



# Terraprobe

*Consulting Geotechnical & Environmental Engineering  
Construction Materials Inspection & Testing*

**HYDROGEOLOGICAL ASSESSMENT  
HORTA-CRAFT GREENHOUSE EXPANSION  
4836 EGREMONT DRIVE  
STRATHROY, ONTARIO**

**Prepared For:** Horta-Craft Ltd.  
4836 Egremont Drive  
Strathroy, Ontario  
N7G 3H3

**Attention :** Mr. Paul Lofgren

**File No. 1-21-0692-54**  
March 28, 2022

**© Terraprobe Inc.**

---

**Terraprobe Inc.**

**Greater Toronto**

11 Indell Lane  
**Brampton**, Ontario L6T 3Y3  
(905) 796-2650 Fax: 796-2250

**Hamilton – Niagara**

903 Barton Street, Unit 22  
**Stoney Creek**, Ontario L8E  
(905) 643-7560 Fax: 643-7559

**Central Ontario**

220 Bayview Drive, Unit 25  
**Barrie**, Ontario L4N 4Y8  
(705) 739-8355 Fax: 739-8369

**Northern Ontario**

1012 Kelly Lake Rd., Unit 1  
**Sudbury**, Ontario P3E 5P4  
(705) 670-0460 Fax: 670-0558

[www.terraprobe.ca](http://www.terraprobe.ca)

## TABLE OF CONTENTS

SECTION	PAGE (S)
1.0 INTRODUCTION .....	1
2.0 SCOPE OF WORK.....	2
3.0 APPLICABLE REGULATIONS AND POLICIES .....	3
3.1 ST. CLAIR CONSERVATION POLICIES AND REGULATIONS (O. REG. 179/06) .....	3
3.2 CLEAN WATER ACT 2006.....	3
3.3 MIDDLESEX CENTRE OFFICIAL PLAN 2020 .....	3
4.0 DESCRIPTION OF SITE CONDITIONS.....	4
4.1 SITE LOCATION AND DESCRIPTION .....	4
4.2 SITE TOPOGRAPHY AND DRAINAGE .....	4
4.3 REGIONAL GEOLOGY AND PHYSIOGRAPHY .....	4
4.4 LOCAL GROUNDWATER RESOURCES.....	4
4.5 RESULTS OF DOOR-TO-DOOR SURVEY.....	5
5.0 RESULTS OF WELL TESTING.....	6
5.1 WELL YIELD TESTING .....	6
5.2 SUSTAINABLE YIELD ANALYSIS.....	6
5.3 AQUIFER ANALYSIS.....	8
5.4 WATER QUALITY ANALYSIS .....	8
6.0 IMPACT ASSESSMENT .....	9
6.1 RADIUS OF INFLUENCE .....	9
6.2 WATER SERVICING IMPACT ASSESSMENT .....	9
6.3 SEWAGE DISPOSAL IMPACT ASSESSMENT .....	10
7.0 SUMMARY AND CONCLUSIONS .....	11
LIMITATIONS.....	14

**FIGURES:**

Figure 1 – Site Location Plan

Figure 2 – Well Location Plan

**TABLES:**

Table 1 – Summary of Groundwater Quality Analysis

**APPENDICES:**

Appendix A     Regulatory Mapping

Appendix B     MECF Well Records

Appendix C     Results of Pumping Test

Appendix D     Laboratory Certificates of Analysis

## **1.0 INTRODUCTION**

Terraprobe Inc. (Terraprobe) has been retained by Horta-Craft Ltd. to complete a hydrogeological investigation in support of future greenhouse expansion for the greenhouse facility located at the municipal address of 4836 Egremont Drive in Strathroy, Ontario, here in referred to as the 'Property' or the 'Site'.

The purpose of this study was to characterize the local and regional geological and hydrogeological conditions through a review of background information, determine development constraints for the Property based on a review of regulatory mapping and planning documents and to complete well testing to determine the quantity and quality of groundwater available to support future greenhouse expansion. The data obtained from this investigation was used to provide assessments of sustainable well yield and the predicted zone of influence of water taking from the existing groundwater supply well for the Property. An impact assessment for increased water taking and subsurface sewage disposal for the Property was completed for surrounding private water supply wells and natural features.

## 2.0 SCOPE OF WORK

The scope of work for the study consisted of the following:

- *A Review of Background Information* – Available background information for the site and the project was reviewed. This included information from public sources, including geologic and topographic mapping, aerial photography and Ministry of Environment, Conservation and Parks (MECP) well records.
- *Completion of a Private Well Survey* – A private well survey was completed for properties within a 500 m radius of the subject site (study area). The well survey will be completed to determine the location, construction details and operational history of private water supply wells within the study area.
- *Completion of a Pumping Test* – Testing was completed from the ground water supply well servicing the greenhouse operations at the estimated daily maximum water demand scenario for the proposed and existing greenhouse facility. The testing will investigate the potential for impact to existing private water supply wells completed in the vicinity of the subject property.
- *Water Quality Sampling* – Water quality analysis was completed from the water supply well for the greenhouse for E. coli, total coliforms, general inorganic chemistry, and metals. Water quality sampling will be completed following several hours of pumping and upon completion of testing to evaluate potential changes to water quality with pumping.

*Hydrogeology Report* - Following completion of the above-noted study, a detailed engineering report was prepared regarding the site hydrogeology. The report provides the factual information gathered during the study, including the background information and results of well testing. An impact assessment for increased water taking from the existing on-site water supply well and for subsurface sewage disposal required for the proposed greenhouse expansion will be provided.



### 3.0 APPLICABLE REGULATIONS AND POLICIES

#### 3.1 St. Clair Conservation Policies and Regulations (O. Reg. 179/06)

Under Section 28 of the Conservation Authorities Act, local conservation authorities are mandated to protect the health and integrity of the regional greenspace system and to maintain or improve the hydrological and ecological functions performed by valley and stream corridors. St. Clair Conservation, through its regulatory mandate, is responsible for issuing permits under Ontario Regulation (O.Reg. 179/06), *Development, Interference with Wetlands and Alterations to Shorelines and Watercourses* for development proposal or Site alteration work to shorelines and watercourses within the regulated areas.

St. Clair Conservation Regulated Area online mapping was reviewed and the Site is not located within a Regulated Area. As such, development permits from St. Clair Conservation under Ont. Reg. 179/06 will not be required for alterations on the Property. Refer to **Appendix A** for associated mapping details.

#### 3.2 Clean Water Act 2006

The MECP mandates the protection of existing and future sources of drinking water under the Clean Water Act, 2006 (CWA). Initiatives under the CWA include the delineation of Wellhead Protection Areas (WHPAs), Significant Groundwater Recharge Areas (SGRAs) and Highly Vulnerable Aquifers (HVAs), as well as the assessment of drinking water quality and quantity threats within Source Protection Regions. Source Protection Plans are developed under the CWA and include the restriction and prohibition of certain types of activities and land uses within WHPAs. This plan dictates that any site within the Thames-Sydenham Region can be rated in terms of score indicating vulnerability to drinking water quality and quantity threats. It is noted that communities within the St. Clair Conservation are typically provided with surface water based municipal water supplies from Lake Huron or the St. Clair River. Municipal well fields within the St. Clair Conservation boundaries were not reported, as such, the Site does not fall within areas regulated as WHPAs, SGRAs or HVAs.

#### 3.3 Middlesex Centre Official Plan 2020

The Property is situated within the planning jurisdiction of Middlesex Centre, the official plan was reviewed for potential development constraints related to planning requirements as provided under the Official Plan. The following development schedules were applicable to the Site:

- Schedule A (Settlement Areas/Land Use Plan) – The Site is not located within a special policy area, floodplain or special resource area.
- Schedule B (Greenlands System) – The Site is not located within an area of natural or scientific interest (ANSI) or a significant woodlot

## **4.0 DESCRIPTION OF SITE CONDITIONS**

### **4.1 Site Location and Description**

The Property is located approximately 700 m east of the intersection of Egremont Drive and Hickory Drive in the Town of Strathroy. The general location of the Site is shown on **Figure 1**.

The Property currently consists of a greenhouse facility operated as Horta-Craft Ltd. It is proposed to expand the greenhouse operations following a phased approach in the future. Current expansion plans are not presently finalized. The purpose of this investigation was to assess the current servicing capabilities for the site such that additional servicing requirements could be assessed once expansion plans for the facility were determined. The facility is privately serviced with a private water supply well and subsurface sewage disposal system.

### **4.2 Site Topography and Drainage**

Based on topographic mapping Site elevation varies from approximately  $251 \pm$  masl to  $249 \pm$  masl (meters above sea level) towards west/southwest. Local drainage is directed along road side drainage swales to the Ed-Wood Drain situated approximately 300 m west of the Site, draining south to the East Sydenham River situated approximately 1.4 km southeast of the Site. Regional and local groundwater flow direction is expected to flow south/southwest towards the East Sydenham River.

### **4.3 Regional Geology and Physiography**

Based on published geological information for the area, the Site is located within the physiographic region known as the Norfolk Sand Plain, an area stretching from the southern shores of Lake Huron to Toronto, including much of the Lake Erie shoreline. Based on the Ontario Geological Survey (OGS) mapping, the surficial geology at the Site consists of glaciolacustrine deep water deposits of silt and clay overlying glaciolacustrine shallow water deposits of sand. The depth of sand was reported as variable between 12 to 16 m in depth.

Bedrock, based on a review of geologic mapping, is shown to consist of limestone/dolostone of the Hamilton Group. Based on the review of the Elgin Middlesex Groundwater Study (2004) bedrock lies at an elevation of approximately 160 masl (depth of approximately 90 m below ground surface). Wells in the vicinity of the site do not encounter bedrock deposits.

### **4.4 Local Groundwater Resources**

MECP Water Well Records (WWRs) were reviewed for the registered wells located at the Site and within a 500 m radius of the site boundaries (study area). Information contained in these records provides data

for determining the nature and use of local groundwater resources. A total of 15 well records were located within the study area, with the details for each well summarized in **Appendix B**. the locations of private wells are provided on the attached **Figure 2**. A summary of data obtained from these MECP records is presented in Table below:

<b>Total Number of Wells</b>	<b>15</b>
<b>Screened Formation</b>	
Overburden	15 (100%)
Bedrock	0 (0%)
<b>Depth Ranges</b>	
Less than 20 m	6 (40%)
20 m to 23 m	9 (60%)
Greater than 23 m.	0 (0%)
<b>Water Use</b>	
Domestic/Stock	10 (67%)
Industrial	1 (7%)
Commercial	2 (13%)
Not Used/ Abandoned	2 (13%)
<b>Pumping Rate</b>	
Less than 20 Lpm	2 (13%)
20 Lpm to 40 Lpm	8 (53%)
Greater than 40 Lpm	3 (20%)
Dry Well	2 (13%)

Based on the review of the well records surrounding private water supply wells are completed within overburden deposits at depths less than 23 m below grade. Well use is primarily for domestic purposes with private commercial, industrial and agricultural uses also present within the study area. Pumping rates are reported between 15.1 L/min to 56.8 L/min (4 to 15 US gallons per minute). Water quality is described as fresh water. The water supply well record for the Site is provided in **Appendix B**.

## 4.5 Results of Door-to-Door Survey

A private well survey was completed for properties located within a 500 m radius of the Site (study area). The private well survey included properties along Egremont Drive between Hickory Drive and Headly Road. Due to the current COVID-19 restrictions that have been imposed by the provincial government and to ensure health and safety, the survey involved limited interaction with the private property owners. Properties within the study area were visited on December 7, 2021 to confirm locations and construction details of private wells. Seven properties were reviewed with municipal address of 4755 (4101087), 4765 (4109202), 4766 (4109949), 4808 (4106427), 4811 (4101090), 4836 (4114251) and 4896 (4104703) Egremont Drive. These properties were confirmed to have private servicing with well record numbers matching records provided in **Appendix B** confirmed as part of the private well survey. Property locations are indicated on the attached **Figure 2**.



## 5.0 RESULTS OF WELL TESTING

### 5.1 Well Yield Testing

Well yield testing was completed on December 7, 2021 with the assistance of a licenced well technician to disconnect the existing distribution system and operate the existing pumping equipment. Discharge was directed to the road side swale along Egremont Drive approximately 15 m southeast from the test well, and was not observed to collect on-site. Discharge drained away from the site and was observed to infiltrate, discharge is not expected to have influenced the results of testing.

The static water level observed prior to the start of testing was 15.6 m below grade. Step testing was completed to determine the expected sustainable yield of the well. The step testing consisted of pumping the on-site well at two rates. Each rate was held constant until a stable water level was reached. Intervals were set at 22.7 L/min (6 USG/min) and 56.8 L/min (15 USG/min). The following summarizes the results of step testing for the existing well:

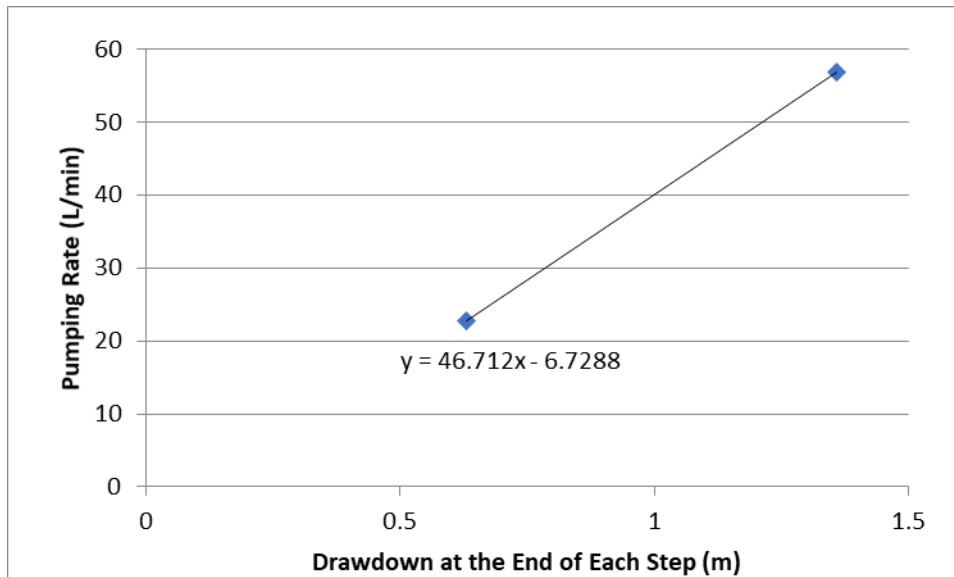
#### Summary of Step Pumping

	First Step Rate	Second Step Rate
Pumping Rate	22.7 L/min	56.8 L/min
Duration of step	15 Minutes	195 Minutes
Volume Pumped	340 L	11,076 L
Static pumping level	16.22 mbgl	16.95 mbgl
Observed drawdown	0.63 m	1.36 m

Static pumping levels within the well were generally reached within 3 minutes of pumping. Recovery of water levels was observed following completion of the pumping test and 99% recovery of the well was observed within 3 minutes following completion of testing. The results of the pumping test are provided in the attached **Appendix C**.

### 5.2 Sustainable Yield Analysis

The sustainable capacity of the well was calculated by the linear relationship of the observed drawdown at the end of each completed step and the pumping rate as shown in the graph below:



The slope of the line of best fit represents the specific capacity for the on-site well was approximately 46.712 L/min, The maximum allowable capacity of the well was estimated according to the equation:

$$Q_{\max} = SC \times S_{w\max} \times FS$$

Where:  $Q_{\max}$  is the estimated maximum pumping rate;

SC is the specific capacity of the well;

$S_{w\max}$  is the maximum allowable drawdown in the well; and,

FS is a factor of safety.

The maximum allowable drawdown from the on-site well is estimated from the static water level of 15.6 mbgl and the pump setting approximately 1.5 m from the base of the well (22.6 m) and a 1.5 m submergence above the pump for an available drawdown of 4.0 m. The resulting sustainable flow rate accounting for a factor of safety of 0.25 would be 140.1 L/min (37 USG/min).

The estimated maximum yield was not confirmed with pumping. The existing pump was not of sufficient capacity to pump at rates exceeding 56.8 L/min. It should be noted that any pumping tests exceeding pumping at the rate of 50,000 L/day would require a temporary Permit to Take Water (PTTW) issued by the MECP. In the event that water taking for the proposed agricultural uses at the site exceeds 50,000 L/day (i.e. 35 L/min or 9 USG/min over 24 hours) a PTTW will be required. In support of this PTTW application, additional well testing would be required to investigate potential for impacts to surrounding private water supply wells and natural features at the anticipated maximum rate of water taking for the proposed facility. This testing was beyond the scope of current reporting. The on-site well is expected to be capable of meeting demand less than 50,000 L/day without additional permitting.

### 5.3 Aquifer Analysis

An aquifer analysis was completed on the results of pumping test for the portion of testing completed at the rate of 56.8 L/min (15 USG/min). Analysis was completed following a Cooper-Jacob analysis for a confined to semi-confined aquifer. Based on the completed analysis the hydraulic conductivity of the underlying medium sand aquifer was calculated at a rate of  $9.5 \times 10^{-5}$  m/s with a transmissivity of  $3.6 \times 10^{-4}$  m<sup>2</sup>/s. Storativity was calculated using Aqtesolv software based on representative values for a medium sand aquifer, resulting in an estimated storativity of  $7.8 \times 10^{-4}$ . Pumping test analysis results are provided in **Appendix C**.

### 5.4 Water Quality Analysis

The on-site well was sampled on December 7, 2021 during and immediately prior to completion of well testing. The well was sampled for general inorganic parameters, metals and microbiology from the discharge pipe leading from the test well. Samples were collected in laboratory supplied bottles appropriate for the completed analysis. All collected samples were stored in coolers on ice for transportation to ALS Laboratories in Mississauga for analysis. ALS Laboratories is a CALA accredited third party laboratory. Certificates of analysis are provided in the attached **Appendix D**. A summary of groundwater quality results are provided in the attached **Table 1**.

Results of groundwater quality analysis were compared to the Ontario Drinking Water Standards (O.Reg. 169/03). Groundwater quality was observed to remain consistent between sampling events, degradation of water quality with pumping is not expected. Upon completion of testing quality exceedances were noted for aesthetic water quality objectives for hardness, colour, turbidity and iron. Operation guidelines and health based quality guidelines of O.Reg. 169/03 were not observed. Low levels of total coliform bacteria (1 CFU/100 mL) were detected in the initial groundwater sample. Non-detectable levels of total coliform were detected in the final collected groundwater sample. The positive total coliform sample was considered likely due to contamination resulting in removal of the existing pump and installation of a test pump for the purpose of testing. Bacteriological contamination of groundwater is not expected based on the depth of the well and overlying soils (i.e., low permeability soils).

The tested groundwater is considered potable. The noted aesthetic exceedances are considered reasonably treatable with water softeners (hardness) and reverse osmosis systems (colour, turbidity, iron) should treatment be required.

## 6.0 IMPACT ASSESSMENT

The impact assessment details that are applicable to the Property are discussed below:

### 6.1 Radius of Influence

The radius of influence of water taking was calculated given the rate of hydraulic conductivity determined for the underlying sand aquifer and the expected maximum drawdown within the water supply well for the pumping rate of 140 L/min (37 USG/min) determined as the sustainable yield from the on-site well. The radius of influence of water taking was assessed based on Sichardt's equation as follows:

$$R = 3000d\sqrt{K}$$

Where: R is the radius of influence (m)

d is the maximum drawdown (4.0 m)

K is the hydraulic conductivity of the water bearing soils ( $9.5 \times 10^{-5}$  m/s)

The resulting radius of influence was calculated at 117 m from the on-site pumping well.

### 6.2 Water Servicing Impact Assessment

The potential impacts on groundwater as a result of water taking for the subject site and future greenhouse expansions was assessed based on the results of the pumping test and groundwater quality analysis. The expected radius of influence for the expected sustainable yield was estimated at a distance of 117 m from the pumping well. Based on the completed well record review and private well survey wells completed to the south and west of the site at municipal addresses of 4811 and 4808 Egremont Drive are located in closest proximity to the pumping well. The following table provides a summary of these wells:

Municipal Address	Well ID	Well Depth (m)	Static Water Level (m)	Distance from Pumping Well (m)
4811 Egremont Drive	4101092	22.6	12.8	130 m West
4808 Egremont Drive	4106427	24.4	14.0	130 m South

Based on the above estimated distances, it is expected that surrounding private wells will be situated outside of the expected radius of influence of pumping. As noted above in Section 5.2, in the event that expanded greenhouse operations require servicing in excess of 50,000 L/day, further testing and well monitoring will be required as part of the Permit application to verify the potential for impact to surrounding private water supply wells. The well is expected to be capable of meeting demand less than 50,000 L/day without any water servicing impact and additional permitting.

The closest surface water feature consists of the Ed-Wood Drain, situated approximately 250 m east of the site. Surface water features fall outside of the calculated radius of influence of 117 m. Impacts to surface water features are not expected as a result of increased water taking at the site.

Groundwater quality observed over the duration of the pumping test indicated non-detectable levels of nitrate, an indicator of impacts of surficial land use including subsurface sewage disposal and agricultural fertilizer application. It is expected that the surficial clay layer expected between 12 to 17 m in thickness provides geological isolation from sources of potential contamination. Groundwater quality was not observed to degrade with pumping. Potential sources of groundwater contamination within the calculated radius of influence are not expected.

### **6.3 Sewage Disposal Impact Assessment**

The site is currently serviced with a Class IV subsurface sewage disposal system. Plans of the installed system were not available at the time of reporting, and a system inspection completed by a licensed septic installer was not completed to confirm the size and capacity of the existing septic system.

It is anticipated that the sewage disposal system can be reviewed based on expansion plans once available. Based on Chapter 8 of the Ontario Building Code (OBC) for non-residential uses (Table 8.2.1.3.B) sewage flows would be based on the per employee sewage flow (75 L/day/person) or the number of water closets (950 L/day), whichever is greater. Given the daily sewage flow requirement it would be feasible to expand greenhouse capacity without expanding the existing septic system, provided the number of employees/water closets remains within the capacity of the existing septic system.

In the event that greenhouse expansion results in increased sewage flows exceeding the current system capacity, the existing system should be decommissioned and a new system be installed by a licensed septic installer. A further investigation with regards to septic requirements can be completed once expansion plans for the greenhouse operations have been finalized. The investigation would include soil percolation analysis for septic system design and completion of a groundwater impact assessment in accordance with Procedure D-5-4 for Individual On-Site Septic Systems. It should be noted that sewage flows less than 10,000 L/day would be subject to approval under the local municipality through the OBC requirements. In the event that peak sewage flows of 10,000 L/day or greater are expected the septic system would be subject to MECP review and approval under an Environmental Compliance Approval (ECA) as required under the Ontario Water Resources Act (OWRA), Section 53.

## 7.0 SUMMARY AND CONCLUSIONS

The following provides a summary of the completed hydrogeological assessment:

1. The property currently consists of a a greenhouse facility operated as Horta-Craft Ltd., it is proposed to expand greenhouse operations following a phased approach in the future. Current expansion plans are not presently finalized.
2. St. Clair Conservation Regulated Area online mapping was reviewed and the site is not located within a Regulated Area. Communities within the St. Clair Conservation are typically provided with surface water based municipal water supplies from Lake Huron or the St. Clair River. Municipal well fields within the St. Clair Conservation boundaries were not reported.
3. Based on topographic mapping Site elevation varies from approximately  $251 \pm$  masl to  $249 \pm$  masl (meters above sea level) towards west/southwest. Local drainage is directed along road side drainage swales to the Ed-Wood Drain situated approximately 300 m west of the site.
4. Based on the Ontario Geological Survey (OGS) mapping, the surficial geology at the Site consists of glaciolacustrine deep water deposits of silt and clay overlying glaciolacustrine shallow water deposits of sand. The depth of sand was reported as variable between 12 to 16 m in depth.
5. Bedrock, based on a review of geologic mapping, is shown to consist of limestone/dolostone of the Hamilton Group. Bedrock lies at an elevation of approximately 160 masl (depth of approximately 90 m below ground surface). Wells in the vicinity of the site do not encounter bedrock deposits.
6. Based on the review of the well records surrounding private water supply wells are completed within overburden deposits at depths less than 23 m below grade. Well use is primarily for domestic purposes with private commercial, industrial and agricultural uses also present within the study area. Pumping rates are reported between 15.1 L/min to 56.8 L/min (4 to 15 US gallons per minute). Water quality is described as fresh water.

The following provides a summary of the conclusions of the completed investigation:

1. Well yield testing was completed on December 7, 2021. The static water level observed prior to the start of testing was 15.6 m below grade. The step testing consisted of pumping the on-site well at two rates. Each rate was held constant until a stable water level was reached. Intervals were set at 22.7 L/min (6 USG/min) and 56.8 L/min (15 USG/min).

2. The maximum allowable drawdown from the on-site well is estimated from the static water level of 15.6 mbgl and the pump setting approximately 1.5 m from the base of the well (22.6 m) and a 1.5 m submergence above the pump for an available drawdown of 4.0 m. The resulting sustainable flow rate accounting for a factor of safety of 0.25 would be 140.1 L/min (37 USG/min).
3. The estimated maximum yield was not confirmed with pumping. The existing pump was not of sufficient capacity to pump at rates exceeding 56.8 L/min. It should be noted that any pumping tests exceeding pumping at the rate of 50,000 L/day would require a temporary Permit to Take Water (PTTW) issued by the MECP. The on-site well is expected to be capable of meeting demand less than 50,000 L/day without additional permitting.
4. Results of groundwater quality analysis were compared to the Ontario Drinking Water Standards (O.Reg. 169/03). Groundwater quality was observed to remain consistent between sampling events, degradation of water quality with pumping is not expected. Upon completion of testing quality exceedances were noted for aesthetic water quality objectives for hardness, colour, turbidity and iron. Operation guidelines and health based quality guidelines of O.Reg. 169/03 were not observed.
5. The tested groundwater is considered potable. The noted aesthetic exceedances are considered reasonably treatable with water softeners (hardness) and reverse osmosis systems (colour, turbidity, iron) should treatment be required.
6. The radius of influence of water taking was calculated given the rate of hydraulic conductivity determined for the underlying sand aquifer and the expected maximum drawdown within the water supply well for the pumping rate of 140 L/min (37 USG/min) determined as the sustainable yield from the on-site well. The resulting radius of influence was calculated at 117 m from the on-site pumping well.
7. It is expected that surrounding private wells and surface water features will be situated outside of the expected radius of influence of pumping. Impacts resulting from increased water taking from the on-site well are not expected.
8. Groundwater quality observed over the duration of the pumping test indicated non-detectable levels of nitrate, an indicator of impacts of surficial land use including subsurface sewage disposal and agricultural fertilizer application. It is expected that the surficial clay layer expected between 12 to 17 m in thickness provides geological isolation from sources of potential contamination.

9. It is anticipated that the sewage disposal system can be reviewed based on expansion plans once available. Based on Chapter 8 of the Ontario Building Code (OBC) for non-residential uses (Table 8.2.1.3.B) sewage flows would be based on the per employee sewage flow (75 L/day/person) or the number of water closets (950 L/day), whichever is greater. Given the daily sewage flow requirement it would be feasible to expand greenhouse capacity without expanding the existing septic system, provided the number of employees/water closets remains within the capacity of the existing septic system.

We trust this report meets with your requirements. Should you have any questions regarding the information presented, please do not hesitate to contact our office.

Yours truly,

**Terraprobe Inc.**



Paul L. Raepple  
Project Manager-Hydrogeology



Shama M. Qureshi, P.Eng., P.Geo., QP<sub>RA-ESA</sub>  
Principal





## LIMITATIONS

This report was prepared by Terraprobe Inc. for the use of **Horta Craft Ltd.** and is intended to provide an assessment of the hydrogeological condition on the property located at **4836 Egremont Drive, Strathroy, ON**. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Terraprobe accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report, including consequential financial effects on transactions or property values or requirements for follow-up actions and costs.

The assessment should not be considered a comprehensive audit that eliminates all risks. The information presented in this report is based on information collected during the completion of well testing conducted by Terraprobe Inc. It is based on conditions at the property at the time of testing.

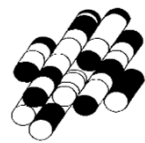
There is no warranty expressed or implied by this report regarding the condition of the property. Professional judgment was exercised in gathering and analyzing information collected by our staff, as well as that submitted by others. The conclusions presented are the product of professional care and competence and cannot be construed as an absolute guarantee.

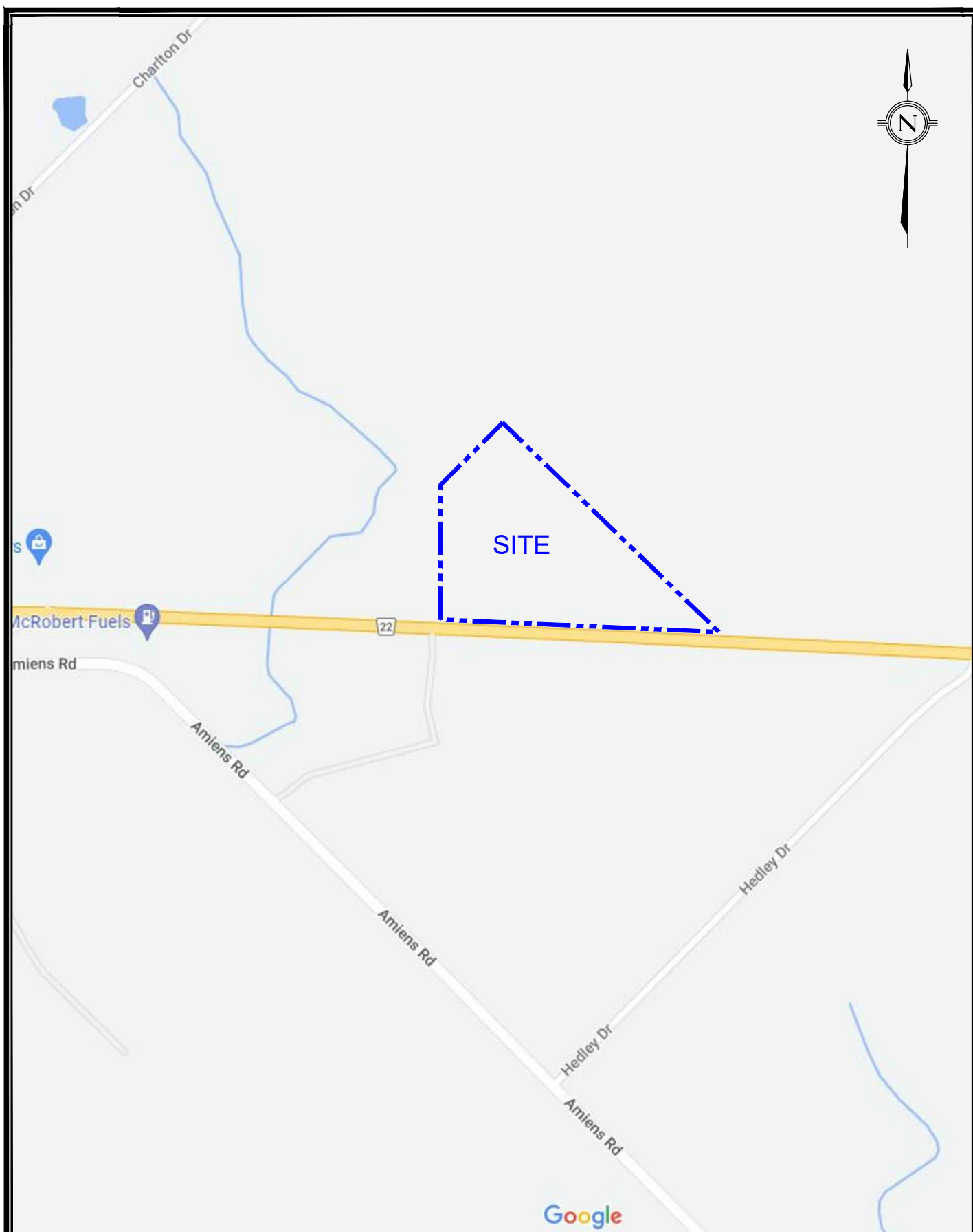
In the event that during future work, new information regarding the condition of the property is encountered, or the proposed development is changed from that which was provided to Terraprobe with respect to the property, Terraprobe should be notified in order that we may re-evaluate the findings of this assessment and provide amendments, as required.

Neither possession of the Work, nor a copy of it, carries the right of publication. All copyright in the Work is reserved to Terraprobe Inc. The Work shall not be disclosed, produced or reproduced, quoted from, or referred to, in whole or in part, or published in any manner, without the express written consent of **Terraprobe Inc.** or/and **Horta-Craft Ltd.**

# FIGURES

**Terraprobe Inc.**





**Terraprobe**

903 Barton Street - Unit 22, Stoney Creek, Ontario, L8E 5R7  
Tel: (905) 643-7560, Fax: (905) 643-7559

Title:

**SITE LOCATION PLAN**  
4836 Egremont Drive, Strathroy, Ontario

File No.

1-21-0692-54

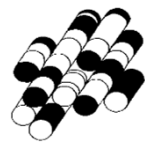
FIGURE :

**1**



# TABLES

**Terraprobe Inc.**



**Table 1: Results of Groundwater Quality Sampling**  
**Horta-Craft Ltd. Greenhouse Expansion**  
**4836 Egremont Drive**  
**Strathroy, Ontario**

Sampling Date/Time	Units			Detection Limit	7-Dec-21	7-Dec-21
					12:00 PM	3:00 PM
		<b>ODWS</b>	<b>AO/OG</b>			
<b>INORGANICS</b>						
Conductivity	umhos/cm			3.0	580	580
Hardness (as CaCO <sub>3</sub> )	mg/L		<b>80-100</b>	2.4	<b>282</b>	<b>286</b>
Dissolved Organic Carbon	mg/L		<b>5</b>	0.50	1.62	1.58
pH	pH units		<b>6.5-8.5</b>	0.10	8.06	8.02
Sulfate (SO <sub>4</sub> )	mg/L		<b>500</b>	0.30	33.8	34.7
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L		<b>30-500</b>	10	275	277
Chloride (Cl)	mg/L		<b>250</b>	0.50	1.01	0.98
Phosphorus, Total	mg/L			0.0030	0.0037	0.0030
Nitrite (as N)	mg/L	<b>1.0</b>		0.010	<0.010	<0.010
Nitrate (as N)	mg/L	<b>10.0</b>		0.020	<0.020	<0.020
Color, True	T.C.U.		<b>5</b>	2.0	<b>42.9</b>	<b>43.1</b>
Turbidity	NTU		<b>5</b>	0.10	<b>9.34</b>	<b>9.93</b>
Total Dissolved Solids	mg/L		<b>500</b>	20	263	296
<b>METALS</b>						
Aluminum (Al)	ug/L		<b>100</b>	10	<10	<10
Antimony (Sb)	ug/L	<b>6</b>		0.60	<0.60	<0.60
Arsenic (As)	ug/L	<b>25</b>		1.0	12.5	12.6
Barium (Ba)	ug/L	<b>1000</b>		10	433	438
Cadmium (Cd)	ug/L	<b>5</b>		0.10	<0.10	<0.10
Calcium (Ca)	mg/L			0.50	64.5	65.4
Chromium (Cr)	ug/L	<b>50</b>		1.0	<1.0	<1.0
Copper (Cu)	ug/L		<b>1000</b>	1.0	<1.0	<1.0
Iron (Fe)	ug/L		<b>300</b>	50	<b>1010</b>	<b>1020</b>
Lead (Pb)	ug/L	<b>10</b>		1.0	<1.0	<1.0
Magnesium (Mg)	mg/L			0.50	29.4	29.8
Manganese (Mn)	ug/L		<b>50</b>	1.0	25.3	24.6
Selenium (Se)	ug/L	<b>10</b>		5.0	<5.0	<5.0
Sodium (Na)	mg/L		<b>200 / 20</b>	0.50	11.4	11.5
Uranium (U)	ug/L	<b>20</b>		5.0	<5.0	<5.0
Zinc (Zn)	ug/L		<b>5000</b>	3.0	<3.0	<3.0
<b>MICROBIOLOGY</b>						
Total Coliforms	CFU/100ml	<b>0</b>			<b>1</b>	0
Escherichia Coli	CFU/100ml	<b>0</b>			0	0

NTU - Nephelometric Turbidity Unit

TCU - True Colour Unit

CFU - Colony Forming Units

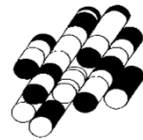
ODWS - Ontario Drinking Water Standards

AO/OG - Aesthetic Objectives/ Operational Guidelines

# **Regulatory Mapping**

## **APPENDIX A**







**Terraprobe Inc.**







## Legend

-  Conservation Land
-  Areas Affected by Ontario Reg 171/0
-  Watercourse
-  Roads
-  Watershed Boundary
-  Lot and Concession
- World Imagery
- Low Resolution 15m Imagery
- High Resolution 60cm Imagery
- High Resolution 30cm Imagery
- Citations
- 2.4m Resolution Metadata

## St. Clair Region Conservation Authority

205 Mill Pond Cres.  
Strathroy, Ontario  
[www.scrca.on.ca](http://www.scrca.on.ca)

0 100 200 400 m

1 : 10000

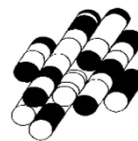
This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of the information displayed in this map product are strongly cautioned to verify all information before making any decisions. © 2017 Reproduction of this map is prohibited without written permission from the St. Clair Region Conservation Authority.



# **MECP Well Records**

## **APPENDIX B**

**Terraprobe Inc.**



**Appendix B: Well Record Summary**  
**Horta-Craft Ltd. Greenhouse Expansion**  
**4836 Egremont Drive**  
**Strathroy, Ontario**

Well ID	Easting	Northing	Ground Elevation (masl)	Well Use	Year Constructed	Static Water Level (m)	Pumping Rate (L/min)	Stratigraphy (depth in m)
4100384	454809	4761424	282.5	Domestic	1956	9.1	22.7	Topsoil (1) Clay (13.1) Hardpan (14.0) Sand (19.5)
4111926	454855	4761326	286.0	Domestic	1989	13.7	56.8	Topsoil (1) Sand (1.8) Clay (17.7) Sand (22.9)
4100387	454896	4761333	282.5	Domestic	1964	12.2	15.1	Clay (10.7) Sand (19.5)
4109202	454878	4761466	286.0	Domestic	1980	7.6	30.3	Previously Dug (2.4) Clay (19.8) Sand (22.9) Sand/Clay (23.8)
4101087	454891	4761477	283.9	Comercial	1958	9.1	34.1	Fill (1.8) Clay (17.1) Sand (20.7)
4109949	454906	4761530	287.8	Domestic/Stock	1983	12.8	30.3	Clay (12.8) Sand (19.8)
4101090	455044	4761278	279.4	Stock	1966	Dry	N/A	Clay (12.8) Sand/Hardpan (20.7) Clay (22.9)
4101089	455101	4761254	280.1	Abandonned	1966	Dry	N/A	Clay (12.8) Sand/Hardpan (20.7) Clay (22.9)
4106427	455133	4761530	282.5	Industrial	1973	14.0	41.6	Topsoil (1) Clay 15.2) Sand/Clay (19.8) Sand (24.4)
4114251	455143	4761558	-	Commercial	1999	14.8	37.9	Clay/Stones (18.3) Sand (22.6)
4101092	455189	4761456	283.2	Stock	1966	12.8	56.8	Clay (11.6) Sand (21.3) Sand/Clay (22.6)
4101091	455275	4761402	282.2	Domestic/Stick	1966	14.0	15.1	Sand (1) Clay (12.2) Sand/Hardpan (15.2) Sand (17.7)
4104703	455843	4761500	279.7	Stock	1969	10.7	37.9	Clay (15.8) Sand (18.0)
4108430	455893	4761402	279.4	Domestic	1978	8.8	22.7	Topsoil (1) Clay (10.1) Sand (14.3)
7183859	455844	4761325	-	Not Used	2012	10.8	37.9	Clay (9.8) Sand (15.2)

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

11

4114251

Municipality Con. 41007 60N 10

County or District <b>Middlesex</b>		Township/Borough/City/Town/Village <b>Kobo</b>		Con block tract survey, etc. <b>con 10</b>		Lot <b>1</b>	
Owner's surname <b>Horta Craft Ltd</b>		First Name <b>Address</b>		Date completed <b>2 day 9 month 99 year</b>			
Zone		Easting		Northing		RC	
U		M		Elevation		RC	
Basin Code		ii		iii		iv	

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)					
General colour	Most common material	Other materials	General description	Depth - feet	
				From	To
Brown	clay	stones		0	16
Blue	clay	stones		16	42
Blue	clay	silt		42	60
Grey	sand	black sand	finer	60	63
Grey	sand	black sand	medium - fine	63	72½
Blue	clay	fine sand		72½	74
16" plug 10" sand pack					

31	
32	

<b>41 WATER RECORD</b> Water found at - feet 60-72½ Kind of water 1 Fresh 3 Sulphur 14 2 Salty 4 Minerals 19 5 Gas 6 Gas 29		<b>51 CASING &amp; OPEN HOLE RECORD</b> Inside diam inches 5½ Material 1 Steel 12 2 Galvanized 13 3 Concrete 14 4 Open hole 15 5 Plastic 16 Wall thickness inches .188 Depth - feet From To 64½		<b>61 PLUGGING &amp; SEALING RECORD</b> Sizes of opening (Slot No.) 10-5 Diameter 5 inches Length 4+3 feet Material and type stainless steel Depth at top of screen 65 feet	
---	--	--	--	---	--

<b>71 PUMPING TEST</b> Pumping test method 1 Pump 2 Bailer Pumping rate 8 GPM Duration of pumping 6 Hours 17-16 Mins		Water level during 1 Pumping 2 Recovery 15 minutes 25-28 30 minutes 29-31 45 minutes 32-34 60 minutes 35-37 48½ feet 51 feet 51 feet 51 feet 51 feet If flowing give rate GPM 60 Recommended pump type 1 Shallow 2 Deep Recommended pump setting 60 feet Recommended pump rate 10 GPM	
--	--	---	--

<b>FINAL STATUS OF WELL</b> 1 Water supply 5 Abandoned, insufficient supply 9 Unfinished 2 Observation well 6 Abandoned, poor quality 10 Replacement well 3 Test hole 7 Abandoned (Other) 4 Recharge well 8 Dewatering		<b>WATER USE</b> 1 Domestic 5 Commercial 9 Not use 2 Stock 6 Municipal 10 Other 3 Irrigation 7 Public supply 4 Industrial 8 Cooling & air conditioning	
<b>METHOD OF CONSTRUCTION</b> 1 Cable tool 5 Air percussion 9 Driving 2 Rotary (conventional) 6 Boring 10 Digging 3 Rotary (reverse) 7 Diamond 11 Other 4 Rotary (air) 8 Jetting			

**LOCATION OF WELL**

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

Egremont Drive

**205495**

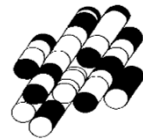
Name of Well Contractor <b>L. Parsons Well Drilling</b>		Well Contractor's Licence No. <b>4204</b>	
Address <b>RR#2 Ilderton</b>			
Name of Well Technician <b>Craig Parsons</b>		Well Technician's Licence No. <b>10208</b>	
Signature of Technician/Contractor <b>Craig Parsons</b>		Submission date <b>30 mo 9 yr 99</b>	

Data source <b>4204</b>		Date received <b>OCT 12 1999</b>	
Date of inspection Inspector			
Remarks <b>CSS.ES0</b>			

## **Results of Pumping Test**

# **APPENDIX C**

**Terraprobe Inc.**





# Well Yield Testing

Date: December 7, 2021

Technician Name: Jason McLeod (T-3021)

Confirm Tag# no tag

Well Owner & Location: Horta Craft Ltd. @ 4836 Egremont Drive, Strathroy, Ontario N7G 3H3

Static level: 51.15 feet (Top of Case)	Draw Down		Draw Down		Recovery							
	Time (min)	Water Level (ft) 6 GPM	Time (min)	Water Level (ft) 15 GPM	Time (min)	Water Level (ft)						
Pump intake set at (ft): 62 feet	1	52.7	16	54.0	1	51.4						
	2	53.2	17	55.1	2	51.4						
	3	53.2	18	55.9	3	51.4						
Duration of Pumping:	4	53.2	19	55.9	4	51.3						
	5	53.2	20	55.9	5	51.3						
	10	53.2	25	55.7	10	51.3						
4 hr+ 8 min	15	53.2	30	55.7								
Final water level end of pumping (ft): 51.6 feet			40	55.7								
			50	55.7								
			60	55.7								
			70	55.6								
			80	55.6								
Recommended pump depth (ft): n/a			90	55.6								
			100	55.6								
			110	55.6								
			120	55.6								
			130	55.6								
Recommended pump rate (GPM): 15 GPM			140	55.6								
			150	55.6								
			160	55.6								
			170	55.6								
			180	55.6								
Well Production (GPM): 15 + GPM			190	55.6								
			200	55.6								
			210	55.6								

End of Pump Test: Water Clear? Yes ☒ No ☐ Other: Chlorinated well upon completion

Notes: Casing is 4 feet above ground.

## WELL ID: 4836 Egremont Drive, Strathroy, ON

Local ID: 4836 Egremont Dr.

Date: #####

Time: 0:00

## INPUT

Construction:	
Casing dia. ( $d_c$ )	0.15 Meter
Annulus dia. ( $d_w$ )	0.3 Meter
Screen Length (L)	2.13 Meter
Depths to:	
water level (DTW)	15.6 Meter
Top of Aquifer	18.3 Meter
Base of Aquifer	22.1 Meter
Annular Fill:	
across screen --	Coarse Sand
above screen --	Bentonite
Aquifer Material -- Medium Sand	
FLOW RATE	56.8 liters/min

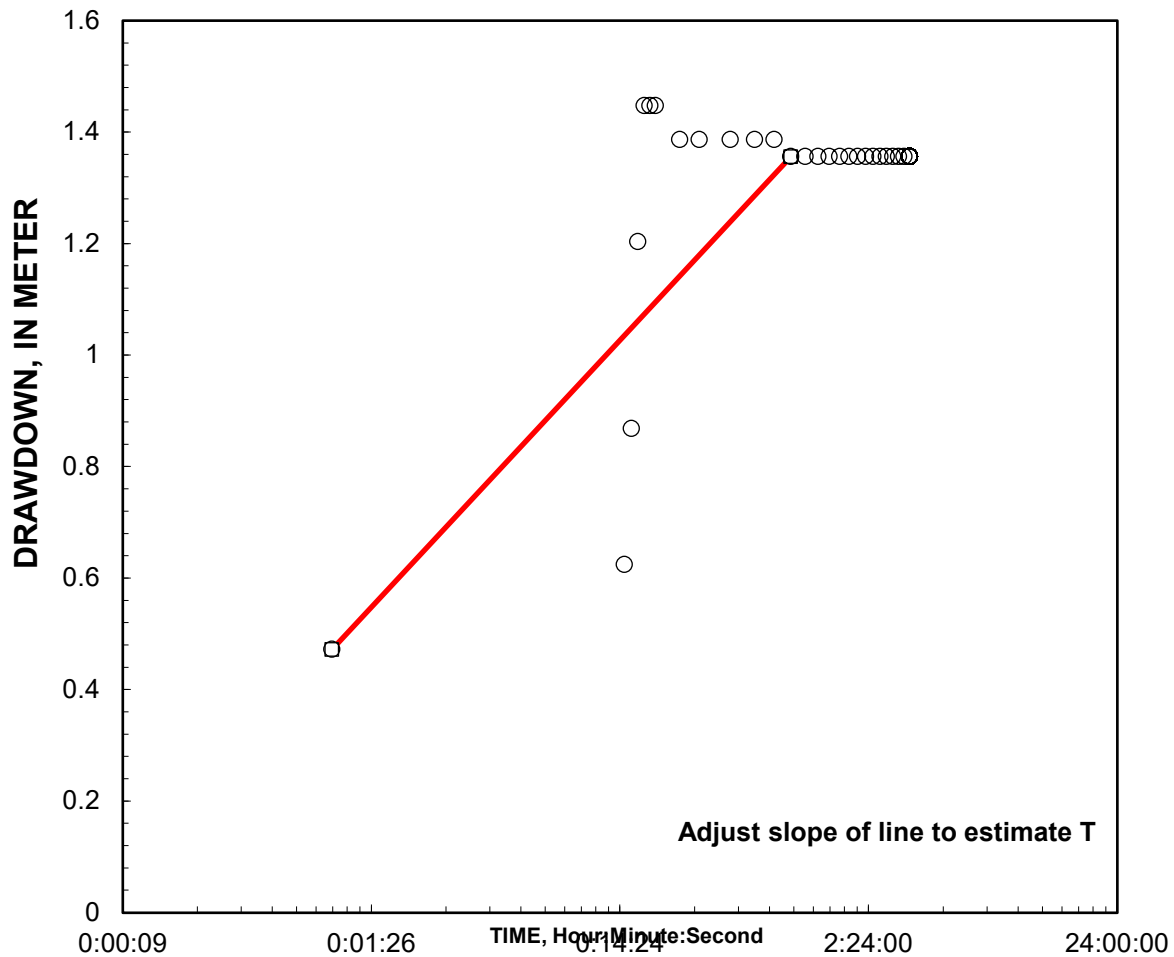
## COMPUTED

Aquifer thickness = 3.8 Meter

Slope = 0.146032 Meter/log10

**Input is consistent.**

K = 0.000095 Meter/Second

T = 0.00036 Meter<sup>2</sup>/Second

REMARKS:

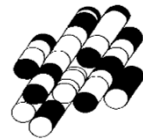
Cooper-Jacob analysis of single-well aquifer test

Reduced Data		
Time,		Water Level
Entry	Date Hr:Min:Sec	Meter
1	1-0-00 0:00:00	15.59
2	1-0-00 0:01:00	16.06
3	1-0-00 0:15:00	16.22
4	1-0-00 0:16:00	16.46
5	1-0-00 0:17:00	16.79
6	1-0-00 0:18:00	17.04
7	1-0-00 0:19:00	17.04
8	1-0-00 0:20:00	17.04
9	1-0-00 0:25:00	16.98
10	1-0-00 0:30:00	16.98
11	1-0-00 0:40:00	16.98
12	1-0-00 0:50:00	16.98
13	1-0-00 1:00:00	16.98
14	1-0-00 1:10:00	16.95
15	1-0-00 1:20:00	16.95
16	1-0-00 1:30:00	16.95
17	1-0-00 1:40:00	16.95
18	1-0-00 1:50:00	16.95
19	1-0-00 2:00:00	16.95
20	1-0-00 2:10:00	16.95
21	1-0-00 2:20:00	16.95
22	1-0-00 2:30:00	16.95
23	1-0-00 2:40:00	16.95
24	1-0-00 2:50:00	16.95
25	1-0-00 3:00:00	16.95
26	1-0-00 3:10:00	16.95
27	1-0-00 3:20:00	16.95

# **Laboratory Certificates of Analysis**

## **APPENDIX D**

**Terraprobe Inc.**







TERRAPROBE-BRAMPTON  
ATTN: Paul Raeppe  
11 Indell Lane  
Brampton ON L6T 3Y3

Date Received: 07-DEC-21  
Report Date: 15-DEC-21 16:03 (MT)  
Version: FINAL

Client Phone: 905-796-2650

## Certificate of Analysis

Lab Work Order #: L2670334  
Project P.O. #: NOT SUBMITTED  
Job Reference: 1-21-0692-54  
C of C Numbers:  
Legal Site Desc:

Emily Smith  
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 5730 Coopers Avenue, Unit #26, Mississauga, ON L4Z 2E9 Canada | Phone: +1 905 507 6910 | Fax: +1 905 507 6927  
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2670334-1 PW1 SA1 Sampled By: P. RAEPPLE on 07-DEC-21 @ 12:00 Matrix: WATER								
<b>Physical Tests</b>								
Color, True		42.9		2.0	T.C.U.		08-DEC-21	R5670885
Conductivity		580		3.0	umhos/cm		08-DEC-21	R5672476
Hardness (as CaCO3)		282	HTC	2.4	mg/L		15-DEC-21	
pH		8.06		0.10	pH units		08-DEC-21	R5672476
Total Dissolved Solids		263	DLDS	20	mg/L		11-DEC-21	R5677236
Turbidity		9.34		0.10	NTU	09-DEC-21	09-DEC-21	R5675752
<b>Anions and Nutrients</b>								
Alkalinity, Total (as CaCO3)		275		10	mg/L		08-DEC-21	R5672476
Chloride (Cl)		1.01		0.50	mg/L		09-DEC-21	R5674534
Nitrate (as N)		<0.020		0.020	mg/L		09-DEC-21	R5674534
Nitrite (as N)		<0.010		0.010	mg/L		09-DEC-21	R5674534
Phosphorus, Total		0.0037		0.0030	mg/L	08-DEC-21	09-DEC-21	R5672489
Sulfate (SO4)		33.8		0.30	mg/L		09-DEC-21	R5674534
<b>Organic / Inorganic Carbon</b>								
Dissolved Carbon Filtration Location		LAB					08-DEC-21	R5671436
Dissolved Organic Carbon		1.62		0.50	mg/L	08-DEC-21	09-DEC-21	R5674156
<b>Bacteriological Tests</b>								
Escherichia Coli		0		0	MPN/100mL		09-DEC-21	R5674911
Total Coliforms		1		0	MPN/100mL		09-DEC-21	R5674911
<b>Total Metals</b>								
Aluminum (Al)		<10		10	ug/L		15-DEC-21	R5679226
Antimony (Sb)		<0.60		0.60	ug/L		15-DEC-21	R5679226
Arsenic (As)		12.5		1.0	ug/L		15-DEC-21	R5679226
Barium (Ba)		433		10	ug/L		15-DEC-21	R5679226
Cadmium (Cd)		<0.10		0.10	ug/L		15-DEC-21	R5679226
Calcium (Ca)		64.5		0.50	mg/L		15-DEC-21	R5679226
Chromium (Cr)		<1.0		1.0	ug/L		15-DEC-21	R5679226
Copper (Cu)		<1.0		1.0	ug/L		15-DEC-21	R5679226
Iron (Fe)		1010		50	ug/L		15-DEC-21	R5679226
Lead (Pb)		<1.0		1.0	ug/L		15-DEC-21	R5679226
Magnesium (Mg)		29.4		0.50	mg/L		15-DEC-21	R5679226
Manganese (Mn)		25.3		1.0	ug/L		15-DEC-21	R5679226
Selenium (Se)		<5.0		5.0	ug/L		15-DEC-21	R5679226
Sodium (Na)		11.4		0.50	mg/L		15-DEC-21	R5679226
Uranium (U)		<5.0		5.0	ug/L		15-DEC-21	R5679226
Zinc (Zn)		<3.0		3.0	ug/L		15-DEC-21	R5679226
L2670334-2 PW1 SA2 Sampled By: P. RAEPPLE on 07-DEC-21 @ 15:00 Matrix: WATER								
<b>Physical Tests</b>								
Color, True		43.1		2.0	T.C.U.		08-DEC-21	R5670885
Conductivity		580		3.0	umhos/cm		08-DEC-21	R5672476

\* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2670334-2 PW1 SA2 Sampled By: P. RAEPPLE on 07-DEC-21 @ 15:00 Matrix: WATER							
Physical Tests							
Hardness (as CaCO3)	286	HTC	2.4	mg/L		15-DEC-21	
pH	8.02		0.10	pH units		08-DEC-21	R5672476
Total Dissolved Solids	296	DLDS	20	mg/L		11-DEC-21	R5677236
Turbidity	9.93		0.10	NTU	09-DEC-21	09-DEC-21	R5675752
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	277		10	mg/L		08-DEC-21	R5672476
Chloride (Cl)	0.98		0.50	mg/L		09-DEC-21	R5674534
Nitrate (as N)	<0.020		0.020	mg/L		09-DEC-21	R5674534
Nitrite (as N)	<0.010		0.010	mg/L		09-DEC-21	R5674534
Phosphorus, Total	0.0030		0.0030	mg/L	08-DEC-21	09-DEC-21	R5672489
Sulfate (SO4)	34.7		0.30	mg/L		09-DEC-21	R5674534
Organic / Inorganic Carbon							
Dissolved Carbon Filtration Location	LAB					08-DEC-21	R5671436
Dissolved Organic Carbon	1.58		0.50	mg/L	08-DEC-21	09-DEC-21	R5674156
Bacteriological Tests							
Escherichia Coli	0		0	MPN/100mL		09-DEC-21	R5674911
Total Coliforms	0		0	MPN/100mL		09-DEC-21	R5674911
Total Metals							
Aluminum (Al)	<10		10	ug/L		15-DEC-21	R5679226
Antimony (Sb)	<0.60		0.60	ug/L		15-DEC-21	R5679226
Arsenic (As)	12.6		1.0	ug/L		15-DEC-21	R5679226
Barium (Ba)	438		10	ug/L		15-DEC-21	R5679226
Cadmium (Cd)	<0.10		0.10	ug/L		15-DEC-21	R5679226
Calcium (Ca)	65.4		0.50	mg/L		15-DEC-21	R5679226
Chromium (Cr)	<1.0		1.0	ug/L		15-DEC-21	R5679226
Copper (Cu)	<1.0		1.0	ug/L		15-DEC-21	R5679226
Iron (Fe)	1020		50	ug/L		15-DEC-21	R5679226
Lead (Pb)	<1.0		1.0	ug/L		15-DEC-21	R5679226
Magnesium (Mg)	29.8		0.50	mg/L		15-DEC-21	R5679226
Manganese (Mn)	24.6		1.0	ug/L		15-DEC-21	R5679226
Selenium (Se)	<5.0		5.0	ug/L		15-DEC-21	R5679226
Sodium (Na)	11.5		0.50	mg/L		15-DEC-21	R5679226
Uranium (U)	<5.0		5.0	ug/L		15-DEC-21	R5679226
Zinc (Zn)	<3.0		3.0	ug/L		15-DEC-21	R5679226

\* Refer to Referenced Information for Qualifiers (if any) and Methodology.

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Dissolved Organic Carbon	MS-B	L2670334-1, -2
Matrix Spike	Barium (Ba)	MS-B	L2670334-1, -2
Matrix Spike	Calcium (Ca)	MS-B	L2670334-1, -2
Matrix Spike	Copper (Cu)	MS-B	L2670334-1, -2
Matrix Spike	Iron (Fe)	MS-B	L2670334-1, -2
Matrix Spike	Lead (Pb)	MS-B	L2670334-1, -2
Matrix Spike	Magnesium (Mg)	MS-B	L2670334-1, -2
Matrix Spike	Manganese (Mn)	MS-B	L2670334-1, -2
Matrix Spike	Sodium (Na)	MS-B	L2670334-1, -2
Matrix Spike	Zinc (Zn)	MS-B	L2670334-1, -2
Matrix Spike	Phosphorus, Total	MS-B	L2670334-1, -2

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-ONT-DW-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2
CL-IC-N-ONT-DW-WT	Water	Chloride by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

COLOUR-ONT-DW-WT	Water	Colour, True Drinking Water	APHA 2120C
True Colour is measured spectrophotometrically by comparison to platinum-cobalt standards using the single wavelength method . Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment. Concurrent measurement of sample pH is recommended.			
DOC-ONT-DW-WT	Water	Dissolved Organic Carbon	APHA 5310B
Sample is filtered through a 0.45um filter, then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic carbon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.			
EC-ONT-DW-WT	Water	Conductivity	APHA 2510 B
Water samples can be measured directly by immersing the conductivity cell into the sample.			
EC-SCREEN-WT	Water	Conductivity Screen (Internal Use Only)	APHA 2510
Qualitative analysis of conductivity where required during preparation of other tests - e.g. TDS, metals, etc.			
HARDNESS-CALC-WT	Water	Hardness	APHA 2340 B
Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.			
MET-ONT-DW-WT	Water	Drinking Water Metals	EPA 6020A
NO2-DW-IC-WT	Water	Nitrite in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-DW-IC-WT	Water	Nitrate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
P-T-COL-DW-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.			
PH-ONT-DW-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.			
Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011). Holdtime for samples under this regulation is 28 days			
SO4-IC-N-ONT-DW-WT	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
SOLIDS-TDS-ONT-DW-WT	Water	Total Dissolved Solids	APHA 2540C
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.			
TC,EC-QT51-DW-WT	Water	Total Coliform and E. Coli	APHA 9223B
This analysis is carried out using procedures adapted from APHA Method 9223 "Enzyme Substrate Coliform Test". E. coli and Total Coliform are determined simultaneously. The sample is mixed with a mixture of hydrolyzable substrates and then sealed in a multi-well packet. The packet is incubated for 18 or 24 hours and then the number of wells exhibiting a positive response are counted. The final result is obtained by comparing the positive responses to a probability table.			
TURB-MET-WT	Water	Turbidity on preserved metals sample	APHA 2130 B
Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.			
TURBIDITY-ONT-DW-WT	Water	Turbidity	APHA 2130 B
Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.			
** ALS test methods may incorporate modifications from specified reference methods to improve performance.			

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

**GLOSSARY OF REPORT TERMS**

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid weight of sample

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.  
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.  
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

## Quality Control Report

Workorder: L2670334

Report Date: 15-DEC-21

Page 1 of 5

Client: TERRAPROBE-BRAMPTON

11 Indell Lane

Brampton ON L6T 3Y3

Contact: Paul Raeppele

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>ALK-ONT-DW-WT</b>		<b>Water</b>						
<b>Batch</b>	<b>R5672476</b>							
<b>WG3671936-2</b>	<b>LCS</b>							
Alkalinity, Total (as CaCO <sub>3</sub> )			104.1		%		85-115	08-DEC-21
<b>WG3671936-1</b>	<b>MB</b>							
Alkalinity, Total (as CaCO <sub>3</sub> )			<20		mg/L		20	08-DEC-21
<b>CL-IC-N-ONT-DW-WT</b>		<b>Water</b>						
<b>Batch</b>	<b>R5674534</b>							
<b>WG3672688-7</b>	<b>LCS</b>							
Chloride (Cl)			99.96		%		70-130	09-DEC-21
<b>WG3672688-6</b>	<b>MB</b>							
Chloride (Cl)			<0.50		mg/L		0.5	09-DEC-21
<b>COLOUR-ONT-DW-WT</b>		<b>Water</b>						
<b>Batch</b>	<b>R5670885</b>							
<b>WG3671945-2</b>	<b>LCS</b>							
Color, True			102.7		%		70-130	08-DEC-21
<b>WG3671945-1</b>	<b>MB</b>							
Color, True			<2.0		T.C.U.		2	08-DEC-21
<b>DOC-ONT-DW-WT</b>		<b>Water</b>						
<b>Batch</b>	<b>R5674156</b>							
<b>WG3672107-2</b>	<b>LCS</b>							
Dissolved Organic Carbon			101.5		%		80-120	09-DEC-21
<b>WG3672107-1</b>	<b>MB</b>							
Dissolved Organic Carbon			<0.50		mg/L		0.5	09-DEC-21
<b>EC-ONT-DW-WT</b>		<b>Water</b>						
<b>Batch</b>	<b>R5672476</b>							
<b>WG3671936-2</b>	<b>LCS</b>							
Conductivity			101.3		%		70-130	08-DEC-21
<b>WG3671936-1</b>	<b>MB</b>							
Conductivity			<6.0		umhos/cm		6	08-DEC-21
<b>MET-ONT-DW-WT</b>		<b>Water</b>						
<b>Batch</b>	<b>R5679226</b>							
<b>WG3675136-2</b>	<b>LCS</b>							
Aluminum (Al)			101.9		%		70-130	15-DEC-21
Antimony (Sb)			101.4		%		70-130	15-DEC-21
Arsenic (As)			102.4		%		70-130	15-DEC-21
Barium (Ba)			101.1		%		70-130	15-DEC-21
Cadmium (Cd)			103.0		%		70-130	15-DEC-21
Calcium (Ca)			95.1		%		70-130	15-DEC-21



## Quality Control Report

Workorder: L2670334

Report Date: 15-DEC-21

Page 3 of 5

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>NO3-DW-IC-WT</b>	<b>Water</b>							
Batch	R5674534							
<b>WG3672688-7</b>	<b>LCS</b>							
Nitrate (as N)			99.6		%		90-110	09-DEC-21
<b>WG3672688-6</b>	<b>MB</b>							
Nitrate (as N)			<0.020		mg/L		0.02	09-DEC-21
<b>P-T-COL-DW-WT</b>	<b>Water</b>							
Batch	R5672489							
<b>WG3671910-2</b>	<b>LCS</b>							
Phosphorus, Total			101.0		%		80-120	09-DEC-21
<b>WG3671910-1</b>	<b>MB</b>							
Phosphorus, Total			<0.0030		mg/L		0.003	09-DEC-21
<b>PH-ONT-DW-WT</b>	<b>Water</b>							
Batch	R5672476							
<b>WG3671936-2</b>	<b>LCS</b>							
pH			7.03		pH units		6.9-7.1	08-DEC-21
<b>SO4-IC-N-ONT-DW-WT</b>	<b>Water</b>							
Batch	R5674534							
<b>WG3672688-7</b>	<b>LCS</b>							
Sulfate (SO4)			101.2		%		90-110	09-DEC-21
<b>WG3672688-6</b>	<b>MB</b>							
Sulfate (SO4)			<0.30		mg/L		0.3	09-DEC-21
<b>SOLIDS-TDS-ONT-DW-WT</b>	<b>Water</b>							
Batch	R5677236							
<b>WG3673552-2</b>	<b>LCS</b>							
Total Dissolved Solids			93.9		%		70-130	11-DEC-21
<b>WG3673552-1</b>	<b>MB</b>							
Total Dissolved Solids			<10		mg/L		10	11-DEC-21
<b>TC,EC-QT51-DW-WT</b>	<b>Water</b>							
Batch	R5674911							
<b>WG3672350-1</b>	<b>MB</b>							
Total Coliforms			0		MPN/100mL		1	09-DEC-21
Escherichia Coli			0		MPN/100mL		1	09-DEC-21
<b>TURBIDITY-ONT-DW-WT</b>	<b>Water</b>							
Batch	R5675752							
<b>WG3672778-3</b>	<b>DUP</b>	<b>L2670334-1</b>						
Turbidity		9.34	9.48		NTU	1.5	15	09-DEC-21
<b>WG3672778-2</b>	<b>LCS</b>							



## Quality Control Report

Workorder: L2670334

Report Date: 15-DEC-21

Page 4 of 5

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TURBIDITY-ONT-DW-WT		Water						
Batch R5675752								
WG3672778-2 LCS								
Turbidity			101.0		%		85-115	09-DEC-21
WG3672778-1 MB								
Turbidity			<0.10		NTU		0.1	09-DEC-21

# Quality Control Report

Workorder: L2670334

Report Date: 15-DEC-21

Page 5 of 5

## Legend:

---

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

## Hold Time Exceedances:

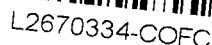
All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

---

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



COC Number: 20 -

Page 1 of 2

AF

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY      YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.