



Terra-Dynamics Consulting Inc.

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

June 7, 2024

Kenedy Stairs Inc.
c/o Chris Laverick
336 Green Road
Stoney Creek, Ontario L8E 2B2

Re: Revised Hydrogeological Assessment – Consent (severance) and Residential Re-development
2970 Highway 3, Port Colborne, Ontario

Dear Mr. Laverick,

1.0 Introduction, Background Information and Purpose

Terra-Dynamics Consulting Inc. (Terra-Dynamics) respectfully submits this Hydrogeological Assessment of sewage impacts to support a residential consent (severance), and residential re-development of 2970 Highway 3, Port Colborne (the Site, Figure 1). The Site is 0.98 hectares and the proposed lots are 0.4 and 0.58 hectares in size (Suda & Maleszyk Surveying Inc, 2024, Figure 2). Terra-Dynamics previously completed a Hydrogeological Assessment to support a residential consent (severance) and re-development of a 7-unit residential building (Terra-Dynamics, 2022), however, the development plan for the Site has now changed.

This hydrogeological assessment is required as part of planning approvals for Niagara Region and the City of Port Colborne as the Site is within a Highly Vulnerable Aquifer area and a Hydrogeological Sensitive Area (NPCA, 2017). The purpose of the study was to satisfy Niagara Official Plan Policy 4.1.9.2(b) which indicates (Niagara Region, 2022):

"the minimum size of the proposed and retained lots shall each 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 but not be less than 0.4 hectares"

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 informed 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 the lots will be provided potable water via cisterns, this report does not include a water supply assessment (MECP, 1996b). Consequently, it is recommended that a development agreement for the severances indicate water supply by cistern, unless a water supply assessment is undertaken for groundwater well supplies.

The following documents the hydrogeological assessment of the Site.

2.0 Methodology

Terra-Dynamics began the assessment once confirmation of the appropriateness of the Terms of Reference was received from Niagara Region (Niagara Region, 2024a). Our work program (as per the Terms of Reference) 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 Ministry of the Environment Conservation and Parks (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 A. This information remains the same as in our 2022 report as no new water well records are listed in the MECP database since 2022 within 200 metres of the Site.

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 March of 2022. A total of sixteen developed properties were identified within 100 metres of the Site and these received a survey by mail. A copy of the questionnaire and information letter is provided in Appendix B.

2.3 Site Visit

The Site was visited by Terra-Dynamics on April 13, 2022, to assess site conditions using hand-auger holes, evaluate the presence/absence of any on-site or nearby private water supply wells, and whether any identified wells may require decommissioning per Ontario Water Resources Act Regulation 903.

The Site was subsequently visited by Terra-Dynamics on May 31, 2024 to investigate the presence/absence of water supply wells at the two structures mapped by the surveyors at the Site (Suda & Maleszyk Surveying Inc, 2024). No water wells were identified on-site. The concrete chamber in the southern part of the Site was identified as a cistern and the frame pumphouse at the northwest corner of the Site was filled with ponded water obscuring if a well was present.

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 (refer to Figure 2, Appendix A);
- ii. Hand-auger holes excavated on the Site (refer to Figure 2, Section 4.1);
- iii. Available soil and surficial geology mapping (refer to Figure 2 and Appendix C); and
- iv. Niagara Peninsula Source Protection Area Assessment Report (NPCA, 2013).

2.5 Assessment of Impact on Water Resources

A revised 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).

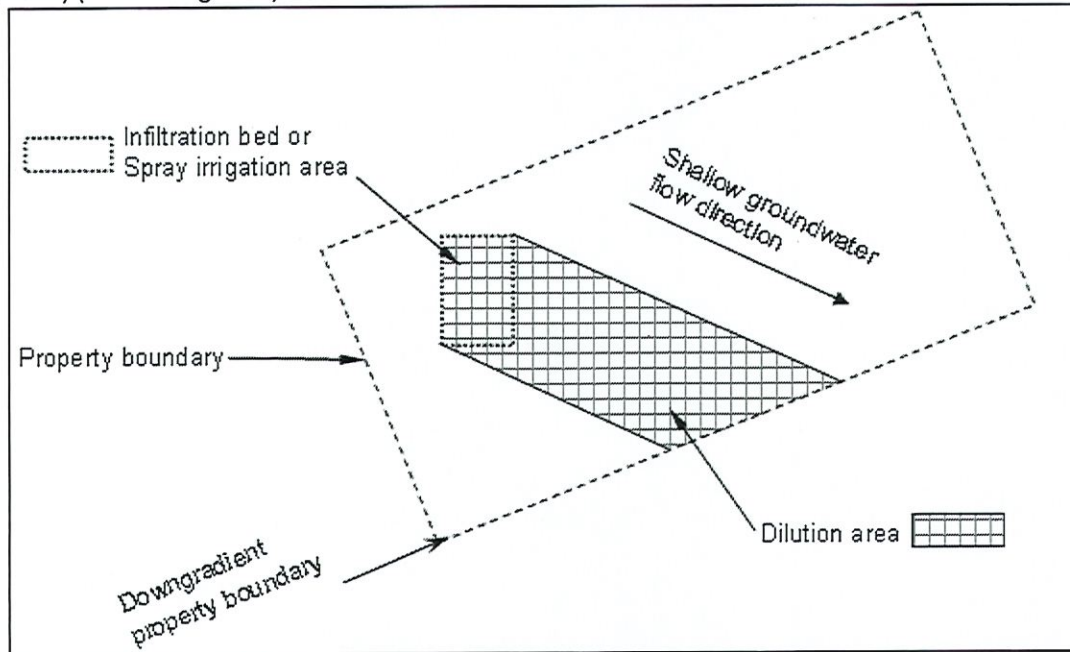


Figure 3 – Sample schematic for a basic groundwater dilution calculation (MECP, 2008)

3.0 Hydrogeological Assessment

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

MECP water well records located within 200 m of the Site were reviewed and 20 records were identified (refer to Figure 2 and Appendix A). Upon reviewing the locational accuracy of the records, Provincial record #6603749 was found to be outside of the 200 m study area and was subsequently removed from this assessment (refer to Appendix A). The well records indicate that water is taken from the bedrock aquifer which is identified in the records as limestone (refer to Section 4.3). The overlying clay and/or sand is very shallow or non-existent, with thicknesses recorded between 0 and 1.2 metres (0 to 4 feet) (refer to Figure 4).

There is a water well mapped by the province at the Site (refer to Figure 2). The record for this well (Provincial record #6600949) indicates that it was constructed in 1954 for domestic water supply purposes for a school. No wells were observed on-site during the site visits on April 13, 2022 or May 31, 2024.

The well records date from 1954 to 1991, with most of the wells (i.e. 14 of 19 wells) constructed in the 1950s and 1960s (refer to Appendix A). The records indicate that the wells were constructed primarily for domestic or farm water supply purposes, and general water quality observations by the water well contractors described the water as sulphurous and/or fresh. Bedrock aquifer static water level depths

were generally below the top of bedrock, with a median depth of groundwater at 5.2 metres below ground surface (m BGS).

Due to historical water well construction practices where bedrock is close to surface, only 1 of the 19 water well records (identified within 200 m of the Site) had a casing length greater than 6 metres (20 feet) (refer to Appendix A). Water wells with casing lengths less than 6 metres (20 feet) are classified as shallow wells which require a minimum set-back of 30 metres (100 feet) (Sharaf, 2013) from potential sources of contaminants (MECP, 2009), such as sewage effluent distribution piping or septic leaching beds. None of the MECP water well records are mapped within 30 metres of the Site.

3.2 Ministry of Natural Resources and Forestry (MNRF) Oil and Gas Records

One MNRF natural gas well record is mapped 150 metres west of the Site, but none are mapped on-site. The record for this natural gas well indicates that it has been abandoned and plugged (MNRF Petroleum Well ID #27061) (OGSR Library, 2022).

3.3 Water Well and Sewage System Results

A water use and septic system survey was mailed in March, 2022 to the sixteen developed parcels located within 100 m of the Site (refer to Figure 2, Table 1, and Appendix B). One completed survey was received; however, (i) it did not include an address and (ii) referenced a road that is not present within the survey area and was therefore not included in this assessment.

Table 1: Summary of Water Well Survey Results

Address	Comments
1118 Sherk Road	No response received
1094 Sherk Road	No response received
1135 Sherk Road	No response received
1101 Sherk Road	No response received
1057 Sherk Road	No response received
1000 Sherk Road	No response received
2924 Highway 3	No response received
2900 Highway 3	No response received
2876 Highway 3	No response received
2935 Highway 3	No response received
3066 Highway 3	No response received
2971 Highway 3	No response received
3077 Highway 3	No response received
2940 Highway 3	No response received
2999 Highway 3	No response received
972 Cedar Bay Road	No response received

4.0 Physical Setting

The Site topography slopes to the south towards Highway 3 with a ground surface elevation ranging between 185 and 183 metres above sea level (m ASL) (refer to Figure 2). The Site is in the Niagara Peninsula Conservation Authority's (NPCA) Lake Erie North Shore (LENS) Watershed Planning Area (AquaResource Inc. and NPCA, 2009) and is primarily within the Bearss Drain watershed, while the upper northwest corner of the Site is situated in the Oil Mill Creek watershed (NPCA, 2017) (refer to Figure 2). There are no natural watercourses or tile drains mapped for the Site (OMAFRA, 2022), and no watercourses or waterbodies were observed during the site visit on April 13, 2022.

4.1 Soils

The Site is located on the Limestone Plain physiographic region (Chapman and Putnam, 1984). The soils for the Site are mapped as Farmington – Very Shallow Phase and Franktown – Very Shallow Phase soils, which are classified as rapidly to imperfectly drained soils with "20-50 cm variable textures over mainly limestone and dolostone bedrock" (OMAFRA, 1989) (refer to Figure 5 and Appendix C). The soils on the Site have been mapped as Hydrologic Soil Group B, which is characterized as moderately fine to moderately coarse textured with moderate infiltration rates (OMAFRA, 2022) (refer to Appendix C). The soil mapping is consistent with on-site conditions which were confirmed to be shallow soil (i.e. 16 – 34 cm) over bedrock. Hand-auger data collected during the site visit on April 13, 2022, is summarized below in Table 2; hand-auger locations are provided on Figure 2.

Table 2: Summary of Terra-Dynamics hand-auger data

Hand-auger Hole ID	Depth to Bedrock (cm)
Location 1	16
Location 2	31
Location 3	32
Location 4	34

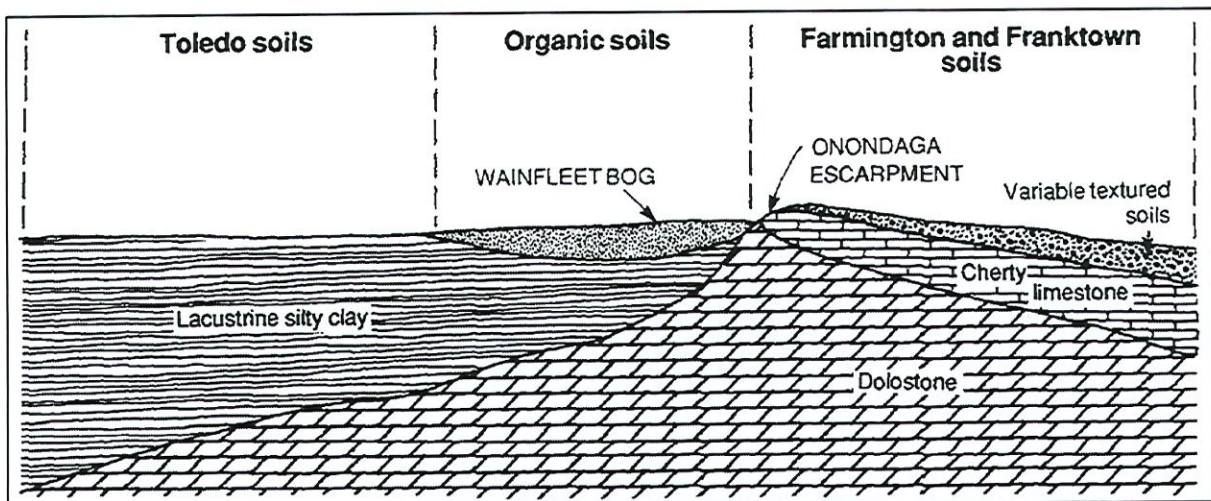


Figure 5 - Schematic regional landscape cross-section showing the relationships of soils to bedrock (OMAFRA, 1989)

4.2 Overburden Geology

The surficial geology of the Site is mapped as cherty limestone (refer to Figure 2) (OGS, 2003), and the overburden was regionally mapped as less than 1 metre thick at the Site (NPCA, 2013). This correlates with the hand-auger data (refer to Section 4.1) and the hydrogeologic section provided on Figure 4, which shows very thin overburden overlying bedrock. Bedrock exposure at ground surface was also observed during the site visit on April 13, 2022, at hand auger location 1 (refer to Figure 2).

4.3 Bedrock Geology

The underlying bedrock is mapped as cherty, fossiliferous, locally argillaceous limestone of the Edgecliff Member of the Onondaga Formation (Armstrong and Dodge, 2007). The bedrock topography dips regionally to the south (NPCA, 2013), and is at approximately 184 m ASL at the Site based on available mapping and nearby water well records (refer to Section 3.1, Appendix A, and Figure 4).

4.4 Groundwater Flow

The regional water table was mapped for NPCA as between 178.4 and 178.3 m ASL with groundwater flow from northeast to southwest across the Site (WHI, 2005) (refer to Figure 6). As shown in cross-section on Figure 4, the water table elevation beneath the Site ranged between 175 and 178 m ASL in nearby well records (refer to Figures 2 and Appendix A).

4.5 Hydrogeologic Setting

The local hydrogeologic setting is generalized as “shallow soil over fractured bedrock” (refer to Figure 7 below) (MECP, 1995), representing conditions where mapped as a Hydrogeologically Sensitive Area and the water table is expected to be within the bedrock aquifer, e.g. the Site.

4.6 Aquifer Vulnerability/Sensitivity

The Site is regionally mapped as a Highly Vulnerable Aquifer (HVA) by the Niagara Peninsula Source Protection Authority (NPSPA, 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 described in Section 4.2, the overburden is generally less than 1 m on the Site, which is insufficient to protect the bedrock aquifer from at-surface activities. As a result of the aquifer being highly vulnerable (i.e. not isolated from at-surface activities), a contaminant assessment is completed to see if lot sizes are appropriate (refer to Figure 8 below).

The Site is also a Hydrogeologically Sensitive Area (HSA) (NPCA, 2017) as it is a “shallow soil property” (EPA, 2018) with areas where the overburden is less than 2 m thick over the bedrock aquifer (refer to Figure 7 below). The MECP has previously defined HSAs as “karstic areas, areas of fractured bedrock exposed at surface, areas of thin soil cover” (MECP, 1995 and 1996a). As a result of being an HSA, the

contaminant assessment for the Site follows Section 22.5.8 of the MECP (2008) to inform site design, effluent treatment and set-backs.

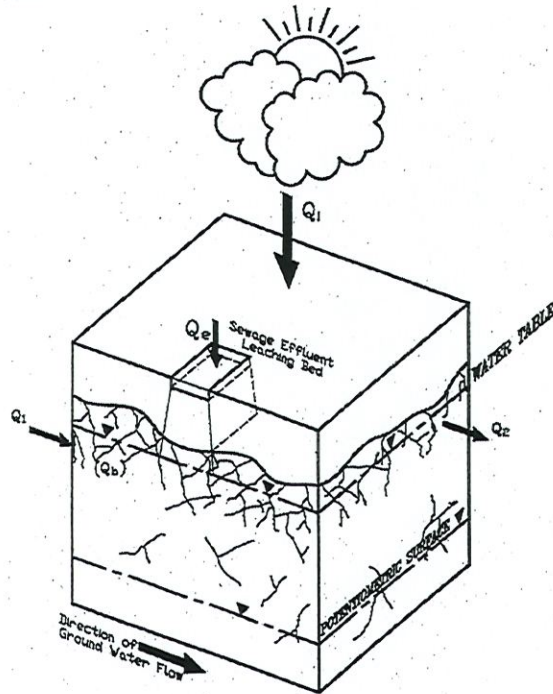


Figure 7 – Shallow soil over fractured bedrock and subsurface sewage system (MECP, 1995)

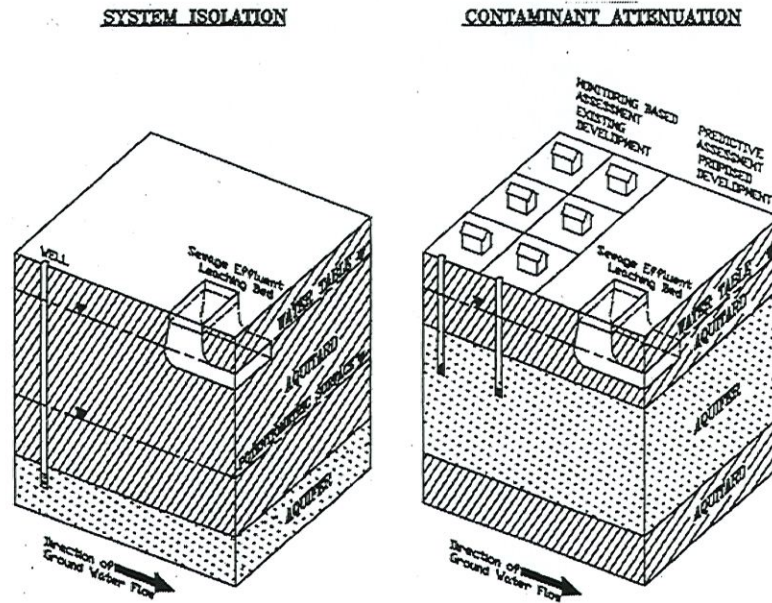


Figure 8 – Water Quality Assessment Process (MECP, 1995)

5.0 Prediction of Contaminant Attenuation

Using the Section 22.5.8 Procedure (refer to Figure 3) (MECP, 2008), an assessment was completed to calculate downgradient property boundary nitrate-nitrogen (NO₃-N) groundwater concentrations (refer to Appendix D, Table D-1). Assessment parameters included:

1. Proposed septic bed locations, and associated dilution areas, as shown on Figure 6 based upon groundwater flowing from northeast to southwest (refer to Section 4.4). However, the previous school building as shown on Figure 6 in the southern part of the Site is no longer present.
2. For the purposes of predicting the potential for groundwater impacts concentrations of 40 and 10 mg/L nitrate-nitrogen were used for effluent without Level IV (or tertiary treatment) nitrogen reduction (MECP, 1996a) and with Level IV (or tertiary) treatment for 75% nitrogen reduction, also referred to as N-II treatment.
3. An average, not peak, sewage loading rate of 1,000 Litres/day was used for the assessment of the 6-bedroom homes (Niagara Region, 2024b).
4. The downgradient concentration is required to be less than the drinking water standard of 10 mg/L NO₃-N as described in MECP (1995) for municipally approved (Part 8 of the Ontario Building Code) septic systems.

In order to meet the downgradient concentration requirement of 10 mg/L nitrate-nitrogen (MECP, 1996a), the sewage system will be required to have Level IV (or tertiary) treatment for 75% nitrogen reduction, also referred to as N-II treatment.

5.1 Effluent Treatment

Niagara Region is the local approval authority within the City of Port Colborne for Part 8 Ontario Building Code septic system permits and allows the use of Level IV/Tertiary treatment to improve septic effluent quality.

In Ontario, certification of systems for nitrogen removal had begun through the application of the CAN-BNQ 3680-600 standard (Ministry of Municipal Affairs and Housing, 2011). It is our understanding that Niagara Region allows nitrogen removal systems with submission of sufficient documentation for 75% nitrogen removal (N-II), e.g. (a) Waterloo Biofilter with WaterNOx™ (an advanced nitrogen removal filter) is expected to be less than 5 mg/L total nitrogen (<https://waterloo-biofilter.com/products/nutrient-removal/nitrogen-removal-products/waternox/>) and (b) Bionest with a DE-OX unit has a reported total nitrogen effluent quality of 6 mg/L.

5.2 Other Considerations

Development agreements should be completed to ensure that cisterns will be used for any new water supplies at the Site. However, if in the future it is desired that new groundwater supplies be constructed, the following should occur:

- (i) a water supply assessment as per MECP (1996b) should be completed;
- (ii) the water supply well should be constructed with a minimum of 6 metres of casing; and

- (iii) the well should be located to meet the minimum Ontario Building Code set-back and be upgradient from existing and new sewage disposal systems.

6.0 Summary of Recommendations

The proposed lots, as shown on Figure 6, can be safely serviced by private sewage systems with the implementation of the following recommendations:

1. The lots be equipped with sewage disposal systems that provide at least 75% nitrogen reduction of septic effluent (Level IV/tertiary treatment);
2. Water is supplied by cisterns for each of the lots by the means of a development agreement. Otherwise, the construction of new groundwater supplies should require:
 - a. A water supply assessment (MECP, 1996b);
 - b. Water wells be constructed with casing to at least 6 metres below ground surface; and
 - c. Locations meet the minimum Ontario Building Code set-backs, and be upgradient of existing and future sewage disposal systems.
3. If any existing water wells are identified at the Site during construction activities they be decommissioned by a licensed water well contractor.

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

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 - Site Details
- Figure 4 - Geologic Cross-section A-A'
- Figure 6 - Septic Plume Assessment
- Appendix A - MECP Water Well Logs
- Appendix B - Water Use & Septic System Survey
- Appendix C - Supporting Information
- Appendix D - Nitrate-Nitrogen Calculations



7.0 References

- 6M Contracting Ltd., 2024. Septic Design, Parts 1 and 2, Sherk Rd., Port Colborne, Ontario. Completed for Colin Dempster.
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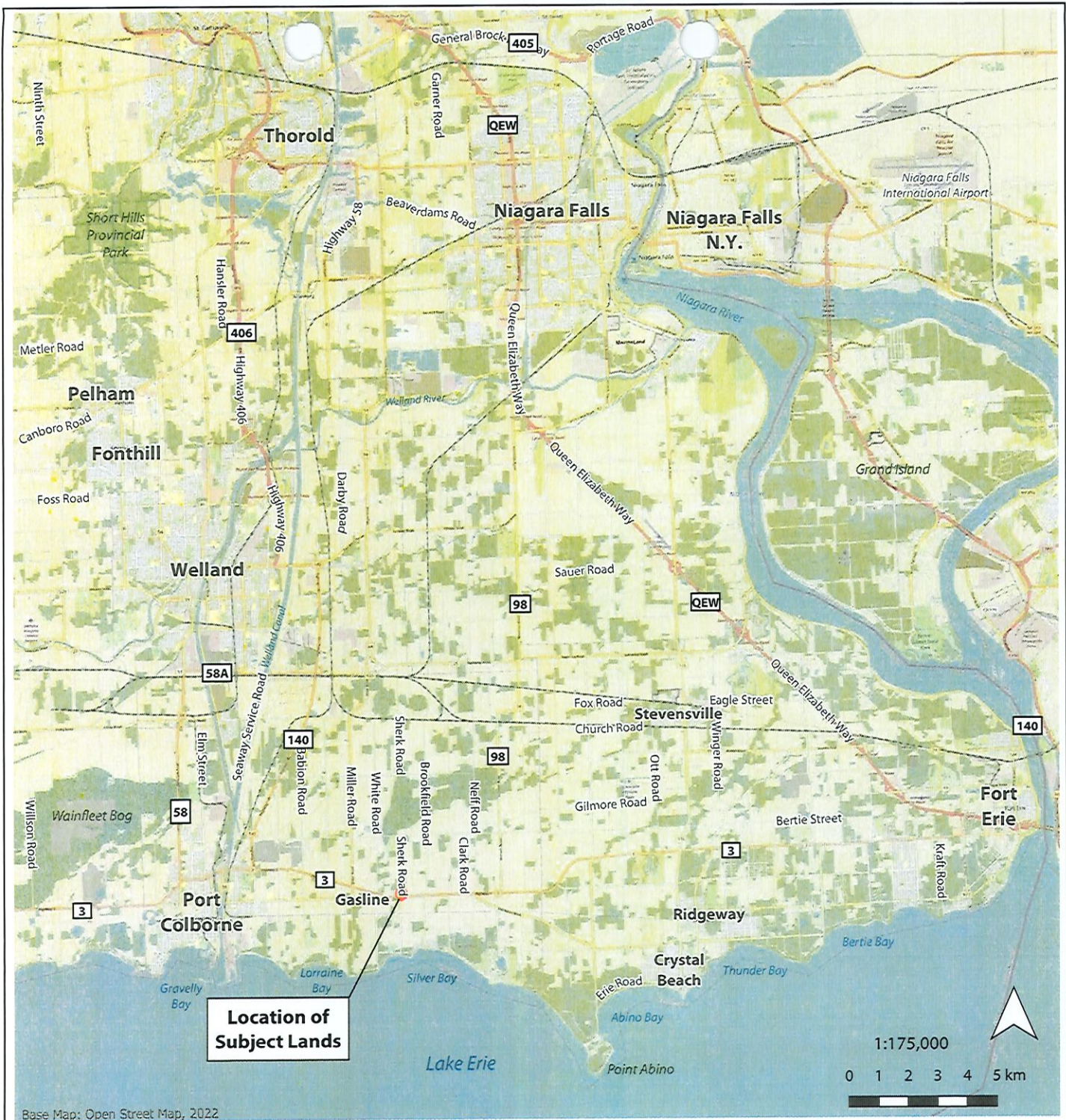
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Suda & Maleszyk Surveying Inc., 2024. Committee of Adjustment Application, Part of Lot 13, Concession 2, Geographic Township of Humberstone, City of Port Colborne.

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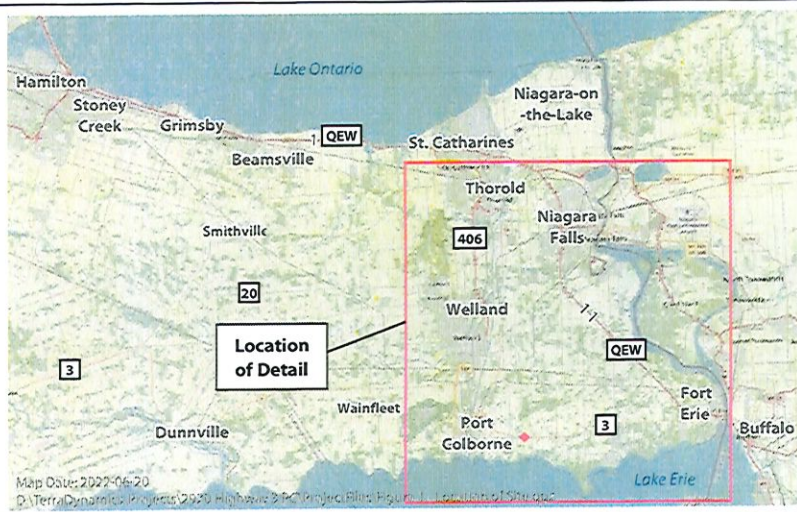
Figures



Base Map: Open Street Map, 2022.

1:175,000

0 1 2 3 4 5 km



Map Date: 2022-06-20
 © Terra-Dynamics Consulting Inc. 2022. Highway 3 PC Project File: Figure 1 - Location of Subject Lands

Location of Subject Lands

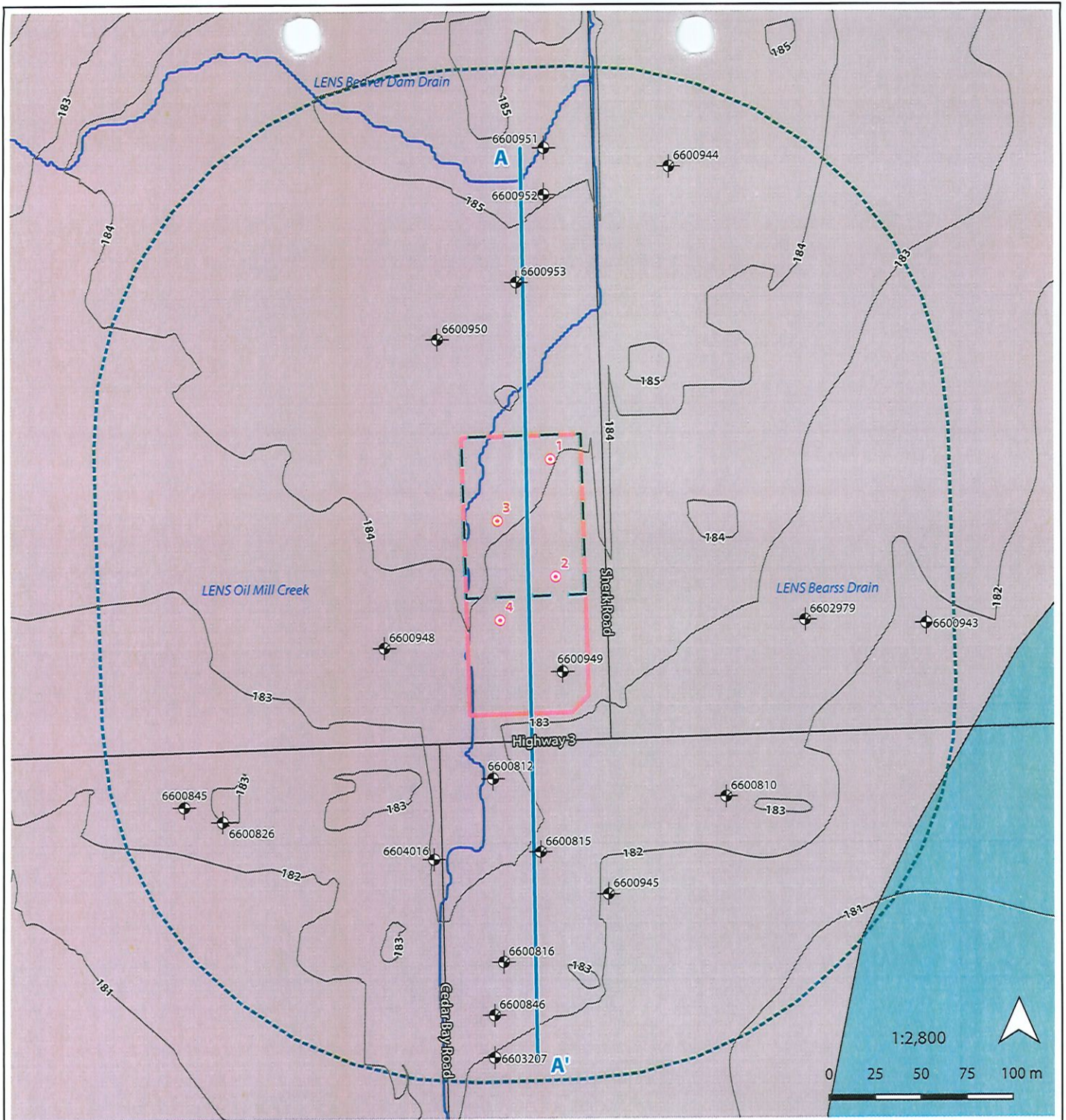
2970 Highway 3, Port Colborne Hydrogeological Assessment



Terra-Dynamics Consulting Inc.

Prepared for:
 Mr. Chris Laverick

Figure 1



- MECP Water Well Record within 200m of Site
- Hand Auger Locations
- Ground Surface Contour (1m)
- Hydrogeologic Cross-Section A-A'
- Site
- Consent
- 200m Buffer of Site
- Subwatershed Boundary
- Surficial Geology**
 - Cherty Limestone
 - Clay and Silt

Site Details

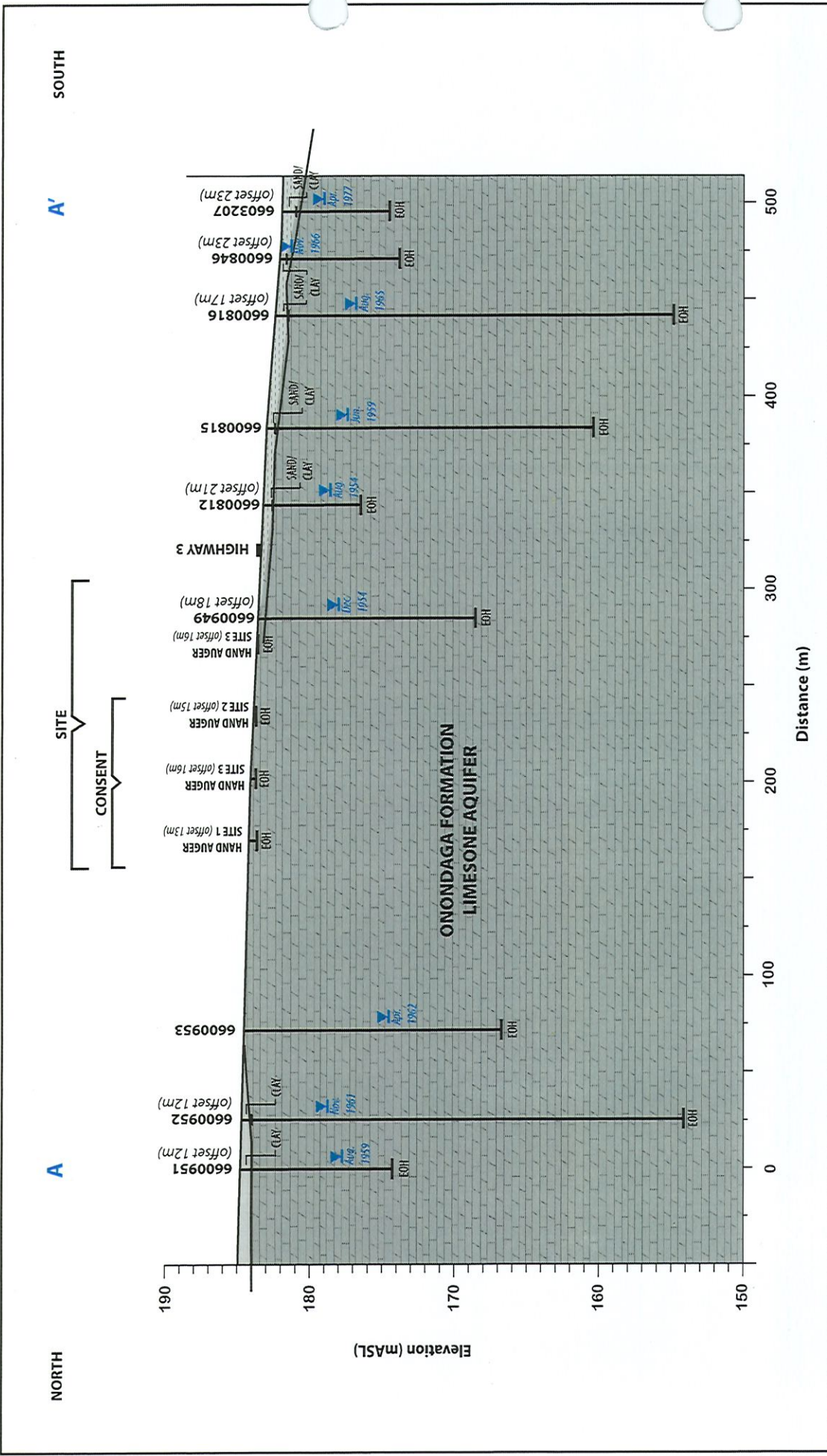
2970 Highway 3, Port Colborne Hydrogeological Assessment



Prepared for:
Mr. Chris Laverick


Figure 2

References: Niagara Peninsula Conservation Authority: Ground Surface Contours (1m), 2010. Ministry of the Environment, Conservation and Parks: Water Well Information System Records, 2022 (updated). Ontario Geological Survey: Surficial Geology. Map Date: 2024-06-06. D:\TerraDynamics\Projects\2970 Highway 3 PC\ProjectFiles\Figure 2 - Site Details.qgz



Hydrogeologic Cross-Section A-A'

2970 Highway 3, Port Colborne, ON
Hydrogeological Assessment



Terra-Dynamics Consulting Inc.

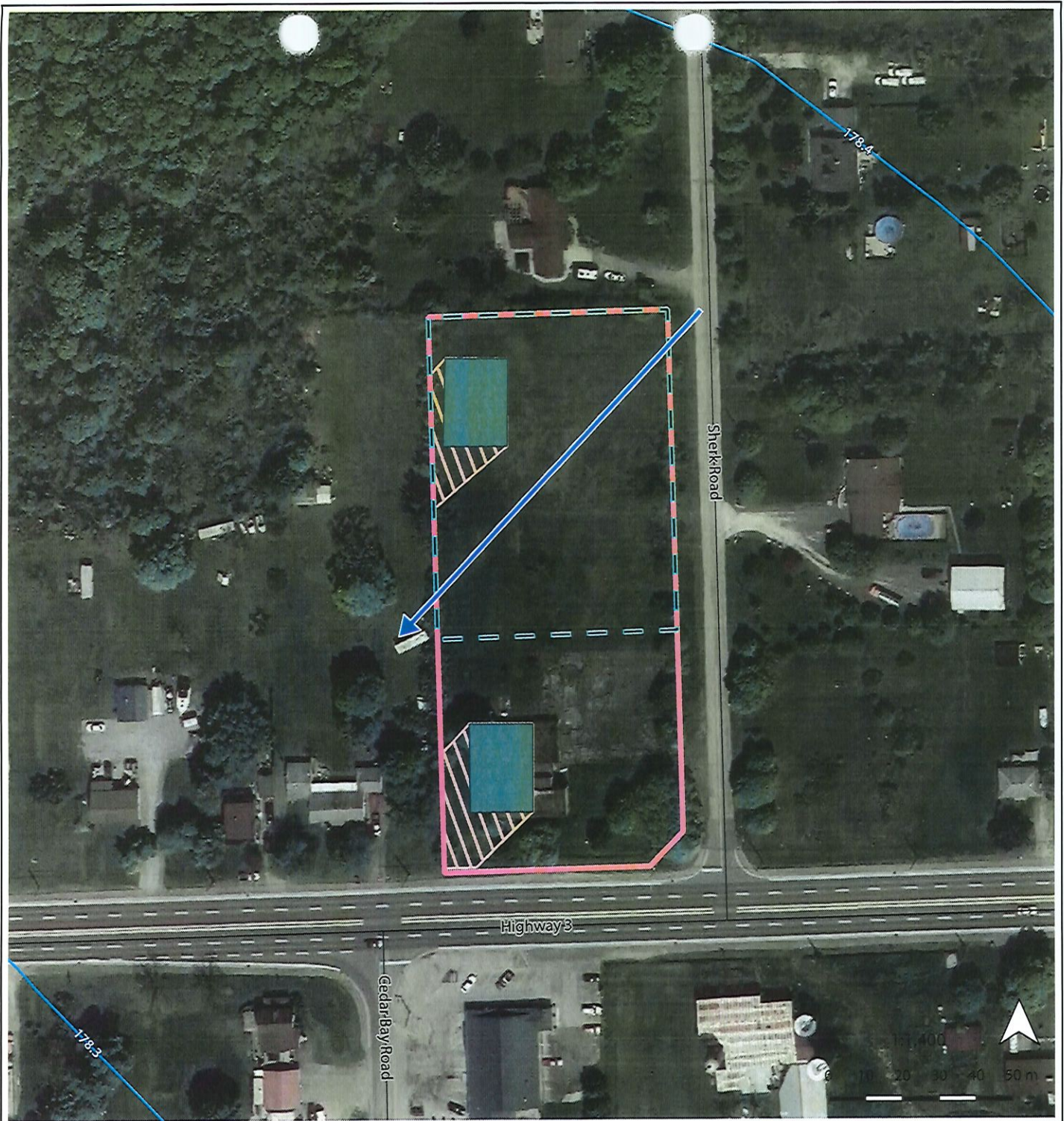
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Figure 4

Well Water Level on date as noted

EOH End of Hole

See Figure 2 for line of cross-section



-  General Direction of Groundwater Flow
-  Groundwater Contour
(metres above sea level) NPCA, 2005
-  Site
-  Consent
-  Proposed Septic Bed Area
-  Effluent Dilution Area

Septic Plume Assessment

2970 Highway 3, Port Colborne Hydrogeological Assessment



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Mr. Chris Laverick

Figure 6

Appendix A
Water Well Records

UTM. | | Z | | | | | | | | E
 | | | | | | | | | | N
 Elev. 9R 0600
 Basin 23 | | | | | |



RECEIVED 66
 SEP - 8 1954
 GEOLOGICAL BRANCH
 DEPARTMENT of MINES

Nº 812

The Well Drillers Act
 Department of Mines, Province of Ontario

Water Well Record PORT COLBORNE

County or Territorial District... Welland Township, Village, Town or City... Chumleyton
 Con... 1 Lot 62 Street and Number (if in Village, Town or City).....
 Owner..... Address... P. R. 1 Port Colborne
 Date Completed... 20 August 1954 Cost of Well (excluding pump).....
(day) (month) (year)

Pipe and Casing Record

Pumping Test

Casing diameter(s)..... 5 5/8
 Length(s) of casing(s)..... 3 ft.
 Type of screen.....
 Length of screen.....
 Distance from top of screen to ground level.....
 Is well a gravel-wall type?.....
 Date.....
 Static level..... 8 ft. 1.7
 Pumping level..... 8 ft. 1.4
 Pumping rate..... 700 gal per hr.
 Duration of test..... 20 minutes
 Distance from cylinder or bowls to ground level.....

Water Record

Kind (fresh or mineral)..... <u>fresh</u>	Depth(s) to Water Horizon(s)..... <u>8 ft.</u> <u>22</u>	Kind of Water..... <u>fresh</u>	No. of Feet Water Rises..... <u>8 ft.</u>
Quality (hard, soft, contains iron, sulphur, etc.)..... <u>fresh</u>			
Appearance (clear, cloudy, coloured)..... <u>clear</u>			
For what purpose(s) is the water to be used?..... <u>Domestic</u>			
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.....			

Well Log

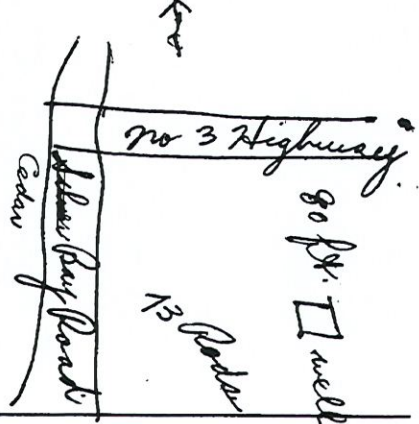
Overburden and Bedrock Record

From To

<u>Sandy loam</u>	0 ft.	<u>1</u> ft.
<u>Black flint</u>	<u>1</u>	<u>22</u>

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?.....
 Drilling Firm..... Hayll & Hallberg
 Address..... P. R. 1 Port Colborne
 Name of Driller..... Bernard Hallberg Address... P. R. 1 Port Colborne
 Date..... Sept 5 Licence Number... 738
Bernard Hallberg
 Signature of Licensee

UTM [] Z [] E

[5] R [] N

Elev. [9] R [0600]

Base [23]



66 No 815
GROUND WATER BRANCH
SEP 23 1959
ONTARIO WATER RESOURCES COMMISSION

The Ontario Water Resources Commission Act, 1957

WATER WELL RECORD

Lot 12
County or District Welland Humberstone Township, Village, Town or City Port Colborne

Well completed 2nd June 1959
Address R. R. 1 Port Colborne

Casing and Screen Record

Inside diameter of casing 5 1/2"
Total length of casing 7'
Type of screen 5"
Length of screen
Depth to top of screen
Diameter of finished hole 5"

Pumping Test

Static level 18 ft.
Test-pumping rate 1 gal. G.P.M.
Pumping level 3.5 ft.
Duration of test pumping 1 hour
Water clear or cloudy at end of test clearing
Recommended pumping rate 1 gal. G.P.M.
with pumping level of 3.5 ft.

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, sulphur)
<u>stones & loam flint</u>	<u>0</u>	<u>2</u>	<u>71</u>	<u>5.3 ft</u>	<u>sulphur</u>

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

business - small store

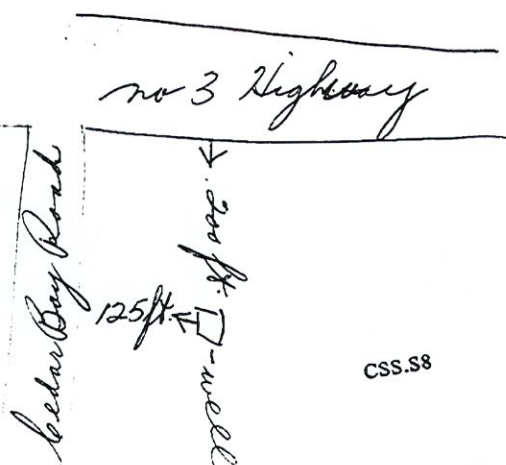
Is well on upland, in valley, or on hillside? level

Location of Well

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



Drilling Firm Leonard Hallborg
Address R. R. 1 Port Colborne
Licence Number 165
Name of Driller Same as firm
Address Same as firm
Date Sept 21, 1959
Leonard Hallborg
(Signature of Licensed Drilling Contractor)



CSS.58



WATER RESOURCES DIVISION

B

66 No 816

NOV 29 1965

PORT COLBORNE ONTARIO WATER RESOURCES COMMISSION

UTM 12 E 5 R

The Ontario Water Resources Commission Act

Elev. 9 R 0599

WATER WELL RECORD

Basin 23 | Welland

Township, Village, Town or City (Numberstone)

Con. 1 Lot 12

Date completed 13 Aug 65 (day month year)

Owner Department of Highways (print in block letters)

Address Gasline Yard #3 highway Port Colborne

Casing and Screen Record

Pumping Test

Inside diameter of casing 6 1/4
Total length of casing 15 ft
Type of screen
Length of screen
Depth to top of screen
Diameter of finished hole 5 3/4

Static level 18 ft
Test-pumping rate 5-6 G.P.M.
Pumping level 65'
Duration of test pumping 8 hours
Water clear or cloudy at end of test clearing
Recommended pumping rate 5 G.P.M.
with pump setting of 80-85' 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)
Sand & stones	0	3		
Flint Rock.	3	90	45	FRESH
			88	SLIGHTLY SULPHUR.

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

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

Drilling or Boring Firm S.W. Merritt

Address R.R. 1 Smithville

Licence Number 1732

Name of Driller or Borer same

Address

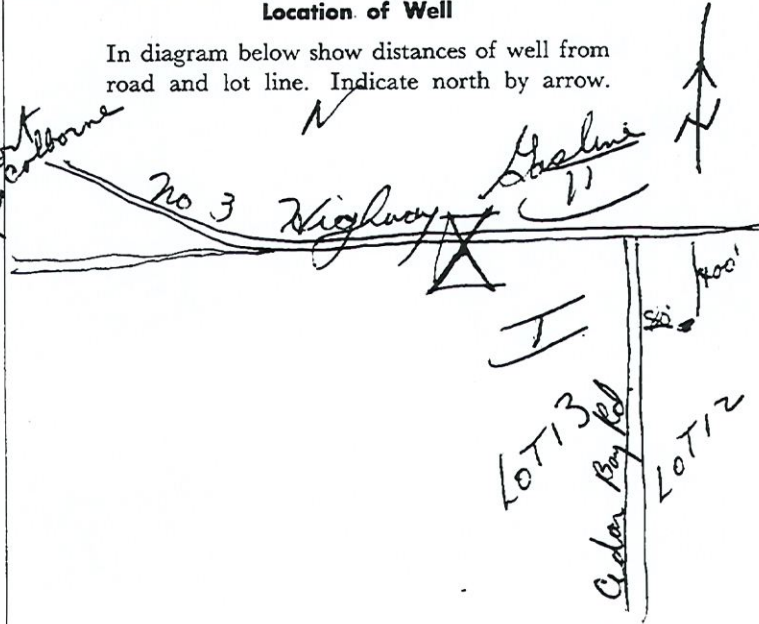
Date Aug 14 / 65

(Signature of Licensed Drilling or Boring Contractor)

Form 7 15M-60-4138

Location of Well

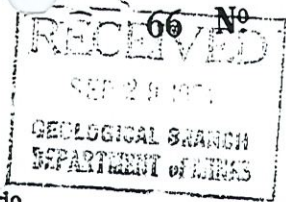
In diagram below show distances of well from road and lot line. Indicate north by arrow.



UTM [] Z [] E
 [9] R [] N
 Elev. [9] B 0599
 Basin [23] [] [] [] [] []



The Well Drillers Act
 Department of Mines, Province of Ontario



826

Water Well Record PORT COLBORNE

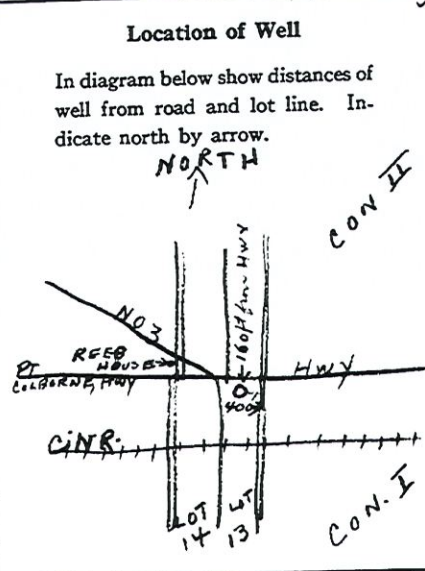
Village, Town or City HUMBERTON
 or City HUMBERTON
 Owner W. McINTYRE

Date Completed... 25 AUG 1954 Cost of Well (excluding pump).....

Pipe and Casing Record		Pumping Test	
Casing diameter(s)..... <u>6 1/4"</u>	Date..... <u>AUG 25/54</u>	Static level..... <u>19 1/2'</u>	
Length(s) of casing(s)..... <u>6'</u>	Pumping level..... <u>20'</u>	Pumping rate..... <u>1 gal.</u>	
Type of screen.....	Duration of test..... <u>1 hr.</u>	Distance from cylinder or bowls to ground level.....	
Length of screen.....	Is well a gravel-wall type?.....		

Water Record			
Kind (fresh or mineral).....	Depth(s) to Water Horizon(s)	Kind of Water	No. of Feet Water Rises
<u>MINERAL fresh</u>	<u>31'</u>	<u>HARD</u>	<u>12 1/2'</u>
Quality (hard, soft, contains iron, sulphur, etc.)..... <u>HARD</u>			
Appearance (clear, cloudy, coloured)..... <u>CLEAR</u>			
For what purpose(s) is the water to be used?..... <u>DOMESTIC</u>			
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.....			

Well Log		
Overburden and Bedrock Record	From	To
	0 ft.	...ft.
<u>Loam</u>	<u>0</u>	<u>1 1/2</u>
<u>BROKEN HARD ROCK</u>	<u>1 1/2</u>	<u>6</u>
<u>FLINT</u>	<u>6</u>	<u>20</u>
<u>LIMESTONE</u>	<u>20</u>	<u>31</u>



Situation: Is well on upland, in valley, or on hillside?.....
 Drilling Firm..... KRAMER + McINTYRE
 Address..... 298 HUMBOLT ST. PORT COLBORNE
 Name of Driller..... W. McINTYRE Address..... 298 HUMBOLT ST.
 Date..... SEPT 22/54 Licence Number..... 750
 Signature of Licensee W. McINTYRE



WATER RESOURCES DIVISION
 66 No 846
 NOV 18 1966
 PORT COLBORNE
 ONTARIO WATER RESOURCES COMMISSION

UTM 12 Z 16 E

5 R 16 N The Ontario Water Resources Commission Act

Elev. 4 R 0599

WATER WELL RECORD

Basin 23 Welland Township, Village, Town or City Humberston

Con. 1 Lot part 13 Date completed 15 Nov 66
 (day month year)

Address R.R. 1 Port Colborne

Casing and Screen Record

Pumping Test

Inside diameter of casing 6 in
 Total length of casing 5 ft
 Type of screen
 Length of screen
 Depth to top of screen
 Diameter of finished hole 5 in

Static level 3 ft
 Test-pumping rate 15 G.P.M.
 Pumping level 15 ft
 Duration of test pumping 1 1/2 hrs
 Water clear or cloudy at end of test clear
 Recommended pumping rate 2 G.P.M.
 with pump setting of 20 feet below ground surface

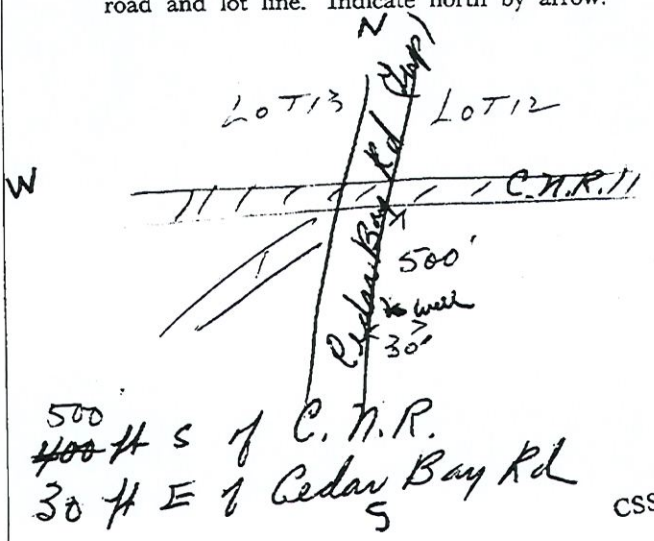
Well Log

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 loam</u>	<u>0</u>	<u>1</u>		
<u>flint</u>	<u>1</u>	<u>27</u>	<u>27</u>	<u>fresh</u>

Location of Well

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



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

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 Dome

Address

Date Nov 15/66

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

UTM [] Z [] E

[9] R [] N

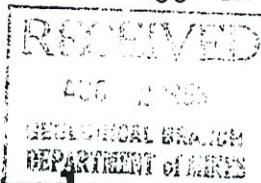
Elev. on [9] R [0599]

Basin [23] []



The Water-well Drillers Act, 1954
Department of Mines

66 N° 943



Water-Well Record

County or Territorial District Midland Township, Village, Town or City Port Colborne

Village, Town or City Port Colborne
Address Crystal Beach

(day) (month) (year)

Pipe and Casing Record

Pumping Test

Casing diameter(s) <u>6 1/4"</u>	Static level <u>27 ft</u>
Length(s) <u>1 1/2 ft to 2 ft</u>	Pumping rate <u>1 gal day</u>
Type of screen	Pumping level <u>42 ft</u>
Length of screen	Duration of test <u>1 hr</u>

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)
<u>Iron</u>	<u>0</u>	<u>16"</u>			
<u>flint Rock</u>	<u>16"</u>	<u>42 ft</u>	<u>42'</u>	<u>15 ft</u>	<u>fresh</u>

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

Domestic

Is water clear or cloudy? Clear

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

Drilling firm M. J. J. Drilling

Address 24 T. Howard St

Port Colborne

Name of Driller

Address

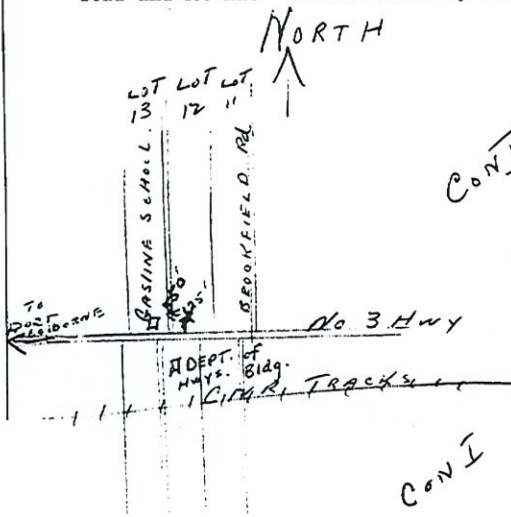
Licence Number M. 750

I certify that the foregoing statements of fact are true.

Date July 156 Midland McDi...
Signature of Licensee Per N. M.

Location of Well

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





UTM [] Z [] E

5 R [] N The Ontario Water Resources Commission Act

Elev. 9 R 05'99

WATER WELL RECORD

Basin 23 Welland Township, Village, Town or City Stumbersome

Con. 2 Lot part 12 Date completed 24 Oct 64

Address [Redacted] RR1 Port Colborne

WATER RESOURCES
66 DIVISION 945
OCT 27 1964
PORT COLBORNE
ONTARIO WATER
RESOURCES COMMISSION

Casing and Screen Record

Inside diameter of casing 6 in.
Total length of casing 6 ft
Type of screen
Length of screen
Depth to top of screen
Diameter of finished hole 5 1/2 in

Pumping Test

Static level 12
Test-pumping rate 2 G.P.M.
Pumping level pumps empty
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 54 feet below ground surface

Well Log

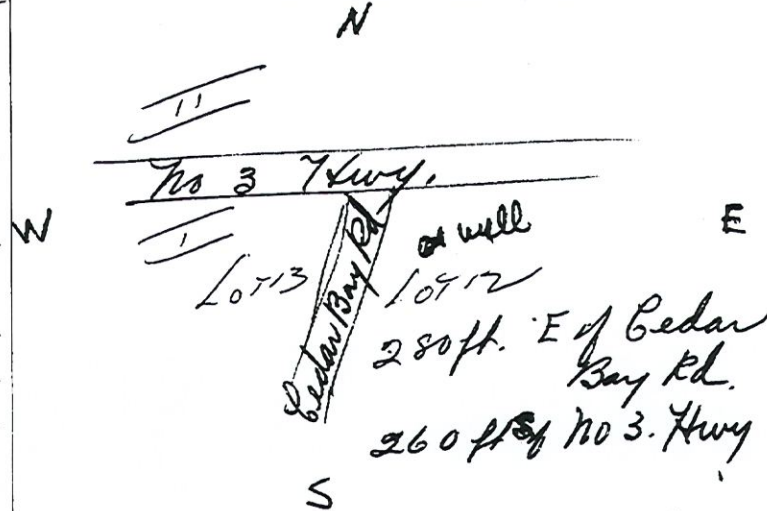
Water Record

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
rubble	0	2		
flint	2	36		
grey limestone	36	56	56	slightly sulphur

For what purpose(s) is the water to be used? poultry farm
Is well on upland, in valley, or on hillside? upland
Drilling or Boring Firm Raymond L. Schooley
Address RR 3 Port Colborne
Licence Number 1237
Name of Driller or Borer Same
Address
Date Raymond L. Schooley
(Signature of Licensed Drilling or Boring Contractor)

Location of Well

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



UTM *18* Z

9 R

Elev. *9* *06109*

Basin *23*



66 No 948

RECEIVED

FEB 8 1950

The Well Drillers Act
Department of Mines, Province of Ontario

GEOLOGICAL BRANCH
DEPARTMENT OF MINES

Water Well Record

County or District *Middlesex* CITY *Humbertville* PORT COLBORNE *II* Lot. *13* Pt. Lot.
B.I. Port Colborne Acres. *0*
(including pump)

Pipe and Casing Record

Pumping Test

Casing diameter(s) <i>5 inch</i>	Date
Length(s) of casing(s) <i>8 ft.</i>	Developed Capacity <i>about 3 gals per hour</i>
Length of screen	Duration of Test
Type of screen	Pumping Rate
Type of pump <i>Hand Pump</i>	Drawdown
Capacity of pump	Static level of completed well <i>16 ft.</i>
Depth of pump setting	Is well a gravel-wall type? <i>No</i>

Water Record

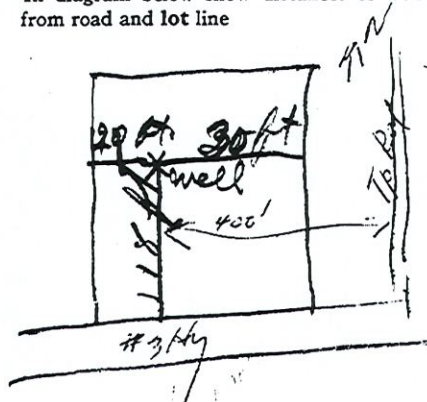
Kind (fresh or mineral)	Depth(s) to Water Horizon(s)	Kind of Water	No. of Feet Water Rises
<i>Mineral sulphur</i>	<i>127 ft</i>	<i>Sulphur</i>	<i>111 ft</i>
Quality (hard, soft, contains iron, sulphur etc.)
Appearance (clear, cloudy, coloured) <i>coloured</i>
For what purpose(s) is the water to be used? <i>House use</i>
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

Well Log

Drift and Bedrock Record	From	To
<i>Gravel</i>	0 ft.	3 ft.
<i>Rock</i>	3	127
.....
.....
.....
.....
.....
.....
.....
.....

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? *upland*

Drilling Firm *L.H. Small*

Address *B.I. Port Colborne Ont.*

Recorded by *same* Address

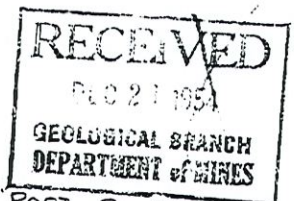
Date *Nov. 14 1949* Licence Number

CSS.S8

Well No.
 UTM Z E
49 R N
 Elev. 9 R 0600
 Basin 243



66 No. 949



The Water-well Drillers Act, 1954
 Department of Mines

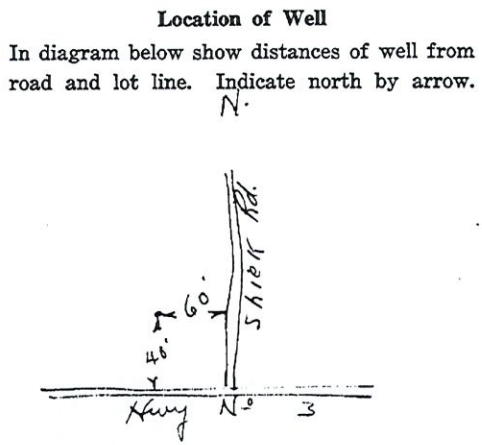
Water-Well Record

County or Territorial District Welland Township, Village, Town or City Port Colborne
 Con. 2 Lot 13 Street and Number (if in Village, Town or City)
 Owner School Address R.R. 1 Port Colborne
 Date completed 4 Dec 1954
 (day) (month) (year)

Pipe and Casing Record		Pumping Test	
Casing diameter (s) <u>5 3/4</u>	Static level <u>1.7 ft</u>	Length (s) <u>5 ft</u>	Pumping rate <u>4 gals per min</u>
Type of screen <u> </u>	Pumping level <u>pumped empty</u>	Length of screen <u> </u>	Duration of test <u>half hour</u>

Overburden and Bedrock Record	Well Log		Water Record		
	From ft.	To ft.	Depth (s) at which water (s) found	No. of feet water rises	Kind of water (fresh, salty, or sulphur)
<u>Shale</u> <u>grey limestone</u>	<u>0 ft</u> <u>28 ft</u>	<u>28 ft</u> <u>48 ft</u>	<u>48 ft</u>	<u>31 ft</u>	<u>sulphur</u>

For what purpose(s) is the water to be used?
School use
 Water clear or cloudy? cloudy
 Well on upland, in valley, or on hillside?
upland
 Drilling firm R. Schooley
 Address R.R. 3
Port Colborne
 Name of Driller R. Schooley
 Address R.R. 3 Port Colborne
 Licence Number 362
 I certify that the foregoing statements of fact are true.
 Date Dec 18/54 R. Schooley
 Signature of Licensee



UTM 1 Z E
9 R N
 Elev. 9 R 06100
 Basin 23



The Water-well Drillers Act, 1954
 Department of Mines

66 No 950
RECEIVED
 JUN - 3 1955
 GEOLOGICAL BRANCH
 DEPARTMENT OF MINES

Water-Well Record

County or Territorial District Welland Township, Village, Town or City Port Colborne ON
 Con. 2 Lot 13 Street and Number (if in Village, Town or City) Humberstone Ave
 Owner S. C. No 2 School house Address
 Date completed 17 March 1955
 (day) (month) (year)

Pipe and Casing Record

Pumping Test

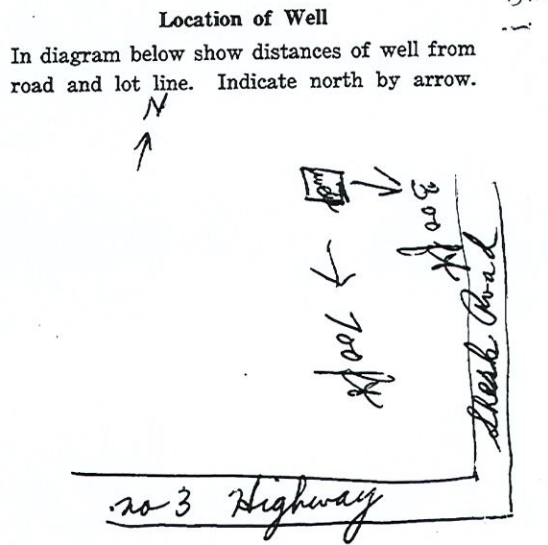
Casing diameter(s) <u>6 3/4"</u>	Static level <u>12 ft</u>
Length(s) <u>4 ft</u>	Pumping rate <u>26 gal per minute</u>
Type of screen <u> </u>	Pumping level <u>22 ft</u>
Length of screen <u> </u>	Duration of test <u>1 hour</u>

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)
<u>Sandy loam</u>	<u>0</u>	<u>4</u>	<u>53 ft</u>	<u>10 ft</u>	<u>sulphur</u>
<u>clay</u>	<u>4</u>	<u>40</u>	<u>108 ft</u>	<u>10 ft</u>	<u>sulphur</u>
<u>blue brown</u>	<u>40</u>	<u>121</u>			

For what purpose(s) is the water to be used?
school
 Is water clear or cloudy? cloudy
 Is well on upland, in valley, or on hillside?
level
 Drilling firm Reynard Hallberg
 Address P.O. 1 Port Colborne
 Name of Driller Reynard Hallberg
 Address P.O. 1 Port Colborne
 Licence Number 738
 I certify that the foregoing statements of fact are true.
 Date May 31 Reynard Hallberg
 Signature of Licensee



UTM Z E
5 R N
 Elev. 4 3 0 0 0
 Basin 2 3



GROUND WATER BRANCH
 REG 06695N
 ONTARIO WATER
 RESOURCES COMMISSION

951

The Ontario Water Resources Commission Act, 1957

WATER WELL RECORD

PORT COLBORNE

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



Well completed 29 Aug 59
 (day) (month) (year)
 Address R.R. 1 Port Colborne

Casing and Screen Record

Inside diameter of casing 5"
 Total length of casing 8 ft.
 Type of screen.....
 Length of screen.....
 Depth to top of screen.....
 Diameter of finished hole 5"

Pumping Test

Static level 24 ft
 Test-pumping rate 12 G.P.M.
 Pumping level 24
 Duration of test pumping 1 hr
 Water clear or cloudy at end of test clear
 Recommended pumping rate 12 G.P.M.
 with pumping level of 24 ft

Well Log

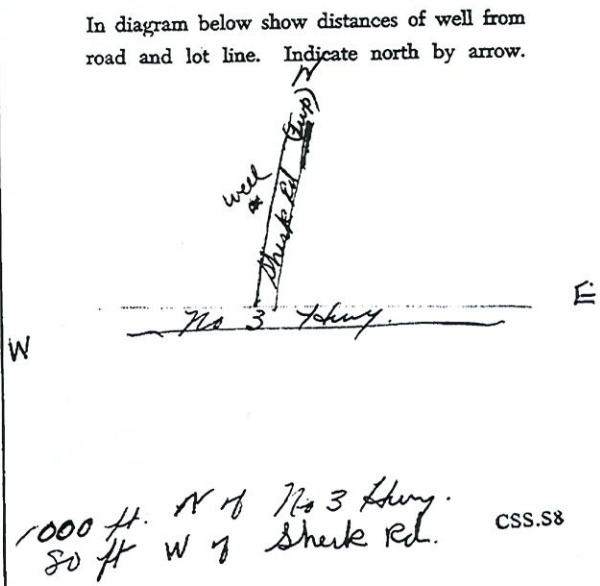
Water Record

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, sulphur)
<u>soil</u>	<u>0</u>	<u>2</u>			
<u>loose rock</u>	<u>2</u>	<u>8</u>			
<u>flint</u>	<u>8</u>	<u>20</u>			
<u>grey limestone</u>	<u>20</u>	<u>36</u>	<u>36 ft.</u>	<u>12 ft</u>	<u>slightly sulphur</u>

For what purpose(s) is the water to be used?
domestic
 Is well on upland, in valley, or on hillside?
upland
 Drilling Firm R. L. Schooley
 Address R.R. 3
Port Colborne
 Licence Number 43
 Name of Driller Same
 Address.....
 Date Aug 30/59
Raymond Schooley
 (Signature of Licensed Drilling Contractor)

Location of Well

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



L.P.
 UTM 1 Z
5 R 1
 Elev. 4 R 8600



GROUND WATER BRANCH
 NOV 1 4 1961 No. 952
 ONTARIO WATER RESOURCES COMMISSION

The Ontario Water Resources Commission Act

WATER WELL RECORD

Basin 23 County or District Welland Township, Village, Town or City Port Colborne
 Date completed 2 11 1961
 (day month year)

Address 83 Zumbro St Port Colborne

Casing and Screen Record

Inside diameter of casing 6"
 Total length of casing 3 ft
 Type of screen none used
 Length of screen
 Depth to top of screen
 Diameter of finished hole 5 5/8

Pumping Test

Static level 21
 Test-pumping rate 1/2 G.P.M.
 Pumping level Pumps dry
 Duration of test pumping 1/2 hr
 Water clear or cloudy at end of test clearing
 Recommended pumping rate 1/2 G.P.M.
 with pump setting of 98 feet below ground surface

Well Log

Overburden and Bedrock Record

Stoney clay
light flint
Brown Rock
Blue rock

From ft.

To ft.

Depth(s) at which water(s) found

Kind of water (fresh, salty, sulphur)

0

2

43

Slightly

2

38

sulphur

38

94

94

100

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

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

Drilling or Boring Firm Walter Hinger & Son
209 Emerick Ave
Fort Erie

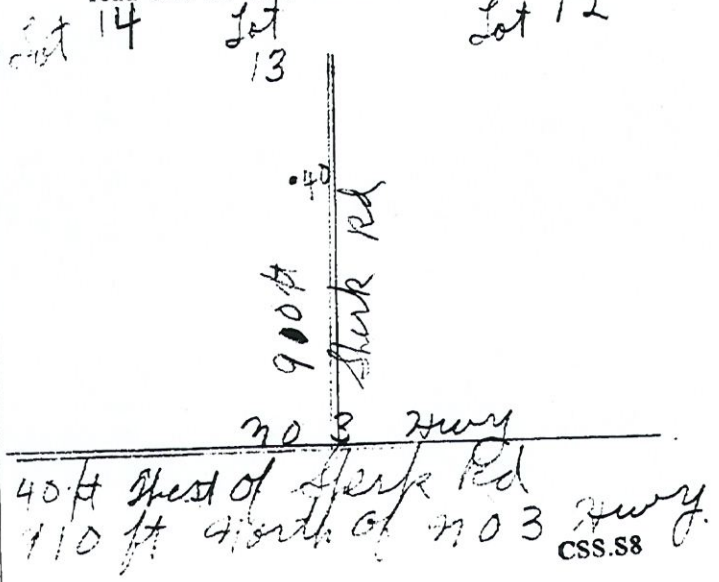
Licence Number 180

Name of Driller or Borer Walter Hinger
 Address Same

Date
 (Signature of Licensed Drilling or Boring Contractor) Walter Hinger

Location of Well

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





GROUND WATER BRANCH
 66 No. 953
 MAY 29 1962
 PORT COLBORNE
 ONTARIO WATER
 RESOURCES COMMISSION

U.T.M. 13 Z 5 R 4 R 0600
 Elev. 4 R 0600

The Ontario Water Resources Commission Act

WATER WELL RECORD

Basin 23 | Well and Well and | Township, Village, Town or City (Humberstone)
 County or District 2 | Lot Part 13 | Date completed 24 April 62
(day) (month) (year)
 Address RR1 Port Colborne

Casing and Screen Record

Inside diameter of casing 6 in.
 Total length of casing 6 ft.
 Type of screen
 Length of screen
 Depth to top of screen
 Diameter of finished hole 5 5/8 in.

Pumping Test

Static level 32 ft.
 Test-pumping rate 1 G.P.M.
 Pumping level 50 ft
 Duration of test pumping 2 hrs
 Water clear or cloudy at end of test clear
 Recommended pumping rate 1 G.P.M.
 with pump setting of 50 feet below ground surface

Well Log

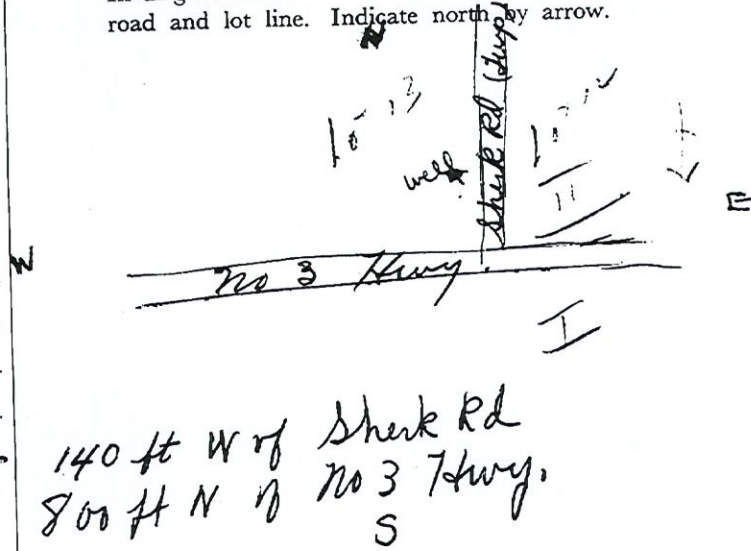
Water Record

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
<u>loose rock</u>	<u>0</u>	<u>6</u>		
<u>flint</u>	<u>6</u>	<u>36</u>		
<u>lime stone</u>	<u>36</u>	<u>58</u>	<u>58 ft</u>	<u>sulphur</u>

For what purpose(s) is the water to be used? domestic
 Is well on upland, in valley, or on hillside? upland
 Drilling or Boring Firm Raymond L. Schooley
 Address RR3 Port Colborne
 Licence Number 567
 Name of Driller or Borer same
 Address
 Date April 24/62
Raymond L. Schooley
 (Signature of Licensed Drilling or Boring Contractor)

Location of Well

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





Ontario

MINISTRY OF THE ENVIRONMENT
The Ontario Water Resources Act

WATER WELL RECORD

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

11 6602979 660.03 301/149
CON. 02

COUNTY OR DISTRICT: **WELLAND** TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: **HUMBERSTONE** CON., BLOCK, TRACT, SURVEY, ETC.: **CON 2** LOT: **012**

DATE COMPLETED: DAY **15** MO. **08** YR. **74**

6602979 11 649229 4150278 4 602 4 23 JUN 15, 1977 283

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET	
				FROM	TO
BLACK	TOP SOIL			0	18"
GREY	LIMESTONE		LAYERED	18"	80"

31 6602979 6602979 6602979

32

41 WATER RECORD

DEPTH FOUND AT - FEET	KIND OF WATER
10-13	1 <input checked="" type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 4 <input type="checkbox"/> MINERAL
15-18	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 4 <input type="checkbox"/> MINERAL
20-23	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 4 <input type="checkbox"/> MINERAL
25-28	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 4 <input type="checkbox"/> MINERAL
30-33	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 4 <input type="checkbox"/> MINERAL

51 CASING & OPEN HOLE RECORD

DEPTH - FEET	MATERIAL	WALL THICKNESS INCHES
0-10	1 <input checked="" type="checkbox"/> STEEL 12	
10-11	2 <input type="checkbox"/> GALVANIZED	
11-18	3 <input type="checkbox"/> CONCRETE	0.158
18-19	4 <input checked="" type="checkbox"/> OPEN HOLE	
19-20	1 <input type="checkbox"/> STEEL 19	
20-23	2 <input type="checkbox"/> GALVANIZED	
23-24	3 <input type="checkbox"/> CONCRETE	
24-25	4 <input checked="" type="checkbox"/> OPEN HOLE	
25-26	1 <input type="checkbox"/> STEEL 26	
26-27	2 <input type="checkbox"/> GALVANIZED	
27-28	3 <input type="checkbox"/> CONCRETE	
28-29	4 <input type="checkbox"/> OPEN HOLE	

SCREEN

SIZE (S) OF OPENING (SLOT NO.)	DIAMETER	LENGTH
	INCHES	FEET

MATERIAL AND TYPL

61 PLUGGING & SEALING RECORD

DEPTH SLT AT - FEET	MATERIAL AND TYPE
10-13	14-17
16-21	22-25
28-29	30-33

71 PUMPING TEST

PUMPING TEST METHOD: 1 PUMP 2 BAILEY

PUMPING RATE: 0010 GPM

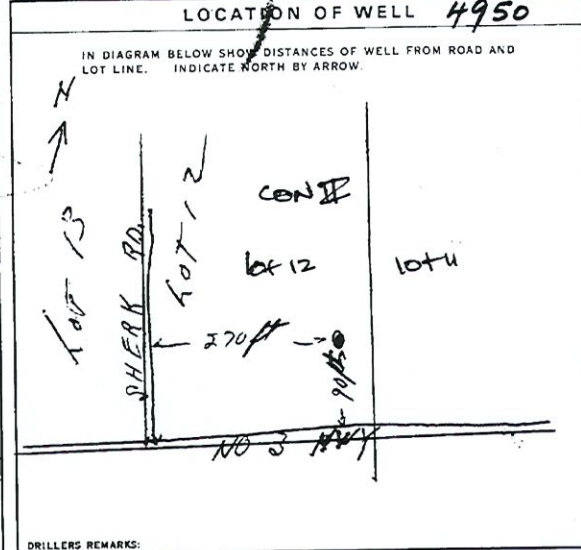
STATIC LEVEL: 030 FEET

WATER LEVELS DURING PUMPING: 060, 030, 28-28, 29-31, 32-34, 33-37

RECOMMENDED PUMP TYPE: SHALLOW DEEP

RECOMMENDED PUMP SETTING: 070 FEET

RECOMMENDED PUMPING RATE: 0005 GPM



84 FINAL STATUS OF WELL: 1 WATER SUPPLY

85-86 WATER USE: 1 DOMESTIC

87 METHOD OF DRILLING: 1 CABLE TOOL

CONTRACTOR

NAME OF WELL CONTRACTOR: **WAYNE McCAFFERY** LICENCE NUMBER: **3571**

ADDRESS: **R.R.#1 SHERKSTON**

NAME OF DRILLER OR BORER: **LEROY KRAMER** LICENCE NUMBER: **3810**

SIGNATURE OF CONTRACTOR: *Wayne McCaffery* SUBMISSION DATE: DAY **9** MO. **SEPT** YR. **74**

OFFICE USE ONLY

DATE SOURCE: **L 3571** CONTRACTOR: **3571** DATE RECEIVED: **180974**

DATE OF INSPECTION: **2** INSPECTOR: **MI P/S**

REMARKS: **CSS.S8**



WATER WELL RECORD

30/1/14g

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

CONTRACTOR **WELL**

COUNTY OR DISTRICT **NIAGARA** TOWNSHIP, BOROUGH, VILLAGE **HUMBERTON** CON. BLOCK, TRACT, SURVEY, ETC. **CON 1** LOT 25-27 **012**

Wellard **Humberston** **Cedar Bay Rd.** DATE COMPLETED DAY **4** MO **Apr** YR **1977**

50040 ELEVATION **0598** WIND CODE **23**

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)						
GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET		
				FROM	TO	
black	topsoil			0	4"	
brown	clay			4"	4"	
grey	limestone	flint		4	25"	

31 **0001302** **0004605** **002521540**

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
00/3	<input checked="" type="checkbox"/> FRESH <input checked="" type="checkbox"/> SULPHUR <input checked="" type="checkbox"/> SALTY <input checked="" type="checkbox"/> MINERAL
15-18	<input type="checkbox"/> FRESH <input type="checkbox"/> SULPHUR <input type="checkbox"/> SALTY <input type="checkbox"/> MINERAL
20-23	<input type="checkbox"/> FRESH <input type="checkbox"/> SULPHUR <input type="checkbox"/> SALTY <input type="checkbox"/> MINERAL
25-28	<input type="checkbox"/> FRESH <input type="checkbox"/> SULPHUR <input type="checkbox"/> SALTY <input type="checkbox"/> MINERAL
30-33	<input type="checkbox"/> FRESH <input type="checkbox"/> SULPHUR <input type="checkbox"/> SALTY <input type="checkbox"/> MINERAL

51 CASING & OPEN HOLE RECORD

DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET	
			FROM	TO
06 7/8	<input checked="" type="checkbox"/> STEEL <input type="checkbox"/> GALVANIZED <input type="checkbox"/> CONCRETE <input type="checkbox"/> OPEN HOLE	.188	0	00/10
06	<input type="checkbox"/> STEEL <input checked="" type="checkbox"/> GALVANIZED <input type="checkbox"/> CONCRETE <input checked="" type="checkbox"/> OPEN HOLE		10	0025
24-25	<input type="checkbox"/> STEEL <input type="checkbox"/> GALVANIZED <input type="checkbox"/> CONCRETE <input type="checkbox"/> OPEN HOLE			

61 PLUGGING & SEALING RECORD

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

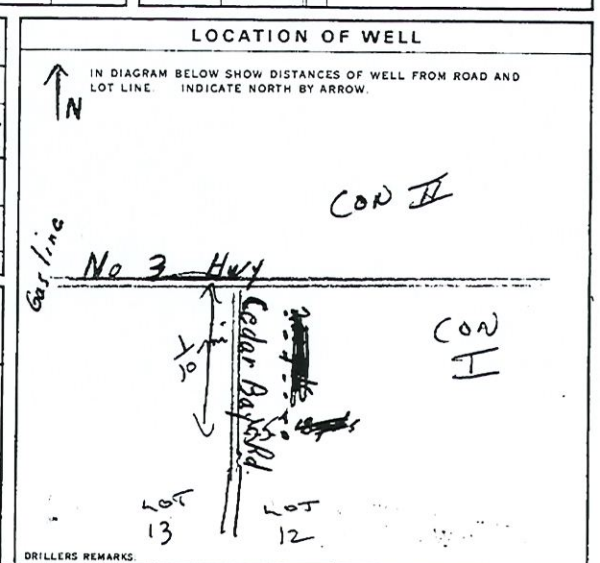
71 PUMPING TEST METHOD

PUMP BAUER **0012** GPM **01** DURATION OF PUMPING **00** HOURS **00** MINUTES

STATIC LEVEL **010** FEET WATER LEVEL END OF PUMPING **012** FEET

WATER LEVELS DURING PUMPING: 15 MINUTES **010** FEET, 30 MINUTES **010** FEET, 45 MINUTES **010** FEET, 60 MINUTES **010** FEET

RECOMMENDED PUMP TYPE SHALLOW DEEP RECOMMENDED PUMP SETTING **022** FEET RECOMMENDED PUMP RATE **0008** GPM



FINAL STATUS OF WELL **1**

WATER USE **01**

METHOD OF DRILLING **1**

CONTRACTOR **Dana Merritt** LICENCE NUMBER **3640**

ADDRESS **RR 2 - 5, S. Shillville**

SIGNATURE **Dana Merritt** LICENCE NUMBER **3640**

SUBMISSION DATE DAY **4** MO **April** YR **1977**

OFFICE USE ONLY

DATA SOURCE **1** **CONTRACT NUMBER** **3640** **DATE RECEIVED** **020577**

DATE OF INSPECTION **Aug 18/77** **INSPECTOR** **AMT**

REMARKS **CSS.S8**

P
WI

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

11

6604016

MUNICIPALITY 66003

CON. 1

LOT 13

COUNTY OR DISTRICT: Welland TOWNSHIP: Humberstone CON. BLOCK: Con 1 LOT: 13
 OWNER (SURNAME FIRST): Bell Canada ADDRESS: Gasline DATE COMPLETED: 15 August 91

ZONE: 21 EASTING: 12 NORTHING: 17 ELEVATION: 26 BASIN CODE: 11

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)					
GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET	
				FROM	TO
<u>brown</u>	<u>top soil</u>	<u>stones</u>	<u>loose</u>	<u>0</u>	<u>2 1/2</u>
<u>grey</u>	<u>limestone</u>		<u>layered</u>	<u>2 1/2</u>	<u>90</u>

31
32

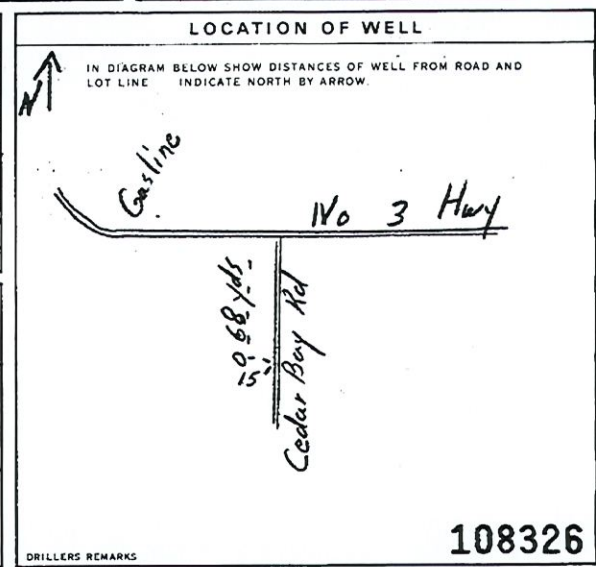
41 WATER RECORD	
WATER FOUND AT - FEET	KIND OF WATER
<u>65</u>	<input type="checkbox"/> FRESH <input type="checkbox"/> SALTY <input type="checkbox"/> SULPHUR <input type="checkbox"/> MINERALS <input type="checkbox"/> GAS
	<input type="checkbox"/> FRESH <input type="checkbox"/> SALTY <input type="checkbox"/> SULPHUR <input type="checkbox"/> MINERALS <input type="checkbox"/> GAS
	<input type="checkbox"/> FRESH <input type="checkbox"/> SALTY <input type="checkbox"/> SULPHUR <input type="checkbox"/> MINERALS <input type="checkbox"/> GAS
	<input type="checkbox"/> FRESH <input type="checkbox"/> SALTY <input type="checkbox"/> SULPHUR <input type="checkbox"/> MINERALS <input type="checkbox"/> GAS
	<input type="checkbox"/> FRESH <input type="checkbox"/> SALTY <input type="checkbox"/> SULPHUR <input type="checkbox"/> MINERALS <input type="checkbox"/> GAS

51 CASING & OPEN HOLE RECORD				
INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET	
			FROM	TO
<u>67</u>	<input type="checkbox"/> STEEL <input type="checkbox"/> GALVANIZED <input type="checkbox"/> CONCRETE <input type="checkbox"/> OPEN HOLE <input type="checkbox"/> PLASTIC	<u>188</u>	<u>0</u>	<u>30'</u>
<u>68</u>	<input type="checkbox"/> STEEL <input type="checkbox"/> GALVANIZED <input type="checkbox"/> CONCRETE <input type="checkbox"/> OPEN HOLE <input type="checkbox"/> PLASTIC		<u>30'</u>	<u>90</u>

SCREEN	SIZE OF OPENING (SLOT NO.)	DIAMETER INCHES	LENGTH FEET

61 PLUGGING & SEALING RECORD		
DEPTH SET AT - FEET	MATERIAL AND TYPE	(CEMENT GROUT, LEAD PACKER, ETC.)

71 PUMPING TEST	
<input type="checkbox"/> PUMP <input checked="" type="checkbox"/> BAILER	PUMPING RATE: <u>1</u> GPM
STATIC LEVEL: <u>18</u> FEET	WATER LEVEL END OF PUMPING: <u>85</u> FEET
WATER LEVELS DURING:	15 MINUTES: <u>85</u> FEET
	30 MINUTES: <u>85</u> FEET
	45 MINUTES: <u>85</u> FEET
	60 MINUTES: <u>85</u> FEET
IF FLOWING: GIVE RATE	PUMP INTAKE SET AT: <u>42</u> FEET
RECOMMENDED PUMP TYPE: <input type="checkbox"/> SHALLOW <input type="checkbox"/> DEEP	RECOMMENDED PUMP SETTING: <u>43-45</u> FEET
	RECOMMENDED PUMPING RATE: <u>46-49</u> GPM



FINAL STATUS OF WELL: WATER SUPPLY OBSERVATION WELL TEST HOLE RECHARGE WELL ABANDONED INSUFFICIENT SUPPLY ABANDONED POOR QUALITY UNFINISHED DEWATERING

WATER USE: DOMESTIC STOCK IRRIGATION INDUSTRIAL OTHER: Bell Ground

METHOD OF CONSTRUCTION: CABLE TOOL ROTARY (CONVENTIONAL) ROTARY (REVERSE) ROTARY (AIR) AIR PERCUSSION BORING DIAMOND JETTING DRIVING DIGGING OTHER

CONTRACTOR: Donald Merritt WELL CONTRACTOR'S LICENCE NUMBER: 3640
 ADDRESS: RR #1 Smithville
 NAME OF WELL TECHNICIAN: Donald Merritt WELL TECHNICIAN'S LICENCE NUMBER: 1-0372
 SIGNATURE OF TECHNICIAN/CONTRACTOR: Donald Merritt SUBMISSION DATE: DAY 29 NO August YR 91

OFFICE USE ONLY: DATA SOURCE: 3640 DATE RECEIVED: SEP 17 1991
 DATE OF INSPECTION: _____ INSPECTOR: _____
 REMARKS: _____
 CSS.ES

Appendix B

Well Use & Septic System Survey



Terra-Dynamics Consulting Inc.

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

March, 2022

Dear Resident:

On behalf of Mr. Chris Laverick, Terra-Dynamics Consulting Inc. is completing a water well and septic system survey. This is a survey of properties in the vicinity of 2970 Highway 3, as shown on the attached map (Site). Mr. Laverick is making application to sever a residential lot from the property. This well and septic system survey is a recommended part of a hydrogeologic, or groundwater, study of the subject lands which informs septic system designs and locations. 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 City of Port Colborne 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.

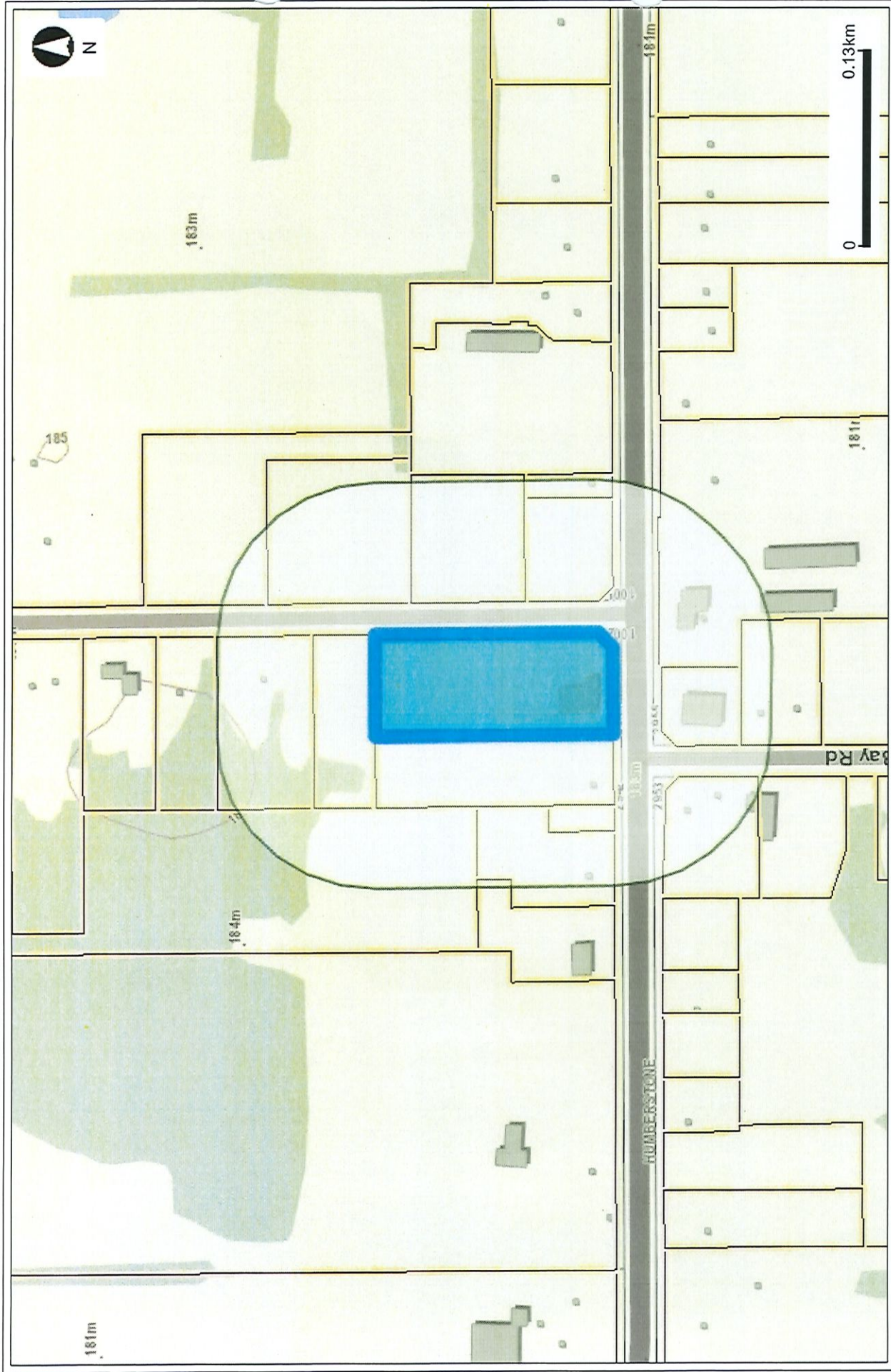
Thank you in advance for your assistance.

Yours truly,

TERRA-DYNAMICS CONSULTING INC.

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

Water well and septic system survey



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.



Terra-Dynamics Consulting Inc.

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

WATER WELL SURVEY FORM

Date: _____

Contact Person: _____

Property Address: _____

Telephone: _____

Email (if further information requested): _____

1.0 GENERAL QUESTIONS

Do you know your drinking water source? Please circle one or more of the following three options:

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

Further comments:

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? _____

Do you have a well log? (i.e. a description of the geology encountered when drilling your well and if yes, can you supply a copy or write down the information in the Comments Section).

What is the use of your well water? (i.e. drinking water for house, garden irrigation, etc.)

Has your well ever run dry? _____

Do you experience problems with taste, colour or odour? (if yes, please explain).

Do you have any water purification systems for your well water? (i.e. water softeners, UV Light for bacteria, Sulphur/Iron Filter for odour or staining, etc.).

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

3.0 SHALLOW WELL (less than 20 feet of casing)

What is the well casing material and diameter? _____

What is the expected age of the well? _____

How deep is the well? _____

Does you utilize a jet pump or a submersible pump? _____

Is there problems with water quality (colour, odour, etc.)? Yes _____ No _____

If yes, please explain _____

Do you have any water purification systems for your dug well water? (i.e. water softeners, UV Light for bacteria, Sulphur/Iron Filter for odour or staining, etc.).

Have you ever experienced freeze-up during the winter? _____

What is the use of your shallow dug well water? (i.e. drinking water for house, irrigation, etc.)

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

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.

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

Appendix C
Supporting Information

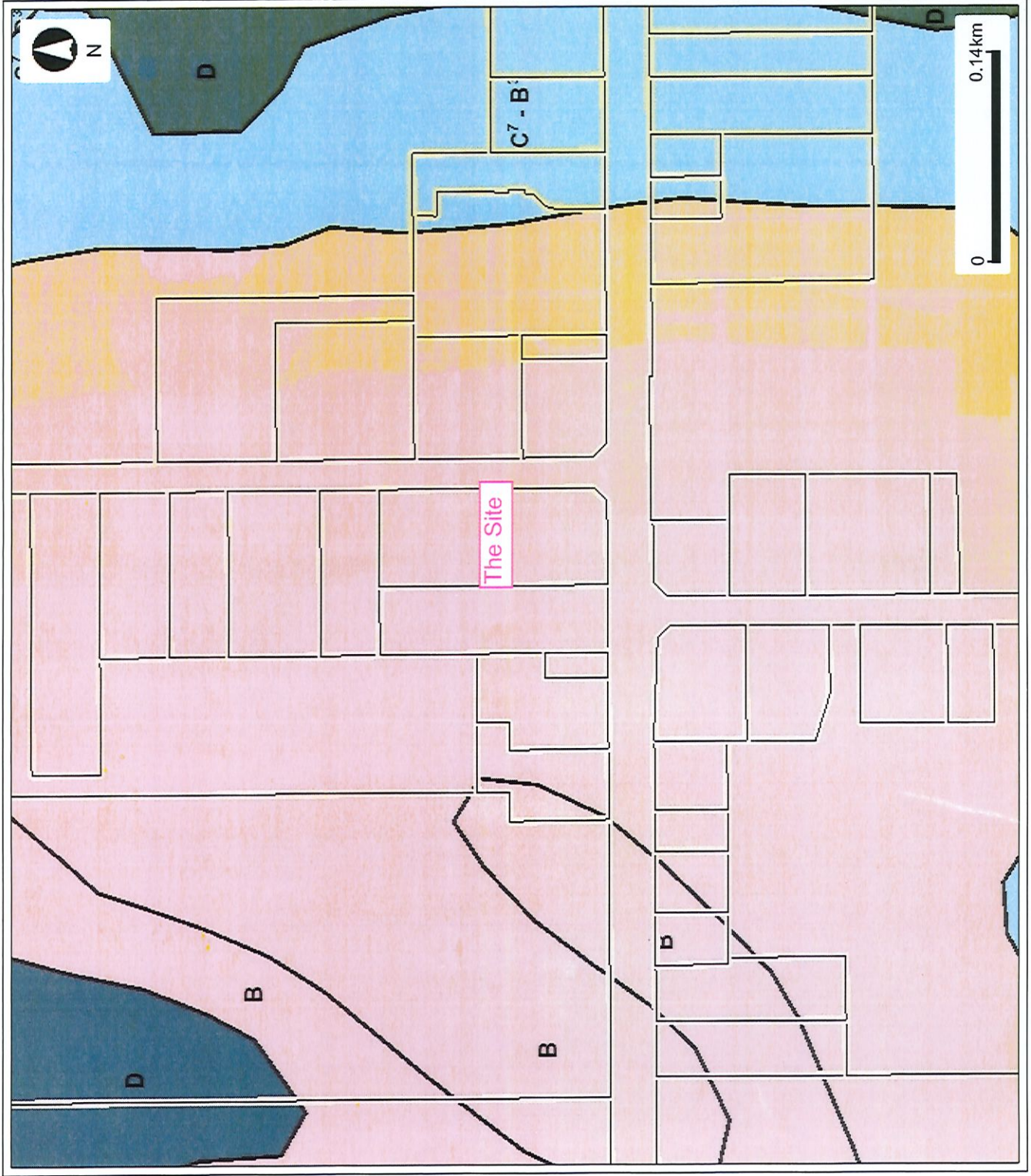
2970 Highway 3 - Soil Classification Map



- Legend**
- Assessment Parcel
 - Soil Name Label
 - Soil Code

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.

2970 Highway 3 - Hydrologic Soil Group Map



Legend

- Assessment Parcel
- 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.

Appendix D
Nitrate-Nitrogen Calculations

Table D-1

22.5.8 Nitrate-nitrogen Prediction Assessment Effluent Calculation Part 1 (Southern Lot)

Site	Dilution Area (m ²) (A _D)	Dilution Area (ha)	Sewage Nitrate-N Load (mg/year)	Meteoritic Dilution (m ³) (V _A)	Annual Sewage Volume (m ³) (V _S)	Total Volume of Water (m ³) (V _T)	Downgradient Nitrate-N Concentration (mg/L) (C _{PB})
Part 1 (Southern Lot)	825	0.08	14,610,000	206	365	572	25.6

Notes:

Average Sewage flow
Infiltration rate (k)

1,000 L/day
0.250 m/year

Nitrate effluent load (C_s)

40 mg/L

Site	Dilution Area (m ²) (A _D)	Dilution Area (ha)	Sewage Nitrate-N Load (mg/year)	Meteoritic Dilution (m ³) (V _A)	Annual Sewage Volume (m ³) (V _S)	Total Volume of Water (m ³) (V _T)	Downgradient Nitrate-N Concentration (mg/L) (C _{PB})
Part 1 (Southern Lot)	825	0.08	3,652,500	206	365	572	6.4

Notes:

Average Sewage flow
Infiltration rate (k)

1,000 L/day
0.250 m/year

Nitrate effluent load (C_s)

10 mg/L

22.5.8 Nitrate-nitrogen Prediction Assessment Effluent Calculation Part 2 (Northern Lot)

Site	Dilution Area (m ²) (A _D)	Dilution Area (ha)	Sewage Nitrate-N Load (mg/year)	Meteoritic Dilution (m ³) (V _A)	Annual Sewage Volume (m ³) (V _S)	Total Volume of Water (m ³) (V _T)	Downgradient Nitrate-N Concentration (mg/L) (C _{PB})
Part 2 (Northern Lot)	674	0.07	14,610,000	169	365	534	27.4

Notes:

Average Sewage flow
Infiltration rate (k)

1,000 L/day
0.250 m/year

Nitrate effluent load (C_s)

40 mg/L

Site	Dilution Area (m ²) (A _D)	Dilution Area (ha)	Sewage Nitrate-N Load (mg/year)	Meteoritic Dilution (m ³) (V _A)	Annual Sewage Volume (m ³) (V _S)	Total Volume of Water (m ³) (V _T)	Downgradient Nitrate-N Concentration (mg/L) (C _{PB})
Part 2 (Northern Lot)	674	0.07	3,652,500	169	365	534	6.8

Notes:

Average Sewage flow
Infiltration rate (k)

1,000 L/day
0.250 m/year

Nitrate effluent load (C_s)

10 mg/L