



# **Terra-Dynamics Consulting Inc.**

**432 Niagara Street, Unit 2 St. Catharines, ON L2M 4W3**

March 8, 2022

Mr. Joseph Moore  
214 Windmill Point Road South  
Fort Erie, ON L0S 1N0

Re: Hydrogeological Assessment – Consents (Land Severances) Part Lot 14 of Concession 2 on Lake Erie, Fort Erie, Ontario

Dear Mr. Moore,

## **1.0 Introduction, Background Information and Purpose**

Mr. Moore retained Terra-Dynamics Consulting Inc. (Terra-Dynamics) to complete a hydrogeological assessment to support three consents from Part Lot 14 of Concession BF on Lake Erie, in the Town of Fort Erie, Ontario (refer to Figure 1). The consents include Parts 2, 3, and 4 (Appendix A, Jordan Station Design Co., 2022) of approximately 0.4 hectares each (referred to herein as the Site). The purpose of the hydrogeological assessment is to satisfy relevant municipal policies including:

1. Town of Fort Erie (2021), policy 4.7.5.1 VIII (b):

*“The creation of new lots is also subject to the following:*

*b. Any new lot is of sufficient size and has suitable soil site conditions for the installation and long term operation of a sustainable private sewage disposal system as determined by the appropriate approval authority.”*

2. Niagara Region Policy 5.C.6.4 (Niagara Region, 2014)

*“Proposals for rural residential development in the Rural Area must meet the following criteria, in addition to the other requirements of this Official Plan....*

*d) Soil and drainage conditions are suitable and permit the proper siting of buildings, the supply of potable water and the installation and long-term operation of an adequate means of waste disposal.*

*i) ...For residential development consisting of up to three lots the minimum lot size will be 1 hectare unless it is determined through a hydrogeological study that considers potential cumulative impacts that a smaller size lot will adequately accommodate private water and sewage treatment facilities for long term operation.”*

The potential sewage impacts to the groundwater system and private wells were assessed using Ministry of the Environment, Conservation and Parks (MECP) Provincial Procedure D-5-4 (MECP, 1996a) and as amended by the MECP Procedure for sewage disposal systems on hydrogeologically sensitive areas (MECP, 2008).

The potential sewage impacts to the groundwater system and private wells were assessed using Ministry of the Environment, Conservation and Parks (MECP) Provincial Procedure D-5-4 (MECP, 1996a) and as amended by the MECP Procedure for sewage disposal systems on hydrogeologically sensitive areas (MECP, 2008). These Provincial Procedures provide an assessment process for determining the potential groundwater impact of private sewage systems.

As new future development on the consents will be provided potable water via municipal supply, this study does not include a water supply assessment (MECP, 1996b).

## **2.0 Work Program**

Our work program included the following components, described below.

### **2.1 Water Well Record Search and Documentation**

Water well records located within 200 metres of the Site were mapped out using the MECP water well records database. The locations of these water well records are provided on a map (refer to Figure 2) and well log information is summarized in Section 3.1 and included in Appendix B (MECP, 2022).

### **2.2 Water Well and Sewage System Survey**

A water well and sewage system survey questionnaire, and explanation letter pertaining to the need for the survey, was mailed to neighbouring properties in January of 2022. A total of twenty-two developed properties were identified within 100 metres of the Site that could receive a survey by mail. A copy of the questionnaire and information letter is provided in Appendix C.

### **2.3 Site Visit**

The Site was visited by Terra-Dynamics on February 2, 2022, to assess site conditions, evaluate the presence/absence of any on-site or nearby private water supply wells, and determine whether any identified wells may require decommissioning as per Ontario Water Resources Act Regulation 903.

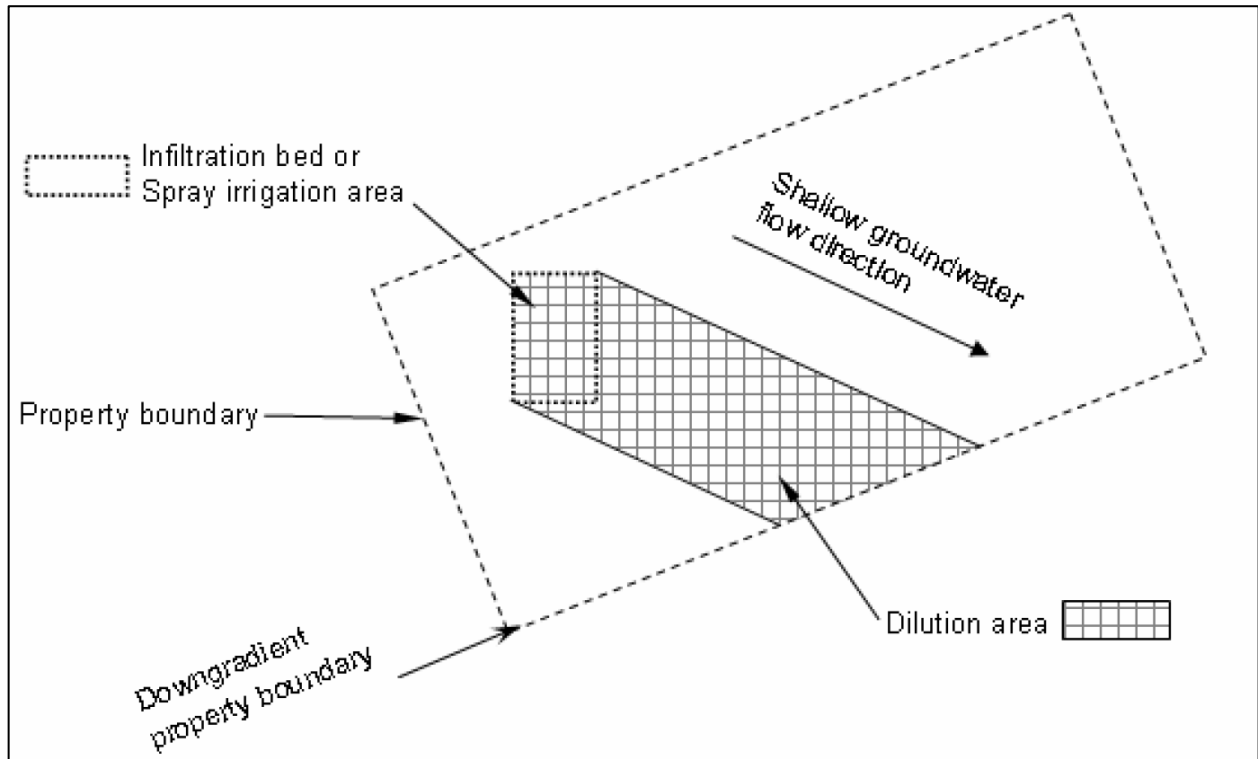
### **2.4 Description of Geologic and Hydrogeologic Setting**

The Site's geologic and hydrogeologic settings were described using published information to assess the aquifer's vulnerability and sensitivity, which included the following:

- i. MECP water well records (Figure 2, Appendix B).
- ii. Soil-Mat Engineers & Consultants Limited on-site boreholes (Figure 2, Appendix D); and
- iii. Niagara Peninsula Source Protection Area Assessment Report (NPSPA, 2013).

### **2.5 Assessment of Sewage Impacts to Groundwater Supplies from Septic Systems**

An assessment of sewage impacts was completed including a nitrate-nitrogen dilution calculation for the proposed septic systems. A sample schematic is presented below of the Section 22.5.8 approach (MECP, 2008) (refer to Figure 3).



**Figure 3** – Sample schematic for a basic groundwater dilution calculation (MECP, 2008)

### 3.0 Hydrogeological Assessment

#### 3.1 Ministry of the Environment, Conservation and Parks Water Well Records

MECP water well records within 200 m of the Site were reviewed and one record was identified (refer to Figure 2 and Appendix B). Provincial well record 6600002 is situated approximately 140 metres southwest of the Site, and identifies water as being taken from the bedrock aquifer (refer to Figure 2). The bedrock aquifer was recorded in the well record as 'flint' (i.e. chert) or limestone beneath between 1.82 metres (6 feet) of clay. The record indicates that the well was constructed in 1966 for domestic (i.e. cottage) purposes, and the general water quality was recorded as fresh (refer to Appendix B).

Due to historical (i.e. pre-2000) water well construction practices, well record 6600002 has a recorded casing length of less than 6 metres (20 feet) (refer to Appendix B). Water wells with casings less than 6 metres (20 feet) are classified as shallow cased wells which require a minimum set-back of 30 metres (100 feet) from sources of contaminants, such as sewage effluent distribution piping or a septic leaching bed (MECP, 2008). However, as previously mentioned this well is situated greater than 30 metres (100 feet) away from the Site (refer to Figure 2).

There are no water wells at the Site according to the MECP database, and no wells were observed during the site visit that was conducted on February 2, 2022.

### **3.2 Water Well and Sewage System Survey Results**

A water use and septic system survey was mailed in January 2022 to the twenty-two developed parcels located within 100 m of the Site (refer to Figure 2, and Table C-1 in Appendix C). One completed survey was returned for the property located at 2479 Windmill Point Lane East. The survey results indicate that the property is currently serviced by a septic system, and that the water supply source is municipal (refer to Appendix C). As described in Table C-1 (Appendix C), some surveys could not be successfully mailed; however, it was determined using GIS mapping from the Town of Fort Erie that the water supply source for these properties is municipal.

### **3.3 Physical Setting**

The Site is relatively flat, with the ground surface at the edges of the property contoured at between 178 and 179 metres above sea level (m ASL) (NPCA, 2010) (refer to Figure 2). The Site is situated to the east of the Six Mile Creek subwatershed (refer to Figure 2), and no watercourses are mapped on-site (NPCA, 2017).

### **3.4 Overburden Geology**

The soils on the Site have not been mapped; however, the nearest surveyed areas to the west and north of the Site are mapped as Brooke Soil - Shallow Phase (OMAFRA, 2022), which is described as a poorly drained clay loam of 0.5 to 1.0 metres in thickness (OMAFRA, 1989). Brooke Soil – Shallow Phase is classified as Hydrologic Soil Group C, which is characterized as a moderately fine to fine texture, and slow infiltration rates (OMAFRA, 2022). The Site is located on the margin between the Haldimand Clay Plain and Limestone Plain physiographic regions (Chapman and Putnam, 1984) with limited clayey silt to silty clay overburden overlying the bedrock (OGS, 2003). As is shown on Figure 2 and Figure 4 (geologic cross-section A-A'), the data indicating limited (less than 2 metres) overburden thickness includes:

- Boreholes identified as BH-1 through BH-12 completed on-site by Soil-Mat Engineers & Consultants Ltd. in November 2021, indicating clayey silt to silty clay overburden thicknesses of between 0.94 m and 1.72 m (auger refusal at these depths was assumed to indicate bedrock, Soil-Mat Ltd., 2021).

Consequently, the Site is considered a “shallow soil property” having less than 2 m of overburden protecting the bedrock aquifer (EPA, 2018) and is classified as hydrogeologically sensitive (MECP, 1996a).

### **3.5 Bedrock Geology**

The underlying bedrock has been mapped as cherty limestone of the Clarence Member of the Onondaga Formation (Armstrong and Dodge, 2007). The bedrock topographic surface dips regionally to the south (WHI, 2005).

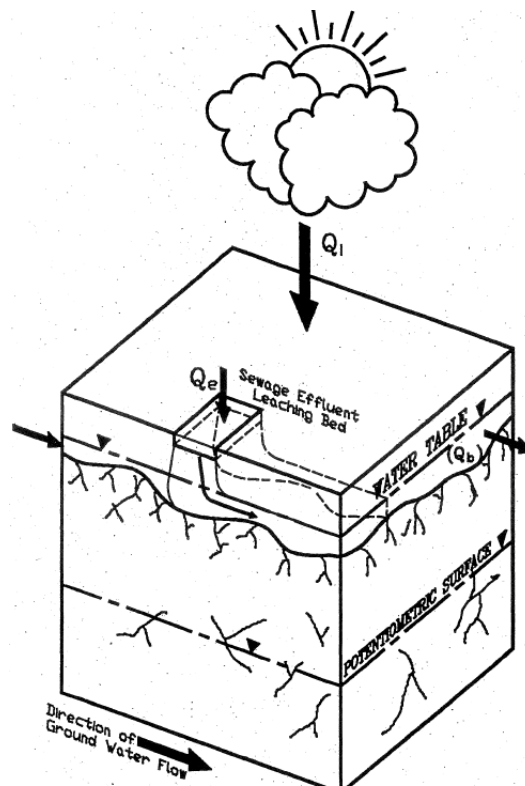
Where private wells are present in the area this bedrock unit would be the local aquifer. Regional water quality information on this aquifer is limited but has indicated the potential for sulphurous conditions (WHI, 2005).

### 3.6 Bedrock Aquifer and Groundwater Flow

The uppermost part of the limestone bedrock is an aquifer where there is “...a higher hydraulic conductivity than the same formation at depth...attributed to weathering of the bedrock surface...” (GLL, 1987). The water table of the bedrock aquifer at the Site is approximately 177 m ASL with regional flow towards the south-southeast (NPSA, 2013) (refer to Figure 5). A review of nearby water well records indicates the water table in the bedrock aquifer is generally above the top of bedrock (refer to Appendix B).

### 3.7 Hydrogeologic Setting

The Section 3.0 information is summarized in the schematic below (refer to Figure 6) as a conceptual model for the assessment of potential sewage system impacts to the bedrock aquifer and private wells.



**Figure 6 – Fractured bedrock aquifer and subsurface sewage system (MECP, 1995)**

### 4.0 Aquifer Vulnerability/Sensitivity

The property is mapped as a Highly Vulnerable Aquifer (HVA) by the Niagara Peninsula Source Protection Authority (NPSA, 2013). An HVA is defined as:

*“An aquifer that can be easily changed or affected by contamination from both human activities and natural processes as a result of (a) intrinsic susceptibility, as a function of the thickness and permeability of overlying layers, or (b) by preferential pathways to the aquifer.”*

As a result of the aquifer being highly vulnerable (i.e. not isolated from at-surface activities) and the Site being characterized as a “shallow soil property” and hydrogeologically sensitive (refer to Section 3.4), a contaminant attenuation assessment has been completed in accordance with Section 22.5.8 (MECP, 2008) to determine if lot sizes are appropriate and the level of sewage treatment required (refer to Step 3 on Figure 7).

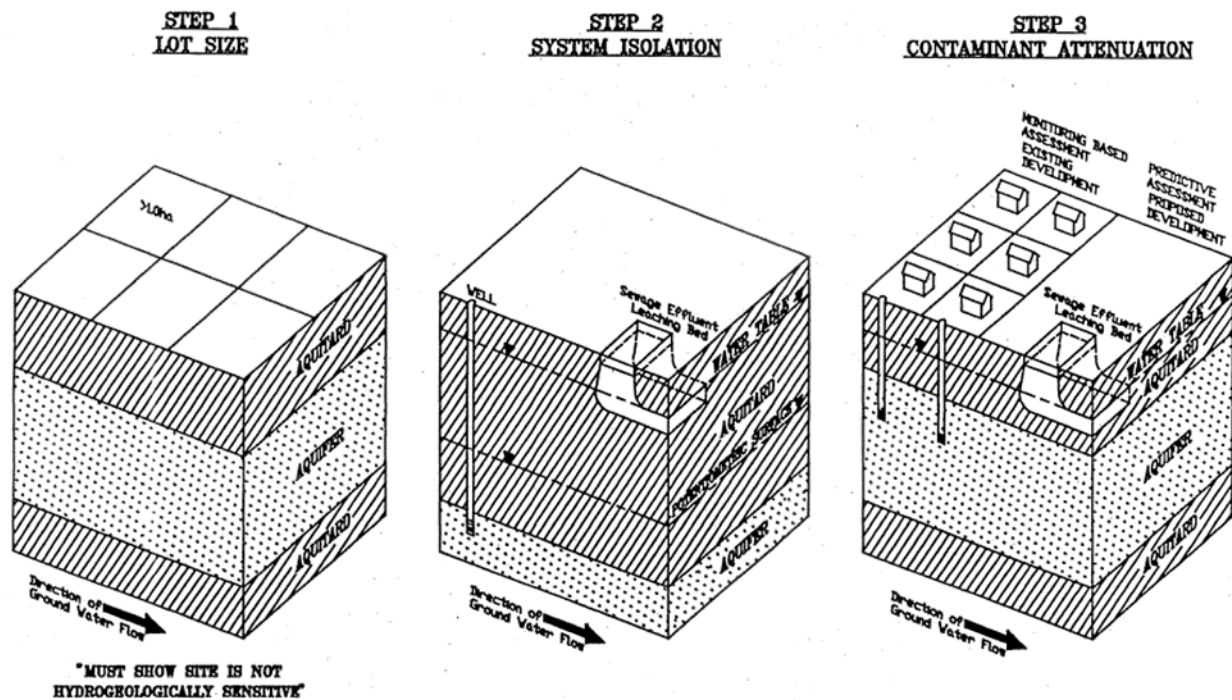


Figure 7 – Three Step Water Quality Assessment Process (MECP, 1995)

## 5.0 Prediction of Contaminant Attenuation

### 5.1 Downgradient Nitrate-Nitrogen Assessment

As is shown on Figure 5, groundwater was determined to flow from approximately north-northwest to south-southeast based on existing information (refer to Section 3.6). Using the Section 22.5.8 procedure as shown on Figure 3 (MECP, 2008), an assessment was completed by calculating the downgradient property boundary nitrate-nitrogen ( $\text{NO}_3\text{-N}$ ) groundwater concentration for the proposed severance septic bed area. For the purposes of predicting the potential for groundwater impacts, a concentration of 40 mg/L  $\text{NO}_3\text{-N}$  is used for sewage effluent for a Class IV system, i.e. without Level IV (or tertiary treatment) nitrogen reduction (MECP, 1996a). This value should be less than the drinking water standard of 10 mg/L  $\text{NO}_3\text{-N}$  at the downgradient property boundary (personal communication, Jamie

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Connelly, Senior Hydrogeologist, MECP and MECP, 1995) for municipally approved septic systems (Part 8 of the Ontario Building Code). New septic bed locations and associated calculated nitrate dilution areas, or septic bed effluent plumes, are shown on Figure 5.

Using this analysis, it was determined that there would be insufficient downgradient dilution areas for the nitrate-nitrogen groundwater concentration to be below 10 mg/L at the downgradient property boundary for the severances if a standard Class 4 septic system was used. However, with tertiary/level IV 75% nitrogen removal technology (referred to as N-II under Ministry of Municipal Affairs and Housing (MMAH), 2011) there is sufficient downgradient dilution area (refer to Table E-1, Appendix E). Sewage effluent treated to 75% removal discharge is of 10 mg/L or less to the septic disposal system.

## **5.2 Effluent Treatment**

Niagara Region has historically recommended only the use of CAN-BNQ 3680-600 standard certified systems for nitrogen removal (MMAH, 2011). Available systems are listed on the Ontario On-site Wastewater Association website (<https://www.oowa.org/industry-resources/options-for-onsite-residential-wastewater-treatment-technologies/>).

There is currently one treatment provider with 75% nitrogen removal and CAN-BNQ certification, and it is Norweco Inc. (<https://www.norweco.com/>). However, it is our understanding that Niagara Region is also allowing some other nitrogen removal systems with submission of sufficient documentation, e.g. Waterloo Biofilter and Bionest.

## **6.0 Summary**

Based on the above information, the proposed severances can be safely serviced by private sewage systems with the following conditions:

1. For each severance, the septic bed is placed in the northeastern corner of the parcel, while maintaining the minimum 3 m Ontario Building Code set-back from the property boundary;
2. Each of these severances be required to have sewage effluent nitrogen removal systems of at least 75% nitrogen removal; and
3. Provision of water supply by municipal supply.

We trust this information is sufficient to your present needs. Please do not hesitate to contact the undersigned if you have any questions.

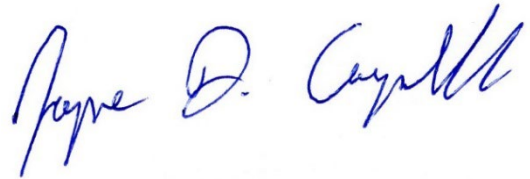
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Yours truly,

TERRA-DYNAMICS CONSULTING INC.



Annie Michaud, M.Eng., P.Eng.  
Senior Water Resource Engineer



Jayme D. Campbell, P.Eng.  
Senior Water Resource Engineer

#### Attachments

Figure 1 – Location of Site  
Figure 2 – Regional Setting  
Figure 4 – Hydrogeologic Cross-section A-A'  
Figure 5 – Septic Bed Effluent Plume Assessment  
Appendix A – Site Survey  
Appendix B – Water Well Records  
Appendix C – Water Use Survey  
Appendix D – Supporting Information  
Appendix E – Nitrate-Nitrogen Calculations



#### **7.0 References**

Armstrong, D.K. and Dodge, J.E.P., 2007. Paleozoic geology of southern Ontario. Ontario Geological Survey, Miscellaneous Release – Data 219.

Burt, A., 2016. Project Unit 13-018. The Niagara Peninsula in Three Dimensions: A Drilling Update. Summary of Field Work and Other Activities 2016, Ontario Geological Survey, Open File Report 6323, p.30-1 to 30-13.

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Niagara Peninsula Source Protection Authority (NPSA), 2013. Updated Assessment Report.

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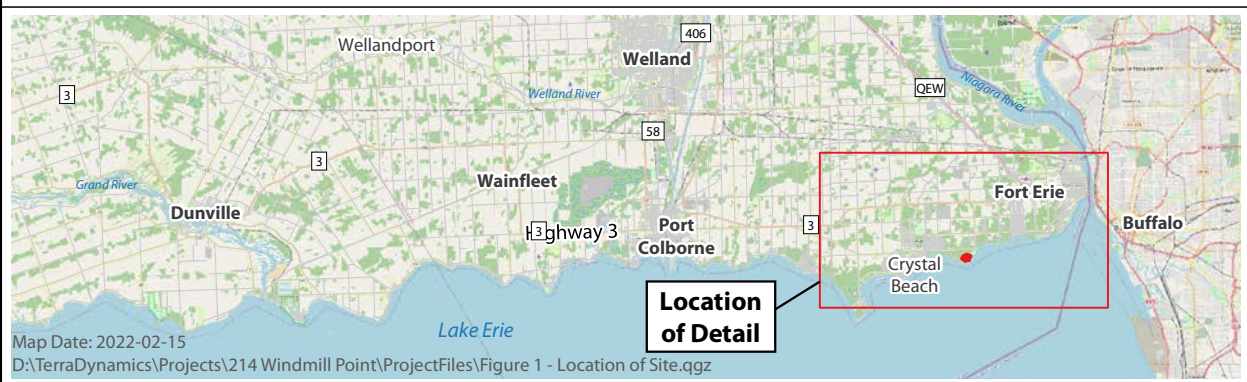
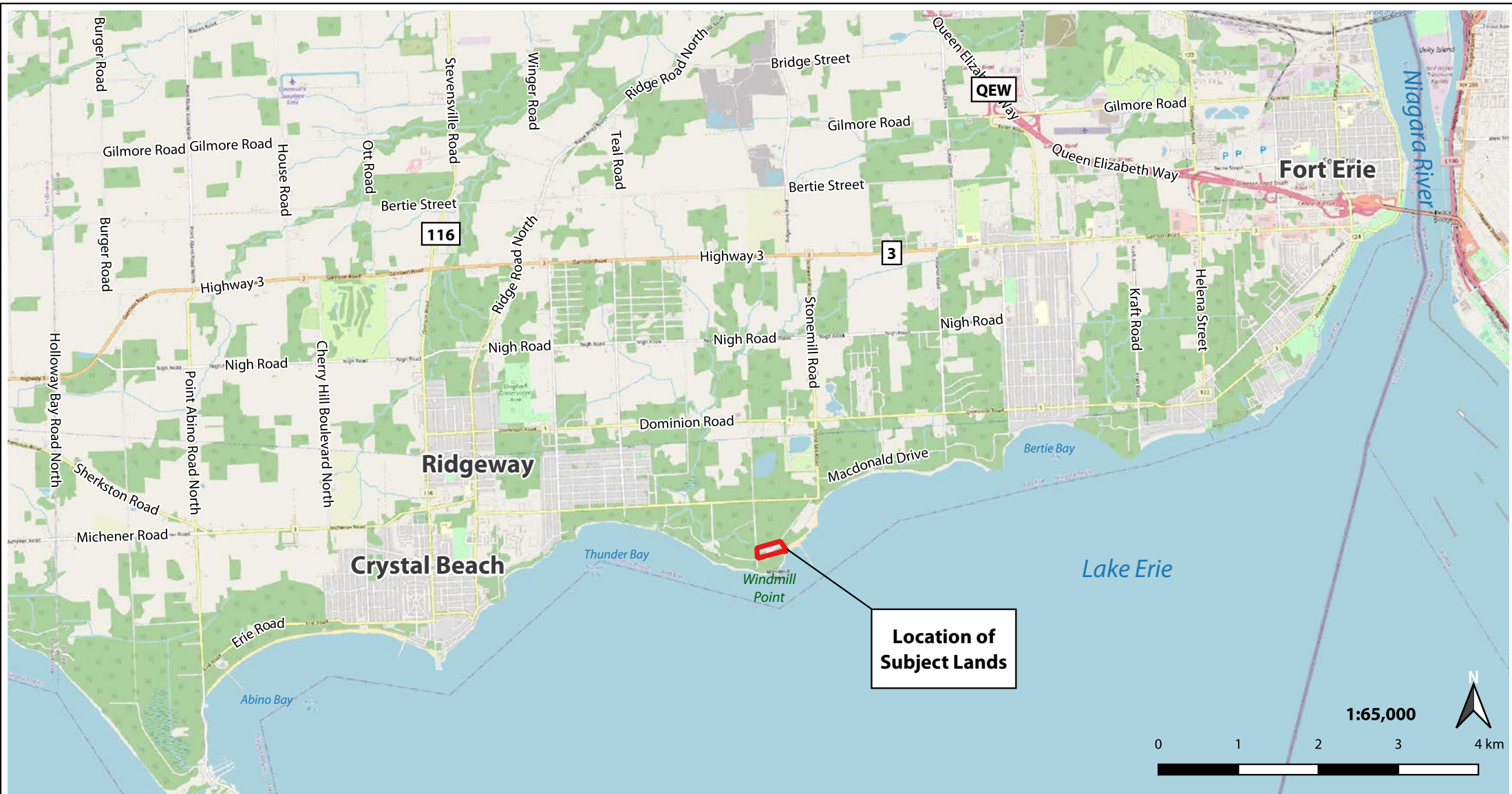
Singer, S.N., Cheng, C.K. and Scafe, M.G., 2003. The Hydrogeology of Southern Ontario, 2<sup>nd</sup> Edition. Environmental Monitoring and Reporting Branch, Ministry of the Environment.

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Town of Fort Erie, 2021. Town of Fort Erie Official Plan.

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## **Figures**

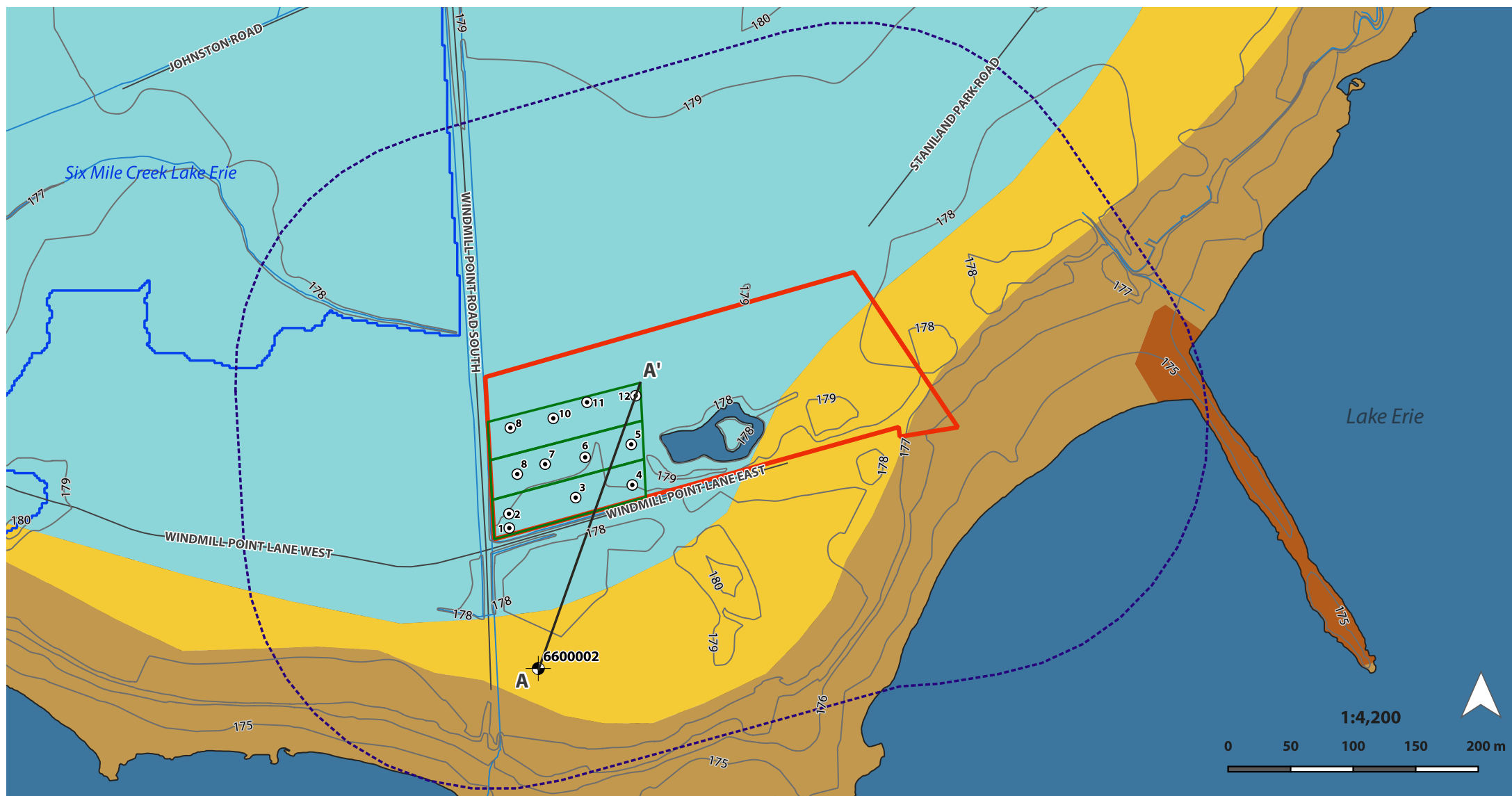


Location of Subject Lands

Hydrogeological Assessment for  
214 Windmill Point Road South, Fort Erie



Figure 1



- MECP Water Well Record
- Soil-Mat Borehole
- Ground Surface Contour (1m)
- Watercourse
- Line of Hydrogeologic Cross-Section A-A'
- Waterbody
- Subwatershed Boundary
- Site
- 200m Buffer of Site
- Proposed Severances
- Surficial Geology**
- Clay and silt
- Fill
- Sand
- Sand and gravel

### Site Details

## Hydrogeological Assessment for 214 Windmill Point Road South, Fort Erie



**Terra-Dynamics Consulting Inc.**

**Figure 2**

References: Ministry of Environment, Conservation and Parks: Drilled Water Well, 2021. Ontario Geological Survey: Surficial Geology. Niagara Peninsula Conservation Authority: Watercourse, 2018; Waterbody, 2010, Ground Surface Contour (1m), 2010. Niagara Region: Assessment Parcels, 2022.

SOUTHWEST

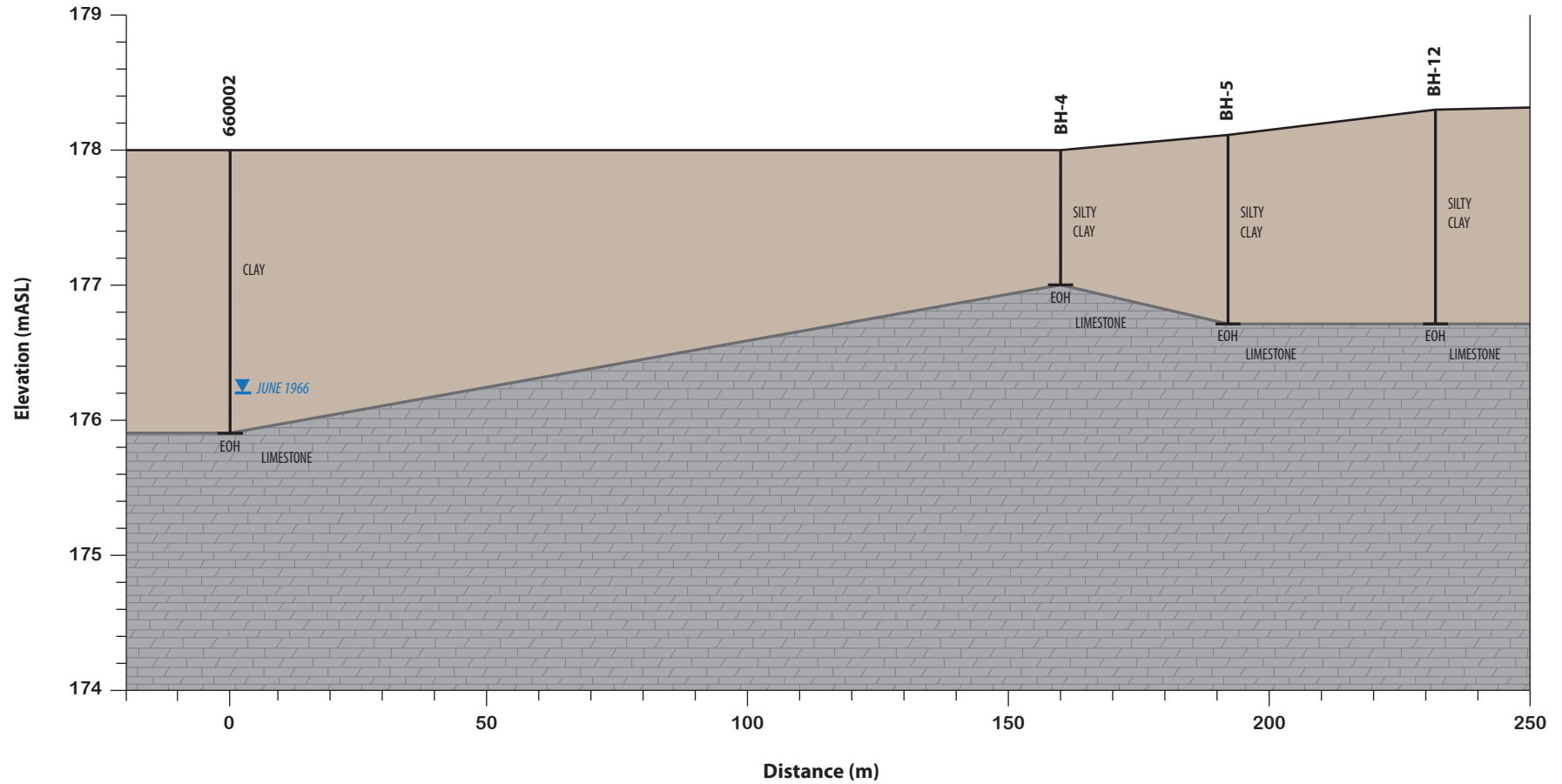
A

A'

NORTHEAST

SITE

PROPOSED SEWAGE DISPOSAL AREA



▼ Well Water Level on date noted

EOH End of Hole

See Figure 2 for line of cross-section

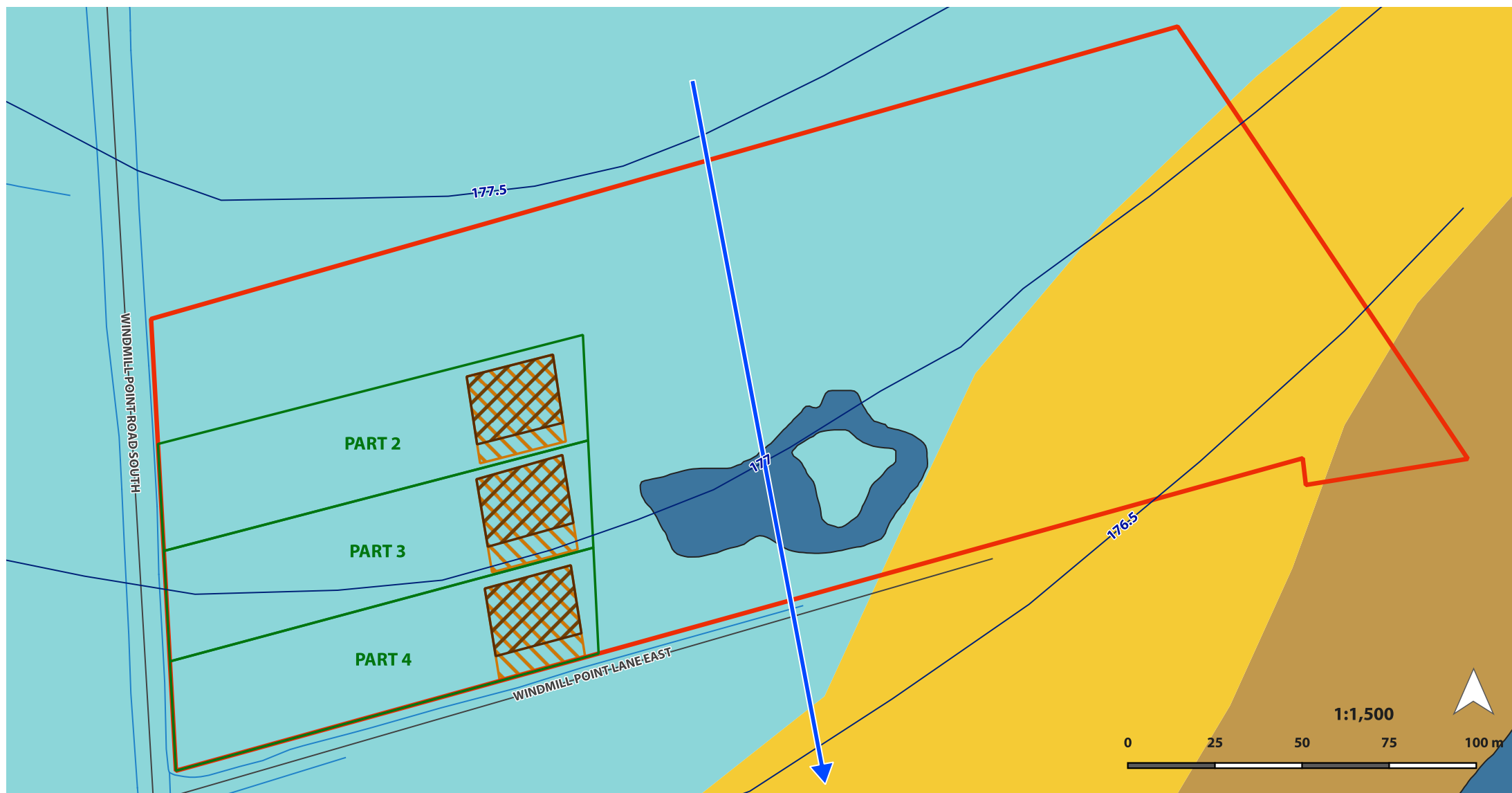
### Hydrogeologic Cross-Section A-A'

Hydrogeological Assessment for  
214 Windmill Point Road South, Fort Erie



Terra-Dynamics Consulting Inc.

Figure 4



- |                                       |                                 |                          |
|---------------------------------------|---------------------------------|--------------------------|
| Watercourse                           | Site                            | <b>Surficial Geology</b> |
| Groundwater Contour (mASL)            | Proposed Severances             | Clay and silt            |
| General Direction of Groundwater Flow | Proposed Septic Bed             | Fill                     |
| Waterbody                             | Proposed Effluent Dilution Area | Sand                     |
|                                       |                                 | Sand and gravel          |

## Septic Plume Assessment

### Hydrogeological Assessment for 214 Windmill Point Road South, Fort Erie



**Terra-Dynamics Consulting Inc.**

**Figure 5**

**Appendix A**

**Preliminary Site Plan**



INFORMATION TAKEN FROM SURVEY BY:  
THE LAROCQUE GROUP O.L.S.  
DATED JANUARY 26th, 2022

SITE CONDITION PLAN  
PART OF LOT 14  
BROKEN FRONT CONCESSION LAKE ERIE  
TOWN OF FORT ERIE  
REGIONAL MUNICIPALITY OF NIAGARA

ZONING ANALYSIS FOR ENTIRE LOT

Zoning	RURAL ZONE - RU	
	Required	Existing / Proposed
Lot Area	60,000.0 sq. m	FULL SITE: 46,668 sq.m
Lot Frontage	95.0m	130.08m
Lot Coverage (incl. Cover Porch)	10% MAX.	1894sqm (4.1%)
Total Insulated Floor Areas	100.0 sq. m	n/a
Primary Building(s) Area	n/a	n/a
Front Yard Setback	15.0m	281m
Rear Yard Setback	15.0m	15 m*
Int. Side Yard Setback	7.5m	36.4m(N) / 20.9m (S)
Ext. Side Yard Setback	15.0m	n/a
Building Height	10.0m/2.5 storeys MAX.	10.0m**
Landscaped Open Space	N/A	xxx%

\*TO NORTH WING WALL FACE  
\*\*DOES NOT INCLUDE CUPOLAS

ZONING ANALYSIS FOR REMNANT LOT

Zoning	RURAL ZONE - RU	
	Required	Existing / Proposed
Lot Area	60,000.0 sq. m	34,376.1 sq.m
Lot Frontage	95.0m	29.44m
Lot Coverage (incl. Cover Porch)	10% MAX.	1894sqm (5.5%)
Total Insulated Floor Areas	100.0 sq. m	n/a
Primary Building(s) Area	n/a	n/a
Front Yard Setback	15.0m	281m
Rear Yard Setback	15.0m	15 m*
Int. Side Yard Setback	7.5m	36.4m(N) / 20.9m (S)
Ext. Side Yard Setback	15.0m	n/a
Building Height	10.0m/2.5 storeys MAX.	10.0m**
Landscaped Open Space	N/A	xxx%

\*TO NORTH WING WALL FACE  
\*\*DOES NOT INCLUDE CUPOLAS

ZONING ANALYSIS FOR PARTS 2, 3, 4 TO BE CREATED BY CONSENT  
ZONING TABLE PROVIDED IS FOR EACH INDIVIDUAL LOT

Zoning	RURAL ZONE - RR (USED AS REFERENCE)	
	Required	Existing / Proposed
Lot Area	4000 sq. m	4,095 sq.m
Lot Frontage	60.0m	33.53m**
Lot Coverage (incl. Cover Porch)	15% MAX.	
Total Insulated Floor Areas	140sm/160SM/180SQM*	
Primary Building(s) Area	n/a	
Front Yard Setback	7.5m	
Rear Yard Setback	10.0m	
Int. Side Yard Setback	3.0m	
Ext. Side Yard Setback	7.5m	
Building Height	9.0m/2.5 storeys MAX.	
Landscaped Open Space	N/A	

\*MIN. FLR AREAS 1 STOREY = 140sm / 1.5 STOREY = 160sm / 2 OR 2.5 STOREY = 180sm  
\*\*DOES NOT COMPLY WITH RR ZONING

- Notes:
- only one dwelling (6.13)
  - accessory units attached to main building (6.43)
  - where there is more than one permitted use, use the most restrictive standards (6.15)
  - min. 30m setback from 1 in 100 year flood elev (6.48)

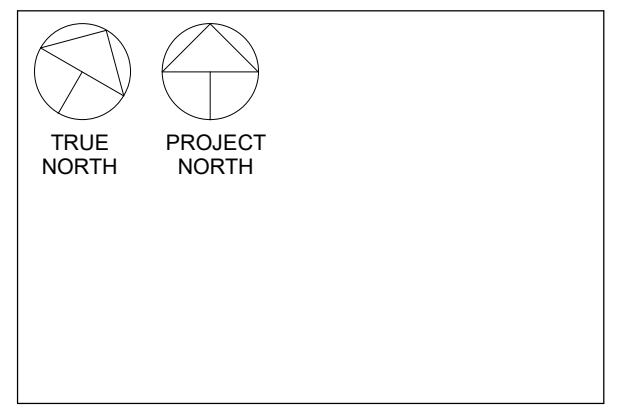
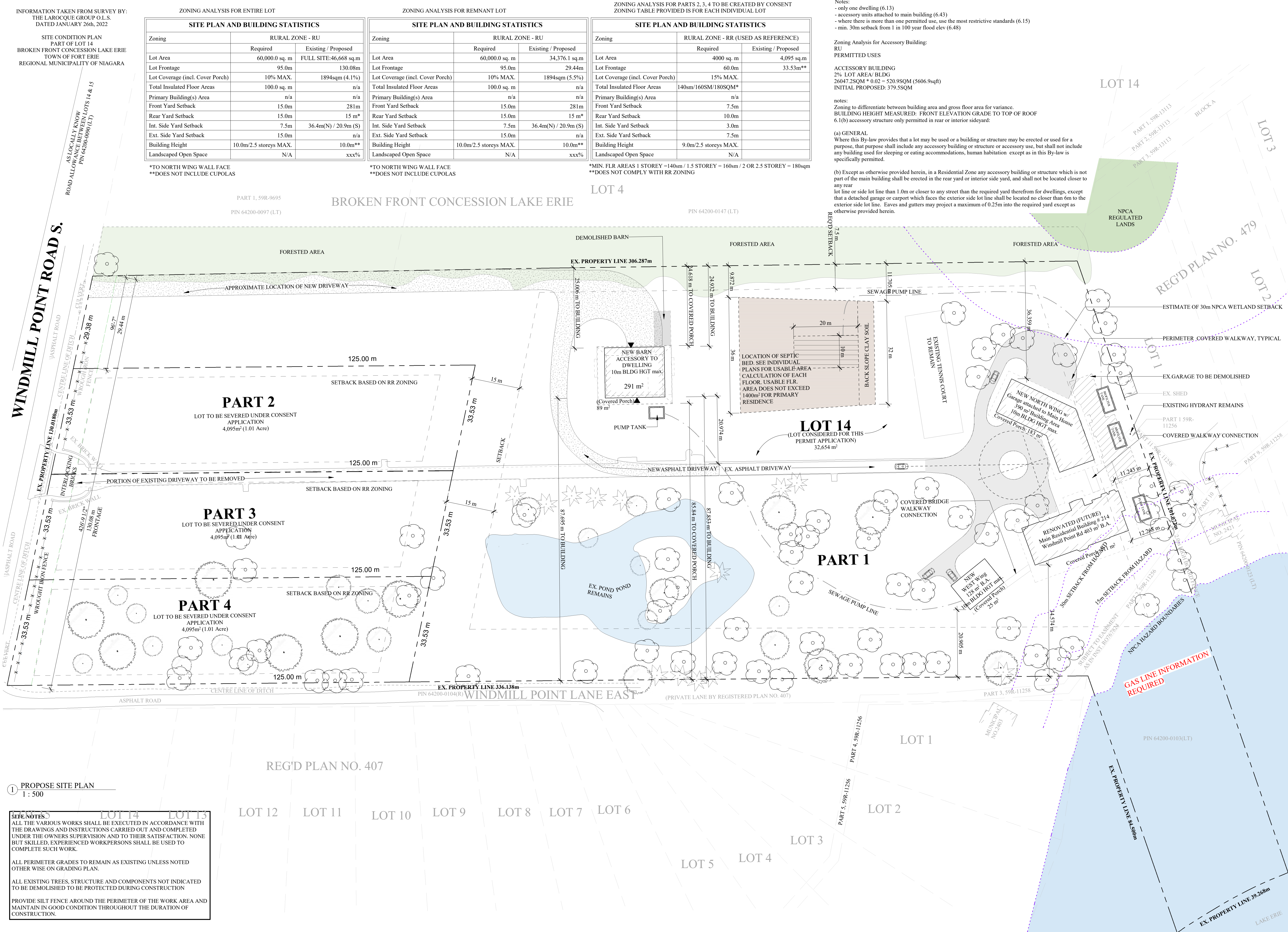
Zoning Analysis for Accessory Building:  
RU  
PERMITTED USES

ACCESSORY BUILDING  
2% LOT AREA/ BLDG  
26047.2SQM \* 0.02 = 520.9SQM (5606.9sqft)  
INITIAL PROPOSED: 379.SSQM

Notes:  
Zoning to differentiate between building area and gross floor area for variance.  
BUILDING HEIGHT MEASURED: FRONT ELEVATION GRADE TO TOP OF ROOF  
6.1(b) accessory structure only permitted in rear or interior sideyard:

(a) GENERAL  
Where this By-law provides that a lot may be used or a building or structure may be erected or used for a purpose, that purpose shall include any accessory building or structure or accessory use, but shall not include any building used for sleeping or eating accommodations, human habitation except as in this By-law is specifically permitted.

(b) Except as otherwise provided herein, in a Residential Zone any accessory building or structure which is not part of the main building shall be erected in the rear yard or interior side yard, and shall not be located closer to any rear lot line or side lot line than 1.0m or closer to any street than the required yard therefrom for dwellings, except that a detached garage or carport which faces the exterior side lot line shall be located no closer than 6m to the exterior side lot line. Eaves and gutters may project a maximum of 0.25m into the required yard except as otherwise provided herein.



#	Description	Date
1		
2		
3		
4		
5		

Contractor

Engineer

Do not scale drawings. Report any discrepancies to Jordan Station Design Co. Inc. before proceeding. Drawings must be sealed by the Licensed Architectural Technologist prior to the use for any building permit applications and/or government approval. Seals must be signed by the Technologist before drawings are used for any construction. All construction to be in accordance with the current Ontario Building Code & all applicable ON. regulations. All drawings & related documents remain the property of Jordan Station Design Co. Inc., all drawings are protected under copyright and under contract Schedule 1 - 'Designer Information' is not required for building permit application as Jordan Station Design Co. Inc. is a holder of a Certificate of Practice from the Ontario Association of Architects.

**JORDAN STATION DESIGN CO**  
info@jordanstationdesignco.ca

**ADDITION + RENOVATION**  
214 Windmill Point Rd S, Ridgeway, ON L0S 1N0

SITE PLAN	
Project number	21007
Date	2021-12-01
Drawn by	GAC / N.W.
Designed by	L.C.
<b>A1-1</b>	
Scale	As indicated

1 PROPOSE SITE PLAN  
1: 500

**SITE NOTES**  
ALL THE VARIOUS WORKS SHALL BE EXECUTED IN ACCORDANCE WITH THE DRAWINGS AND INSTRUCTIONS CARRIED OUT AND COMPLETED UNDER THE OWNERS SUPERVISION AND TO THEIR SATISFACTION. NONE BUT SKILLED, EXPERIENCED WORKPERSONS SHALL BE USED TO COMPLETE SUCH WORK.

ALL PERIMETER GRADES TO REMAIN AS EXISTING UNLESS NOTED OTHERWISE ON GRADING PLAN.

ALL EXISTING TREES, STRUCTURE AND COMPONENTS NOT INDICATED TO BE DEMOLISHED TO BE PROTECTED DURING CONSTRUCTION

PROVIDE SILT FENCE AROUND THE PERIMETER OF THE WORK AREA AND MAINTAIN IN GOOD CONDITION THROUGHOUT THE DURATION OF CONSTRUCTION.

**Appendix B**

**Water Well Records**



UTM 5 0580 23 W

66 N<sup>o</sup> B2

Elev. 4 0580

The Ontario Water Resources Commission Act

# WATER WELL RECORD

FORT ERIE

Basin 23 Welland

Township, Village, Beaufort or City

Con. B.F. Lot part of 3 14

Date completed 7th June 1966  
(day month year)

Address Ridgeway

### Casing and Screen Record

### Pumping Test

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

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

### Water Record

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
<u>clay flint</u>	<u>9</u>	<u>37</u>	<u>31</u>	<u>fresh</u>

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

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

Drilling or Boring Firm Raymond L. Schooley

Address R.R. 3 Port Colborne

Licence Number 1959

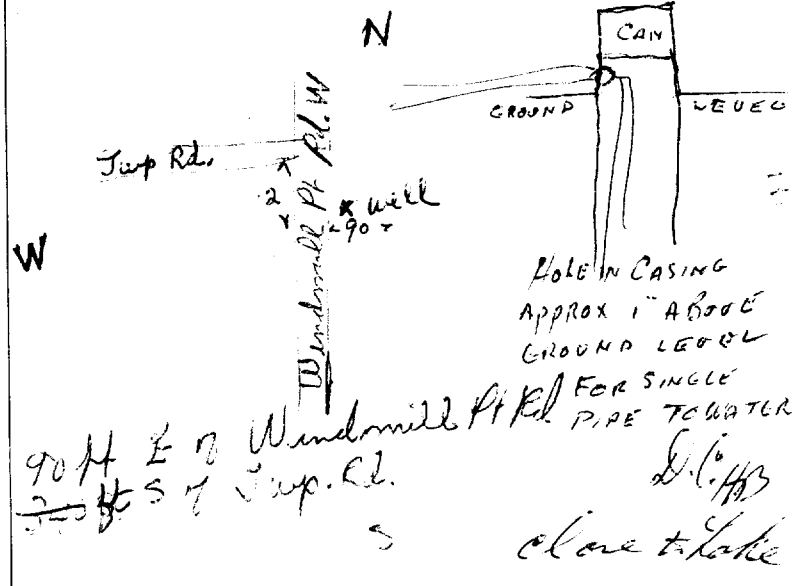
Name of Driller or Borer same

Date June 15/66  
Raymond L. Schooley  
(Signature of Licensed Drilling or Boring Contractor)

Form 7 15M-60-4138

### Location of Well

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



**Appendix C**

**Well Use & Septic System Survey**



## **Terra-Dynamics Consulting Inc.**

**432 Niagara Street, Unit 2 St. Catharines, ON L2M 4W3**

January, 2022

Dear Resident:

On behalf of Mr. Joseph Moore, Terra-Dynamics Consulting Inc. is completing a water well and septic system survey. This is a survey of properties in the vicinity of 214 Windmill Point Road South, as shown on the attached map (Site). Mr. Moore is making application to sever three lots on the property. This well and septic system survey is a recommended part of a hydrogeologic, or groundwater, study of the subject lands. This is a standard questionnaire for properties on private services.

The purpose of this survey is to collect information on private or residential water wells, cisterns and septic systems within approximately 100 metres of the property (as shown by the outline on the attached map). **Participation is voluntary.** Participation involves completing the attached questionnaire on municipal, well and/or cistern use, groundwater quantity, quality and your septic system. Please complete it as best as you can. Please fill out the questionnaire and mail it back to Terra-Dynamics Consulting Inc. in the self-addressed and stamped envelope. The information you provide will be summarized in our report to Niagara Region and the Town of Fort Erie and personal information (e.g. name, address, etc.) will be kept confidential and will not be included in our report.

If you have any questions about the questionnaire, please contact Jayme Campbell at 289-407-0915 or via email at [jcampbell@terra-dynamics.com](mailto:jcampbell@terra-dynamics.com).

Thank you in advance for your assistance.

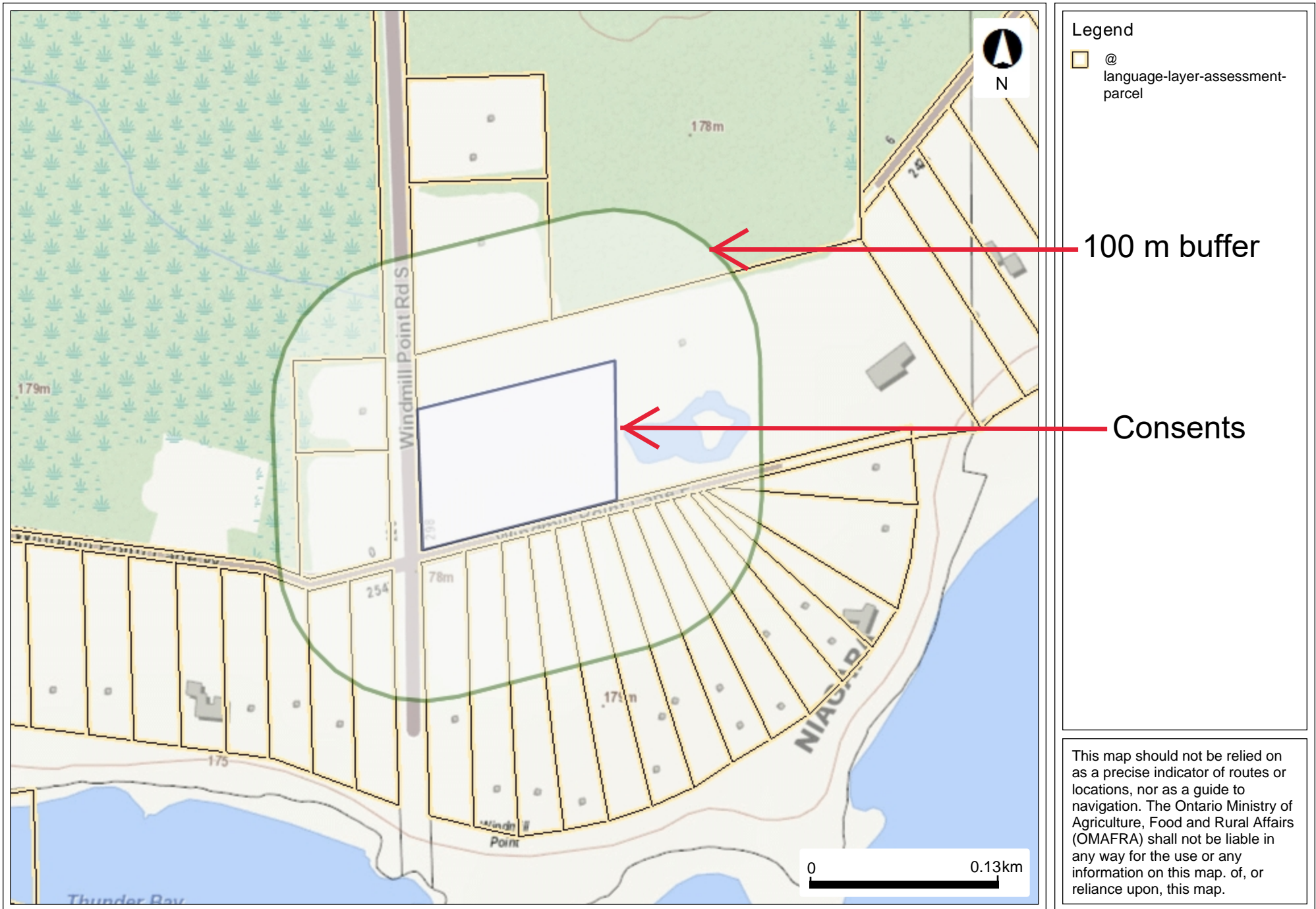
Yours truly,

TERRA-DYNAMICS CONSULTING INC.

A handwritten signature in blue ink that reads 'Jayme D. Campbell'. The signature is written in a cursive, flowing style.

Jayme D. Campbell, P.Eng.  
Senior Water Resource Engineer

# Water well and septic system survey



**Table C-1: Address List for Water Use Surveys for 214 Windmill Point Road South**

	<b>Address</b>	<b>Mail Out</b>	<b>Municipality</b>	<b>Postal Code</b>
1	166 Windmill Point Road South	Bounced back, address is correct	Fort Erie	LOS 1N0
2	124 Windmill Point Road South	No response received		
3	No address	No response received		
4	201 Windmill Point Road	No response received		
5	225 Windmill Point South	No response received		
6	2547 Windmill Point Lane West	No response received		
7	2557 Windmill Point Lane West	Bounced back, address is correct, private lane		
8	2567 Windmill Point Lane West	Bounced back, address is correct, private lane		
9	2403 Windmill Point Lane East	Bounced back, address is correct, private lane		
10	2407 Windmill Point Lane East	No response received		
11	2411 Windmill Point Lane East	Bounced back, address is correct, private lane		
12	2415 Windmill Point Lane East	No response received		
13	2419 Windmill Point Lane East	Bounced back, address is correct, private lane		
14	2435 Windmill Point Lane East	Bounced back, address is correct, private lane		
15	2451 Windmill Point Lane East	No response received		
16	2465 Windmill Point Lane East	Bounced back, address is correct, private lane		
17	2479 Windmill Point Lane East	Completed survey returned		
18	2491 Windmill Point Lane East	No response received		
19	2497 Windmill Point Lane East	No response received		
20	2513 Windmill Point Lane East	Bounced back, address is correct, private lane		
21	2525 Windmill Point Lane East	No response received		
22	2535 Windmill Point Lane East	No response received		



**Terra-Dynamics Consulting Inc.**

432 Niagara Street, Unit 2 St. Catharines, ON L2M 4W3

**WATER WELL SURVEY FORM**

Date: JANUARY, 29, 2022

Contact Person: [REDACTED]

Property Address: 2479 WINDMILL POINT LANE, RIDGEWAY, ON

Telephone: [REDACTED]

Email (if further information requested): [REDACTED]

**1.0 GENERAL QUESTIONS**

Do you know your drinking water source? Please circle one or more of the following <sup>4</sup> options:

- 1. Well (20+ feet casing)
- 2. Shallow Well (less than 20 feet of casing)
- 3. Cistern
- 4. Municipal

Further comments:

I OBJECT TO SUBDIVISION OR REZONING OR SEVERANCE OF THE 217 WINDMILL POINT ROAD SOUTH PROPERTY

Use page 3 or a separate sheet of paper for additional comments.

If your water supply is from a cistern, the rest of the questions do not apply. If you have both a cistern and a well, please complete the well questionnaire (Section 2.0 or 3.0). Please let us know where your place is located either on the supplied map or the area for a sketch on the second last page of this form. Please mail the completed form back to Terra-Dynamics in the provided envelope. Thank you for your assistance.

- If you have a drilled deep well (20+ feet of casing) please complete Sections 2 & 4
- If you have a shallow well (less than 20 feet of casing), please complete Sections 3&4

**2.0 DRILLED WELL (greater than 20 feet of casing)**

How deep is your well? \_\_\_\_\_

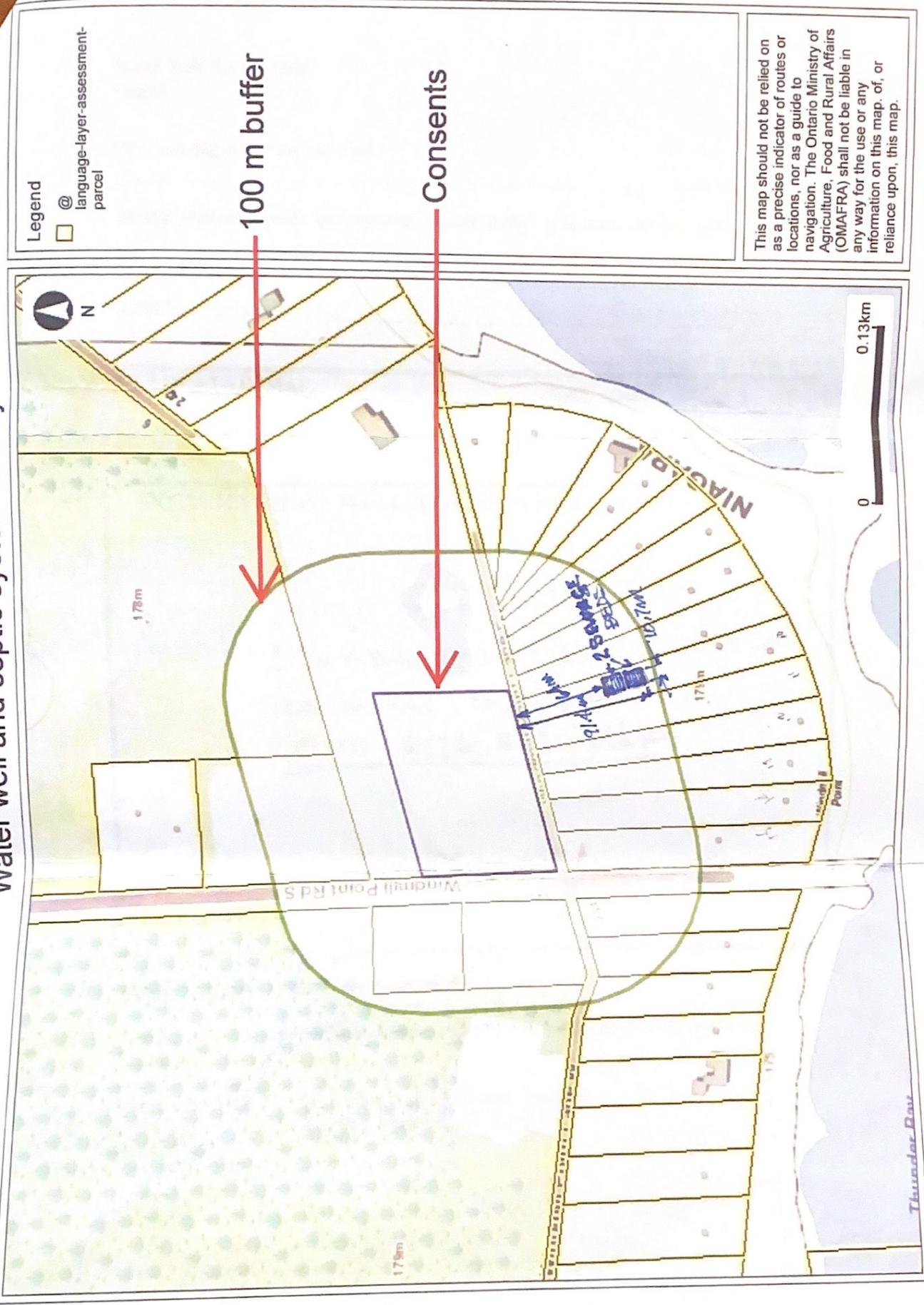
Is your well drilled into rock? \_\_\_\_\_ What is the well casing diameter? \_\_\_\_\_

Do you know when your well was drilled? \_\_\_\_\_

Do you know the name of the well driller? \_\_\_\_\_



# Water well and septic system survey



Has your dug well ever run dry?

Do you perform regular maintenance on your pump? (i.e. pump service, silt removal)

Additional comments:

---

---

#### 4.0 LOCATION MAP

Can you please draw a sketch map of the location of your well(s), septic tank and sewage bed on your property (please show the location relative to buildings and roads).

#### SKETCH MAP OF WELL(S) and SEWAGE SYSTEM LOCATIONS

2 SEWAGE (TILE) BEDS INSIDE  
100 meters BUFFER  
SEE ATTACHED MAP

Other Comments: (Use a separate sheet, if required)

Please mail the completed form back to Terra-Dynamics in the provided envelope.  
Thank you for your help.

Jayme Campbell, P. Eng., Senior Water Resource Engineer  
432 Niagara Street, Unit 2, St. Catharines, ON L2M 4W3  
289-407-0915

**Appendix D**

**Supporting Information**

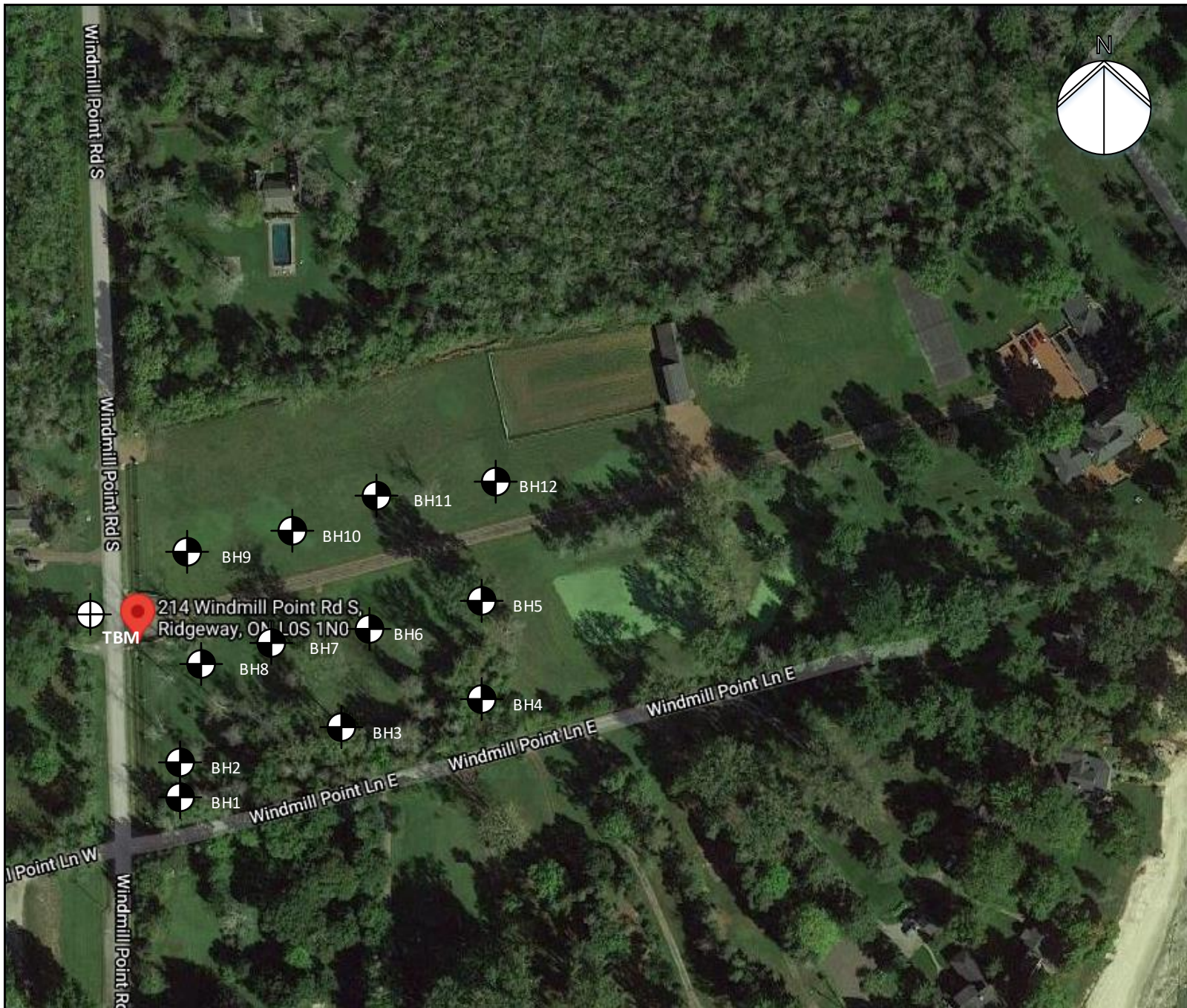
# OMAFRA Soil Map: 214 Windmill Point Road South, Fort Erie



- Legend**
- Assessment Parcel
  - Soil Name Label
  - Hydrologic Soil Group**
    - A - High
    - B - Moderate
    - C - Slow
    - D - Very Slow

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





LEGEND	
	Borehole Location BH#
	Temporary Benchmark Base of Hydro Pole Assigned Elevation: 100.00m

NOTES
1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. Report No. SM301772-G.
2. Borehole locations are approximate.

**SOIL-MAT**  
ENGINEERS & CONSULTANTS LTD.

Geotechnical Investigation  
Proposed Residential  
Development  
214 Windmill Point Road South  
Fort Erie, Ontario

Temporary Borehole  
Location Plan

Project No. SM 301772-G

Date: November 2021

Drawn: KJR	Checked: KR
------------	-------------

SM 301772-G Borehole Location Plan

Drawing No. 1

# Log of Borehole No. 1

**Project No:** SM 301772-G

**Project:** Proposed Lot Severance

**Location:** 214 Windmill Point Road

**Client:** Leigh Whyte, MCIP, RPP, AICP

**Project Manager:** Kyle Richardson, P.Eng.

**Borehole Location:** See Drawing No.1

**UTM Coordinates - N:** 4748324

**E:** 662644



Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE						Moisture Content w%		
					Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm <sup>2</sup> )	U.Wt. (kN/m <sup>3</sup> )	▲	▲
0	99.56		Ground Surface										
			<b>Topsoil</b> Approximately 200 millimetres of topsoil.										
1	99.30		<b>Silty Clay/Clayey Silt</b> Brown, trace sand, reworked in appearance in upper levels, firm.	SS	1	2,3,5,6	8						
2													
3													
4	98.30		Auger Refusal on Assumed Bedrock.	SS	2	4,8,50/4	100		0.5				
5			End of Borehole										
6			NOTES: 1. Borehole was advanced using solid stem auger equipment on November 10, 2021 to spoon refusal at a depth of 1.2 metres. 2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903. 3. Soil samples will be discarded after 3 months unless otherwise directed by our client.										
7													
8													
9													
10													

**Drill Method:** Solid Stem Auger

**Drill Date:** November 10, 2021

**Hole Size:** 150 Millimetres

**Drilling Contractor:** Elements Geo

**Soil-Mat Engineers & Consultants Ltd.**

130 Lancing Drive, Hamilton, ON L8W 3A1

T: 905.318.7440 F: 905.318.7455

E: [info@soil-mat.ca](mailto:info@soil-mat.ca)

**Datum:** Temporary Benchmark

**Field Logged by:** KJR

**Checked by:** KR

**Sheet:** 1 of 1

# Log of Borehole No. 2

**Project No:** SM 301772-G

**Project:** Proposed Lot Severance

**Location:** 214 Windmill Point Road

**Client:** Leigh Whyte, MCIP, RPP, AICP

**Project Manager:** Kyle Richardson, P.Eng.

**Borehole Location:** See Drawing No.1

**UTM Coordinates - N:** 4748331

**E:** 662641



Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE						Moisture Content w%		
					Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm <sup>2</sup> )	U.Wt. (kN/m <sup>3</sup> )	▲	▲
0	99.62		Ground Surface										
	99.50		<b>Topsoil</b> Approximately 150 millimetres of topsoil.										
1			<b>Silty Clay/Clayey Silt</b> Brown, trace sand and gravel, reworked in appearance in upper levels, firm to stiff.		SS	1	1,2,3,4	5		1.5			
2													
3													
4					SS	2	5,7,8,50/1	15		2.5			
4	98.30		Auger Refusal on Assumed Bedrock.										
5			End of Borehole										
6			NOTES: 1. Borehole was advanced using solid stem auger equipment on November 10, 2021 to spoon refusal at a depth of 1.3 metres. 2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903. 3. Soil samples will be discarded after 3 months unless otherwise directed by our client.										
7													
8													
9													
10													

**Drill Method:** Solid Stem Auger

**Drill Date:** November 10, 2021

**Hole Size:** 150 Millimetres

**Drilling Contractor:** Elements Geo

**Soil-Mat Engineers & Consultants Ltd.**

130 Lancing Drive, Hamilton, ON L8W 3A1

T: 905.318.7440 F: 905.318.7455

E: [info@soil-mat.ca](mailto:info@soil-mat.ca)

**Datum:** Temporary Benchmark

**Field Logged by:** KJR

**Checked by:** KR

**Sheet:** 1 of 1

# Log of Borehole No. 3

**Project No:** SM 301772-G

**Project:** Proposed Lot Severance

**Location:** 214 Windmill Point Road

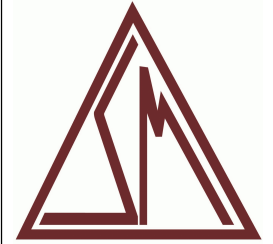
**Client:** Leigh Whyte, MCIP, RPP, AICP

**Project Manager:** Kyle Richardson, P.Eng.

**Borehole Location:** See Drawing No.1

**UTM Coordinates - N:** 4748333

**E:** 662666



Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE						Moisture Content w%		
					Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm <sup>2</sup> )	U.Wt. (kN/m <sup>3</sup> )	▲	▲
0	99.55		Ground Surface										
			<b>Topsoil</b> Approximately 200 millimetres of topsoil.										
1	99.30		<b>Silty Clay/Clayey Silt</b> Brown, trace sand and gravel, reworked in appearance in upper levels, firm.	SS	1	1,2,3,5	5		3.0				
3	98.60		Auger Refusal on Assumed Bedrock.	SS	2	3,50/3	100		1.5				
10			End of Borehole										
			NOTES:										
			1. Borehole was advanced using solid stem auger equipment on November 10, 2021 to spoon refusal at a depth of 0.9 metres.										
			2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903.										
			3. Soil samples will be discarded after 3 months unless otherwise directed by our client.										

**Drill Method:** Solid Stem Auger

**Drill Date:** November 10, 2021

**Hole Size:** 150 Millimetres

**Drilling Contractor:** Elements Geo

**Soil-Mat Engineers & Consultants Ltd.**

130 Lancing Drive, Hamilton, ON L8W 3A1

T: 905.318.7440 F: 905.318.7455

E: [info@soil-mat.ca](mailto:info@soil-mat.ca)

**Datum:** Temporary Benchmark

**Field Logged by:** KJR

**Checked by:** KR

**Sheet:** 1 of 1



# Log of Borehole No. 4

**Project No:** SM 301772-G

**Project:** Proposed Lot Severance

**Location:** 214 Windmill Point Road

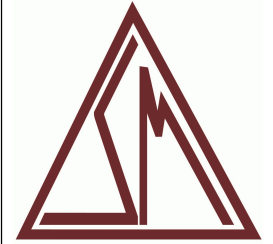
**Client:** Leigh Whyte, MCIP, RPP, AICP

**Project Manager:** Kyle Richardson, P.Eng.

**Borehole Location:** See Drawing No.1

**UTM Coordinates - N:** 4748350

**E:** 662721



Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE						Moisture Content w%		
					Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm <sup>2</sup> )	U.Wt.(kN/m <sup>3</sup> )	▲ 10 20 30 40 ▲	
0	99.54		Ground Surface										
			<b>Topsoil</b> Approximately 200 millimetres of topsoil.										
1	99.30		<b>Silty Clay/Clayey Silt</b> Brown, trace sand and gravel, reworked in appearance in upper levels, firm.	SS	1	2,3,3,6	6		1.5				
3	98.60		Auger Refusal on Assumed Bedrock.	SS	2	4,50/3	100		4.0				
10			End of Borehole										
			NOTES: 1. Borehole was advanced using solid stem auger equipment on November 10, 2021 to spoon refusal at a depth of 0.9 metres. 2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903. 3. Soil samples will be discarded after 3 months unless otherwise directed by our client.										

**Drill Method:** Solid Stem Auger

**Drill Date:** November 10, 2021

**Hole Size:** 150 Millimetres

**Drilling Contractor:** Elements Geo

**Soil-Mat Engineers & Consultants Ltd.**

130 Lancing Drive, Hamilton, ON L8W 3A1

T: 905.318.7440 F: 905.318.7455

E: [info@soil-mat.ca](mailto:info@soil-mat.ca)

**Datum:** Temporary Benchmark

**Field Logged by:** KJR

**Checked by:** KR

**Sheet:** 1 of 1

# Log of Borehole No. 5

**Project No:** SM 301772-G

**Project:** Proposed Lot Severance

**Location:** 214 Windmill Point Road

**Client:** Leigh Whyte, MCIP, RPP, AICP

**Project Manager:** Kyle Richardson, P.Eng.

**Borehole Location:** See Drawing No.1

**UTM Coordinates - N:** 4748380

**E:** 662721



Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE						Moisture Content w%		
					Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm <sup>2</sup> )	U.Wt. (kN/m <sup>3</sup> )	▲	▲
0	99.96		Ground Surface										
			<b>Topsoil</b> Approximately 250 millimetres of topsoil.										
1	99.70		<b>Silty Clay/Clayey Silt</b> Brown, trace sand and gravel, silty seams, reworked in appearance in upper levels, firm.	SS	1	3,3,4,3	7		2.0				
2													
3													
4													
1				SS	2	3,3,5,50/5	8		1.5				
4	98.60		Auger Refusal on Assumed Bedrock.										
5			End of Borehole										
6			NOTES: 1. Borehole was advanced using solid stem auger equipment on November 10, 2021 to spoon refusal at a depth of 1.3 metres. 2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903. 3. Soil samples will be discarded after 3 months unless otherwise directed by our client.										
7													
8													
9													
10													

**Drill Method:** Solid Stem Auger

**Drill Date:** November 10, 2021

**Hole Size:** 150 Millimetres

**Drilling Contractor:** Elements Geo

**Soil-Mat Engineers & Consultants Ltd.**

130 Lancing Drive, Hamilton, ON L8W 3A1

T: 905.318.7440 F: 905.318.7455

E: [info@soil-mat.ca](mailto:info@soil-mat.ca)

**Datum:** Temporary Benchmark

**Field Logged by:** KJR

**Checked by:** KR

**Sheet:** 1 of 1

# Log of Borehole No. 6

**Project No:** SM 301772-G

**Project:** Proposed Lot Severance

**Location:** 214 Windmill Point Road

**Client:** Leigh Whyte, MCIP, RPP, AICP

**Project Manager:** Kyle Richardson, P.Eng.

**Borehole Location:** See Drawing No.1

**UTM Coordinates - N:** 4748371

**E:** 662696



Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE						Moisture Content w%		
					Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm <sup>2</sup> )	U.Wt.(kN/m <sup>3</sup> )	▲	▲
0	99.71		Ground Surface										
			<b>Topsoil</b> Approximately 250 millimetres of topsoil.										
1	99.50		<b>Silty Clay/Clayey Silt</b> Brown, trace sand and gravel, reworked in appearance in upper levels, firm.	SS	1	2,3,3,4	6		2.0				
3													
1				SS	2	4,5,50/5	100		3.5				
4	98.50		Auger Refusal on Assumed Bedrock.										
			End of Borehole										
5													
6													
2			NOTES: 1. Borehole was advanced using solid stem auger equipment on November 10, 2021 to spoon refusal at a depth of 1.2 metres. 2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903. 3. Soil samples will be discarded after 3 months unless otherwise directed by our client.										
7													
8													
9													
3													
10													

**Drill Method:** Solid Stem Auger

**Drill Date:** November 10, 2021

**Hole Size:** 150 Millimetres

**Drilling Contractor:** Elements Geo

**Soil-Mat Engineers & Consultants Ltd.**

130 Lancing Drive, Hamilton, ON L8W 3A1

T: 905.318.7440 F: 905.318.7455

E: [info@soil-mat.ca](mailto:info@soil-mat.ca)

**Datum:** Temporary Benchmark

**Field Logged by:** KJR

**Checked by:** KR

**Sheet:** 1 of 1

# Log of Borehole No. 7

**Project No:** SM 301772-G

**Project:** Proposed Lot Severance

**Location:** 214 Windmill Point Road

**Client:** Leigh Whyte, MCIP, RPP, AICP

**Project Manager:** Kyle Richardson, P.Eng.

**Borehole Location:** See Drawing No.1

**UTM Coordinates - N:** 4748369

**E:** 662675



Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE						Moisture Content w%		
					Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm <sup>2</sup> )	U.Wt. (kN/m <sup>3</sup> )	▲	▲
0	99.72		Ground Surface										
			<b>Topsoil</b> Approximately 250 millimetres of topsoil.										
1	99.51		<b>Silty Clay/Clayey Silt</b> Brown, trace sand, trace to some gravel, reworked in appearance in upper levels, firm to stiff.	SS	1	1,2,3,4	5		2.5				
2													
3				SS	2	3,4,6,8	10		3.5				
4													
5													
6	98.00		Auger Refusal on Assumed Bedrock.	SS	3	2,50/2	100						
7			End of Borehole										
8			NOTES: 1. Borehole was advanced using solid stem auger equipment on November 10, 2021 to spoon refusal at a depth of 1.7 metres. 2. Borehole was recorded as open and 'wet' at a depth of 0.8 metres upon completion and backfilled as per Ontario Regulation 903. 3. Soil samples will be discarded after 3 months unless otherwise directed by our client.										
9													
10													

**Drill Method:** Solid Stem Auger

**Drill Date:** November 10, 2021

**Hole Size:** 150 Millimetres

**Drilling Contractor:** Elements Geo

**Soil-Mat Engineers & Consultants Ltd.**

130 Lancing Drive, Hamilton, ON L8W 3A1

T: 905.318.7440 F: 905.318.7455

E: [info@soil-mat.ca](mailto:info@soil-mat.ca)

**Datum:** Temporary Benchmark

**Field Logged by:** KJR

**Checked by:** KR

**Sheet:** 1 of 1

# Log of Borehole No. 8

**Project No:** SM 301772-G

**Project:** Proposed Lot Severance

**Location:** 214 Windmill Point Road

**Client:** Leigh Whyte, MCIP, RPP, AICP

**Project Manager:** Kyle Richardson, P.Eng.

**Borehole Location:** See Drawing No.1

**UTM Coordinates - N:** 4748353

**E:** 662643



Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE						Moisture Content w%		
					Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm <sup>2</sup> )	U.Wt. (kN/m <sup>3</sup> )	▲ 10 20 30 40 ▲	
0	99.74		Ground Surface										
			<b>Topsoil</b> Approximately 250 millimetres of topsoil.										
1	99.50		<b>Silty Clay/Clayey Silt</b> Brown, trace sand and gravel, reworked in appearance in upper levels, firm.	SS	1	2,2,3,4	6		1.0				
3	98.70		Auger Refusal on Assumed Bedrock.	SS	2	4,50/3	100		2.0				
			End of Borehole										
6			NOTES: 1. Borehole was advanced using solid stem auger equipment on November 10, 2021 to spoon refusal at a depth of 1.0 metres. 2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903. 3. Soil samples will be discarded after 3 months unless otherwise directed by our client.										

**Drill Method:** Solid Stem Auger

**Drill Date:** November 10, 2021

**Hole Size:** 150 Millimetres

**Drilling Contractor:** Elements Geo

**Soil-Mat Engineers & Consultants Ltd.**

130 Lancing Drive, Hamilton, ON L8W 3A1

T: 905.318.7440 F: 905.318.7455

E: [info@soil-mat.ca](mailto:info@soil-mat.ca)

**Datum:** Temporary Benchmark

**Field Logged by:** KJR

**Checked by:** KR

**Sheet:** 1 of 1

# Log of Borehole No. 9

**Project No:** SM 301772-G

**Project:** Proposed Lot Severance

**Location:** 214 Windmill Point Road

**Client:** Leigh Whyte, MCIP, RPP, AICP

**Project Manager:** Kyle Richardson, P.Eng.

**Borehole Location:** See Drawing No.1

**UTM Coordinates - N:** 4748387

**E:** 662636



Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE						Moisture Content w%		
					Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm <sup>2</sup> )	U.Wt.(kN/m <sup>3</sup> )	▲ 10 20 30 40 ▲	
0	100.01		Ground Surface										
	99.80		<b>Topsoil</b> Approximately 250 millimetres of topsoil.										
1			<b>Silty Clay/Clayey Silt</b> Brown, trace to some sand and gravel, reworked in appearance in upper levels, firm.	SS	1	3,3,3,3	6		2.0				
2													
3				SS	2	3,6,50/4	100		0.5				
4	98.80		Auger Refusal on Assumed Bedrock.										
			End of Borehole										
5													
6			NOTES: 1. Borehole was advanced using solid stem auger equipment on November 10, 2021 to spoon refusal at a depth of 1.2 metres. 2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903. 3. Soil samples will be discarded after 3 months unless otherwise directed by our client.										
7													
8													
9													
10													

**Drill Method:** Solid Stem Auger

**Drill Date:** November 10, 2021

**Hole Size:** 150 Millimetres

**Drilling Contractor:** Elements Geo

**Soil-Mat Engineers & Consultants Ltd.**

130 Lancing Drive, Hamilton, ON L8W 3A1

T: 905.318.7440 F: 905.318.7455

E: [info@soil-mat.ca](mailto:info@soil-mat.ca)

**Datum:** Temporary Benchmark

**Field Logged by:** KJR

**Checked by:** KR

**Sheet:** 1 of 1

# Log of Borehole No. 10

**Project No:** SM 301772-G

**Project:** Proposed Lot Severance

**Location:** 214 Windmill Point Road

**Client:** Leigh Whyte, MCIP, RPP, AICP

**Project Manager:** Kyle Richardson, P.Eng.

**Borehole Location:** See Drawing No.1

**UTM Coordinates - N:** 4748389

**E:** 662655



Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE						Moisture Content w%		
					Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm <sup>2</sup> )	U.Wt. (kN/m <sup>3</sup> )	▲ 10 20 30 40 ▲	
0	100.16		Ground Surface										
			<b>Topsoil</b> Approximately 250 millimetres of topsoil.										
1	99.90		<b>Silty Clay/Clayey Silt</b> Brown, trace to some sand and gravel, reworked in appearance in upper levels, firm to stiff.	SS	1	2,2,3,3	5		1.5				
2													
3													
4				SS	2	4,4,5,6	9		2.5				
5	98.60		Auger Refusal on Assumed Bedrock.										
6			End of Borehole										
7			NOTES: 1. Borehole was advanced using solid stem auger equipment on November 10, 2021 to auger refusal at a depth of 1.5 metres. 2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903. 3. Soil samples will be discarded after 3 months unless otherwise directed by our client.										
8													
9													
10													

**Drill Method:** Solid Stem Auger

**Drill Date:** November 10, 2021

**Hole Size:** 150 Millimetres

**Drilling Contractor:** Elements Geo

**Soil-Mat Engineers & Consultants Ltd.**

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E: [info@soil-mat.ca](mailto:info@soil-mat.ca)

**Datum:** Temporary Benchmark

**Field Logged by:** KJR

**Checked by:** KR

**Sheet:** 1 of 1

# Log of Borehole No. 11

**Project No:** SM 301772-G

**Project:** Proposed Lot Severance

**Location:** 214 Windmill Point Road

**Client:** Leigh Whyte, MCIP, RPP, AICP

**Project Manager:** Kyle Richardson, P.Eng.

**Borehole Location:** See Drawing No.1

**UTM Coordinates - N:** 4748399

**E:** 662678



Depth ft m	Elevation (m)	Symbol	Description	Well Data	SAMPLE						Moisture Content w%		
					Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm <sup>2</sup> )	U.Wt. (kN/m <sup>3</sup> )	▲	▲
0	100.18		Ground Surface										
			<b>Topsoil</b> Approximately 250 millimetres of topsoil.										
1	99.90		<b>Silty Clay/Clayey Silt</b> Brown, trace to some sand and gravel, reworked in appearance in upper levels, firm to stiff.	SS	1	2,1,2,2	3		3.0				
2													
3													
4				SS	2	2,3,4,6	7		2.5				
5													
6	98.50		Auger Refusal on Assumed Bedrock.	SS	3	50/4	100		2.0				
7			End of Borehole										
8			NOTES: 1. Borehole was advanced using solid stem auger equipment on November 10, 2021 to spoon refusal at a depth of 1.6 metres. 2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903. 3. Soil samples will be discarded after 3 months unless otherwise directed by our client.										
9													
10													

**Drill Method:** Solid Stem Auger

**Drill Date:** November 10, 2021

**Hole Size:** 150 Millimetres

**Drilling Contractor:** Elements Geo

**Soil-Mat Engineers & Consultants Ltd.**

130 Lancing Drive, Hamilton, ON L8W 3A1

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**Datum:** Temporary Benchmark

**Field Logged by:** KJR

**Checked by:** KR

**Sheet:** 1 of 1



# Log of Borehole No. 12

**Project No:** SM 301772-G

**Project:** Proposed Lot Severance

**Location:** 214 Windmill Point Road

**Client:** Leigh Whyte, MCIP, RPP, AICP

**Project Manager:** Kyle Richardson, P.Eng.

**Borehole Location:** See Drawing No.1

**UTM Coordinates - N:** 4748407

**E:** 662703



Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE						Moisture Content w%		
					Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm <sup>2</sup> )	U.Wt. (kN/m <sup>3</sup> )	▲ 10 20 30 40 ▲	● 20 40 60 80 ●
0	100.14		Ground Surface										
			<b>Topsoil</b> Approximately 250 millimetres of topsoil.										
1	99.90		<b>Silty Clay/Clayey Silt</b> Brown, trace to some sand and gravel, reworked in appearance in upper levels, firm to stiff.	SS	1	3,3,3,3	6		1.0				
2													
3													
4				SS	2	3,4,6,4	10		2.5				
5													
6	98.50		Auger Refusal on Assumed Bedrock.	SS	3	50/6	100		1.5				
7			End of Borehole										
8			NOTES: 1. Borehole was advanced using solid stem auger equipment on November 10, 2021 to spoon refusal at a depth of 1.6 metres. 2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903. 3. Soil samples will be discarded after 3 months unless otherwise directed by our client.										
9													
10													

**Drill Method:** Solid Stem Auger

**Drill Date:** November 10, 2021

**Hole Size:** 150 Millimetres

**Drilling Contractor:** Elements Geo

**Soil-Mat Engineers & Consultants Ltd.**

130 Lancing Drive, Hamilton, ON L8W 3A1

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E: [info@soil-mat.ca](mailto:info@soil-mat.ca)

**Datum:** Temporary Benchmark

**Field Logged by:** KJR

**Checked by:** KR

**Sheet:** 1 of 1

## **Appendix E**

### **Nitrate-Nitrogen Calculations**

**Table E-1: Nitrate-nitrogen dilution calculations for proposed severances, 214 Windmill Point Road South, Fort Erie**

**Section 22.5.8 Nitrate-N Predictive Assessment Tertiary/Level IV Septic Residential Calculation**

*\*with tertiary/level IV 75% nitrogen removal applied*

<u>Site</u>	<u>Dilution Area (m<sup>2</sup>) (A<sub>D</sub>)</u>	<u>Dilution Area (ha)</u>	<u>Sewage Nitrate-N Load (mg/year)</u>	<u>Meteoric Dilution (m<sup>3</sup>) (V<sub>A</sub>)</u>	<u>Annual Sewage Volume (m<sup>3</sup>) (V<sub>S</sub>)</u>	<u>Total Volume of Water (m<sup>3</sup>) (V<sub>T</sub>)</u>	<u>Downgradient Nitrate-N Concentration (mg/L) (C<sub>PB</sub>)</u>
Part 2	630	0.06	3,652,500	158	365	523	7.0

Notes:

Average Sewage flow 1,000 L/day  
 Infiltration rate (k) 0.250 m/year  
 Nitrate effluent load (C<sub>s</sub>) 10 mg/L

**Section 22.5.8 Nitrate-N Predictive Assessment Tertiary/Level IV Septic Residential Calculation**

*\*with tertiary/level IV 75% nitrogen removal applied*

<u>Site</u>	<u>Dilution Area (m<sup>2</sup>) (A<sub>D</sub>)</u>	<u>Dilution Area (ha)</u>	<u>Sewage Nitrate-N Load (mg/year)</u>	<u>Meteoric Dilution (m<sup>3</sup>) (V<sub>A</sub>)</u>	<u>Annual Sewage Volume (m<sup>3</sup>) (V<sub>S</sub>)</u>	<u>Total Volume of Water (m<sup>3</sup>) (V<sub>T</sub>)</u>	<u>Downgradient Nitrate-N Concentration (mg/L) (C<sub>PB</sub>)</u>
Part 3	694	0.07	3,652,500	174	365	539	6.8

Notes:

Average Sewage flow 1,000 L/day  
 Infiltration rate (k) 0.250 m/year  
 Nitrate effluent load (C<sub>s</sub>) 10 mg/L

**Section 22.5.8 Nitrate-N Predictive Assessment Tertiary/Level IV Septic Residential Calculation**

*\*with tertiary/level IV 75% nitrogen removal applied*

<u>Site</u>	<u>Dilution Area (m<sup>2</sup>) (A<sub>D</sub>)</u>	<u>Dilution Area (ha)</u>	<u>Sewage Nitrate-N Load (mg/year)</u>	<u>Meteoric Dilution (m<sup>3</sup>) (V<sub>A</sub>)</u>	<u>Annual Sewage Volume (m<sup>3</sup>) (V<sub>S</sub>)</u>	<u>Total Volume of Water (m<sup>3</sup>) (V<sub>T</sub>)</u>	<u>Downgradient Nitrate-N Concentration (mg/L) (C<sub>PB</sub>)</u>
Part 4	676	0.07	3,652,500	169	365	534	6.8

Notes:

Average Sewage flow 1,000 L/day  
 Infiltration rate (k) 0.250 m/year  
 Nitrate effluent load (C<sub>s</sub>) 10 mg/L