Appendix A Discipline Study Reports

A.1. Natural Environment

A.2. Archaeology

A.3. Cultural Heritage

A.4. Geotechnical and Hydrogeological

A.1. Natural Environment

Natural Heritage Existing Conditions Report

Colony Road Watermain Replacement

Fort Erie, Ontario

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1. Introduction

GEI Consultants Canada Ltd. (GEI) was retained by the Town of Fort Erie to complete a Natural Heritage Existing Conditions Report in support of the Beachfront Water Servicing Strategy Class Environmental Assessment (EA) Schedule B and Enhanced Conceptual Design, located in the Town of Fort Erie (herein referred to as the Subject Lands) (**Figure 1**, **Appendix A**). This report will provide a high-level overview of the existing natural heritage background information, policies and legislation relevant to the Subject Lands. It will include a desktop review of natural heritage features and their extent within and adjacent to the Subject Lands to guide the selection of the best alternative..

1.1 Study Background

The Town of Fort Erie has initiated a Municipal Class EA to guide the assessment process in determining the preferred alternative for a watermain relocation project. Currently the existing 3 km watermain in the Colony Road neighborhood is experiencing significant operational, maintenance and servicing risks associated with the location and condition. As a result, the proposed Class EA Schedule B and Enhanced Conceptual Design will allow for enhanced servicing to residents and alleviate the identified risks.

1.2 Study Area

The Subject Lands are bound by Colony Road to the west and south, Thunder Bay Road to the north and Staniland Park Road to the east in the Town of Fort Erie. The site is predominantly made up of woodland and wetland communities, a watercourse and residential land use along the shore of Lake Erie.

2. Policy Context

An assessment of the quality and extent of natural heritage features found on, and within 120 m of the Subject Lands and the potential impacts to these features from the proposed watermain project was undertaken to comply with requirements of the following regulatory agencies, local municipality, and/or legislation:

- Provincial Planning Statement (2020);
- *A Place to Grow Act* (2020);
- *Endangered Species Act*, (2007);
- *Fisheries Act*, (2019);
- *Migratory Birds Convention Act*, (1994);
- Town of Fort Erie Official Plan (2021);
- Niagara Region Official Plan (2022);
- Niagara Peninsula Conservation Authority; and
- Watershed planning documents.

2.1 Provincial Planning Statement

The Provincial Planning Statement (PPS;MMAH 2020) provides direction on matters of provincial interest related to land use planning and development. It "supports a comprehensive, integrated and long-term approach to planning…" The PPS is to be read in its entirety and land use planners and decision-makers need to consider all relevant policies and how they work together. This report addresses those policies that are specific to Natural Heritage (Section 4.1) with some reference to other policies with relevance to Natural Heritage and impact assessment consideration.

Eight types of significant natural heritage features are defined in the PPS, as follows:

- Significant wetlands;
- Significant coastal wetlands;
- Significant woodlands;
- Significant valleylands;
- Significant wildlife habitat (SWH);
- Fish habitat;
- Habitat of endangered and threatened species; and
- Significant areas of natural and scientific interest (ANSIs).

Development and site alteration shall not be permitted in significant wetlands, or in significant coastal wetlands. Development and site alteration shall not be permitted in significant woodlands, significant valleylands, SWH or significant ANSIs, unless it is demonstrated that there will be no negative impacts on the natural features or their ecological functions.

Development and site alteration shall not be permitted in the habitat of endangered and threatened species or in fish habitat, except in accordance with provincial and federal

requirements. Development and site alteration may be permitted on lands adjacent to fish habitat provided it has been demonstrated that there will be no negative impacts on the natural feature or its ecological functions.

2.2 Endangered Species Act

The provincial *Endangered Species Act, 2007* (ESA) was developed to:

- Identify species at risk (SAR), based upon best available science;
- Protect SAR and their habitats and to promote the recovery of SAR; and
- Promote stewardship activities that would support those protection and recovery efforts.

The ESA protects all Threatened, Endangered, and Extirpated species listed on the Species at Risk in Ontario List (SARO; Ontario Regulation 230/08). These species are legally protected from harm or harassment and their associated habitats are legally protected from damage or destruction, as defined under the ESA.

It should be noted that for the purposes of this assessment, SAR will be considered those species designated as either Endangered or Threatened on the SARO list. Habitats for species with a designation of Special Concern on the SARO list are treated as a Species of Conservation Concern (SOCC) and are protected under the PPS as a type of Significant Wildlife Habitat (SWH).

2.3 Federal Fisheries Act

Fisheries and Oceans Canada (DFO) administers the federal *Fisheries Act* (1985) which defines fish habitat as “spawning grounds and other areas, including nursery, rearing, food supply and migration areas, on which fish depend directly or indirectly in order to carry out their life processes” [subsection (2)1]. The *Fisheries Act* prohibits the death of fish by means other than fishing [subsection 34.4 (1)] and the harmful alteration, disruption or destruction of fish habitat [HADD; subsection 35. (1)]. A HADD is defined as “any temporary or permanent change to fish habitat that directly or indirectly impairs the habitat’s capacity to support one or more life processes” (DFO 2021).

Some projects may be eligible for exemption from the DFO review process, as specified under Step 3 of the DFO Fish and Fish Habitat Protection Program review process, such as clear-span bridges and bridge maintenance projects where DFO mitigation measures are applied, artificial waterbodies with no hydrological connection to occupied fish habitat, and projects that follow the Standards and Codes of Practice defined by DFO (DFO, 2021). All other projects or activities that have the potential to impact fish or fish habitat should be submitted to DFO through the “Request for Review” process. DFO will review the proposed project to determine whether there is potential to (1) impact an aquatic species at risk, (2) cause the death of fish or (3) result in HADD of fish habitat. The death of fish by means other than fishing or a HADD of fish habitat can be authorized by DFO under paragraphs 34.4(2)(b) or 35(2)(b) of the *Fisheries Act*. Authorizations require the preparation and submission of an application

package identifying the impacts on fish and fish habitat as well as the avoidance, mitigation and offsetting measures that will be implemented as well as any monitoring that is proposed.

2.4 Migratory Birds Convention Act

The *Migratory Birds Convention Act* (1994) provides protection to migratory birds, their habitats and nests at the federal level by prohibiting the destruction of active migratory bird nests. Currently, 700 migratory bird species are protected under this Act, including songbirds, woodland birds, waterfowl, shorebirds and seabirds. Although no permit is required by the legislation, appropriate timing constraints on potentially disruptive activities such as vegetation clearing (e.g., tree removal) where migratory birds may be nesting are required to avoid contravention of this Act. The requirement to ensure that there are no bird nests present within the work area rests with the proponent of the activity.

2.5 Town of Fort Erie Official Plan

The Town of Fort Erie Official Plan (OP; 2021) was approved by the Niagara Regional Council on November 18, 2011, and provides policies, goals and objectives to manage the future development within the Town. The Subject Lands are generally designated as Rural and Rural Residential with Environmental Protection and Environmental Conservation areas as per Schedule A (Land Use Plan).

Within the OP, Environmental Protection areas include:

- Provincially Significant Wetland (PSW) Areas;
- ANSIs;
- Habitat of Threatened, and Endangered Species;
- Habitat of Species of Special Concern; and
- Natural Hazards (flooding hazards, erosion hazards or dynamic beach hazards)

Within the OP, Environmental Conservation areas include:

- Locally Significant Natural Areas (Significant Woodlands, Thickets, Meadowlands, Significant Wildlife Habitat Areas, and Environmentally Sensitive Areas and Environmental Corridors and Linkages);
- Locally Significant Wetlands; and
- Woodlands, in some cases Valleylands, Meadows, and Rehabilitation Areas, which include corridor and linkages.

The Environmental Protection and Environmental Conservation areas within the Subject Lands are further designated as PSWs, Significant Natural Areas, Environmentally Sensitive Areas, Environmental Corridors and Woodlands over 2 ha as per Schedule C (Natural Heritage Features). Natural hazards including the floodplain associated with the watercourse and shore of Lake Erie were identified within the Subject Lands as per Schedule C1 (Natural Hazards & Fish Habitat). In addition, critical fish habitat is noted within the Six Mile Creek.

As per section 8.7.1 of the OP, public works and/or private infrastructure works and actions shall be undertaken in ways that are consistent with the protection of Natural Heritage Features and Areas. In instances where public and/or private infrastructure works may impinge upon these areas, the Town will consider the impacts of its proposed actions, consider alternatives and implement measures to minimize or preferably avoid impacts if feasible. Such public and/or private infrastructure works shall be subject to Section 8.1 and Section 12.6 of the OP.

2.6 Region of Niagara Official Plan

As of March 31, 2025, the Region of Niagara no longer has planning authority, and the Niagara Regional Official Plan (ROP; 2022) has become an official plan of the Town of Fort Erie.

Similar to the Town of Fort Erie OP (2021), the ROP also outlines policies and plans to provide direction to future growth and development within the Region. Schedule C1 (Natural Environment System Overlay and Provincial Natural Heritage Systems) designates the Subject Lands as under the Natural Environmental System Overlay and Growth Plan Natural Heritage System. Schedule C2 (Natural Environment System-Individual Components and Features) identifies PSWs, Other Wetlands and Non-Provincially Significant Wetlands, Permanent and Intermittent Streams, Significant Woodlands. One of the components of the Region's natural environment system includes the Provincial Natural Heritage System which is made up of the Natural Heritage System for the Growth Plan and the Greenbelt Natural Heritage System.

The individual features and components of the Region's natural environment system include:

a) significant woodlands;
b) other woodlands;
c) provincially significant wetlands;
d) other wetlands and non-provincially significant wetlands;
e) life science areas of natural and scientific interest;
f) earth science areas of natural and scientific interest;
g) permanent and intermittent streams;
h) inland lakes; and
i) linkages.

Areas that overlap with two or more components of the natural environment system will be subject to the policies that provide the highest level of protection. As the Subject Lands fall within the Growth Plan, and therefore within the Provincial Natural Heritage System, 30 m vegetation protection zones are required for significant woodlands, wetlands and permanent and intermittent streams. Activities that create or maintain infrastructure within the Provincial Natural Heritage System will be authorized under an EA. In addition, an Environmental Impact Study (EIS) will be required for development or site alterations within 120 m of any key natural heritage feature within the Growth Plan.

2.7 Niagara Peninsula Conservation Authority

O. Reg. 41/24 allows Conservation Authorities to implement Section 28 *Conservation Authorities Act, 1990* (amended 2024), which states under Section 28(1) that:

> 28 (1) *No person shall carry on the following activities, or permit another person to carry on the following activities, in the area of jurisdiction of an authority:*
>
> *1. Activities to straighten, change, divert or interfere in any way with the existing channel of a river, creek, stream or watercourse or to change or interfere in any way with a wetland.*
>
> *2. Development activities in areas that are within the authority's area of jurisdiction and are,*
>
> *i. hazardous lands,*
>
> *ii. wetlands,*
>
> *iii. river or stream valleys the limits of which shall be determined in accordance with the regulations,*
>
> *iv. areas that are adjacent or close to the shoreline of the Great Lakes-St. Lawrence River System or to an inland lake and that may be affected by flooding, erosion or dynamic beach hazards, such areas to be further determined or specified in accordance with the regulations, or*
>
> *v. other areas in which development should be prohibited or regulated, as may be determined by the regulations. 2017, c. 23, Sched. 4, s. 25.*

Pursuant to O. Reg. 41/24, any interference with or development in or on areas stated in the *Conservation Authorities Act* (e.g., hazardous lands, wetlands, river or stream valleys) requires permission from the Conservation Authority. The Conservation Authority may issue permits under Section 28.1 and may attach conditions on the permits per Section 9(1) of the Regulation.

A review of the NPCA watershed explorer mapping tool was completed to understand whether hazardous lands, wetlands, shorelines and areas susceptible to flooding, and associated allowances were found within, or adjacent to, the boundaries of the Subject Lands. The Subject Lands are overlapped by the NPCA's provincially evaluated regulation wetlands and their allowance. In addition, the floodplain extent is also associated with the regulated Six Mile Creek (**Figure 2, Appendix A**). The shoreline of Lake Erie is also a regulated feature.

Any approvals required under the Planning Act or the Niagara Escarpment Planning and Development Act must be obtained before the NPCA can grant permission for development in a Regulated Area.

2.8 Six Mile Creek

The Subject Lands are within the Six Mile Creek Subwatershed of the Fort Erie Creeks Watershed as discussed in the NPCA's Fort Erie Creeks-watershed Plan (2008). Within the Subject Lands, the riparian habitat is classified as a swamp. All the watercourse channels are identified as Type 1/Critical Habitat with high production capacity and sensitive fish species or habitats. These areas require a high degree of protection and are sensitive to development. The fish community identified within Six Mile Creek is relatively diverse with stream and lake species. Spawning habitat for the White Sucker (*Catostomus commersonii*) and the Quillback (*Carpiodes cyprinus*) may be present within the lower reaches of Six Mile Creek (NPCA, 2008).

3. Background Review

3.1 Background Review Summary

GEI has relied upon supporting background information to provide additional insight into the overall character of the Subject Lands. These resources included:

- MNR Land Information Ontario (LIO) Natural Features Mapping (2024);
- Natural Heritage Information Centre (NHIC) database (2024);
- Provincial wildlife atlases:
  - Ontario Breeding Bird Atlas (OBBA) (Bird Studies Canada; BSC et al. 2007);
  - Ontario Reptile and Amphibian Atlas (2020); and
  - Toronto Entomologists' Association's (TEA) Ontario Butterfly and Moth Atlases (2023, 2020).
- DFO Aquatic Species at Risk Distribution Mapping (2024); and
- Citizen Science Databases (i.e., iNaturalist and eBird).

The results of these background reviews are discussed in the following sections. A list of rare species identified through background review within and adjacent to the Subject Lands is provided in **Table 1, Appendix B**.

3.1.1 Land Information Ontario Natural Features Summary

Based on MNR's LIO geographic database, the following features were found within and adjacent to the Subject Lands (**Figure 2, Appendix A**):

- Provincially Significant Wetlands are identified throughout the Subject Lands as part of the Six Mile Creek Wetland Complex;
- Six Mile Creek bisects the eastern portion of the Subject Lands, flowing into Lake Erie;
- Woodlands are identified throughout the Subject Lands;
- White-tailed Deer Wintering Area (Stratum 2) is identified throughout the Subject Lands;
- Lake Erie is immediately adjacent to the Subject Lands; and
- The shoreline of Lake Erie is identified as Waterfowl Winter Concentration Area.

No other known natural heritage features were identified in LIO within or adjacent (120 m) to the Subject Lands.

3.1.2 NHIC Database Results

The NHIC database (MNR 2024) was searched for records of provincially significant plants, vegetation communities and wildlife on and in the vicinity of the Subject Lands. The database provides occurrence data by 1 km^2 area squares, with three squares overlapping the Subject Lands (17PH6148, 17PH6248, 17PH6348A) total of 12 species were recorded in the atlas squares that overlap with the Subject Lands, with the following species of interest noted:

- Species listed as Threatened or Endangered on the SARO List:
  - Butternut (*Juglans cinerea*) – Endangered;

    - Red-headed Woodpecker (*Melanerpes erythrocephalus*) - Endangered;
    - Fowler's Toad (*Anaxyrus fowleri*) - Endangered; and
    - White Wood Aster (*Eurybia divaricate*) – Threatened.
- Species of Conservation Concern (i.e., listed as Special Concern on the SARO List or identified as an S1–S3 species):
    - Common Hop-tree (*Ptelea trifoliata*) - Special Concern;
    - Eastern Wood-Pewee (*Contopus virens*) - Special Concern;
    - Honey Locust (*Gleditsia triacanthos*) - S2;
    - Lizard's-tail (*Saururus cernuus*) – S3;
    - Snapping Turtle (*Chelydra serpentina*) – Special Concern;
    - Swamp Rose-mallow (*Hibiscus moscheutos*) - Special Concern;
    - Tufted Titmouse (*Baeolophus bicolor*) - S3; and
    - Wood Thrush (*Hylocichla mustelina*) - Special Concern.

In addition to the identified species, a rare plant community (Sea Rocket Sand Beach Type) - S2S3 was noted along the shore of Lake Erie. A wildlife concentration area (Mixed Wader Nesting Colony) was also identified within the Subject Lands

3.1.3 Ontario Breeding Bird Atlas

The Ontario Breeding Bird Atlas contains detailed information on the population and distribution status of Ontario birds (Cadman et al. 2007). The data is presented on 100 km^2 area squares with one square overlapping the Subject Lands (17PH46). It should be noted that the Subject Lands are a small component of the overall bird atlas square, and therefore it is unlikely that all bird species are found within the Subject Lands. Habitat type, availability and size are all contributing factors in bird species presence and use.

A total of 96 bird species were recorded in the atlas square, with the following species of interest noted:

- Species listed as Threatened or Endangered on the SARO List:
    - Bank Swallow (*Riparia riparia*) – Threatened;
    - Bobolink (*Dolichonyx oryzivorus*) – Threatened;
    - Chimney Swift (Chaetura pelagica) – Threatened; and
    - Eastern Meadowlark (*Sturnella magna*) – Threatened.
- Species of Conservation Concern (i.e., listed as Special Concern on the SARO List or identified as an S1–S3 species; B= breeding population, N=non-breeding population, M= migrant population):
    - Barn Swallow (*Hirundo rustica*) – Special Concern;
    - Blue-winged Teal (*Anas discors*) – S3B, S4M;
    - Eastern Wood-Pewee – Special Concern;
    - Grasshopper Sparrow (Ammodramus savannarum) - Special Concern;
    - Purple Martin (*Progne subis*) – S3B;
    - Tufted Titmouse - S3; and
    - Wood Thrush – Special Concern.

3.1.4 Ontario Reptile and Amphibian Atlas

The Ontario Reptile and Amphibian Atlas contains detailed information on the population and distribution status of Ontario herpetofauna (Ontario Nature 2020). The data is presented on 100 km^2 area squares with one square overlapping the Subject Lands (17PH64). It should be noted that the Subject Lands are a small component of the overall atlas square, and therefore, it is unlikely that all herpetofauna species are found within the Subject Lands. Habitat type, availability and size are all contributing factors in herpetofauna species presence and use.

A total of seven species were recorded in the atlas square that overlaps with the Subject Lands.

Of these species, the following species of interest are noted: Fowler's Toad - Endangered and Snapping Turtle (*Chelydra serpentina*) – Special Concern.

3.1.5 Ontario Butterfly and Moth Atlas

The Ontario Butterfly and Moth Atlases (Toronto Entomologists' Association 2023, 2020), contain detailed information on the population and distribution status of butterflies and moths in Ontario. The database provides occurrence data by 10 km x 10 km squares. The Subject Lands are located within the atlas square (17PH64), which was used to determine a potential butterfly and moth species list for the area. The Subject Lands are a small component of the overall atlas square, and therefore all the butterfly and moth species listed for this atlas square may not be found within the Subject Lands. Habitat type, availability, and size are all contributing factors to butterfly and moth species presence and use.

No moth atlas square was available for the Subject Lands. Of the reported butterfly species, the following species of interest is noted: Monarch (*Danaus plexippus*) – Special Concern.

3.1.6 Fisheries and Oceans Canada Aquatic Species at Risk Distribution Mapping

Aquatic species at risk distribution mapping (DFO 2024) was reviewed to identify any known occurrences of aquatic SAR, including fish and mussels, within the subwatershed where the Subject Lands are located. No SAR were identified within Six Mile Creek on the Subject Lands. However, 1km upstream of the watercourse, Grass Pickerel (*Esox americanus vermiculatus*) a special concern species was identified. Downstream of the Six Mile Creek in Lake Erie, Spotted Sucker (*Minytrema melanops*) - Special Concern, Silver Chub (*Macrhybopsis storeriana)* - Endangered, and Silver Lamprey (*Ichthyomyzon unicuspis*) - Special Concern are identified.

3.1.7 Citizen Science Databases (eBird and iNaturalist)

The iNaturalist (2024) database is a large citizen science-based identification and data collection app. It allows any citizen to submit observations to be reviewed and identified by other naturalists and scientists to help provide accurate species observations. As the observations can be submitted by anyone, and the records are not officially vetted, the data obtained from this tool should not be used as a clear indicator of species presence, and species may be filtered out based on habitat and target survey efforts.

The eBird (2024) database is a large citizen science-based project with a goal to gather bird diversity information in the form of checklists of birds, archive it, and share it to power new data-driven approaches to science, conservation and education. As observations can be submitted by anyone, and the records are not officially vetted, the data obtained from this tool should not be used as a clear indicator of species presence, and species may be filtered out based on habitat and target survey efforts.

These online databases were examined to identify observations made within the Subject Lands that were research grade. However, no significant species were found on the Subject Lands or within 120 meters of its boundaries.

4. Existing Conditions Assessment and Next Steps/ Requirements

4.1 Significance Analysis

Eight types of natural features and areas are identified in the PPS (MMAH 2020):

- PSW;
- Significant coastal wetlands;
- Significant woodlands;
- Significant valleylands;
- SWH;
- Fish habitat;
- Habitat of endangered and threatened species; and
- Significant ANSI.

The presence/absence of these natural features on the Subject Lands are discussed in the subsequent sections of this Report. The NHRM (MNR 2010) were referenced to assess the potential significance of other natural features, and their associated forms and functions on the landscape.

In addition to the evaluation of natural heritage features and areas identified within the PPS (2024) and criteria outlined within the NHRM (2010), this section evaluates the presence of the NHS of the Town's OP (2021), the Region of Niagara OP (2022) and the regulated features in accordance with NPCA Ontario Regulation 155/06.

4.1.1 Significant Wetlands

Within Ontario, significant wetlands are identified by the MNR or by their designates. Other evaluated or unevaluated wetlands may be identified for conservation by the municipality or the conservation authority.

Within the Subject Lands, wetlands making up portions of the PSW Six Mile Creek Wetland Complex are identified.

It is recommended that a confirmatory site visit be completed during the growing season (May through September) to confirm the limits of the wetland complex along any proposed route alignment. NPCA will need to be consulted should changes to the boundaries be identified, and if changes are identified, the MNR should be notified of changes to the wetland boundaries.

Typically, a 30 m setback from a PSW is recommended.

If the preferred route alignment will directly impact a portion of the PSW, a Class Environmental Assessment (EA) will be required to obtain approval for the development, while if the preferred route alignment does not directly impact the PSW, but would be within 120 m of the PSW, an Environmental Impact Study (EIS) would be required.

Permitting would also be required from the NPCA for any development within 120 m of the PSW. Considerations will need to be given to construction methodologies that would reduce impact on the wetlands, including potentially the use of directional drilling and/or construction in the winter to minimize the extent of disturbance required to the wetland.

4.1.2 Significant Coastal Wetlands

Like significant wetlands, the MNR or their designates identify significant coastal wetlands present on the landscape. Coastal wetlands are defined in the NHRM (MNR 2010) as:

a. "Any wetland that is located on one of the Great Lakes or their connecting channels (Lake St. Clair, St. Mary's, St. Clair, Detroit, Niagara and St. Lawrence Rivers); or
b. Any other wetlands that is on a tributary to any of the above-specified water bodies and lies, either wholly or in part, downstream of a line located two km upstream of the 1:100-year floodplain (plus wave run-up) of the large water body to which the tributary is connected."

No significant coastal wetlands were identified within the Subject Lands.

4.1.3 Significant Woodlands

Significant woodlands are identified by the planning authority in consideration of criteria established by the MNR. Under the NHRM (2010) and the ROP (2022), woodlands are defined as:

> *"...treed areas that provide environmental and economic benefits to both the private landowner and the general public, such as erosion prevention, hydrological and nutrient cycling, provision of clean air and the long-term storage of carbon, provision of wildlife habitat, outdoor recreational opportunities, and the sustainable harvest of a wide range of woodland products. Woodlands include treed areas, woodlots or forested areas and vary in their level of significance at the local, regional and provincial levels."*

The PPS defines significant woodlands as:

> *"ecologically important in terms of features such as species composition, age of trees and stand history; functionally important due to its contribution to the broader landscape because of its location, size or due to the amount of forest cover in the planning area; or economically important due to site quality, species composition, or past management history."*

In accordance with the above noted definitions, natural treed communities (Coniferous Forest, FOC; Mixed Forest, FOM; FOD; Coniferous Swamp, SWC; Mixed Swamp, SWM; SWD) and cultural forest/plantation communities (CUW, CUP) are considered woodlands (i.e., meets the *Forestry Act* woodland density requirements). Woodland patches are considered part of the same continuous woodland if they are within 20 m of each other.

As identified within the ROP (2022), several significant woodlands are identified within the Subject Lands.

It is recommended that a confirmatory site visit be completed during the growing season (May through September) to confirm the limits of woodland communities along any proposed route alignment. The Town of Fort Erie will need to be consulted around any identification of woodland limits.

Typically, a minimum 10 m setback is recommended from significant woodlands. If the preferred route alignment will directly impact a portion of a significant woodland, a Class EA will be required to permit the development, while any development within 120 m of a significant woodland would require an EIS. Consideration will need to be given to construction methodologies that would reduce impact on the woodlands, including potentially the use of directional drilling and/or construction in the winter to minimize the extent of disturbance required to the woodland.

4.1.4 Significant Valleylands

Significant valleylands are defined and designated by the planning authority. General guidelines for determining significance of these features are presented in the NHRM (MNR 2010) for Policy 2.1 of the PPS. Recommended criteria for designating significant valleylands includes prominence as distinctive landform, degree of naturalness, and importance of its ecological functions, restoration potential and historical and cultural values.

The Six Mile Creek valleyland is a well-defined feature on the landscape. This feature is considered a stream corridor given the presence of a defined watercourse channel associated with the Six Mile Creek, and based on the connectivity it provides on the broader landscape, it meets the definition of a Significant Valleyland.

As per the Town's OP, for Valleylands where the valleybank height is 3 meters or greater, a minimum setback of 7.5 meters from the stable top of the valley slope is required. If there is evidence of slope instability or if the valley slope exceeds a 3:1 ratio (horizontal to vertical), a geotechnical report prepared by a qualified engineer must be submitted with any application for new development or site alteration. Wherever possible, existing vegetation within the required setback should be maintained, and vegetation located below the top of the valley slope must not be disturbed.

An Environmental Impact Study (EIS) will be required for any development which impacts the Significant Valleyland. As with the wetlands, consideration would need to be given to the use of trenchless technologies, such as directional drilling, if a crossing of Six Mile Creek is required.

4.1.5 Significant Wildlife Habitat

SWH is one of the more complex natural heritage features to identify and evaluate. There are several provincial documents that discuss identifying and evaluating SWH including the NHRM (MNR 2010), the SWH Technical Guide (MNR 2000), and the SWH Eco-Region Criterion Schedule (MNR 2015). The Subject Lands are located in Eco-Region 7E and were therefore assessed using the 7E Criterion Schedule (MNR 2015).

There are four general types of SWH:

- Seasonal concentration areas;
- Rare or specialized habitats;
- Habitat for species of conservation concern; and
- Animal movement corridors.

General descriptions of these types of SWH are provided in the following sections.

Seasonal Concentration Areas

Seasonal concentration areas are those sites where large numbers of a species gather together at one time of the year, or where several species congregate. Seasonal concentration areas include deer yards; wintering sites for snakes, bats, raptors and turtles; waterfowl staging and molting areas, bird nesting colonies, shorebird staging areas, and migratory stopover areas for passerines or butterflies. Only the best examples of these concentration areas are usually designated as SWH.

Rare or Specialized Habitats

Rare and specialized habitat are two separate components. Rare habitats are those with vegetation communities that are considered rare in the province. SRANKS are rarity rankings applied to species at the 'state', or in Canada at the provincial level, and are part of a system developed under the auspices of the Nature Conservancy (Arlington, VA). Generally, community types with SRANKS of S1 to S3 (extremely rare to rare-uncommon in Ontario), as defined by the NHIC (2024), could qualify. It is to be assumed that these habitats are at risk and that they are also likely to support additional wildlife species that are considered significant. Specialized habitats are microhabitats that are critical to some wildlife species. The NHRM (MNR 2010) defines specialized habitats as those that provide for species with highly specific habitat requirements, areas with exceptionally high species diversity or community diversity, and areas that provide habitat that greatly enhances species' survival.

Habitat for Species of Conservation Concern

Species of conservation concern include those that are provincially rare (S1 to S3), provincially historic records (SH) and Special Concern species. Several specialized wildlife habitats are also included in this SWH category, including Terrestrial Crayfish habitat, and significant breeding bird habitats for marsh, open country and early successional bird species.

Habitats of species of conservation concern do not include habitats of endangered or threatened species as identified by the ESA (2019 Consolidation). Endangered and threatened species are discussed in **Section 4.1.7**.

Animal Movement Corridors

Animal movement corridors are areas that are traditionally used by wildlife to move from one habitat to another. This is usually in response to different seasonal habitat requirements, including areas used by amphibians between breeding and summer/over-wintering habitats, called amphibian movement corridors.

Given the absence of site-specific information, it is not possible to provide any further conclusion with respect to the abundance or type of significant wildlife habitats present within the Subject Lands. However, any natural areas present within the Subject Lands have the potential to be a component of significant wildlife habitat, and mitigation measures to reduce impacts to resident wildlife communities should be considered and implemented.

If present, an EIS will be required for the development. It would be likely that any SWH features present within the landscape would be associated with one of the other feature types discussed herein, and so mitigation measures to protect those features would also likely be effective at protecting these feature types.

4.1.6 Fish Habitat

Fish habitat, as defined in the federal *Fisheries Act*, c. F-14, means "spawning grounds and nursery, rearing, food supply, and migration areas on which fish depend directly or indirectly in order to carry out their life processes." Fish, as defined in S.2 of the Fisheries Act, c. F-14, includes "parts of fish, shellfish, crustaceans, marine animals and any parts of shellfish, crustaceans or marine animals, and the eggs, sperm, spawn, larvae, spat and juvenile stages of fish, shellfish, crustaceans and marine animals."

Within the Subject Lands, Six Mile Creek is identified as direct fish habitat.

In accordance with the Town's OP, a vegetated buffer of at least 30 meters is required next to Critical Fish Habitat, and at least 15 meters next to Important or Marginal Fish Habitat. Smaller buffers may be allowed if an EIS shows no harmful alteration or destruction to Fish Habitat.

As with significant valleylands, an EIS will be required for any development which impacts fish habitat. Consideration would need to be given to the use of trenchless technologies, such as directional drilling, if a crossing of Six Mile Creek is required.

Should it be determined that in-water works are required, the fisheries timing window shall be respected (i.e., avoid the period between October 1 to May 31 of any given year for fall spawning and March 15 to July 15 for spring spawning), in accordance with the DFO *Ontario Restricted Activity Timing Windows for the Protection of Fish and Fish Habitat* and the *In-water Work Timing Window Guidelines* (MNR 2013).

In addition, any work that has the potential to impact fish habitat in Six Mile Creek will likely need to be provided to DFO for consideration via the Request for Review process.

4.1.7 Habitat for Endangered and Threatened Species

As this Report only provides a desktop review of potential natural heritage features, detailed ecological surveys will be needed to confirm absence or presence of the following SAR identified during the background review:

- Bank Swallow – Threatened;

- Butternut – Endangered;
- Fowler's Toad - Endangered;
- Red-headed Woodpecker - Endangered; and
- White Wood Aster – Threatened.

Suitable forested vegetation communities on the Subject Lands may support Butternut, Red-headed Woodpecker and White Wood Aster. Suitable riverbanks along the Six Mile Creek may support Bank Swallows. These areas of potential suitable habitat are shown in **Figure 3** (**Appendix A**). Beaches along the shoreline of Lake Erie may support Fowler's Toad. The residential homes within the Subject Lands may provide suitable chimneys for the Chimney Swift.

Though identified during the background review, a review of aerial imagery does not indicate large grassland fields within the Subject Lands that would provide suitable habitat for Bobolink and Eastern Meadowlark, and so it is not expected that these species are present. Further, though Chimney Swift or endangered species of bats may be using some of the buildings within the Subject Lands, the proposed works would not require removal of a structure and so they are not considered further.

In addition to those species identified during the background review, the forested vegetation communities within the Subject Lands may provide suitable habitat for species at risk bats.

Once a preferred route alignment is identified, it would be recommended that a site visit be completed to assess for potential occurrence of the wildlife species identified above. Where suitable habitat is identified, confirmatory surveys will likely be required, and would likely include:

- Botanical inventory for White Wood Aster and Butternut
- Habitat suitability for Fowler's Toad
- Breeding bird surveys (to be completed in June)
- Bat habitat assessment (to be completed during leaf off conditions between November and March)
- Bat acoustic survey (to be completed in June).

To minimize impacts to species at risk, removal of trees and any sand dunes should be avoided to the greatest extent possible.

If dunes are present that would provide habitat for Fowler's Toad, work should be timed to the active period (late May through September) to ensure they are active. Exclusion fencing should be placed around the work area and searches would be required to ensure that all toads present within the work area are removed.

Any work requiring tree or vegetation removal would not to be timed outside of the active bat and bird periods to remain compliant with the ESA and the MBCA. As such, removals would be recommended to avoid the period from April 1 through October 31.

Should suitable SAR habitat be identified, additional permitting or registration from MECP will be required.

4.1.8 Significant Areas of Natural and Scientific Interest

No ANSIs were identified on or within 120 m of the Subject Lands.

4.1.9 Town of Fort Erie Official Plan

The Subject Lands contain both Environmental Protection and Environmental Conservation areas. As indicated within the OP (2021), the Subject Lands have the following natural heritage features:

- Environmental Protection:
    - PSW (Six Mile Creek Wetland Complex);
    - Candidate Habitat of Threatened, and Endangered Species;
    - Candidate Habitat of Species of Special Concern; and
    - Natural Hazards (flooding hazards, erosion hazards or dynamic beach hazards).
- Environmental Conservation:
    - Locally Significant Natural Areas (Significant Woodlands, SWH, and Environmentally Sensitive Areas and Environmental Corridors);
    - Valleylands; and
    - Fish Habitat
        - Six Mile Creek- Critical Fish Habitat
        - Tributary of Six Mile Creek- Unclassified Fish Habitat

As identified above, the proposed works are likely to require either a Class EA (PSW, significant woodlands) or an EIS (all other feature types) to obtain approval for the proposed development. The outcome of those studies would be identifications of mitigation measures to ensure impacts to features are minimized to the greatest extent possible.

In addition, any works within the regulatory area of the NPCA under O.Reg. 41/24 will also require a permit from that agency.

Finally, should suitable habitat for endangered and threatened species be identified within the area, additional permitting or registration from MECP will likely be required.

4.1.10 Niagara Region Official Plan

Within the Subject Lands, the following natural heritage features are identified through the ROP (2022):

- PSWs (Six Mile Creek Wetland Complex);
- Other Wetlands and Non-Provincially Significant Wetlands;

- Permanent and Intermittent Streams; and
- Significant Woodlands.

4.1.11 NPCA Regulated Features

Pursuant of O. Reg. 41/24, the NPCA has the authority to regulate development within its regulated areas. The NPCA regulates the following features:

- Lands adjacent to or close to the shoreline of the Great Lakes-St. Lawrence River System that may be affected by flooding, erosion or dynamic beaches;
- River or stream valleys that have depressional features associated with a river or stream, whether or not they contain a watercourse;
- Hazardous lands;
- Wetlands; and
- Other areas where development could interfere with the hydrologic function of a wetland, including areas within 30 m of wetlands.

Within the Subject Lands, all wetland vegetation communities including the PSWs (Six Mile Creek Wetland Complex) and Six Mile Creek are all regulated features with hazards. The shorelines of Lake Erie are also regulated by the NPCA.

Development activities occurring within the regulated areas outlined above will require a permit to be issued by the NPCA.

4.2 Summary of Existing Conditions

The following constraints have been identified through the desktop background review and should be considered when selecting alternatives identified in the watermain replacement project (**Figure 3**, **Appendix A**):

- PSWs (Six Mile Creek Wetland Complex);
- Significant Woodlands;
- Significant Valleylands (Six Mile Creek);
- SWH;
- Fish Habitat (Six Mile Creek and tributary); and
- Habitat for Endangered and Threatened Species.

5. Next Steps

Several significant natural heritage features have been identified within the Subject Lands, including PSWs, woodlands, valleylands, SWH and habitat for endangered and threatened species. The next step would be to further characterize the limits and quality of the natural heritage features with each proposed alternative through fieldwork studies. This will serve to narrow down the alternatives and guide the development to the most feasible and sustainable option.

To complete that characterization, the following fieldwork program would be recommended for the preferred route options:

- Site reconnaissance surveys to identify wildlife habitat features;
- Ecological Land Classification (ELC) and Botanical Inventories;
- Delineation of wetland and woodland limits

In addition, depending on the route options being investigated, the following wildlife surveys may be required:

- Breeding Bird Surveys;
- Amphibian and Reptile Surveys;
- Bat Habitat Assessment and Acoustic Monitoring;
- Aquatic Habitat Assessment

Following completion of the fieldwork program, sufficient data would be in hand to support either an EIS or Class EA process. In addition, permits may also be required from DFO, MECP and/or NPCA, depending on the final route alignment.

As it relates to project design and implementation considerations, the following is offered:

- Where possible, the following setbacks should be provided:
  - 30 m from PSWs;
  - 10 m from Significant Woodlands;
  - 7.5 m from stable top of slope; and
  - 15-30 from fish habitat within Six Mile Creek
- Any work involving crossing of PSW or Six Mile Creek should consider trenchless technologies. If in-water work is required, all works will need to be timed outside of the period from October 1 to May 31 and March 15 to July 15.
- Tree removal requirements should be minimized to the greatest extent possible.
- If the preferred option involves work along the beach, and sand dunes are present that could be impacted, work will need to be timed to the Fowler's Toad active period, and exclusion fencing and surveys will be required to support the work program.

- If removal of natural vegetation is required (trees, shrubs, open grassed areas), vegetation removal work will need to be timed outside of the bat and bird active window (typically April 1 through October 31 in any given year) to avoid impacts to these species.

Should you have any questions or concerns regarding the information provided within these preliminary ecological constraints and opportunities memo, please contact one of the undersigned.

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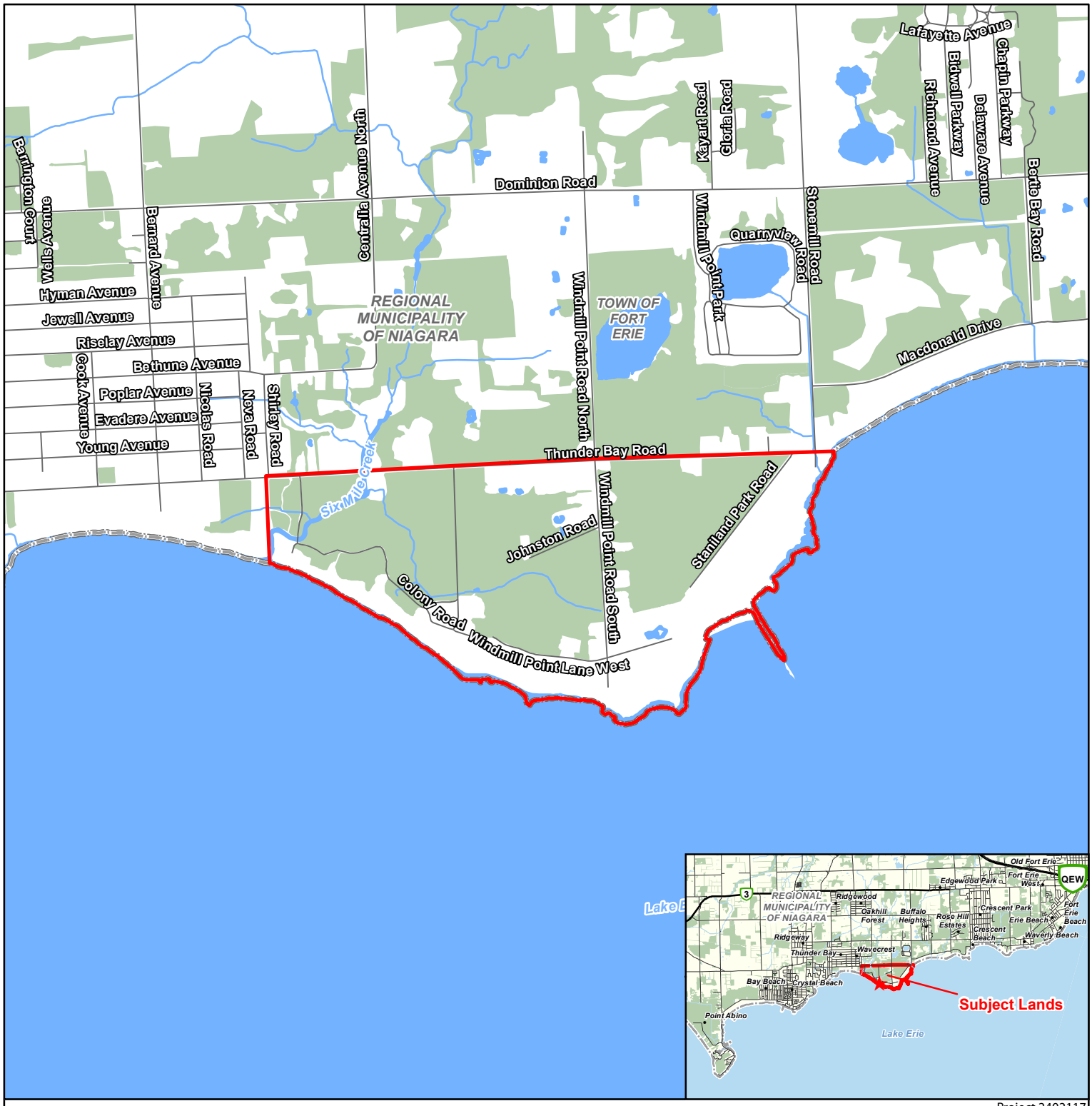
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Appendix A

Figures



Project 2402117

NOTES:
1. Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere.
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2024.

Legend
- Subject Lands
- Road
- Watercourse
- Waterbody
- Wooded Area

Colony Rd Watermain Relocation Project
Town of Fort Erie

Figure 1
Location of Subject Lands

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GEI Consultants

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NOTES:

1. Coordinate System: NAD 1983 UTM Zone 17N.
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario; © Niagara Region 2024.

Legend

- Subject Lands
- Provincially Significant Wetland
- Locally/Other Significant Wetland
- Wetland - Not evaluated per OWES
- Watercourse
- Waterbody
- Wooded Area
- NPCA Regulation Limits
- Wildlife Activity Area
- Aquatic Species at Risk - Fish
- Niagara Region Environmental Protection Areas
- Niagara Region Environmental Conservation Areas

Project 2402117

Colony Rd Watermain Relocation Project
Town of Fort Erie

Figure 2
Landscape Setting

0 250 m
1:15,000

N

GEI Consultants



Project 2402117

NOTES:
1. Coordinate System: NAD 1983 UTM Zone 17N.
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2024.

Legend
- Subject Lands
- Current Watermain Alignment
- Proposed Alignment
- Provincially Significant Wetland
- Wetland - Not evaluated per OWES
- Watercourse (Fish Habitat)
- Waterbody
- Wooded Area
- Significant Woodlands
- Candidate Habitat for Endangered and Threatened Species and Significant Wildlife Habitat
- Wildlife Activity Area

Colony Rd Watermain Relocation Project
Town of Fort Erie

Figure 3
Significant Natural Heritage Features

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GEI Consultants

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Appendix B

Background Search Results

Table 1: Rare Species Identified Through Background Review Within and Adjacent to the Subject Lands

Taxa	Species Name	Scientific Name	ESA Status	S-Rank	Source
Birds	Red-headed Woodpecker	*Melanerpes erythrocephalus*	Endangered	S3	OBBA
	Bank Swallow	*Riparia riparia*	Threatened	S4B	OBBA
	Bobolink	*Dolichonyx oryzivorus*	Threatened	S4B	OBBA
	Chimney Swift	*Chaetura pelagica*	Threatened	S3B	OBBA
	Eastern Meadowlark	*Sturnella magna*	Threatened	S4B	OBBA
	Barn Swallow	*Hirundo rustica*	Special Concern	S4B	OBBA
	Eastern Wood-pewee	*Contopus virens*	Special Concern	S4B	OBBA
	Grasshopper Sparrow	*Ammodramus savannarum*	Special Concern	S4B	OBBA
	Wood Thrush	*Hylocichla mustelina*	Special Concern	S4B	OBBA
	Blue-winged Teal	*Anas discors*	-	S3B	OBBA
	Purple Martin	*Progne subis*	-	S3B	OBBA
	Tufted Titmouse	*Baeolophus bicolor*	-	S3	OBBA, NHIC
Insect	Monarch	*Danaus plexippus*	Special Concern	S4B	OBA
Reptiles	Fowler's Toad	Anaxyrus fowleri	Threatened	S3	ORAA
	Snapping Turtle	*Chelydra serpentina*	Special Concern	S4B	ORAA
Plants	Butternut	*Juglans cinerea*	Endangered	S2?	NHIC
	White Wood Aster	*Eurybia divaricata*	Threatened	S3	NHIC
	Common Hop-tree	*Ptelea trifoliata*	Special Concern	S3	NHIC
	Swamp Rose-mallow	*Hibiscus moscheutos*	Special Concern	S3	NHIC
	Honey Locust	*Gleditsia triacanthos*	-	S2?	NHIC
	Lizard's-tail	*Saururus cernuus*	-	S3	NHIC
Fish	Grass Pickerel	*Esox americanus vermiculatus*	Special Concern	S3	DFO
	Spotted Sucker	*Minytrema melanops*	Special Concern	S2	DFO
	Silver Chub	Macrhybopsis storeriana	Endangered	S2	DFO
	Silver Lamprey	Ichthyomyzon unicuspis	Special Concern	S3	DFO

A.2. Archaeology

Stage 1 Archaeological Assessment Colony Road Watermain Relocation (Lot 13 to Lot 17, Broken Front on Lake Erie Concession, Bertie Geographical Township, County of Welland), Town of Fort Erie

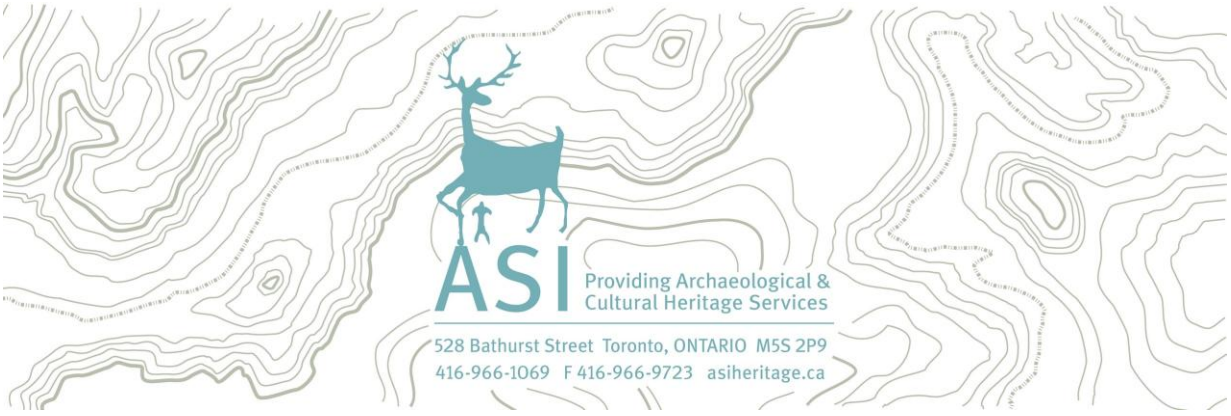
Original Report

Prepared for:

GEI Consultants
1266 South Service Rd, Unit C3-1
Stoney Creek, ON, L8E 5R9

Archaeological Licence: P094 (Merritt)
PIF P094-0394-2024
Archaeological Services Inc. File: 23EA-284

8 September 2025



Executive Summary

Archaeological Services Inc. was contracted by GEI Consultants (formerly GM BluePlan Engineering Limited), on behalf of the town of Fort Erie, to conduct a Stage 1 Archaeological Assessment (Background Research) as part of the Colony Road Watermain Relocation Municipal Class Environmental Assessment. This project involves the relocation of the existing three-kilometre watermain in the Colony Road neighbourhood. The Stage 1 Study Area is on Windmill Point which extends south into Lake Erie and is generally bound by Thunder Bay Road in the north.

The Stage 1 background study determined there are no previously registered archaeological sites located within one kilometre of the Study Area. According to background research, the *Archaeological Master Plan of the Town of Fort Erie*, and the *Niagara Region Archaeological Management Plan*, the Study Area exhibits archaeological potential and part of the Study Area is considered an archaeologically sensitive area.

The following recommendations are made:

1) Parts of the Study Area exhibit archaeological potential. These lands require Stage 2 archaeological assessment by test pit survey at five metre intervals. Stage 2 is required prior to any proposed construction activities on these lands;

2) Stage 2 archaeological assessment is required to confirm the extent of wetlands and permanently saturated poorly drained soils within the Study Area;

3) Parts of the Study Area require a visual inspection during Stage 2 to confirm these areas do not retain archaeological potential on account of deep and extensive land disturbance;

4) The remainder of Study Area does not retain archaeological potential on account of being previously assessed. These lands do not require further archaeological assessment; and,

5) Should the proposed work extend beyond the current Study Area, further archaeological assessment should be conducted to determine the archaeological potential of the surrounding lands.

Project Personnel

- **Principal**: Lisa Merritt, MSc (P094), Principal, Infrastructure
- **Senior Project Manager**: Sarah Jagelewski, BA Hons (R405), Lead Archaeologist, Manager, Infrastructure
- **Practice Area Coordinator**: Katrina Thach, BA Hons (R1225), Associate Archaeologist, Assistant Manager, Infrastructure
- **Project Administrator**: Justine Tenzer, BA Hons, Archaeologist, Proposal Administrator, Infrastructure; Catherine Kitchen, BA, Archaeologist (R1364), Project Administrator, Infrastructure
- **Project Director (Licencee)**: Lisa Merritt
- **Project Manager**: Eliza Brandy, MA (R1109), Lead Archaeologist, Project Manager, Infrastructure
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- **Report Review**: Eliza Brandy, Lisa Merritt

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1.0 Project Context

Archaeological Services Inc. (ASI) was contracted by GEI Consultants (formerly GM BluePlan Engineering Limited), on behalf of the town of Fort Erie, to conduct a Stage 1 Archaeological Assessment (Background Research) as part of the Colony Road Watermain Relocation Municipal Class Environmental Assessment. This project involves the relocation of the existing three-kilometre watermain in the Colony Road neighbourhood, Town of Fort Erie.

The Stage 1 Study Area is generally bound by Thunder Bay Road in the north and by Lake Erie to the south, to west of Colony Road and east of Staniland Park Road/Lake Erie in the east (Figure 1).

All activities carried out during this assessment were completed in accordance with the *Ontario Heritage Act* (1990, as amended in 2023) and the 2011 *Standards and Guidelines for Consultant Archaeologists* (S & G), administered by the Ministry of Citizenship and Multiculturalism (MCM 2011).

1.1 Development Context

All work has been undertaken as required by the *Environmental Assessment Act, RSO* (Environmental Assessment Act, R.S.O. c. E.18, 1990 as amended 2022) and regulations made under the Act, and are therefore subject to all associated legislation. This project is being conducted in accordance with the *Municipal Class Environmental Assessment* process (Municipal Engineers Association, 2023).

The *Archaeological Master Plan of the Town of Fort Erie* (ASI, 2003) and the *Niagara Region Archaeological Management Plan* (ASI, 2023) were also consulted.

Authorization to carry out the activities necessary for the completion of the Stage 1 archaeological assessment was granted by GEI Consultants on March 6, 2024.

1.1.1 Treaties

1.1.1.1. 1701 Deed from the Five Nations to the King, of their Beaver Hunting Ground

In the late seventeenth century, the Haudenosaunee of the Five Nations Confederacy residing in upstate New York and Southern Ontario were dealing with military engagements and encroachment from French forces as well as the movement of the Mississaugas and other Anishinaabeg peoples into the area, all of which contributed to fears among the Confederacy about the loss of their beaver hunting grounds (Williams & Nelson, 1995). To address their concerns, the Confederacy met with the Province of New York's acting colonial governor John Nanfan, as well as a British representative on behalf of the Indian Affairs Department, Robert Livingston, in July 1701. The Confederacy hoped to urge the English into action in their disputes with the French and their Indigenous allies. The British hoped that an alliance with the Haudenosaunee would continue to ensure a strong trading relationship, keep French efforts to control the fur trade in check, and assert British control deeper into North America (Brandao & Starna, 1996; Jamieson, 2013).

Ultimately, the Deed from the Five Nations to the King, sometimes referred to as the Treaty of Fort Albany, the Nanfan Treaty, the Albany Deed, or Livingston's Deed, was signed by representatives of the British Crown and the Haudenosaunee Confederacy in 1701 (Williams & Nelson, 1995). The Deed established the Beaver Hunting Grounds as a vast territory spanning much of the lands surrounding the lower Great Lakes, including Southern Ontario, as well as into the Ohio River Valley (Jamieson, 2013).

There has been significant debate about the terms of the agreement. The Six Nations of the Grand River interpret the agreement as a valid treaty that recognized the Confederacy's ownership of and access to the natural resources within the Beaver Hunting Grounds, while also receiving the Crown's support and protection (Jamieson, 2013; Williams & Nelson, 1995). Others, though, note that while the Haudenosaunee fished and hunted in Southern Ontario in the late seventeenth century, these lands were not under their authority at the time and

as such, they could not negotiate a formal treaty with the British Crown for this territory (Calverley, 2002; Jennings, 1984; Schmalz, 1984). Research indicates that the British did not formally recognize the agreement, and currently neither the Canadian government nor the British Crown recognize the 1701 Deed as a treaty.

1.1.1.2. Treaty 381, the Niagara Purchase

The Study Area is within territory covered by Treaty 381, the Niagara Purchase.

The Niagara Purchase was among the earliest agreements between the Crown and Indigenous Peoples in the area now known as Ontario and was one of several agreements from the eighteenth and nineteenth century that are collectively known as the Upper Canada Land Surrenders (Boileau, 2021).

It was signed in 1781, amidst the context of the American Revolution, between representatives of the British Crown and the Chippewa and Mississaugas. It covers a four-mile (six-and-a-half kilometre) wide tract of land on the west side of "the Straits" between Lake Erie and Lake Ontario which had not been agreed upon in the 1764 Niagara Peace Treaty (Crown-Indigenous Relations and Northern Affairs, 2016).[1] The British hoped that opening these lands along the west bank of the Niagara River to Loyalists after the American Revolution would spur agricultural development to provide food for their military and other recently-arrived settlers in the area (Boileau, 2021).

The signees of the treaty representing the Crown included Colonel Guy Johnson (Superintendent General of Indian Affairs), as well as Captains Andrew Parke

[1] For further information on the 1764 Treaty of Niagara, see Karl S. Hele's entry in The Canadian Encyclopedia; Nathan Tidridge, *The Queen at the Council Fire: The Treaty of Niagara, Reconciliation, and the Dignified Crown in Canada* (Toronto: Dundurn Press, 2015); and John Borrows, "Wampum at Niagara: The Royal Proclamation, Canadian Legal History, and Self-Government," in Michael Asch, ed., *Aboriginal and Treaty Rights in Canada: Essays on Law, Equality, and Respect for Difference* (1997), 155–172.

and William Potts of the King's Regiment, and John Dease and Alexander McKee, Deputy Agents of Indian Affairs. The signees of the treaty representing the Chippewa and Mississauga included Nanibizure, Paghquan, Wabicanine, and Minaghquat (Crown-Indigenous Relations and Northern Affairs, 2016; Surtees, 1984).

1.2 Historical Context

1.2.1 Indigenous Land Use and Settlement

Current archaeological evidence indicates humans were present in southern Ontario approximately 13,000 years before present (BP) (Ferris, 2013). Populations at this time would have been highly mobile, inhabiting a boreal-parkland similar to the modern sub-arctic. By approximately 10,000 BP, the environment had progressively warmed (Edwards & Fritz, 1988) and populations now occupied less extensive territories (Ellis & Deller, 1990).

Between approximately 10,000-5,500 BP, the Great Lakes basins experienced low-water levels, and many sites which would have been located on those former shorelines are now submerged. This period produces the earliest evidence of heavy wood working tools, an indication of greater investment of labour in felling trees for fuel, to build shelter, and watercraft production. These activities suggest prolonged seasonal residency at occupation sites. Polished stone and native copper implements were being produced by approximately 8,000 BP; the latter was acquired from the north shore of Lake Superior, evidence of extensive exchange networks throughout the Great Lakes region. The earliest archaeological evidence for cemeteries dates to approximately 4,500-3,000 BP and is interpreted by archaeologists to be indicative of increased social organization and the investment of labour into social infrastructure (Brown, 1995, p. 13; Ellis et al., 1990, 2009).

Between 3,000-2,500 BP, populations continued to practice residential mobility and to harvest seasonally available resources, including spawning fish. The Woodland period begins around 2,500 BP and exchange and interaction networks broaden at this time (Spence et al., 1990, pp. 136, 138) and by approximately 2,000 BP, evidence exists for small community camps, focusing

on the seasonal harvesting of resources (Spence et al., 1990, pp. 155, 164). By 1,500 BP there is macro botanical evidence for maize in southern Ontario, and it is thought that maize only supplemented people's diet. There is earlier phytolithic evidence for maize in central New York State by 2,300 BP – it is likely that once similar analyses are conducted on Ontario ceramic vessels of the same period, the same evidence will be found (Birch & Williamson, 2013, pp. 13–15). As is evident in detailed Anishinaabek ethnographies, winter was a period during which some families would depart from the larger group as it was easier to sustain smaller populations (Rogers, 1962). It is generally understood that these populations were Algonquian-speakers during these millennia of settlement and land use.

From the beginning of the Late Woodland period at approximately 1,000 BP, lifeways became more similar to that described in early historical documents. Between approximately 1000-1300 Common Era (CE), larger settlement sites focused on horticulture begin to dominate the archaeological record. Seasonal dispersal of the community for the exploitation of a wider territory and more varied resource base was still practised (Williamson, 1990, p. 317). By 1300-1450 CE, archaeological research focusing on these horticultural societies note that this episodic community dispersal was no longer practised and these populations now occupied sites throughout the year (Dodd et al., 1990, p. 343). By the mid-sixteenth century these small villages had coalesced into larger communities (Birch et al., 2021). Through this process, the socio-political organization of these First Nations, as described historically by the French and English explorers who first visited southern Ontario, was developed. Other First Nation communities continued to practice residential mobility and to harvest available resources across landscapes they returned to seasonally/annually.

By 1600 CE, the Confederation of Nations were encountered by the first European explorers and missionaries in Simcoe County. Samuel de Champlain in 1615 reported that a group of Iroquoian-speaking people situated between the Haudenosaunee and the Huron-Wendat were at peace and remained "la nation neutre". Like the Huron-Wendat, Petun, and Haudenosaunee, the Neutral or Attawandaron people were settled village agriculturalists.

By the 1640s, devastating epidemics and the traditional enmity between the Haudenosaunee and the Attawandaron and the Huron-Wendat (and their Algonquian allies such as the Nippissing and Odawa) led to their dispersal from southern Ontario. Shortly afterwards, the Haudenosaunee established a series of settlements at strategic locations along the trade routes inland from the north shore of Lake Ontario. Peace was achieved between the Haudenosaunee and the Anishinaabe Nations in August of 1701 when representatives of more than twenty Anishinaabe Nations assembled in Montreal to participate in peace negotiations. Peace was confirmed again at council held at Lake Superior when the Haudenosaunee delivered a wampum belt to the Anishinaabe Nations. This agreement between the Haudenosaunee and Anishinaabe nations is referred to as the Dish with One Spoon.

In 1763, following the fall of Quebec, New France was transferred to British control at the Treaty of Paris. The British government began to pursue major land purchases to the north of Lake Ontario in the early nineteenth century. The Crown acknowledged the Mississaugas of the Credit as the owners of the lands between Georgian Bay and Lake Simcoe and entered into negotiations for additional tracts of land as the need arose to facilitate European settlement.

1.2.2 Post-Contact Settlement

Historically, the Study Area is located in the Geographical Bertie Township, County of Welland in Lot 13 to Lot 17 in the Broken Front on Lake Erie Concession.

The S & G stipulates that areas of early Euro-Canadian settlement (pioneer homesteads, isolated cabins, farmstead complexes), early wharf or dock complexes, pioneer churches, and early cemeteries are considered to have archaeological potential. Early historical transportation routes (trails, passes, roads, railways, portage routes), properties listed on a municipal register or designated under the Ontario Heritage Act or a federal, provincial, or municipal historic landmark or site are also considered to have archaeological potential.

For the Euro-Canadian period, the majority of early nineteenth century farmsteads (i.e., those that are arguably the most potentially significant

resources and whose locations are rarely recorded on nineteenth century maps) are likely to be located in proximity to water. The development of the network of concession roads and railroads through the course of the nineteenth century frequently influenced the siting of farmsteads and businesses. Accordingly, undisturbed lands within 100 metres of an early settlement road are also considered to have potential for the presence of Euro-Canadian archaeological sites.

The first Europeans to arrive in the area were transient merchants and traders from France and England, who followed Indigenous pathways and set up trading posts at strategic locations along the well-traveled river routes. All of these occupations occurred at sites that afforded both natural landfalls and convenient access, by means of the various waterways and overland trails, into the hinterlands. Early transportation routes followed existing Indigenous trails, both along the lakeshore and adjacent to various creeks and rivers (ASI 2006). Early European settlements occupied similar locations as Indigenous settlements as they were generally accessible by trail or water routes and would have been in locations with good soil and suitable topography to ensure adequate drainage.

Throughout the period of initial European settlement, Indigenous groups continued to fish, gather, and hunt within their traditional and treaty territories, albeit often with legal and informal restrictions imposed by colonial authorities and settlers. In many cases, Indigenous peoples acted as guides and teachers, passing on their traditional knowledge to settlers, allowing them to sustain themselves in their new homes. Indigenous peoples entered into economic arrangements and partnerships, and often inter-married with settlers. However, pervasive and systemic oppression and marginalization of Indigenous peoples also characterized Euro-Canadian colonization, with thousands being displaced from their lands, denied access to traditional and treaty hunting, fishing, and collecting grounds, and forced to assimilate with Euro-Canadian culture through mandatory attendance at Day and Residential Schools (Ray, 2005; Rogers & Smith, 1994).

1.2.3 Bertie Township

The first township survey was undertaken in 1784, and the first legal settlers occupied their land holdings in the same year. The first settlers were Loyalists, mainly Butler's Rangers, following the end of the American Revolutionary War. Among them were James Secord and Phillip Bender, who were responsible for securing government funds to build the first gristmill and sawmill in the township, to be located on Secord's farm. The earliest Mennonite pioneer was Jacob Sevitz who came in 1788, soon followed by many other Mennonite families, mainly from Lancaster County, Pennsylvania (Burkholder, 1935). Since no official name had been given to the survey lands the survey map was entitled "Quaker Township" (Fort Erie Museum Board, 1997). It was renamed for Sir Peregrine Bertie (1714-1778), 3rd Duke of Ancaster, by an Act of Parliament in 1793. By 1808 there were around forty homes in the township. In 1812 the township had several mills, schools and churches. The largest community was Stevensville, and other growing settlements included Point Abino, Mulgrave, Ridgeway, Amigari, Bridgeburg, Snyder, Windmill Point (the location of our study area), Ridgemount, Crystal Beach, Shipyards, and Erie Beach (Armstrong, 1985; Boulton, 1805; Davies & Felstead, 1996; Rayburn, 1997; Smith, 1846). The Town of Fort Erie, the Township of Bertie, and the Village of Crystal Beach were amalgamated as the Town of Fort Erie in 1970 (Osgoode Hall Law School, 1980).

The waterfront saw continuous residential growth throughout the twentieth century. The number of homes lining the shores of Lake Erie within the study area increased steadily from the 1930s through the 1970s and has become a popular destination for seasonal recreational activities.

1.2.4 Windmill Point

A grant of 400 acres within the area that would become Windmill Point was given to Silas Carter in the early 1780s by the government of Upper Canada (Andrews, 1952). Limestone, from the quarry nearby (part of the present-day Windmill Point Park and Campground), was used to build roadways, buildings, and landmarks in the area (Windmill Point Park, 2024). It was also used to build a three-story, circular, 60-foot-high mill in 1816, in addition to broken boulders from the farm and burr stones from Buffalo brought over on the ice. Power was

supplied by four sails which could be furled when Windmill Point's vigorous winds became too strong (Andrews, 1952). The mill was eventually sold to Old Miller Mann, and operation ceased sometime between 1875 and 1880. Carter's property also included a farm, brick kiln, lime kiln and yard, and a tannery which specialized in handmade boots (Andrews, 1952).

1.2.5 Map Review

The 1815 *Map of Niagara District* (Nesfield, 1815), 1862 *Map of the Counties of Lincoln and Welland* (Tremaine & Tremaine, 1862), the 1876 *Illustrated Historical Atlas of the Counties of Lincoln and Welland* (Page, 1876) and topographic maps from 1907, 1934, and 1973 (Department of Energy, Mines and Resources, 1973; Department of Militia and Defence, 1907; Department of National Defence, 1934) were examined to determine the presence of historical features within the Study Area during the nineteenth and twentieth century (Figure 2 to Figure 7).

It should be noted that not all features of interest were mapped systematically in the Ontario series of historical atlases. For instance, they were often financed by subscription limiting the level of detail provided on the maps. Moreover, not every feature of interest would have been within the scope of the atlases. The use of historical map sources to reconstruct or predict the location of former features within the modern landscape generally begins by using common reference points between the various sources. The historical maps are geo-referenced to provide the most accurate determination of the location of any property on a modern map. The results of this exercise can often be imprecise or even contradictory, as there are numerous potential sources of error inherent in such a process, including differences of scale and resolution, and distortions introduced by reproduction of the sources.

The 1815 map (Figure 2) shows "5 Mile Point" was a significant feature of the landscape of the north shore of Lake Erie. A main historical road followed the edge of the lake connecting early settler homes, such as the Carter family and Baxter Family to "Concession Road" depicted north of the Study Area. This road possibly corresponds to the present-day Colony Road, Windmill Point Lane, and

Staniland Park Road. (Note: this map was originally created with north at the bottom of the page.)

The 1862 map (Figure 3) shows the Study Area in a largely rural context. Within the Study Area two structures are visible on the northeastern corner, and a windmill is labelled on the southernmost point of the shoreline. An unnamed watercourse from Lake Erie runs north-south within the western limits of the Study Area.

The 1876 map (Figure 4) indicates limited growth following the 1862 mapping. The windmill labeled at the southernmost edge of the shoreline is now labelled as a gristmill. Two more structures have been built within the Study Area, both adjacent to an orchard. The properties along the southern tip of the Study Area have been divided into smaller parcels.

The 1907 map (Figure 5) indicates that a quarry was constructed to the north between 1876 and 1907 with water access by railway that cuts through the east portion of the Study Area to a pier in the lake. Two roads with water access can be seen within the Study Area, one of which follows the alignment of the current Windmill Point Road South. The western offshoot of what is now Windmill Point Road South follows the same alignment as the current Johnston Road until its turning point, where the road now terminates. The map indicates that at this time a structure still stood where the windmill and gristmill were indicated on previous mapping, as well as a structure on the eastern edge of the shoreline. This general area along the southern shoreline is now identified as the Windmill Point community from this point onward in the historical mapping. Shirley Road is shown at the western limits of the Study Area.

The 1934 map (Figure 6) indicates a marked growth in development between 1907 and 1934. The map indicates that the quarry was still present, however, does not indicate whether the railway access to Lake Erie remains, however the pier does remain illustrated. A paved road running east-west matches the alignment of the present-day Thunder Bay Road. A second north-south dirt road west of Windmill Point Road South runs from Thunder Bay Road to the shoreline and aligns with the present-day Colony Road. A wagon or unused road connects

the two roadways and is an extension of the present-day Johnston Road. Structures now line the shoreline at regular intervals.

The 1973 map (Figure 7) shows a continuation in residential development along the shoreline of the Study Area, as well as along Windmill Point Road South. Windmill Point Road South, Colony Road and Windmill Point Lane are all shown as two-lane, hard surface roads. A bridge is marked running north-south on the western portion of Colony Road over the watercourse. Smaller, unclassified roads are indicated following the alignments of the current day Staniland Park Road, Windmill Point Lane, and the east-west alignment at the southern end of Colony Road. Johnston Road is not indicated on this map. Where the windmill and gristmill were indicated in previous mapping there is no indication of a structure still standing; however, a horizontal control point (with third-order or better elevation) is indicated in the location. The western pier is not depicted on this map.

1.2.6 Aerial and Orthoimagery Review

Figure 8 shows historical aerial imagery from 1934 (*Niagara Air Photo Index, 1934 Series*, 1934). The 1934 imagery shows Thunder Bay Road, Colony Road, Windmill Point Road South, Windmill Point Lane, and Staniland Park Road. Most of the Study Area is shown to include agricultural fields, with tree lines separating some of the fields. Trees bound the watercourse within the western portion of the Study Area. Laneways lead from Colony Road and Windmill Point Lane to private properties, which line most of the shoreline. A sports court is shown west of Colony Road where the eastern portion of road curves westwards following the shoreline. A long pier, which related to the railway access used for the quarry in early twentieth-century mapping, is visible but there is no indication of direct access from the quarry to the shoreline by 1934. There is no indication of a windmill, gristmill, or small pier at the southern tip of the Study Area.

Figure 9 shows historical aerial imagery from 1954 (*Niagara Air Photo Index, 1954 Series*, 1954), which shows laneways from Staniland Park Road to properties near the shoreline. What appears to be sports fields are visible north

of Windmill Point Lane, off Windmill Point Road South. Note: the 1954 aerial photographs overlap, obscuring the view of Windmill Point Road South.

Figure 10 shows aerial imagery from 2000 (*Niagara Air Photo Index, 2000 Series*, 2000), which demonstrates grown of residential properties south of Thunder Bay Road and Windmill Point Road South. At this time, scrub brush or trees appear to cover the fields visible in the 1934 and 1954 aerials.

A review of available Google satellite imagery shows the Study Area remained relatively unchanged between 2002 and 2023.

1.3 Archaeological Context

This section provides background research pertaining to previous archaeological fieldwork conducted within and in the vicinity of the Study Area, its environmental characteristics (including drainage, soils or surficial geology and topography, etc.), and current land use and field conditions. Three sources of information were consulted to provide information about previous archaeological research: the site record forms for registered sites available online from the MCM through "Ontario's Past Portal"; published and unpublished documentary sources; and the files of ASI.

1.3.1 Geography

In addition to the known archaeological sites, the state of the natural environment is a helpful indicator of archaeological potential. Accordingly, a description of the physiography and soils are briefly discussed for the Study Area.

The S & G stipulates that primary water sources (lakes, rivers, streams, creeks, etc.), secondary water sources (intermittent streams and creeks, springs, marshes, swamps, etc.), ancient water sources (glacial lake shorelines indicated by the presence of raised sand or gravel beach ridges, relic river or stream channels indicated by clear dip or swale in the topography, shorelines of drained lakes or marshes, cobble beaches, etc.), as well as accessible or inaccessible shorelines (high bluffs, swamp or marsh fields by the edge of a lake, sandbars

stretching into marsh, etc.) are characteristics that indicate archaeological potential.

Water has been identified as the major determinant of site selection and the presence of potable water is the single most important resource necessary for any extended human occupation or settlement. Since water sources have remained relatively stable in Ontario since 5,000 B.P. (Karrow & Warner, 1990, fig. 2.16), proximity to water can be regarded as a useful index for the evaluation of archaeological site potential. Indeed, distance from water has been one of the most commonly used variables for predictive modeling of site location.

Other geographic characteristics that can indicate archaeological potential include elevated topography (eskers, drumlins, large knolls, and plateaux), pockets of well-drained sandy soil, especially near areas of heavy soil or rocky ground, distinctive land formations that might have been special or spiritual places, such as waterfalls, rock outcrops, caverns, mounds, and promontories and their bases. There may be physical indicators of their use, such as burials, structures, offerings, rock paintings or carvings. Resource areas, including; food or medicinal plants (migratory routes, spawning areas) are also considered characteristics that indicate archaeological potential (S & G, Section 1.3.1).

The Study Area is located within the limestone and clay physiographic landforms of the Haldimand Clay Plain physiographic region of southern Ontario (Chapman & Putnam, 1984). The Haldimand Clay Plain physiographic region (Chapman & Putnam, 1984, pp. 156–159) is among the largest of the 53 defined physiographic regions in southern Ontario, comprising approximately 3,500 square kilometres (MacDonald, 1980, p. 3). Generally, this region is flat and poorly drained, although it includes several distinctive landforms including dunes, cobble, clay, and sand beaches, limestone pavements, and back-shore wetland basins. Within this part of the Niagara peninsula, a number of environmental sub-regions have been described, including the Niagara Slough Clay Plain, the Fort Erie Clay Plain, the Calcareous Rock Plain (Onondaga Escarpment), the Buried Moraines, the Lake Erie Coast, and the Niagara River Valley (MacDonald, 1980). The distribution and nature of these sub-regions, and

the specific environmental features they contain, have influenced land use in the region throughout history and pre-history.

The Onondaga Formation provided one of the most widely used cherts for tool manufacture throughout regional prehistory. Commonly known as Onondaga chert, due to its presence in the Onondaga Formation, this material does not outcrop on the Onondaga Escarpment, except where exposed by modern stone quarrying. The chert-bearing Clarence Member does outcrop northwest of Ridgeway at Cherry Hill (Telford & Tarrant, 1975) and, more significantly, extensive outcrops occur on most of the north shore of Lake Erie from Fort Erie to Nanticoke (Parkins, 1977, p. 86). In these locations, Onondaga chert would have been available in abundance to Indigenous peoples. Quarrying was unnecessary, as large chert cobbles litter the local beaches, the result of wave action which fractures and reduces the tabular chert.

The Study Area is within a coastal dune, which likely corresponds to a beach-dune complex along the north shore of Lake Erie, dating circa 3,400 BP (Pengelly et al., 1997).

Figure 11 demonstrates the surficial geology of the Study Area which is underlain by man-made deposits on the historical pier; littoral-foreshore deposits; Eolian deposits; and massive well laminated fine-textured glaciolacustrine deposits of silt, clay, sand, and gravel (Ontario Geological Survey, 2010).

Soil types that have been mapped (Figure 12) within the Study Area include (Ontario Institute of Pedology, 1989a, 1989b):

- Maplewood, a sand or loam over lacustrine silty clay with poor to imperfect drainage
- Alluvium, an alluvial deposit on floodplains with variable drainage
- Brooks, shallow soils over bedrock with poor drainage
- Farmington, shallow soils over bedrock with rapid drainage
- Welland, lacustrine heavy clay with poor drainage
- Natural beach-scarp complex with variable to rapid drainage

Figure 12 also shows three large areas of wetland within the Study Area (ESRI 2024; Ontario Ministry of Natural Resources and Forestry, 2022). These areas are located between Thunder Bay Road to the north and the three roads which follow the direction of the shoreline (Colony Road, Windmill Point Lane West, and Staniland Park Road), in areas that are scrubland/forested and have not been developed.

The Study Area is along the north shore of Lake Erie. An unnamed tributary running north from Lake Erie is within the western portion of the Study Area. It is within the Fort Erie watershed, which encompasses an area approximately 183 square kilometres of largely agricultural lands with pockets of rural and urban residential development to the eastern and southern regions (Niagara Peninsula Conservation Authority, 2012; Philips Engineering Ltd., 2008, p. 45).

1.3.2 Previously Registered Archaeological Sites

In Ontario, information concerning archaeological sites is stored in the Ontario Archaeological Sites Database maintained by the MCM. This database contains archaeological sites registered within the Borden system. Under the Borden system, Canada has been divided into grid blocks based on latitude and longitude. A Borden block is approximately 13 kilometres east to west, and approximately 18.5 kilometres 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 located in Borden block *AfGs.*

According to the Ontario Archaeological Sites Database, there are no previously registered archaeological sites located within one kilometre of the Study Area (MCM 2024).

1.3.3 Previous Archaeological Assessments

ASI reviewed previous archaeological assessments that detail fieldwork within 50 metres of the Study Area. Only those specific archaeological assessments of direct relevance to the present undertaking will be included here:

- (Detritus Consulting, 2019) *Stage 1-2 Archaeological Assessment 124 Windmill Point Road Part of Lot 14, Broken Front on Lake Erie Geographic*

Township of Bertie, Historic County of Welland Regional Municipality of Niagara Town of Fort Erie. P017-0597-2017.

- This project area overlaps the current Study Area at 124 Windmill Point Road. Three rectangular parcels of land were assessed, between Windmill Point Road to the west and Thunder Bay Road to the north, by test pit survey at five metre intervals, and no archaeological resources were identified. As such, the three areas were recommended not to require further archaeological assessment.

1.4 Current Land Use and Conditions

The Stage 1 Study Area is on the northern shore of Lake Erie. The northern limits of the Study Area include Thunder Bay Road, a two-lane road with one lane per direction of traffic. The Thunder Bay Road right-of-way includes ditches. A channelized portion of a tributary from Lake Erie intersects Thunder Bay Road. The tributary is channelized for approximately 170 metres south of the road.

Three roads follow the direction of the shoreline to the north of the beachfront properties. Colony Road, a narrow private road leading to 2681 to 2923 Colony Road, is within the western portion of the Study Area. Colony Road creates a loop from Thunder Bay Road to the beachfront and back to Thunder Bay Road, passing over the tributary once by bridge. Colony Road does not connect to Windmill Point Lane West/East. Windmill Point Lane West and Windmill Point Lane East follow the shoreline, connecting to Thunder Bay Road by Windmill Point Road South. Windmill Point Road South is a two-way road with one lane per direction of traffic. Staniland Park Road, another narrow private road, follows the shoreline within the eastern portion of the Study Area.

Long driveways lead to residential houses from the roads, most of which are located near the beaches. Centralia Avenue Beach is within the western portion of the Study Area, Stonemill Road and Thunder Bay Road within the eastern portion, and Windmill Point Road South Beach connecting the two in the middle portion. North of the beachfront properties are shared community sport courts. Between Thunder Bay Road and the residential houses are large portions of

wetland which have not been developed and appear to be in areas of dense scrub brush and forest.

2.0 Analysis of Archaeological Potential

The S & G, Section 1.3.1, lists criteria that are indicative of archaeological potential. The Study Area meets the following criteria indicative of archaeological potential:

- Water sources within 300 metres: primary, secondary, or past water source (Lake Erie, unnamed tributary);
- Early settlements within 100 metres (homesteads, farmsteads, windmill, gristmill);
- Early historic transportation routes within 100 metres (Thunder Bay Road, Colony Road, Windmill Point Road, Stonemill Road)

According to the S & G, Section 1.4 Standard 1e, no areas within a property containing locations listed or designated by a municipality can be recommended for exemption from further assessment unless the area can be documented as disturbed. The Town of Fort Erie Municipal Heritage Register and the Niagara Navigator were consulted and no properties within the Study Area are Designated under the *Ontario Heritage Act*.

The *Archaeological Master Plan of the Town of Fort Erie* (ASI, 2003) and the *Niagara Region Archaeological Management Plan* (ASI, 2023) were reviewed for background information and to help inform any indicators of archaeological potential not captured in other research. Generally speaking, archaeological management plans are high-level analyses of archaeological potential for non-specialists but cannot be considered a replacement for Stage 1 archaeological assessments. ASI's review of the above archaeological management plans indicate there are no cemeteries, ossuaries, registered archaeological sites or pre-contact Indigenous villages within the Study Area and that most of the Study Area retains archaeological potential. An archaeologically sensitive area (ASA) is located within the study area (ASI 2023: Figure 13). The ASA represents the area of coastal dunes, where potential for deeply-buried paleosols and in-situ

archaeological deposits within and beneath sands associated with the documented dune formation may be found (see Section 1.3.1).

The background research determined that the Study Area exhibits archaeological potential. According to the S & G Section 2.1.2, test pit survey is required on terrain where ploughing is not viable, such as wooded areas, properties where existing landscaping or infrastructure would be damaged, overgrown farmland with heavy brush or rocky pasture, and narrow linear corridors up to 10 metres wide (Figure 14: areas highlighted in green). Any areas of archaeological potential will require Stage 2 archaeological assessment, prior to any construction activities or other proposed project impacts.

A review of topographic mapping (ESRI 2024) indicates parts of the Study Area are located within permanently low lying wetland/swamp areas (Figure 14: areas highlighted in light blue). However, since no property inspection was conducted, these lands must be subject to Stage 2 assessment as per S & G Sections 1.2.1 and 2.1.2 to verify the exact locations of permanently wet areas and any lands which may be subject to test pit survey.

Part of the Study Area has been previously assessed and does not require further archaeological assessments (Figure 14: areas highlighted in red).

Part of the Study Area includes an unnamed tributary (Figure 14: areas highlighted in dark blue). If impacts to the waterbed are proposed, marine archaeological potential will be evaluated through a separate process following the MCM's (2016) *Criteria For Evaluating Marine Archaeological Potential* checklist.

Part of the Study Area has been subjected to deep soil disturbance events due to construction of the historical railway and pier, roads, houses, laneways, and game courts. According to the S & G Section 1.3.2 these areas do not retain archaeological potential (Figure 14: areas highlighted in yellow) and require a property inspection to confirm disturbance.

2.1 Conclusions

The Stage 1 background study determined there are no previously registered archaeological sites located within one kilometre of the Study Area. According to background research, the *Archaeological Master Plan of the Town of Fort Erie* (ASI, 2003), and the *Niagara Region Archaeological Management Plan* (ASI, 2023), the Study Area exhibits archaeological potential and part of the Study Area is an archaeologically sensitive area.

3.0 Recommendations

The following recommendations are made:

1) Parts of the Study Area exhibit archaeological potential. These lands require Stage 2 archaeological assessment by test pit survey at five metre intervals (Figure 14: areas highlighted in green). Stage 2 is required prior to any proposed construction activities on these lands;

2) Stage 2 archaeological assessment is required to confirm the extent of wetlands and permanently saturated poorly drained soils within the Study Area (Figure 14: areas highlighted in light blue);

3) Parts of the Study Area require a visual inspection during Stage 2 to confirm that these areas do not retain archaeological potential on account of deep and extensive land disturbance (Figure 14: areas highlighted in yellow);

4) The remainder of the Study Area does not retain archaeological potential on account of being previously assessed. These lands do not require further archaeological assessment; and,

5) Should the proposed work extend beyond the current Study Area, further archaeological assessment should be conducted to determine the archaeological potential of the surrounding lands.

NOTWITHSTANDING the results and recommendations presented in this study, ASI notes that no archaeological assessment, no matter how thorough or carefully completed, can necessarily predict, account for, or identify every form

of isolated or deeply buried archaeological deposit. In the event that archaeological remains are found during subsequent construction activities, the consultant archaeologist, approval authority, and the Archaeology Programs Unit of the MCM should be immediately notified.

The above recommendations are subject to MCM approval and it is an offence to alter any archaeological site without MCM concurrence. No grading or other activities that may result in the destruction or disturbance of any archaeological sites are permitted until notice of MCM approval has been received.

4.0 Advice on Compliance with Legislation

- This report is submitted to the Minister 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 Citizenship and Multiculturalism 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 Archaeological Reports referred to in Section 65.1 of the *Ontario Heritage Act*.

- Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48 (1) of the *Ontario Heritage Act*.
- The *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33 requires that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the Ministry of Public and Business Services Delivery.
- Archaeological sites recommended for further archaeological fieldwork or protection remain subject to Section 48 (1) of the *Ontario Heritage Act* and may not be altered, or have artifacts removed from them, except by a person holding an archaeological licence.

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6.0 Maps

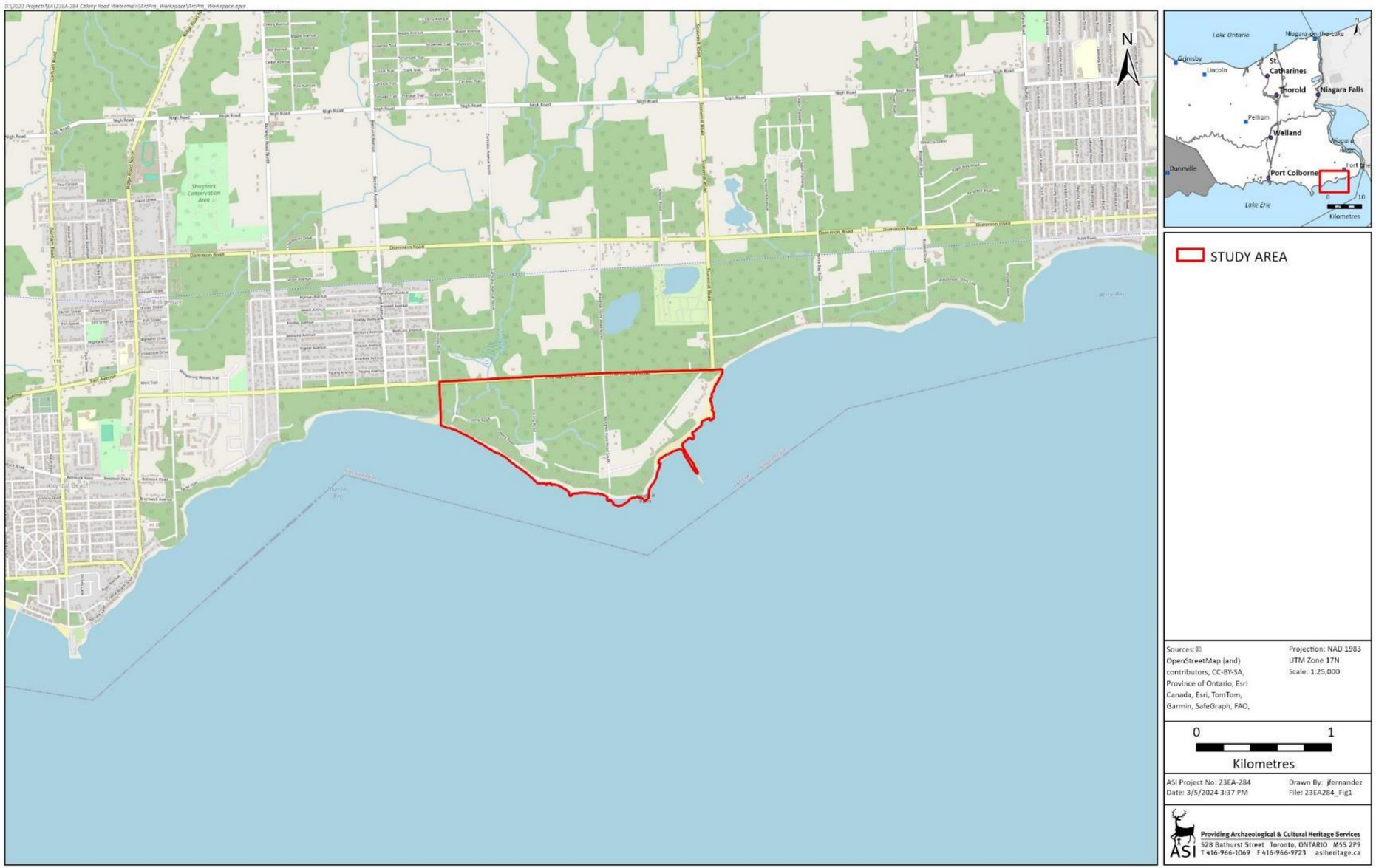


Figure 1: Stage 1 Colony Road Watermain Relocation Study Area.



Figure 2: The Study Area (approximate location) overlaid on the 1815 Map of the Niagara District.



Figure 3: The Study Area (approximate location) overlaid on the 1862 Tremaine Map of Lincoln and Welland County.



Figure 4: The Study Area (approximate location) overlaid on the 1876 Illustrated Historical Atlas of Lincoln and Welland County.

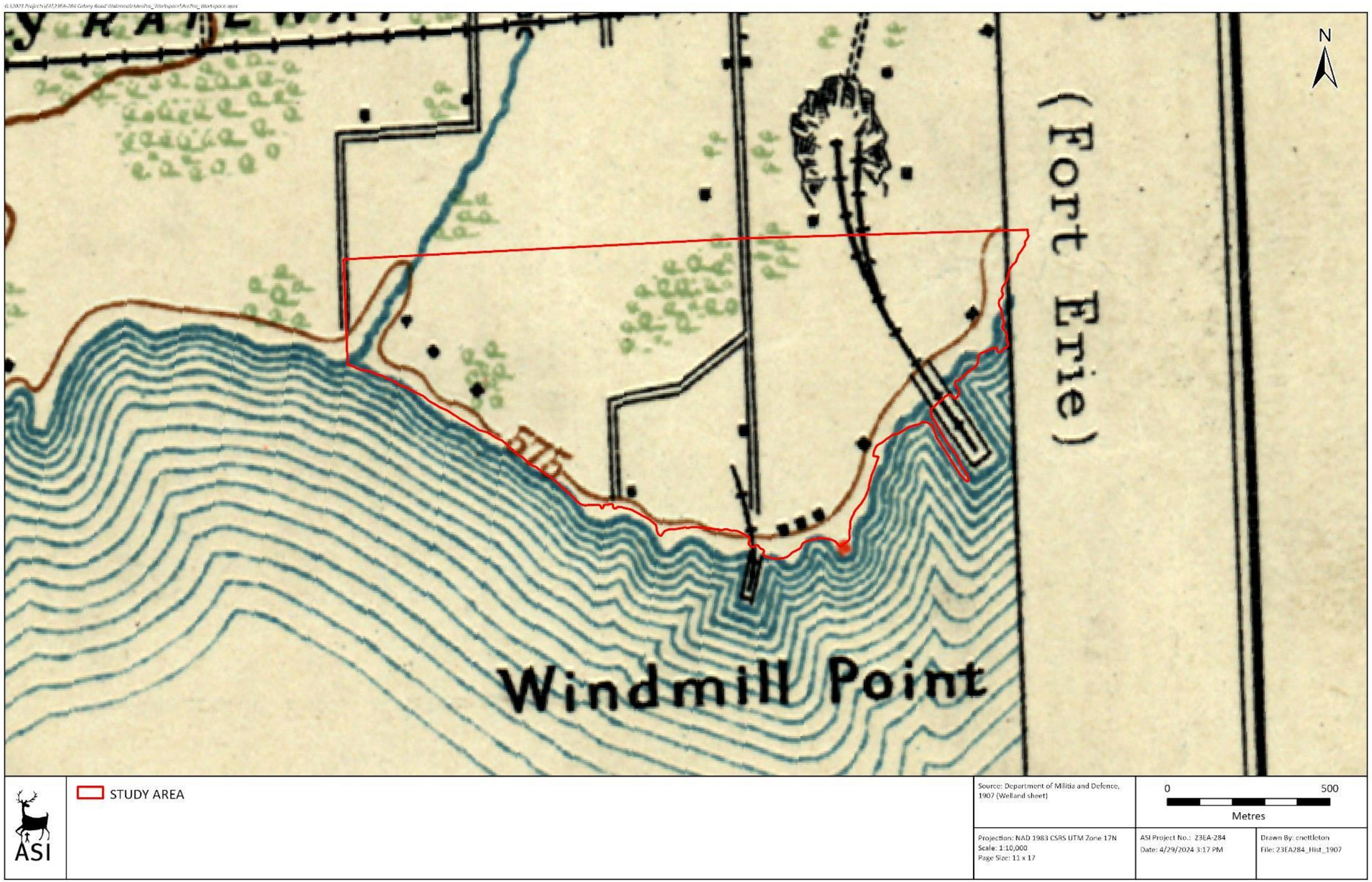


Figure 5: The Study Area (approximate location) overlaid on the 1907 topographic map – Welland Sheet.



Figure 6: The Study Area (approximate location) overlaid on the 1934 topographic map – Welland Sheet.

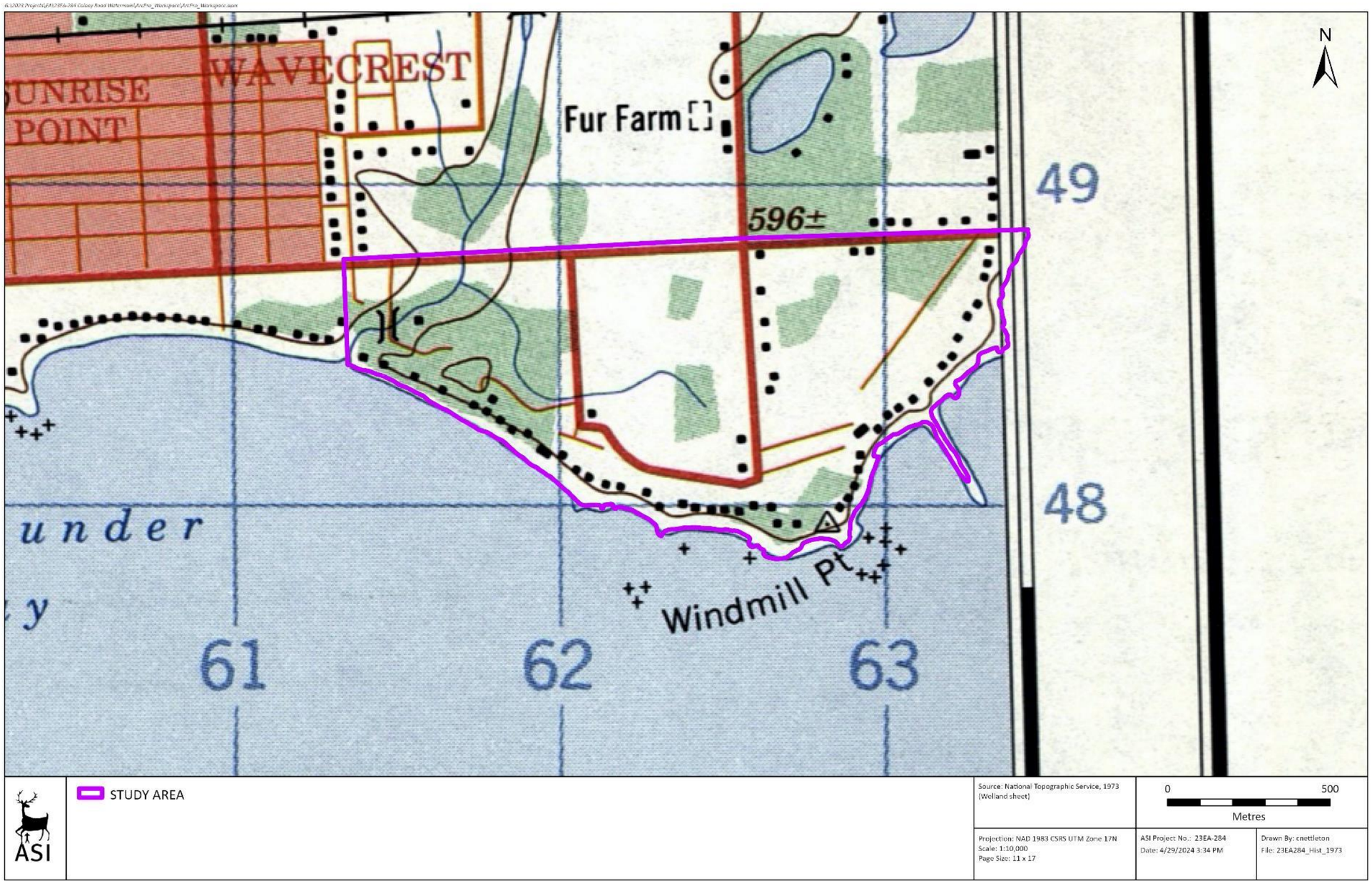


Figure 7: The Study Area (approximate location) overlaid on the 1973 topographic map – Welland Sheet.



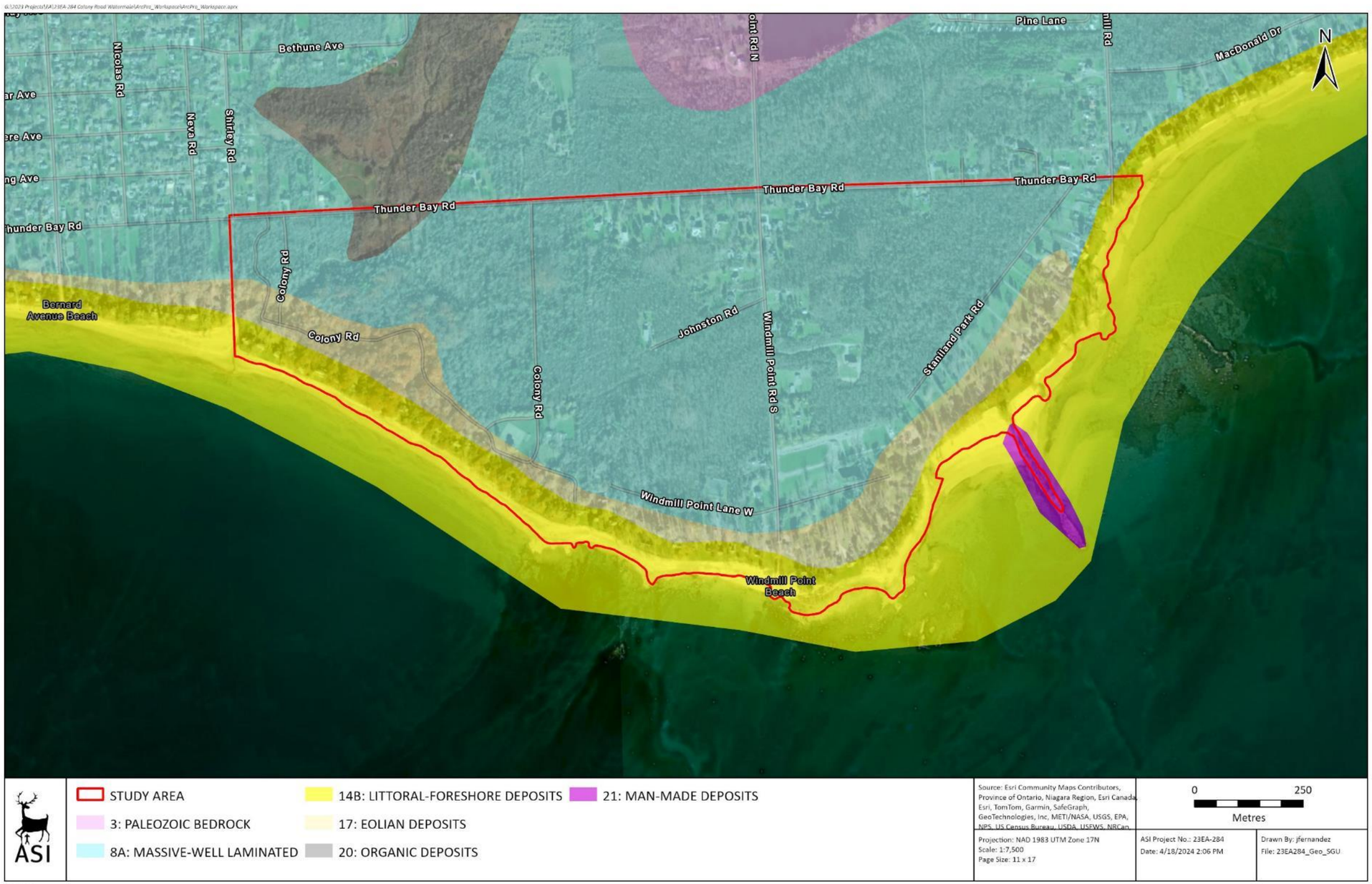
Figure 8: The Study Area (approximate location) overlaid on 1934 Aerial Photography.



Figure 9: The Study Area (approximate location) overlaid on 1954 Aerial Photography.



Figure 10: The Study Area (approximate location) overlaid on 2000 Aerial Photography.



Figure

Figure 11: Study Area – Surficial Geology

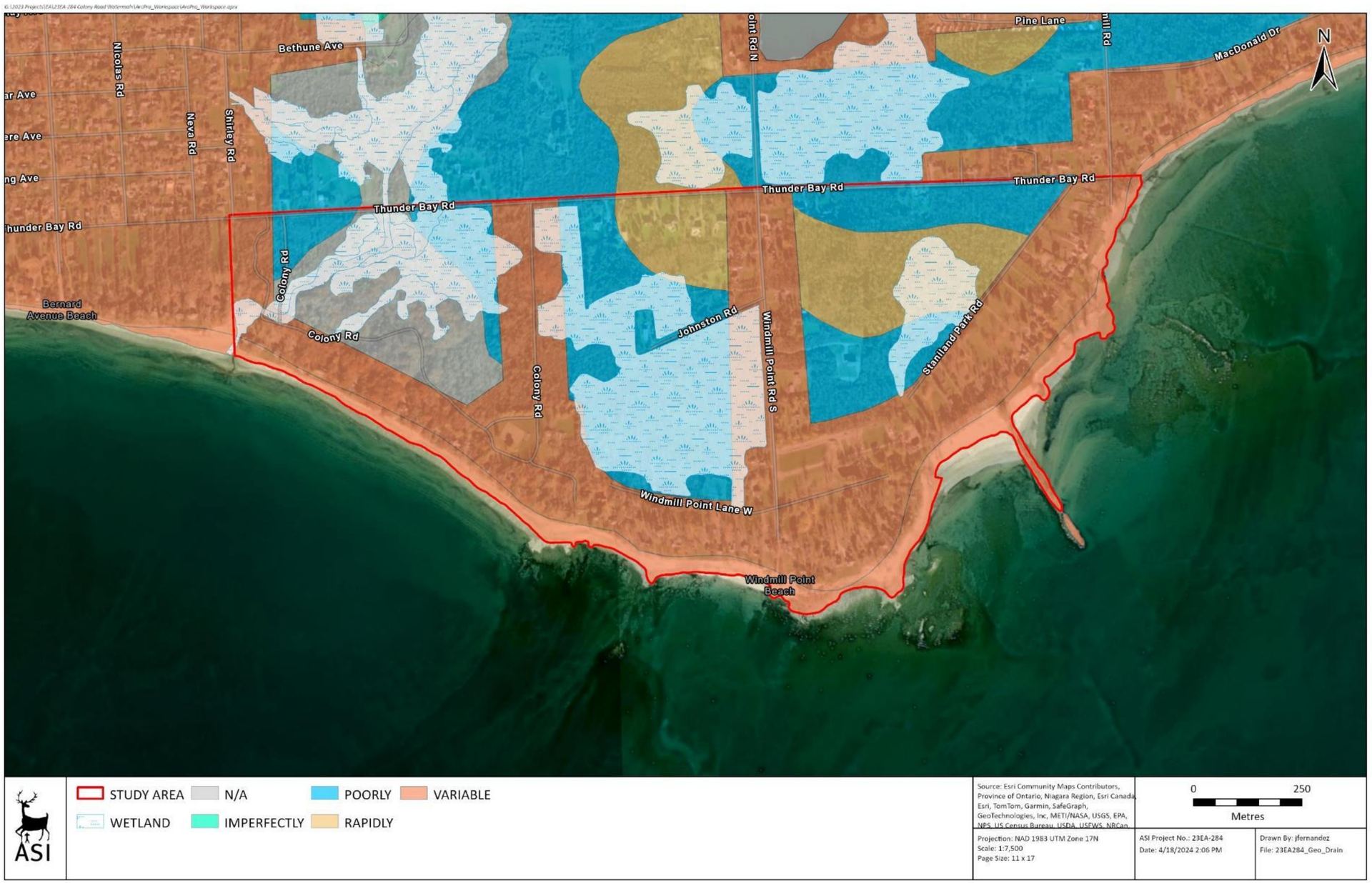


Figure 12: Study Area - Soil Drainage



Figure 13: Study Area – Archaeological Potential Mapping, including an Archaeological Sensitive Area (ASA), from the Niagara Region Archaeological Management Plan (ASI 2023)



Figure 14: Colony Road Watermain Relocation – Results of Stage 1

A.3. Cultural Heritage

Cultural Heritage Report:
Desktop Baseline Conditions

Colony Road Watermain Relocation Project
Municipal Class Environmental Assessment

Town of Fort Erie
Niagara Region, Ontario

Final Report

Prepared for:

GEI Consultants
1266 South Service Rd, Unit C3-1
Stoney Creek, ON, L8E 5R9

Archaeological Services Inc. File: 23CH-228

May 2024 (revised October 2024 and September 2025)



Executive Summary

Archaeological Services Inc. was contracted by GEI Consultants (formerly GM BluePlan Engineering) on behalf of the Town of Fort Erie to conduct a Cultural Heritage Report as part of the Colony Road Watermain Relocation Project conducted under the Municipal Class Environmental Assessment process. The purpose of this report is to present a list of previously identified built heritage resources and cultural heritage landscapes to identify baseline cultural heritage conditions and inform the planning process. Fieldwork to confirm the existing conditions of the area and present a preliminary impact assessment based on a preferred alternative is not included in this report and will need to be completed to satisfy the requirements of the Municipal Class Environmental Assessment process.

The Colony Road Watermain Relocation Municipal Class Environmental Assessment involves the relocation of the Colony Road watermain to a new location within the study area boundaries. The project study area consists of an area bounded by Thunder Bay Road to the north, Colony Road to the west, and Lake Erie to the east and south.

The results of background historical research and a review of secondary source material, including historical mapping, indicate a study area with an Indigenous history spanning several millennia, a rural and residential land use history dating back to the early nineteenth century, and a rise in recreational use along the waterfront in the twentieth century. A review of federal, provincial, and municipal registers, inventories, and databases revealed that there are no known built heritage resources (B.H.R.s) and no known cultural heritage landscapes (C.H.L.s) in the Colony Road Watermain Relocation study area. Five areas with heritage sensitivity were identified during the background information review.

Based on the results of the assessment, the following recommendations and next steps have been developed:

1. It is recommended that until fieldwork can be conducted by a qualified heritage professional to confirm the presence or absence of potential cultural heritage resources, activity related to the Colony Road Watermain Relocation avoid the northeast corner of the study area along the shoreline residential area as at least one structure may date to the late nineteenth century. Additionally, the shoreline at the southernmost point of the study has potential for structural remains relating to the windmill or gristmill at Windmill Point. The watercourse in the west portion of the study area, the woodlot surrounding the western shoreline of the study area, and Lake Erie also have the potential to be considered cultural heritage landscapes.

2. Fieldwork to observe the existing conditions of the study area, and identify and potential built heritage resources and/or cultural heritage landscapes should be undertaken to satisfy requirements of the Municipal Class Environmental Assessment. This can occur once a short list of alternatives, or a preferred alternative has been determined.
3. This report should be submitted by the proponent to the Town of Fort Erie and Niagara Region for their records.

Report Accessibility Features

This report has been formatted to meet the Information and Communications Standards under the *Accessibility for Ontarians with Disabilities Act*, 2005 (A.O.D.A.). Features of this report which enhance accessibility include: headings, font size and colour, alternative text provided for images, and the use of periods within acronyms. Given this is a technical report, there may be instances where additional accommodation is required in order for readers to access the report's information. If additional accommodation is required, please contact Annie Veilleux, Manager of the Cultural Heritage Division at Archaeological Services Inc., by email at aveilleux@asiheritage.ca or by phone 416-966-1069 ext. 255.

Project Personnel

- **Senior Project Manager**: Lindsay Graves, M.A., C.A.H.P., Senior Cultural Heritage Specialist, Assistant Manager - Cultural Heritage Division
- **Project Coordinator:** Jessica Bisson, B.F.A. (Hon.), Cultural Heritage Technician, Division Coordinator – Cultural Heritage Division
- **Project Manager**: Meredith Stewart, M.A., M.S.c., C.A.H.P., Cultural Heritage Specialist, Project Manager - Cultural Heritage Division
- **Report Production**: Becca Clark, B.A. (Hon), Advanced Dipl., Cultural Heritage Technical Writer and Researcher – Cultural Heritage Division
- **Graphics Production**: Jonas Fernandez, M.S.c., Manager, Geomatics - Operations Division

  Carolyn Nettleton, B.A., Archaeologist, Geomatics Technician – Operations Division
- **Report Reviewer(s)**: Meredith Stewart and Lindsay Graves

Qualified Persons Involved in the Project

Lindsay Graves, M.A., C.A.H.P.
Senior Cultural Heritage Specialist, Assistant Manager - Cultural Heritage Division

The Senior Project Manager for this Cultural Heritage Report is **Lindsay Graves** (M.A., Heritage Conservation), Senior Cultural Heritage Specialist and Assistant Manager for the Cultural Heritage Division. She was responsible for: overall project scoping and approach; development and confirmation of technical findings and study recommendations; application of relevant standards, guidelines and regulations; and implementation of quality control procedures. Lindsay is academically trained in the fields of heritage conservation, cultural anthropology, archaeology, and collections management and has over 15 years of experience in the field of cultural heritage resource management. This work has focused on the assessment, evaluation, and protection of built heritage resources and cultural heritage landscapes. Lindsay has extensive experience undertaking archival research, heritage survey work, heritage evaluation and heritage impact assessment. She has also contributed to cultural heritage landscape studies and heritage conservation plans, led heritage commemoration and interpretive programs, and worked collaboratively with multidisciplinary teams to sensitively plan interventions at historic sites/places. In addition, she is a leader in the completion of heritage studies required to fulfill Class Environmental Assessment processes and has served as Project Manager for over 100 heritage assessments during her time at Archaeological Services Inc. Lindsay is a member of the Canadian Association of Heritage Professionals.

Meredith Stewart, M.A., M.S.c., C.A.H.P.
Project Manager - Cultural Heritage Division

The project manager for this report is **Meredith Stewart** (M.A., Art History, M.S.c., Historic Preservation), who is a Cultural Heritage Specialist within the Cultural Heritage Division. She was responsible for day-to-day management and coordination of project tasks, communications and overseeing technical

reporting. Meredith's work as a cultural heritage professional has focused on historical research, large-area studies, and survey work. Meredith holds a M.A. in Art History from Carleton University, where she focused on architectural history and the built environment, and graduated with a M.S.c. in Historic Preservation from the School of the Art Institute of Chicago. Meredith utilizes her knowledge of architectural history and building materials in the identification and evaluation of heritage buildings and structures. Meredith is a member in good standing of the Canadian Association of Heritage Professionals.

Becca Clark, B.A. (Hons)
Cultural Heritage Technical Writer and Researcher - Cultural Heritage Division

The report writer for this project is **Becca Clark** (B.A. Hons, Adv. Diploma Applied Museum Studies), who is a Cultural Heritage Technical Writer and Researcher and Project Administrator within the Cultural Heritage Division. She was responsible for preparing and contributing research and technical reporting. With her educational and working background, Becca provides an understanding of Ontario history and built heritage as well as skilled research and analysis. Her time as a museum professional focused on local history in Southern Ontario and how it may be represented by objects and built heritage. In 2021, Becca researched, designed, and produced the Guelph Civic Museum's exhibition "The Origin of Fan: Folding Form and Function". She has since translated her knowledge of Southern Ontario's history into built heritage research. In 2023, she joined ASI's Cultural Heritage team as a Cultural Heritage Technician.

Glossary

Built Heritage Resource (B.H.R.)
Definition: "…a building, structure, monument, installation or any manufactured 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" (Ministry of Municipal Affairs and Housing, 2020, p. 41).

Cultural Heritage Landscape (C.H.L.)
Definition: "…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" (Ministry of Municipal Affairs and Housing, 2020, p. 42).

Known Built Heritage Resource or Cultural Heritage Landscape
Definition: A known built heritage resource or cultural heritage landscape is a property that has recognized cultural heritage value or interest. This can include a property listed on a Municipal Heritage Register, designated under Part IV or V of the *Ontario Heritage Act*, or protected by a heritage agreement, covenant or easement, protected by the *Heritage Railway Stations Protection Act or the Heritage Lighthouse Protection Act*, identified as a Federal Heritage Building, or located within a U.N.E.S.C.O. World Heritage Site (Ministry of Tourism, Culture and Sport, 2016).

Impact

Definition: Includes negative and positive, direct and indirect effects to an identified built heritage resource and cultural heritage landscape. Direct impacts include destruction of any, or part of any, significant heritage attributes or features and/or unsympathetic or incompatible alterations to an identified resource. Indirect impacts include, but are not limited to, creation of shadows, isolation of heritage attributes, direct or indirect obstruction of significant views, change in land use, land disturbances (Ministry of Tourism Culture and Sport, 2006b). Indirect impacts also include potential vibration impacts.

Mitigation

Definition: Mitigation is the process of lessening or negating anticipated adverse impacts to built heritage resources or cultural heritage landscapes and may include, but are not limited to, such actions as avoidance, monitoring, protection, relocation, remedial landscaping, and documentation of the cultural heritage landscape and/or built heritage resource if to be demolished or relocated (Ministry of Tourism Culture and Sport, 2006a).

Potential Built Heritage Resource or Cultural Heritage Landscape

Definition: A potential built heritage resource or cultural heritage landscape is a property that has the potential for cultural heritage value or interest. This can include properties/project area that contain a parcel of land that is the subject of a commemorative or interpretive plaque, is adjacent to a known burial site and/or cemetery, is in a Canadian Heritage River Watershed, or contains buildings or structures that are 40 or more years old (Ministry of Tourism, Culture and Sport, 2016).

Significant

Definition: With regard to cultural heritage and archaeology resources, significant means “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.* While some significant resources may already be identified and inventoried by

official sources, the significance of others can only be determined after evaluation" (Ministry of Municipal Affairs and Housing, 2020, p. 51).

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1.0 Introduction

Archaeological Services Inc. was contracted by GEI Consultants on behalf of the Town of Fort Erie to conduct a Cultural Heritage Desktop Report as part of the Colony Road Watermain Relocation Project conducted under the Municipal Class Environmental Assessment process. The purpose of this report is to present a list of previously identified built heritage resources and cultural heritage landscapes to identify baseline cultural heritage conditions and inform the planning process. Fieldwork to confirm the existing conditions of the area and present a preliminary impact assessment based on a preferred alternative is not included in this report and will need to be completed to satisfy the requirements of the Municipal Class Environmental Assessment process.

1.1 Project Overview

The Colony Road Watermain Relocation Municipal Class Environmental Assessment involves the relocation of the Colony Road watermain to a new location within the study area boundaries. The project study area consists of an area bounded by Thunder Bay Road to the north, Colony Road to the west, and Lake Erie to the east and south.

1.2 Description of Study Area

This Cultural Heritage Report will focus on the project study area (Figure 1). This area has been defined as inclusive of those lands that may contain built heritage resources or cultural heritage landscapes that may be subject to direct or indirect impacts as a result of the proposed undertaking. Properties within the study area are located in the Town of Fort Erie.

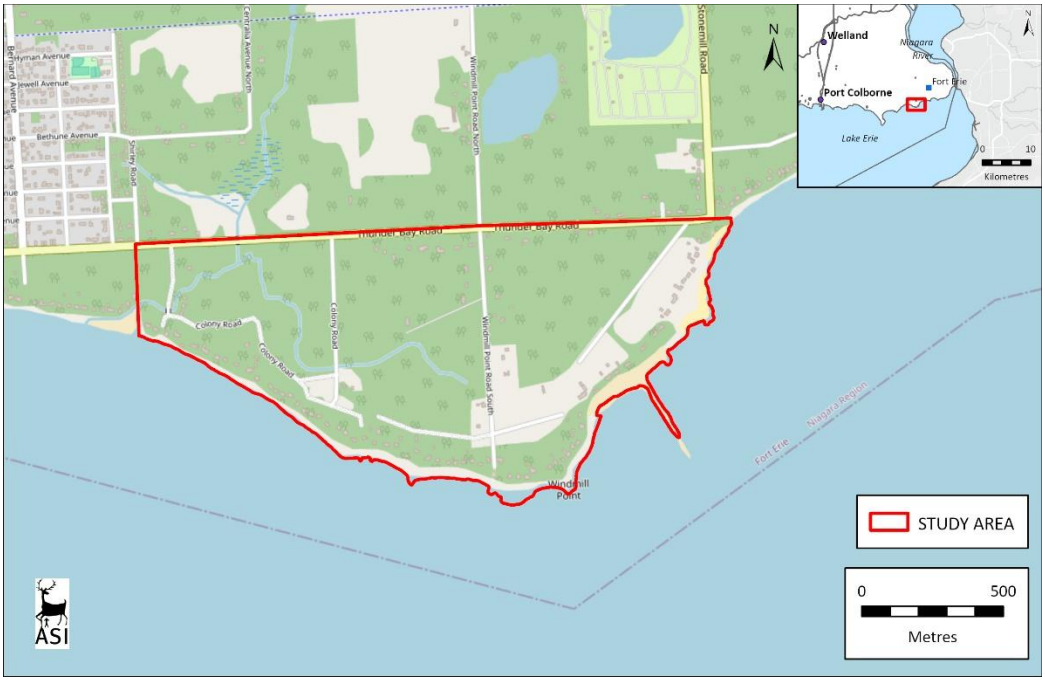


Figure 1: Location of the study area (Base Map: ©OpenStreetMap and contributors, Creative Commons-Share Alike License (C.C.-By-S.A.))

2.0 Methodology

The following sections provide a summary of regulatory requirements and municipal and regional heritage policies that guide this cultural heritage assessment. In addition, an overview of the process undertaken to identify known built heritage resources and cultural heritage landscapes is provided.

2.1 Regulatory Requirements

The *Ontario Heritage Act* (O.H.A.) (Ontario Heritage Act, R.S.O. c. O.18, [as Amended in 2023], 1990) is the primary piece of legislation that determines policies, priorities and programs for the conservation of Ontario's heritage. There are many other provincial acts, regulations and policies governing land use planning and resource development that support heritage conservation, including:

- The *Planning Act* (Planning Act, R.S.O. 1990, c. P.13, 1990), which states that "conservation of features of significant architectural, cultural,

historical, archaeological or scientific interest" is a "matter of provincial interest". The *Provincial Policy Statement* (Ministry of Municipal Affairs and Housing, 2020), issued under the *Planning Act*, links heritage conservation to long-term economic prosperity and requires municipalities and the Crown to conserve significant built heritage resources and cultural heritage landscapes.

- The *Environmental Assessment Act* (Environmental Assessment Act, R.S.O. c. E.18, 1990), which defines "environment" to include cultural conditions that influence the life of humans or a community. Cultural heritage resources, which includes archaeological resources, built heritage resources and cultural heritage landscapes, are important components of those cultural conditions.

The Ministry of Citizenship and Multiculturalism (hereafter "The Ministry") is charged under Section 2.0 of the O.H.A. with the responsibility to determine policies, priorities, and programs for the conservation, protection, and preservation of the heritage of Ontario. The *Standards and Guidelines for Conservation of Provincial Heritage Properties* (Ministry of Citizenship and Multiculturalism, 2010) (hereinafter "*Standards and Guidelines")* apply to properties the Government of Ontario owns or controls that have "cultural heritage value or interest" (C.H.V.I.). The *Standards and Guidelines* provide a series of guidelines that apply to provincial heritage properties in the areas of identification and evaluation; protection; maintenance; use; and disposal. For the purpose of this report, the *Standards and Guidelines* provide points of reference to aid in determining potential heritage significance in the identification of built heritage resources and cultural heritage landscapes. While not directly applicable for use in properties not under provincial ownership, the *Standards and Guidelines* are regarded as best practice for guiding heritage assessments and ensure that additional identification and mitigation measures are considered.

Similarly, the *Ontario Heritage Tool Kit* (Ministry of Citizenship and Multiculturalism, 2006) provides a guide to evaluate heritage properties. To conserve a built heritage resource (B.H.R.) or cultural heritage landscape (C.H.L.), the *Ontario Heritage Tool Kit* states that a municipality or approval authority may require a heritage impact assessment and/or a conservation plan to guide the approval, modification, or denial of a proposed development.

2.2 Municipal/Regional Heritage Policies

The study area is located within the Town of Fort Erie, in the Niagara Region. Policies relating to built heritage resources and cultural heritage landscapes were reviewed from the following sources:

- *Town of Fort Erie Official Plan*
- *Niagara Region Official Plan*
- *Place to Grow: Growth Plan for the Greater Golden Horseshoe*

2.3 Identification of Built Heritage Resources and Cultural Heritage Landscapes

This Cultural Heritage Desktop Report follows guidelines presented in the *Ontario Heritage Tool Kit* (Ministry of Citizenship and Multiculturalism, 2006) and *Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes* (Ministry of Tourism, Culture and Sport, 2016). The objective of this report is to present an inventory of known B.H.R.s and C.H.L.s, and to provide a high-level preliminary understanding of potential direct or indirect impacts to the known B.H.R.s and C.H.L.s located within areas as a result of the proposed project.

In the course of the cultural heritage assessment process, all potentially affected B.H.R.s and C.H.L.s are subject to identification and inventory. Generally, when conducting an identification of B.H.R.s and C.H.L.s within a study area, three stages of research and data collection are undertaken to appropriately establish the potential for and existence of B.H.R.s and C.H.L.s in a geographic area:

background research and desktop data collection; field review; and identification. This report includes only the background research and desktop data collection.

Background historical research, which includes consultation of primary and secondary source research and historical mapping, is undertaken to identify early settlement patterns and broad agents or themes of change in a study area. This stage in the data collection process enables the researcher to determine the presence of sensitive heritage areas that correspond to nineteenth- and twentieth-century settlement and development patterns. To augment data collected during this stage of the research process, federal, provincial, and municipal databases and/or agencies are consulted to obtain information about specific properties that have been previously identified and/or designated as having cultural heritage value. Typically, resources identified during these stages of the research process are reflective of particular architectural styles or construction methods, associated with an important person, place, or event, and contribute to the contextual facets of a particular place, neighbourhood, or intersection.

2.4 Background Information Review

To make an identification of previously identified known or potential built heritage resources and cultural heritage landscapes within the study area, the following sections present the resources that were consulted as part of this Cultural Heritage Report.

2.4.1 Review of Existing Heritage Inventories

A number of resources were consulted in order to identify previously identified built heritage resources and cultural heritage landscapes within the study area. These resources, reviewed on 4 April 2024, include:

- The Town of Fort Erie's Heritage Register (Town of Fort Erie, 2023);
- The *Ontario Heritage Act Register* (Ontario Heritage Trust, n.d.b);

- The *Places of Worship Inventory* (Ontario Heritage Trust, n.d.c);
- The inventory of Ontario Heritage Trust easements (Ontario Heritage Trust, n.d.a);
- The Ontario Heritage Trust's *An Inventory of Provincial Plaques Across Ontario*: a PDF of Ontario Heritage Trust Plaques and their locations (Ontario Heritage Trust, 2023);
- The Ontario Heritage Trust's *An Inventory of Ontario Heritage Trust-owned properties across Ontario*: a PDF of properties owned by the Ontario Heritage Trust (Ontario Heritage Trust, 2019);
- Niagara Navigator: Cemeteries, Designated Heritage Properties, Historic Sites (*Niagara Navigator*, n.d.)
- Canada's Historic Places website: available online, the searchable register provides information on historic places recognized for their heritage value at the local, provincial, territorial, and national levels (Parks Canada, n.d.a);
- Directory of Federal Heritage Designations: a searchable on-line database that identifies National Historic Sites, National Historic Events, National Historic People, Heritage Railway Stations, Federal Heritage Buildings, and Heritage Lighthouses (Parks Canada, n.d.b);
- Canadian Heritage River System: a national river conservation program that promotes, protects and enhances the best examples of Canada's river heritage (Canadian Heritage Rivers Board and Technical Planning Committee, n.d.); and,
- United Nations Educational, Scientific and Cultural Organization (U.N.E.S.C.O.) World Heritage Sites (U.N.E.S.C.O. World Heritage Centre, n.d.).

2.4.2 Review of Previous Heritage Reporting

No additional cultural heritage studies were undertaken within the study area.

2.5 Community Engagement

The section provides a brief summary of the groups and individuals who were engaged, how and when community engagement was undertaken and the results of the engagement, including responses, comments or concerns expressed and how these were considered.

The following individuals, groups, and/or organizations were contacted by A.S.I. to gather information on known and potential B.H.R.s and C.H.L.s, active and inactive cemeteries, and areas of identified Indigenous interest within the study area:

- Town of Fort Erie (email communication 10 April 2024). Emailed to confirm that there are no known B.H.R.s or C.H.L.s within the study area. At the time of report submission, no comment has been received.
- The Ministry (email communication 10 April and 15 April 2024). Email correspondence confirmed that to date, there are no properties designated by the Minister and the Ministry is not aware of any known Provincial Heritage Properties within the study area.
- The Ontario Heritage Trust (email communication 10 and 29 April 2024). Email correspondence confirmed that there are no conservation easements, plaques, or Trust-owned properties within the study area.
- An attempt to contact Heritage Niagara through a webpage request was made (10 April 2024), but could not be completed due to an error on the website.

Indigenous community engagement for this project is being completed by GEI Consultants. Following review of this draft report, the Six Nations of the Grand River provided feedback which included the identification of the forest, watercourse, and lake as culturally significant. The Mississaugas of the Credit First Nation also provided feedback which was received and incorporated into this updated Desktop Cultural Heritage Report.

2.6 Preliminary Impact Assessment Methodology

To provide a high-level assessment of the potential impacts of the undertaking, identified B.H.R.s and C.H.L.s are considered against a range of possible negative impacts, based on the *Ontario Heritage Tool Kit InfoSheet #5: Heritage Impact Assessments and Conservation Plans* (Ministry of Tourism Culture and Sport, 2006b). These include:

Direct impacts:

- Destruction of any, or part of any, significant heritage attributes or features; and
- Alteration that is not sympathetic, or is incompatible, with the historic fabric and appearance.

Indirect impacts:

- 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; and
- Land disturbances such as a change in grade that alters soils, and drainage patterns that adversely affect an archaeological resource.

Indirect impacts from construction-related vibration have the potential to negatively affect B.H.R.s and C.H.L.s depending on the type of construction methods and machinery selected for the project and proximity and composition of the identified resources. Potential vibration impacts are defined as having potential to affect an identified B.H.R.s and C.H.L.s where work is taking place

within 50 metres of features on the property. A 50-metre buffer is applied in the absence of a project-specific defined vibration zone of influence based on existing secondary source literature (Carman et al., 2012; Crispino & D'Apuzzo, 2001; P. Ellis, 1987; Rainer, 1982; Wiss, 1981). This buffer accommodates any additional or potential threat from collisions with heavy machinery or subsidence (Randl, 2001).

Several additional factors are also considered when evaluating potential impacts on identified B.H.R.s and C.H.L.s. These are outlined in a document set out by the Ministry of Culture and Communications (now Ministry of Citizenship and Multiculturalism) and the Ministry of the Environment entitled *Guideline for Preparing the Cultural Heritage Resource Component of Environmental Assessments* (1992). While this document has largely been superseded in some respects by more current policies and legislation, the guidance provided that continues to be of relevance to this specific project includes the following definitions:

- Magnitude: the amount of physical alteration or destruction which can be expected;
- Severity: the irreversibility or reversibility of an impact;
- Duration: the length of time an adverse impact persists;
- Frequency: the number of times an impact can be expected;
- Range: the spatial distribution, widespread or site specific, of an adverse impact; and
- Diversity: the number of different kinds of activities to affect a heritage resource.

The proposed undertaking should endeavor to avoid adversely affecting identified B.H.R.s and C.H.L.s and interventions should be managed in such a way that identified features are conserved. When the nature of the undertaking is such that adverse impacts are unavoidable, it may be necessary to implement alternative approaches or mitigation strategies that alleviate the negative effects on identified B.H.R.s and C.H.L.s. Mitigation is the process of lessening or

negating anticipated adverse impacts and may include, but are not limited to, such actions as avoidance, monitoring, protection, relocation, remedial landscaping, and documentation of the B.H.R. or C.H.L. if to be demolished or relocated.

Various works associated with infrastructure improvements have the potential to affect B.H.R.s and C.H.L.s in a variety of ways, and as such, appropriate mitigation measures for the undertaking need to be considered.

3.0 Summary of Historical Development Within the Study Area

This section provides a brief summary of historical research. A review of available primary and secondary source material was undertaken to produce a contextual overview of the study area, including a general description of physiography, Indigenous land use, and Euro-Canadian settlement.

3.1 Physiography

The study area is situated within the Haldimand Clay Plain physiographic region of southern Ontario (Chapman & Putnam, 1984). The Haldimand Clay Plain physiographic region (Chapman & Putnam, 1984) is among the largest of the 53 defined physiographic regions in southern Ontario, comprising approximately 3,500 square kilometres (MacDonald, 1980). Generally, this region is flat and poorly drained, although it includes several distinctive landforms including dunes, cobble, clay, and sand beaches, limestone pavements, and back-shore wetland basins. Within this part of the Niagara peninsula, a number of environmental sub-regions have been described, including the Niagara Slough Clay Plain, the Fort Erie Clay Plain, the Calcareous Rock Plain (Onondaga Escarpment), the Buried Moraines, the Lake Erie Coast, and the Niagara River Valley (MacDonald, 1980). The distribution and nature of these sub-regions, and the specific environmental features they contain, have influenced land use in the region throughout history and pre-history. The study area is located on the

shores of Lake Erie in the sand plains of the Haldimand Clay Plain, representing the sandy beaches of the Lake Erie coastline that turns into a wooded area inland.

3.2 Indigenous Land Use and Settlement

Current archaeological evidence indicates humans were present in southern Ontario approximately 13,000 years before present (BP) (Ferris, 2013). Populations at this time would have been highly mobile, inhabiting a boreal-parkland similar to the modern sub-arctic. By approximately 10,000 BP, the environment had progressively warmed (Edwards & Fritz, 1988) and populations now occupied less extensive territories (Ellis & Deller, 1990).

Between approximately 10,000-5,500 BP, the Great Lakes basins experienced low-water levels, and many sites which would have been located on those former shorelines are now submerged. This period produces the earliest evidence of heavy wood working tools, an indication of greater investment of labour in felling trees for fuel, to build shelter, and watercraft production. These activities suggest prolonged seasonal residency at occupation sites. Polished stone and native copper implements were being produced by approximately 8,000 BP; the latter was acquired from the north shore of Lake Superior, evidence of extensive exchange networks throughout the Great Lakes region. The earliest archaeological evidence for cemeteries dates to approximately 4,500-3,000 BP and is interpreted by archaeologists to be indicative of increased social organization and the investment of labour into social infrastructure (Brown, 1995, p. 13; Ellis et al., 1990, 2009).

Between 3,000-2,500 BP, populations continued to practice residential mobility and to harvest seasonally available resources, including spawning fish. The Woodland period begins around 2,500 BP and exchange and interaction networks broaden at this time (Spence et al., 1990, pp. 136, 138) and by approximately 2,000 BP, evidence exists for small community camps, focusing on the seasonal harvesting of resources (Spence et al., 1990, pp. 155, 164). By 1,500 BP there is macro botanical evidence for maize in southern Ontario, and it

is thought that maize only supplemented people's diet. There is earlier phytolithic evidence for maize in central New York State by 2,300 BP – it is likely that once similar analyses are conducted on Ontario ceramic vessels of the same period, the same evidence will be found (Birch & Williamson, 2013, pp. 13–15). As is evident in detailed Anishinaabek ethnographies, winter was a period during which some families would depart from the larger group as it was easier to sustain smaller populations (Rogers, 1962). It is generally understood that these populations were Algonquian-speakers during these millennia of settlement and land use.

From the beginning of the Late Woodland period at approximately 1,000 BP, lifeways became more similar to that described in early historical documents. Between approximately 1000-1300 Common Era (CE), larger settlement sites focused on horticulture begin to dominate the archaeological record. Seasonal dispersal of the community for the exploitation of a wider territory and more varied resource base was still practised (Williamson, 1990, p. 317). By 1300-1450 CE, archaeological research focusing on these horticultural societies note that this episodic community dispersal was no longer practised and these populations now occupied sites throughout the year (Dodd et al., 1990, p. 343). By the mid-sixteenth century these small villages had coalesced into larger communities (Birch et al., 2021). Through this process, the socio-political organization of these First Nations, as described historically by the French and English explorers who first visited southern Ontario, was developed. Other First Nation communities continued to practice residential mobility and to harvest available resources across landscapes they returned to seasonally/annually.

By 1600 CE, the Confederation of Nations were encountered by the first European explorers and missionaries in Simcoe County. Samuel de Champlain in 1615 reported that a group of Iroquoian-speaking people situated between the Haudenosaunee and the Huron-Wendat were at peace and remained "la nation neutre". Like the Huron-Wendat, Petun, and Haudenosaunee, the Neutral or Attawandaron people were semi-settled village agriculturalists.

By the 1640s, devastating epidemics and the traditional enmity between the Haudenosaunee[1] and the Attawandaron and the Huron-Wendat (and their Algonquian allies such as the Nippissing and Odawa) led to their dispersal from southern Ontario. Around 1650, the Attawandaron were displaced by the Haudenosaunee Confederacy. Shortly afterwards, the Haudenosaunee established a series of settlements at strategic locations along the trade routes inland from the north shore of Lake Ontario. They were then displaced by the Mississaugas, a seasonally migrant people that hunted, fished, and gathered throughout their land, at the close of the seventeenth century. Peace was achieved between the Haudenosaunee and the Anishinaabe Nations in August of 1701 when representatives of more than twenty Anishinaabe Nations assembled in Montreal to participate in peace negotiations. Peace was confirmed again at council held at Lake Superior when the Haudenosaunee delivered a wampum belt to the Anishinaabe Nations. This agreement between the Haudenosaunee and Anishinaabe nations is referred to as the Dish with One Spoon.

In 1763, following the fall of Quebec, New France was transferred to British control at the Treaty of Paris. The British government began to pursue major land purchases to the north of Lake Ontario in the early nineteenth century. The Crown acknowledged the Mississaugas of the Credit as the owners of the lands between Georgian Bay and Lake Simcoe and entered into negotiations for additional tracts of land as the need arose to facilitate European settlement.

3.3 Treaties and Traditional Territories

The following section provides a discussion of the Treaties and traditional territories within which the study area is situated.

[1] The Haudenosaunee are also known as the New York Iroquois or Five Nations Iroquois and after 1722 Six Nations Iroquois. They were a confederation of five distinct but related Iroquoian–speaking nations - the Seneca, Onondaga, Cayuga, Oneida, and Mohawk. Each lived in individual territories in what is now known as the Finger Lakes district of Upper New York. In 1722 the Tuscarora joined the confederacy.

3.3.1 Treaty 381, the Niagara Purchase

The study area is within territory covered by Treaty 381, the Niagara Purchase. The Niagara Purchase was among the earliest agreements between the Crown and Indigenous Peoples in the area now known as Ontario and was one of several agreements from the eighteenth and nineteenth century that are collectively known as the Upper Canada Land Surrenders (Boileau, 2021).

It was signed in 1781, amidst the context of the American Revolution, between representatives of the British Crown and the Chippewa and Mississaugas. It covers a four-mile (six-and-a-half kilometre) wide tract of land on the west side of "the Straits" between Lake Erie and Lake Ontario which had not been agreed upon in the 1764 Niagara Peace Treaty (Crown-Indigenous Relations and Northern Affairs, 2016).[2] The British hoped that opening these lands along the west bank of the Niagara River to Loyalists after the American Revolution would spur agricultural development to provide food for their military and other recently-arrived settlers in the area (Boileau, 2021).

The signees of the treaty representing the Crown included Colonel Guy Johnson (Superintendent General of Indian Affairs), as well as Captains Andrew Parke and William Potts of the King's Regiment, and John Dease and Alexander McKee, Deputy Agents of Indian Affairs. The signees of the treaty representing the Chippewa and Mississauga included Nanibizure, Paghquan, Wabicanine, and

[2] For further information on the 1764 Treaty of Niagara, see Karl S. Hele's entry in The Canadian Encyclopedia; Nathan Tidridge, *The Queen at the Council Fire: The Treaty of Niagara, Reconciliation, and the Dignified Crown in Canada* (Toronto: Dundurn Press, 2015); and John Borrows, "Wampum at Niagara: The Royal Proclamation, Canadian Legal History, and Self-Government," in Michael Asch, ed., *Aboriginal and Treaty Rights in Canada: Essays on Law, Equality, and Respect for Difference* (1997), 155–172.

Minaghquat (Crown-Indigenous Relations and Northern Affairs, 2016; Surtees, 1984).

3.3.2 1701 Deed from the Five Nations to the King, of their Beaver Hunting Ground

In the late seventeenth century, the Haudenosaunee of the Five Nations Confederacy residing in upstate New York and Southern Ontario were dealing with military engagements and encroachment from French forces as well as the movement of the Mississaugas and other Anishinaabeg peoples into the area, all of which contributed to fears among the Confederacy about the loss of their beaver hunting grounds (Williams & Nelson, 1995). To address their concerns, the Confederacy met with the Province of New York's acting colonial governor John Nanfan, as well as a British representative on behalf of the Indian Affairs Department, Robert Livingston, in July 1701. The Confederacy hoped to urge the English into action in their disputes with the French and their Indigenous allies. The British hoped that an alliance with the Haudenosaunee would continue to ensure a strong trading relationship, keep French efforts to control the fur trade in check, and assert British control deeper into North America (Brandao & Starna, 1996; Jamieson, 2013).

Ultimately, the Deed from the Five Nations to the King, sometimes referred to as the Treaty of Fort Albany, the Nanfan Treaty, the Albany Deed, or Livingston's Deed, was signed by representatives of the British Crown and the Haudenosaunee Confederacy in 1701 (Williams & Nelson, 1995). The Deed established the Beaver Hunting Grounds as a vast territory spanning much of the lands surrounding the lower Great Lakes, including Southern Ontario, as well as into the Ohio River Valley (Jamieson, 2013).

There has been significant debate about the terms of the agreement. The Six Nations of the Grand River interpret the agreement as a valid treaty that recognized the Confederacy's ownership of and access to the natural resources within the Beaver Hunting Grounds, while also receiving the Crown's support and protection (Jamieson, 2013; Williams & Nelson, 1995). Others, though, note

that while the Haudenosaunee fished and hunted in Southern Ontario in the late seventeenth century, these lands were not under their authority at the time and as such, they could not negotiate a formal treaty with the British Crown for this territory (Calverley, 2002; Jennings, 1984; Schmalz, 1984). Research indicates that the British did not formally recognize the agreement, and currently neither the Canadian government nor the British Crown recognize the 1701 Deed as a treaty.

3.4 Historical Euro-Canadian Township Survey and Settlement

The first Europeans to arrive in the area were transient merchants and traders from France and England, who followed Indigenous pathways and set up trading posts at strategic locations along the well-traveled river routes. All of these occupations occurred at sites that afforded both natural landfalls and convenient access, by means of the various waterways and overland trails, into the hinterlands. Early transportation routes continued the use of existing Indigenous trails that typically followed the highlands adjacent to various creeks and rivers (Archaeological Services Inc., 2006). Early European settlements occupied similar locations as Indigenous settlements as they were generally accessible by trail or water routes and would have been in locations with good soil and suitable topography to ensure adequate drainage.

Historically, the study area is located in the Former Township of Bertie, County of Welland in part of Lots 13-17, Broken Front on Lake Erie.

3.4.1 Town of Fort Erie

The earliest post-contact European settlement of the area was related to the Garrison established at Fort Erie, one of a series of British bastions along the Great Lakes located northeast of the study area and designed to control access to the Niagara river. The British built at least two forts on this strategic site following their conquest of New France during the Seven Years War. While the first was built to the east of the present fort in 1764, the latest was started in

1805, although work progressed slowly. When war broke out in 1812, the fort consisted of just two barracks flanked by stone bastions and fronted by an earthen parapet on the lake side. A stockade and a ditch were quickly added to protect the inland approach.

By 1807, it was reported that the village of Fort Erie contained 30 houses, and fish and small game were abundant in the neighbourhood (Anonymous, 1887). Land under cultivation was still confined to a narrow strip along the river and two roads were passable by wagon; one road followed the river and the other extended between Point Abino and Millers Creek along the summit of the limestone ridge situated a few kilometres east of the river.

Fort Erie's location on the Niagara River made it vulnerable to attack during the War of 1812, and the fort itself was occupied by American forces in 1813 and 1814 who, when retreating after the first occupation, destroyed many civilian buildings.

Fortunately for the merchants in the village, the hostilities did not damage Fort Erie's reputation as an important commercial distribution centre for the western frontier and other settlements on the Great Lakes (Johnston, 1927). Merchants in Buffalo, for example, found it cheaper to purchase goods that had travelled by boat to Fort Erie than to have goods brought overland from New York City. Taverns and stores that were rebuilt close to the ferry landings between Garrison Road and Bertie Street thrived. Yet, while the commercial growth of Fort Erie was notable during the first quarter of the nineteenth century, the village's importance may have diminished after 1825 (Johnston, 1927). This has been attributed to the construction of the Erie Canal which made it more convenient for people in Buffalo to trade with the rest of New York State. The opening of the first Welland Canal also helped to reduce the amount of commercial traffic that came to Fort Erie.

The construction of the Buffalo, Brantford & Goderich Railway in 1853 signaled the beginning of a new commercial enterprise in Fort Erie, the "car ferry." Railway cars arriving at either the Fort Erie or Buffalo terminus were shunted onto a special ferry known as "The International Steambridge" that took them across the Niagara River.

The significant rise in population, from 180 people in 1843 to 706 people at the time of the 1860 census, has been attributed to the industry associated with the

coming of the railway, and provided the impetus for the village's incorporation in 1857 (Bingham, 1957). When it was incorporated as a village in 1857, it was known as "Waterloo." Registered plans of subdivision for this village date from 1854-1861.

The town of Fort Erie was bounded by the lines of the Grand Trunk Railway. In 1873, this place was described as a "flourishing post village" and contained an American consular office (Crossby, 1873). In 1876, it contained a railway depot, one wharf, ferry dock, customs house, post office, town hall, school, several stores, and four churches. It was amalgamated with Victoria or International Bridge in 1895 and was incorporated as the village of Bridgeburg. It became a town in 1915, and following amalgamation with Waterloo in 1932, it acquired its present name (Rayburn, 1997; Scott, 1997; Winearls, 1991).

The year 1857 was also significant for the fact that the governments of Canada West (Ontario) and New York State approved a charter for the construction of a railway bridge that would permanently link the Grand Trunk terminus in Fort Erie with Buffalo (Spear, 1977). It was not until 1873, however, that the International Bridge was completed under the direction of Colonel Casimir Gzowski and pronounced an immediate engineering success. The bridge, however, was built north of the village, and effectively diverted railway traffic away from the car ferry service. Thus the economic growth that the village had experienced came to an end when the last ferry ran in 1873 (Raymond, 1957).

The next important development in the area, however, was the construction of the Peace Bridge in the late 1920s. It was constructed under the auspices of a group of Fort Erie and Buffalo businessmen who envisioned the bridge as a link that would bring prosperity to both communities on the Niagara River (Spear, 1977).

The waterfront saw continuous residential growth throughout the twentieth century. The number of homes lining the shores of Lake Erie within the study area increased steadily from the 1930s through the 1970s and has become a popular destination for seasonal recreational activities.

3.4.2 Former Township of Bertie

The first township survey was undertaken in 1784, and the first legal settlers occupied their land holdings in the same year. The first settlers were Loyalists, mainly Butler's Rangers, following the end of the American Revolutionary War. Among them were James Secord and Phillip Bender, who were responsible for securing government funds to build the first gristmill and sawmill in the township, to be located on Secord's farm. The earliest Mennonite pioneer was Jacob Sevitz who came in 1788, soon followed by many other Mennonite families, mainly from Lancaster County, Pennsylvania (Burkholder, 1935). Since no official name had been given to the survey lands the survey map was entitled "Quaker Township" (Fort Erie Museum Board, 1997). It was renamed for Sir Peregrine Bertie (1714-1778), 3rd Duke of Ancaster, by an Act of Parliament in 1793. By 1808 there were around forty homes in the township. In 1812 the township had several mills, schools and churches. The largest community was Stevensville, and other growing settlements included Point Abino, Mulgrave, Ridgeway, Amigari, Bridgeburg, Snyder, Windmill Point (the location of our study area), Ridgemount, Crystal Beach, Shipyards, and Erie Beach (Armstrong, 1985; Boulton, 1805; Davies & Felstead, 1996; Rayburn, 1997; Smith, 1846). The Town of Fort Erie, the Township of Bertie, and the Village of Crystal Beach were amalgamated as the Town of Fort Erie in 1970 (Osgoode Hall Law School, 1980).

3.5 Review of Historical Mapping

The 1862 *Map of the Counties of Lincoln and Welland* (Tremaine & Tremaine, 1862), and the 1876 *Illustrated Historical Atlas of the Counties of Lincoln and Welland* (Page, 1876), were examined to determine the presence of historical features within the study area during the nineteenth century (Figure 2 and Figure 3). Historically, the study area is located in the Former Township of Bertie, County of Welland in part of Lots 13-17, Broken Front on Lake Erie.

It should be noted, however, that not all features of interest were mapped systematically in the Ontario series of historical atlases. For instance, they were often financed by subscription limiting the level of detail provided on the maps.

Moreover, not every feature of interest would have been within the scope of the atlases. The use of historical map sources to reconstruct or predict the location of former features within the modern landscape generally begins by using common reference points between the various sources. The historical maps are geo-referenced to provide the most accurate determination of the location of any property on a modern map. The results of this exercise can often be imprecise or even contradictory, as there are numerous potential sources of error inherent in such a process, including differences of scale and resolution, and distortions introduced by reproduction of the sources.

The 1862 *Map of the Counties of Lincoln and Welland* represents the study area in a largely rural context (Figure 2). Within the study area two structures are visible on the northeastern corner, and a windmill is labelled on the southernmost point of the shoreline. An unnamed river from Lake Erie runs north-south along the western edge of the study area. The study area is divided into large parcels and the Buffalo and Lake Huron Railway runs east-west beyond the northern boundary of the study area. The 1876 *Illustrated Historical Atlas of the Counties of Lincoln and Welland* indicates limited growth following the 1862 mapping (Figure 3). The windmill labeled at the southernmost edge of the shoreline is now labelled as a gristmill. Two more structures have been built within the study area, both adjacent to an orchard. The properties along the southern tip of the study area have been divided into smaller parcels.

In addition to nineteenth-century mapping, historical topographic mapping and aerial photographs from the twentieth century were examined. This report presents maps and aerial photographs from 1907, 1934, 1954 and 1973 (Figure 4 to Figure 7).

The 1907 topographic map of Welland (Department of Militia and Defence, 1907) indicates that a quarry was constructed to the north between 1876 and 1907 with water access that cuts through the east portion of the study area (Figure 4). Two roads with water access can be seen within the study area, one of which follows the alignment of the current Windmill Point Road South. The

western offshoot of what is now Windmill Point Road South follows the same alignment as the current Johnston Road until its turning point, where the road now terminates. The map indicates that a structure still stands where the windmill and gristmill were indicated on previous mapping, as well as a structure on the eastern edge of the shoreline. This general area along the southern shoreline is now identified as the Windmill Point community from this point onward in the historical mapping.

The 1934 topographic map of Welland (Department of National Defence, 1934) indicates a marked growth in development between 1907 and 1934 (Figure 5). The map indicates that the quarry that was opened between 1876 and 1907 is still present, however, does not indicate whether the access to Lake Erie from the quarry remains. A paved road running east-west matches the alignment of the present-day Thunder Bay Road. A second north-south dirt road west of Windmill Point Road South runs from Thunder Bay Road to the shoreline and aligns with the present-day Colony Road. A wagon or unused road connects the two roadways, and is an extension of the present-day Johnston Road. Structures now line the shoreline at regular intervals and a small port or dock can be seen where the windmill and gristmill were indicated on previous mapping.

The 1954 aerial photograph of Southern Ontario (City of Toronto, 1954) reflects the development patterns of the 1934 mapping (Figure 6). A road running parallel to the shoreline can be seen reflecting the alignment of the present-day Windmill Point Lane West and the southern addition to Colony Road. Driveways leading to private properties lining the majority of the shoreline are visible, along with a long pier that relates to the water access used for the quarry in earlier mapping. There is no indication of direct access from the quarry to the shoreline by 1954. The tributary running north from Lake Erie appears again on the 1954 photograph but stops when it reaches the Buffalo and Lake Huron Railway Line. There is no indication of a windmill, gristmill, or small pier at the southern tip of the study area.

The 1973 topographic map of Welland (Department of Energy, Mines and Resources, 1973) shows a continuation in development along the shoreline of the study area, as well as along Windmill Point Road South (Figure 7). Windmill Point Road South, Colony Road and Windmill Point Lane West are all shown as two-lane, hard surface roads. A bridge is marked running north-south on the western portion of Colony Road. Smaller, unclassified roads are indicated following the alignments of the current day Staniland Park Road, Windmill Point Lane East, and the east-west alignment at the southern end of Colony Road. Johnston Road is not indicated on this map. Where the windmill and gristmill were indicated in previous mapping there is no indication of a structure still standing; however, a horizontal control point is indicated in their place.



Figure 2: The study area overlaid on the 1862 *Tremaine Map of the Counties of Lincoln and Welland* (Tremaine & Tremaine, 1862).

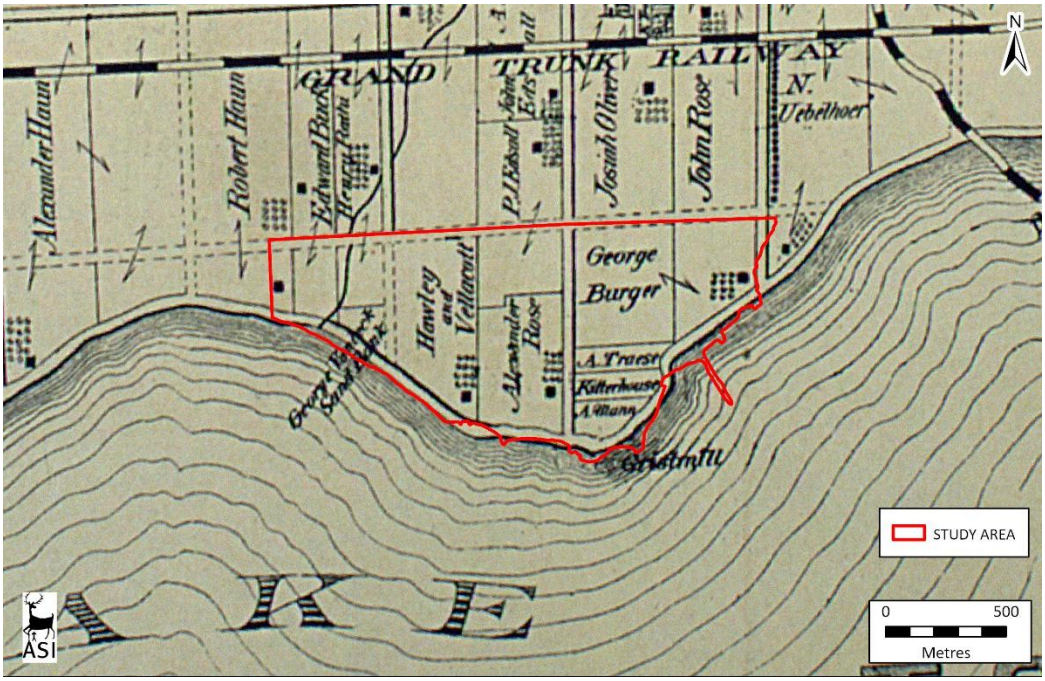


Figure 3: The study area overlaid on the 1876 *Historical Atlas of the Counties of Lincoln and Welland* (Page, 1876).



Figure 4: The study area overlaid on the 1907 topographic map of Welland (Department of Militia and Defence, 1907).



Figure 5: The study area overlaid on the 1934 topographic map of Welland (Department of National Defence, 1934).



Figure 6: The study area overlaid on the 1954 aerial photograph of Southern Ontario (City of Toronto, 1954).

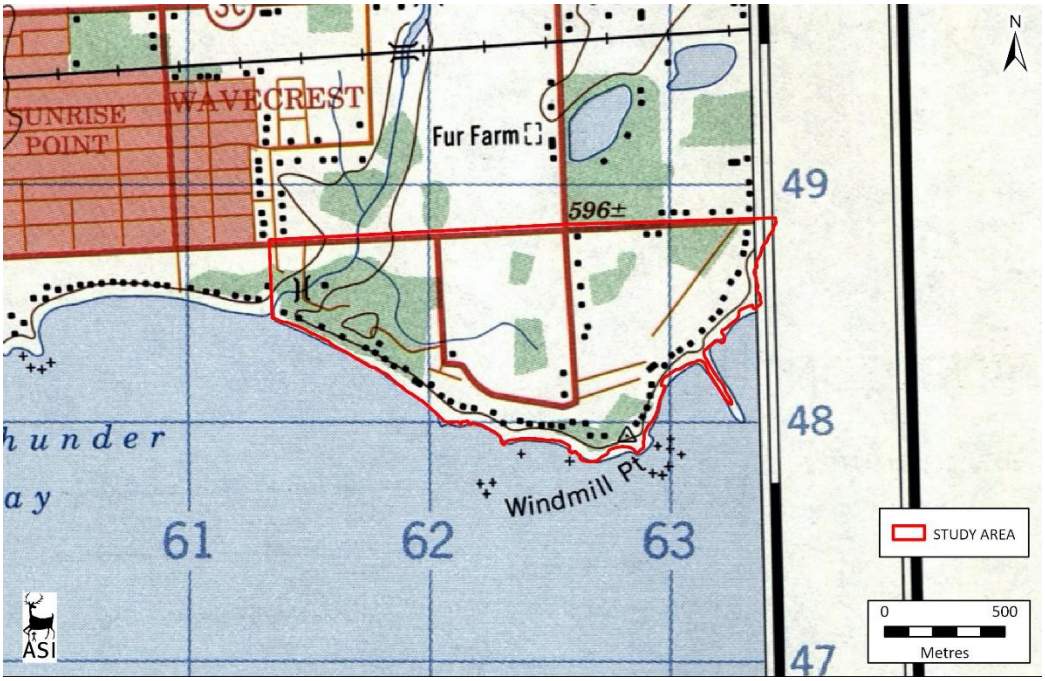


Figure 7: The study area overlaid on the 1973 topographic map of Welland (Department of Energy, Mines and Resources, 1973).

4.0 Desktop Results

Based on the results of the background research, no known built heritage resources and/or cultural heritage landscapes were identified within the study area.

Two areas of interest, the northeastern corner of the study area where early residential structures may still be extant and the historical location of the windmill/gristmill on the shoreline, were identified during the historical mapping review as having heritage potential (Figure 8). Both sites require further investigation through fieldwork to determine their level of cultural heritage interest. In addition, Lake Erie, its unnamed watercourse that runs north-south through the study area, and the surrounding woodlot have the potential for being identified as potential cultural heritage landscapes, to be confirmed through fieldwork.

5.0 High-Level Impact Assessment

The following sections provide more detailed information regarding the proposed project undertaking and high-level analysis of the potential impacts on the areas with potential heritage sensitivity.

5.1 Description of Proposed Undertaking

The Colony Road Watermain Relocation Project involves the relocation of the existing watermain in the Colony Road neighbourhood, located south of Thunder Bay Road. The existing watermain is approximately 3 kilometres in length and services the Colony Road neighbourhood. There are currently significant risks identified associated with the existing watermain, which include: operational risks; maintenance risks; and water pressure and fireflow concerns. To remedy these risks and ensure residents in the area can continue to rely on Town drinking water, the watermain needs to be relocated. The Municipal Class Environment Assessment being undertaken as part of this project will inform the development of relocation alternatives. This desktop report provides guidance on locations within the study area that contain known cultural heritage resources – built heritage resources and cultural heritage landscapes – and provides a high-level impact assessment on any identified resources.

5.2 High-Level Description of Potential Impacts

No known built heritage resources or cultural heritage landscapes were identified within the project study area. Five areas of potential heritage sensitivity have been identified through historical mapping review and through input from community engagement (Figure 8). Until fieldwork is conducted to confirm the presence or absence of potential built heritage resources and/or cultural heritage landscapes, these areas should be avoided for proposed construction work.

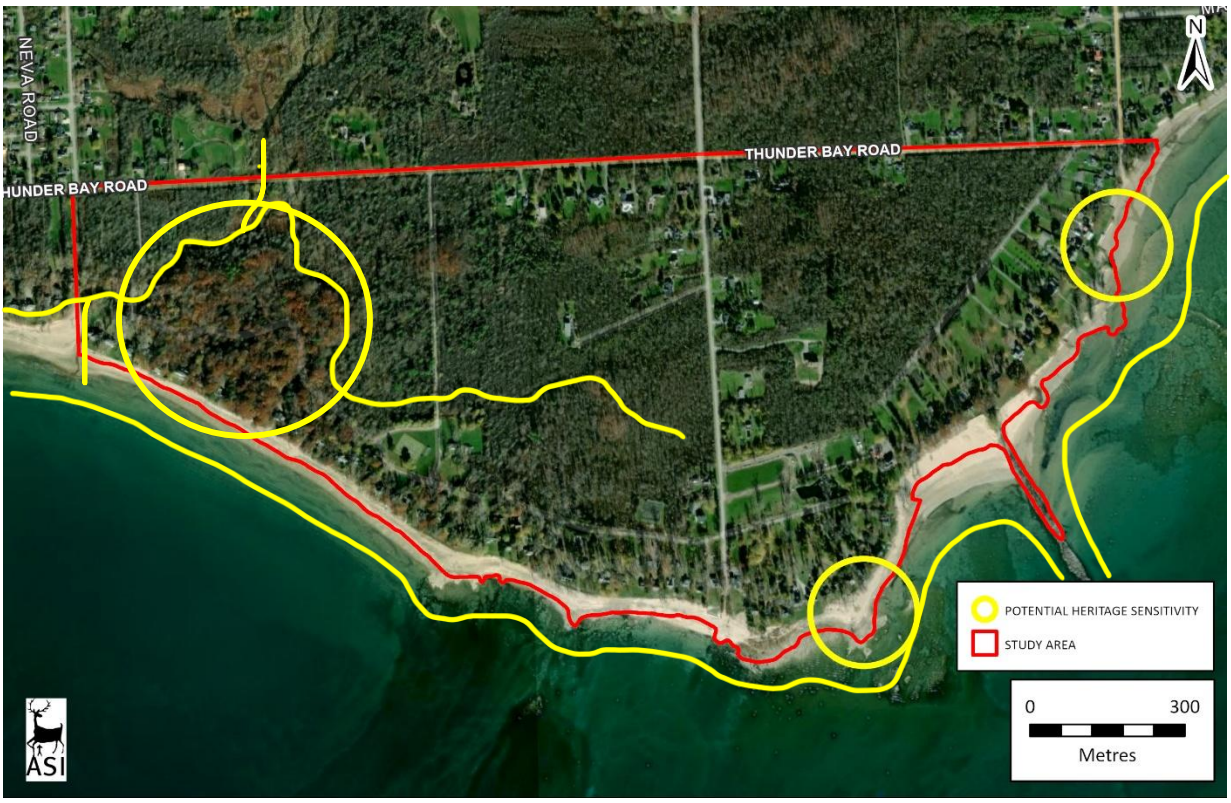


Figure 8: Map of the study area showing the location of potential heritage sensitivity (circled in yellow).

6.0 Results and Next Steps

The results of background historical research and a review of secondary source material, including historical mapping, indicate a study area with an Indigenous history spanning several millennia, a rural and residential land use history dating back to the early nineteenth century, and a rise in recreational use along the waterfront in the twentieth century. A review of federal, provincial, and municipal registers, inventories, and databases revealed that there are no known built heritage resources (B.H.R.s) and no known cultural heritage landscapes (C.H.L.s) in the Colony Road Watermain Relocation study area. Five areas with potential heritage sensitivity have been identified through the historical mapping review.

Based on the results of the assessment, the following recommendations and next steps have been developed:

1. It is recommended that until fieldwork can be conducted by a qualified heritage professional to confirm the presence or absence of potential cultural heritage resources, activity related to the Colony Road Watermain Relocation avoid the northeast corner of the study area along the shoreline residential area as at least one structure may date to the late nineteenth century. Additionally, the shoreline at the southernmost point of the study area should be handled with care as there is a potential for structural remains relating to the windmill or gristmill at Windmill Point. The watercourse in the west portion of the study area, the woodlot surrounding the western shoreline of the study area, and Lake Erie also have the potential to be considered cultural heritage landscapes.

2. Fieldwork to observe the existing conditions of the study area and identify and potential B.H.R.s and/or C.H.L.s should be undertaken to satisfy requirements of the Municipal Class Environmental Assessment. This can occur once a short list of alternatives, or a preferred alternative has been determined.
3. This report should be submitted by the proponent to the Town of Fort Erie and Niagara Region for their records.

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A.4. Geotechnical and Hydrogeological

Technical Memorandum

411 Huronia Rd ● Barrie, ON L4N 9B3 ● 800.810.3281

To: Lisa Vespi, Infrastructure Services, The Corporation of the Town of Fort Erie

From: Sandra Anastasio

Date: May 13, 2025

Re: Geotechnical & Hydrogeological Background Conditions Report
Colony Road Watermain Relocation Project, Class Environmental Assessment Schedule B and Enhanced Conceptual Design
Contract No. ISE-23P-CRWRP
Fort Erie, ON

Project No.: 2403039

GEI Consultants Canada Ltd. (GEI) was retained by The Corporation of the Town of Fort Erie (the Client) to complete a geotechnical and hydrogeological background report to determine the background site conditions for a proposed watermain relocation in Fort Erie, Ontario. A site location plan illustrating the site is provided as Figure 1.

1. INTRODUCTION & CONTEXT

The existing watermain is approximately 3 kilometres in length within the Colony Road neighbourhood. The watermain is either located near the shoreline or underneath the private residential properties close to the shoreline, south of Colony Road itself. The watermain is experiencing significant operational, maintenance, and servicing risk due to its current location and condition.

This report is being prepared in support of an Environmental Assessment and Conceptual Design to determine the best long-term solution to replace or repair the watermain to both alleviate risk and maintain or improve the current level of service for residents. At this stage, no conceptual site plan or designs are yet available. There are currently five (5) potential alternatives that are being considered and refined, including:

1. Do Nothing: Complete localized spot repair and implement limited mitigation features (pipe isolation and armor stones).
2. Watermain Replacement:
    a. Replace watermain along the same alignment with deeper watermain.
    b. Watermain lining and replacement – Reline the existing watermain along lower risk areas and replace with deeper watermain in high-risk areas.
3. Watermain Relocation:
    a. Relocate watermain along existing roadways.
    b. Relocate watermain with road improvement.
4. Replace existing watermain with small diameter servicing watermain along existing roadways, including 3 different options for fire flow:

a. Improve hydrants on Thunder Bay Road for tanker trucks.
b. Use of water storage vaults within the community for pumper and tanker trucks.
c. Use dry hydrant with connection to Lake Erie for pumper and tanker trucks.

5. Abandonment of municipal water services:
    a. Properties water serviced to be provided via water cisterns and weekly water delivery. For fire flow, improve hydrants on Thunder Bay Road for tanker trucks. Potential for bulk-water station to be installed on Thunder Bay Road to facilitate bulk water delivery.
    b. Installation of groundwater wells on residential properties.

This background report by GEI reviews publicly available sources of subsurface information, surficial geology, and bedrock mapping to discuss potential geotechnical and hydrogeological engineering constraints for the subject area to inform the evaluation of the potential alternatives listed above.

2. BACKGROUND REVIEW

An overview of the subsurface conditions expected to be encountered was established using a range of publicly available information and previous subsurface investigations by other consultants nearby to the subject area and are summarized below.

Topography and Surface Water

Topography across the subject area is mildly undulating, under 5m, with a maximum Elev 180 m (OMNR) generally sloping southeast towards Lake Erie. The Study Area is within a coastal dune, which likely corresponds to a beach-dune complex along the north shore of Lake Erie, dating circa 3,400 BP (Pengelly et al., 1997). The landscape is largely forested with extensive areas of wetlands mapped across the area. Lake Erie is a significant surface water feature located south of the existing and proposed watermain locations. Lake Erie water levels fluctuate seasonally around an average Elev. 174.5 m (NOAA, Great Lakes Environmental Research Laboratory), A stable water course that crosses Thunder Bay Rd west of Colony Rd is found at approximately Elev. 175 m. Due to the proximity of the lake and presence of a stable watercourse local to the area, surface water and near surface unconfined groundwater, hydraulic connectivity is expected in shallow formation (near surface) materials and may be an important, albeit currently unquantified contribution to observable groundwater depths and any related dewatering.

Physiology and Geology Mapping

The subject area is within the physiographic region known as the Haldimand Clay Plain (Chapman and Putnam, 2007). The subject area is primarily located within clay plains, but there are some limestone plains located nearby. A map of the physiographic regions is provided in Figure 2. Surficial geology is provided in Figure 3 and shows the subject area is primarily located in fine-textured glaciolacustrine deposits (Ontario Geological Survey, OGS 2010). The existing watermain is primarily located in coarse-textured lacustrine deposits found directly along the coastline and eolian deposits located just beyond the shoreline. Organic deposits and Paleozoic bedrock are also found in the designated subject area.

Bedrock geology mapping from the OGS (2011) was reviewed and is provided in Figure 4. The OGS mapping indicates that the subject area is located in the Detroit River Group, as part of the Onondaga Formation.

Drift thickness mapping from the OGS indicates bedrock is regionally approximately ranging from 0.0 to 8.0 metres below ground surface (m bgs).

OGS Boreholes

Two (2) nearby boreholes registered with the OGS (Figure 5) were found near the subject area[1]. The first borehole is located 0.7 km from the subject area and encountered a soft clay with organic material underneath fill, to the end of the borehole at a depth of 2.4 m (Elev. 172.4 m). The second borehole is located 1.5 km from the subject area and encountered clay and till to a depth of 3.8 m (Elev. 173.9 metres above sea level, m asl) and limestone bedrock below.

MECP Water Well Records and Water Taking Permits Mapping

The Ministry of Environment, Conservation and Parks (MECP) water well records[2] were obtained within 500 meters of the subject area to assess the general nature of the groundwater resource in the near vicinity of the subject area. Seventeen (17) well records were found, with the approximate MECP well locations shown in Figure 5 and the records included in Enclosure 2 for reference.

The wells were installed for the following uses:

- Sixteen (16) records indicate that the wells are to be used for domestic use.
- One (1) record indicates that the well is to be used for commercial use.

The stratigraphic descriptions within the MECP well records are typically inaccurate due to the methodology in which they are determined (observations of cuttings and no consistency between descriptions of soil between different well drillers). Though this is the case, an overall sense of the stratigraphy can still be determined.

The well records generally encountered clay from surface or directly below a thin layer of loam, extending to depths of 1.5 to 9.1 m bgs. Below the clay was bedrock, described as either limestone or shale. Historic water levels ranged from 2.4 to 14.6 m bgs in the well records.

The well records also indicate wells are seated in water bearing units with fresh and clear water with relatively shallow static water levels (< 10 ft below surface). The most reliable well recovery measures appear in records later than 1990 in both limestone and shale bedrock seatings. Recommended residential production pumping rates in the records range from a conservative 1 gal/minute to 10 gal/minute. For comparison, contemporary recommendations in Ontario are on the order of 5 gal/minute during peak times of the day. Fast recovery rates appear to meet or exceed this and may also indicate the presence of karstic or fractured bedrock. Based on the historical records, the materials appear likely suitable for single family residential dwellings.

The online MECP Permit to Take Water (PTTW) database shows there are no active PTTWs within 1 km of the study area. The nearest permit is approximately 4 km northeast of the study area located at (water) Lots 8 and 9 of Concession 1, in the Geographic Township of Bertie, Fort Erie, Regional Municipality of

[1] https://www.geologyontario.mndm.gov.on.ca/mines/data/google/wells/boreholes.kml
[2] Well records - Datasets - Ontario Data Catalogue

Niagara. The water taking from Lake Erie is for Fort Erie Water Treatment Plant (Rosehill WTP) with a maximum water taking rate of 78,000,480 L/day. Though not necessarily the case, the lack of PTTW's in this area may indicate that there is limited need for extensive dewatering.

Source Water Protection and Other Regulatory Requirements

The subject area is within the jurisdiction of the Niagara Peninsula Protection Area. Based on Source Water Protection online mapping[3], the following is noted:

- Wellhead Protection Area (WHPA): The subject area is not located within a WHPA (Figure 6).
- Intake Protection Zone (IPZ): The subject area is located within an Intake Protection Zone (Zone 2) (Figure 7).
- Highly Vulnerable Aquifer (HVA): The subject area is located within an HVA (Figure 8). Under the Niagara Peninsula Source Protection Plan, specific activities like new agricultural land uses, combined sewers, and certain industrial effluent systems are prohibited within HVAs to protect drinking water sources. None of the proposed alternatives are expected to be appreciably constrained by being within an HVA.
- Significant Groundwater Recharge Area (SGRA): The subject area is located within a SGRA (Figure 9).
- The subject area is not located within the Oak Ridges Moraine, Niagara Escarpment Plans, or the Greenbelt.
- The subject area is not located in an Event Based Area.
- The subject area is within the following watershed hierarchy:
    - St. Lawrence River (Primary Watershed).
    - Lake Erie (Secondary Watershed).
    - Northeast Lake Erie Shoreline (Tertiary Watershed).

Aerial images from 2010 to 2023 were reviewed in First Base Solutions (Figure 10A shows 2010, Figure 10B shows 2018, and Figure 10C shows 2023. The subject area is predominantly forested woodland, except for rural residences located along roadways. No major development is visible over this time period. Road usage appears to increase over this span of time as indicated through increased visibility of north-south roadways near Colony Road.

MTO Boreholes

The Ontario Ministry of Transportation (MTO) Foundation Library online database[4] was searched for any MTO geotechnical reports and boreholes near the study area. The nearest geotechnical report was completed in 1968 for an underpass structure at the crossing of Gilmore Road and the Queen Elizabeth Way (QEW), over 5 km from the study area (Figure 5).

Five (5) boreholes were drilled as part of the investigation, along with a dynamic cone penetration test for each borehole. Five (5) additional dynamic cone penetration tests were carried out to define the bedrock

[3] Ministry of the Environment, Conservation and Parks (gov.on.ca)
[4] Terms and Conditions - Foundation Library - MTO

profile. Grain size distributions and Atterberg Limits were conducted on various overburden samples.

In the five (5) boreholes drilled, the overburden encountered ranged from silty clay/clayey silt with trace sand and gravel to silt with sand and some gravel. The overburden extended to depths ranging from 2.8 to 4.6 m (Elev. 186.1 to 184.4 m asl). The overburden had a consistency of stiff to very hard and had moisture contents ranging from 9 to 26%.

Dolomite bedrock was encountered in all boreholes and cone penetration tests at depths of 1.8 to 4.6 m bgs (Elev. 183.9 to 183.0 m asl). The bedrock was generally in sound condition with Rock Quality Designations (RQD) of 94 to 100%.

Groundwater levels were observed in the open holes during the investigation at depths of 0.0 to 1.5 m bgs (Elev. 186.4 to 185.5 m asl).

Previous Investigations

Three (3) subsurface investigation reports were provided by the client for review. These reports drilled boreholes less than 1 km from the subject area. Below any fill found in the boreholes was a silty clay layer. The boreholes were either terminated in this silty clay layer or were terminated upon auger refusal on assumed bedrock at depths of 6.7 to 7.5 m. Groundwater was observed at a depth of 0.76 m for one project. Water observed during another project was considered to represent a perched condition in the near surface granular deposits. Groundwater was not observed in the third project.

Multiple publicly available subsurface investigation reports were found in the Fort Erie region but were 6 to 9 km from the study area. Based on the findings of these reports, the surficial geology was predominantly a silty clay/clayey silt glacial till with trace sand and gravel, which extended to depths of 3.3 to 6.4 m bgs. Underneath the glacial till was dolostone bedrock, with elevations of 182.2 to 178.9 m asl. The top 3 m of the bedrock was observed to be poorer in quality with RQDs ranging from 41 to 85%, while the bedrock below had RQDs ranging from 87 to 95%.

The groundwater level observed in the reports ranged from 3.7 to 3.9 m bgs, with an elevation of 181.5 to 181.7 m asl, located in the bedrock.

The measured hydraulic conductivity in the upper bedrock ranged from $3.8x10^{-4}$ to $4.7x10^{-4}$ m/s, with a geometric mean of $4.4x10^{-4}$ m/s. The estimated empirical hydraulic conductivity of the overburden was calculated to be $1.7x10^{-7}$ m/s.

3. PRELIMINARY ASSESSMENT OF SUBSURFACE CONDITIONS

The previous subsurface investigation reports provided by the client, the MECP well records and OGS surficial geology mapping are considered the most reliable sources for understanding site-specific subsurface conditions. In addition, other geological mapping indicates regional consistency in subsurface conditions, suggesting that data from locations several kilometers away can be representative of the site conditions as well.

Soil conditions across the study area are predominantly characterized by relatively impermeable silt or

clay deposits. Near the shoreline, the presence of beach sands points to cohesionless deposits, as corroborated by the surficial geology mapping. The bedrock within the area, primarily part of the Detroit River Group, is found at relatively shallow depths. In some areas, bedrock may be present near surface.

Groundwater in the project area is influenced by the proximity to Lake Erie, with a lake level that typically ranges between Elev. 174 to 175[5] m based on the 1985 International Great Lakes Datum. The maximum elevation within the study area is about 180 metres, indicating that groundwater levels are likely generally near the surface. The presence of extensive wetland features mapped within the area further supports the existence of shallow groundwater conditions.

It is important to note that this preliminary assessment of subsurface conditions is based solely on a background review; actual conditions may vary significantly and would need to be verified through a site-specific subsurface investigation. The details provided here are intended only to inform potential alternatives for watermain replacement/repair as part of the EA process.

4. GEOTECHNICAL AND HYDROGEOLOGICAL CONSIDERATIONS

The following considerations are derived from the background research discussed above.

- The existing watermain appears to be located within coarse-textured lacustrine deposits in the western half and in eolian deposits in the eastern half. This is due to the proximity of the existing watermain to the shoreline. The area north of the existing watermain is predominantly fine-textured glaciolacustrine deposits.
- There are extensive areas of mapped wetlands. When constructing near a wetland, the Niagara Peninsula Conservation Authority (NPCA) Development & Interference permit for work within regulated wetlands and the Lake Erie shoreline is required. It is expected that the near surface soils in these areas will be organic/peat deposits. Organic materials are typically not geotechnically competent to support servicing when encountered.
- Groundwater is expected to be relatively shallow throughout the study area. In areas of fine-textured deposits (silts and clays), dewatering is expected to be minimal due to the relatively impermeable nature of these types of deposits. If work is to be conducted closer to the shoreline, more significant construction dewatering may be required.
- Though the bedrock is relatively shallow in the study area, due to the typical depth of watermain installations (on the order of maximum 2 metres), it is not expected to be a major constraint. In areas where bedrock is encountered within the excavation depth, there may be the presence of some fractured zone which may allow for easier excavation. It should be expected that any deep excavations into the bedrock would require mechanically breaking through the use of hydraulic breakers or even blasting.
- Silt and clay-based soils can be more difficult to work with, especially during inclement weather conditions. These soils are also likely not to be suitable for re-use in settlement sensitive areas as trench backfill and would have to be removed off-site. Scheduling of earthworks to promote working during more favourable times of the year would be recommended where feasible.

[5] https://tides.gc.ca/en/historical-monthly-mean-water-levels-coordinated-network-lake-erie

The table below discusses the relative importance of each of these geotechnical and hydrogeological considerations respective of each of the proposed development approaches outlined in Section 1. This table is being provided to support the evaluation of potential alternatives as part of the Class EA process.

Table 1. Watermain Relocation Options Analysis

Potential Alternative	Geotechnical Constraint	Hydrogeological Constraint
Option 1: Do Nothing	None (N/A)	None (N/A)
Option 2: Watermain Replacement	Medium - Cohesive deposits expected to be suitable for servicing support. Bedrock and/or organics may be encountered at surface or shallow depth during construction which have to be considered.	Medium – Shallow groundwater will be encountered. Cohesive deposits are expected to exhibit slower permeability, which contribute to manageable discharging volumes over a dewatering period (unless near shoreline where cohesionless deposits may exist). Construction near wetland areas may require additional consideration of natural heritage features, dewatered volumes, which may involve seasonal constraints.
Option 3: Watermain Relocation		
Option 4: Replace existing watermain with small diameter servicing watermain and improve fire flows.		
Option 5a: Abandonment of municipal water services.	None (N/A)	Low – Possible increased contamination related to transportation pathways.
Option 5b: Installation of wells on residential properties.		Medium – Private drinking wells are common, with yields that typically are suitable. Though this is the case, the density and number of proposed wells may potentially provide low yields in this area. Wells are relatively shallow (around 10 to 15 metres in depth) and installed uniformly in the bedrock. In general, it is uncertain whether the aquifer system in the area can supply current needs of the private wells owners, because the thickness and hydraulic properties of the weathered bedrock in the area are highly variable and not clearly understood.

Notes:

1. Low –Low probability to be a constraining factor, peripheral effects may be present.
2. Medium –Medium probability for solvable constraints to exist, definable through background study.
3. High –Indicates high probability of subsurface constraint requiring additional consideration and which may be undefinable, even in the presence of background study.
4. None (N/A) – Not applicable, generally due to nature of the solution (e.g. no subsurface activity is expected). Therefore, this is likely favourable in the assessment of the alternative as there is technically no constraint.

For both permitting requirements as well as to support detailed design, a subsurface investigation consisting of boreholes and monitoring wells will be required to support preparation of both a detailed geotechnical and hydrogeological report.

5. DESIGN AND CONSTRUCTION

The background review has scoped key geotechnical and hydrogeological constraints and confirmed that a targeted field program is needed before design can progress once a preferred alternative is chosen. The following actions shown in the table below are recommended on a preliminary level and are expected to

be refined based on the preferred alternative. They are provided just for contextual purposes only at this stage.

Stage	Action
A. Subsurface Investigation	• Advance boreholes and install monitoring wells along the preferred alignment once it is selected under the Class EA. • Conduct index/strength testing of overburden, packer tests in shallow bedrock, and slug tests in wells, as required. • Install at least one data logger in the shoreline reach to capture lake-affected water levels.
B. Detailed Design	• Select pipe class, embedment, and frost-protection depth using test results and local seasonal frost penetration. • Allow for excavation through hardclays and possible shallow bedrock; specify mechanical breaking and limited controlled blasting where refusal is indicated. • Require removal or bridging of organics/peat in mapped wetland areas; lightweight fill or geogrid reinforcement may be warranted. • Prepare a dewatering assessment; if pumping rates exceed 50 m^3/day for >30 days, register an EASR or obtain an MECP Permit to Take Water. • Incorporate source-water-protection constraints (IPZ-2, SGRA, HVA) into the Erosion and Sediment Control (ESC) and spill-prevention plans.
C. Permitting & Approvals	• NPCA Development & Interference permit for work within regulated wetlands and the Lake Erie shoreline. • MECP EASR or PTTW for construction dewatering and trench water discharge. • Utility locates and road occupancy permits where relocation follows existing road allowances and to facilitate subsurface investigation.
D. Tender-Ready Documents	• Provide geotechnical and hydrogeological design reports summarizing investigation results, recommended bedding/backfill specifications, temporary works design parameters (excavation side-slopes, active shoring, allowable bearing on bedrock), and the groundwater management plan. • Recommendations within the geotechnical and hydrogeological design reports to be incorporated into the relevant drawings and specifications, and reviewed by the engineer for general conformance.
E. Construction Execution	• Preferably schedule open-cut sections during late summer/early autumn when groundwater is typically lowest and clay deposits are workable. • Use trenchless methods (HDD or auger bore) beneath wetlands or sensitive shoreline zones to avoid dewatering and habitat disturbance where feasible. • Implement turbidity and flow monitoring for any lake or creek discharges. • Specify geotechnical inspection for bedding placement and compaction; refuse wet, plastic clays for reuse in settlement-sensitive areas.

6. CONCLUSION

We trust this information is sufficient for your present purposes. Should you have any questions concerning the above, or can be of any further assistance, please do not hesitate to contact the undersigned.

Yours truly,

GEI Consultants

Prepared By:

E-Khaz
May 13, 2025



_____
Esmaeil Khazaei, Ph.D., P.Geo.
Senior Hydrogeologist

Reviewed By:



_____
Alexander Winkelmann, P.Eng.
Geotechnical Practice Lead, Vice-President

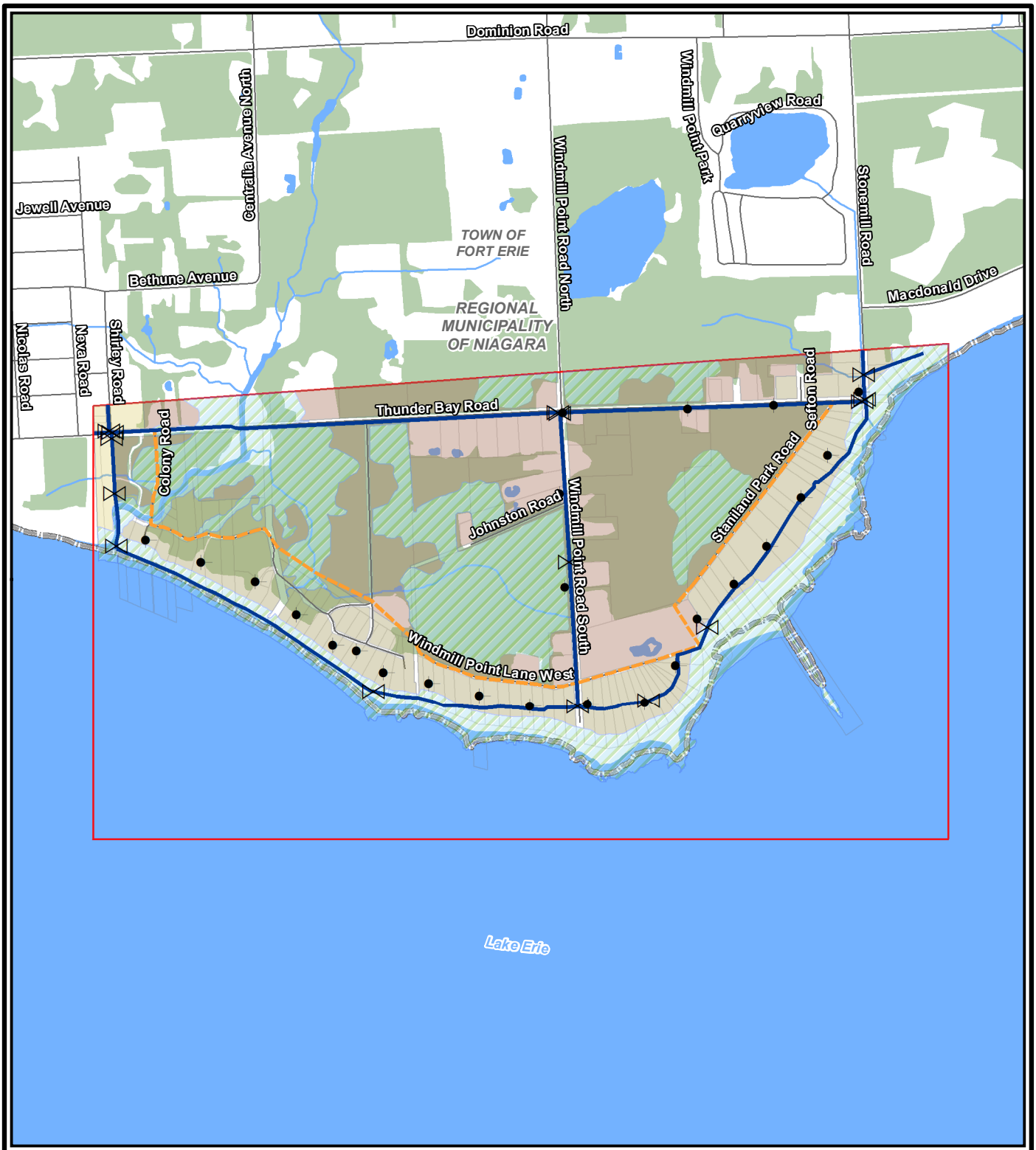
Appendices
Appendix A Enclosures

7. REFERENCES

1. Pengelly, J. W., Tinkler, K. J., Parkins, W. G., & Mccarthy, F. M. (1997). 12,600 Years of Lake Level Changes, Changing Sills, Ephemeral Lakes and Niagara Gorge erosion in the Niagara Peninsula and Eastern Lake Erie Basin. Journal of Paleolimnology, 17(4), 377–402.
2. Chapman, L.J., & Putnam, D.F. 1984, digitized in 2007. Physiography of southern Ontario, Ontario Geological Survey Miscellaneous Release--Data 228.
3. Ontario Geological Survey. 2010. Surficial geology of Southern Ontario, Ontario Geological Survey Miscellaneous Release--Data 128-REV.
4. Ontario Geological Survey 2011. Bedrock geology of Ontario, Ontario Geological Survey, Miscellaneous Release---Data 126-Revision 1.

Appendix A Enclosures

A.1. Figures



NOTES:
1. Coordinate System: NAD 1983 UTM Zone 17N.
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2024.

Legend

- Subject Area
- Water Main
- Water Hydrant
- Water System Valve
- Proposed Alignment
- Road
- Watercourse
- Waterbody
- Wooded Area
- Property Parcels

OP Land Use Designations

- Environmental Protection
- Low Density Residential
- Rural
- Rural Residential

N

0 150 300 m

1:15,000

Geotechnical and Hydrogeological Desktop Study
Colony Rd Watermain Relocation Project

Town of Fort Erie

GEI Consultants

Project 2403039

SITE LOCATION PLAN

March 2024 Fig. 1



NOTES:

1. Coordinate System: NAD 1983 UTM Zone 17N.
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2024.

Physiography of Southern Ontario data source: Chapman, L.J. and Putnam, D.F. 2007. Physiography of Southern Ontario; Ontario Geological Survey, Miscellaneous Release--Data 228 ISBN 978-1-4249-5158-1

Legend

- Subject Area
- Road
- Watercourse
- Waterbody
- 9: Limestone Plains
- 12: Clay Plains

N

0 150 300 m

1:15,000

Geotechnical and Hydrogeological
Desktop Study
Colony Rd Watermain Relocation Project

Town of Fort Erie

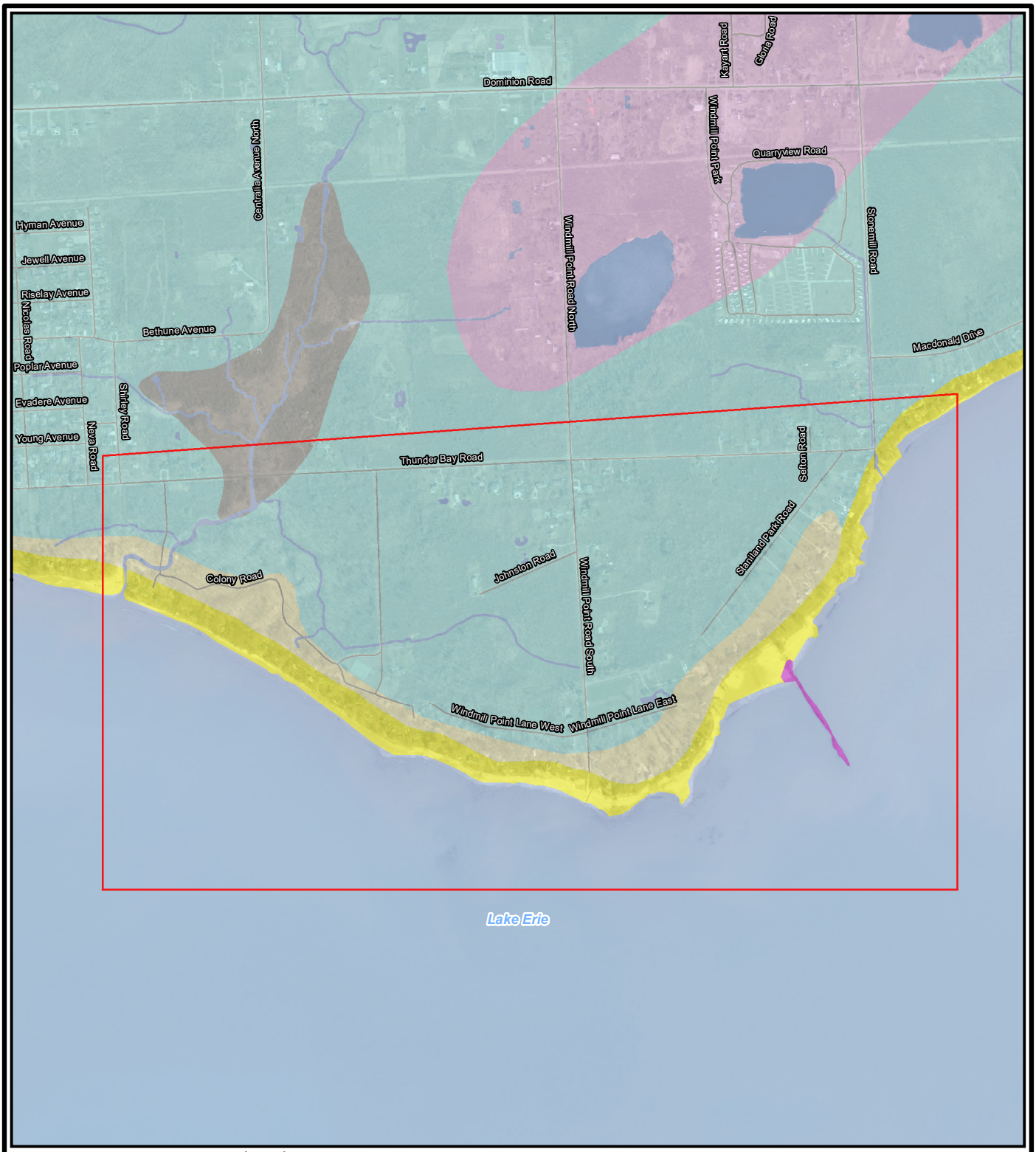
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Project 2403039

PHYSIOGRAPHIC REGIONS

March 2024 Fig. 2

Path: C:\Users\sbeatty\OneDrive - GEI Consultants, Inc\Desktop\2024-02_geotechnical_and_hydrogeological_desktop_study\2403039_rpt_fig02_physiographic_regions.mxd Date Saved: Friday, March 22, 2024 Last Modified by: SarBea3652



NOTES:

1. Coordinate System: NAD 1983 UTM Zone 17N.
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Surficial Geology of Southern Ontario data source: Ontario Geological Survey 2010. Surficial geology of Southern Ontario; Ontario Geological Survey, Miscellaneous Release--Data 128-REV ISBN 978-1-4435-2483-4 [DVD] ISBN 978-1-4435-2482-7 [zip file]

Legend

- Road
- Watercourse
- Waterbody

Surficial Geology

- 3: Paleozoic bedrock
- 8a: Fine-textured glaciolacustrine deposits (Massive-well laminated)
- 14b: Coarse-textured lacustrine deposits (Littoral-foreshore deposits)
- 17: Eolian deposits
- 20: Organic deposits
- 21: Man-made deposits

N

0 150 300 m

1:15,000

Geotechnical and Hydrogeological Desktop Study
Colony Rd Watermain Relocation Project

Town of Fort Erie

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SURFICIAL GEOLOGY

Project 2403039

March 2024

Fig. 3

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NOTES:

1. Coordinate System: NAD 1983 UTM Zone 17N.
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2024.

Bedrock geology data source: Ontario Geological Survey 2011. 1:250 000 scale bedrock geology of Ontario; Ontario Geological Survey, Miscellaneous Release---Data 126-Revision 1. ISBN 978-1-4435-5704-7 (CD) ISBN 978-1-4435-5705-4 [zip file]

Legend

- Subject Area
- Road
- Watercourse
- Waterbody

Bedrock Geology

- Detroit River Group; Onondaga Formation

N

0 150 300 m

1:15,000

Geotechnical and Hydrogeological Desktop Study
Colony Rd Watermain Relocation Project

Town of Fort Erie

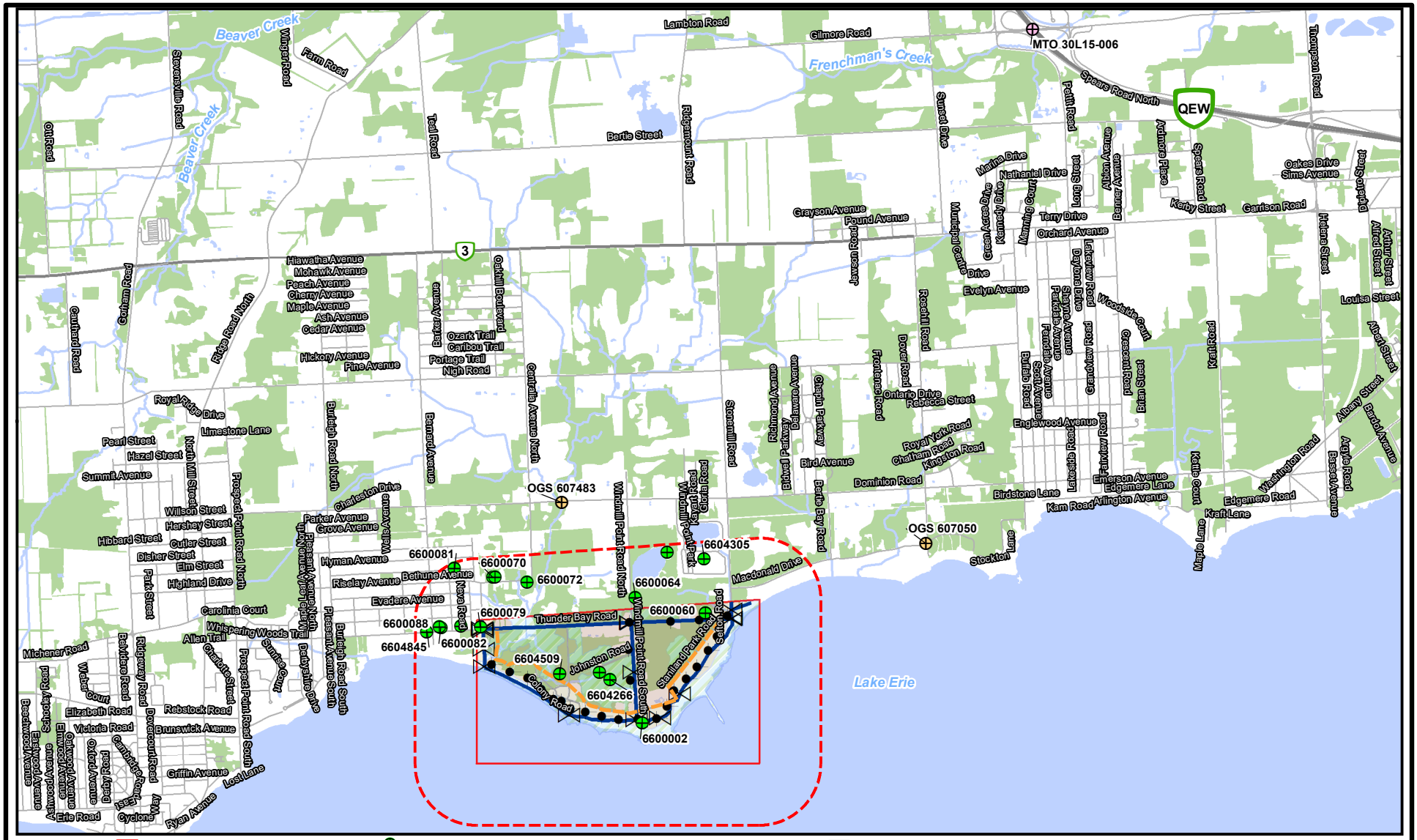
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Project 2403039

BEDROCK GEOLOGY

March 2024 Fig. 4

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NOTES:
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Geotechnical and Hydrogeological Desktop Study
Colony Rd Watermain Relocation Project

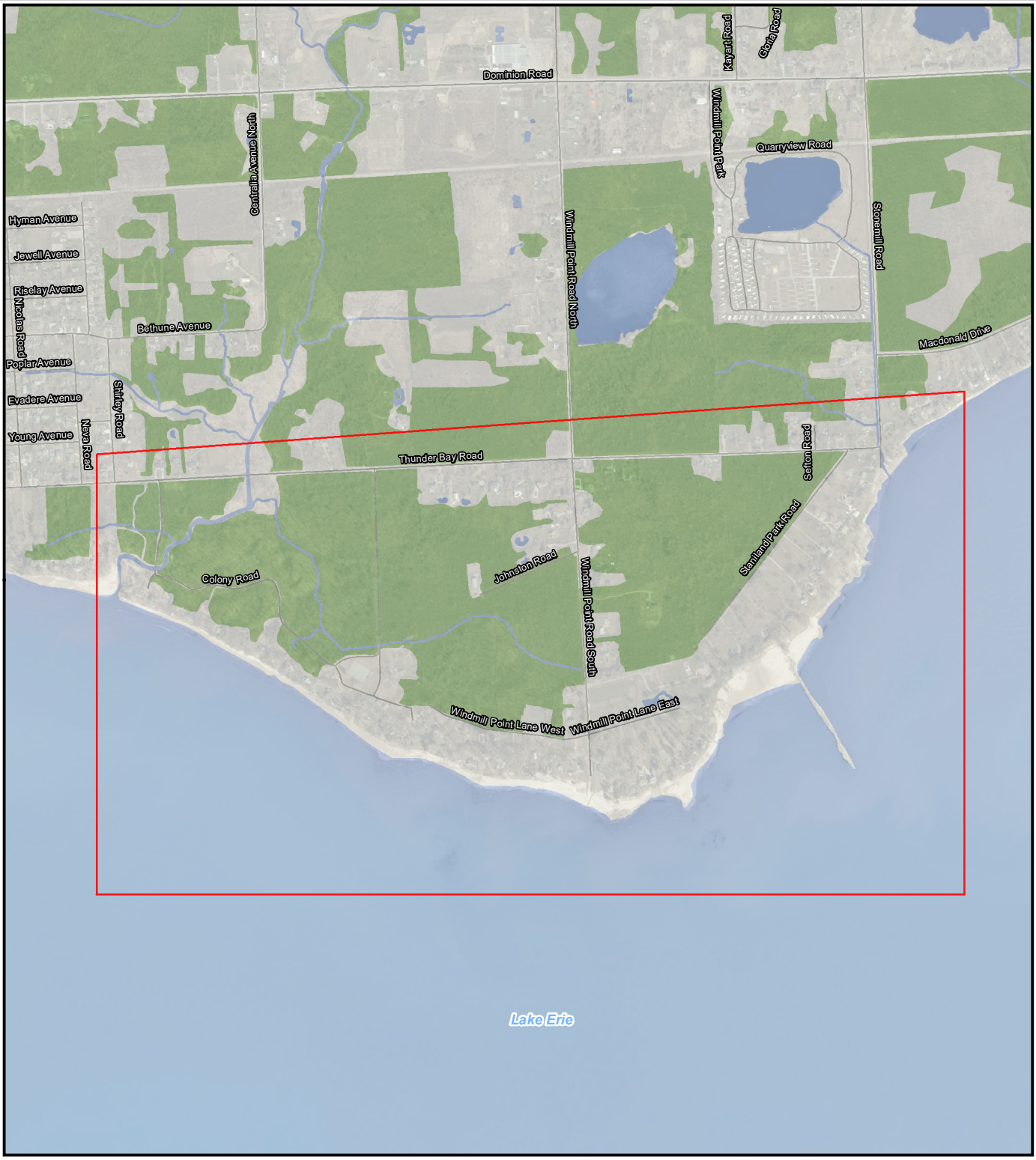
Town of Fort Erie

GEI Consultants

MECP WELL RECORD LOCATIONS

Project 2403039 | May 2025 | Fig. 5

Path: \\bos-pzcc-1\Data_Storage\Working\GM BLUEPLAN ENGINEERING LTD\2403039 Colony Rd Watermain Rplc\05_GIS\figures\report_figures\2024-03_hydrogeo\2403039_rpt_fig05_land_mecp_well_record_locations.mxd Date Saved: Thursday, May 8, 2025 Last Modified by: Scolnn3763



NOTES:
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Legend

- Subject Area
- Road
- Watercourse
- Waterbody
- Wooded Area

Wellhead Protection Area

- Zone A
- Zone B
- Zone C
- Zone D
- Q1
- Q2

- No Well Head Protection Area within Subject Area -

N

0 150 300 m

1:15,000

Geotechnical and Hydrogeological Desktop Study
Colony Rd Watermain Relocation Project

Town of Fort Erie

GEI Consultants

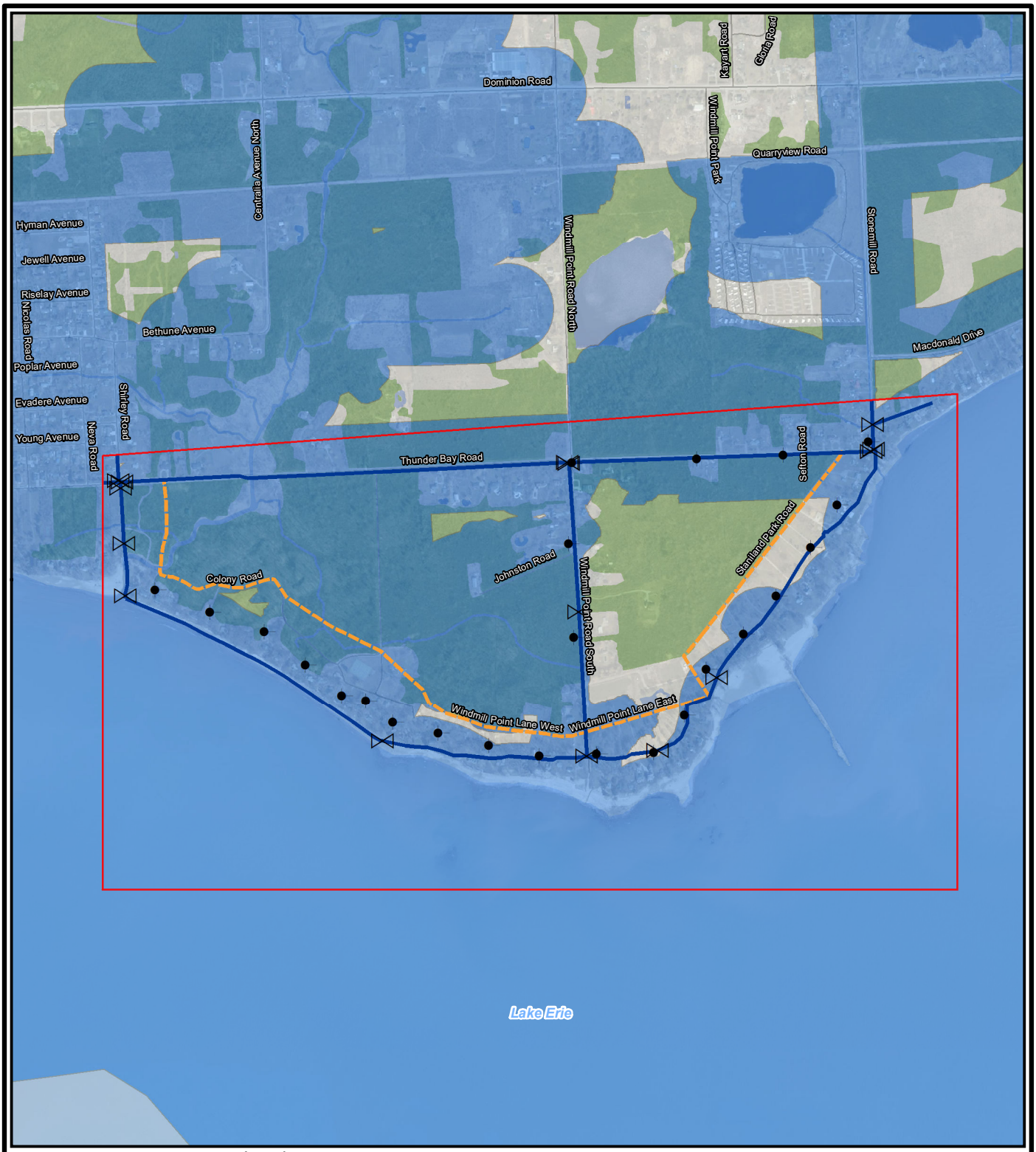
WELL HEAD PROTECTION AREA

Project 2403039

March 2024

Fig. 6

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NOTES:
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Legend

- Subject Area
- Water Main
- Proposed Alignment
- Water Hydrant
- Water System Valve
- Road
- Watercourse
- Waterbody
- Wooded Area

Intake Protection Zones

- Intake Protection Zone 1
- Intake Protection Zone 2
- Intake Protection Zone 3

- Intake Protection Zone 2 within Site (NPCA, 2010) -

N

0 150 300 m

1:15,000

Geotechnical and Hydrogeological Desktop Study
Colony Rd Watermain Relocation Project

Town of Fort Erie

GEI Consultants

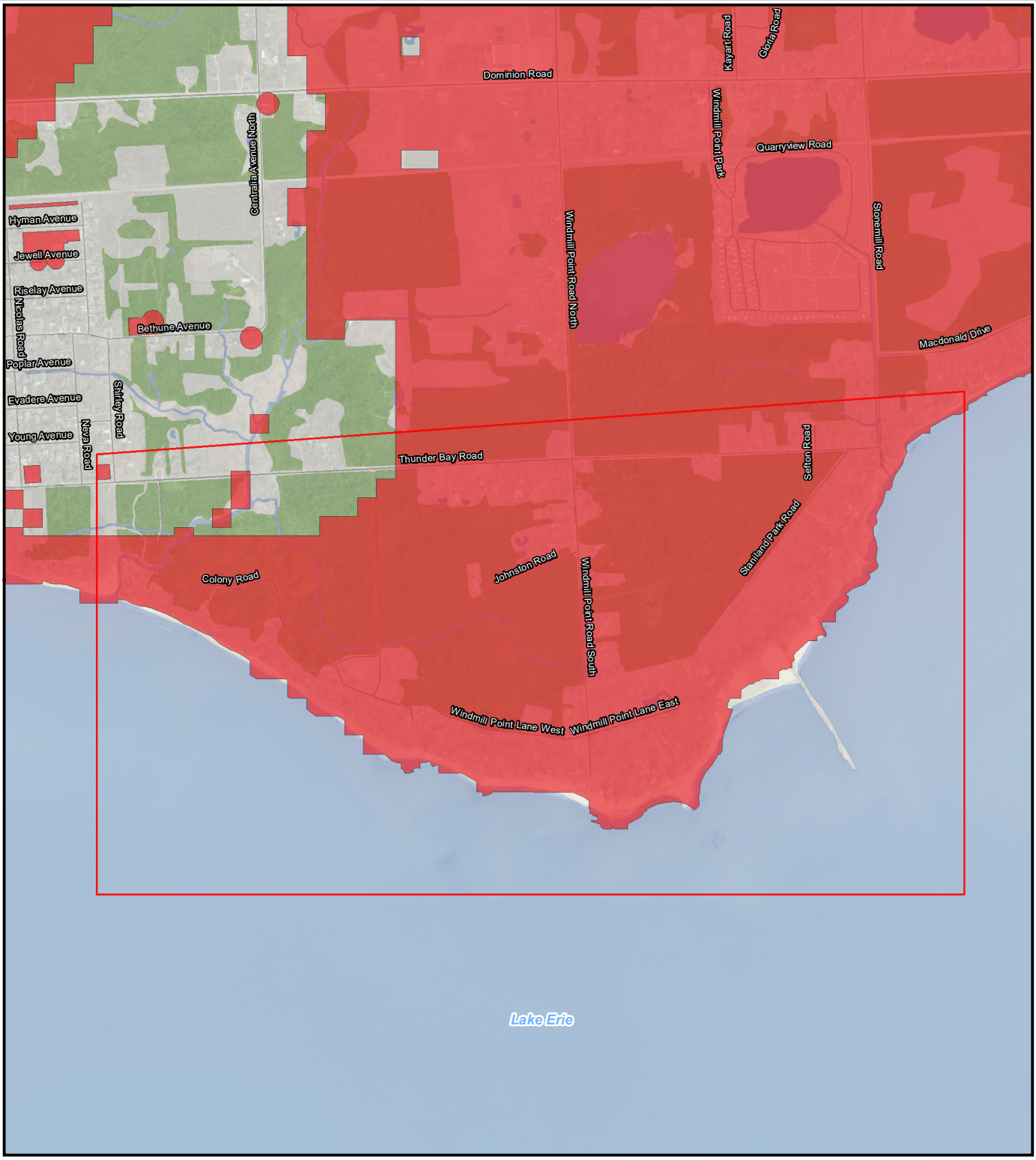
INTAKE PROTECTION ZONES

Project 2403039

March 2024

Fig. 7

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Legend

- Subject Area
- Highly Vulnerable Aquifer (NPCA)
- Road
- Watercourse
- Waterbody
- Wooded Area

- Highly Vulnerable Aquifer within Site -

N

0 150 300 m

1:15,000

Geotechnical and Hydrogeological Desktop Study
Colony Rd Watermain Relocation Project

Town of Fort Erie

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HIGHLY VULNERABLE AQUIFER

Project 2403039

March 2024

Fig. 8

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Legend

- Subject Area
- Water Main
- Proposed Alignment
- Water Hydrant
- Water System Valve
- Road
- Watercourse
- Waterbody
- Wooded Area
- Significant Groundwater Recharge Area (NPCA)

N

0 150 300 m

1:15,000

Geotechnical and Hydrogeological Desktop Study
Colony Rd Watermain Relocation Project

Town of Fort Erie

GEI Consultants

Project 2403039

SIGNIFICANT GROUNDWATER RECHARGE AREA

March 2024 Fig. 9



NOTES:
1. Coordinate System: NAD 1983 UTM Zone 17N.
2. Airphoto source:

Legend

Subject Area

N

0 150 300 m

1:15,000

Geotechnical and Hydrogeological
Desktop Study
Colony Rd Watermain Relocation Project

Town of Fort Erie

GEI Consultants

2010
AERIAL PHOTOGRAPH

Project 2403039

March 2024

Fig. 10A

Path: C:\Users\sbeatty\OneDrive - GEI Consultants, Inc\Desktop\Fort Erie\05_GIS\figures\report_figures\2403039_rpt_fig10_historical_airphotos.mxd Date Saved: Sunday, March 24, 2024 Last Modified by: SanBea3652



NOTES:
1. Coordinate System: NAD 1983 UTM Zone 17N.
2. Airphoto source:

Legend

Subject Area

N

0 150 300 m

1:15,000

Geotechnical and Hydrogeological
Desktop Study
Colony Rd Watermain Relocation Project

Town of Fort Erie

GEI Consultants

2018
AERIAL PHOTOGRAPH

Project 2403039

March 2024

Fig. 10B

Path: C:\Users\sbeatty\OneDrive - GEI Consultants, Inc\Desktop\Fort Erie\05_GIS\figures\report_figures\2403039_rpt_fig10_historical_airphotos.mxd Date Saved: Sunday, March 24, 2024 Last Modified by: SanBea3652



NOTES:
1. Coordinate System: NAD 1983 UTM Zone 17N.
2. Airphoto source:

Legend

Subject Area

N

0 150 300 m

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Geotechnical and Hydrogeological
Desktop Study
Colony Rd Watermain Relocation Project

Town of Fort Erie

GEI Consultants

2023
AERIAL PHOTOGRAPH

Project 2403039

March 2024

Fig. 10C

Path: C:\Users\sbeatty\OneDrive - GEI Consultants, Inc\Desktop\Fort Erie\05_GIS\figures\report_figures\2403039_rpt_fig10_historical_airphotos.mxd Date Saved: Sunday, March 24, 2024 Last Modified by: SanBea3652

A.2. MECP Well Records

JD

UTM Z E

5 R N

Elev. 9 R 0580

Basin 23

66 No. B2

The Ontario Water Resources Commission Act

WATER WELL RECORD

FORT ERIE (Bertie)

County or District Welland Township, Village, Town or City

Con. B.F. Lot part 3 14 Date completed 7th (day) June (month) 66 (year)

[redacted] ess Ridgeway

Casing and Screen Record

Inside diameter of casing 6 in

Total length of casing 9 ft.

Type of screen

Length of screen

Depth to top of screen

Diameter of finished hole 5 1/2

Pumping Test

Static level 6 ft

Test-pumping rate 2 G.P.M.

Pumping level 25 ft

Duration of test pumping 1 1/2 hrs

Water clear or cloudy at end of test clear

Recommended pumping rate 1 G.P.M.

with pump setting of 30 feet below ground surface

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Water Record: Depth(s) at which water(s) found	Water Record: Kind of water (fresh, salty, sulphur)
clay flint	0	7		
	7	31	31	fresh

For what purpose(s) is the water to be used? cottage

Is well on upland, in valley, or on hillside? upland

Drilling or Boring Firm Raymond L. Schooley

Address R.R.3 Port Colborne

Licence Number 1959

Name of Driller or Borer Same

Address

Date June 15/66

Raymond L. Schooley

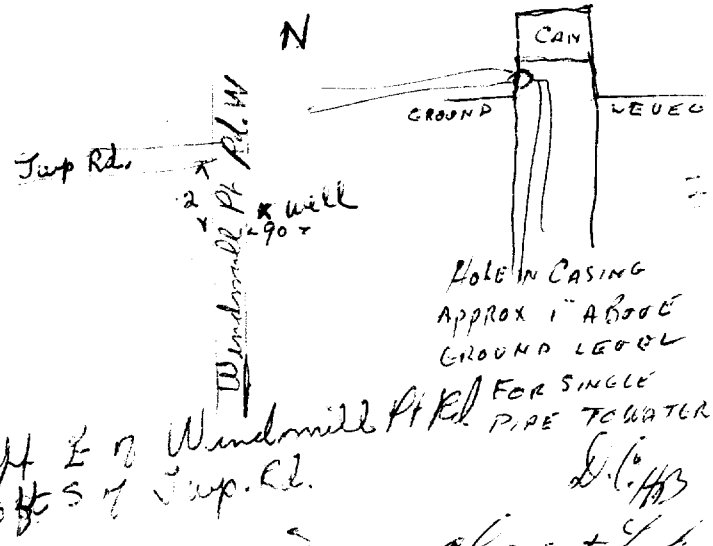
(Signature of Licensed Drilling or Boring Contractor)

Form 7 15M-60-4138

OWRC COPY

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



90 ft E of Windmill Pt Rd

300 ft S of Twp. Rd.

L.C. 4B3

clear to lake

UTM Z E
R N
Elev. R 05985
Basin Front
Lot - 15. 23.

ONTARIO

RECEIVED
DEC 31 1953
GEOLOGICAL BRANCH
DEPARTMENT of MINES

66 No 3

The Well Drillers Act

Department of Mines, Province of Ontario

Water Well Record FORT ERIE

County or Territorial District.. Welland ..... ~~Township, Village, Town or City~~ (Bertie) .....
Con. 13 ..Lot 15 ..Street and Number (if in Village, Town or City) .....
Owner [redacted] ..... Address .... Crystal Beach .....
Date Completed .... 8th (day) .... sept (month) .... 1953 (year). Cost of Well (excluding pump) .... $ 95.00 .....

Pipe and Casing Record

Casing diameter(s) .... 5" .....
Length(s) of casing(s) .... 11' 6" .....
Type of screen .....
Length of screen .....
Distance from top of screen to ground level .....
Is well a gravel-wall type? .....

Pumping Test

Date .... sept 8th 1953 .....
Static level .... 9 ft .....
Pumping level .... 12 ft. .....
Pumping rate .... 10 gal. per m. .....
Duration of test .... ½ hr. .....
Distance from cylinder or bowls to ground level .....

Water Record

Kind (fresh or mineral) .... fresh .....
Quality (hard, soft, contains iron, sulphur, etc.) .... hard .....
Appearance (clear, cloudy, coloured) .... clear .....
For what purpose(s) is the water to be used? .... house use .....
.....
How far is well from possible source of contamination? .... 50' .....
What is the source of contamination? .... septic tank .....
Enclose a copy of any mineral analysis that has been made of water .....

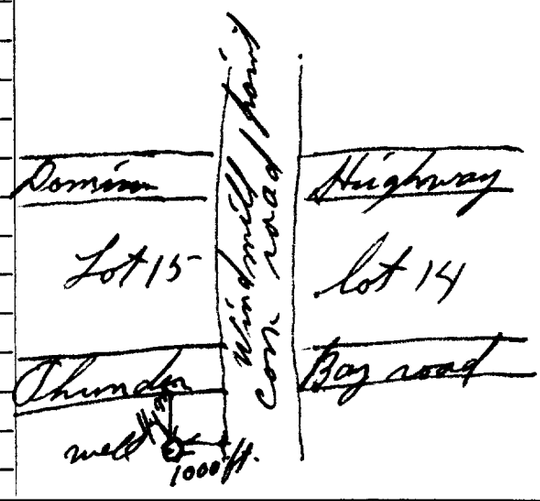
Depth(s) to Water Horizon(s)	Kind of Water	No. of Feet Water Rises
17 ft.	fresh	8'
25'	"	16'

Well Log

Overburden and Bedrock Record	From	To
red clay	0 ft.	10 ft.
flint rock	10 "	27 "

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Situation: Is well on upland, in valley, or on hillside? .... level land .....
Drilling Firm .... E. Johnston & son .....
Address .... Ridgeway, Ont .....
Name of Driller .... Earl Johnston .... Address .... Ridgeway Ont .....
Date .... Dec. 28th 1953 .... Licence Number .... 126 .....

Earl Johnston
Signature of Licensee

FORM 5

CSS.S8

UTM Z E
9 R N
Elev. 9 R 05899
Basin 23

ONTARIO

The Water-well Drillers Act, 1954
Department of Mines

RECEIVED JUL 19 1966
GEOLOGICAL BRANCH
DEPARTMENT OF MINES

66 No. 60

Water-Well Record

FORT ERIE

County or Territorial District Welland Township, Village, Town or City (Bestie)
[redacted] Village, Town or City)
Address 369 Woodbridge ave
Buffalo N Y

(day) (month) (year)

Pipe and Casing Record

Casing diameter(s) 6"
Length(s) 9'
Type of screen none used
Length of screen

Pumping Test

Static level Came to Surface
Pumping rate 30 gal a min
Pumping level 1 ft
Duration of test ½ hour

Well Log

Water Record

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, or sulphur)
Stony Clay	0	9			
Flint	9	24	22	22	Fresh

For what purpose(s) is the water to be used?
Swimming Pool
Is water clear or cloudy? Clear
Is well on upland, in valley, or on hillside?

Drilling firm Walter Wenger & Son
Address

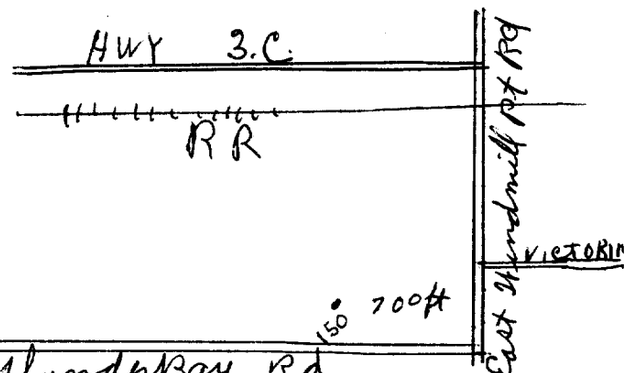
Name of Driller Walter Wenger
Address 209 Emerick Ave
Fort Erie
Licence Number 671

I certify that the foregoing statements of fact are true.

Date July 16 Walter Wenger
Signature of Licensee

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



150 ft north of Thunder Bay Road
700 ft West of East Windmill Point Rd

Form 5

CSS.S8

UTM [redacted] E
Con. I
Lot 9 N
Elev. 9 R 0595
Basin 27

ONTARIO

The Well Drillers Act

Department of Mines, Province of Ontario

66 No. 64

Conc - I F.L.E.
Lot - 14

Water Well Record

[redacted] FORT ERIE ... Con. I ... Lot ... Pt. Lot 14

[redacted] Windmill Point ... Acres ...

[redacted] ... (not including pump) 99.75

Pipe and Casing Record

Casing diameter(s) 6 5/8"
Length(s) of casing(s) 14'
Length of screen
Type of screen
Type of pump
Capacity of pump
Depth of pump setting

Pumping Test

Date July 21st 1949
Developed Capacity 8 gals. per min
Duration of Test 1/2 hr.
Pumping Rate 8 gals. per min
Drawdown 18 ft
Static level of completed well ~~27½ ft.~~ 6'
Is well a gravel-wall type?

Water Record

Kind (fresh or mineral) Fresh
Quality (hard, soft, contains iron, sulphur etc.) hard some sulphur
Appearance (clear, cloudy, coloured) Clear
For what purpose(s) is the water to be used? Domestic
How far is well from possible source of contamination? 50'
What is source of contamination? septic Tank
Enclose a copy of any mineral analysis that has been made of water

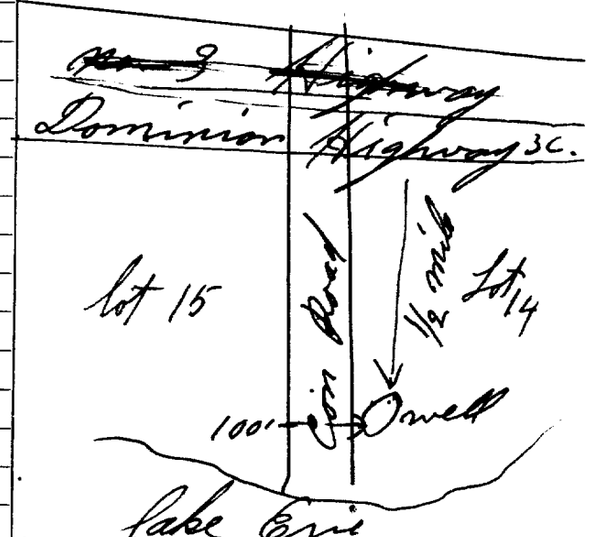
Depth(s) to Water Horizon(s)	Kind of Water	No. of Feet Water Rises
26'	fresh	20'

Well Log

Drift and Bedrock Record	From	To
Clay	0 ft.	14 ft.
Flint Rock	14 "	28½ "

Location of Well

In diagram below show distances of well from road and lot line



Situation: Is well on upland, in valley, or on hillside? Level land
Drilling Firm S. Johnston & son
Address Ridgeway Ont
Recorded by S. Johnston Address Ridgeway Ont
Date July 21st 1949 Licence Number

CSS.58

UTM Z E
9 R N
Elev. 9 R 05810
Basin 23

ONTARIO

The Water-well Drillers Act, 1954
Department of Mines

66 No. 70

RECEIVED
OCT 12 1955
GEOLOGICAL BRANCH
DEPARTMENT of MINES

Lake Erie Front.

Water-Well Record

FORT ERIE

County or Territorial District Welland Township, Village, Town or City (Bertie)

[redacted] Village, Town or City)

[redacted] ddress 200 Condon Ave Buffalo N.Y.

Date completed (day) (month) (year)

Pipe and Casing Record

Casing diameter(s) 6"
Length(s) 28'
Type of screen none used
Length of screen

Pumping Test

Static level 3'
Pumping rate 20 gal a min
Pumping level 5'
Duration of test ½ hour

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, or sulphur)
Topsoil	0	2			
Brown clay	2	16	35'	32	Sulphur
Blue Clay &	16	27			
Hard Flint	27	36			
					N

Water Record

For what purpose(s) is the water to be used?
House
Is water clear or cloudy? Cloudy
Is well on upland, in valley, or on hillside?

Drilling firm Walter Hunger & Son
Address Fort Erie

Name of Driller Walter Hunger
Address 209 Emerick ave
Fort Erie

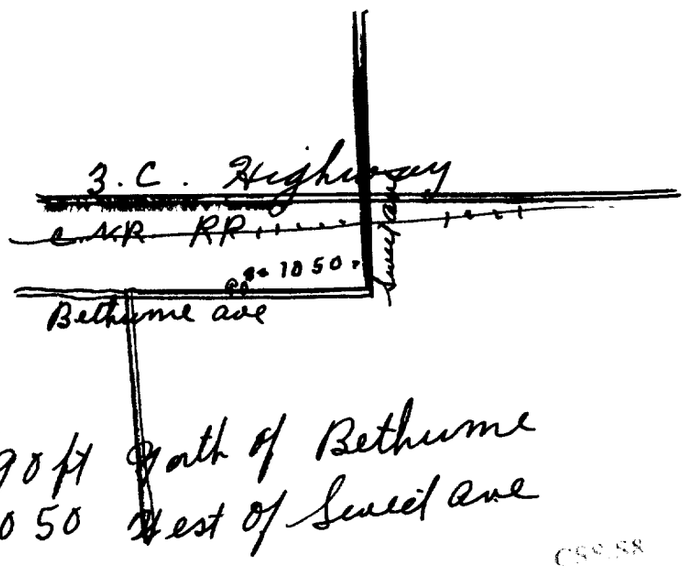
Licence Number 671

I certify that the foregoing statements of fact are true.

Date July 4 Walter Hunger
Signature of Licensee

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



90 ft South of Bethune
1050 West of Lot line ave

Form 5

UTM | | Z | | | | | | E
| 5 | R | | | | | | | N
Elev. | 4 | R: | 0 | 5 | 8 | 9 |
Basin | 123 | | | | |
Lot 17

ONTARIO

The Water-well Drillers Act, 1954
Department of Mines

66 No. 71

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OCT 22 1956
GEOLOGICAL BRANCH
DEPARTMENT of MINES

Water-Well Record

FORT ERIE

County or Territorial District... Welland ... Township, Village, (Town) or City... (Bertie)
Con. 6 T. L. Rd. Lot 7 Street and Number (if in Village, Town or City)...
Owner [redacted] Address ... Thunder Bay ont.
Date completed ... 9th (day) Oct (month) 1956 (year)

Pipe and Casing Record [redacted] Pumping Test

Casing diameter(s)	6"	Static level	9 ft
Length(s)	31'	Pumping rate	5 Mak. Brs. pm
Type of screen		Pumping level	15 ft.
Length of screen		Duration of test	½ hr.

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, or sulphur)
Red clay	0	25'			
hard pan & gravel	25'	30'	28'	19'	sulphur

Water Record

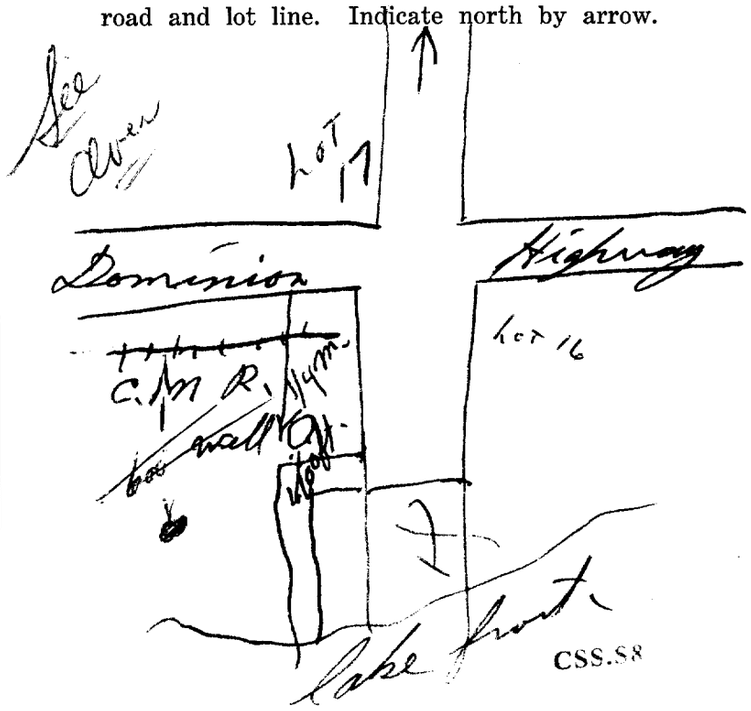
For what purpose(s) is the water to be used?
House use
Is water clear or cloudy? clear
Is well on upland, in valley, or on hillside?
Level land
Drilling firm E. Johnston & son
Address Ridgeway Ont
Name of Driller Earl Johnston
Address Ridgeway Ont
Licence Number 126

I certify that the foregoing statements of fact are true.

Date Oct. 15th E. Johnston
Signature of Licensee

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



CSS.58

Form 5

UTM | | Z | | | | | | E
| 5 | R | | | | | | | N
Elev. | 9 | R | 0581 |

Basin | 23 |

The Ontario Water Resources Commission Act

WATER WELL RECORD

66 No. B 72

FORT ERIE

County or District Welland Township, Village, Town or City Bertie

Con. 1 Lot part 17 Date completed 29 (day) April (month) 1967 (year)

[redacted] ess Ridgeway

Casing and Screen Record

Inside diameter of casing 6 in

Total length of casing 30 ft.

Type of screen

Length of screen

Depth to top of screen

Diameter of finished hole 5 1/2

Pumping Test

Static level 4 ft

Test-pumping rate 10 G.P.M.

Pumping level 20

Duration of test pumping 1 hr

Water clear or cloudy at end of test clear

Recommended pumping rate 1 G.P.M.

with pump setting of 25 feet below ground surface

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Water Record: Depth(s) at which water(s) found	Water Record: Kind of water (fresh, salty, sulphur)
red clay	0	25		
gravel	25	29		slightly
flint	29	40	40	sulphur

For what purpose(s) is the water to be used? cottage

Is well on upland, in valley, or on hillside? upland

Drilling or Boring Firm Raymond L. Schooley

Address RR 3 Port Colborne

Licence Number 2454

Name of Driller or Borer Same

Address

Date April 29/67

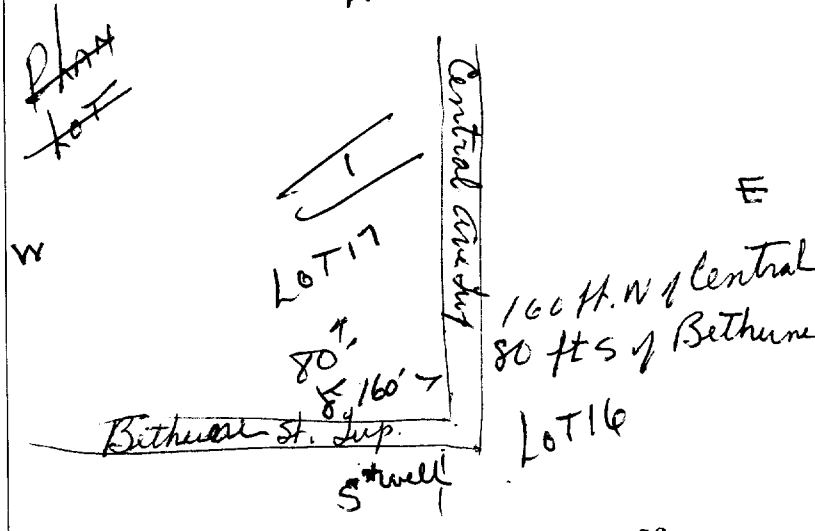
Raymond L. Schooley
(Signature of Licensed Drilling or Boring Contractor)

Form 7 15M-60-4138

OWRC COPY

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



CSS.S8

UTM Z E
R N
Elev. R 0580 FRONT
Basin 2 3

ONTARIO

66 No. 79

RECEIVED
MAR 26 1952
GEOLOGICAL BRANCH
DEPARTMENT of MINES

The Well Drillers Act
Department of Mines, Province of Ontario

Water Well Record

[redacted] Village, ~~Town or City~~ (Bertie)
...vn or City) Thunder Bay Fort Erie Ont.
Date Completed 21 (day) June (month) 51 (year) Cost of Well (excluding pump)

Pipe and Casing Record

Casing diameter(s) 6 4
Length(s) of casing(s) 23'
Type of screen
Length of screen
Distance from top of screen to ground level
Is well a gravel-wall type?

Pumping Test

Date
Static level 18'
Pumping level Bailer Tested
Pumping rate Strong Well
Duration of test
Distance from cylinder or bowls to ground level

Water Record

Kind (fresh or mineral) Fresh
Quality (hard, soft, contains iron, sulphur, etc.) Hard
Appearance (clear, cloudy, coloured) Clear
For what purpose(s) is the water to be used? Cottage
How far is well from possible source of contamination?
What is the source of contamination?
Enclose a copy of any mineral analysis that has been made of water

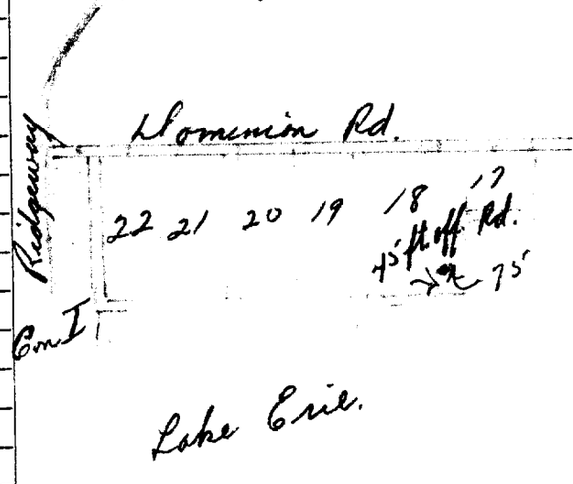
Depth(s) to Water Horizon(s)	Kind of Water	No. of Feet Water Rises
23'	fresh	15'
96		18

Well Log

Overburden and Bedrock Record	From	To
	0 ft.	...ft.
Clay	0	13
Rock	13	32

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Situation: Is well on upland, in valley, or on hillside? level
Drilling Firm Elson Schweyer
Address Stevensville
Name of Driller Elson Schweyer Address Stevensville
Date Mar. 31/52 Licence Number 352
Elson Schweyer
Signature of Licensee

FORM 5

CSS.S8

UTM Z E

R N

Elev. R 05821

Basin 23

ONTARIO

The Water-well Drillers Act, 1954

Department of Mines

66 No. 81

Water-Well Record

FORT ERIE

County or Territorial District Welland Township, Village, ~~Town or City~~ (Township)

[redacted] Village, Town, or City)

dress 1501 Bluff

(day) (month) (year)

Pipe and Casing Record

Casing diameter(s) 6"

Length(s)

Type of screen

Length of screen

Pumping Test

Static level 1

Pumping rate 12 gal per min

Pumping level

Duration of test 1 hour

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, or sulphur)
Top soil	0	1			
[illegible]	1	11			
[illegible]	11	22			fresh
Lots of water	22	30	25	24	[illegible]

Water Record

For what purpose(s) is the water to be used? Domestic

Is water clear or cloudy? [illegible]

Is well on upland, in valley, or on hillside? [illegible]

Drilling firm [illegible]

Address Fort Erie

Name of Driller [illegible]

Address

Licence Number 676

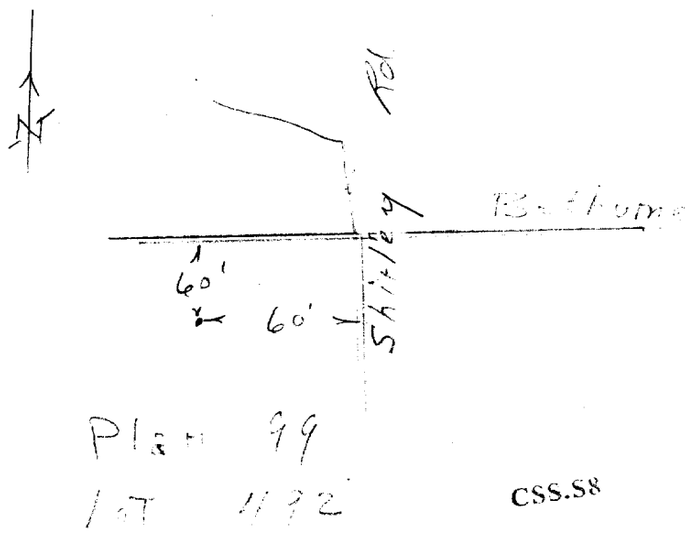
I certify that the foregoing statements of fact are true.

Date [illegible]

Signature of Licensee

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Plan 99

Lot 192

CSS.S8

Form 5

UTM Z E
R N
Elev. R 0583
Basin 23

CON I
LOT 18

ONTARIO

The Water-well Drillers Act, 1954
Department of Mines

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JUN - 3 1955
GEOLOGICAL BRANCH
DEPARTMENT of MINES

66 No. 82

Water-Well Record

FORT ERIE

County or Territorial District ..... Welland ..... ~~Township~~, ~~Village, Town or City~~ (Bertie Twsp.)

[redacted] Village, Town or City) .....

Address ..... Buffalo N.Y. .....

(day) (month) (year)

Pipe and Casing Record

Casing diameter(s) ..... 5 5/8 in.
Length(s) ..... 26 ft
Type of screen .....
Length of screen .....

Pumping Test

Static level ..... 10 ft.
Pumping rate ..... 5 gal per minute
Pumping level ..... 36 ft.
Duration of test ..... 1 hour.

Well Log

Overburden and Bedrock Record	From ft.	To ft.
6 clay flint	0	26
	26	50.

Water Record

Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, or sulphur)
48 ft.	40 ft.	sulphur

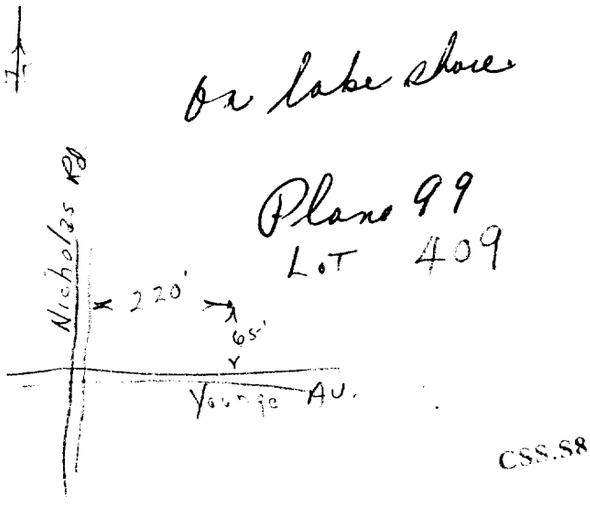
For what purpose(s) is the water to be used? ..... cottage residence .....
Is water clear or cloudy? ..... clear.
Is well on upland, in valley, or on hillside? ..... level.
Drilling firm ..... Leonard Hall Chas
Address ..... R.R.1 Port Colborne Ont.
Name of Driller ..... Same as above
Address .....
Licence Number 738

I certify that the foregoing statements of fact are true.

Date ..... May 31 ..... Leonard Hall Chas
Signature of Licensee

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



CSS.58

Form 5

UTM Z E
R N
Elev. R 05824
Basin 23 Feet
Con 1
Lot - 18

ONTARIO

The Water-well Drillers Act, 1954
Department of Mines

RECEIVED
JUN - 3 1955
No. 66
GEOLOGICAL BRANCH
DEPARTMENT of MINES

83

Water-Well Record FORT ERIE

County or Territorial District ..... Welland ..... Township, Village, Town or City ..... (Bertie Twsp.) .....

[redacted] Village, Town or City) .....

ddress ..... Buffalo N.Y. .....

(day) (month) (year)

Pipe and Casing Record

Casing diameter(s) ..... 5 5/8 .....
Length(s) ..... 20 ft. .....
Type of screen ..... — .....
Length of screen ..... — .....

Pumping Test

Static level ..... ~~14 ft~~ 10' .....
Pumping rate ..... 5 gal per minute .....
Pumping level ..... 30 ft. .....
Duration of test ..... 40 minutes .....

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, or sulphur)
blue clay	0	20	47 ft	40 ft	sulphur
shale	20	50			

Water Record

M

For what purpose(s) is the water to be used? ..... domestic .....
Is water clear or cloudy? ..... clearing .....
Is well on upland, in valley, or on hillside? ..... level .....
Drilling firm ..... Leonard Hallberg .....
Address ..... R.R.1 Fort Colborne Ont .....
Name of Driller ..... Same as above .....
Address .....
Licence Number ..... 738 .....

I certify that the foregoing statements of fact are true.

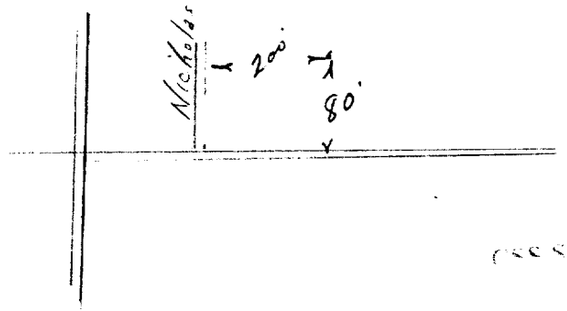
Date ..... may 31 ..... Leonard Hallberg .....
Signature of Licensee

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.

North

Plan 99
on Lake shore



Form 5

Form No. 2 2M-May 1946-A849

13

Jan 21/47

66 No. 88

UTM Z E

9 R N

LAKE ERIE EAST

Elev. 9 R 05833

Lot 21 3

Basin

ONTARIO

The Well Drillers Act

Department of Mines, Province of Ontario

Water Well Record

FORT ERIE

[redacted] Con. 1 Lot 19 Pt. Lot

Buffalo Acres

Cost of Well (not including pump) 107.00

Pipe and Casing Record

Casing diameter(s) 6"

Length(s) of casing(s) 24'

Length of screen

Type of screen

Type of pump

Capacity of pump

Depth of pump setting

Pumping Test

Date

Developed Capacity

Duration of Test

Pumping Rate

Drawdown

Static level of completed well

Is well a gravel-wall type?

Water Record

Kind (fresh or mineral) Fresh

Quality (hard, soft, contains iron, sulphur etc.) Hard

Appearance (clear, cloudy, coloured) Clear

For what purpose(s) is the water to be used? for house use

How far is well from possible source of contamination?

What is source of contamination?

Enclose a copy of any mineral analysis that has been made of water

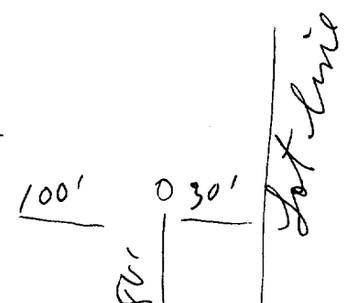
Depth(s) to Water Horizon(s)	Kind of Water	No. of Feet Water Rises
17'		26'

Well Log

Drift and Bedrock Record	From	To
24 feet Surface	0 ft.	ft.
19 feet rock		

Location of Well

In diagram below show distances of well from road and **lot** line



Situation: Is well on upland, in valley, or on hillside?

Drilling Firm Frank Roth

Address Ridgeway

Recorded by Address

Date Licence Number

CSS.S8

MINISTRY OF THE ENVIRONMENT
The Ontario Water Resources Act

WATER WELL RECORD

ONTARIO

30 4/14H

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

11 — 6602737 — MUNICIP. 6 6 1 0 0 1 — CON. LEF — 10 11

COUNTY OR DISTRICT: 32 WELLAND — TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: BERTIE (PORT ERIE ~~RIDGEWAY~~) — CON., BLOCK, TRACT, SURVEY, ETC.: 1 F.L.E. — LOT: 014

[redacted] WINDMILL PT RD. N/S

DATE COMPLETED: DAY 18 MO. 01 YR. 73

UTM ZONE 17 — EASTING 749360 — RC. 4 — NORTHING 05798 — RC. X — BASIN CODE 23

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
brown	clay		loose	0	5
grey	limestone		layered	5	30

31 — 0001516ON1 — 0031621IS1

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
008	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
06	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	188	0	~~0004~~ 0004
05 06	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	250	4	~~0007~~ 0007
06	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE		7	~~30~~ 0030

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER INCHES	LENGTH FEET
MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN FEET	

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER, ETC.)
10-13	14-17	
18-21	22-25	
26-29	30-33	

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☐ PUMP 2 ☒ BAILER — PUMPING RATE: 0012 GPM — DURATION OF PUMPING: 02 HOURS 00 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 1 ☐ PUMPING 2 ☒ RECOVERY	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
005 FEET	015 FEET		005 FEET	005 FEET	005 FEET	005 FEET

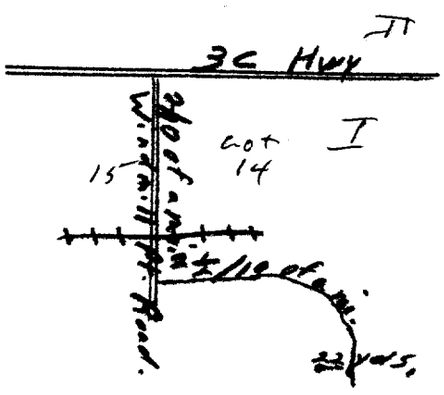
IF FLOWING GIVE RATE: GPM — PUMP INTAKE SET AT: FEET — WATER AT END OF TEST: 1 ☒ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE: ☒ SHALLOW ☐ DEEP — RECOMMENDED PUMP SETTING: 027 FEET — RECOMMENDED PUMPING RATE: 0010 GPM

GPM./FT. SPECIFIC CAPACITY

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



DRILLERS REMARKS:

FINAL STATUS OF WELL

1 ☒ WATER SUPPLY 2 ☐ OBSERVATION WELL 3 ☐ TEST HOLE 4 ☐ RECHARGE WELL 5 ☐ ABANDONED, INSUFFICIENT SUPPLY 6 ☐ ABANDONED, POOR QUALITY 7 ☐ UNFINISHED

WATER USE

01

1 ☒ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL ☐ OTHER 5 ☐ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED

METHOD OF DRILLING

1 ☒ CABLE TOOL 2 ☐ ROTARY (CONVENTIONAL) 3 ☐ ROTARY (REVERSE) 4 ☐ ROTARY (AIR) 5 ☐ AIR PERCUSSION 6 ☐ BORING 7 ☐ DIAMOND 8 ☐ JETTING 9 ☐ DRIVING

CONTRACTOR

NAME OF WELL CONTRACTOR: Donald Merritt — LICENCE NUMBER: 3640

ADDRESS: RR #1 Smithville

NAME OF DRILLER OR BORER: Donald Merritt — LICENCE NUMBER: 3640

SIGNATURE OF CONTRACTOR: Donald Merritt — SUBMISSION DATE: DAY ____ MO. Jan YR. 73

OFFICE USE ONLY

DATA SOURCE: 1 — CONTRACTOR: 3640 — DATE RECEIVED: 260373

DATE OF INSPECTION: 13 9 73 — INSPECTOR: [illegible]

REMARKS: [illegible] P 3 WI

MINISTRY OF THE ENVIRONMENT COPY

FORM 7 07-091

Ministry of Environment and Energy
Ontario

The Ontario Water Resources Act
WATER WELL RECORD

Print only in spaces provided.
Mark correct box with a checkmark, where applicable.

11 | 6604266 | Municipality 66001 | Con. BF

WELLAND

County or District [redacted] | Township/Borough/City/Town/Village FORT ERIE | Con block tract survey, etc. BFL | Lot 15

Address WINDMILL POINT RD | Date completed 13 day 06 month 97 year

21 | Northing | RC | Elevation | RC | Basin Code | ii | iii | iv

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)

General colour	Most common material	Other materials	General description	Depth – feet From	Depth – feet To
BROWN	CLAY		PACKED	0	6
BROWN	CLAY	FINE GRAVEL	PACKED	6	15
GREY	LIMESTONE		LAYERED	15	42

31 | 32

41 WATER RECORD

Water found at – feet	Kind of water
40	1 ☑ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas

51 CASING & OPEN HOLE RECORD

Inside diam inches	Material	Wall thickness inches	Depth – feet From	Depth – feet To
5 1/8	1 ☑ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☐ Open hole 5 ☐ Plastic	1.88	0	20
5	1 ☐ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☑ Open hole 5 ☐ Plastic		20	
	1 ☐ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☐ Open hole 5 ☐ Plastic			

SCREEN

Sizes of opening (Slot No.)	Diameter inches	Length feet
Material and type	Depth at top of screen feet	

61 PLUGGING & SEALING RECORD

☐ Annular space ☐ Abandonment

Depth set at – feet From	Depth set at – feet To	Material and type (Cement grout, bentonite, etc.)

71 PUMPING TEST

Pumping test method: 1 ☐ Pump 2 ☑ Bailer | Pumping rate 21 GPM | Duration of pumping 2 Hours 30 Mins

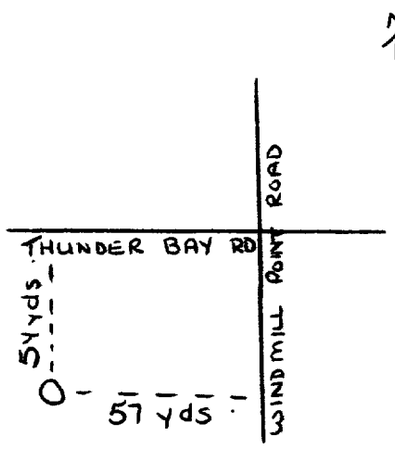
Static level	Water level end of pumping	Water levels during: 1 ☐ Pumping 2 ☑ Recovery			
		15 minutes	30 minutes	45 minutes	60 minutes
10 feet	30 feet	10 feet	10 feet	10 feet	10 feet

If flowing give rate: GPM | Pump intake set at: feet | Water at end of test: ☑ Clear ☐ Cloudy

Recommended pump type: ☑ Shallow ☐ Deep | Recommended pump setting: 25 feet | Recommended pump rate: GPM

LOCATION OF WELL

In diagram below show distances of well from road and lot line.
Indicate north by arrow.



184229

FINAL STATUS OF WELL

1 ☑ Water supply 2 ☐ Observation well 3 ☐ Test hole 4 ☐ Recharge well 5 ☐ Abandoned, insufficient supply 6 ☐ Abandoned, poor quality 7 ☐ Abandoned (Other) 8 ☐ Dewatering 9 ☐ Unfinished 10 ☐ Replacement well

WATER USE

1 ☑ Domestic 2 ☐ Stock 3 ☐ Irrigation 4 ☐ Industrial 5 ☐ Commercial 6 ☐ Municipal 7 ☐ Public supply 8 ☐ Cooling & air conditioning 9 ☐ Not used 10 ☐ Other

METHOD OF CONSTRUCTION

1 ☑ Cable tool 2 ☐ Rotary (conventional) 3 ☐ Rotary (reverse) 4 ☐ Rotary (air) 5 ☐ Air percussion 6 ☐ Boring 7 ☐ Diamond 8 ☐ Jetting 9 ☐ Driving 10 ☐ Digging 11 ☐ Other

Name of Well Contractor	Well Contractor's Licence No.
KEN SCHOOLEY	4795
Address: RR#1 PORT COLBORNE	
Name of Well Technician: KEN SCHOOLEY	Well Technician's Licence No.: T-0351
Signature of Technician/Contractor	Submission date: 28 day 07 mo 97 yr

MINISTRY USE ONLY

Data source	Contractor: 4795	Date received: AUG 08 1997
Date of inspection	Inspector	
Remarks: CSS.S8		

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Ministry of Environment and Energy
Ontario

The Ontario Water Resources Act
WATER WELL RECORD

Print only in spaces provided.
Mark correct box with a checkmark, where applicable.

WELLAND

11 | 6604305 | Municipality 66001 | Con. LEF | 01

County or District	Township/Borough/City/Town/Village	Con. block tract survey, etc.	Lot
NIAGARA	~~FORT ERIE~~ Ridgeway	1	13

Address: [redacted] 2409 DOMINION RD

Date completed: 26 day 09 month 98 year

21 | Northing | RC | Elevation | RC | Basin Code | ii | iii | iv

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)

General colour	Most common material	Other materials	General description	Depth – feet From	Depth – feet To
BROWN	TOPSOIL		LOOSE	0	2
GREY	SHALE		LAYERED	2	45

31

32

41 WATER RECORD

Water found at – feet	Kind of water
43	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas

51 CASING & OPEN HOLE RECORD

Inside diam inches	Material	Wall thickness inches	Depth – feet From	Depth – feet To
11 / 5	1 ☑ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☐ Open hole 5 ☐ Plastic	1.88	0	20
11 / 5	1 ☐ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☑ Open hole 5 ☐ Plastic		20	45
	1 ☐ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☐ Open hole 5 ☐ Plastic			

SCREEN

Sizes of opening (Slot No.)	Diameter inches	Length feet
Material and type	Depth at top of screen feet	

61 PLUGGING & SEALING RECORD

☐ Annular space ☐ Abandonment

Depth set at – feet From	Depth set at – feet To	Material and type (Cement grout, bentonite, etc.)

71 PUMPING TEST

Pumping test method: 1 ☑ Pump 2 ☑ Bailer
Pumping rate: 28 GPM
Duration of pumping: 2 Hours 0 Mins

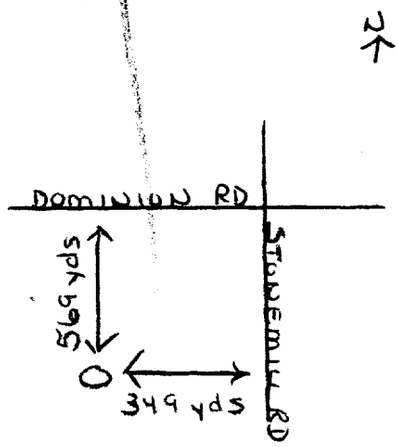
Static level	Water level end of pumping	Water levels during: 1 ☐ Pumping 2 ☐ Recovery			
		15 minutes	30 minutes	45 minutes	60 minutes
5 feet	5 feet	5 feet	5 feet	5 feet	5 feet

If flowing give rate	Pump intake set at	Water at end of test
GPM	feet	☑ Clear ☐ Cloudy

Recommended pump type	Recommended pump setting	Recommended pump rate
☑ Shallow ☐ Deep	30 feet	GPM

LOCATION OF WELL

In diagram below show distances of well from road and lot line.
Indicate north by arrow.



192418

FINAL STATUS OF WELL

1 ☑ Water supply
2 ☐ Observation well
3 ☐ Test hole
4 ☐ Recharge well
5 ☐ Abandoned, insufficient supply
6 ☐ Abandoned, poor quality
7 ☐ Abandoned (Other)
8 ☐ Dewatering
9 ☐ Unfinished
10 ☐ Replacement well

WATER USE

1 ☐ Domestic
2 ☐ Stock
3 ☐ Irrigation
4 ☐ Industrial
5 ☑ Commercial
6 ☐ Municipal
7 ☐ Public supply
8 ☐ Cooling & air conditioning
9 ☐ Not used
10 ☐ Other

METHOD OF CONSTRUCTION

1 ☑ Cable tool
2 ☐ Rotary (conventional)
3 ☐ Rotary (reverse)
4 ☐ Rotary (air)
5 ☐ Air percussion
6 ☐ Boring
7 ☐ Diamond
8 ☐ Jetting
9 ☐ Driving
10 ☐ Digging
11 ☐ Other

Name of Well Contractor	Well Contractor's Licence No.
KEN SCHOOLEY	4795
Address: 2387 HOUSE RD STEVENSVILLE	
Name of Well Technician: KEN SCHOOLEY	Well Technician's Licence No.: T-0351
Signature of Technician/Contractor	Submission date: 30 day 09 mo 98 yr

MINISTRY USE ONLY

Data source	Contractor	Date received
	4795	NOV 0 6 1998
Date of inspection	Inspector	
Remarks		

CSS. ES9

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0506 (07/94) Front Form 9

Ontario **Ministry of the Environment**

The Ontario Water Resources Act
WATER WELL RECORD

Print only in spaces provided.
Mark correct box with a checkmark, where applicable.

WELLAND

11 **6604509** Municipality 66001 Con.

County or District: NIAGARA [redacted]
Township/Borough/City/Town/Village: FORT ERIE
Con block tract survey, etc.: BF
Lot: 16
Address: NIAGARA BLVD.
Date completed: 07 day 11 month 00 year
Northing RC Elevation RC Basin Code ii iii iv

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)

General colour	Most common material	Other materials	General description	Depth - feet From	Depth - feet To
BROWN	CLAY		PACKED	0	24
GREY	FINE GRAVEL		PACKED	24	253'
GREY	SHALE		LAYERED	253'	263'
GREY	LIMESTONE		LAYERED	263'	28

31
32

41 WATER RECORD

Water found at - feet	Kind of water
26	1 ☑ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas

51 CASING & OPEN HOLE RECORD

Inside diam inches	Material	Wall thickness inches	Depth - feet From	Depth - feet To
6⅝	1 ☑ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☐ Open hole 5 ☐ Plastic	188	0	256'
6	1 ☐ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☑ Open hole 5 ☐ Plastic		256'	28
	1 ☐ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☐ Open hole 5 ☐ Plastic			

SCREEN

Sizes of opening (Slot No.)	Diameter inches	Length feet
Material and type	Depth at top of screen feet	

61 PLUGGING & SEALING RECORD

☐ Annular space ☐ Abandonment

Depth set - From	Depth set - To	Material and type (Cement grout, bentonite, etc.)

PUMPING TEST

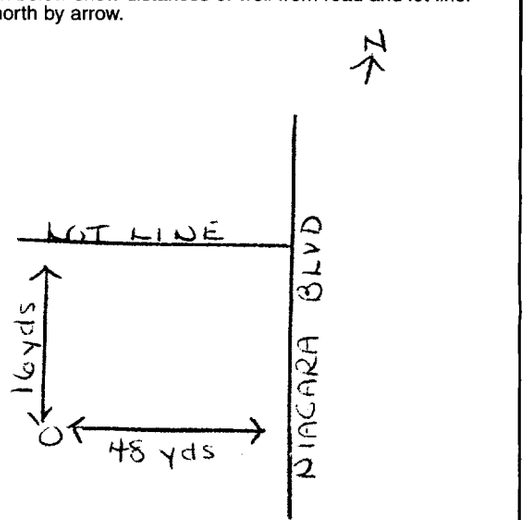
71 Pumping test method: 1 ☐ Pump 2 ☑ Bailer
Pumping rate: 28 GPM
Duration of pumping: 2 Hours 30 Mins

Static level	Water level end of pumping	Water levels during: 1 ☐ Pumping 2 ☐ Recovery			
		15 minutes	30 minutes	45 minutes	60 minutes
8 feet	10 feet	8 feet	8 feet	8 feet	8 feet

If flowing give rate: GPM
Pump intake set at: feet
Water at end of test: ☑ Clear ☐ Cloudy
Recommended pump type: ☑ Shallow ☐ Deep
Recommended pump setting: 25 feet
Recommended pump rate: GPM

LOCATION OF WELL

In diagram below show distances of well from road and lot line. Indicate north by arrow.



219375

FINAL STATUS OF WELL 54

1 ☑ Water supply 2 ☐ Observation well 3 ☐ Test hole 4 ☐ Recharge well 5 ☐ Abandoned, insufficient supply 6 ☐ Abandoned, poor quality 7 ☐ Abandoned (Other) 8 ☐ Dewatering 9 ☐ Unfinished 10 ☐ Replacement well

WATER USE 55-56

1 ☑ Domestic 2 ☐ Stock 3 ☐ Irrigation 4 ☐ Industrial 5 ☐ Commercial 6 ☐ Municipal 7 ☐ Public supply 8 ☐ Cooling & air conditioning 9 ☐ Not use 10 ☐ Other

METHOD OF CONSTRUCTION 57

1 ☑ Cable tool 2 ☐ Rotary (conventional) 3 ☐ Rotary (reverse) 4 ☐ Rotary (air) 5 ☐ Air percussion 6 ☐ Boring 7 ☐ Diamond 8 ☐ Jetting 9 ☐ Driving 10 ☐ Digging 11 ☐ Other

Name of Well Contractor	Well Contractor's Licence No.
KEN SCHOOLEY	4795
Address: RR#1 STEVENSVILLE	
Name of Well Technician: KEN SCHOOLEY	Well Technician's Licence No.: T-0351
Signature of Technician/Contractor	Submission date: 04 day 12 mo 00 yr

MINISTRY USE ONLY

Data source 58 | Contractor 59-62: 4795 | Date received 63-68: JAN 12 2001 | 80
Date of inspection | Inspector
Remarks

CSS.ES1

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0506 (11/98) Front Form 9

Ontario — Ministry of the Environment

Well Tag A021417 (or below)

A021417

Well Record

Regulation 903 Ontario Water Resources Act

page 1 of 1

Instructions for Completing Form

- For use in the **Province of Ontario** only. This document is a permanent **legal** document. Please retain for future reference.
- All Sections **must** be completed in full to avoid delays in processing. Further instructions and explanations are available on the back of this form.
- Questions regarding completing this application can be directed to the Water Well Management Coordinator at 416-235-6203.
- **All metre measurements shall be reported to 1/10th of a metre.**
- Please print clearly in blue or black ink only.

Ministry Use Only

MUN | CON | LOT

[redacted]

Address of Well Location (County/District/Municipality): 3083 Thunder Bay Rd R.dewey

Township: Fort Erie

Lot: 1A

Plan: 68

RR#/Street Number/Name: 3083 Thunder Bay Rd

City/Town/Village: Fort Erie

Site/Compartment/Block/Tract etc.

GPS Reading: NAD 83 | Zone 17 | Easting 660910 | Northing 4748639 | Unit Make/Model: Magellan 8100 | Mode of Operation: ☐ Undifferentiated ☑ Averaged ☐ Differentiated, specify

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth From	Depth To (Metres)
Brown	Silty Sand			0	2.4
Grey	Clay & Gravel			2.4	6.09
Grey	Silty clay & Gravel			6.09	9.14
Grey	limestone			9.14	13.10

Hole Diameter

Depth From	Depth To (Metres)	Diameter (Centimetres)
0	13.1	15

Water Record

Water found at 12 Metres / Kind of Water

- 12 m: ☐ Fresh ☑ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:
- ___ m: ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:
- ___ m: ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:

After test of well yield, water was: ☑ Clear and sediment free ☐ Other, specify

Chlorinated: ☑ Yes ☐ No

Construction Record

Inside diam centimetres	Material	Wall thickness centimetres	Depth From	Depth To (Metres)
Casing				
15	☑ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	188	0	9.1
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
Screen				
Outside diam	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	Slot No.		
No Casing or Screen				
	☑ Open hole		9.1	13.10

Test of Well Yield

Pumping test method: Submersible

Pump intake set at - (metres) 12.8

Pumping rate - (litres/min) 37.8

Duration of pumping 1 hrs + ___ min

Final water level end of pumping ___ metres

Recommended pump type: ☐ Shallow ☑ Deep

Recommended pump depth. 82 metres

Recommended pump rate. 37 (litres/min)

If flowing give rate - (litres/min)

If pumping discontinued, give reason. /

Draw Down Time min	Draw Down Water Level Metres	Recovery Time min	Recovery Water Level Metres
Static Level	3.0		
1	4.8	1	7.3
2	5.2	2	5.4
3	5.8	3	4.6
4	6.1	4	4.3
5	6.3	5	3.9
10	6.9	10	3.6
15	7.2	15	3.5
20	7.5	20	3.4
25	7.7	25	3.2
30	8.1	30	3.2
40	8.5	40	3.1
50	8.9	50	3.1
60	9.0	60	3.1

Plugging and Sealing Record ☐ Annular space ☐ Abandonment

Depth set at - From	Depth set at - To (Metres)	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
0	6m	Benton. to Slurry	

Method of Construction

☑ Cable Tool ☐ Rotary (air) ☐ Diamond ☐ Digging
☐ Rotary (conventional) ☐ Air percussion ☐ Jetting ☐ Other
☐ Rotary (reverse) ☐ Boring ☐ Driving

Water Use

☑ Domestic ☐ Industrial ☐ Public Supply ☐ Other
☐ Stock ☐ Commercial ☐ Not used
☐ Irrigation ☐ Municipal ☐ Cooling & air conditioning

Final Status of Well

☑ Water Supply ☐ Recharge well ☐ Unfinished ☐ Abandoned, (Other)
☐ Observation well ☐ Abandoned, insufficient supply ☐ Dewatering
☐ Test Hole ☐ Abandoned, poor quality ☐ Replacement well

Well Contractor/Technician Information

Name of Well Contractor: C. + C/Eddy's Drilling — Well Contractor's Licence No.: 7294

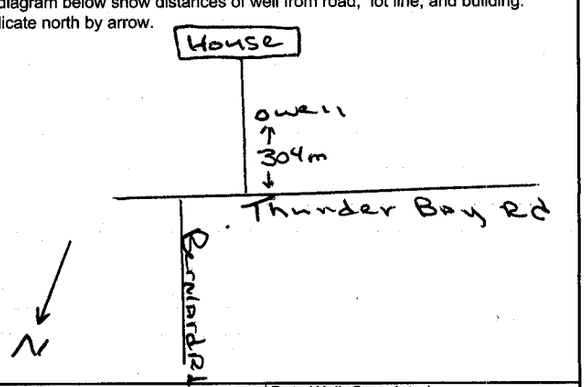
Business Address (street name, number, city etc.): 108 Queen St South Thorold ont

Name of Well Technician (last name, first name): Gladney Edward — Well Technician's Licence No.: T-2099

Signature of Technician/Contractor: x Ed — Date Submitted: 05 / 2 / 10

Location of Well

In diagram below show distances of well from road, lot line, and building. Indicate north by arrow.



Audit No. Z 21663

Date Well Completed: YYYY 05 | MM 2 | DD 1

Was the well owner's information package delivered? ☑ Yes ☐ No

Date Delivered: YYYY 05 | MM 2 | DD 9

Ministry Use Only

Data Source | Contractor 7294

Date Received: YYYY MAR | MM 01 | DD 2005

Date of Inspection: YYYY | MM | DD

Remarks | Well Record Number

0506E (09/03) Contractor's Copy ☐ Ministry's Copy ☑ Well Owner's Copy ☐

Cette formule est disponible en français