Reconstructing existing road infrastructure;<br>○ Crossing a railroad;<br>○ A stream crossing;<br>○ Constructing new sewers;<br>○ Upgrading existing sewers; and<br>○ Upgrading and integrating sewers along a Regional Road. | • 130 Queen Street |

# 6.0 Evaluation of Proposed Alternative Routes

## 6.1 Evaluation Criteria

The following sub-sections of this report provide an evaluation of the five proposed alternatives for the Baden Trunk Sanitary Sewer to determine whether or not each of the alternatives is likely to result in adverse impacts to cultural heritage resources identified by the Township of Wilmot.

The following provides a summary of the potential sources of adverse impacts which have been identified in the Ontario Heritage Toolkit:

- **Destruction:** of any, or part of any *significant heritage attributes* or features;
- **Alteration:** that is not sympathetic, or is incompatible, with the historic fabric and appearance:
- **Shadows:** created that alter the appearance of a *heritage attribute* or change the viability of a natural feature or plantings, such as a garden;
- **Isolation:** of a *heritage attribute* from its surrounding environment, context or a significant relationship;
- **Direct or Indirect Obstruction**: of significant views or vistas within, from, or of built and natural features;
- **A change in land use**: such as rezoning a battlefield from open space to residential use, allowing new development or site alteration to fill in the formerly open spaces;
- **Land disturbances:** such as a change in grade that alters soils, and drainage patterns that adversely affect an archaeological resource.

The impacts of a proposed development or change to a cultural heritage resource may be direct or indirect. They may occur over a short term or long term duration, and may occur during a pre-construction phase, construction phase or post-construction phase. Impacts to a cultural heritage resource may also be site specific or widespread, and may have low, moderate or high levels of physical impact.

## 6.2 Evaluation of Alternatives and Identified Cultural Heritage Resources

The following evaluation of each of the Alternatives determines whether or not each Alternative is likely to result in adverse impacts to Cultural Heritage Resources which have been identified by either the Township of Wilmot or the Region of Waterloo. This includes properties listed on the Town of Wilmot Heritage Register, designated under Part IV of the *Ontario Heritage Act*, as well as scenic roads and potential Cultural Heritage Landscapes identified by the Region of Waterloo.

None of the proposed Alternatives are anticipated to result in the removal of any building or feature which has been identified on the Township of Wilmot Heritage Register as being of Cultural Heritage Value or Interest. Alternatives 1, 2, and 3 are located along a right-of-way and are not anticipated to result in adverse impacts related to destruction, alteration, shadows, isolation, direct or indirect obstruction, or a change in land use. Each of the Alternatives considered in this report is related to construction work which is both subterranean and will be undertaken for a limited period of time.

However, Alternatives 1, 2, and 3 are located within close proximity of identified cultural heritage resources and have the potential to result in impacts due to land disturbances and vibrations. The following properties are located adjacent to Alternatives 1, 2, and 3:

- Alternative 1 – close proximity to 8 Foundry Street, 39 Snyder's Road West, 53 Snyder's Road West, and 55 Snyder's Road West.
- Alternative 2 – close proximity to 8 Foundry Street, 55 Snyder's Road West, and 39 Snyder's Road.
- Alternative 3 – close proximity to at 55 Snyder's Road West, 44 Beck Street, 75 Charles Street, 76 Mill Street, and 39 Snyder's Road West.

Alternatives 4 and 5 are the only Alternatives which are partially located within lands currently used as either agricultural fields or floodplains located along Baden Creek. Alternatives 4 and 5 are located adjacent to the property at 130 Queen Street, which is listed on the Township of Wilmot Heritage Register. A review of the description of 130 Queen Street provided in the Township's Heritage Register identifies that the property is of cultural heritage value or interest for the existing Georgian style dwelling which was formerly part of an agricultural farm complex. Regional mapping data identifies that this property has been severed, whereby the dwelling has been separated from the surrounding agricultural lands and the property now functions as a residential lot. The Register does not identify any features of the property which are of CHVI other than the existing dwelling. Historical mapping and aerial images for the detailed study identifies that the former farm complex included a barn and accessory buildings. The barn, as well as an existing dwelling and accessory building are visible on the 1954 aerial photo (see below).




**Figure 11:** Detail of the 1954 aerial photo of Baden and surrounding area. Approximate location of existing dwelling and accessory structure and former barn noted with arrows. (Source: University of Toronto Digital Map Library, accessed 2021)

Land information available from the Region of Waterloo identifies that the current limits of 130 Queen Street includes the existing dwelling and landscaped open space. This property no longer includes the lands which formerly included a barn and the existing accessory structure. The aerial photograph provided below demonstrates that Alternatives 4 and 5 are sited away from any existing built features, including the accessory structure formerly associated with the farm complex at 130 Queen Street.

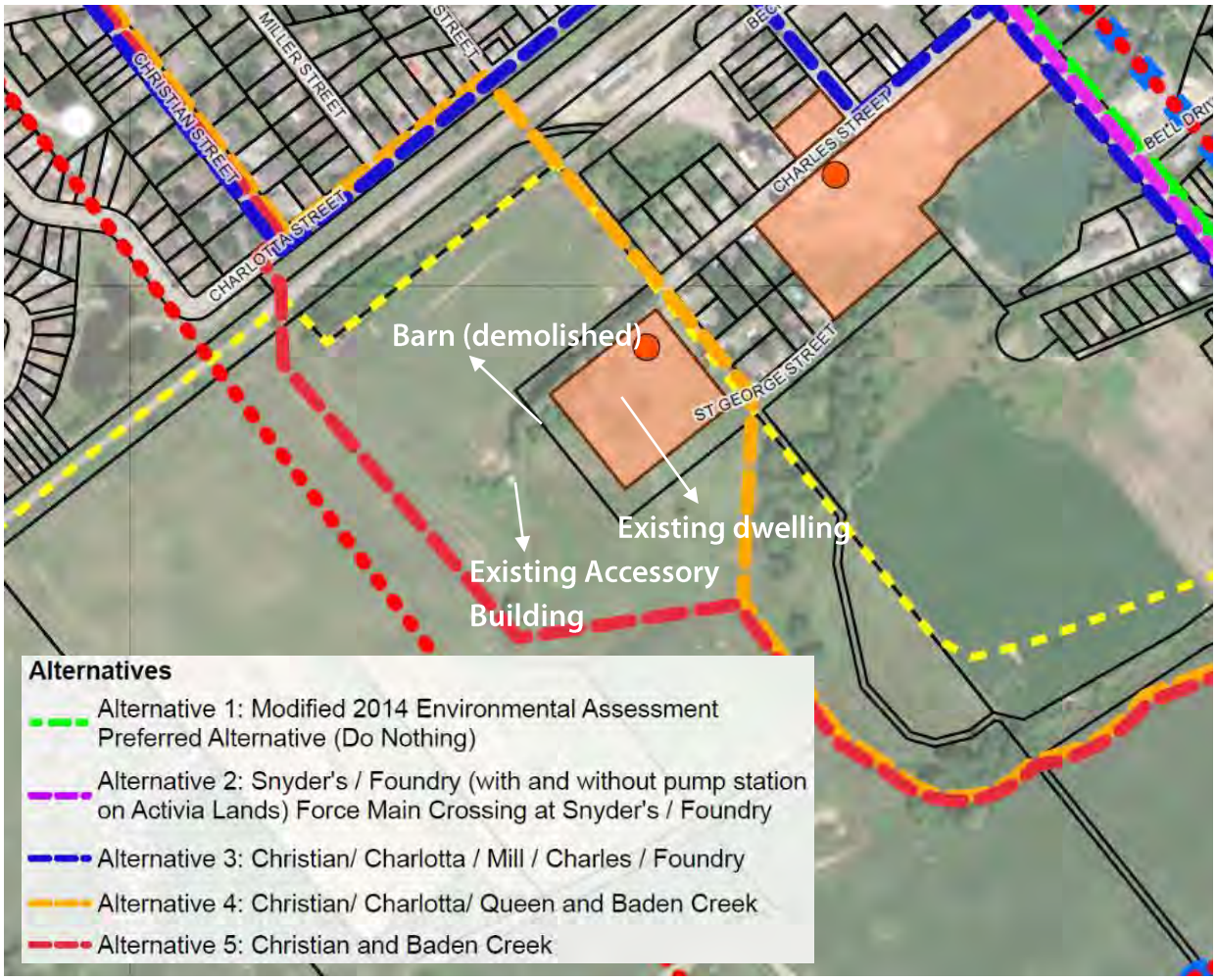



**Figure 12:** Detail of Heritage Status and Baden Trunk Sanitary Sewer Alternatives Map. Approximate location of existing dwelling and accessory structure and former barn noted with arrows. Alternative route 5 noted with red dashed line. Alternative route 4 noted with orange dashed line. (Source: MHBC, 2021)

## 6.3 Evaluation of Alternatives and the proposed Cultural Heritage Landscape and Scenic Roads (Snyder's Road and Foundry Street)

Each of the Alternatives has the potential to result in adverse impacts should the Preferred Alternative going forward include plans for road reconstruction that changes the existing road profile and character. Currently, there are no plans for road reconstruction related to the Baden Trunk Sanitary Sewer. However, it is possible that when preferred Alternative is selected, it is combined with Regional or Township road improvement projects.

Alternatives 1, 2, and 3 are located along the identified scenic roads of Snyder's Road and Foundry Street. Alternatives 4 and 5 are partially located along historic side streets which do not currently include curbs, gutters, etc. The existing street fabric forms part of the character of this part of Baden. This includes street widths, grassed boulevards with mature trees, for example. The reconstruction of streets to an urban standard could change their character. While the specific character and defining attributes of the CHL have yet to be identified, the existing side-streets that were established in the mid. 19th century could be identified as cultural heritage attributes as part of the Region of Waterloo Cultural Heritage Landscape Study.

# 7.0 Conclusions and recommendations

## 7.1 Summary of Conclusions and Mitigation Recommendations:

None of the Alternatives considered in this report are likely to result in the removal of identified cultural heritage resources given that the construction associated with the sewer for all of the Alternatives are either located within the road right-of-way, or are located considerable distance away from identified cultural heritage resources. Similarly, there are likely to be additional (i.e. unidentified) cultural heritage resources within the detailed study area which are located adjacent to the various Alternatives considered in this report. These are also not likely to be impacted given that these Alternatives are located within the road right-of-way. The only Alternatives which are located outside of the right-of-way are Alternatives 4 and 5. In both cases, the construction is sited away from the dwelling of CHVI at 130 Queen Street as well as an existing accessory structure which has been severed from 130 Queen Street.

This report acknowledges that none of the Alternatives are currently associated with any Township or Regional road improvements or infrastructure projects. However, the Region of Waterloo has identified that Baden is a potential Cultural Heritage Landscape, and Foundry Street and Snyder's Road have been identified as scenic roads. Further, the project meets the criteria of the Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes Checklist of the Ministry of Heritage, Sport, Tourism and Culture Industries (see Appendix C). As a result of the aforementioned, it is recommended that a Heritage Impact Assessment be prepared should construction of the preferred sewer alignment be coordinated with road reconstruction and the design of the sewer has the effect of changing the profile or character of streets and roads which are either scenic (i.e. Foundry Street and Snyder's Road) or heritage attributes identified in the forthcoming Cultural Heritage Landscape Study of the Region of Waterloo.

# 8.0 References

H. Parsell & Co., *Illustrated Historical Atlas of Waterloo & Wellington Counties Ontario,* 1881

History of Wilmot Township, Township webpage, accessed online at http://www.wilmot.ca/en/living-here/History-of-Wilmot-Township.aspx

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Waterloo Historic Countryside Tour 3 -

*Accessed online at https://www.regionofwaterloo.ca/en/exploring-the-region/resources/Documents/2014_Wilmot_To*

*ur_3_Access.pdf*

# Appendix **A** – Map of Broader and Local Study Area and Alternatives

## LEGEND

- PROPERTY LINE
- EXISTING SANITARY TRUNK
- EXISTING SANITARY FORCEMAIN
- 326 EXISTING 2015 GRCA CONTOURS
- DRAINAGE TO FOUNDRY STREET TRUNK SEWER
- DRAINAGE BY GRAVITY TO NAFZIGER ROAD TRUNK SEWER
- DRAINAGE TO FOREST GLEN WWPS
- DRAINAGE TO WILMOT EMPLOYMENT LANDS TRUNK SEWER
- LANDS NOT TO BE DEVELOPED
- GRCA REGULATORY FLOODPLAIN
- GRCA EXISTING WATERBODY
- GRCA EXISTING WATERCOURSE
- TOWNSHIP URBAN AREA
- COUNTRYSIDE LINE
- PRIMARY STUDY AREA
- DETAILED STUDY AREA
- PROPOSED WASTEWATER PUMPING STATION
- EXISTING WASTEWATER PUMPING STATION

### ALTERNATIVES

1. MODIFIED 2014 ENVIRONMENTAL ASSESSMENT PREFERRED ALTERNATIVE (DO NOTHING)
2. SNYDER'S/FOUNDRY (with and without pump station on Activa Lands) FORCE MAIN CROSSING AT SNYDER'S/FOUNDRY
3. CHRISTIAN/CHARLOTTA/MILL/ CHARLES/FOUNDRY
4. CHRISTIAN/CHARLOTTA/QUEEN AND BADEN CREEK
5. CHRISTIAN AND BADEN CREEK

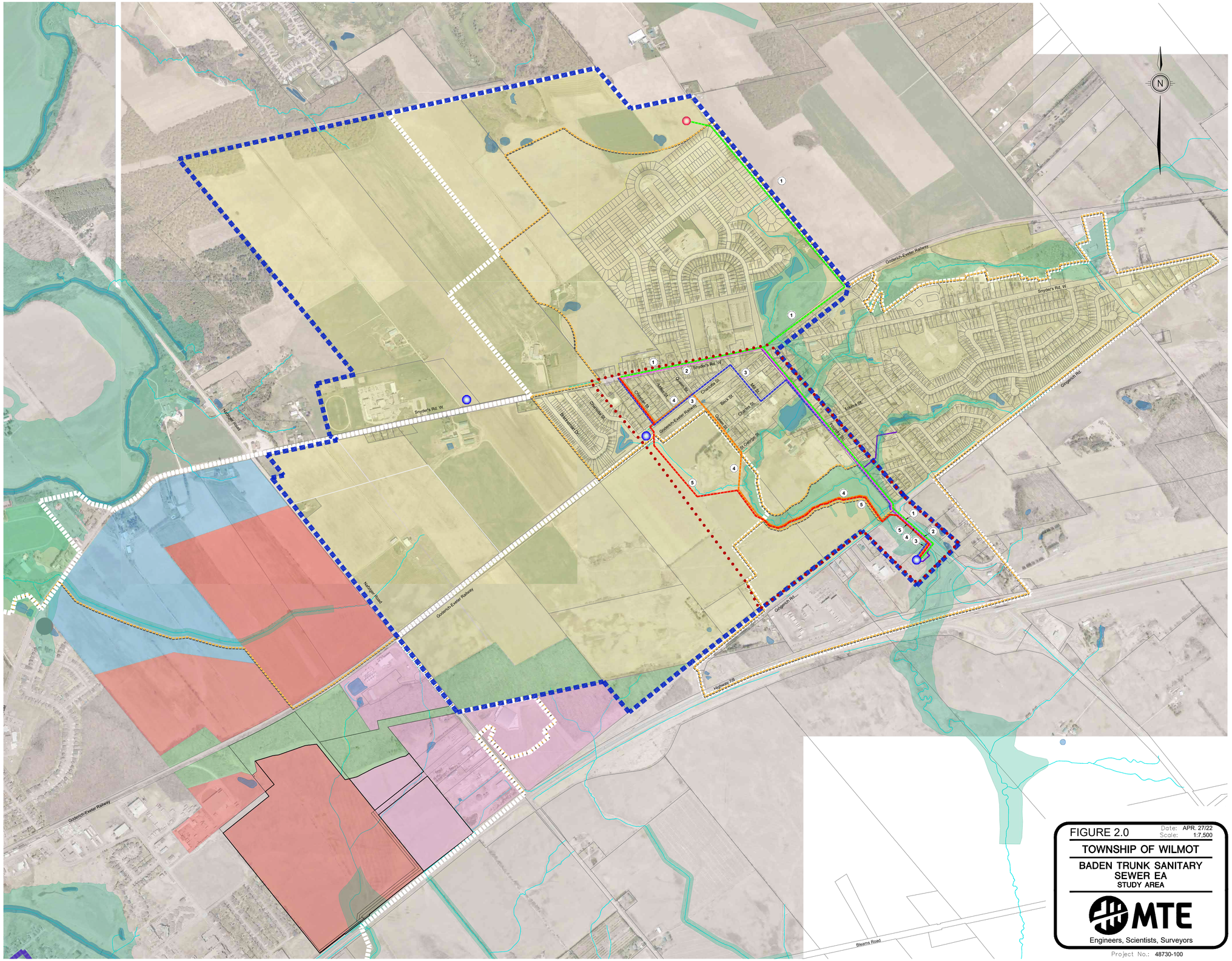


FIGURE 2.0

Date: APR. 27/22
Scale: 1:7,500

**TOWNSHIP OF WILMOT**

**BADEN TRUNK SANITARY SEWER EA**
**STUDY AREA**

MTE
Engineers, Scientists, Surveyors

Project No.: 48730-100

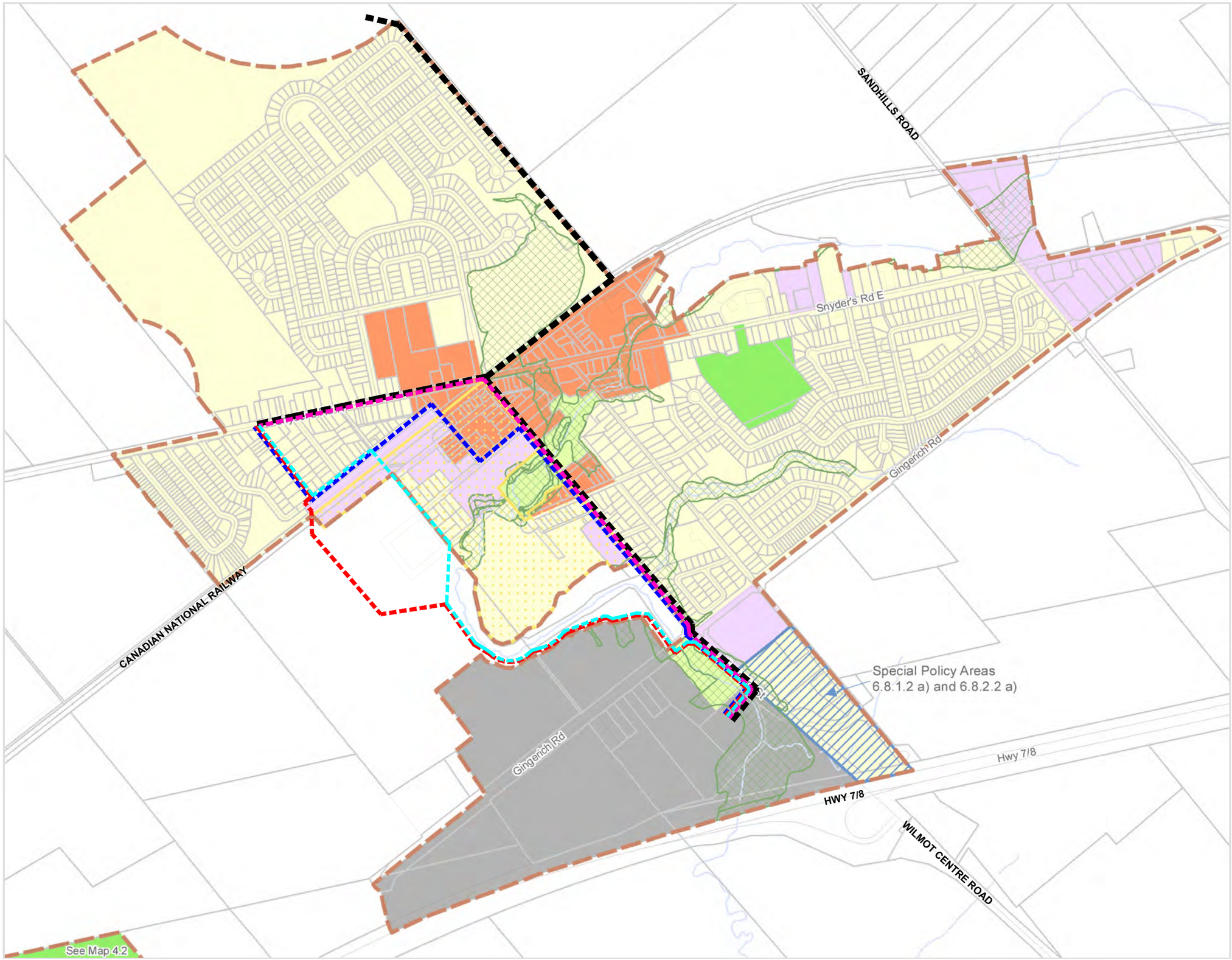


Figure 1:
Sewer Alternatives Overlaid on
Township of Wilmot Official Plan (2019):
**Map 4.1 Baden Urban Area**

**Township of Baden**
Township of Wilmot
Region of Waterloo

**LEGEND**

Sewer Alternatives

- Alternative 1: Modified 2014 Environmental Assessment Preferred Alternative (Do Nothing)
- Alternative 2: Snyder's / Foundry (with and without pump station on Activa Lands) Force Main Crossing at Snyder's / Foundry
- Alternative 3: Christain/ Charlotta / Mill / Charles / Foundry
- Alternative 4: Christian/ Charlotta/ Queen and Baden Creek
- Alternative 5: Christain and Baden Creek

- Urban Area Boundary
- Urban Growth Centre Overlay
- Environmentally Constrained Lands
- Special Policy Areas
- Urban Residential
- Urban Core Area
- General Industrial
- Light Industrial
- Open Space
- Major Recreation

**Notes:**
• For information purposes only
• Source: Parcel data from Region of Waterloo and Teranet Land Information Services and its licensors (2019); Map from Township of Wilmot (2019), Sewer Alternatives from Township of Wilmot (2022)

**DATE:** May 2, 2022
**FILE:** 0941CD
**SCALE:** 1: 10,000
**DRAWN:** CCF

north

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Figure 2:
Sewer Alternatives Overlaid on
Township of Wilmot Official Plan (2019):
**Map 10 The Countryside**

**Township of Baden**
Township of Wilmot
Region of Waterloo

**LEGEND**

Sewer Alternatives

- Alternative 1: Modified 2014 Environmental Assessment Preferred Alternative (Do Nothing)
- Alternative 2: Snyder's / Foundry (with and without pump station on Activa Lands) Force Main Crossing at Snyder's / Foundry
- Alternative 3: Christain/ Charlotta / Mill / Charles / Foundry
- Alternative 4: Christian/ Charlotta/ Queen and Baden Creek
- Alternative 5: Christain and Baden Creek

- Countryside Line
- Protected Countryside
- Rural Areas*
- Prime Agricultural
- Urban Areas / Rural Settlement Areas

**Notes:**
• For information purposes only
• Source: Parcel data from Region of Waterloo and Teranet Land Information Services and its licensors (2019); Map from Township of Wilmot (2019), Sewer Alternatives from Township of Wilmot (2022)

**DATE:** May 2, 2022
**FILE:** 0941CD
**SCALE:** 1: 10,000
**DRAWN:** CCF

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# Appendix **B** – Map of Cultural Heritage Properties identified by the Township of Wilmot in Relation to the Broader and Local Study Areas

2

- Designated Part IV
- Listed on the Register
- Primary Study Area
- Detailed Study Area
- Baden Boundary
- Property Parcels

**Heritage Type**

- Designated Part IV
- Listed on the Register

**Alternatives**

- Alternative 1: Modified 2014 Environmental Assessment Preferred Alternative (Do Nothing)
- Alternative 2: Snyder's / Foundry (with and without pump station on Activia Lands) Force Main Crossing at Snyder's / Foundry
- Alternative 3: Christian/ Charlotta / Mill / Charles / Foundry
- Alternative 4: Christian/ Charlotta/ Queen and Baden Creek
- Alternative 5: Christian and Baden Creek

Source: Aerial from Esri and Maxar 2022, Parcel data from Region of Waterloo and Teranet Land Information Services and its licensors (2019); Sewer Alternatives from Township of Wilmot (2022)

250 125 0 250 500 750 1,000 Meters

# Baden Heritage Properties and Trunk Sanitary Sewer EA

# Appendix **C** - Ministry of Tourism, Culture and Sport Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes Checklist

Ontario

**Ministry of Tourism, Culture and Sport**

Programs & Services Branch
401 Bay Street, Suite 1700
Toronto ON M7A 0A7

# Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes

**A Checklist for the Non-Specialist**

The **purpose of the checklist** is to determine:

- if a property(ies) or project area:
  - is a recognized heritage property
  - may be of cultural heritage value
- it includes all areas that may be impacted by project activities, including – but not limited to:
  - the main project area
  - temporary storage
  - staging and working areas
  - temporary roads and detours

**Processes covered** under this checklist, such as:

- *Planning Act*
- *Environmental Assessment Act*
- *Aggregates Resources Act*
- *Ontario Heritage Act* – Standards and Guidelines for Conservation of Provincial Heritage Properties

**Cultural Heritage Evaluation Report (CHER)**

If you are not sure how to answer one or more of the questions on the checklist, you may want to hire a qualified person(s) (see page 5 for definitions) to undertake a cultural heritage evaluation report (CHER).

The CHER will help you:

- identify, evaluate and protect cultural heritage resources on your property or project area
- reduce potential delays and risks to a project

**Other checklists**

Please use a separate checklist for your project, if:

- you are seeking a Renewable Energy Approval under Ontario Regulation 359/09 – separate checklist
- your Parent Class EA document has an approved screening criteria (as referenced in Question 1)

Please refer to the Instructions pages for more detailed information and when completing this form.

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Project or Property Name
Baden Trunk Sanitary Sewer

Project or Property Location (upper and lower or single tier municipality)
Township of Wilmot

Proponent Name
Township of Wilmot

Proponent Contact Information
n/a

## Screening Questions

| | Yes | No |
|---|---|---|
| 1. Is there a pre-approved screening checklist, methodology or process in place? | ☐ | ☑ |

**If Yes,** please follow the pre-approved screening checklist, methodology or process.

**If No,** continue to Question 2.

## Part A: Screening for known (or recognized) Cultural Heritage Value

| | Yes | No |
|---|---|---|
| 2. Has the property (or project area) been evaluated before and found **not** to be of cultural heritage value? | ☐ | ☑ |

**If Yes,** do **not** complete the rest of the checklist.

The proponent, property owner and/or approval authority will:

- summarize the previous evaluation and
- add this checklist to the project file, with the appropriate documents that demonstrate a cultural heritage evaluation was undertaken

The summary and appropriate documentation may be:

- submitted as part of a report requirement
- maintained by the property owner, proponent or approval authority

**If No**, continue to Question 3.

| | Yes | No |
|---|---|---|
| 3. Is the property (or project area): | | |
| a. identified, designated or otherwise protected under the *Ontario Heritage Act* as being of cultural heritage value? | ☑ | ☐ |
| b. a National Historic Site (or part of)? | ☑ | ☐ |
| c. designated under the *Heritage Railway Stations Protection Act*? | ☐ | ☑ |
| d. designated under the *Heritage Lighthouse Protection Act*? | ☐ | ☑ |
| e. identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office (FHBRO)? | ☐ | ☑ |
| f. located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site? | ☐ | ☑ |

**If Yes** to any of the above questions, you need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report, if a Statement of Cultural Heritage Value has not previously been prepared or the statement needs to be updated

If a Statement of Cultural Heritage Value has been prepared previously and if alterations or development are proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

**If No**, continue to Question 4.

## Part B: Screening for Potential Cultural Heritage Value

| | Yes | No |
|---|---|---|
| 4. Does the property (or project area) contain a parcel of land that: | | |
| a. is the subject of a municipal, provincial or federal commemorative or interpretive plaque? | ☑ | ☐ |
| b. has or is adjacent to a known burial site and/or cemetery? | ☑ | ☐ |
| c. is in a Canadian Heritage River watershed? | ☐ | ☑ |
| d. contains buildings or structures that are 40 or more years old? | ☑ | ☐ |

## Part C: Other Considerations

| | Yes | No |
|---|---|---|
| 5. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area): | | |
| a. is considered a landmark in the local community or contains any structures or sites that are important in defining the character of the area? | ☐ | ☑ |
| b. has a special association with a community, person or historical event? | ☑ | ☐ |
| c. contains or is part of a cultural heritage landscape? | ☑ | ☐ |

**If Yes** to one or more of the above questions (Part B and C), there is potential for cultural heritage resources on the property or within the project area.

You need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report (CHER)

If the property is determined to be of cultural heritage value and alterations or development is proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

**If No** to all of the above questions, there is low potential for built heritage or cultural heritage landscape on the property.

The proponent, property owner and/or approval authority will:

- summarize the conclusion
- add this checklist with the appropriate documentation to the project file

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g. under the *Environmental Assessment Act, Planning Act* processes
- maintained by the property owner, proponent or approval authority

## Instructions

Please have the following available, when requesting information related to the screening questions below:

- a clear map showing the location and boundary of the property or project area
  - large scale and small scale showing nearby township names for context purposes
- the municipal addresses of all properties within the project area
- the lot(s), concession(s), and parcel number(s) of all properties within a project area

For more information, see the Ministry of Tourism, Culture and Sport's Ontario Heritage Toolkit or Standards and Guidelines for Conservation of Provincial Heritage Properties.

In this context, the following definitions apply:

- **qualified person(s)** means individuals – professional engineers, architects, archaeologists, etc. – having relevant, recent experience in the conservation of cultural heritage resources.
- **proponent** means a person, agency, group or organization that carries out or proposes to carry out an undertaking or is the owner or person having charge, management or control of an undertaking.

### 1. Is there a pre-approved screening checklist, methodology or process in place?

An existing checklist, methodology or process may already be in place for identifying potential cultural heritage resources, including:

- one endorsed by a municipality
- an environmental assessment process e.g. screening checklist for municipal bridges
- one that is approved by the Ministry of Tourism, Culture and Sport (MTCS) under the Ontario government's Standards & Guidelines for Conservation of Provincial Heritage Properties [s.B.2.]

## Part A: Screening for known (or recognized) Cultural Heritage Value

### 2. Has the property (or project area) been evaluated before and found not to be of cultural heritage value?

Respond 'yes' to this question, **if all** of the following are true:

A property can be considered not to be of cultural heritage value if:

- a Cultural Heritage Evaluation Report (CHER) - or equivalent - has been prepared for the property with the advice of a qualified person and it has been determined not to be of cultural heritage value and/or
- the municipal heritage committee has evaluated the property for its cultural heritage value or interest and determined that the property is not of cultural heritage value or interest

A property may need to be re-evaluated, if:

- there is evidence that its heritage attributes may have changed
- new information is available
- the existing Statement of Cultural Heritage Value does not provide the information necessary to manage the property
- the evaluation took place after 2005 and did not use the criteria in Regulations 9/06 and 10/06

**Note**: Ontario government ministries and public bodies [prescribed under Regulation 157/10] may continue to use their existing evaluation processes, until the evaluation process required under section B.2 of the Standards & Guidelines for Conservation of Provincial Heritage Properties has been developed and approved by MTCS.

To determine if your property or project area has been evaluated, contact:

- the approval authority
- the proponent
- the Ministry of Tourism, Culture and Sport

### 3a. Is the property (or project area) identified, designated or otherwise protected under the *Ontario Heritage Act* as being of cultural heritage value e.g.:

i. designated under the *Ontario Heritage Act*

- individual designation (Part IV)
- part of a heritage conservation district (Part V)

**Individual Designation – Part IV**

A property that is designated:

- by a municipal by-law as being of cultural heritage value or interest [s.29 of the *Ontario Heritage Act*]
- by order of the Minister of Tourism, Culture and Sport as being of cultural heritage value or interest of provincial significance [s.34.5]. **Note**: To date, no properties have been designated by the Minister.

**Heritage Conservation District – Part V**

A property or project area that is located within an area designated by a municipal by-law as a heritage conservation district [s. 41 of the *Ontario Heritage Act*].

For more information on Parts IV and V, contact:

- municipal clerk
- Ontario Heritage Trust
- local land registry office (for a title search)

---

ii. subject of an agreement, covenant or easement entered into under Parts II or IV of the *Ontario Heritage Act*

An agreement, covenant or easement is usually between the owner of a property and a conservation body or level of government. It is usually registered on title.

The primary purpose of the agreement is to:

- preserve, conserve, and maintain a cultural heritage resource
- prevent its destruction, demolition or loss

For more information, contact:

- Ontario Heritage Trust - for an agreement, covenant or easement [clause 10 (1) (c) of the *Ontario Heritage Act*]
- municipal clerk – for a property that is the subject of an easement or a covenant [s.37 of the *Ontario Heritage Act*]
- local land registry office (for a title search)

---

iii. listed on a register of heritage properties maintained by the municipality

Municipal registers are the official lists - or record - of cultural heritage properties identified as being important to the community.

Registers include:

- all properties that are designated under the *Ontario Heritage Act* (Part IV or V)
- properties that have not been formally designated, but have been identified as having cultural heritage value or interest to the community

For more information, contact:

- municipal clerk
- municipal heritage planning staff
- municipal heritage committee

---

iv. subject to a notice of:

- intention to designate (under Part IV of the *Ontario Heritage Act*)
- a Heritage Conservation District study area bylaw (under Part V of the *Ontario Heritage Act*)

A property that is subject to a **notice of intention to designate** as a property of cultural heritage value or interest and the notice is in accordance with:

- section 29 of the *Ontario Heritage Act*
- section 34.6 of the *Ontario Heritage Act*. **Note**: To date, the only applicable property is Meldrum Bay Inn, Manitoulin Island. [s.34.6]

An area designated by a municipal by-law made under section 40.1 of the *Ontario Heritage Act* as a **heritage conservation district study area**.

For more information, contact:

- municipal clerk – for a property that is the subject of notice of intention [s. 29 and s. 40.1]
- Ontario Heritage Trust

---

v. included in the Ministry of Tourism, Culture and Sport's list of provincial heritage properties

Provincial heritage properties are properties the Government of Ontario owns or controls that have cultural heritage value or interest.

The Ministry of Tourism, Culture and Sport (MTCS) maintains a list of all provincial heritage properties based on information provided by ministries and prescribed public bodies. As they are identified, MTCS adds properties to the list of provincial heritage properties.

For more information, contact the MTCS Registrar at registrar@ontario.ca.

**3b. Is the property (or project area) a National Historic Site (or part of)?**

National Historic Sites are properties or districts of national historic significance that are designated by the Federal Minister of the Environment, under the *Canada National Parks Act*, based on the advice of the Historic Sites and Monuments Board of Canada.

For more information, see the National Historic Sites website.

**3c. Is the property (or project area) designated under the *Heritage Railway Stations Protection Act*?**

The *Heritage Railway Stations Protection Act* protects heritage railway stations that are owned by a railway company under federal jurisdiction. Designated railway stations that pass from federal ownership may continue to have cultural heritage value.

For more information, see the Directory of Designated Heritage Railway Stations.

**3d. Is the property (or project area) designated under the *Heritage Lighthouse Protection Act*?**

The *Heritage Lighthouse Protection Act* helps preserve historically significant Canadian lighthouses. The Act sets up a public nomination process and includes heritage building conservation standards for lighthouses which are officially designated.

For more information, see the Heritage Lighthouses of Canada website.

**3e. Is the property (or project area) identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office?**

The role of the Federal Heritage Buildings Review Office (FHBRO) is to help the federal government protect the heritage buildings it owns. The policy applies to all federal government departments that administer real property, but not to federal Crown Corporations.

For more information, contact the Federal Heritage Buildings Review Office.

See a directory of all federal heritage designations.

**3f. Is the property (or project area) located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site?**

A UNESCO World Heritage Site is a place listed by UNESCO as having outstanding universal value to humanity under the Convention Concerning the Protection of the World Cultural and Natural Heritage. In order to retain the status of a World Heritage Site, each site must maintain its character defining features.

Currently, the Rideau Canal is the only World Heritage Site in Ontario.

For more information, see Parks Canada – World Heritage Site website.

## Part B: Screening for potential Cultural Heritage Value

**4a. Does the property (or project area) contain a parcel of land that has a municipal, provincial or federal commemorative or interpretive plaque?**

Heritage resources are often recognized with formal plaques or markers.

Plaques are prepared by:

- municipalities
- provincial ministries or agencies
- federal ministries or agencies
- local non-government or non-profit organizations

For more information, contact:

- municipal heritage committees or local heritage organizations – for information on the location of plaques in their community
- Ontario Historical Society's Heritage directory – for a list of historical societies and heritage organizations
- Ontario Heritage Trust – for a list of plaques commemorating Ontario's history
- Historic Sites and Monuments Board of Canada – for a list of plaques commemorating Canada's history

**4b. Does the property (or project area) contain a parcel of land that has or is adjacent to a known burial site and/or cemetery?**

For more information on known cemeteries and/or burial sites, see:

- Cemeteries Regulations, Ontario Ministry of Consumer Services – for a database of registered cemeteries
- Ontario Genealogical Society (OGS) – to locate records of Ontario cemeteries, both currently and no longer in existence; cairns, family plots and burial registers
- Canadian County Atlas Digital Project – to locate early cemeteries

In this context, adjacent means contiguous or as otherwise defined in a municipal official plan.

**4c. Does the property (or project area) contain a parcel of land that is in a Canadian Heritage River watershed?**

The Canadian Heritage River System is a national river conservation program that promotes, protects and enhances the best examples of Canada's river heritage.

Canadian Heritage Rivers must have, and maintain, outstanding natural, cultural and/or recreational values, and a high level of public support.

For more information, contact the Canadian Heritage River System.

If you have questions regarding the boundaries of a watershed, please contact:

- your conservation authority
- municipal staff

**4d. Does the property (or project area) contain a parcel of land that contains buildings or structures that are 40 or more years old?**

A 40 year 'rule of thumb' is typically used to indicate the potential of a site to be of cultural heritage value. The approximate age of buildings and/or structures may be estimated based on:

- history of the development of the area
- fire insurance maps
- architectural style
- building methods

Property owners may have information on the age of any buildings or structures on their property. The municipality, local land registry office or library may also have background information on the property.

**Note:** 40+ year old buildings or structure do not necessarily hold cultural heritage value or interest; their age simply indicates a higher potential.

A building or structure can include:

- residential structure
- farm building or outbuilding
- industrial, commercial, or institutional building
- remnant or ruin
- engineering work such as a bridge, canal, dams, etc.

For more information on researching the age of buildings or properties, see the Ontario Heritage Tool Kit Guide Heritage Property Evaluation.

## Part C: Other Considerations

**5a. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) is considered a landmark in the local community or contains any structures or sites that are important to defining the character of the area?**

Local or Aboriginal knowledge may reveal that the project location is situated on a parcel of land that has potential landmarks or defining structures and sites, for instance:

- buildings or landscape features accessible to the public or readily noticeable and widely known
- complexes of buildings
- monuments
- ruins

**5b. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) has a special association with a community, person or historical event?**

Local or Aboriginal knowledge may reveal that the project location is situated on a parcel of land that has a special association with a community, person or event of historic interest, for instance:

- Aboriginal sacred site
- traditional-use area
- battlefield
- birthplace of an individual of importance to the community

**5c. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) contains or is part of a cultural heritage landscape?**

Landscapes (which may include a combination of archaeological resources, built heritage resources and landscape elements) may be of cultural heritage value or interest to a community.

For example, an Aboriginal trail, historic road or rail corridor may have been established as a key transportation or trade route and may have been important to the early settlement of an area. Parks, designed gardens or unique landforms such as waterfalls, rock faces, caverns, or mounds are areas that may have connections to a particular event, group or belief.

For more information on Questions 5.a., 5.b. and 5.c., contact:

- Elders in Aboriginal Communities or community researchers who may have information on potential cultural heritage resources. Please note that Aboriginal traditional knowledge may be considered sensitive.
- municipal heritage committees or local heritage organizations
- Ontario Historical Society's "Heritage Directory" - for a list of historical societies and heritage organizations in the province

An internet search may find helpful resources, including:

- historical maps
- historical walking tours
- municipal heritage management plans
- cultural heritage landscape studies
- municipal cultural plans

Information specific to trails may be obtained through Ontario Trails.

# Appendix **D** – Photo Map

## Photo Map – Aerial Photo of Broad and Local Study Areas (Baden Trunk Sanitary Sewer)





Photos 1 & 2: (left) View of Steinmann Mennonite Church at 1316 Snyder's Road West, looking north from south side of Snyder's Road West, (right) View of driveway providing access to 1138 Snyder's Road West, looking north-east from north side of Snyder's Road West, (Source: MHBC, 2021)





Photos 3 & 4: (left) View of agricultural fields looking north-west towards 1138 Snyder's Road West from north side of Snyder's Road West, (right) View of Snyder's Road West looking east towards Baden Water Tower, (Source: MHBC, 2021)




Photos 5 & 6: (left) View of boundary of Baden Boundary looking south from north side of Snyder's Road West, (right) View of Baden Boundary looking north from south side of Snyder's Road West, (Source: MHBC, 2021)




Photos 7 & 8: (left) View of Christian Street looking south along Sewer Trunk Alternatives 3, 4, and 5 (right) View of Snyder's Road West looking east from Christian Street along Sewer Trunk Alternative 3, (Source: MHBC, 2021)



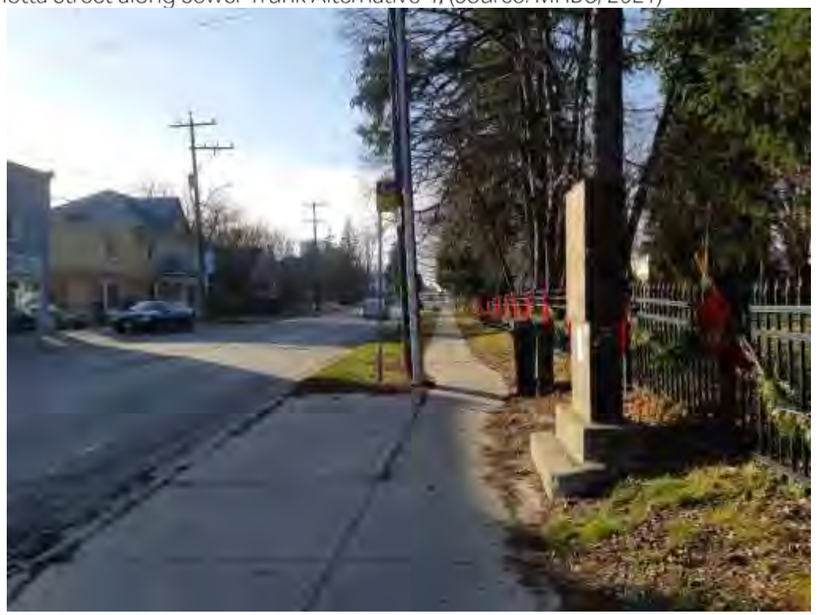

Photos 9 & 10: (left) View of railway looking south from intersection of Christian Street and Charlotta Street, (right) View of Charlotta Street looking east towards Miller Street along Sewer Trunk Alternatives 3 and 4, (Source: MHBC, 2021)




Photos 11 & 12: (left) View of railway looking south-east from Charlotta Street, (right) View of agricultural fields looking south across railway towards Sewer Trunk Alternatives 4 and 5, (Source: MHBC, 2021)




Photos 13 & 14: (left) View of Charlotta Street looking east towards Mill Street along Sewer Trunk Alternative 3, (right) View of railway, looking south towards historic mill buildings from Charlotta Street along Sewer Trunk Alternative 4, (Source: MHBC, 2021)




Photos 15 & 16: (left) View of Snyder's Road West looking west at 60 Snyder's Road West (Castle Kilbride) from north side of Snyder's Road West along Sewer Trunk Alternative No. 2(right) View of Snyder's Road West looking east at 60 Snyder's Road West (Castle Kilbride) from north side of Snyder's Road West along Sewer Trunk Alternative No. 2, (Source: MHBC, 2021)




Photos 17 & 18: (left) View of 39 Snyder's Road West looking south from 60 Snyder's Road west along Mill Street, (right) View of 53 Snyder's Road West and 55 Snyder's Road West looking south from 60 Snyder's Road West, (Source: MHBC, 2021)




Photos 19 & 20: (left) View of Livingston Presbyterian Church at 44 Beck Street looking north-east from south-west corner of Beck Street and Mill Street, (right) View of Mill Street looking north along Sewer Trunk Alternative 3, (Source: MHBC, 2021)



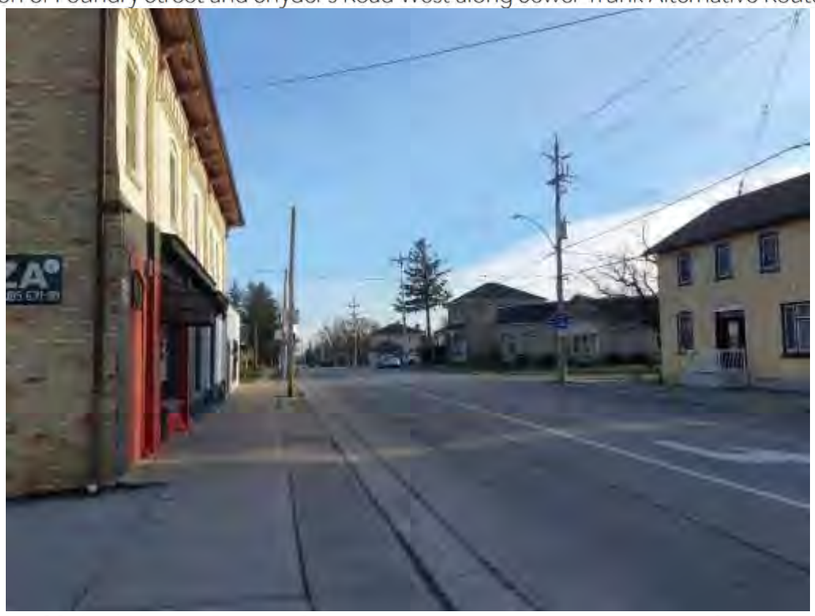
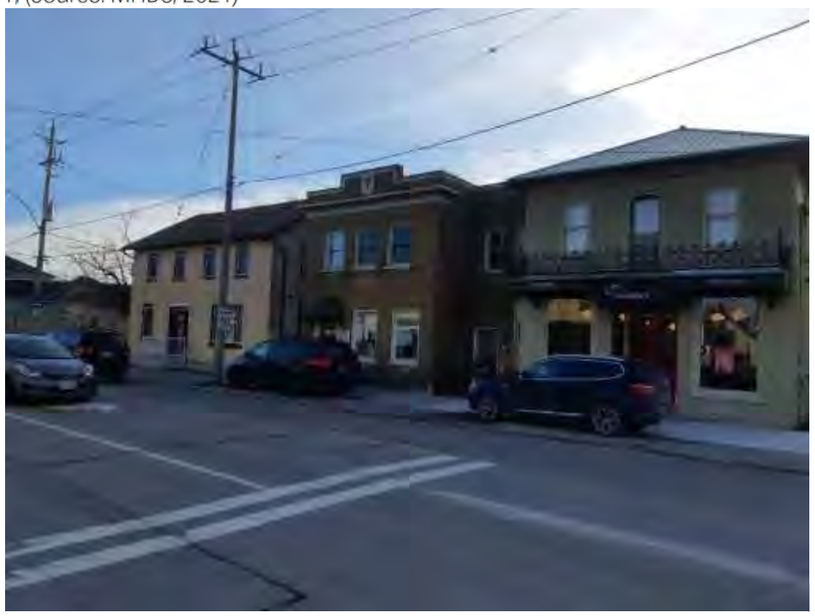

Photos 21 & 22: (left) View of agricultural fields looking north from Queen Street along Sewer Trunk Alternative 4, (right) View of 130 Queen Street looking west from Queen Street, adjacent to Sewer Trunk Alternative 4, (Source: MHBC, 2021)




Photos 23 & 24: (left) View of termination of Queen Street at St. George Street looking south-west along Sewer Trunk Alternative 4, (right) View of Charles Street looking east, with 75 Charles Street and 76 Mill Street located in the periphery, along Sewer Trunk Alternative 3, (Source: MHBC, 2021)



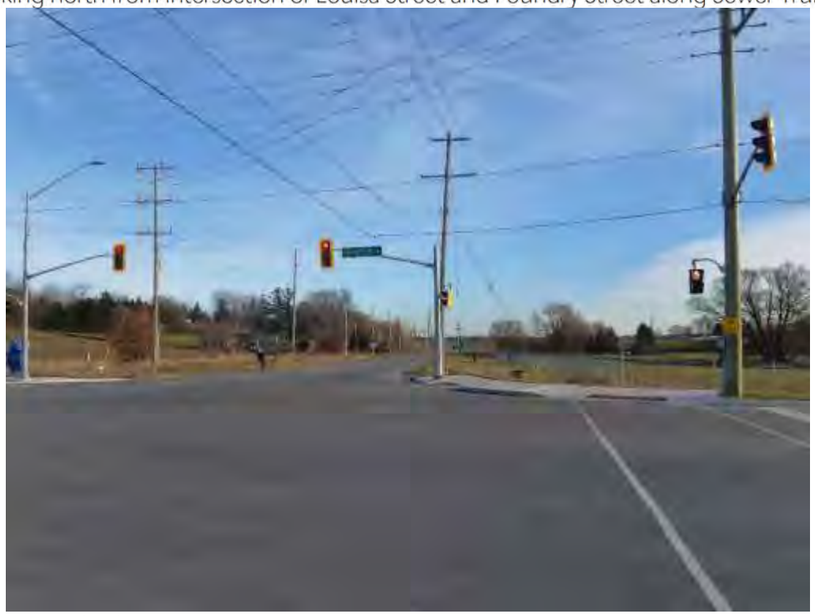
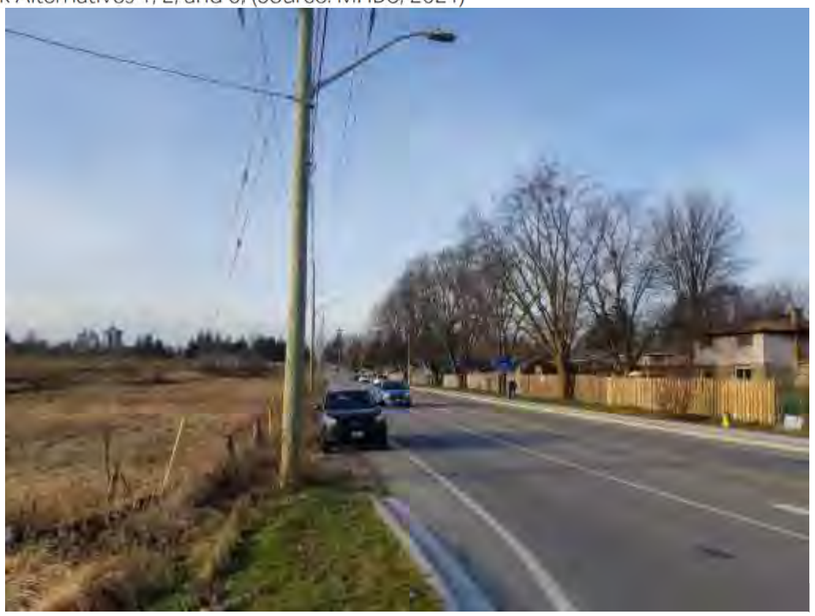

Photos 25 & 26: (left) View of Charles Street looking east from intersection of Charles Street and Mill Street along Sewer Trunk Alternative 3, (right) View of railway looking east from intersection of Foundry Street and Snyder's Road West along Sewer Trunk Alternative Route 1, (Source: MHBC, 2021)

Photos 27 & 28: (left) View of Foundry Street looking south from intersection of Snyder's Road East and Foundry Street along Sewer Trunk Alternatives 1 and 2, (right) View of 8 Foundry Street looking south-west from south-east corner of Foundry Street and Snyder's Road East along route of Sewer Trunk Alternatives 1 and 2, (Source: MHBC, 2021)




Photos 29 & 30: (left) View of Foundry Street looking south from intersection of Louisa Street and Foundry Street along Sewer Trunk Alternatives 1, 2, and 3 (right) View of Foundry Street looking north from intersection of Louisa Street and Foundry Street along Sewer Trunk Alternatives 1, 2, and 3, (Source: MHBC, 2021)

Photos 31 & 32: (left) View of Foundry Street looking south at the intersection of Gingerich Road and Foundry Street along Sewer Trunk Alteratives 1, 2, 3, 4, and 5, (right) View of Foundry Street looking north from intersection of Gingerich Road and Foundry Street along Sewer Trunk Alternatives 1, 2, and 3, (Source: MHBC, 2021)



Photos 33: (left) View of Baden Wastewater Pumping Station along Sewer Alternatives 1, 2, 3, 4 and 5, (Source: MHBC, 2021)

# Appendix **E** – Excerpts of the Township of Wilmot Heritage Register (properties located within the Broader Study Area)

Township of Wilmot Heritage Register

# Excerpts of Properties located within the Baden Trunk Sanitary Sewer Broader Study Area

## Listed

### 1316 Snyder's Road West

| | | | | | |
|---|---|---|---|---|---|
|  | Steinmann Mennonite Church<br><br>040-007-19900 | 1946 | 1316 Snyder's Rd West<br>**Baden** | Baden | CON N OF SNYDER'S RD PT LOT 18 RP 58R15509 PART 5 |

Cultural Heritage Value/ Heritage Attributes

Vernacular: 1 storey reddish-brown brick; gable faces south. The entrance door is in the centre, the date stone says 1884, and 1946 is near the bottom of the left hand buttress. This church was originally called The Wilmot Amish Mennonite Congregation. As it grew, a frame meeting house was built in 1884 on land purchased from Daniel Steinmann. In 1946, a decision to build a new church was made and the church dedication was May 16, 1948. In 1964, the church was renamed Steinmann Mennonite Church. An educational wing was built in 1976. Above the door are 3 Gothic windows with multiple panes. 2 Gothic windows with multiple panes are on either side of the buttresses. Right side (east): a low 1 storey addition covers part of the right hand wall of the church. Left side (west): 6 Gothic windows with small panes and Gothic framing are evenly spaced with a brick pilaster in between each window. The foundation is parged and marked out to look like stone. The newer addition starts at the rear of the left wall of the church and extends across the back of the church and part way up the right hand wall. The church's main entrance is at the back corner. It is constructed of darker red brick and has a number of pointed arched windows.





(images) MHBC 2021

## 55 Snyder's Road West

| | | | | | |
|---|---|---|---|---|---|
|  | Hilborn General Store<br><br>040-006-02000 | 1854 | 55 Snyder's Road West<br>**Baden** | Baden | PLAN 627, LOT 130, PT LOT 129<br>RP58R4327 PTS 2 & 3 |

Cultural Heritage Value/ Heritage Attributes

Vernacular; board and batten construction, early style general store with typical four large show windows, two on each side of a recessed entrance; false front style, known as boomtown front and used to add prominence and elegance, was added later. Operated by the Hilborn Brothers until 1900, then Mr. I. R. Shantz, and also Abe Hunsberger. Used as a general store for over 150 years. Note: Mr. Shantz built the home directly beside this store.



(images) MHBC 2021



## 8 Foundry Street

| | | | | | |
|---|---|---|---|---|---|
|  | Lorentz / Miller Store<br><br>040-006-075 | 1876 | 8 Foundry Street<br>**Baden** | Baden | PLN 627, PT LOTS 105, 106<br>RP58R1287 Part 1, PT 5 |
| Cultural Heritage Value/ Heritage Attributes<br>Italianate; 2 storey, 3 over 3 bays facade, decorative upper storey porch. Originally an early store, apothecary store, and antique store. John Lorentz (born in Petersburg 1843) built and operated a hardware store and tinsmith shop, bought by I.P. Livingston who passed it on to his son-in-law, then sold to local resident J. C. Miller, whose sons continue to operate it as an antique store. | | | | | |





(images) MHBC 2021

## 75 Charles Street & 76 Mill Street

| | | | | | |
|---|---|---|---|---|---|
|  | Livingston Linseed Oil Mill / Baden Feed & Supply<br><br>040-006-09510<br>040-006-09600 (store)<br>040-006-07120 (remainder of the property including the grain bins etc). | c.1870 | 75 Charles Street<br>**Baden**<br><br>76 Mill Street<br>**Baden** | Baden | PLN 627 LOTS 112 TO 114, 119 120 126 TO 128 183 TO 190 199 TO 201 PT MILL POND RP58R6700 PT 2<br><br>PLN 627 LOT 165 to 166 173 174 181 182 PT LOT 169 PT |

Cultural Heritage Value/ Heritage Attributes

Industrial; a series of brick buildings that are directly related to the operation of James Livingston's flax business that manufactured linseed oil c.1867 in Baden. Some buildings contain elevators, various multi-paned windows and one notable section is where the train would enter for the product to be unloaded into hopper cars. The oldest building is a 1 storey building currently painted white and has 8 sections divided by pilasters. The top of each section has corbelled brickwork. Historic use of the various buildings includes: oil works, elevator, iron oil tanks, boiler/engine room, warehouse, and oil storage





(left) 75 Charles Street, (right) 76 Mill Street MHBC 2021

## 53 Snyder’s Road West

| | | | | | |
|---|---|---|---|---|---|
|  | Hunsberger / Shinnie House<br><br>040-006-020 01 | 1893 | 53 Snyder's Road West<br>**Baden** | Baden | PLN 627, PT LOT 129<br>RP58R4327 PT 1 |

Cultural Heritage Value/ Heritage Attributes

Queen Anne; 2 storey, yellow brick, projecting bay on right with gable roof, brackets at angles of bay, large half round window on first floor of bay, hipped metal roof, rubble stone foundation, decorated frieze, open double porch. Built by Mr. I. R. Shantz, owner of the general store located beside this home



(images) MHBC 2021



# 130 Queen Street

| | | | | | |
|---|---|---|---|---|---|
|  | Miller / Schmidt House<br><br>040-006-08900 | 1856 | 130 Queen Street<br>**Baden** | Baden | PART LOT 16 CON SOUTH OF SNYDER'S RD |

Cultural Heritage Value/ Heritage Attributes

Georgian; 2 storey, salmon brick, 4 bays on each floor; enclosed entrance porch with balcony above; small attic windows on end walls. A century farm for five generations of Millers; the birthplace of Christian S. Miller who aided Jacob Beck in the founding of Baden. The Honourable Adam Beck, Jacob's son, in his speech on Dec. 29 1911 when hydro-electric power first illuminated the village of Baden, paid tribute to Christian Miller, "My father, in the early fifties, helped to found this village with kindly Chris Miller who...helped the hardy pioneers hew their way through forests and bush, to found a home." (Berlin News Record, December, 1911)



(images) MHBC 2021



## Designated

60 Snyder's Road West: Castle Kilbride National Historic Site



Character defining elements that contribute to the heritage value of Castle Kilbride include its:

- centre-hall plan with three sections, including main house, first wing and rear wing
- two-storey New Hamburg Brick and Tile construction
- fieldstone foundation
- four single-stack brick chimneys on the main section of the house, as well as a chimney on the back wall of the first wing
- belvedere crowning the hipped roof with a centre gable
- symmetrical and balanced façade design
- open porch with a solid rail, supported by turned posts on wood piers with round-headed mouldings, and rope turn posts with Corinthian capitals on similar piers
- wide overhanging eaves with paired bracketing and cornices
- two-storey projecting bays on the façade with frieze and paired brackets
- second-storey six-bay centrally paired windows
- two-storey verandah on the east elevation of the first wing supported by turned posts with brackets
- single brackets and boxed cornice with frieze beneath, on the rear wing, which features a door and a window
- west elevation which is the same as the east main house elevation
- two-door outdoor privy, west of the main residence, featuring quoining, frieze and bracketing details
- fifteen principle rooms, many including gas and electric light fixtures, Venetian marble fireplaces, and interior cherry wood folding shutters
- intricate mouldings, patterns and murals painted by H. Schasstein
- custom made furniture, such as a desk and bookcase set in the library, which was made by Krug's in the nearby City of Kitchener
- "trompe l'oeil" style paintings giving a three dimensional appearance
- second-storey hallway ceiling paintings and domed skylight, one of which is the original stained glass
- situation on a large and wide lot facing Snyder's Road West, which is not uniform to the surrounding streetscape
- heart-shaped circular drive
- terminating north view from Mill Street.



(images) MHBC 2021



## 1138 Snyder's Road West



Character defining elements that contribute to the heritage value of the Wagler Property include its:

- two-storey stone residence
- fieldstone and stucco construction of the farmhouse
- rectangular floor plan
- symmetrical design
- stucco verandah which spans the length of the façade
- two stone chimneys
- 8 over 12 windows
- outbuildings, including the barn, the drive shed, the wash house, the bake house, the wood shed, the building containing a water tank and the wooden windmill above the well
- siting of the buildings on the property





(images) MHBC 2021 (entrance to 1038 Snyder's Road West)

39 Snyder's Road West



Character defining elements that contribute to the heritage value of the Baden Hotel include its:

- carved date stone which reads "Christoph Kraus, July 22 1874" on the northwest elevation
- proximity to the Railway station
- location on the village's main street
- buff brick, common bond, construction including its wall orientation parallel to the angled streets
- fieldstone foundation
- symmetrical elevations
- 6 over 6 double hung windows
- bay windows including lug sills and radiating brick voussoirs
- gable roofline including lancet windows on the east and west elevations
- balcony on second floor of the west elevation
- boxed corner plain frieze soffit and fascia
- cut corner entrance on the west elevation



(images) MHBC 2021



44 Beck Street



Character Defining Elements:

- South Façade – Beck Street
- West Side – Mill Street
- East Side
- North Side – Rear
- Windows
- Organ
- Church Pews
- Painting
- Baptismal Front
- Masonic Lodge Hall



(images) MHBC 2021



# Appendix **F** - Curriculum Vitae

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URBAN DESIGN
& LANDSCAPE
ARCHITECTURE

# CURRICULUM**VITAE**

## Dan Currie, BA, BES, MA, MCIP, RPP, CAHP

Dan Currie, a Partner with MHBC, joined MHBC Planning in 2009, after having worked in various positions in the public sector since 1997 including the Director of Policy Planning for the City of Cambridge and Senior Policy Planner for the City of Waterloo.

Dan provides a variety of planning services for public and private sector clients including a wide range of policy and development work. Dan has experience in a number of areas including strategic planning, growth plan policy, secondary plans, watershed plans, housing studies and downtown revitalization plans. Dan specializes in long range planning and has experience in growth plans, settlement area expansions and urban growth studies. He has provided expert planning evidence to the Local Planning Appeals Tribunal and heritage planning evidence to the Conservation Review Board.

Dan holds a Masters degree in Planning from the University of Waterloo, a Bachelors degree (Honours) in Planning from the University of Waterloo and a Bachelor of Arts degree from the University of Saskatchewan. He is a registered Professional Planner and a Member of the Canadian Institute of Planners and a Professional Member of the Canadian Association of Heritage Professionals.

### EDUCATION

2006
Masters of Arts (Planning)
University of Waterloo

1998
Bachelor of Environmental Studies
University of Waterloo

1998
Bachelor of Arts (Art History)
University of Saskatchewan

### PROFESSIONAL ASSOCIATIONS

Full Member, Canadian Institute of Planners
Full Member, Ontario Professional Planners Institute
Professional Member, Canadian Association of Heritage Professionals

### PROFESSIONAL HISTORY

| | |
|---|---|
| 2013 – Present | Partner,<br>MacNaughton Hermsen Britton Clarkson Planning Limited |
| 2009 – 2013 | Associate<br>MacNaughton Hermsen Britton Clarkson Planning Limited |
| 2007 - 2009 | Director, Policy Planning, City of Cambridge |
| 2000 - 2007 | Senior Planner, City of Waterloo |

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# CURRICULUM**VITAE**

## Dan Currie, BA, BES, MA, MCIP, RPP, CAHP

| | |
|---|---|
| 1999 - 2000 | Planner, City of Waterloo |
| 1997 - 1998 | Research Planner**,** City of Kitchener |

## SELECTED PROJECT EXPERIENCE

### MASTER PLANS, GROWTH MANAGEMENT STRATEGIES AND POLICY STUDIES

Township of West Lincoln, Smithville Northwest Quadrant Secondary Plan
Township of Tiny Growth Management Strategy and Urban Expansion Analysis
Niagara-on-the-Lake Mary Street Streetscape Study
Richmond Hill, Bond Crescent Intensification Strategy
City of Cambridge Climate Change Adaptation Policy
Ministry of Infrastructure Pilot Test of Growth Plan Indicators Study
Cambridge West Master Environmental Servicing Plan
Township of Tiny Residential Land Use Study
Township of West Lincoln Settlement Area Expansion Analysis
Port Severn Settlement Area Boundary Review
City of Cambridge Green Building Policy
Township of West Lincoln Intensification Study & Employment Land Strategy
Ministry of the Environment Review of the D-Series Land Use Guidelines
Meadowlands Conservation Area Management Plan
City of Cambridge Trails Master Plan
City of Kawartha Lakes Growth Management Strategy
City of Cambridge Growth Management Strategy
Cambridge GO Train Feasibility Study
City of Waterloo Height and Density Policy
City of Waterloo Student Accommodation Study
Uptown Waterloo Residential Market Study
City of Waterloo Land Supply Study
City of Kitchener Inner City Housing Study

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# CURRICULUM**VITAE**

## Dan Currie, BA, BES, MA, MCIP, RPP, CAHP

HERITAGE PLANNING

Port Credit Heritage Conservation District
Town of Cobourg Heritage Master Plan
Municipality of Chatham-Kent Rondeau Heritage Conservation District Plan
City of Markham Victoria Square Heritage Conservation District Study
City of Kingston Barriefield Heritage Conservation District Plan
Burlington Heights Heritage Lands Management Plan
Township of Muskoka Lakes, Bala Heritage Conservation District Study and Plan
Municipality of Meaford, Downtown Meaford Heritage Conservation District Plan
City of Guelph Brooklyn and College Hill Heritage Conservation District Plan
Niagara Peninsula Conservation Authority St John's Master Plan
City of Toronto Garden District Heritage Conservation District Study and Plan
City of London Western Counties Cultural Heritage Plan
City of Cambridge Heritage Master Plan
City of Waterloo Mary-Allen Neighbourhood Heritage District Study
City of Waterloo Rummelhardt School Heritage Designation
Other heritage consulting services including:

- Heritage Impact Assessments
- Requests for Designations
- Alterations or new developments within Heritage Conservation Districts

DEVELOPMENT PLANNING

Provide consulting services and prepare planning applications for private sector clients for:

- Draft plans of subdivision
- Consent
- Official Plan Amendment
- Zoning By-law Amendment
- Minor Variance
- Site Plan

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# CURRICULUMVITAE

## Vanessa Hicks, M.A., C.A.H.P.

*Associate*

### EDUCATION

2016
Master of Arts in Planning, specializing in Heritage Planning
*University of Waterloo, School of Planning*

2010
Bachelor of Arts (Honours) in Historical/Industrial Archaeology
*Wilfrid Laurier University*

### CREDENTIALS

Canadian Association of Heritage Professionals (full member)

Vanessa Hicks is a Senior Heritage Planner and Associate with MHBC. Vanessa and joined the firm after having gained experience as a Manager of Heritage Planning in the public realm where she was responsible for working with Heritage Advisory Committees in managing heritage resources, Heritage Conservation Districts, designations, special events and heritage projects.
Vanessa is a full member of the Canadian Association of Heritage Professionals (CAHP) and graduated from the University of Waterloo with a Masters Degree in Planning, specializing in heritage planning and conservation. Vanessa provides a variety of research and report writing services for public and private sector clients. She has experience in historical research, inventory work, evaluation and analysis on a variety of projects, including Heritage Conservation Districts (HCDs), Heritage Impact Assessments (HIAs), Cultural Heritage Evaluation Reports (CHERs), Conservation Plans (CPs), Documentation and Salvage Reports, and Commemoration Projects (i.e. plaques).

### PROFESSIONAL EXPERIENCE

| | |
|---|---|
| June 2016 - Present | Cultural Heritage Specialist/ Heritage Planner<br>MacNaughton Hermsen Britton Clarkson Planning Ltd. |
| 2012 - 2016 | Program Manager, Heritage Planning<br>Town of Aurora |
| May 2012 - October 2012 | Heritage Planning Assistant<br>Town of Grimsby |
| 2007 - 2010 | Archaeologist<br>Archaeological Research Associates Ltd. |

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# Technical Memo 3

# Transportation / Municipal Services & Utilities

**Project Name:** Baden Trunk Sanitary Sewer EA

**MTE File No.:** 48730-100

**To:** Jeff Molenhuis, Township of Wilmot
Bryan Bishop, Township of Wilmot
Trevor Heywood, GRCA
Kaoru Yajimi, ROW

**cc:** Pierre Chauvin, MHBC
Paul Britton, MHBC

**Date:** November 6, 2022

**From:** Jeff Martens, P.Eng.
Carla Illman, M.Eng.

---

**Re: BADEN TRUNK SANITARY SEWER CLASS B ENVIRONMENTAL ASSESSMENT**
**Transportation/Municipal Services and Utilities Assessment of Alternatives**

# 3.0 Transportation/Municipal Services & Utilities

### 3.A Transportation Network (Roads and Pedestrians)

***Roads and Intersections***

This Factor Group was assessed based on the potential impact each alternative would have on local roads, regional roads and intersections during construction. It should be noted that all alternatives would impact the intersection at Snyder's Road West and Christian Street, Foundry Street and Gingerich Road, and Foundry Street at the entrance to the Baden WWPS.

Alternative 5 received a maximum score of 10. This alternative would have the least impact on existing roads, both locally and regionally. Impacted roads include Christian Street, a small section of Charlotta Street and a small section on Gingerich Road as well as the intersections mentioned above.

Alternative 4 received a score of 8. This alternative is similar to Alternative 5 however a larger section of Charlotta Street and Queen Street would also be impacted. In addition, construction would locally impact eight intersections.

Alternative 3 received a score of 5. This alternative would impact local and regional roads. Impacted roads include Christian Street, Charlotta Street, Mill Street, part of Charles Street, and Foundry Street south of Charles Street. In addition, construction would locally impact eleven intersections.

Alternative 2 received a score of 2. This alternative would greatly impact regional roads Foundry Street and Snyder's Road West. It would impact eleven (11) intersections along these roads including the major intersection at Snyder's Road West and Foundry Street.

Alternative 1 received the minimum score of 1. This alternative is similar to Alternative 2 except it would also disturb an existing farm lane impacting the access to the agricultural/livestock operations.

***Traffic Operations***

This Factor Group reviews road safety and accessibility with respect to sight distance and turning movements. It takes into consideration the capability to accommodate forecast traffic demand and the ability to provide appropriate access to existing properties during construction.

Traffic operations similarly impeded by all alternatives include the intersection at Snyder's Road West and Christian Street and the intersection at Foundry Street and Gingerich Road which impacts traffic operation to, and from, Highway 401 located to the south of the Baden WWPS.

Alternative 5 received a maximum score of 10. This alternative impedes traffic operations the least by avoiding the major Regional Roads where possible. The only impact is along the narrow local right-of-way where construction would likely impact the entire width of the road along Christian Street. Sightline would be temporarily impacted at three (3) intersections. This alternative would least impact road accessibility to existing residential properties.

Alternative 4 received a score of 9. This alternative is similar to Alternative 5 except it would impact two additional local roads, Charlotta Street and Queen Street, as well as eight (8) intersections that affect sightline. Traffic control measures would be required during construction.

Alternative 3 received a score of 4. This alternative would impact the largest number of local roads, Christian Street, Charlotta Street, Mill Street, and Charles Street, and one Regional Road, Foundry Street south of Charles Street. Sightline would be affected at eleven (11) intersections. This alignment would temporarily impede access to several residential homes along the local roads, as well as businesses and additional homes on Foundry Street. Traffic control measures would be required during construction especially when considering Foundry Street is a major access road to, and from, Highway 8. The Township's Fire Hall along Foundry Street would be directly impacted requiring alternative access arrangements during construction.

Alternative 2 received a score of 2. This alternative would require significant closures on the heavily trafficked Snyder's Road West and Foundry Street during construction. Significant temporary traffic routing operations through residential neighbourhoods would be required during construction. Traffic operations would be greatly impeded at the busy intersection of Snyder's Road West and Foundry Street requiring traffic control measures for access to Highway 8. The Township's Fire Hall along Foundry Street would be directly impacted requiring alternative access arrangements during construction.

Alternative 1 received the minimum score of 1. This alternative is similar to Alternative 2 except that it would also impact an existing farm lane which serves as a secondary access to an existing agricultural/livestock operation. The farm lane is a narrow roadway and would be required to be built to a municipal/maintenance access standard.

***Transportation Policy Initiatives***

This Factor Group evaluates the impact on the capability to support municipal policy initiatives regarding transit and active transportation. Public transit services affected include the Kiwanis specialized transit and the Grand River Transit line 77 bus. The Kiwanis specialized transit services individual residences therefore local roads are impacted greater. The scoring is based on the number of roads impacted and the ability for the public to reach bus stops.

Alternative 5 received a maximum score of 10. This alternative would have the least potential obstructions for the Kiwanis transit due to the fewest roads being impacted. There are no direct impacts to public transit routes.

Alternative 4 received a score of 8. This alternative is similar to Alternative 5 however additional local roads (Charlotta Street and Queen Street) may impact the Kiwanis transit. There are no direct impacts to public transit routes.

Alternative 3 received a score of 5. This alternative would have a greater potential of obstructing the Kiwanis transit due to construction along many local roads (Christian Street, Charlotta Street, Mill Street and Charles Street) and Foundry Street. There are no direct impacts to public transit routes.

Alternative 2 received a score of 2. This alternative was not considered to be a viable option due to obstructing the public bus service to and from Kitchener (Bus line 77 - intersection of Snyder's Road West & Foundry Street) as well as for the Kiwanis transit.

Alternative 1 received the minimum score of 1. This alternative is similar to Alternative 2 however it may additionally impact access of Kiwanis transit along the farm road if ever required.

***Railroad Crossings***

This Factor Group evaluates the ease of railroad crossing construction based on depth, right-of-way and associated approvals.

Alternative 3 received a maximum score of 10. This alignment, though deep, was deemed the easiest to construct due to sufficient access down the local road Mill Street (**Figure 6.1**).

Alternative 5 received a score of 7. This alignment would have some challenges due to the length and angled crossing required to trench the railroad and the Baden Creek Tributary 'A' (**Figure 8.1**).

Alternative 4 received a score of 5. Though this alternative has plenty of access along Queen Street, there appears to also be a railway turnout that leads to the mill located at 75 Charles Street increasing the required length. There is also a locally significant wetland that may be impacted during the construction of the trench due to dewatering. This alternative would require mitigation (**Figure 7.1**).

Alternative 1 received a score of 2. This alternative is not a favourable option due to the depth of the trench and it traversing through the main intersection of Snyder's Road West and Foundry Street (**Figure 4.1**).

Alternative 2 received the minimum score of 1. This alternative is similar to Alternative 1, but a deeper trench would be required due to the depth of the sewer (**Figure 5.1**).

## 3.B Municipal Services and Utilities

### *Municipal Services*

This Factor Group evaluates opportunities for connections to the broader sanitary system. It identifies impacts to existing sanitary, water, and storm infrastructure during construction as well as identifying possible undermining of infrastructure during construction.

Alternative 5 received a maximum score of 10. This alternative would have the least impact on existing local services. It may impact services during construction along Christian Street due to the depth of the sewer. The existing 450mm regional watermain along Christian Street and Gingerich Road that would require adequate separation from proposed services.

Alternative 4 received a score of 8. This alternative is similar to Alternative 5 with its impacts to Christian Street, but would also impact Charlotta Street and Queen Street. The existing 450mm regional watermain along Christian Street, Charlotta Street and Gingerich Road that would require adequate separation from proposed services.

Alternative 3 received a score of 6. This alternative is similar to Alternative 4 but would impact additional local streets (Mill Street, and Saint Charles Street as well as Foundry Street). The existing 450mm regional watermain along Christian Street, Charlotta Street, Mill Street, Charles Street, and Foundry Street would require adequate separation from proposed services.

Alternative 1 received a score of 3. This alternative would have significant potential impacts to existing services along Regional Roads Snyder's Road West and Foundry Street. In addition, the existing 450mm regional watermain along Foundry Street would require adequate separation from proposed services.

Alternative 2 received the minimum score of 1. This alternative is similar to Alternative 1 except it would potentially impact more municipal infrastructure due to deeper sewer alignment, leading to an increased potential of undermining.

### *Municipal Infrastructure (Above ground)*

This Factor Group reviews the degree of impact that the alternative would have on additional above-ground municipal structures including sanitary pumping stations, acoustic noise walls, rights-of-way and their associated long-term maintenance requirements.

Alternative 5 received the maximum score of 10. This alternative would eliminate the need for the Baden West WWPS and the Waterloo-Oxford School WWPS, which would be decommissioned under the ultimate development condition. The acoustic noise wall along Charlotta Street may be removed or remain in-tact for privacy. Rights-of-way impacted along Christian Street, Charlotta Street and Foundry Street.

Alternative 4 received a score of 9. This alternative is similar to Alternative 5 except it would impact the Queen Street right-of-way as well as increasing the impacts to the Charlotta Street right-of-way.

Alternative 3 received a score of 8. This alternative is also similar to Alternatives 4 and 5, however, this alignment will impact the right-of-way of additional local streets (Mill Street, Charles Street) as well as the Regional Road, Foundry Street.

Alternative 2 received a score of 5. Only one WWPS would be decommissioned, the Waterloo-Oxford School WWPS, under the ultimate development condition. This alternative would require the noise wall to remain. The right-of-way along Regional Roads; Snyder's Road West and Foundry Street, would be fully impacted.

Alternative 1 received the minimum score of 1. This alternative is similar to Alternative 2, however an additional pumping station is required within Parcel O (**Figure 4.1)**. The existing WWPS and noise wall on Charlotta Street would remain. Impacts to existing rights-of-way include Snyder's Road East as well as the private farm road leading to the additional WWPS.

***Utilities***

This Factor Group reviews the degree of exposure of hydro, gas and bell utilities and/or utility conflicts during construction. Scoring takes into account that all alignments will have the same degree of utility exposure and/or conflicts from the Foundry Street/Gingerich Road intersection to the Baden WWPS.

Alternative 5 received a maximum score of 10. This alternative would have the least impact on utilities due to construction only occuring along one local road, Christian Street. Depending upon construction methods, street lights may potentially be impacted along Christian Street during construction.

Alternative 4 received a score of 8. This alternative is similar to Alternative 5 in that utilities would be impacted along the additional local roads of Charlotta Street and Queen Street.

Alternative 3 received a score of 5. This alternative would impact utilities along the local roads of Christian Street, Charlotta Street, Mill Street and Charles Street as well as the utilities along Foundry Street, a major Regional Road, possibly impacting transmission to additional local neighbourhoods. There would be an increased risk to underground utilities along the narrow rights-of-way of the local roads due to the depth of the sewer.

Alternative 2 received a score of 2. This alternative would impact utilities along the major Regional Roads of Snyder's Road West and Foundry Street, possibly impacting transmission to additional local neighbourhoods. There would be an increased risk associated with construction within major rights-of-way containing more significant underground utilites.

Alternative 1 received the minimum score of 1. This alternative is similar to Alternative 2 except part of the private farm road, north of Snyder's Road East, also has utilities.

# Technical Memo 4
# Financial

Technical Memorandum

| | | | |
|---|---|---|---|
| **Project Name:** | Baden Trunk Sanitary Sewer EA | **MTE File No.:** | 48730-100 |
| **To:** | Jeff Molenhuis, Township of Wilmot<br>Bryan Bishop, Township of Wilmot<br>Trevor Heywood, GRCA | **Date:** | November 6, 2022 |
| **cc:** | Kaoru Yajimi, ROW<br>Pierre Chauvin, MHBC<br>Paul Britton, MHBC | **From:** | Jeff Martens, P.Eng.<br>Carla Illman, M.Eng. |

**Re: BADEN TRUNK SANITARY SEWER CLASS B ENVIRONMENT ASSESSMENT**
**Financial Evaluation of Alternatives**

# 4.0 Financial

***Capital Cost***

This Factor Group reviews the estimated Capital Cost associated with constructing, upgrading and/or replacing a sanitary sewer. Each alternative has been itemized and includes manholes, forcemain, pipes, trenchless construction, equipment, labor costs and pumping station as required.

Trenchless construction costs vary and are dependent upon the complexity of the installation. The complexity surrounding trenchless construction are discussed in the Technical section. Please refer to the attached Cost Estimate Table in **Appendix A**.

Quoted costs are preliminary cost estimates and are subject to change with final design.

Alternative 5 received the maximum score of 10. This alternative would require approximately 1900m of sewer pipe and manholes, 2 – 30m trenchless stream crossings and a 40m trenchless railway crossing.

Capital Cost = $3.63M

Alternative 4 received a score of 9. This alternative requires approximately 2005m of sewer pipe with manholes, 2 – 30m trenchless stream crossings and a 95m trenchless railway crossing.

Capital Cost = $4.42M

Alternative 3 received the minimum score of 8. This alternative requires approximately 1980m of sewer pipe with manholes and 1 – 30m trenchless railway crossing. Greater cost is due to sewer depth.

Capital Cost = $4.56M

Alternative 2 received a score of 7. This alternative requires approximately 1800m of sewer pipe with manholes and 1 – 60m trenchless railway crossing. Greater cost is due to sewer depth and complexity of installation.

Capital Cost = $5.07M

Alternative 1 received a score of 1. This alternative requires a sanitary pump station, approximately 1560m of forcmain pipe, air release valve chambers, approximately 1800m of sewer pipe and manholes, a 60m trenchless railway crossing and a 20m trenchless stream crossing for the forcemain. Greater cost due to additional forcemain and pumping station as well as the complexity of installation.

Capital Cost = $7.09M

***Operational Cost – Sanitary Sewer***

This Factor Group qualifies the proposed long-term operations and maintenance requirements for each alignment and is scored accordingly. Costs are associated with maintenance of pumping stations, sewers, easements, rights-of-way and traffic control as a result of maintenance operations.

Alternative 5 received a maximum score of 10. This alignment would eliminate two existing pumping stations, Baden West WWPS and School WWPS, requiring only one pumping station, Baden WWPS, to service all of Baden. The maintenance access adjacent to the Baden Creek (within the Schmidt Lands), will require maintenance but is less costly than maintenance within the road network.

Alternative 4 received a score of 8. This alternative is the similar to Alternative 5, however there are additional local road rights-of-way to maintain. Costs associated with traffic control may be greater as a result of the additional roads.

Alternative 3 received a score of 6. This alternative eliminates two existing pumping stations. The alignment would be entirely within the local and regional road rights-of-way, increasing maintenance costs and traffic control as a result of maintenance operations.

Alternative 2 received a score of 5. This alternative would eliminate one pumping station (School Block WWPS). Maintenance costs associated with rights-of-way would be greater along the busy regional roads. Extensive traffic control will be required along Snyder's Road West and Foundry Street during maintenance operations.

Alternative 1 received a score of 1. This alternative would significantly increase associated operational costs due to an additional pumping station and associated long forcemain. Additional maintenance costs would be required for forcemain easement. Extensive traffic control will be required along Snyder's Road West and Foundry Street during maintenance operations. Special coordination will be required along the farm road north of Snyder's Road East.

# Appendix A

## Cost Estimate

| BADEN SANITARY TRUNK SEWER PRELIMINARY COST ESTIMATE | | | | | |
|---|---|---|---|---|---|
| **Alternatives** | **A1** | **A2** | **A3** | **A4** | **A5** |
| | **Modified 2014 Environmental Assessment Preferred Alternative (Do Nothing)** | **Snyder's/Foundry** | **Christian/Charlotta/Mill Charles/Foundry** | **Christian/Charlotta/Queen and Baden Creek** | **Christian and Baden Creek** |
| **TOTAL LENGTH (m )** | **3355** | **1800** | **1985** | **2095** | **1905** |
| **Capital Cost** | **$ 5,908,859** | **$ 4,222,945** | **$ 3,802,635** | **$ 3,684,232** | **$ 3,025,695** |
| **Total Construction** | **$ 5,908,859** | **$ 4,222,945** | **$ 3,802,635** | **$ 3,684,232** | **$ 3,025,695** |
| **20% Contingency** | **$ 1,181,772** | **$ 844,589** | **$ 760,527** | **$ 736,846** | **$ 605,139** |
| **Total Capital Cost** | **$ 7,090,631** | **$ 5,067,534** | **$ 4,563,162** | **$ 4,421,078** | **$ 3,630,834** |
| **TOTAL ESTIMATED COST** | **$7,090,630.80** | **$5,067,534.00** | **$4,563,162.00** | **$4,421,078.40** | **$3,630,834.00** |
| **Operational Cost of Pump Station and Maintenance (WWPS: $30,000-$50,000/year)** | **$150,000-$250,000** | **$120,000-$200,000** | **$50,000.00** | **$50,000.00** | **$50,000.00** |

Notes:

1. Cost estimate does not include HST (%13)
2. Estimate does not include environmental mitigation
3. Estimate does not include soft costs (Engineering, Legal, Planning, etc.)
4. Estimate does not include cost of modifying to increase capacity or to replacing pumping station
5. Estimate does not include cost of dewatering

# Technical Memo 5
# Technical

| | | | |
|---|---|---|---|
| **Project Name:** | Baden Trunk Sanitary Sewer EA | **MTE File No.:** | 48730-100 |
| **To:** | Jeff Molenhuis, Township of Wilmot<br>Bryan Bishop, Township of Wilmot<br>Trevor Heywood, GRCA | **Date:** | November 6, 2022 |
| **cc:** | Kaoru Yajimi, ROW<br>Pierre Chauvin, MHBC<br>Paul Britton, MHBC | **From:** | Jeff Martens, P.Eng.<br>Carla Illman, M.Eng. |

**Re: BADEN TRUNK SANITARY SEWER CLASS B ENVIRONMENTAL ASSESSMENT**
**Technical Assessment of Alternatives**

# 5.0 Technical

***Constructability***

This Factor Group evaluates the alternative alignments according to physical constructability (adequate access to construction area); potential conflicts with existing infrastructure other than utilities; depth of sewer, trenchless crossings, and water table and groundwater dewatering (short term impact). Generally, less interference with existing roads, from the constructability point of view, is considered a benefit.

Alternative 5 received a maximum score of 10. A large portion (~60%) of the alignment is within agricultural lands with minimal depths where possible. However, the upstream portion of this alignment, along Christian Street, ranges from 8.3m to 9.3m deep (**Figure 8.1).** This road contains a local sewer and a 450mm regional watermain. The complexity lies within the installation of the deep sanitary trunk while not undermining the watermain and maintaining adequate separation within the narrow right-of-way as well as reconstructing the local sewer. Two trenchless crossings are required, one within the railway and Baden Creek Tributary A, and one at Gingerich Road. Groundwater interaction at these locations is considered negligible.

Alternative 4 received a score of 9. This alternative is similar to Alternative 5, but scored lower because there are more local roads along this alignment (Charlotta Street and Queen Street) increasing the complexity of the installation as described in Alternative 5. This alignment has close interactions with locally significant wetlands (**Figure 7.1)** requiring more attention to reduce impacts. Dewatering and additional erosion control measures may be required. The upstream trenchless stream crossing of the Baden Creek Tributary A is close to Baden Creek, adding more complexity by increasing the potential for dewatering at this location.

Alternative 3 received a score of 6. This alternative is located within the local rights-of-way. The depth of sewer combined with the narrow width of the rights-of-way increases the complexity of the alignment within these streets (**Figure 6.1**). Two open cut crossings are required along Foundry Street at the Baden Creek pond and Huehn Award Drain crossings. Dewatering and flow rerouting is required during the construction of these crossings. The trenchless railway crossing at Mill Street is considered the most feasible of the alternatives.

Alternative 2 received a score of 2. This alternative scored lower than Alternative 3 because of the complexity of constructing a deep sanitary trunk sewer along Snyder's Road West and the trenchless railway crossing at the critical intersection of Snyder's Road West and Foundry Street (**Figure 5.1**).

Alternative 1 received a score of 1. This alternative scored lower than Alternative 2 because of the additional 20m stream crossing north of Snyder's Road West. This alignment is just downstream of two (2) local wetlands (**Figure 4.1**), where potential dewatering and additional erosion control measures will be required.

***Trenchless (Constructability and Complexity)***

This Factor Group assesses the complex issues regarding the installation of trenchless sewer pipes under the railways and at the stream crossings. Installation of trenchless connections become more complicated when dealing with narrow right-of-way, deep sewers, various connections and busy intersections. Sending and receiving pit locations are dependent upon soil structure and will require confirmation by a geotechnical engineer.

Alternative 3 received the maximum score of 10. This alternative would require approximately 40m of trenchless connection for the railway crossing along Mill Street. The sewer depth at this crossing increases its complexity, however, Mill Street provides the most direct installation with ample clearance for sending and receiving pits. No trenchless stream crossings required.

Alternative 5 received a score of 9. This alternative would require approximately 60m of trenchless railway crossing and 1-40m and 1-30m trenchless stream crossings. Challenges for this alignment include back-to-back sending and receiving pits for the railway crossing and the crossing along Tributary A. No dewatering would be required at this crossing. The trenchless stream crossing north of Gingerich Road, does not present any foreseen issues.

Alternative 4 received a score of 8. This alternative would require approximately 95m of trenchless railway crossing and 2-30m trenchless stream crossing. The trenchless crossing is longer than Alternative 5 because of the existing spur line. A local wetland, located between the railway and the spur line, lies directly above the proposed alignment presenting potential challenges. A second wetland also runs along this alignment and would be situated near the sending pit. The trenchless stream crossing, north of Gingerich Road, does not present any foreseen issues.

Alternative 2 received a score of 3. This alternative would require approximately 60m of trenchless railway crossing at the intersection of Snyder's Road West and Foundry Street. The railway right-of-way is narrow through the intersection requiring sending and receiving pits to be located outside of the intersection. The depth (>6m) of this trenchless connection poses additional complications through the intersection as well as the connection with the deep trunk sewer along Snyder's Road West and the local sewer at Livingston Boulevard.

Alternative 1 received the minimum score of 1. This alternative is similar to Alternative 2 except there would be an additional 20m trenchless crossing north of Snyder's Road East for the forcemain. This crossing is within a regulated floodplain and under a permanent watercourse believed to have groundwater inflow. This crossing is also just downstream of a locally significant wetland.

***Property (Land/Acquisition)***

This Factor Group reviewed property requirements for the Baden Trunk alternatives and was assessed based on the number and area of properties and ease of acquisition.

Alternative 2 received a maximum score of 10. This alternative would be located fully within existing rights-of-way therefore no additional land acquisitions would be required.

Alternative 3 received a score of 9. This alternative would be located fully within existing rights-of-way therefore no additional land acquisitions would be required.

Alternative 4 received a score of 8. This alternative would require a portion of the right-of-way to be acquired. An understanding has been reached with the property owner that arrangements will be made regarding securing the right-of-way through the open areas.

Alternative 5 received a score of 7. This alternative is similar to Alternative 4 except a larger portion of open land would need to be secured.

Alternative 1 received a score of 1. Construction of the new pumping station would require approximately one residential lot (~0.16acre). It is anticipated arrangements can be made with the property owner to secure the required area for the pumping station. However, securing the right of way along the private farm lane for the forcemain is uncertain.

***Serviceability (Long-term)***

This Factor Group evaluates the percentage of Baden to be serviced by the Baden Trunk in support of future growth. Percentages were determined by serviceable drainage area for each alternative.

Alternative 5 received a maximum score of 10. This alignment would be able to service all of Baden's future growth areas, including Foxboro. Refer to **Figure 8.2** for contributing sanitary drainage areas.

Alternative 4 received a score of 9. This alignment is similar to Alternative 5, refer to **Figure 7.2** for contributing sanitary drainage areas.

Alternative 3 received a score of 7. This alignment scored lower than Alternative 4 because it would service approximately 90% of Baden's future growth areas. The remaining area would be serviced through New Hamburg. Refer to **Figure 6.2** for contributing sanitary drainage areas.

Alternative 2 received a score of 5. This alignment scored lower than Alternative 3 because it would service approximately 80% of Baden's future growth areas. The remaining area would be serviced through New Hamburg. Refer to **Figure 5.2** for contributing sanitary drainage areas.

Alternative 1 received a score of 1. This alignment scored lower than Alternative 2 because it would service approximately 75% of Baden's future growth areas. The remaining area would be serviced through New Hamburg. Refer to **Figure 8.2** for contributing sanitary drainage areas.

# Technical Memo 6

# Selection of the Preferred Alternative & Evaluation Matrix

Technical Memorandum

| | | | |
|---|---|---|---|
| **Project Name:** | Baden Trunk Sanitary Sewer EA | **MTE File No.:** | 48730-100 |
| **To:** | Jeff Molenhuis, Township of Wilmot<br>Bryan Bishop, Township of Wilmot<br>Trevor Heywood, GRCA | **Date:** | November 6, 2022 |
| **cc:** | Kaoru Yajimi, ROW<br>Pierre Chauvin, MHBC<br>Paul Britton, MHBC | **From:** | Jeff Martens, P.Eng.<br>Carla Illman, M.Eng. |

**Re: BADEN TRUNK SANITARY SEWER CLASS B ENVIRONMENTAL ASSESSMENT**
**Selection of the Preferred Alternative**

## 6.0 Selection of the Preferred Alternative

The preferred sanitary sewer trunk alignment was selected by following a Schedule B framework outlined in the Municipal Engineers Class Environmental Assessment manual. Based on the preceding analysis and the outcome of the evaluation matrix (**Appendix A**), the preferred alternative is **Alternative 5 with a total score of 47**. The sanitary sewer construction of the preferred alternative has the following benefits:

- Least impacts existing businesses and residents
- Least impacts to cultural heritage
- Provides timely project completion due to minimal regional road corridors, coordination
- Provides flexibility for servicing the entire primary study area
- Eliminates two (2) existing pumping stations
- Eliminates noise and odour associated with the removal of existing pumping stations
- Reduces long-term operational/maintenance cost
- Minimal impact to road network
- Minimal impact to traffic
- Minimizes impacts to significant water courses (Baden Creek at the Baden Creek pond and the Huehn Award Drain)
- Avoids wetlands, woodlands, Butternuts
- Does not impact flow regime of any water feature
- Eliminates impacts to the coldwater fisheries tributary (Huehn Award Drain)
- Represents the least cost solution

Other design alternatives ranked as follows:

- **Alternative 4 with a total score of 38** – Viable alternative, stays within Township boundaries providing timely project completion, minimal impacts to existing businesses, residents and cultural heritage sites, reduces long-term operational costs, eliminates 2 existing pumping stations and associated noise and odour, minimizes impacts to significant water courses, eliminates impacts to the cold water fisheries tributary and provides flexibility for servicing the entire primary study area

  (18.4% behind the first ranked alternative);

- **Alternative 3 with a total score of 34** – Eliminate 2 existing pumping stations and associated noise and odour, reduces long-term operational/maintenance cost, avoids wetlands, woodlands and butternut trees, has a secure right-of-way. (28.0% behind the first ranked alternative);
- **Alternative 2 with a total score of 23** – This alternative avoids wetlands, woodlands, butternuts and has a secure right-of-way

  (49.7% behind the first ranked alternative);
- **Alternative 1 with a total score of 9** – It is the current approved alignment. (80.2% behind the first ranked alternative).

# Appendix A

## Evaluation Matrix

## PRELIMINARY EVALUATION CRITERIA - BADEN SANITARY TRUNK

| Factor Category / Factor Group / Factor | | Alternative | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | A1 | | A2 | | A3 | | A4 | | A5 | |
| Date: August 2022 | Description | Modified 2014 Environmental Assessment Preferred Alternative (Do Nothing) | | Snyder's/Foundry | | Christian/Charlotta/Mill/Charles/Foundry | | Christian/Charlotta/Queen and Baden Creek | | Christian and Baden Creek | |
| | | Score | Comments | Score | Comments | Score | Comments | Score | Comments | Score | Comments |
| **1. NATURAL ENVIRONMENT** | | | | | | | | | | | |
| **1.A Terrestrial Ecosystems** | | | | | | | | | | | |
| Vegetation Communities and Flora | Impact on feature and function of vegetation communities and flora<br>-ecological significance (type, size, composition, species of conservation concern)<br>-sensitivity/ susceptibility (e.g., mortality, stress, composition change). | 4 | Impact along Foundry St, near pond and area N. of Snyder's Rd West. Consruction of segments may impact CUW1, CUM1. Indirect potential impacts to CUT1 and areas near SUM1 unless properly mitigated. | 10 | Negligible impacts to natural features along Foundry St. and Snyder's Road W. | 8 | Similar to Option A2, except more potential impacts along Charlotta St and Foundry St (CUM1) during construction to regionally significant Running Serviceberry if not properly mitigated. | 1 | Largest extents of construction within natural areas. Temporary disturbances to CUM1 meadow. Construction is in proximity to FOD7-3, potential edge tree removal and tree root disturbance, regionally significant Running Serviceberry disturbance. | 5 | Traverses near less meadow area than A5. Potential fringe impact to CUM1 and FOD7-3, depending on surveyed alignment. |
| Wildlife Habitat | Impact on feature and function of wildlife habitat<br>-significance (e.g., size, presence of specialized habitat elements, species of conservation concern)<br>-sensitivity (e.g., noise, light)<br>Effects on wildlife movement corridors (e.g., habitat removal, fragmentation, potential increases in animal-vehicle conflicts). | 1 | Anticipated but unknown impacts to wildlife north of Snyder's Rd W within wetlands which were not part of the NEA (impacts therefore considered potentially significant to wildlife). Potential tree removals in CUW1 required which may house SAR bats. Potential impact to Turtle Wintering Areas in Baden Creek Pond habitat due to dewatering. | 6 | Similar impacts to Baden Creek habitats as A1 and A3. | 5 | Similar impacts to Baden Creek habitats as A1 and A2. A3 scored slighlty lower than A2 due to construction dewer depth and extent of work. | 4 | Largest extent of construction within natural areas. Impacts to amphibian breeding habitat (MAM2-2). Closest impact to forested area, potential disturbance to SAR bat habitats (FOD7-3). Temporary impacts to habitats within CUM1. | 10 | Algment runs along outer boundary of wildlife corridor. No impacts to wetland habitats. Less impacts to CUM1 habitats than A4. Potential tree removals in CUW1 required which may house SAR bats. |
| | Normalized Factor Group Score | 2.5 | | 8.0 | | 6.5 | | 2.5 | | 7.5 | |
| **1.B Wetland Ecosystems** | | | | | | | | | | | |
| Wetlands | Impact on feature and function of wetlands (e.g., area, classification and quality, relative extent, function in broader wetland complex ecosystem). | 1 | Construction of sewer north of Snyder's Road West & Foundry Street may directly impact Locally Significant Wetland feature. Potential indirect impacts to adjacent meadow marsh unless mitigated. Construction may disrupt local drainage regime and hydrological conditions that support the wetland. | 8 | No impact to wetlands. Alignment is in slight proximity to Locally Significant Wetland north of Snyder's Road West & Foundry Street. | 9 | No impact to wetlands. Alignment is in slight proximity to MAM2. | 4 | Construction directly impacts wetlands MAM2 & MAM2-2 due to proximity during construction. May impact surface drainage catchments and impair water quality unless properly mitigated. | 10 | Does not impact wetlands. |
| | Normalized Factor Group Score | 1.0 | | 8.0 | | 9.0 | | 4.0 | | 10.0 | |
| **1.C Aquatic Ecosystems** | | | | | | | | | | | |
| Aquatic Habitat | -Number of water bodies and watercourse crossings.<br>-Sensitivity of fish/fish habitat and thermal regime (warm, cool or cold water).<br>-Extent (area) and function of riparian habitat removed.<br>-Extent and type of fish habitat (in-stream) altered/displaced in watercourse, including importance to aquatic ecosystem (e.g. spawning, nursery areas, habitat for species of conservation concern or less tolerant species). | 1 | 3 watercourse crossings; a stream crossing north of Snyder's Road West to Tributary B, a stream crossing to Baden Creek Pond, a cold water stream crossing at Huehn Award Drain. All watercourses provide aquatic habitat, subject to federal *Fisheries Act* . Crossings require fish capture and relocation during construction, watercourses need isolation and de-watering, water quality treatment, etc.. | 4 | 2 watercourse crossings; a stream crossing to Baden Creek Pond, a cold water stream crossing at Huehn Award Drain. | 3 | 2 watercourse crossings; a stream crossing to Baden Creek Pond, a cold water stream crossing at Huehn Award Drain. Al is a slighlty deeper crossing than A2. | 7 | 2 watercourse crossings: a stream crossing at Gingerich Road, a stream crossing at Baden Creek Tributary A upstream of the confluence. Tributary A identified as intermittent flow with no groundwater interaction, may be accessible to fish. Potential to construct through tributary during period of no flows. Trenchless installation to be utilized for both crossings.Tributary A crossing is closer to Baden Creek than A5. | 10 | 2 watercourse crossings: a stream crossing at Gingerich Road, a stream crossing at Baden Creek Tributary A upstream of the confluence. Tributary A identified as intermittent flow with no groundwater interaction, may be accessible to fish. Potential to construct through tributary during period of no flows. Trenchless installation to be utilized for both crossings. |
| | Normalized Factor Group Score | 1.0 | | 4.0 | | 3.0 | | 7.0 | | 10.0 | |
| **1.D Surface Water (Quality - Impact to Water Quality / Thermal / Chlorides)** | | | | | | | | | | | |
| Water Quality | Impact on water quality of surface water features (TSS, gas/oil fueling, construction operations). | 1 | Similar to A2 with additional upstream impacts at stream crossing north of Snyder's Road West. Increased risk of surface water impacts adjacent to Locally Signficant Wetland. All ultimately can increase TSS levels in Baden Creek unless properly mitigated. | 3 | Two open cut stream culvert crossings at the Baden Creek Pond Tributary B and Huehn Award Drain. Flow rerouting and dewatering required to prevent increased flows. Increased potential for contaminated sediments from the Regional Roadway to enter Baden Creek Pond and Baden Creek. | 2 | Similar to A2 with deeper sanitary sewer depths, further potential impacts during construction. | 8 | Similar to A5, but trenchless crossing is closer to Baden Creek. Increased potential impacts to water quality, | 10 | Proposed trenchless crossing at Baden Creek Tributary A is an intermittent flow tributary with no evidence of groundwater interaction, no dewatering required during construction. No anticipated impacts at the trenchless crossing underneath the culvert at Gingerich. |
| Thermal Regime | Impact in the thermal regime of surface water features. | 1 | Similar to A2 with additional upstream impacts at stream crossing north of Snyder's Road West. Additional dewatering and construction can ultimately can affect thermal regime in Baden Creek Pond and HAD. | 3 | Close proximity to HAD which provides coldwater in support of cool water habitat in Baden Creek Pond. Pond has GW connectivity as well, where dewatering during construction can affect thermal regime. Potential impact to vegetation that regulates temperature in Baden Creek | 2 | Similar to A2 with deeper sanitary sewer depths, further potential impacts during construction. | 8 | Similar to A5, but trenchless crossing is closer to Baden Creek. Increased potential impacts to thermal regime. | 10 | No impact on Baden Creek Pond and Huehn Award Drain. Trenchless crossing on intermittent tributary,, no groundwater interaction/impact to thermal regime |
| Chlorides | Impact on water quality of surface water features. | 10 | Not Significant | 10 | Not Significant | 10 | Not Significant | 10 | Not Significant | 10 | Not Significant |
| | Normalized Factor Group Score | 4.0 | | 5.3 | | 4.7 | | 8.7 | | 10.0 | |
| **1.E Groundwater Resources** | | | | | | | | | | | |
| Regional Recharge Areas (Groundwater) | Encroachment into the Regional Recharge Area. (removal/disruption of function – area; depth). | 1 | Similar to A2 and A3 with respect to HAD, with additional proximity to recharge areas near pump station within Parcel O. | 7 | Close proximity to HAD, which is connected to the Regional Recharge Area, depth of trunk may affect GW | 6 | Similar to A2, but sewer is deeper under the HAD. | 9 | Similar to A5, alignment is slighlty closer to regional recharge area. | 10 | Alignment is furthest away from recharge areas. BH sample shows no sand layer as that of the regional recharge area, will not draw groundwater |
| Groundwater Quality - Clean Water Act (WHPA, SGRA, IPZ, HVA) | Potential for impacts to vulnerable areas (Area) as defined in Source Water Protection Areas (SWPA). | 1 | Closest proximity to WHPA north of Parcel O | 5 | Similar to A3 | 6 | WHPA location to the east | 9 | Similar to A5, alignment is slighlty closer to WHPAs and SGRAs. | 10 | Furthest alignment from WHPA location to east, does not affect it |
| Shallow Groundwater Movement/Contributions (Quality and Quantity) | Potential for interference with existing flow patterns (baseflow) relative to proximity to significant surface water feature and significant groundwater feature discharge areas. Consider Short-Term Impact.Regional shallow gw elevation 346m - 353m | 1 | Shallow forcemain from pump station and stream crossing N of Snyder's Road West, may affect Baden Creek Pond and HAD. Largest extent of construction and potential impacts to groundwater. | 5 | May affect Baden Creek Pond and HAD during construction. | 4 | Proximity to wetland MAM2, may affect Baden Breek Pond and HAD during construction due to depth of sewer. | 2 | Close proximity to wetland MAM2 and MAM2-2, tributary crossing at fish habitat location. | 10 | No evidence of GW interaction at Baden Creek tributary A stream crossing, no sand layer in stream crossing at Gingerich Road. GW impacts minimal/negligible. |
| | Normalized Factor Group Score | 1.0 | | 5.7 | | 5.3 | | 6.7 | | 10.0 | |
| **1.F Surface Drainage (Quantity - Erosion)** | | | | | | | | | | | |
| Quantity (flows) | Quantity Control and Flow Regime | 7 | Impacts flows at Baden Creek Tributary B, Baden Creek Pond and Huehn Award Drain crossings. Tributary B is trenchless, others are open cut which requires stream diversion. Mitigation required for sediment control and flow rate. | 6 | Impacts flows at Baden Creek Pond and Huehn Award Drain crossings. Crossings are open cut and requires stream diversion. Mitigation required for sediment control and flow rate. Deeper trench than A1 | 1 | Impacts flows at Baden Creek Pond and Huehn Award Drain crossings. Crossings are open cut and requires stream diversion, mitigation required for sediment control and flow rate. Significantly deeper trench than A2 | 8 | Trenchless railway crossing occuring through a sand layer near local wetlands and section between trenchless crossing and Queen Street may result in potential dewatering and rerouting to Baden Creek. No anticipated change to flow regime due to tenchless crossing north of Gingerich Road. | 10 | No change to flow regime due to tenchless crossings at Baden Creek Tributary A and Gingerich Road. No dewatering or flow rerouting anticipated. |
| Floodplain Function | Impacts to Regulatory Floodplain and changes to floodplain hydrologic function. (During Construction), including need for GRCA work permit | 7 | Minimal impact to floodplain due to (2) stream crossings occuring along road right-of-way. Imapct to floodplain at stream crossing north of Snyder's Road East. | 10 | Minimal impact to floodplain due to (2) stream crossings occuring along road right-of-way | 9 | Minimal impact to floodplain boundary & impacts GRCA floodplain boundary, closest to floodplain near forest, impact at 2 stream crossing | 1 | Alignment along floodplain boundary & impacts GRCA floodplain boundary, impact at 2 stream crossing | 6 | Alignment along floodplain boundary & impacts GRCA floodplain boundary, impact at 2 stream crossing |
| Stormwater Management | Opportunities to enhance roadway stormwater management measures, including coordination withluse of adjacent development facilities. | 10 | Not Significant | 10 | Not Significant | 10 | Not Significant | 10 | Not Significant | 10 | Not Significant |
| Water Balance | Chanoes to water balance due to develooment | 10 | Not Sionificant | 10 | Not Sionificant | 10 | Not Sionificant | 10 | Not Sionificant | 10 | Not Sionificant |
| Erosion Assessment | Impact on Slope stability due to stream disturbances and from increased TSS during construction. | 1 | Two open cut stream crossings along Foundry Street at the Baden Creek pond and Huehn Award Drain, additional upstream trenchless crossing at Baden Creek Tributary B, mitigation required to prevent increased TSS loading and erosion prevention | 4 | Two open cut stream crossings along Foundry Street at the Baden Creek pond and Huehn Award Drain, mitigation required to prevent increased TSS loading and erosion prevention | 3 | Similar to A2, but sewer is deeper under the HAD, furher erosion potential | 9 | Similar to A5, trenchless crossing closer to Baden Creek than A5. | 10 | Two trenchless crossings. No dewatering anticipated, so less erosion concerns are present. Erosion setbacks present, construction to take place outside buffer where possible. |
| | Normalized Factor Group Score | 7.0 | | 8.0 | | 6.6 | | 7.6 | | 9.2 | |
| | **TOTAL CATEGORY SCORE** | 2.8 | | 6.5 | | 5.9 | | 6.1 | | 9.5 | |
| | **% BEHIND FIRST RANKED ALIGNMENT** | 71% | | 31% | | 38% | | 36% | | 0% | |
| | **CATEGORY RANKING** | 5 | | 2 | | 4 | | 3 | | 1 | |
| **2. SOCIO-CULTURAL ENVIRONMENT** | | | | | | | | | | | |
| **2.A Land Use Policy** | | | | | | | | | | | |
| Land Use Designations and Policies | Aligned with Provincial, Regional and Township growth and development goals, objectives or policies (high, medium, low).<br>Upper tier and lower tier infrastructure and corridor owner.<br>Efficiency of resulting development patterns and timing. | 1 | Least compatibe due to timing and prioritization of regional projects (2 separate regional projects, 1 local project). In addition, temporary disturbance to access for local agricultural operation north of Snyder's Road. Does not fully integrate Township's plan to join Baden and New Hamburg servicability. | 2 | Similar to A3, except 2 Regional projects required to facilitate this alignment. Lower scoring due to complexity of Regional projects. | 4 | Low degree of compatibility due to timing and prioritization of regional projects combined with local projects (1 regional project, 1 local project), does not fully integrate Township's plan to join Baden and New Hamburg servicability. | 10 | Autonomy to implement infrastructure improvement without upper tier regulations formulating development and growth independently | 8 | Similar to A4, longer construction time within Schmidt Lands (Parcel AA) and disruption to agricultural lands, impact to growing season |
| Impact of the Sanitary Sewer on Adjacent Lands | Impacts to residence and businesses | 1 | Impacts adjacent residential properties and busisess along major regional roads Foundry Street and Snyder's Road West. | 2 | Impacts adjacent residential properties and busisess along major regional roads Foundry Street and Snyder's Road West. | 4 | Impacts several residential properties along local roads Christian Street, Charlotta Street, Mill Street, Charles Street. Impacts businesses and residents along Foundry Street Regional Road. | 8 | More residential properties impacted than A5 along Christian Street and Charlotta Street. Coordination required with Schmidt Lands. | 10 | Least amount of properties impacted primarily along Christian Street. Coordination required with Schmidt Lands. |
| | Normalized Factor Group Score | 1.0 | | 2.0 | | 4.0 | | 9.0 | | 9.0 | |
| **2.B Archaeological Resources** | | | | | | | | | | | |
| Known and/or Potential Archaeolgical Sites | Number/type/significance of direct/indirect impacts to known archaeological resources and/or areas of high archaeological potential. | 8 | Furthest and shallowest from found artifact, Baden Creek is a barrier to artifact location | 10 | Furthest from found artifact but not as shallow, Baden Creek is a barrier to artifact location | 9 | Furthest and deepest from found artifact, Baden Creek is a barrier to artifact location | 1 | Alignment impacts the 50m monitoring buffer at Findspot-16 Findspot-18 and construction may impact AiHk-469 50m monitoring buffer. | 5 | Alignment impacts the monitoring 50m buffer at Findspot-16 Findspot-18 |
| | Normalized Factor Group Score | 8.0 | | 10.0 | | 9.0 | | 1.0 | | 5.0 | |
| **2.C Built Heritage** | | | | | | | | | | | |
| Built Heritage Features | Number/type/significance of direct/indirect impacts to built heritage resources (based on presence of built heritage resources identified by the Region of Waterloo). | 2 | Construction will affect scenic routes along Snyder's Road West and Foundry Street; Adjacent to 4 listed and 2 designated properties listed on OHA | 1 | Similar to A1, but road closures anticipated to be longer due to depth of sewers | 5 | Construction will affect scenic route along Foundry Street; Adjacent to 4 listed and 2 designated properties listed on OHA | 9 | Similar to A5, alignment is closer in proximity to 130 Queen Street | 10 | No direct impacts to heritage properties or OHA, alignment is near one listed property: 130 Queen Street |
| | Normalized Factor Group Score | 2.0 | | 1.0 | | 5.0 | | 9.0 | | 10.0 | |
| **2.D Noise** | | | | | | | | | | | |
| Noise | Noise impacts due to addition/removal of wastewater pumping stations (weps) | 1 | Noise from additional weps, noise wall remains at Baden West WWPS | 2 | No additional weps, noise wall remains at Baden West WWPS | 8 | Removal of noise wall and Baden West WWPS | 9 | Removal of noise wall and Baden West WWPS | 10 | Removal of noise wall and Baden West WWPS |
| | Normalized Factor Group Score | 1.0 | | 2.0 | | 8.0 | | 9.0 | | 10.0 | |
| | **TOTAL CATEGORY SCORE** | 3.0 | | 3.8 | | 6.5 | | 7.0 | | 8.5 | |
| | **% BEHIND FIRST RANKED ALIGNMENT** | 65% | | 56% | | 24% | | 18% | | 0% | |
| | **CATEGORY RANKING** | 5 | | 4 | | 3 | | 2 | | 1 | |
| **3. TRANSPORTATION/MUNICIPAL SERVICES AND UTILITIES** | | | | | | | | | | | |
| **3.A Transportation Network (Roads and Pedestrians)** | | | | | | | | | | | |
| Roads and Intersections | Potential impacts to roads/intersections. | 1 | Similar to A2, additional impact to private farm road access north of Snyder's Road East | 2 | 2 regional roads, 11 road intersection, major intersection impact of Snyder's Road West and Foundry Street | 5 | Christian Street, Charlotta Street, Mill Street, Carles Street, large portion of Foundry Street (Regional) / 11 intersections | 8 | Christian Street, larger portion of Charlotta than A5, Queen Street, portion of Gingerich Road, portion of Foundry Street (Regional) / 8 intersections | 10 | Christian Street, portion of Charlotta, portion of Gingerich Road, portion of Foundry Street (Regional) / 3 intersections |
| Traffic Operations | Road safety and accessibility (sight distance; turning movements).<br>Capacity/capability to accommodate forecast traffic demand.<br>Provides for appropriate access to existing properties. Impact on access to existing properties. | 1 | Similar to A2, additional impacts to farm lane access at Snyder's Road/Foundry intersection. | 2 | Impedes traffic along two Regional Roads Foundry Street and Snyder's Road West. Significant temporary traffic operations routing through local roads required during construction. | 4 | Impedes traffic along the most local roads (4: Christian Street, Charlotta Street, Mill Street, Charles Street) and a portion of Regional Road Foundry Street. 11 intersections will have line of sight affected during construction. Additional arrangements required for Township's Fire Hall at Foundry Street during construction. | 9 | Impedes slighlty more traffic than A5 along Charlotta Street and Queen Street. Impedes access to more homes than A5. 8 intersections will have sightline affected. | 10 | Impedes the least amount of traffic throughout construction. Narrow local right of ways, construction will impact entirety of roadway. 3 intersections will have sightline affected. Least amount of homes have access affected. |
| Transportation policy initiatives | Capability to support municipal policy initiatives (transit, active transportation, roundabouts). | 1 | Transit obstruction for bus service to and from Kitchener (bus line 77-intersection of Snyder's Rd W & Foundry St), additional obstruction of access along Farm Road | 2 | Transit obstruction for bus service to and from Kitchener (bus line 77-intersection of Snyder's Rd W & Foundry St). | 5 | Minimal impact to local transit, will affect access to several residential properties in neighborhoods and along Foundry Street. No direct impact to trnasit routes. | 8 | Similar to A5 with addition impacts to Charlotta Street and Queen Street. No direct impact to transit routes. | 10 | Least potential transit obstructions (Kiwanis transit) only affects Christian Street and small portion of Charlotta Street, will affect access to residential properties in neighborhoods. No direct impact to trnasit routes. |
| Railroad Crossing | Ease of railroad crossing, approval | 2 | Significant trench required through main intersection of Snyder's Road W and Foundry Street crossing | 1 | Similar to A1 but deeper trench required. | 10 | Easiest trench crossing to construct at local road (Mill St.) | 5 | Trench crossing at local road (Queen St.), will cross two widths of railway to address additional railway directed to private business (75 Charles Street). Trench is in close proximity to wetland MAM2 and cultersal woodland CUE1 | 7 | Trench crossing will cross railway as well as Baden Creek Tributary A. Tributary A is ephemeral, no complications anticipated if constructed duing dry period. |
| | Normalized Factor Group Score | 1.3 | | 1.8 | | 6.0 | | 7.5 | | 9.3 | |
| **3.B Municipal Services and Utilities** | | | | | | | | | | | |
| Municipal Services (sanitary, water, storm) | Opportunities for connections to the broader sanitary system.<br>Impacts to existing sanitary, water, & storm infrastructure during construction.<br>Undermines existing infrastructure. | 3 | Major impact to existing Regional infrastructure | 1 | Similar to A1 but deeper sanitary sewer alignment leads to larger potential impact to existing services | 6 | Moderate impact to existing Local and Regional services, 450mm regional WTM along Christian Street, Charlotta Street, Mill Street, Charles and Foundry. Large portion of Foundry Street services potentially impacted. | 8 | Minimal impact to existing Local and Regional services, 450mm regional WTM along Christian Street, Charlotta Street, and Gingerich Road. | 10 | Least impact to existing local services, 450mm regional WTM present along Christian Street and Gingerich Road. |
| Municipal Infrastructure | Wasterwater Pumping Stations<br>Noise Wall | 1 | Similar to A2, requires and additional pumping station in Parcel O | 5 | No additional pumping station required, Baden West WWPS will remain, School WWPS to ultimately be decommissioned. Noise wall stays on Charlotta Street. | 8 | Baden West WWPS and School WWPS to be decommissioned, noise wall removed on Charlotta Street | 9 | Baden West WWPS and School WWPS to be decommissioned (1 total pumping station), noise wall removed on Charlotta Street | 10 | Baden West WWPS and School WWPS to be decommissioned (1 total pumping station), noise wall removed on Charlotta Street |
| Utilities (Bell, Hydro, Gas) | Degree of exposure of utilities and/or utility conflicts with road design. | 1 | Impact along regional roads, transmission line to local neighbourhoods, hydro lines along farm road | 2 | Impact along regional roads, transmission line to local neighbourhoods | 5 | Impact along regional and local roads, including transmission line to local neighbourhoods | 8 | Impact along some local roads | 10 | Impact along 1 local road |
| | Normalized Factor Group Score | 1.7 | | 2.7 | | 6.3 | | 8.3 | | 10.0 | |
| | **TOTAL CATEGORY SCORE** | 1.5 | | 2.2 | | 6.2 | | 7.9 | | 9.6 | |
| | **% BEHIND FIRST RANKED ALIGNMENT** | 85% | | 77% | | 36% | | 18% | | 0% | |
| | **CATEGORY RANKING** | 5 | | 4 | | 3 | | 2 | | 1 | |
| **4. FINANCIAL** | | | | | | | | | | | |
| Capital Cost | Total Construction costs | 1 | $8,222,525 (1800m & 1554m forcemain of pipes, pumping station, 2 trenchless crossings) | 7 | $5,741,535 (1800m of pipe, 1 trenchless crossing) | 8 | $5,142,061 (~1985m of pipe, 1 trenchless crossing) | 9 | $4,837,808 (~2095m of pipe, 3 trenchless crossings) | 10 | $3,564,104 (1905m of pipe, 3 trenchless crossings) |
| Operational Cost (Sanitary sewer) | Operational costs due to traffic during maintenance, pumping station | 1 | Traffic costs during maintenance, 4 pumping stations, maintenance of right-of-ways. | 5 | Traffic costs during maintenance, 2 pumping stations, maintenance of right-of-ways. | 6 | Traffic costs during maintenance.1 pumping station, maintenance of right-of-ways. | 8 | Traffic control during maintenance, 1 pumping station, maintenance of right-of-ways. | 10 | Traffic control during maintenance, 1 pumping station, maintenance of right-of-ways. |
| | Normalized Factor Group Score | 1.0 | | 6.0 | | 7.0 | | 8.5 | | 10.0 | |
| | **TOTAL CATEGORY SCORE** | 1.0 | | 6.0 | | 7.0 | | 8.5 | | 10.0 | |
| | **% BEHIND FIRST RANKED ALIGNMENT** | 90% | | 40% | | 30% | | 15% | | 0% | |
| | **CATEGORY RANKING** | 5 | | 4 | | 3 | | 2 | | 1 | |
| **5. TECHNICAL** | | | | | | | | | | | |
| Constructability | Physical constructability (adequate access to construction area).<br>Potential conflicts with existing infrastructure (other than utilities).<br>Depth, trenchless crossings<br>Water Table and groundwater dewatering (short term impact). | 1 | Similar to A2 with additional trenchless crossing north of Snyder's Road West. | 2 | Entirety of construction within two Regional Roads Foundry Street and Snyder's Road West. Trenchless railway crossing at intersection will be very complex. 2 open cut trenches along Foundry Street. | 6 | Alignment is located within the most local right-of-ways, narrow widths and deep sewer depth incrase complexity of alignment. Two open cut crossings along Regional Road Foundry Street. Dewatering and flow rerouting required. Trenchless crossing at Mill Street considered easiest of the 5 alternatives. | 9 | Similar to A5, but additional alignment is present within local roads, and less with the agricultural lands. Potential interaction with wetlands MAM2 and MAM2-2. Trenchless crossing at Tributary A is closer to Baden Creek than A5. | 10 | Large portion of the alignment is within agricultural lands at minimal depths. ease of access throughout lands. Narrow ROW on Christian Street paired with deep trunk sewer leads to a complex installation of Trunk, including complete removal and replacement of local sewer down Christian (minimal), regional 450mm watermain down Christian St. and Charlotta St., railway and 2 stream crossings. |
| Trenchless (Constructability and Complexity) | The complex issues associated with the construction of the trunk sewer. | 1 | Requires a 60m trenchless railway crossing at the intersection of Snyder's Road West and Foundry Street. Railway has a narrow right-of-way through the intersection requiring sending and receiving pits to be located outside of intersection. Two additional sewer connections at intersection. Requires an additional 20m trenchless forcemain stream crossing north of Snyder's Road East. | 3 | Requires a 60m trenchless railway crossing at the intersection of Snyder's Road West and Foundry Street. Railway has a narrow right-of-way through the intersection requiring sending and receiving pits to be located outside of intersection. Two additional sewer connections at intersection. | 10 | Requires 40m of trenchless piping for the railway crossing. Though a deep trench, it provides the straightest, most direct installation, sufficient clearance for sending and receiving pits. No trenchless stream crossings required. | 8 | Requires 95m of trenchless piping for the railway crossing and 2-30m trenchless stream crossing. The railway right-of-way is wider to accommodate for spur line. The trenchless connection will pass directly under a local wetland and second wetland is in close proximity to the sending pit. Trenchless stream crossing upstream of existing culvert north of Gingerich Road. | 9 | Requires a 60m trenchless railway crossing and 2 trenchless stream crossing (1-40m, 1-30m). This alignment has back to back sending and receiving pits for the railway crossing and the crossing along Tributary A. No groundwater interaction at trenchless location. Trenchless stream crossing upstream of existing culvert north of Gingerich Road. |
| Property (Land/acquisition) | Property requirements (number, area) and ease of acquisition | 1 | Understanding with the property owner that arrangements will be made regarding securing the land for the pumping station. Uncertainty surrounding securing the right-of-way along the private farm road. | 10 | No land acquisition required, fully within existing right-of-ways | 9 | No land acquisition required, fully within existing right-of-ways | 8 | Understanding with the property owners that arrangements will be made regarding securing the right-of-way through open areas. Larger area to secure than Alternative 4. | 7 | Understanding with the property owners that arrangements will be made regarding securing the right-of-way through open areas. Larger area to secure than Alternative 4. |
| Serviceability (Long-term) | Percentage of Baden to be serviced by Trunk sewer. | 1 | Will service approximately 75% of Baden | 5 | Will service approximately 80% of Baden | 7 | Will service approximately 94% of Baden | 9 | Will service approximately 100% of Baden & Foxboro | 10 | Will service approximately 100% of Baden & Foxboro |
| | Normalized Factor Group Score | 1.0 | | 5.0 | | 8.0 | | 8.5 | | 9.0 | |
| | **TOTAL CATEGORY SCORE** | 1.0 | | 5.0 | | 8.0 | | 8.5 | | 9.0 | |
| | **% BEHIND FIRST RANKED ALIGNMENT** | 89% | | 44% | | 11% | | 6% | | 0% | |
| | **CATEGORY RANKING** | 90% | | 4 | | 3 | | 2 | | 1 | |
| | **GRAND TOTAL** | **9** | | **23** | | **34** | | **38** | | **47** | |
| | **% BEHIND FIRST RANKED ALIGNMENT** | **80.2%** | | **49.6%** | | **28.0%** | | **18.4%** | | **0.0%** | |
| | **CATEGORY RANKING** | **5** | | **4** | | **3** | | **2** | | **1** | |

# Appendix F

# Detailed Evaluation Matrix

## PRELIMINARY EVALUATION CRITERIA - BADEN SANITARY TRUNK

| Factor Category / Factor Group / Factor | | Alternative | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | A1 | | A2 | | A3 | | A4 | | A5 | |
| Date: November 2022 | Description | Modified 2014 Environmental Assessment Preferred Alternative (Do Nothing) | | Snyder's/Foundry | | Christian/Charlotta/Mill/Charles/Foundry | | Christian/Charlotta/Queen and Baden Creek | | Christian and Baden Creek | |
| | | Score | Comments | Score | Comments | Score | Comments | Score | Comments | Score | Comments |
| **1. NATURAL ENVIRONMENT** | | | | | | | | | | | |
| **1.A Terrestrial Ecosystems** | | | | | | | | | | | |
| Vegetation Communities and Flora | Impact on feature and function of vegetation communities and flora<br>-ecological significance (type, size, composition, species of conservation concern)<br>-sensitivity/ susceptibility (e.g., mortality, stress, composition change). | 4 | Impact along Foundry St, near pond and area N. of Snyder's Rd West. Consruction of segments may impact CUW1, CUM1. Indirect potential impacts to CUT1 and areas near SUM1 unless properly mitigated. | 10 | Negligible impacts to natural features along Foundry St. and Snyder's Road W. | 8 | Similar to Option A2, except more potential impacts along Charlotta St and Foundry St (CUM1) during construction to regionally significant Running Serviceberry if not properly mitigated. | 1 | Largest extents of construction within natural areas. Temporary disturbances to CUM1 meadow. Construction is in proximity to FOD7-3, potential edge tree removal and tree root disturbance, regionally significant Running Serviceberry disturbance. | 5 | Traverses near less meadow area than A5. Potential fringe impact to CUM1 and FOD7-3, depending on surveyed alignment. |
| Wildlife Habitat | Impact on feature and function of wildlife habitat<br>-significance (e.g., size, presence of specialized habitat elements, species of conservation concern)<br>-sensitivity (e.g., noise, light)<br>Effects on wildlife movement corridors (e.g., habitat removal, fragmentation, potential increases in animal-vehicle conflicts). | 1 | Anticipated but unknown impacts to wildlife north of Snyder's Rd W within wetlands which were not part of the NEA (impacts therefore considered potentially significant to wildlife). Potential tree removals in CUW1 required which may house SAR bats. Potential impact to Turtle Wintering Areas in Baden Creek Pond habitat due to dewatering. | 6 | Similar impacts to Baden Creek habitats as A1 and A3. | 5 | Similar impacts to Baden Creek habitats as A1 and A2. A3 scored slighlty lower than A2 due to construction dewer depth and extent of work. | 4 | Largest extent of construction within natural areas. Impacts to amphibian breeding habitat (MAM2-2). Closest impact to forested area, potential disturbance to SAR bat habitats (FOD7-3). Temporary impacts to habitats within CUM1. | 10 | Algment runs along outer boundary of wildlife corridor. No impacts to wetland habitats. Less impacts to CUM1 habitats than A4. Potential tree removals in CUW1 required which may house SAR bats. |
| | Normalized Factor Group Score | 2.5 | | 8.0 | | 6.5 | | 2.5 | | 7.5 | |
| **1.B Wetland Ecosystems** | | | | | | | | | | | |
| Wetlands | Impact on feature and function of wetlands (e.g., area, classification and quality, relative extent, function in broader wetland complex ecosystem). | 1 | Construction of sewer north of Snyder's Road West & Foundry Street may directly impact Locally Significant Wetland feature. Potential indirect impacts to adjacent meadow marsh unless mitigated. Construction may disrupt local drainage regime and hydrological conditions that support the wetland. | 8 | No impact to wetlands. Alignment is in slight proximity to Locally Significant Wetland north of Snyder's Road West & Foundry Street. | 9 | No impact to wetlands. Alignment is in slight proximity to MAM2. | 4 | Construction directly impacts wetlands MAM2 & MAM2-2 due to proximity during construction. May impact surface drainage catchments and impair water quality unless properly mitigated. | 10 | Does not impact wetlands. |
| | Normalized Factor Group Score | 1.0 | | 8.0 | | 9.0 | | 4.0 | | 10.0 | |
| **1.C Aquatic Ecosystems** | | | | | | | | | | | |
| Aquatic Habitat | -Number of water bodies and watercourse crossings.<br>-Sensitivity of fish/fish habitat and thermal regime (warm, cool or cold water).<br>-Extent (area) and function of riparian habitat removed.<br>-Extent and type of fish habitat (in-stream) altered/displaced in watercourse, including importance to aquatic ecosystem (e.g. spawning, nursery areas, habitat for species of conservation concern or less tolerant species). | 1 | 3 watercourse crossings; a stream crossing north of Snyder's Road West to Tributary B, a stream crossing to Baden Creek Pond, a cold water stream crossing at Huehn Award Drain. All watercourses provide aquatic habitat, subject to federal *Fisheries Act* . Crossings require fish capture and relocation during construction, watercourses need isolation and de-watering, water quality treatment, etc.. | 4 | 2 watercourse crossings; a stream crossing to Baden Creek Pond, a cold water stream crossing at Huehn Award Drain. | 3 | 2 watercourse crossings; a stream crossing to Baden Creek Pond, a cold water stream crossing at Huehn Award Drain. Al is a slighlty deeper crossing than A2. | 7 | 2 watercourse crossings: a stream crossing at Gingerich Road, a stream crossing at Baden Creek Tributary A upstream of the confluence. Tributary A identified as intermittent flow with no groundwater interaction, may be accessible to fish. Potential to construct through tributary during period of no flows. Trenchless installation to be utilized for both crossings.Tributary A crossing is closer to Baden Creek than A5. | 10 | 2 watercourse crossings: a stream crossing at Gingerich Road, a stream crossing at Baden Creek Tributary A upstream of the confluence. Tributary A identified as intermittent flow with no groundwater interaction, may be accessible to fish. Potential to construct through tributary during period of no flows. Trenchless installation to be utilized for both crossings. |
| | Normalized Factor Group Score | 1.0 | | 4.0 | | 3.0 | | 7.0 | | 10.0 | |
| **1.D Surface Water (Quality - Impact to Water Quality / Thermal / Chlorides)** | | | | | | | | | | | |
| Water Quality | Impact on water quality of surface water features (TSS, gas/oil fueling, construction operations). | 1 | Similar to A2 with additional upstream impacts at stream crossing north of Snyder's Road West, increased risk of surface water impacts adjacent to Locally Signficant Wetland. All ultimately can increase TSS levels in Baden Creek unless properly mitigated. | 3 | Two open cut stream culvert crossings at the Baden Creek Pond Tributary B and Huehn Award Drain. Flow rerouting and dewatering required to prevent increased flows. Increased potential for contaminated sediments from the Regional Roadway to enter Baden Creek Pond and Baden Creek. | 2 | Similar to A2 with deeper sanitary sewer depths, further potential impacts during construction. | 8 | Similar to A5, but trenchless crossing is closer to Baden Creek. Increased potential impacts to water quality, | 10 | Proposed trenchless crossing at Baden Creek Tributary A is an intermittent flow tributary with no evidence of groundwater interaction, no dewatering required during construction. No anticipated impacts at the trenchless crossing underneath the culvert at Gingerich. |
| Thermal Regime | Impact in the thermal regime of surface water features. | 1 | Similar to A2 with additional upstream impacts at stream crossing north of Snyder's Road West. Additional dewatering and construction can ultimately can affect thermal regime in Baden Creek Pond and HAD. | 3 | Close proximity to HAD which provides coldwater in support of cool water habitat in Baden Creek Pond. Pond has GW connectivity as well, where dewatering during construction can affect thermal regime. Potential impact to vegetation that regulates temperature in Baden Creek | 2 | Similar to A2 with deeper sanitary sewer depths, further potential impacts during construction. | 8 | Similar to A5, but trenchless crossing is closer to Baden Creek. Increased potential impacts to thermal regime. | 10 | No impact on Baden Creek Pond and Huehn Award Drain. Trenchless crossing on intermittent tributary,, no groundwater interaction/impact to thermal regime |
| Chlorides | Impact on water quality of surface water features. | 10 | Not Significant | 10 | Not Significant | 10 | Not Significant | 10 | Not Significant | 10 | Not Significant |
| | Normalized Factor Group Score | 4.0 | | 5.3 | | 4.7 | | 8.7 | | 10.0 | |
| **1.E Groundwater Resources** | | | | | | | | | | | |
| Regional Recharge Areas (Groundwater) | Encroachment into the Regional Recharge Area. (removal/disruption of function – area; depth). | 1 | Similar to A2 and A3 with respect to HAD, with additional proximity to recharge areas near pump station within Parcel O. | 7 | Close proximity to HAD, which is connected to the Regional Recharge Area, depth of trunk may affect GW | 6 | Similar to A2, but sewer is deeper under the HAD. | 9 | Similar to A5, alignment is slighlty closer to regional recharge area. | 10 | Alignment is furthest away from recharge areas. BH sample shows no sand layer as that of the regional recharge area, will not draw groundwater |
| Groundwater Quality - Clean Water Act (WHPA, SGRA, IPZ, HVA) | Potential for impacts to vulnerable areas (Area) as defined in Source Water Protection Areas (SWPA). | 1 | Closest proximity to WHPA north of Parcel O | 5 | Similar to A3 | 6 | WHPA location to the east | 9 | Similar to A5, alignment is slighlty closer to WHPAs and SGRAs. | 10 | Furthest alignment from WHPA location to east, does not affect it |
| Shallow Groundwater Movement/Contributions (Quality and Quantity) | Potential for interference with existing flow patterns (baseflow) relative to proximity to significant surface water feature and significant groundwater feature discharge areas. Consider Short-Term Impact.Regional shallow gw elevation 346m - 353m | 1 | Shallow forcemain from pump station and stream crossing N of Snyder's Road West, may affect Baden Creek Pond and HAD. Largest extent of construction and potential impacts to groundwater. | 5 | May affect Baden Creek Pond and HAD during construction. | 4 | Proximity to wetland MAM2, may affect Baden Breek Pond and HAD during construction due to depth of sewer. | 2 | Close proximity to wetland MAM2 and MAM2-2, tributary crossing at fish habitat location. | 10 | No evidence of GW interaction at Baden Creek tributary A stream crossing, no sand layer in stream crossing at Gingerich Road. GW impacts minimal/negligible. |
| | Normalized Factor Group Score | 1.0 | | 5.7 | | 5.3 | | 6.7 | | 10.0 | |
| **1.F Surface Drainage (Quantity - Erosion)** | | | | | | | | | | | |
| Quantity (flows) | Quantity Control and Flow Regime | 7 | Impacts flows at Baden Creek Tributary B, Baden Creek Pond and Huehn Award Drain crossings. Tributary B is trenchless, others are open cut which requires stream diversion. Mitigation required for sediment control and flow rate. | 6 | Impacts flows at Baden Creek Pond and Huehn Award Drain crossings. Crossings are open cut and requires stream diversion. Mitigation required for sediment control and flow rate. Deeper trench than A1 | 1 | Impacts flows at Baden Creek Pond and Huehn Award Drain crossings. Crossings are open cut and requires stream diversion, mitigation required for sediment control and flow rate. Significantly deeper trench than A2 | 8 | Trenchless railway crossing occuring through a sand layer near local wetlands and section between trenchless crossing and Queen Street may result in potential dewatering and rerouting to Baden Creek. No anticipated change to flow regime due to tenchless crossing north of Gingerich Road. | 10 | No change to flow regime due to tenchless crossings at Baden Creek Tributary A and Gingerich Road. No dewatering or flow rerouting anticipated. |
| Floodplain Function | Impacts to Regulatory Floodplain and changes to floodplain hydrologic function. (During Construction), including need for GRCA work permit | 7 | Minimal impact to floodplain due to (2) stream crossings occuring along road right-of-way. Imapct to floodplain at stream crossing north of Snyder's Road East. | 10 | Minimal impact to floodplain due to (2) stream crossings occuring along road right-of-way | 9 | Minimal impact to floodplain boundary & impacts GRCA floodplain boundary, closest to floodplain near forest, impact at 2 stream crossing | 1 | Alignment along floodplain boundary & impacts GRCA floodplain boundary, impact at 2 stream crossing | 6 | Alignment along floodplain boundary & impacts GRCA floodplain boundary, impact at 2 stream crossing |
| Stormwater Management | Opportunities to enhance roadway stormwater management measures, including coordination withluse of adjacent development facilities. | 10 | Not Significant | 10 | Not Significant | 10 | Not Significant | 10 | Not Significant | 10 | Not Significant |
| Water Balance | Chanoes to water balance due to develooment | 10 | Not Sionificant | 10 | Not Sionificant | 10 | Not Sionificant | 10 | Not Sionificant | 10 | Not Sionificant |
| Erosion Assessment | Impact on Slope stability due to stream disturbances and from increased TSS during construction. | 1 | Two open cut stream crossings along Foundry Street at the Baden Creek pond and Huehn Award Drain, additional upstream trenchless crossing at Baden Creek Tributary B, mitigation required to prevent increased TSS loading and erosion prevention | 4 | Two open cut stream crossings along Foundry Street at the Baden Creek pond and Huehn Award Drain, mitigation required to prevent increased TSS loading and erosion prevention | 3 | Similar to A2, but sewer is deeper under the HAD, furher erosion potential | 9 | Similar to A5, trenchless crossing closer to Baden Creek than A5. | 10 | Two trenchless crossings. No dewatering anticipated, so less erosion concerns are present. Erosion setbacks present, construction to take place outside buffer where possible. |
| | Normalized Factor Group Score | 7.0 | | 8.0 | | 6.6 | | 7.6 | | 9.2 | |
| | **TOTAL CATEGORY SCORE** | 2.8 | | 6.5 | | 5.9 | | 6.1 | | 9.5 | |
| | **% BEHIND FIRST RANKED ALIGNMENT** | 71% | | 31% | | 38% | | 36% | | 0% | |
| | **CATEGORY RANKING** | 5 | | 2 | | 4 | | 3 | | 1 | |
| **2. SOCIO-CULTURAL ENVIRONMENT** | | | | | | | | | | | |
| **2.A Land Use Policy** | | | | | | | | | | | |
| Land Use Designations and Policies | Aligned with Provincial, Regional and Township growth and development goals, objectives or policies (high, medium, low).<br>Upper tier and lower tier infrastructure and corridor owner.<br>Efficiency of resulting development patterns and timing. | 1 | Least compatibe due to timing and prioritization of regional projects (2 separate regional projects, 1 local project). In addition, temporary disturbance to access for local agricultural operation north of Snyder's Road. Does not fully integrate Township's plan to join Baden and New Hamburg servicability. | 2 | Similar to A3, except 2 Regional projects required to facilitate this alignment. Lower scoring due to complexity of Regional projects. | 4 | Low degree of compatibility due to timing and prioritization of regional projects combined with local projects (1 regional project, 1 local project), does not fully integrate Township's plan to join Baden and New Hamburg servicability. | 10 | Autonomy to implement infrastructure improvement without upper tier regulations formulating development and growth independently | 8 | Similar to A4, longer construction time within Schmidt Lands (Parcel AA) and disruption to agricultural lands, impact to growing season |
| Impact of the Sanitary Sewer on Adjacent Lands | Impacts to residence and businesses | 1 | Impacts adjacent residential properties and busisess along major regional roads Foundry Street and Snyder's Road West. | 2 | Impacts adjacent residential properties and busisess along major regional roads Foundry Street and Snyder's Road West. | 4 | Impacts several residential properties along local roads Christian Street, Charlotta Street, Mill Street, Charles Street. Impacts businesses and residents along Foundry Street Regional Road. | 8 | More residential properties impacted than A5 along Christian Street and Charlotta Street. Coordination required with Schmidt Lands. | 10 | Least amount of properties impacted primarily along Christian Street. Coordination required with Schmidt Lands. |
| | Normalized Factor Group Score | 1.0 | | 2.0 | | 4.0 | | 9.0 | | 9.0 | |
| **2.B Archaeological Resources** | | | | | | | | | | | |
| Known and/or Potential Archaeolobgical Sites | Number/type/significance of direct/indirect impacts to known archaeological resources and/or areas of high archaeological potential. | 8 | Furthest and shallowest from found artifact, Baden Creek is a barrier to artifact location | 10 | Furthest from found artifact but not as shallow, Baden Creek is a barrier to artifact location | 9 | Furthest and deepest from found artifact, Baden Creek is a barrier to artifact location | 1 | Alignment impacts the 50m monitoring buffer at Findspot-16 Findspot-18 and construction may impact AiHk-469 50m monitoring buffer. | 5 | Alignment impacts the monitoring 50m buffer at Findspot-16 Findspot-18 |
| | Normalized Factor Group Score | 8.0 | | 10.0 | | 9.0 | | 1.0 | | 5.0 | |
| **2.C Built Heritage** | | | | | | | | | | | |
| Built Heritage Features | Number/type/significance of direct/indirect impacts to built heritage resources (based on presence of built heritage resources identified by the Region of Waterloo). | 2 | Construction will affect scenic routes along Snyder's Road West and Foundry Street; Adjacent to 4 listed and 2 designated properties listed on OHA | 1 | Similar to A1, but road closures anticipated to be longer due to depth of sewers | 5 | Construction will affect scenic route along Foundry Street; Adjacent to 4 listed and 2 designated properties listed on OHA | 9 | Similar to A5, alignment is closer in proximity to 130 Queen Street | 10 | No direct impacts to heritage properties or OHA, alignment is near one listed property: 130 Queen Street |
| | Normalized Factor Group Score | 2.0 | | 1.0 | | 5.0 | | 9.0 | | 10.0 | |
| **2.D Noise** | | | | | | | | | | | |
| Noise | Noise impacts due to addition/removal of wastewater pumping stations (weps) | 1 | Noise from additional weps, noise wall remains at Baden West WWPS | 2 | No additional weps, noise wall remains at Baden West WWPS | 8 | Removal of noise wall and Baden West WWPS | 9 | Removal of noise wall and Baden West WWPS | 10 | Removal of noise wall and Baden West WWPS |
| | Normalized Factor Group Score | 1.0 | | 2.0 | | 8.0 | | 9.0 | | 10.0 | |
| | **TOTAL CATEGORY SCORE** | 3.0 | | 3.8 | | 6.5 | | 7.0 | | 8.5 | |
| | **% BEHIND FIRST RANKED ALIGNMENT** | 65% | | 56% | | 24% | | 18% | | 0% | |
| | **CATEGORY RANKING** | 5 | | 4 | | 3 | | 2 | | 1 | |
| **3. TRANSPORTATION/MUNICIPAL SERVICES AND UTILITIES** | | | | | | | | | | | |
| **3.A Transportation Network (Roads and Pedestrians)** | | | | | | | | | | | |
| Roads and Intersections | Potential impacts to roads/intersections. | 1 | Similar to A2, additional impact to private farm road access north of Snyder's Road East | 2 | 2 regional roads, 11 road intersection, major intersection impact of Snyder's Road West and Foundry Street | 5 | Christian Street, Charlotta Street, Mill Street, Carles Street, large portion of Foundry Street (Regional) / 11 intersections | 8 | Christian Street, larger portion of Charlotta than A5, Queen Street, portion of Gingerich Road, portion of Foundry Street (Regional) / 8 intersections | 10 | Christian Street, portion of Charlotta, portion of Gingerich Road, portion of Foundry Street (Regional) / 3 intersections |
| Traffic Operations | Road safety and accessibility (sight distance; turning movements).<br>Capacity/capability to accommodate forecast traffic demand.<br>Provides for appropriate access to existing properties. Impact on access to existing properties. | 1 | Similar to A2, additional impacts to farm lane access at Snyder's Road/Foundry intersection. | 2 | Impedes traffic along two Regional Roads Foundry Street and Snyder's Road West. Significant temporary traffic operations routing through local roads required during construction. | 4 | Impedes traffic along the most local roads (4: Christian Street, Charlotta Street, Mill Street, Charles Street) and a portion of Regional Road Foundry Street. 11 intersections will have line of sight affected during construction. Additional arrangements required for Township's Fire Hall at Foundry Street during construction. | 9 | Impedes slighlty more traffic than A5 along Charlotta Street and Queen Street. Impedes access to more homes than A5. 8 intersections will have sightline affected. | 10 | Impedes the least amount of traffic throughout construction. Narrow local right of ways, construction will impact entirety of roadway. 3 intersections will have sightline affected. Least amount of homes have access affected. |
| Transportation policy initiatives | Capability to support municipal policy initiatives (transit, active transportation, roundabouts). | 1 | Transit obstruction for bus service to and from Kitchener (bus line 77-intersection of Snyder's Rd W & Foundry St), additional obstruction of access along Farm Road | 2 | Transit obstruction for bus service to and from Kitchener (bus line 77-intersection of Snyder's Rd W & Foundry St). | 5 | Minimal impact to local transit, will affect access to several residential properties in neighborhoods and along Foundry Street. No direct impact to trnasit routes. | 8 | Similar to A5 with addition impacts to Charlotta Street and Queen Street. No direct impact to transit routes. | 10 | Least potential transit obstructions (Kiwanis transit) only affects Christian Street and small portion of Charlotta Street, will affect access to residential properties in neighborhoods. No direct impact to trnasit routes. |
| Railroad Crossing | Ease of railroad crossing, approval | 2 | Significant trench required through main intersection of Snyder's Road W and Foundry Street crossing | 1 | Similar to A1 but deeper trench required. | 10 | Easiest trench crossing to construct at local road (Mill St.) | 5 | Trench crossing at local road (Queen St.), will cross two widths of railway to address additional railway directed to private business (75 Charles Street). Trench is in close proximity to wetland MAM2 and cultersal woodland CUE1 | 7 | Trench crossing will cross railway as well as Baden Creek Tributary A. Tributary A is ephemeral, no complications anticipated if constructed during dry period. |
| | Normalized Factor Group Score | 1.3 | | 1.8 | | 6.0 | | 7.5 | | 9.3 | |
| **3.B Municipal Services and Utilities** | | | | | | | | | | | |
| Municipal Services (sanitary, water, storm) | Opportunities for connections to the broader sanitary system.<br>Impacts to existing sanitary, water, & storm infrastructure during construction.<br>Undermines existing infrastructure. | 3 | Major impact to existing Regional infrastructure | 1 | Similar to A1 but deeper sanitary sewer alignment leads to larger potential impact to existing services | 6 | Moderate impact to existing Local and Regional services, 450mm regional WTM along Christian Street, Charlotta Street, Mill Street, Charles and Foundry. Large portion of Foundry Street services potentially impacted. | 8 | Minimal impact to existing Local and Regional services, 450mm regional WTM along Christian Street, Charlotta Street, and Gingerich Road. | 10 | Least impact to existing local services, 450mm regional WTM present along Christian Street and Gingerich Road. |
| Municipal Infrastructure | Wasterwater Pumping Stations<br>Noise Wall | 1 | Similar to A2, requires and additional pumping station in Parcel O | 5 | No additional pumping station required, Baden West WWPS will remain, School WWPS to ultimately be decommissioned. Noise wall stays on Charlotta Street. | 8 | Baden West WWPS and School WWPS to be decommissioned, noise wall removed on Charlotta Street | 9 | Baden West WWPS and School WWPS to be decommissioned (1 total pumping station), noise wall removed on Charlotta Street | 10 | Baden West WWPS and School WWPS to be decommissioned (1 total pumping station), noise wall removed on Charlotta Street |
| Utilities (Bell, Hydro, Gas) | Degree of exposure of utilities and/or utility conflicts with road design. | 1 | Impact along regional roads, transmission line to local neighbourhoods, hydro lines along farm road | 2 | Impact along regional roads, transmission line to local neighbourhoods | 5 | Impact along regional and local roads, including transmission line to local neighbourhoods | 8 | Impact along some local roads | 10 | Impact along 1 local road |
| | Normalized Factor Group Score | 1.7 | | 2.7 | | 6.3 | | 8.3 | | 10.0 | |
| | **TOTAL CATEGORY SCORE** | 1.5 | | 2.2 | | 6.2 | | 7.9 | | 9.6 | |
| | **% BEHIND FIRST RANKED ALIGNMENT** | 85% | | 77% | | 36% | | 18% | | 0% | |
| | **CATEGORY RANKING** | 5 | | 4 | | 3 | | 2 | | 1 | |
| **4. FINANCIAL** | | | | | | | | | | | |
| Capital Cost | Total Construction costs | 1 | $8,222,525 (1800m & 1554m forcemain of pipes, pumping station, 2 trenchless crossings) | 7 | $5,741,535 (1800m of pipe, 1 trenchless crossing) | 8 | $5,142,061 (~1985m of pipe, 1 trenchless crossing) | 9 | $4,837,808 (~2095m of pipe, 3 trenchless crossings) | 10 | $3,564,104 (1905m of pipe, 3 trenchless crossings) |
| Operational Cost (Sanitary sewer) | Operational costs due to traffic during maintenance, pumping station | 1 | Traffic costs during maintenance, 4 pumping stations, maintenance of right-of-ways. | 5 | Traffic costs during maintenance, 2 pumping stations, maintenance of right-of-ways. | 6 | Traffic costs during maintenance.1 pumping station, maintenance of right-of-ways. | 8 | Traffic control during maintenance, 1 pumping station, maintenance of right-of-ways. | 10 | Traffic control during maintenance, 1 pumping station, maintenance of right-of-ways. |
| | Normalized Factor Group Score | 1.0 | | 6.0 | | 7.0 | | 8.5 | | 10.0 | |
| | **TOTAL CATEGORY SCORE** | 1.0 | | 6.0 | | 7.0 | | 8.5 | | 10.0 | |
| | **% BEHIND FIRST RANKED ALIGNMENT** | 90% | | 40% | | 30% | | 15% | | 0% | |
| | **CATEGORY RANKING** | 5 | | 4 | | 3 | | 2 | | 1 | |
| **5. TECHNICAL** | | | | | | | | | | | |
| Constructability | Physical constructability (adequate access to construction area).<br>Potential conflicts with existing infrastructure (other than utilities).<br>Depth, trenchless crossings<br>Water Table and groundwater dewatering (short term impact). | 1 | Similar to A2 with additional trenchless crossing north of Snyder's Road West. | 2 | Entirety of construction within two Regional Roads Foundry Street and Snyder's Road West. Trenchless railway crossing at intersection will be very complex. 2 open cut trenches along Foundry Street. | 6 | Alignment is located within the most local right-of-ways, narrow widths and deep sewer depth incrase complexity of alignment. Two open cut crossings along Regional Road Foundry Street. Dewatering and flow rerouting required. Trenchless crossing at Mill Street considered easiest of the 5 alternatives. | 9 | Similar to A5, but additional alignment is present within local roads, and less with the agricultural lands. Potential interaction with wetlands MAM2 and MAM2-2. Trenchless crossing at Tributary A is closer to Baden Creek than A5. | 10 | Large portion of the alignment is within agricultural lands at minimal depths. ease of access throughout lands. Narrow ROW on Christian Street paired with deep trunk sewer leads to a complex installation of Trunk, including complete removal and replacement of local sewer down Christian (minimal), regional 450mm watermain down Christian St. and Charlotta St., railway and 2 stream crossings. |
| Trenchless (Constructability and Complexity) | The complex issues associated with the construction of the trunk sewer. | 1 | Requires a 60m trenchless railway crossing at the intersection of Snyder's Road West and Foundry Street. Railway has a narrow right-of-way through the intersection requiring sending and receiving pits to be located outside of intersection. Two additional sewer connections at intersection. Requires an additional 20m trenchless forcemain stream crossing north of Snyder's Road East. | 3 | Requires a 60m trenchless railway crossing at the intersection of Snyder's Road West and Foundry Street. Railway has a narrow right-of-way through the intersection requiring sending and receiving pits to be located outside of intersection. Two additional sewer connections at intersection. | 10 | Requires 40m of trenchless piping for the railway crossing. Though a deep trench, it provides the straightest, most direct installation, sufficient clearance for sending and receiving pits. No trenchless stream crossings required. | 8 | Requires 95m of trenchless piping for the railway crossing and 2-30m trenchless stream crossing. The railway right-of-way is wider to accommodate for spur line. The trenchless connection will pass directly under a local wetland and second wetland is in close proximity to the sending pit. Trenchless stream crossing upstream of existing culvert north of Gingerich Road. | 9 | Requires a 60m trenchless railway crossing and 2 trenchless stream crossing (1-40m, 1-30m). This alignment has back to back sending and receiving pits for the railway crossing and the crossing along Tributary A. No groundwater interaction at trenchless location. Trenchless stream crossing upstream of existing culvert north of Gingerich Road. |
| Property (Land/acquisition) | Property requirements (number, area) and ease of acquisition | 1 | Understanding with the property owner that arrangements will be made regarding securing the land for the pumping station. Uncertainty surrounding securing the right-of-way along the private farm road. | 10 | No land acquisition required, fully within existing right-of-ways | 9 | No land acquisition required, fully within existing right-of-ways | 8 | Understanding with the property owners that arrangements will be made regarding securing the right-of-way through open areas. Larger area to secure than Alternative 4. | 7 | Understanding with the property owners that arrangements will be made regarding securing the right-of-way through open areas. Larger area to secure than Alternative 4. |
| Serviceability (Long-term) | Percentage of Baden to be serviced by Trunk sewer. | 1 | Will service approximately 75% of Baden | 5 | Will service approximately 80% of Baden | 7 | Will service approximately 94% of Baden | 9 | Will service approximately 100% of Baden & Foxboro | 10 | Will service approximately 100% of Baden & Foxboro |
| | Normalized Factor Group Score | 1.0 | | 5.0 | | 8.0 | | 8.5 | | 9.0 | |
| | **TOTAL CATEGORY SCORE** | 1.0 | | 5.0 | | 8.0 | | 8.5 | | 9.0 | |
| | **% BEHIND FIRST RANKED ALIGNMENT** | 89% | | 44% | | 11% | | 6% | | 0% | |
| | **CATEGORY RANKING** | 90% | | 4 | | 3 | | 2 | | 1 | |
| | **GRAND TOTAL** | **9** | | **23** | | **34** | | **38** | | **47** | |
| | **% BEHIND FIRST RANKED ALIGNMENT** | **80.2%** | | **49.6%** | | **28.0%** | | **18.4%** | | **0.0%** | |
| | **CATEGORY RANKING** | **5** | | **4** | | **3** | | **2** | | **1** | |

# Appendix G

# Preliminary Plan and Profile Drawings and Design Sheet

# BADEN - NEW HAMBURG SANITARY SERVICING

**(ALTERNATIVE #5)**

**TOWNSHIP OF WILMOT, Ontario**

Project Number: 48730-104
Date: November 9, 2022
Design By: AJC
Checked By: JEM
File: Q:\48730\100\SAN\48730-100 ALT 5 Sanitary Servicing Strategy.xls

## SANITARY SEWER DESIGN SHEET
## ( 60 Ppha )
## ENGINEERING AND PUBLIC WORKS

**Design Parameters**

Average Daily Flow: 0.0032 L/s/c

Commercial 0.95 L/s/ha
Industrial 0.40 L/s/ha
Inst. / School 0.25 L/s/ha

Mannings "*n*" 0.0130
Min. Velocity 0.6 m/sec
Max. Velocity 3.0 m/sec
Residential Harmon Peaking Factor (F)
Residential Areas Infiltration 0.25 L/s/ha

| LOCATION | | | | RESIDENTIAL AREAS and POPULATION | | | | | | SCHOOL, INSTITUTIONAL | | | COMMERCIAL | | | INDUSTRIAL | | | | INFILTRATION | | | DESIGN | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | HECTARES AND FLOW OF EACH ZONING | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | 0.25 *L/s/ha* | | | 0.95 *L/s/ha* | | | 0.40 *L/s/ha* | | | | | | | | | | | |
| STREET | AREA NO. | MANHOLE LOCATION FROM MH | MANHOLE LOCATION TO MH | AREA | DENSITY | POPUL. | CUMUL POPUL. | PEAK FACTOR "F" | PEAK RES. FLOW | AREA | CUMUL AREA | PEAK FLOW | AREA | CUMUL AREA | PEAK FLOW | AREA | CUMUL AREA | PEAK FLOW | TOTALS-C-I FLOW | AREA | CUMUL AREA | INFIL FLOW | TOTAL VOLUME FLOW | LENGTH | SLOPE | PIPE SIZE | CAPACITY | FULL FLOW VELOCITY |
| | | | | *ha* | *ppha* | *1000s* | *1000s* | | *L/sec* | *ha* | *ha* | *L/sec* | *ha* | *ha* | *L/sec* | *ha* | *ha* | *L/sec* | *L/sec* | *ha* | *ha* | *L/sec* | *L/sec* | *m* | *%* | *mm* | *L/sec.* | *m/s* |
| **1 - TO MH22 ON SNYDER'S RD W** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FOXBORO | 1 | FOXBORO | P1 (1012 LANDS) | 42.12 | 15 | 0.632 | 0.632 | 3.920 | 7.88 | | | | | | | | | | 0.00 | 42.12 | 42.12 | 10.53 | 18.41 | | 0.50 | 250 | 42.03 | 0.86 |
| Parcel P2 | 2 | P2 (1012 LANDS) | P1 (1012 LANDS) | 30.58 | 60 | 1.835 | 1.835 | 3.615 | 21.11 | | | | | | | | | | 0.00 | 30.58 | 30.58 | 7.65 | 28.75 | | 0.50 | 250 | 42.03 | 0.86 |
| Parcel O2 | 3 | O2 | O1 | 24.91 | 60 | 1.495 | 1.495 | 3.681 | 17.51 | | | | | | | | | | 0.00 | 24.91 | 24.91 | 6.23 | 23.74 | | 0.50 | 250 | 42.03 | 0.86 |
| Parcel O1 | 4 | O1 | P1 (1012 LANDS) | 14.91 | 60 | 0.895 | 2.389 | 3.524 | 26.80 | | | | | | | | | | 0.00 | 14.91 | 39.82 | 9.96 | 36.76 | | 0.50 | 250 | 42.03 | 0.86 |
| Confluence through Parcel P1 (1012 Snyder's Road) | 5 | P1 (1012 LANDS) | BADEN TRUNK | 20.46 | 60 | 1.228 | 6.083 | 3.165 | 61.28 | | | | | | | | | | 0.00 | 20.46 | 132.98 | 33.25 | 94.53 | | 0.35 | 450 | 168.59 | 1.06 |
| Parcel Y2 | 6 | Y2 | Y1 | 24.24 | 60 | 1.454 | 1.454 | 3.689 | 17.08 | | | | | | | | | | 0.00 | 24.24 | 24.24 | 6.06 | 23.14 | | 0.50 | 250 | 42.03 | 0.86 |
| Parcel Y1 | 7 | Y1 | SNYDERS RD W | 18.40 | 60 | 1.104 | 2.558 | 3.500 | 28.50 | | | | | | | | | | 0.00 | 18.40 | 42.64 | 10.66 | 39.16 | | 0.50 | 250 | 42.03 | 0.86 |
| Parcel Z | 8 | Z | SNYDERS RD W | 7.98 | 60 | 0.479 | 0.479 | 3.984 | 6.07 | | | | | | | | | | 0.00 | 7.98 | 7.98 | 2.00 | 8.07 | | 0.50 | 200 | 23.18 | 0.74 |
| *SCHOOL PS* | *9* | *SCHOOL PS* | *SNYDERS RD W* | | | *0.000* | *0.000* | *4.500* | *0.00* | *15.35* | *15.35* | *3.84* | | | | | | | *3.84* | *15.35* | *15.35* | *3.84* | *7.68* | | *0.50* | *200* | *23.18* | *0.74* |
| Confluence on Snyder's Road West | - | SNYDERS RD W | BADEN TRUNK | | | 0.000 | 3.037 | 3.438 | 33.23 | | 15.35 | 3.84 | | | | | | | 3.84 | 0.00 | 65.97 | 16.49 | 53.56 | | 0.50 | 300 | 68.34 | 0.97 |
| **Confluence to Baden Trunk @ Snyder's Rd W** | - | **BADEN TRUNK** | | | | | **9.121** | **2.994** | **86.92** | | **15.35** | **3.84** | | | | | | | **3.84** | **0.00** | **198.95** | **49.74** | **140.50** | | **1.00** | **450** | 284.96 | 1.79 |
| **2 - CHRISTIAN/CHARLOTTA TO SCHMIDT LANDS** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Parcel X | 10 | X | Q | 13.43 | 60 | 0.806 | 0.806 | 3.859 | 9.90 | | | | | | | | | | 0.00 | 13.43 | 13.43 | 3.36 | 13.25 | | 0.50 | 200 | 23.18 | 0.74 |
| Parcel W | 11 | W | Q | 35.85 | 60 | 2.151 | 2.151 | 3.561 | 24.38 | | | | | | | | | | 0.00 | 35.85 | 35.85 | 8.96 | 33.34 | | 0.50 | 250 | 42.03 | 0.86 |
| Parcel Q | 12 | Q | BADEN WEST | 32.17 | 60 | 1.930 | 4.887 | 3.254 | 50.62 | | | | | | | | | | 0.00 | 32.17 | 81.45 | 20.36 | 70.98 | | 0.50 | 375 | 123.91 | 1.12 |
| *Ex. Baden West Subdivision + Christian Street* *(incl. 9.16ha from Ex. WWPS per Baden West Subdivision - Wastewater Pumping Station Design Brief [Stantec, 2005])* | *13* | *BADEN WEST* | *BADEN TRUNK* | *14.62* | *60* | *0.877* | *5.764* | *3.187* | *58.47* | | | | | | | | | | *0.00* | *14.62* | *96.07* | *24.02* | *82.49* | | *0.50* | *375* | *123.91* | *1.12* |
| **Confluence to Baden Trunk @ Christian/Charlotta** | | **BADEN TRUNK** | | | | | **14.885** | **2.782** | **131.78** | | **15.35** | **3.84** | | | | | | | **3.84** | **0.00** | **295.02** | **73.76** | **209.37** | | **1.00** | **450** | **284.96** | **1.79** |
| **3 - FLOWS THROUGH SCHMIDT LANDS TO GINGERICH** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Parcel AA (N-NW Portion to Trunk) | 14 | AA1 | BADEN TRUNK | 67.11 | 60 | 4.027 | 4.027 | 3.331 | 42.69 | | | | | | | | | | 0.00 | 67.11 | 67.11 | 16.78 | 59.46 | | 0.50 | 300 | 68.34 | 0.97 |
| **Confluence to Baden Trunk** | | **BADEN TRUNK** | | | | | **18.911** | **2.677** | **161.13** | | **15.35** | **3.84** | | | | | | | **3.84** | **0.00** | **362.13** | **90.53** | **255.50** | | **0.65** | **525** | **346.55** | **1.60** |
| Parcel AA (SW Portion to Trunk) | 15 | AA2 | AA3 | 19.60 | 60 | 1.176 | 1.176 | 3.754 | 14.05 | | | | | | | | | | 0.00 | 19.60 | 19.60 | 4.90 | 18.95 | | 0.50 | 200 | 23.18 | 0.74 |
| | 16 | AA3 | BADEN TRUNK | 17.07 | 60 | 1.024 | 2.200 | 3.553 | 24.88 | | | | | | | | | | 0.00 | 17.07 | 36.67 | 9.17 | 34.05 | | 0.50 | 250 | 42.03 | 0.86 |
| Parcel BB (South Industrial Lands to Trunk) | 17 | BB2 | BADEN TRUNK | | | 0.000 | 0.000 | 4.500 | 0.00 | | | | | | | 19.73 | 19.73 | 7.8920 | 7.89 | 19.73 | 19.73 | 4.93 | 12.82 | | 0.60 | 200 | 25.39 | 0.81 |
| **Confluence Baden Trunk @ to Gingerich Road** | | **BADEN TRUNK** | | | | | **21.112** | **2.629** | **176.65** | | **15.35** | **3.84** | | | | | **19.73** | **7.8920** | **11.73** | **0.00** | **418.53** | **104.63** | **293.01** | | **0.25** | **675** | **420.08** | **1.17** |
| **4 - FLOWS TO FOUNDRY STREET TRUNK** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Ex. Activa MDS Lands to Foundry* *(Area per Stantec Sanitary Sewer Design Sheet [2009])* | *18* | *BAD1* | *FOUNDRY* | *53.12* | *60* | *3.187* | *3.187* | *3.420* | *34.69* | *2.25* | *2.25* | *0.5625* | *0.91* | *0.91* | *0.8645* | | | | *1.43* | *56.28* | *56.28* | *14.07* | *50.19* | | *0.60* | *300* | *74.87* | *1.06* |
| **West side to Foundry** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Ex. Lots to Snyder's Road West (North of CN Rail)* | *19* | *BAD2* | *FOUNDRY* | *12.06* | *60* | *0.724* | *0.724* | *3.886* | *8.95* | | | | | | | | | | *0.00* | *12.06* | *12.06* | *3.02* | *11.97* | | *0.50* | *200* | *23.18* | *0.74* |

| LOCATION | | | | RESIDENTIAL AREAS and POPULATION | | | | | | SCHOOL, INSTITUTIONAL | | | COMMERCIAL | | | INDUSTRIAL | | | TOTALS-C-I FLOW | INFILTRATION | | | DESIGN | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STREET | AREA NO. | MANHOLE LOCATION | | AREA | DENSITY | POPUL. | CUMUL POPUL. | PEAK FACTOR "F" | PEAK RES. FLOW | HECTARES AND FLOW OF EACH ZONING | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | 0.25 *L/s/ha* | | | 0.95 *L/s/ha* | | | 0.40 *L/s/ha* | | | | | | | | | | | | |
| | | FROM MH | TO MH | | | | | | | AREA | CUMUL AREA | PEAK FLOW | AREA | CUMUL AREA | PEAK FLOW | AREA | CUMUL AREA | PEAK FLOW | | AREA | CUMUL AREA | INFIL FLOW | TOTAL VOLUME FLOW | LENGTH | SLOPE | PIPE SIZE | CAPACITY | FULL FLOW VELOCITY |
| | | | | *ha* | *ppha* | *1000s* | *1000s* | | *L/sec* | *ha* | *ha* | *L/sec* | *ha* | *ha* | *L/sec* | *ha* | *ha* | *L/sec* | *L/sec* | *ha* | *ha* | *L/sec* | *L/sec* | *m* | *%* | *mm* | *L/sec.* | *m/s* |
| *Ex. Lots west of Foundry Street @ Charles (South of CN Rail)* | *20* | *BAD3* | *CHARLES @ FOUNDRY* | *7.85* | *60* | *0.471* | *0.471* | *3.987* | *5.98* | | | | | | | | | | *0.00* | *7.85* | *7.85* | *1.96* | *7.94* | | *0.50* | *200* | *23.18* | *0.74* |
| Parcel U | 21 | U | CHARLES @ FOUNDRY | 2.48 | 60 | 0.149 | 0.149 | 4.192 | 1.99 | | | | | | | | | | 0.00 | 2.48 | 2.48 | 0.62 | 2.61 | | 0.50 | 200 | 23.18 | 0.74 |
| Parcel BB1 to Foundry | 22 | BB1 | FOUNDRY | 13.17 | 60 | 0.790 | 0.790 | 3.864 | 9.72 | | | | | | | | | | 0.00 | 13.17 | 13.17 | 3.29 | 13.01 | | 0.50 | 200 | 23.18 | 0.74 |
| **Confluence flows west of Foundry** | | | | | | | **2.134** | **3.564** | **24.20** | | | | | | | | | | | | **35.56** | **8.89** | **33.09** | | **0.50** | **250** | **42.03** | **0.86** |
| **East side to Foundry** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Parcel S, R, V | 23 | S, R, V | TRUNK TO FOUNDRY | 18.77 | 60 | 1.126 | 1.126 | 3.766 | 13.50 | | | | | | | | | | 0.00 | 18.77 | 18.77 | 4.69 | 18.19 | | 0.50 | 200 | 23.18 | 0.74 |
| *Ex. Lots east of Foundry Street* | *24* | | *TRUNK TO FOUNDRY* | *99.31* | *60* | *5.959* | *5.959* | *3.174* | *60.19* | | | | | | | | | | *0.00* | *99.31* | *99.31* | *24.83* | *85.02* | | *0.50* | *375* | *123.91* | *1.12* |
| Parcel T | 25 | T | TRUNK TO FOUNDRY | 0.92 | 60 | 0.055 | 0.055 | 4.306 | 0.76 | | | | | | | | | | 0.00 | 0.92 | 0.92 | 0.23 | 0.99 | | 0.50 | 200 | 23.18 | 0.74 |
| **Conflulence flows east of Foundry** | | | | | | | **7.140** | **3.098** | **70.41** | | | | | | | | | | | | **119.00** | **29.75** | **100.16** | | **0.50** | **375** | **123.91** | **1.12** |
| **Confluence @ Gingerich Road Intersection** | | | | | | | **12.461** | **2.859** | **113.40** | | **2.25** | **0.5625** | | **0.91** | **0.8645** | | | | **1.43** | | **210.84** | **52.71** | **167.54** | | **0.50** | **450** | **201.50** | **1.27** |
| **5 - TO BADEN WWPS** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Ex. Industrial Lots on Gingerich Road* | *26* | | | | | | | | | | | | | | | *26.91* | *26.91* | *10.7640* | *10.76* | *26.91* | *26.91* | *6.73* | *17.49* | | *0.50* | *200* | *23.18* | *0.74* |
| **TOTAL APPROXIMATE FLOWS TO BADEN TRUNK ALT 5** | | | | | | | **33.572** | **2.429** | **259.60** | | **17.60** | **4.4000** | | **0.91** | **0.8645** | | **46.64** | **18.6560** | **23.92** | | **656.28** | **164.07** | **447.59** | | **0.30** | **750** | **609.46** | **1.38** |

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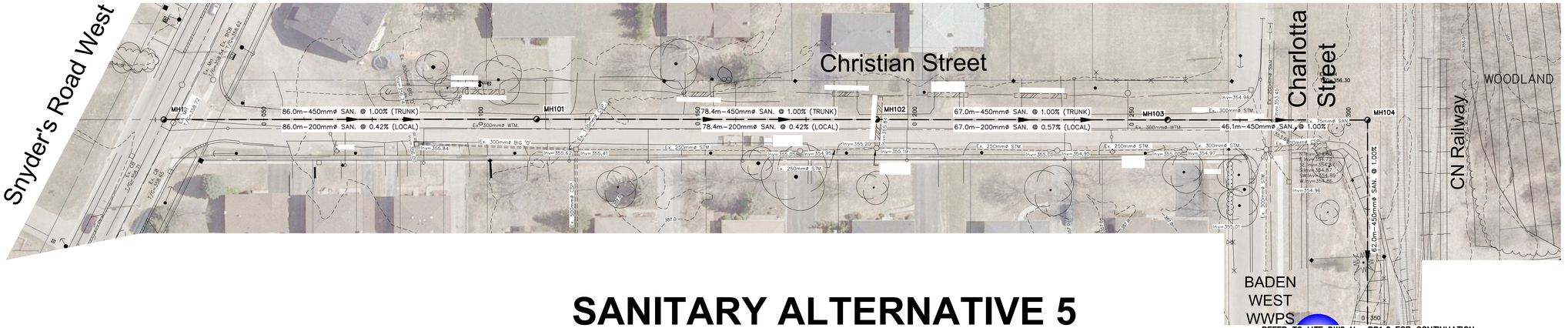
Snyder's Road West
Christian Street
Charlotta Street
CN Railway
WOODLAND
BADEN WEST WWPS
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MH101
MH102
MH103
MH104
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86.0m–200mmø SAN. @ 0.42% (LOCAL)
78.4m–450mmø SAN. @ 1.00% (TRUNK)
78.4m–200mmø SAN. @ 0.42% (LOCAL)
67.0m–450mmø SAN. @ 1.00% (TRUNK)
67.0m–200mmø SAN. @ 0.57% (LOCAL)
46.1m–450mmø SAN. @ 1.00%
62.0m–450mmø SAN. @ 1.00%
Ex. 300mmø WTM.
Ex. 300mmø STM.
Ex. 250mmø STM
Ex. 300mmø BIG 'O'
Ex. 200mmø SAN.
Ex. 300mmø CSP
Ex. 450mmø CSP
Ex. 1200mmø STM.
Ex. 1500mmø STM.
Ex. 1800mmø STM.
Ex. MH
Ex. CB
Ex. Hydrant
Ex. Gas Valve
Ex. Gas Meter
Ex. Hydro Pole
Ex. Guy Wire
Ex. Light Standard
Ex. Sign
Ex. Tree
Ex. Fence
Ex. Building
Ex. Asphalt
Ex. Concrete
Ex. Gravel
Ex. Grass
Ex. Ditch
Ex. Culvert
Ex. Retaining Wall
Ex. Guiderail
Ex. Overhead Wires
Ex. Underground Hydro
Ex. Underground Bell
Ex. Underground Gas
Ex. Underground Cable TV
Ex. Underground Telephone
Ex. Underground Fibre Optic
Ex. Underground Traffic
Ex. Underground Unknown
Ex. Underground Communications
Ex. Underground Electrical
Ex. Underground Water
Ex. Underground Sanitary
Ex. Underground Storm
Ex. Underground Combined
Ex. Underground Foundation Drain
Ex. Underground Footing Tile
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Ex. Underground Catch Basin Lead
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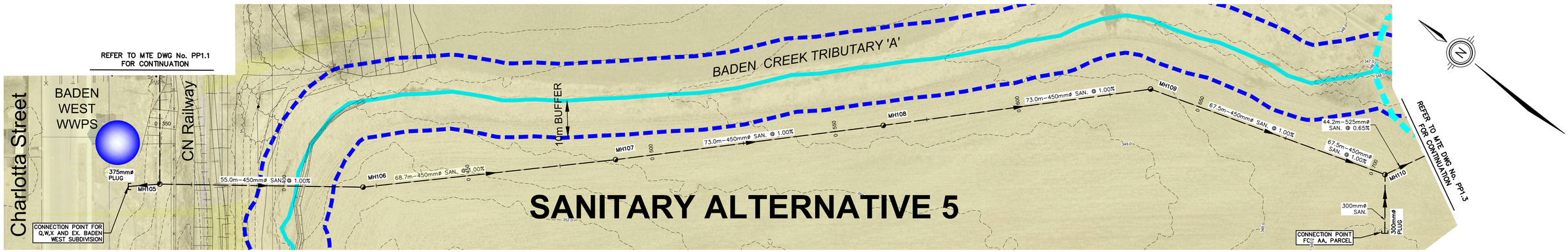


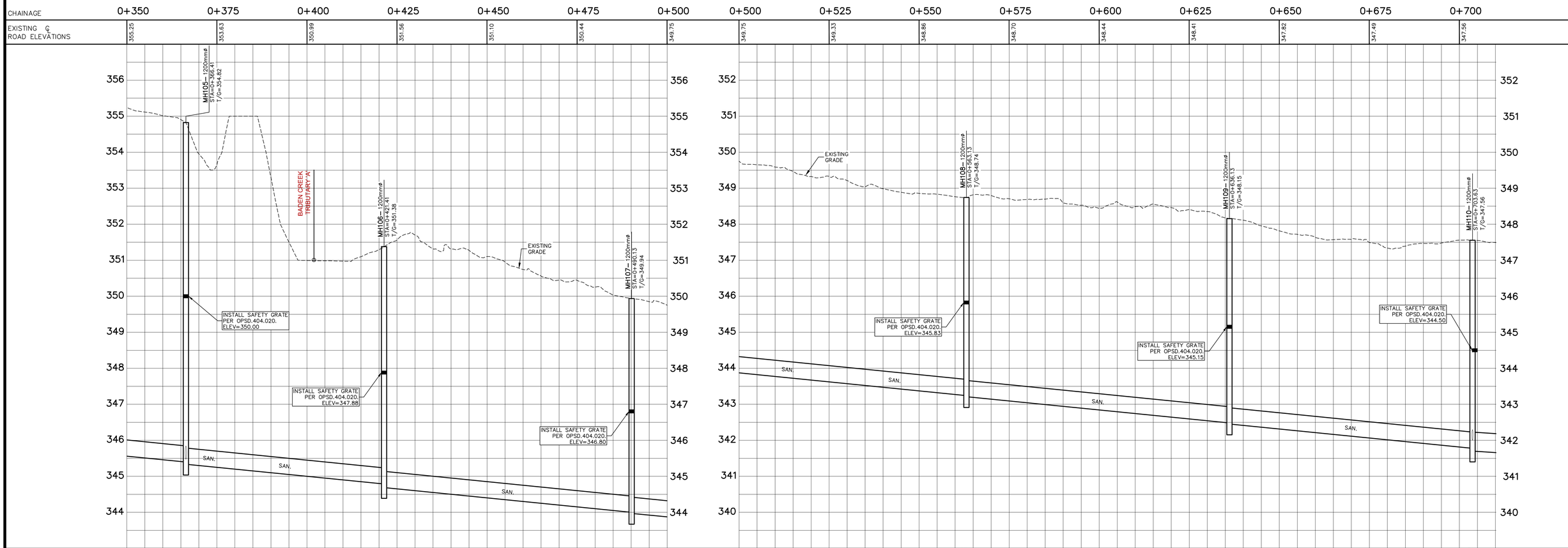


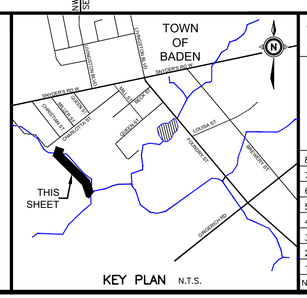


TOWNSHIP OF WILMOT

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GEODETIC BM ELEV. = m

SITE BENCHMARK ELEV. = m

OWNER: TOWNSHIP OF WILMOT

PROJECT: BADEN TRUNK SEWER EA

DRAWING: SANITARY ALTERNATIVE 5

STA 0+350 TO STA 0+710

MTE
Engineers, Scientists, Surveyors
519-743-6500

| | |
|---|---|
| Project Manager: D.ROGA | Project No.: 48730-100 |
| Design By: AJC | Checked By: |
| Drawn By: ACH | Checked By: |
| Surveyed By: | Drawing No.: PP1.2 |
| Date: Sep.20/22 | |
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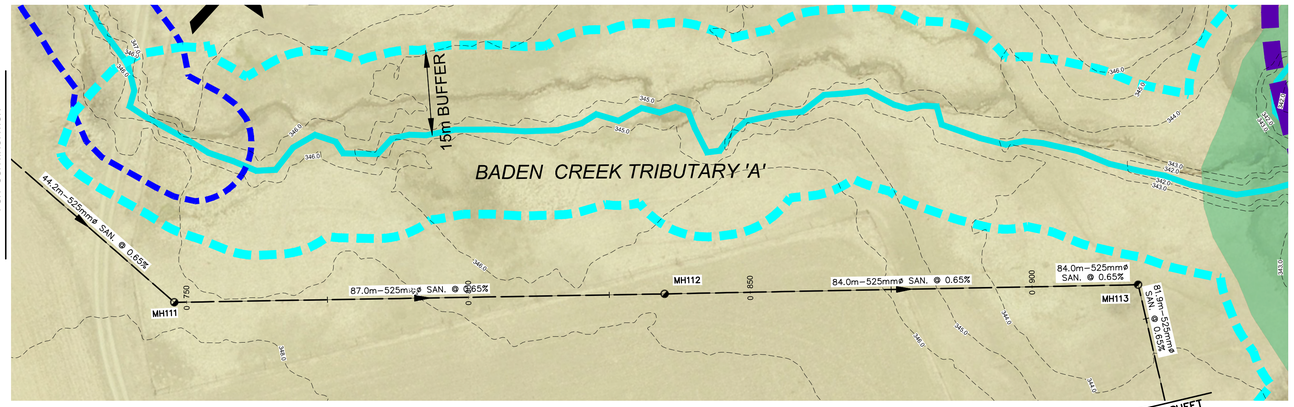


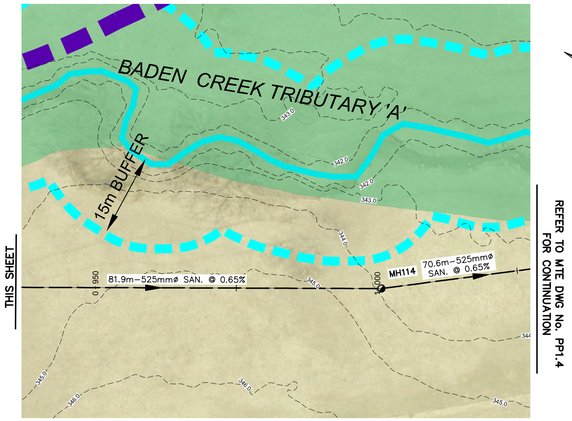


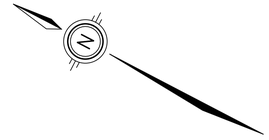

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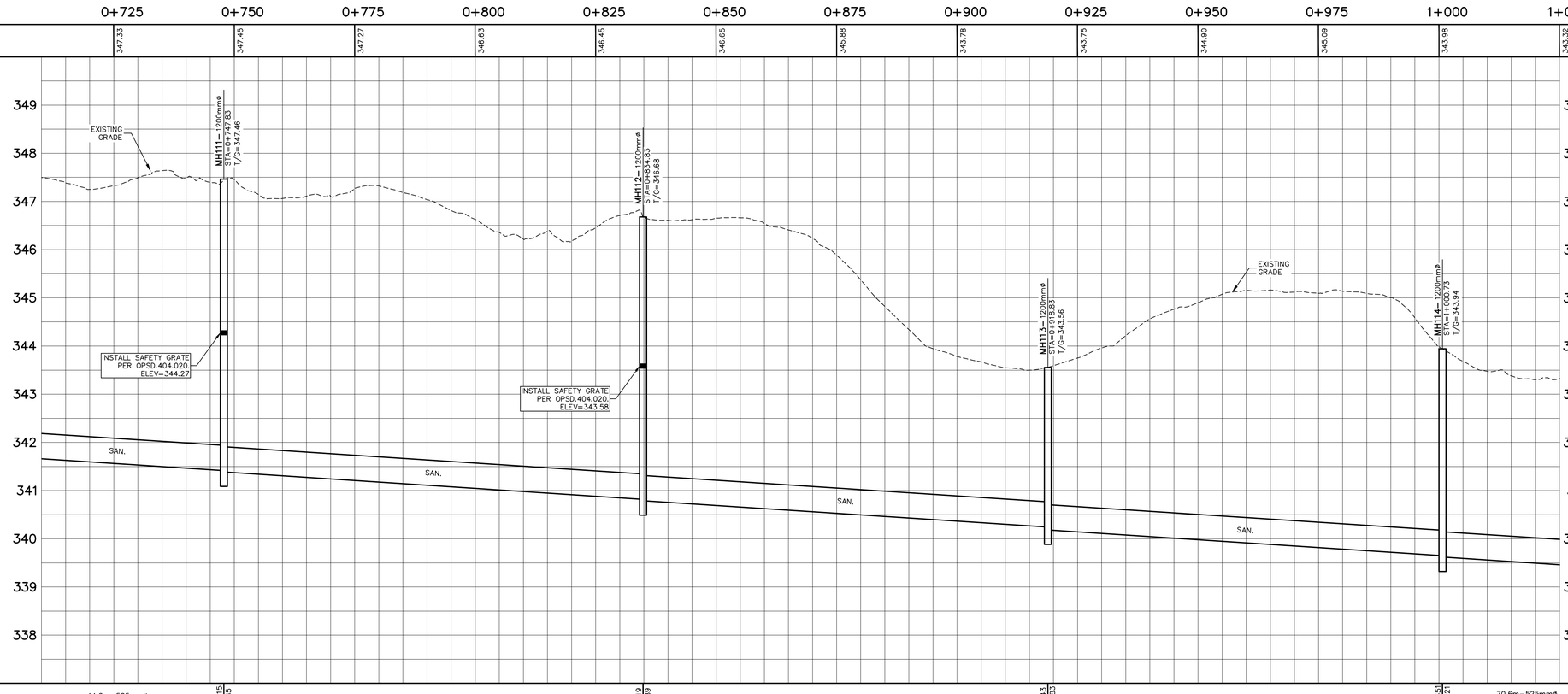


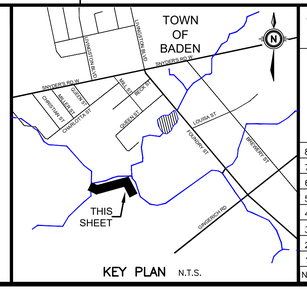


TOWNSHIP OF WILMOT

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GEODETIC BM ELEV. = m

SITE BENCHMARK ELEV. = m

OWNER
TOWNSHIP OF WILMOT

PROJECT
BADEN TRUNK SEWER EA

DRAWING
SANITARY ALTERNATIVE 5
STA 0+710 TO STA 1+025

MTE
Engineers, Scientists, Surveyors
519-743-6500

| | |
|---|---|
| Project Manager: D.ROGA | Project No.: 48730-100 |
| Design By: AJC | Checked By: |
| Drawn By: ACH | Checked By: |
| Surveyed By: | Drawing No.: PP1.3 |
| Date: Sep.20/22 | |
| Scale: H 1:500 V 1:50 | Sheet of |

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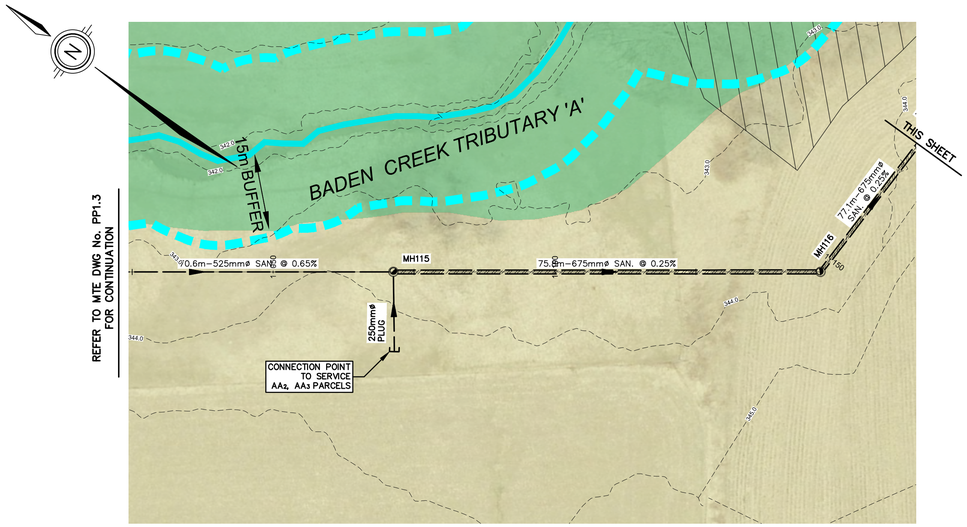


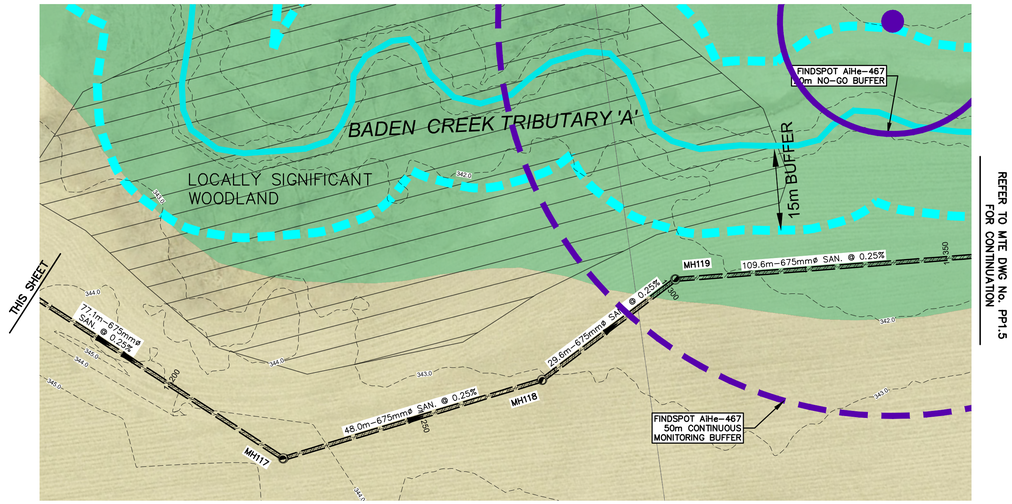


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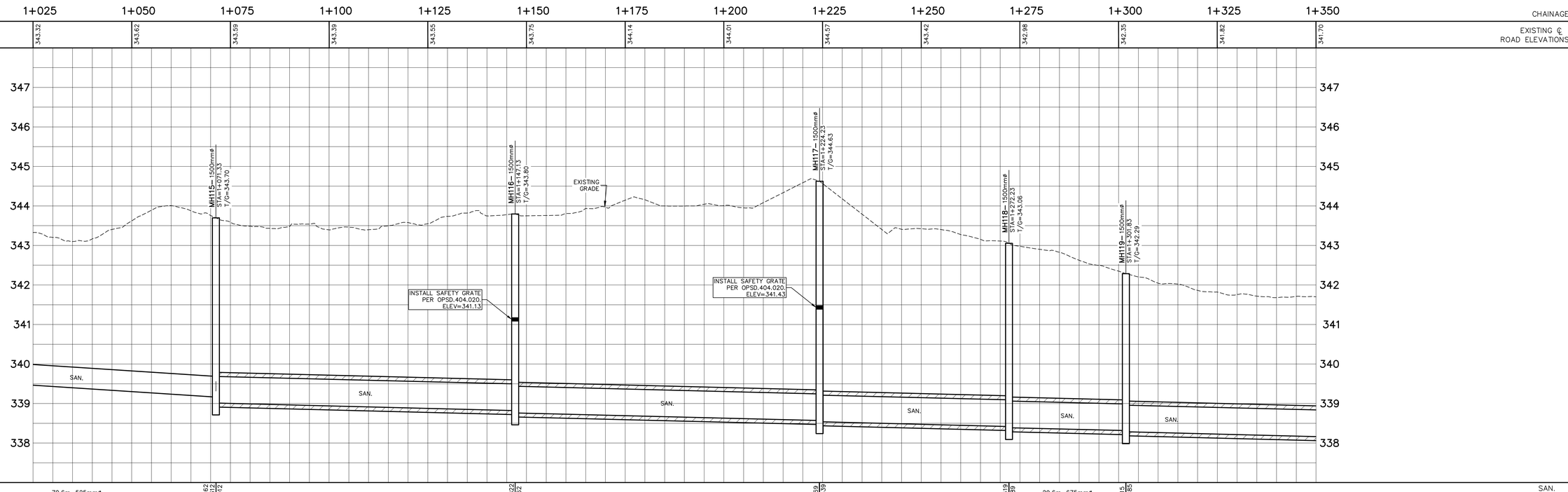


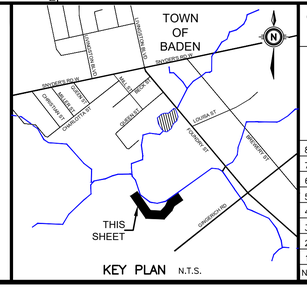


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GEODETIC BM ELEV. = m

SITE BENCHMARK ELEV. = m

OWNER
TOWNSHIP OF WILMOT

PROJECT
BADEN TRUNK SEWER EA

DRAWING
SANITARY ALTERNATIVE 5
STA 1+025 TO STA 1+350

MTE
Engineers, Scientists, Surveyors
519-743-6500

| | |
|---|---|
| Project Manager D.ROGA | Project No. 48730-100 |
| Design By AJC | Checked By |
| Drawn By ACH | Checked By |
| Surveyed By | Drawing No. PP1.4 |
| Date Sep.20/22 | |
| Scale H 1:500 V 1:50 | Sheet of |

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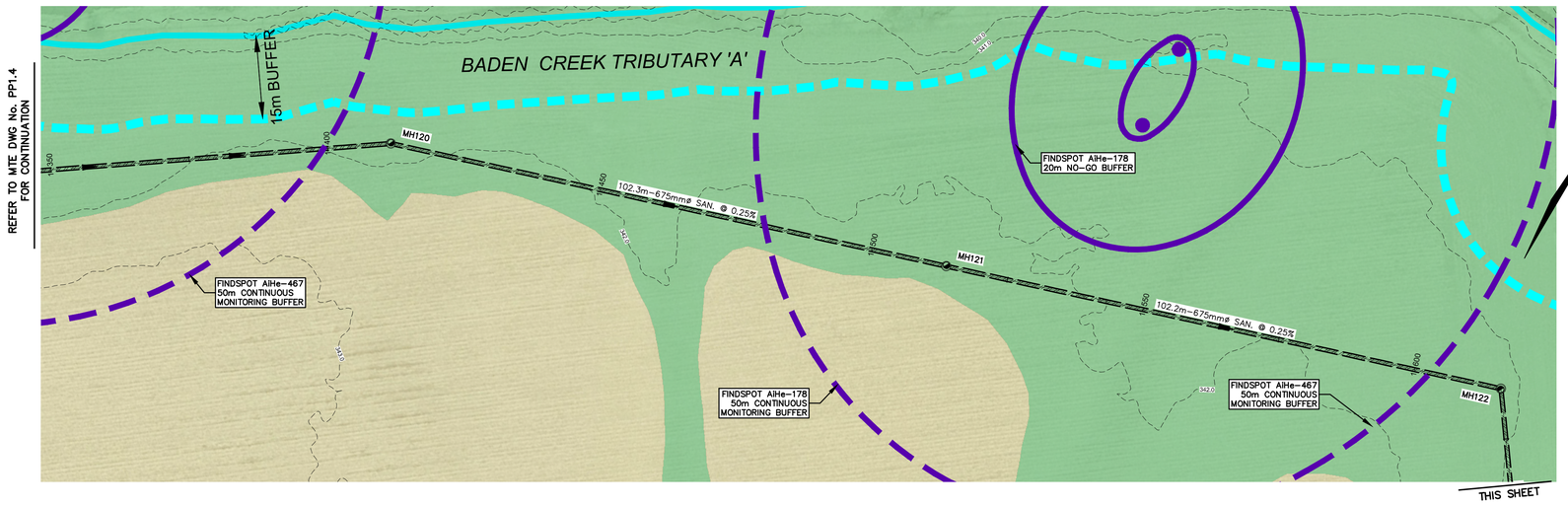


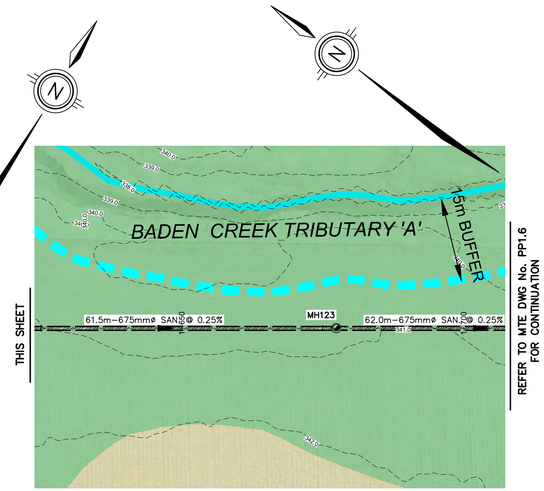


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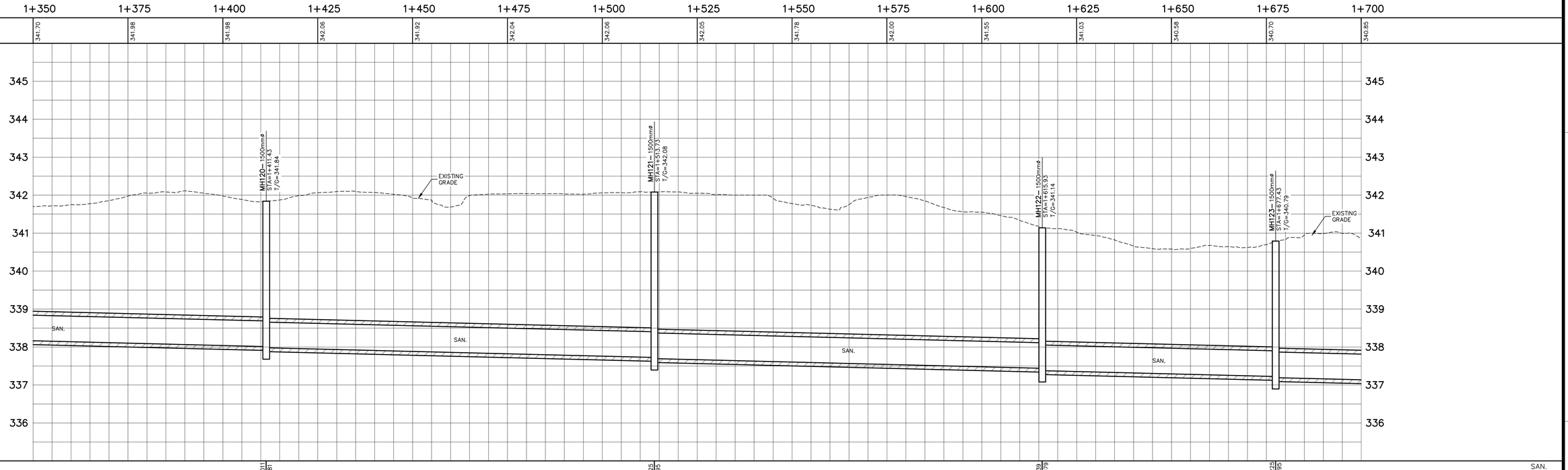


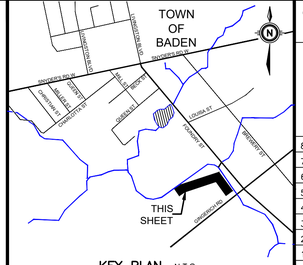


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GEODETIC BM ELEV. = m

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OWNER
TOWNSHIP OF WILMOT

PROJECT
BADEN TRUNK SEWER EA

DRAWING
SANITARY ALTERNATIVE 5
STA 1+350 TO STA 1+700

MTE
Engineers, Scientists, Surveyors
519-743-6500

| | |
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| Project Manager D.ROGA | Project No. 48730-100 |
| Design By AJC | Checked By |
| Drawn By ACH | Checked By |
| Surveyed By | Drawing No. PP1.5 |
| Date Sep.20/22 | |
| Scale H 1:500 V 1:50 | Sheet of |

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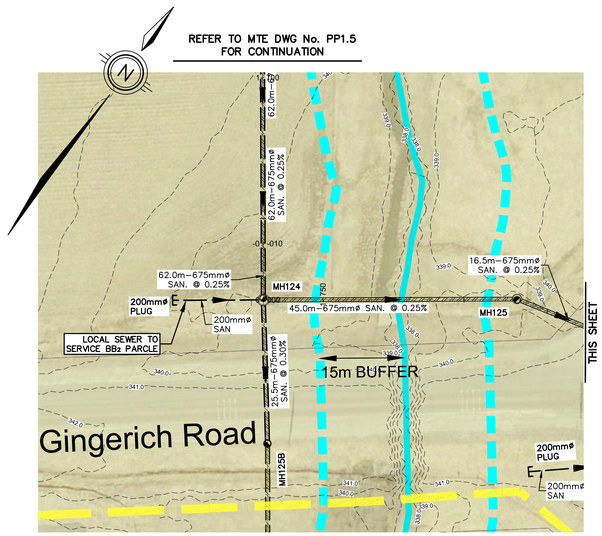


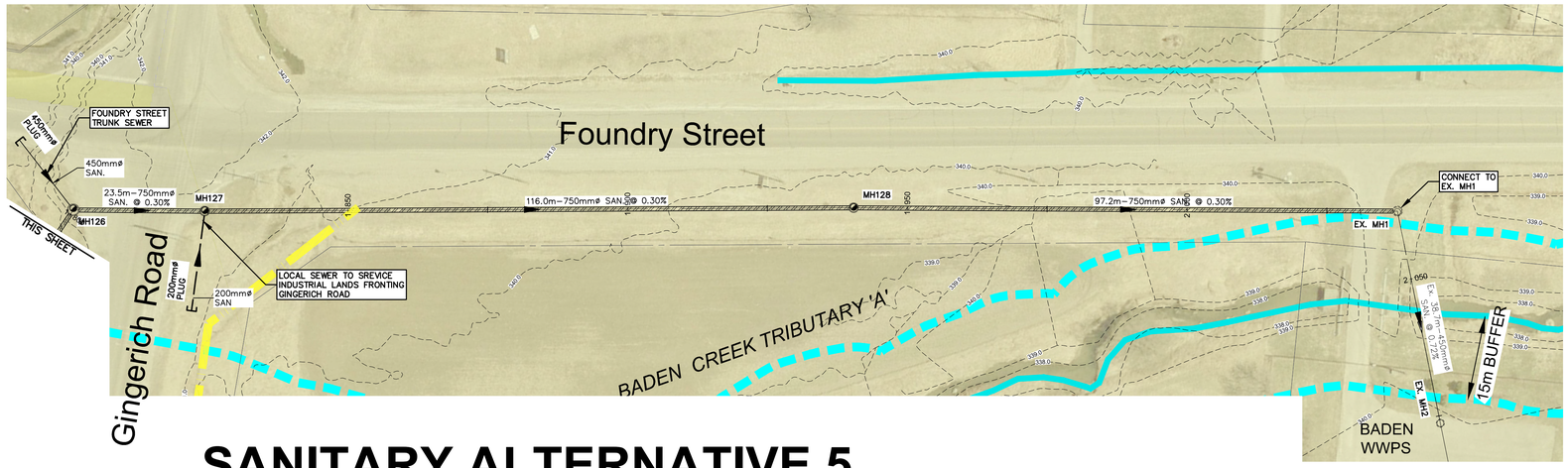


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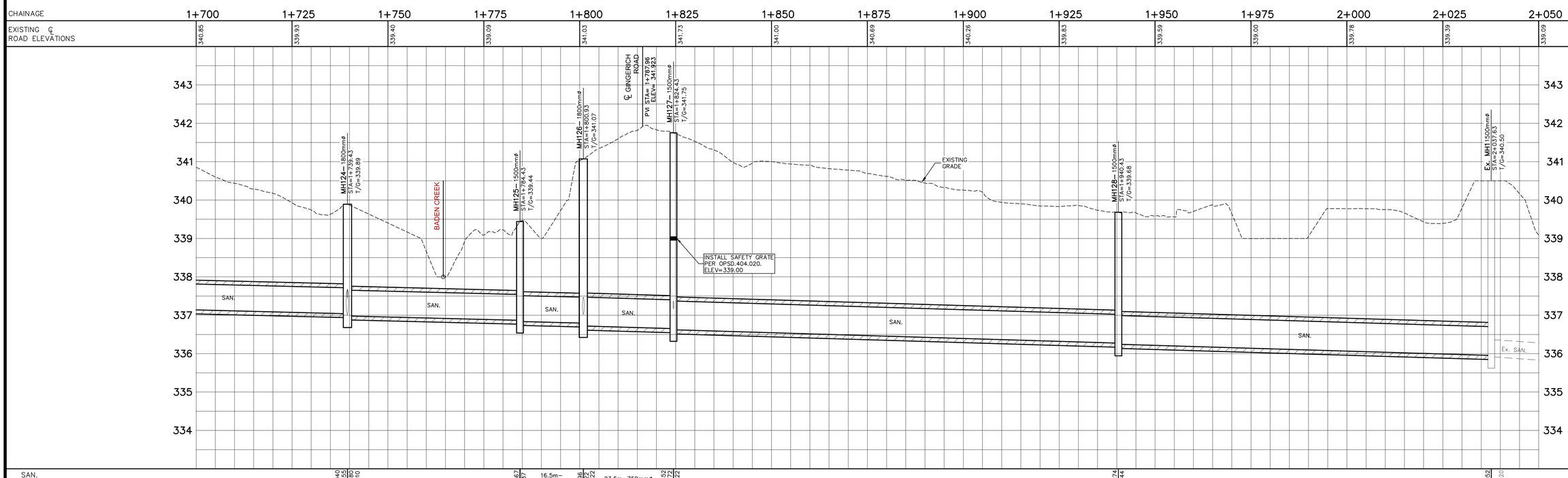


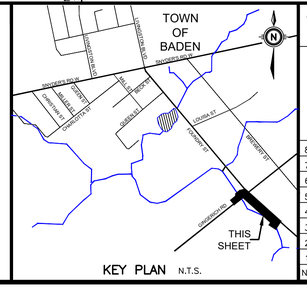


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OWNER
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SANITARY ALTERNATIVE 5
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MTE
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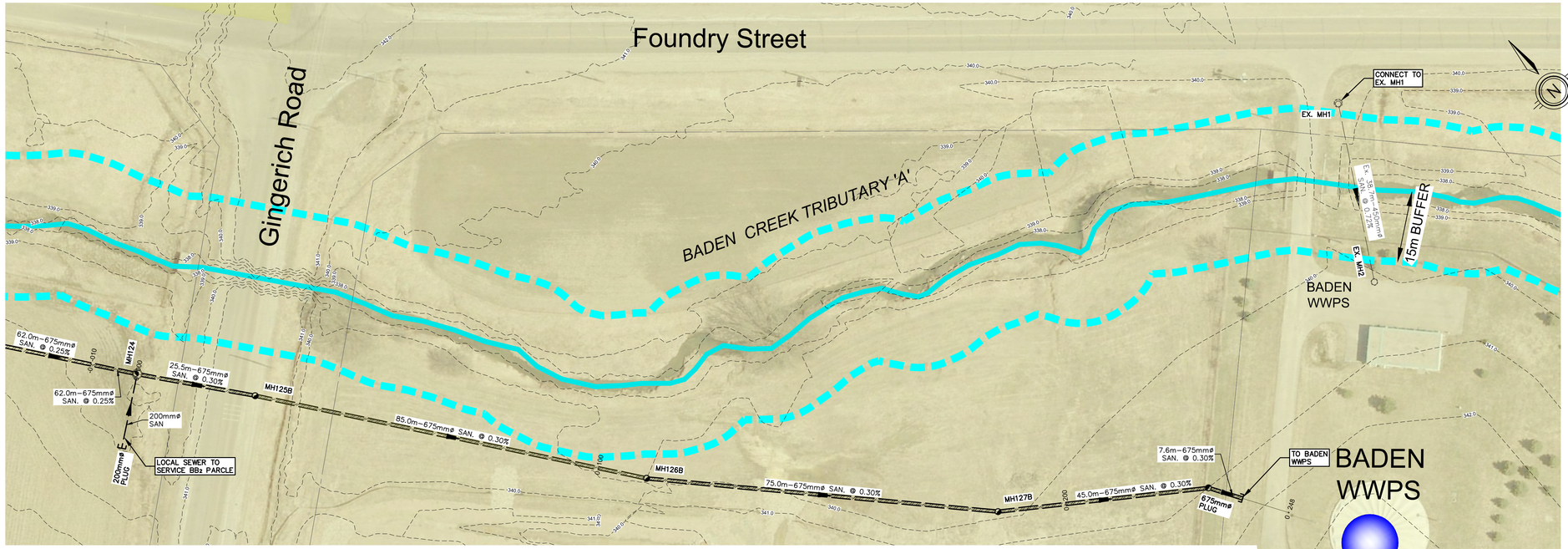
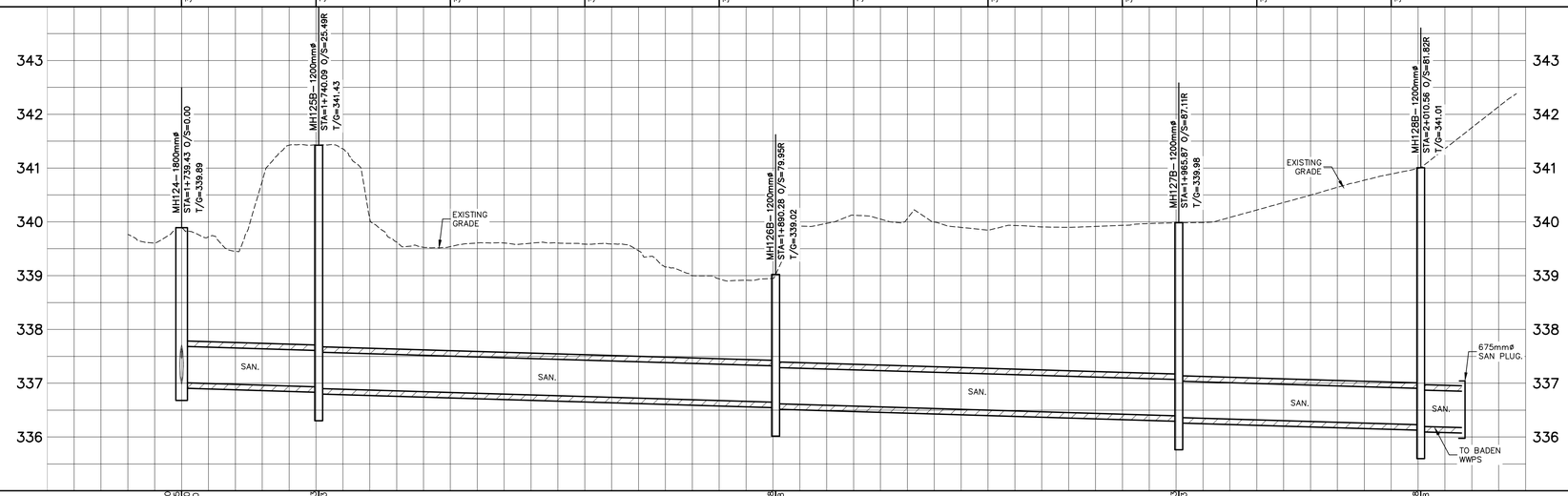
| Project Manager D.ROGA | Project No. 48730-100 |
| Design By AJC | Checked By |
| Drawn By ACH | Checked By |
| Surveyed By | Drawing No. PP1.6 |
| Date Sep.20/22 | |
| Scale H 1:500 V 1:50 | Sheet of |

MTE FILE PATH: P:\P\48730\100\48730-100-PP1
November 10, 2022 – 12:30:34 AM – Plotted By: Adam Hewson

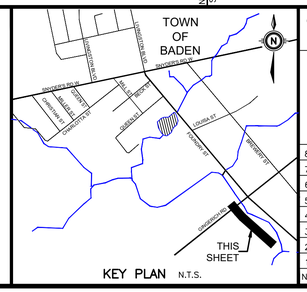



# SANITARY ALTERNATIVE 5

| CHAINAGE | −0+025 | 0+000 | 0+025 | 0+050 | 0+075 | 0+100 | 0+125 | 0+150 | 0+175 | 0+200 | 0+225 | 0+250 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EXISTING ℄ ROAD ELEVATIONS | | 339.89 | 341.43 | 339.54 | 339.59 | 338.94 | 340.12 | 339.85 | 339.94 | 340.22 | 340.89 | |




| SAN. SEWER INVERT | NW337.040 SW337.455 NE336.980 SE337.010 | 25.5m–675mmø SAN. @ 0.30% (TRUNK) | NW336.933 SE336.903 | 85.0m–675mmø SAN. @ 0.30% (TRUNK) | NW336.648 SE336.618 | 75.0m–675mmø SAN. @ 0.30% (TRUNK) | NW336.393 SE336.363 | 45.0m–675mmø SAN. @ 0.30% (TRUNK) | NW336.228 SE336.198 | SAN. SEWER INVERT |
|---|---|---|---|---|---|---|---|---|---|---|




TOWNSHIP OF WILMOT

| No. | REVISION | BY | DATE |
|---|---|---|---|
| 8. | | | |
| 7. | | | |
| 6. | | | |
| 5. | | | |
| 4. | | | |
| 3. | | | |
| 2. | | | |
| 1. | | | |

GEODETIC BM ELEV. = m

SITE BENCHMARK ELEV. = m

OWNER: TOWNSHIP OF WILMOT

PROJECT: BADEN TRUNK SEWER EA

DRAWING: SANITARY ALTERNATIVE 5b

STA 1+700 TO STA 2+002.10

MTE
Engineers, Scientists, Surveyors
519-743-6500

| | |
|---|---|
| Project Manager: D.ROGA | Project No.: 48730-100 |
| Design By: AJC | Checked By: |
| Drawn By: ACH | Checked By: |
| Surveyed By: | Drawing No.: PP1.6b |
| Date: Sep.20/22 | |
| Scale: H 1:500 V 1:50 | Sheet of |

MTE FILE PATH: P:\P\48730\100\48730-100-PP1
November 10, 2022 – 12:33:31 AM – Plotted By: Adam Hewson