November 19, 2021 Reference No. 11207536-01

Rubal Kundra
Life at the Woodland Inc.
Unit 201, 5 Brisdale Drvie
Brampton ON L7A 0S9

Re: Hydrogeological Assessment: Well Testing and Monitoring Report Update
Proposed Residential Development
Part Lot 27, Concession 10, Otonabee South-Monaghan
Peterborough ON

Dear Mr. Kundra:

1. Introduction

The following report presents the results of aquifer performance testing conducted at four (4) water wells located at Part Lot 27, Concession 10 in the Township of Otonabee-South Monaghan in the County of Peterborough ("the Site"). This letter is updated to reflect a change in ownership from Al Demonte to Mr. Rubal (the Client) and an updated concept plan. This letter contains the same hydrogeological content as the well testing and monitoring report prepared for Mr. Demonte dated July 22, 2015 with updates only to the Figures (to reflect the new concept plan and updated aerial photographs) and additional new attachments that contain the preliminary hydrogeological assessment report and the peer review correspondence with Stantec and subsequent response memos. These documents are provided for reference in Appendix D and E for the preliminary hydrogeologic assessment report and Stantec peer review, respectively. It is noted that this hydrogeological assessment was approved by the peer reviewer. Health Unit conditions related to proposed septic systems are provided in Appendix F for reference.

This letter provides information that the wells are constructed in a suitable manner and can support typical, single-family household usage and builds upon the preliminary report prepared for the Site by Geo-Logic (now GHD) entitled "Hydrogeological Assessment Report – Proposed Residential Development, Part Lot 27, Concession 10, Otonabee-South Monaghan Township, Peterborough, Ontario, Project No. G024636E1" dated October 2013. The preliminary report provided subsurface conditions based upon test pits completed at the Site, general groundwater and hydrogeological information, water balance details and water and waste disposal recommendations. The preliminary report should be referred to for details and will not be discussed further in this letter. The proposed development originally included thirty-four (34) residential lots which has been currently reduced to 27 lots. The waste disposal recommendations provided in the preliminary report are no longer valid and are to be replaced by the waste disposal recommendations prepared by Gunnell Engineering (November 1, 2021).

The pumping test information presented in this letter remains valid for the proposed 27-lot subdivision.

2. Test Well Construction Details

Four (4) drilled test water wells were constructed on the Site for the purpose of aquifer performance testing by conducting pumping tests. The new drilled test wells were constructed by Herb Lang Well Drilling Ltd. (Ministry of the Environment License No. 3367) and completed in March and April 2015. The Ministry of the Environment, Conservation and Parks (MECP) well records are presented in Appendix A. The test wells are located as shown on the Plot Plan within the Figures index. The drilled test wells are labelled as TW-1, TW-2, TW-3 and TW-4.

The following sections discuss the test wells utilized for the aquifer performance testing.

Test well TW-1 (MECP Well Tag No. A175906) has the following characteristics:

- Drilled to approximately 30.5 m encountering loam, clay gravel, and limestone to depth. Bedrock and water was encountered at 14.0 m;
- Recommended for pumping at 15.9 litres per minute or L/min (3.5 Imperial gallons per minute or Igpm); and
- Construction was completed on April 16, 2015.

Test well TW-2 (MECP Well Tag No. A175907) has the following characteristics:

- Drilled to approximately 30.5 m encountering loam, clay gravel, gravel and limestone to depth. Bedrock and water was encountered at 17.1 m;
- Recommended for pumping at 13.6 L/min (3 Igpm); and
- Construction was completed on April 16, 2015.

Test well TW-3 (MECP Well Tag No. A175901) has the following characteristics:

- Drilled to approximately 39.6 m encountering clay, clay gravel, and limestone to depth. Bedrock was encountered at 18.3 m;
- Water was encountered at 15.5 m;
- Recommended for pumping at 13.6 L/min (3 Igpm); and
- Construction was completed on April 1, 2015.

Test well TW-4 (MECP Well Tag No. A175895) has the following characteristics:

- Drilled to approximately 38.1 m encountering clay gravel and limestone to depth. Bedrock was encountered at 7.3 m;
- Water was encountered at 38.1 m;
- Recommended for pumping at 13.6 L/min (3 Igpm); and
- Construction was completed on March 18, 2015.

3. Aquifer Performance Testing

A pumping test program was carried out between June 3 and July 14, 2015 to assess aquifer response and confirm the availability of a suitable groundwater resource for the proposed residential development. Controlled constant rate pumping tests were conducted for a minimum of six hours at each of the test wells with recovery measurements completed after the pumping. Submersible pumps were installed in each well to conduct the testing. Water levels in the test wells were monitored throughout the aquifer performance testing to evaluate the potential for interference. The discharge water was directed away from each pumped well a distance of approximately 30 m downgradient and was allowed to flow overland away from the tested well. This practice safeguards against artificial recharge of the well from occurring during the pumping test. Chlorine levels were checked prior to bacteria sampling conducted at each of the test wells. The residual chlorine was non-detect prior to obtaining the bacteriological samples.

Field measurements of pH, temperature, and conductivity were completed with a Hach Pocket Pro^{+} Multi 2. Free chlorine was measured with a Hach Pocket Colorimeter II. Turbidity was measured with a Hach 2100Q Portable Turbidimeter. Calibration of the instruments was completed before each pumping test.

The results of the constant rate pumping tests are graphically presented in Appendix B. The Constant Rate Drawdown, Recovery and Testing Details curves include flow rate, conductivity, pH, turbidity, temperature, free chlorine and methane gas are presented on the Plates in Appendix B. Drawdown data from each constant rate test was plotted on a drawdown versus time semi-log plot in order to evaluate transmissivity and specific capacity coefficients. The coefficients are summarized in Table 3.1. A summary of each pumping test is provided as follows:

3.1 Test Well No. 1 (TW-1)

The water level during the pumping test at TW-1 dropped quickly for the first 60 minutes at a pumping rate of 13.6 L/min (3 Igpm) and the rate of drop slowed after 60 minutes. After 8.25 hours of pumping, the water level was approximately 14.6 m and nearly 14.4 m of available drawdown above the pump was remaining. The plotted data indicates this well can provide long-term quantities of groundwater at a pumping rate of 13.6 L/min provided there is sufficient recovery time.

The estimated transmissivity for TW-1 was 0.59 m^2/day (39.6 Igpd/ft) based on the drawdown and 0.77 m^2/day (51.4 Igpd/ft) based on the recovery period and represents a low transmissivity.

3.2 Test Well No. 2 (TW-2)

The water level during the pumping test at TW-2 dropped quickly within the first 50 minutes at a pumping rate of 13.6 L/min (3 Igpm). After 50 minutes the water level began levelling off around 15.5 m. After 60 minutes the water level began to drop until reaching the pump intake at 29.8 m after 180 minutes. By 210 minutes the pumping rate had been reduced to 9.1 L/min (2 Igpm). The pumping test was continued for nearly 8 hours at 9.1 L/min. The data indicates this well can provide long-term quantities of groundwater at a pumping rate of 9.1 L/min provided there is sufficient recovery time.

The estimated transmissivity for TW-2 was 0.07 m^2/day (4.6 Igpd/ft) based on the drawdown and 0.11 m^2/day (7.6 Igpd/ft) based on the recovery period and represents a low transmissivity.

3.3 Test Well No. 3 (TW-3)

The water level during the pumping test at TW-3 dropped to 23.4 m at the end of the pumping test at a rate of 9.1 L/min. The test was conducted for 750 minutes. At the end of the testing there was 11.2 m of available drawdown above the pump remaining. The data indicates this well can provide long-term quantities of groundwater at a pumping rate of 9.1 L/min provided there is sufficient recovery time.

The estimated transmissivity for TW-3 was 0.33 m^2/day (22.4 Igpd/ft) based on the drawdown and 0.30 m^2/day (20.1 Igpd/ft) based on the recovery period and represents a low transmissivity.

3.4 Test Well No. 4 (TW-4)

The water level during the pumping test at TW-4 dropped quickly within the first 35 minutes at a pumping rate of 13.6 L/min (3 Igpm). After 510 minutes of pumping, the water level was approximately 28.3 m with nearly 9.0 m of available drawdown above the pump remaining. The data indicates this well can provide long-term quantities of groundwater at a pumping rate of 13.6 L/min provided there is sufficient recovery time.

The estimated transmissivity for TW-4 was 0.06 m^2/day (4.1 Igpd/ft) based on the drawdown and 0.2 m^2/day (13.6 Igpd/ft) based on the recovery period and represents a low transmissivity.

Table 3.1: Aquifer Performance Testing Summary

WELL No.	STEP No.	YIELD		TYPE	TIME	MAXIMUM DRAWDOWN		AVAILABLE DRAWDOWN*		SPECIFIC CAPACITY		ESTIMATED TRANSMISSIVITY	
		lgpm	L/min		minutes	feet	metres	feet	metres	lgpm/ft	L/min/m	lgpd/ft	m^2/day
TW-1	1	0	0	Static	0	0	0	94.3	28.7	---	---	---	---
	2	3	13.6	Const	496	44.7	13.6	49.6	15.1	0.07	1.00	39.6	0.59
	3	0	0	Recvy	91% recovery after 24 hours							51.3	0.77
TW-2	1	0	0	Static	0	0	0	86.4	26.3	---	---	---	---
	2	3	13.6	Const	120	---	---	---	---	---	---	---	---
	3	2.6	12.0	Const	30	---	---	---	---	---	---	---	---
	4	2.2	10.0	Const	60	---	---	---	---	---	---	---	---
	5	2	9.1	Const	463	86.4	26.3	0	0	0.02	0.35	4.6	0.07
	6	0	0	Recvy	95% recovery after 3 hours 33 minutes							7.7	0.11
TW-3	1	0	0	Static	0	0	0	113.6	34.6	---	---	---	---
	2	2	9.1	Const	750	76.7	23.4	36.9	11.2	0.03	0.39	22.4	0.33
	3	0	0	Recvy	95% recovery after 17 hours 40 minutes							20.1	0.30
TW-4	1	0	0	Static	0	0	0	112.9	34.4	---	---	---	---
	2	3	13.6	Const	510	83.4	25.4	29.5	9.0	0.04	0.54	4.1	0.06
	3	0	0	Recvy	95% recovery after 9 hours 40 minutes							13.6	0.20

Notes:
lgpm = Imperial gallons per minute; lgpd/ft = Imperial gallons per day per foot
"Recvy" refers to Recovery measurements; "Const" refers to the Constant Rate test
*Available Drawdown refers to the height of water in the well above the pump.
Static water levels at TW-1, TW-2, TW-3, and TW-4 were 0.22, 2.46, 0.70, and 2.17 metres below existing grade, respectively.

The pumping data reflects relatively low transmissivities of the aquifer complexes below the Site. The recovery measurements also indicate relatively low to moderate recharge. It is concluded that the tested drilled wells (TW-1, TW-2, TW-3, and TW-4) can provide operational yields on the order of 9.1 to 13.6 L/min (2 to 3 lgpm) based on an adequate period of recharge. Over the duration of the pumping tests, the wells yielded approximately:

- TW-1: 6,765 litres (~1,488 Imperial gallons of water);
- TW-2: 6,805 litres (~1,497 Imperial gallons of water);
- TW-3: 5,678 litres (~1,500 Imperial gallons of water); and,
- TW-4: 6,955 litres (~1,530 Imperial gallons of water).

3.5 Well Interference

The test wells were monitored during each pumping test to assess the potential for well interference. The approximate linear distances between the test well locations were updated using the Conceptual Plan, Figure 4. The distances are provided in Table 3.2 and range from about 190 m to 350 m.

Table 3.2: Approximate Distances Between Test Wells

Location	Observation Wells (Distances from Test Wells in metres)			
	TW-1	TW-2	TW-3	TW-4
TW-1	---	190	260	350
TW-2	190	---	215	190
TW-3	260	215	---	190
TW-4	350	190	190	---

The data collected during the pumping tests illustrated that there was minor hydraulic connectivity between TW-2 and TW-4 (Table 3.3). There was insignificant interference between the other test wells during the pumping tests. Significant interference to future wells in the subdivision and existing local wells is not expected based on usage from the proposed residential development.

Table 3.3: Maximum Drawdowns in Test Wells

PUMPING WELLS		OBSERVATION WELLS	
LOCATION	DRAWDOWN AT PUMPING WELL(m)	LOCATION	DRAWDOWN AT OBSERVATION WELL(m)
TW-1	-13.6	TW-2	0.22
		TW-3	-0.06
		TW-4	0.16
TW-2	-26.3	TW-1	0.18
		TW-3	-0.02
		TW-4	-1.15
TW-3	-23.4	TW-1	0.15
		TW-2	-0.34
		TW-4	-0.14
TW-4	-25.4	TW-1	0.29
		TW-2	-1.14
		TW-3	0.01

Note: -ve value indicates the water level is lowering; +ve value indicates the water level is recharging.

The pumping data information indicates that there is a sufficient quantity of water below the Site for the planned development without significant impact to existing neighbouring wells.

4. Test Well Water Quality

Groundwater samples were collected during the course of the pumping tests for the purpose of water quality analyses. The wells were sampled after a minimum period of about one (1) hour into the constant rate test and at the end of the test. Certificates of chemical analyses are presented in Appendix C. The water quality data are summarized and compared with the Ontario Drinking Water Standards (ODWS) in Table 4.1.

Table 4.1: Test Well Water Quality Summary

PARAMETER	Test Well TW-1		Test Well TW-2		Test Well TW-3		Test Well TW-4		ODWS		
	1 hr	End	1 hr	End	1 hr	End	1 hr	End	MAC	IMAC	AO/OG
Alkalinity (as $CaCO_3$)	98	95	162	168	116	121	159	163	--	--	30 to 500
Ammonia+Ammonium	0.21	0.24	0.28	0.35	0.17	0.30	0.14	0.27	--	--	--
Arsenic	0.0003	<0.0002	0.0008	0.0002	0.0009	0.0006	0.0006	<0.0002	--	0.025	--
Barium	0.0185	0.0192	0.0962	0.0746	0.0406	0.05	0.532	0.0601	1	--	--
Boron	0.323	0.311	0.134	0.196	0.148	0.156	0.239	.306	5	--	--
Calcium	7.24	6.63	26.4	26.5	21.3	33.0	35.3	35.2	--	--	--
Chloride	29	20	55	49	20	64	22	71	--	--	250
Chromium	0.00016	0.00009	0.00048	0.00018	0.00023	0.00116	0.00034	0.00007	0.05	--	--
Colour (T.C.U.)	<3	<3	<3	3	<3	3	3	<3	--	--	5
Conductivity (µS/cm)	318	281	536	527	337	453	407	570	--	--	--
Copper	0.00028	0.00003	0.00139	0.00037	0.00049	0.001	0.00049	0.00019	--	--	1.0
Fluoride	**1.55**	1.44	0.39	0.37	0.58	0.64	0.49	0.94	1.5	--	--
Hardness (as $CaCO_3$)	35.4	32.7	**208**	**206**	98.8	**139**	**167**	**170**	--	--	80 to 100
Iron	**2.56**	0.024	**15.7**	0.112	**4.66**	**0.539**	**5.39**	**0.381**	--	--	0.3
Lead	0.0003	0.00001	0.00029	0.00002	0.00010	0.00023	0.00028	0.00012	0.01	--	--
Magnesium	4.22	3.92	34.4	34.0	11.1	13.7	19.2	20.0	--	--	--
Manganese	0.0159	0.00130	0.0601	0.00562	0.0400	0.0239	0.0172	0.00627			0.05
Nitrogen-Kjeldahl (N)	0.23	0.21	0.24	0.29	0.26	0.4	0.17	0.23	--	--	--
Nitrite (N)	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	1.0	--	--
Nitrate (N)	<0.006	<0.006	<0.006	<0.006	<0.06	0.498	<0.006	<0.006	10	--	--
Organic Nitrogen	<0.05	<0.05	<0.05	<0.05	0.09	0.1	<0.05	<0.05	--	--	0.15
pH (units)	8.21	8.18	8.15	8.17	8.18	8.33	8.24	8.23	--	--	6.5 to 8.5
Phosphorus	<0.03	<0.03	0.022	0.012	0.012	0.028	0.014	0.006	--	--	--
Selenium	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004	<0.001	<0.001	0.01	--	--
Sodium	51.7	45.6	26.2	24.4	31.6	47.3	26.9	50.0	--	--	200
Sulphate	21	17	29	27	30	30	36	35	--	--	500
Total Dissolved Solids	174	152	270	264	186	263	237	312	--	--	500
Turbidity (N.T.U.)	**38.7**	0.60	**150**	0.38	**51.3**	**42.8**	**32.9**	3.53	--	--	5
Uranium	0.000009	0.000002	0.000044	0.000019	0.000249	0.000095	0.000020	0.000010	0.02	--	--
Zinc	0.007	0.004	0.039	0.007	0.025	0.03	0.004	<0.002	--	--	5.0
E. coli	---	0	---	0	---	0	---	0	0	--	--
Total Coliform	---	0	---	0	---	5	---	0	<6	--	--
Fecal Coliform	---	0	---	0	---	0	---	0	0	--	--

Notes: All units in mg/L (i.e. parts per million) unless otherwise noted. Time indicates when the sample was obtained during the pumping test.

MAC = maximum acceptable concentration (health related); IMAC = Interim MAC (insufficient data to establish MAC or not feasible to establish MAC to desired level); AO/OG = aesthetic objective or operational guideline (not health related)

Bacteriological data is presented in Colony Forming Units per 100 mL (CFU/100 mL). Bolded value exceeds ODWS

Each of the test wells with the exception of TW-1 had exceedances of the aesthetic objective for hardness. TW-3 and TW-4 had exceedances of iron at the end of the testing. At the end of the testing, there were no other water quality exceedances with the exception of turbidity at TW-3. There were no health-related parameters exceeding the ODWS. The following sections discuss the water quality presented in Table 4.1.

4.1 Aesthetic Parameters

The groundwater in the area is generally hard with the exception of TW-1. At TW-2, TW-3 and TW-4, the water hardness ranges from 139 to 206 mg/L as $CaCO_3$ (based upon samples collected at the end of the pumping tests) and related to the overburden materials containing calcium and to a lesser extent, magnesium. Elevated hardness and iron is a common trait of groundwater supplies in Southern Ontario and can be treated using commercially available treatment equipment such as a water softener.

Turbidity was higher in the laboratory samples compared to measurements collected at the well head which can be attributed to iron that may be precipitating out before the sample can be analyzed causing elevated turbidity in the laboratory sample.

4.2 Bacteria

Total coliform was reported in only TW-3; however, levels were less than 6 coliform forming units per 100 mL. As described in Procedure D-5-5: Technical Guideline for Private Wells, total coliform counts of less than 6 per 100 mL of sample and zero (0) for *Escherichia* coli (*E*. coli) and fecal coliforms shall be considered as indicative of acceptable water quality. As a precaution, GHD recommends that bacteriological treatment (i.e. ultraviolet) be used by individual residences to ensure potable water is available to each of the dwellings in this proposed development.

5. Conclusion and Recommendations

Based on the results of our investigation, it is our professional opinion that the Site is suitable for the 27-lot development. As part of this study, four (4) pumping tests were conducted of drilled water wells at the Site. Based on the pumping tests, the test wells, TW-1, TW-2, TW-3 and TW-4 were rated to have operational yields of 13.6 L/min (3 Igpm), 9.1 L/min (2 Igpm), 9.1 L/min (2 Igpm), and 13.6 L/min (3 Igpm), respectively. The available well data confirms that adequate groundwater resources are available for the proposed development. A nitrate impact assessment was completed previously and approved for 34 lots. The projected nitrate concentration becomes lower and improves for a 27-lot development.

It is our professional opinion that there is minimal potential for groundwater and surface water impact as a result of the planned residential development from a quality and quantity perspective provided that the septic systems and wells are constructed properly. Well construction should follow recommendations provided in Geo-Logic's "Hydrogeological Assessment Report – Proposed Residential Development, Part Lot 27, Concession 10, Otonabee-South Monaghan Township, Peterborough, Ontario, Project No. G024636E1" dated October 2013. Septic recommendations are provided by Gunnell Engineering.

The groundwater is expected to require water treatment for hardness and potentially iron, but treatment should be at the discretion of the individual residences. Ultraviolet treatment is recommended as a precautionary measure for each of the residences.

Based upon the pumping tests, it is recommended that flow restriction valves be installed at each of the production wells to reduce overpumping of the wells. The restriction should be based on the well performance data carried out prior to use. As examples, at TW-1 and TW-4, the flow rates should be restricted to about 13 L/min; and, at TW-2 and TW-3 the rates should be restricted to about 9 L/min.

Some wells may also require engineered containment systems. These systems are generally used for low flow or low recovery wells, enabling fresh water from the well to be "trickled" into a storage tank. Then the water is delivered to the house upon demand using a secondary pump. A nominal 4500 L engineered storage tank system would eliminate the potential for interference between wells by smoothing out the drawdowns created during pumping of individual wells within the future subdivision. The system would be engineered such that pumping cycles are used to take no more water than the well can produce, so fluctuations in the well's water level are reduced. Drawdown and overpumping is controlled and interference between wells is reduced or eliminated. Once the pumping cycles have been set up, water is collected day and night, whether or not there is water being used, until the tank is full. As an example, pumping rates can be restricted to as little as 3.1 litres per minute (this is the rate required to fill 4500 L over the course of a 24-hour day). It would be expected that a typical household will use about 1000 litres per day or less than 1 litre per minute over 24 hours. The rate selected would be subject to the requirements of the system equipment, pump ratings etc.

As long as the wells are able to produce water, the engineered system has the advantage of providing water at rates and quantities for typical domestic usage when required by the household. The water provided from the storage tank to the points of consumption in the house can then be provided to meet volume demands and minimum rates such as 13.6 L/min (MOE Protocol D-5-5) regardless of the yield produced by the well itself. At this development, the engineered storage system will provide added assurance that water will be available to future homeowners for the long-term without interference concerns.

Based on the results of the aquifer performance testing and water quality analyses, it is our opinion that the drilled wells should provide an adequate supply and suitable quality of water to support the proposed residential development.

We trust that this report meets your immediate requirements. Should you have any questions, please contact our office.

Sincerely,

GHD

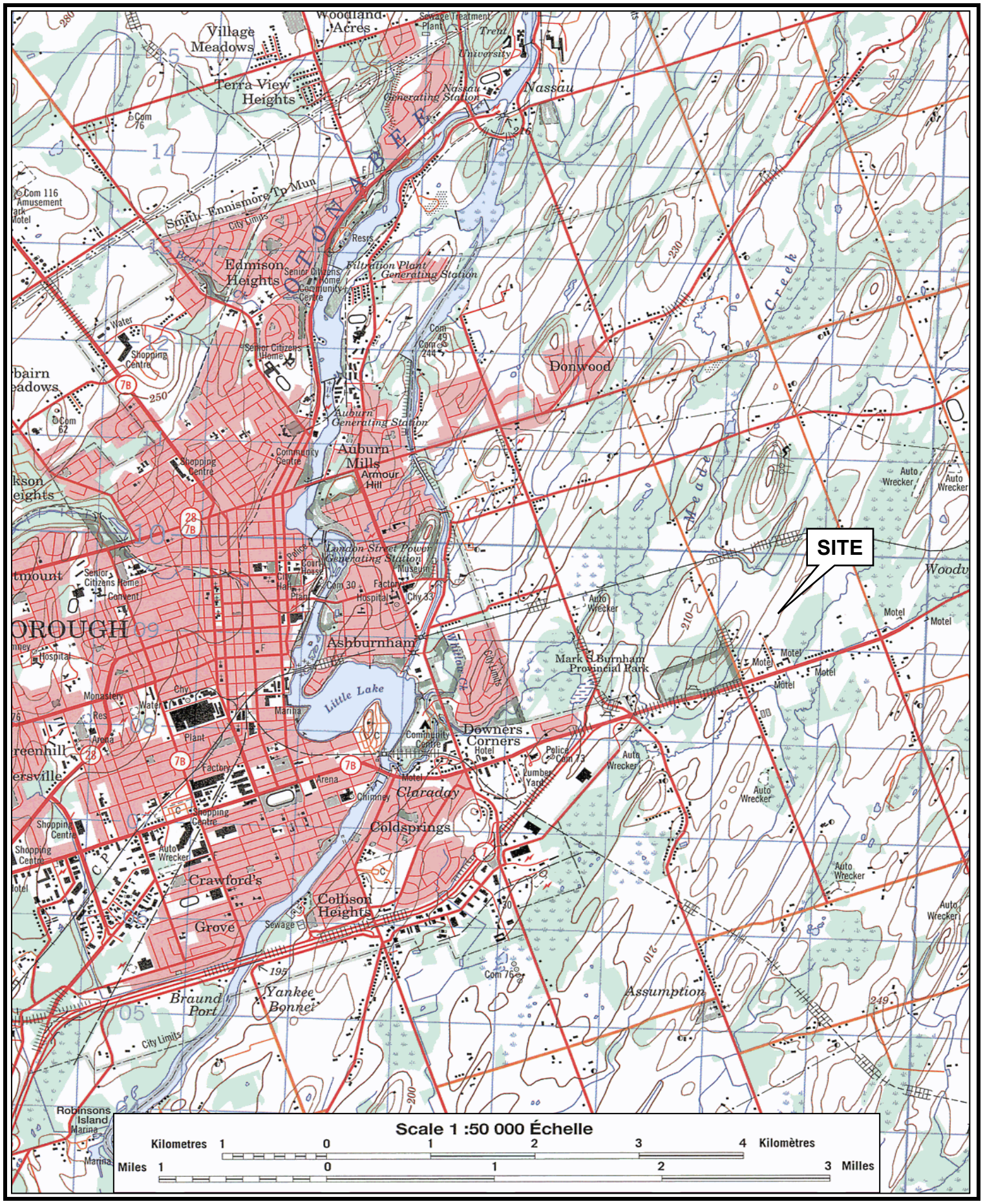
Steve Gagne, H.S.Bc.
Associate, Project Director

Robert Neck, M.Eng., P.Geo. (Limited)
Associate, Project Director

Attachments:

Figures
Appendix A – MECP Test Well Records
Appendix B – Aquifer Performance Testing Curves
Appendix C – Certificates of Analyses
Appendix D – Preliminary Hydrogeological Assessment Report
Appendix E – Peer Review Correspondence
Appendix F – Health Unit Conditions

Figures



Base map compiled from Energy, Mines and Resources Canada Map 31 D/8 published 1999. Information current as of 1996.

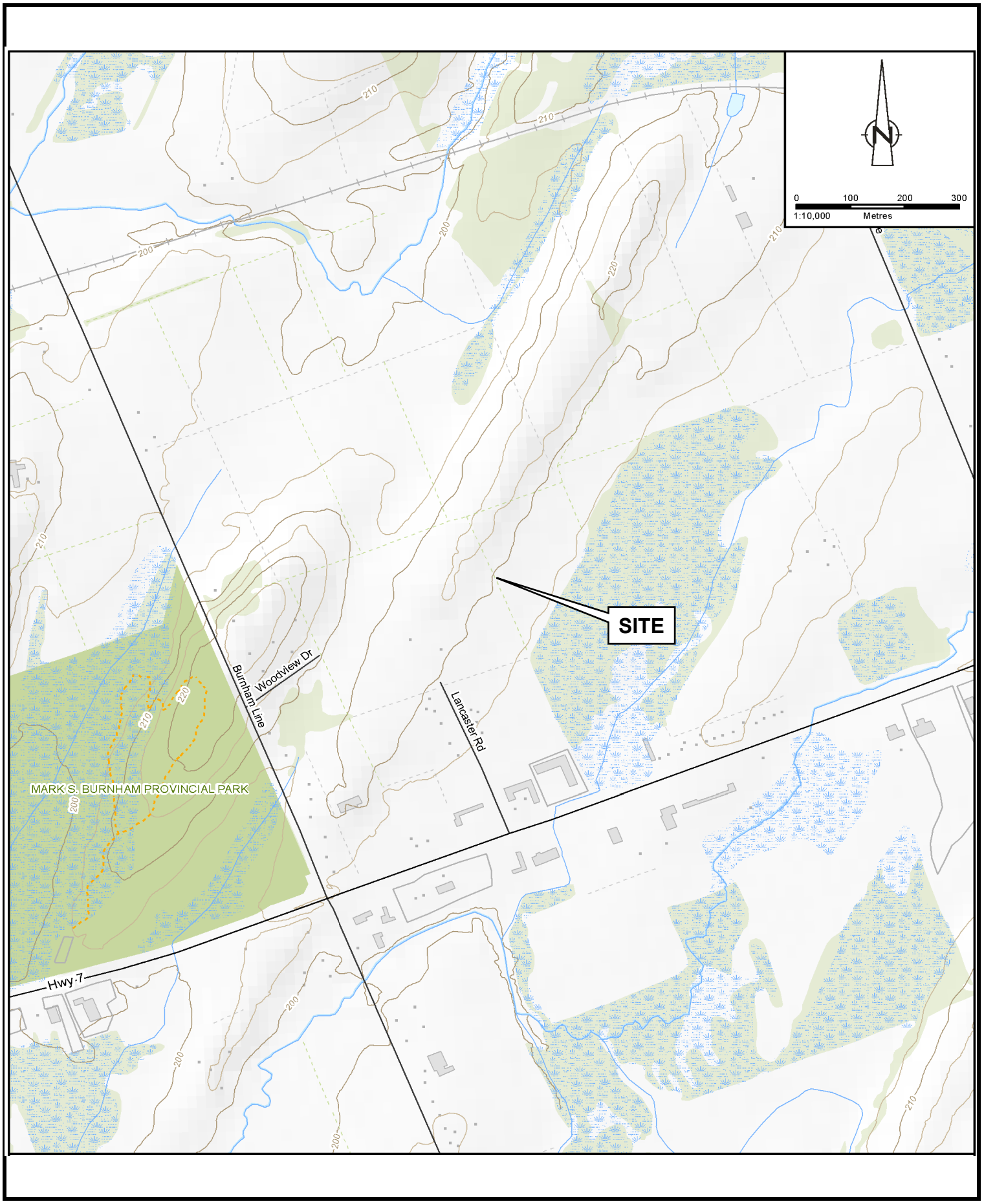
Scale:
1:50000
Coordinate System
NAD 1983 UTM
Zone 17

Life at the Woodland
Pt Lt 27 Con 10, Peterborough ON
Hydrogeological Assessment

11207536-01
November 2021

Vicinity Plan

FIGURE 1



Source: MNR NRVIS, 2013. Produced by CRA under license from Ontario Ministry of Natural Resources. © Queen's Printer 2013.

Scale:
1:10000
Coordinate System
NAD 1983 UTM
Zone 17

Life at the Woodlands
Pt Lt 27 Con 10, Peterborough ON
Hydrogeological Assessment

11207536-01
November 2021

Site Plan

FIGURE 2

Source: Google Earth. Imagery date 5/6/2018. © 2020 Google.

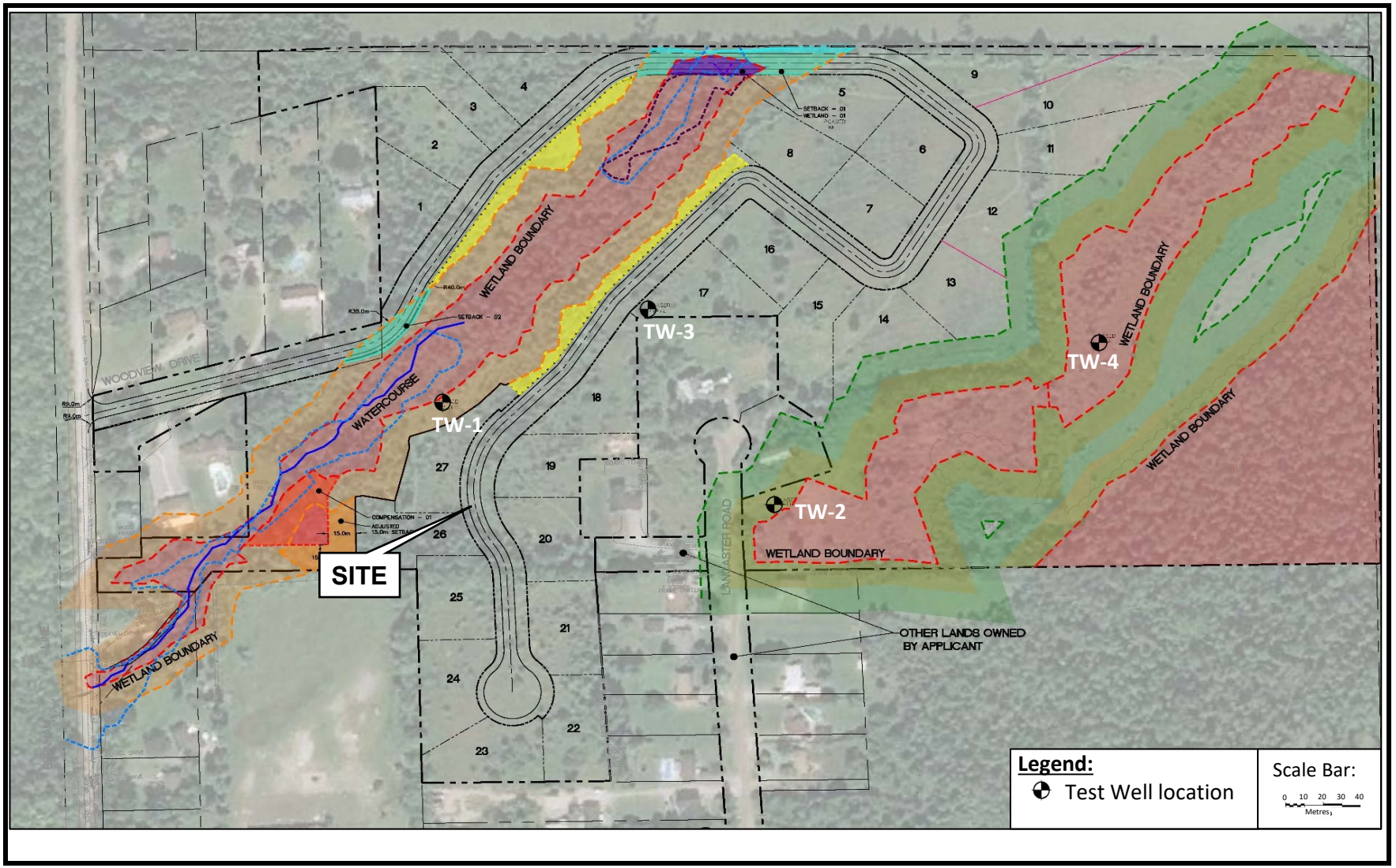
Scale:
Refer to Scale Bar
Coordinate System:
NAD 1983 UTM Zone 17

Life at the Woodland
Pt Lt 27 Con 10, Peterborough ON
Hydrogeological Assessment

11207536-01
November 2021

Plot Plan

FIGURE 3



Source: DM Wills Associates Limited. "Draft Plan /w Wetlands". Dated October 21, 2021

Scale:
1:1000
Refer to Scale Bar
Coordinate System:

Life at the Woodland
Pt Lt 27 Con 10, Peterborough ON
Hydrogeological Assessment

11207536-01
November 2021

Concept Plan

FIGURE 4

Appendix A
MECP Test Well Records

A175906 TW-1

Ontario — Ministry of the Environment

Well Tag No. (Place Sticker and/or Print Below): **Tag#: A175906**

Well Record

Regulation 903 Ontario Water Resources Act

Page ____ of ____

Measurements recorded in: ☐ Metric ☒ Imperial

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
Al	Demarle		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
2752 OLD NORWOOD RD	ICEENE	ON	K9J 0G6	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
LANCASTER RD	OTONABEE	27	11

County/District/Municipality	City/Town/Village	Province	Postal Code
PETERBOROUGH	PETERBOROUGH	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	718288	4909084		

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	To
BROWN	LOAM	CLAY SAND	SOFT	0'	8'
GREY	CLAY GRAVEL	STONES	PACKED	8'	18'
GREY	GRAVEL	STONES	CEMENTED	18'	44'
GREY	LIMESTONE SHALE	SAND	LAYERED	44'	46'
GREY	LIMESTONE	SHALE	LAYERED + HARD	46'	100'

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0'	20'	BENTONITE CHIPS	250 LBS
		BENTONITE SLURRY	40 GAL

Method of Construction

☒ Cable Tool ☐ Diamond ☐ Rotary (Conventional) ☐ Jetting ☐ Rotary (Reverse) ☐ Driving ☐ Boring ☐ Digging ☐ Air percussion ☐ Other, specify

Well Use

☐ Public ☐ Commercial ☐ Not used ☒ Domestic ☐ Municipal ☐ Dewatering ☐ Livestock ☐ Test Hole ☐ Monitoring ☐ Irrigation ☐ Cooling & Air Conditioning ☐ Industrial ☐ Other, specify

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To
6 1/4"	Steel	.188	+16"	46'
6"	open hole		46'	100'

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	To

Status of Well

☒ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☐ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☐ Abandoned, other, specify ☐ Other, specify

Water Details

Water found at Depth (m/ft)	Kind of Water	Hole Diameter Depth From	To	Diameter (cm/in)
46'	☒ Fresh ☒ Unlested ☐ Gas ☐ Other, specify	0'	20'	8 3/4"
	☐ Fresh ☐ Untested ☐ Gas ☐ Other, specify	20'	46'	6 5/8"
	☐ Fresh ☐ Untested ☐ Gas ☐ Other, specify	46'	100'	6"

Results of Well Yield Testing

After test of well yield, water was: ☒ Clear and sand free ☐ Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft): 95'

Pumping rate (l/min / GPM): 4 GPM

Duration of pumping: 1 hrs + 00 min

Final water level end of pumping (m/ft): 343

If flowing give rate (l/min / GPM):

Recommended pump depth (m/ft): 95'

Recommended pump rate (l/min / GPM): 3.56 PM

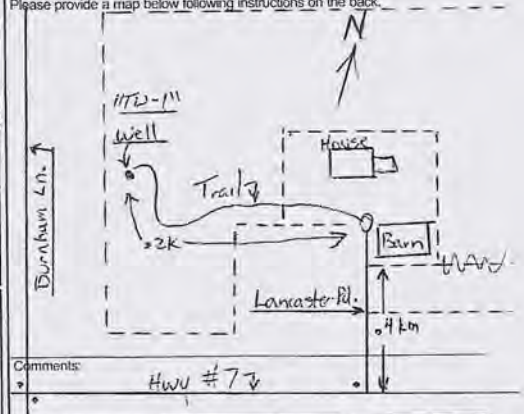
Well production (l/min / GPM): 3.56PM

Disinfected? ☒ Yes ☐ No

Draw Down Time (min)	Water Level (m/ft)	Recovery Time (min)	Water Level (m/ft)
Static Level	913"		913
1	11'5	1	31'6
2	12'9	2	30'5
3	14'1	3	29'6
4	15'6	4	28'8
5	16'1	5	28'0
10	19'7	10	24'8
15	22'5	15	22'4
20	24'7	20	20'7
25	26'4	25	19'2
30	28'4	30	18'1
40	30'9	40	16'7
50	32'8	50	15'5
60	343"	60	14'6"

Map of Well Location

Please provide a map below following instructions on the back.



Comments: HWY #7

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
HERB LANG WELL DRILLING LTD	3316

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
4852 HWY #7	OMEMEE	ON	K0L 2W0	

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)	Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
7059791088	MASK KEVIN	3416		2015/04/16

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☒ Yes ☐ No	2014/12/05	2015/04/16

Ministry Use Only

Audit No. Z 204187

Ministry's Copy

A175907 TW-2

Ontario Ministry of the Environment

Measurements recorded in: ☐ Metric ☒ Imperial

Well Tag No. *(Place Sticker and/or Print Below)*
Tag#: A175907

Well Record
Regulation 903 Ontario Water Resources Act

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
AL	DEMONTE		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
2752 OLD NORWOOD RD	KEENE	ON	K9J6G6	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
LANCASTER RD	OTONABEE	27	11

County/District/Municipality	City/Town/Village	Province	Postal Code
PETERBOROUGH	PETERBOROUGH	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	718476	4909089		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	To
BROWN	LOAM	CLAY SAND	SOFT	0'	6'
GREY	CLAY GRAVEL	STONES	PACKED	6'	24'
GREY	GRAVEL	STONES	CEMENTED	24'	56'
GREY	LIMESTONE	SHALE	LAYERED	56'	100'

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/cf)
0'	20'	BENTONITE CHIPS	250 LBS
		BENTONITE SLURRY	40 GAL

Method of Construction

☒ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☐ Boring ☐ Digging
☐ Air percussion
☐ Other, specify

Well Use

☐ Public ☐ Commercial ☐ Not used
☒ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☐ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☐ Industrial
☐ Other, specify

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To
6 1/4"	Steel	0.188	+16"	56'
6'	Open hole		56'	100'

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	To

Status of Well

☒ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☐ Abandoned, other, specify
☐ Other, specify

Water Details

Water found at Depth (m/ft)	Kind of Water	Other, specify
56'	☒ Fresh ☒ Untested ☐ Gas	☐ Other, specify
Water found at Depth (m/ft)	Kind of Water: ☐ Fresh ☐ Untested ☐ Gas	☐ Other, specify
Water found at Depth (m/ft)	Kind of Water: ☐ Fresh ☐ Untested ☐ Gas	☐ Other, specify

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	20	8 3/4"
20	56	6 5/8"
56	100	6"

Results of Well Yield Testing

After test of well yield, water was:
☒ Clear and sand free
☐ Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft): 95'

Pumping rate (l/min / GPM): 3 1/4 GPM

Duration of pumping: 1 hrs + 00 min

Final water level end of pumping (m/ft): 44'3

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft): 95'

Recommended pump rate (l/min / GPM): 3 GPM

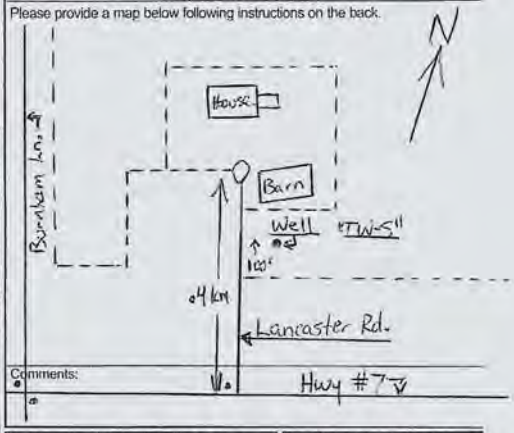
Well production (l/min / GPM): 3 GPM

Disinfected? ☒ Yes ☐ No

Draw Down Time (min)	Water Level (m/ft)	Recovery Time (min)	Water Level (m/ft)
Static Level	10'1"		10'1"
1	13'1	1	43'2
2	15'8	2	42'2
3	17'9	3	41'1
4	19'0	4	40'2
5	20'3	5	39'3
10	25'4	10	34'8
15	29'3	15	30'3
20	32'6	20	26'8
25	35'2	25	24'0
30	37'2	30	21'5
40	40'8	40	15'7
50	42'6	50	14'8
60	44'3"	60	13'9"

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
HERB LANGE WELL DRILLING LTD	3316

Business Address (Street Number/Name)	Municipality
4852 HWY #7	OMEMEE

Province	Postal Code	Business E-mail Address
ON	K0K 2W0	

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
7057997088	MASIK KEVIN

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
3160		2015/04/16

Well owner's information package delivered	Date Package Delivered	Ministry Use Only
☒ Yes ☐ No	2014/12/05	Audit No. Z 204188
	Date Work Completed: 2015/04/16	

0506E (2007/12) © Queen's Printer for Ontario, 2007 Ministry's Copy

TW-3

Ontario — Ministry of the Environment

Well Tag No. *(Place Sticker and/or Print Below)*: **Tag#: A175901**

Well Record

Regulation 903 Ontario Water Resources Act

Page ____ of ____

Measurements recorded in: ☐ Metric ☒ Imperial

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
AL	DEMONTE		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
2752 OLD NORWOOD RD	KEENE	ON	K9J 0G6	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
LANCASTER RD	OTONABEE	27	11

County/District/Municipality	City/Town/Village	Province	Postal Code
PETERBOROUGH	PETERBOROUGH	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	718441	4909331		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
GREY	CLAY	STONES	PACKED	0'	44'
GREY	CLAY GRAVEL	SAND	LOOSE WET	44'	51'
GREY	SHALE LIMESTONE	SAND	LAYERED	51'	60'
GREY	LIMESTONE		HARD	60'	130'

Annular Space

Depth Set at (m/ft) From	Depth Set at (m/ft) To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0'	20'	BENTONITE SLURRY	50 GAL
		BENTONITE CHIPS	50 LBS

Method of Construction

☒ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☐ Boring ☐ Digging
☐ Air percussion
☐ Other, specify

Well Use

☐ Public ☐ Commercial ☐ Not used
☒ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☐ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☐ Industrial
☐ Other, specify

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
6 1/4	Steel	.188	+2'	51'
6 1/4	OPEN HOLE		51'	130'

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Status of Well

☒ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☐ Abandoned, other, specify
☐ Other, specify

Water Details

Water found at Depth (m/ft)	Kind of Water	Hole Diameter Depth From	Hole Diameter Depth To	Hole Diameter (cm/in)
51'	☒ Fresh ☒ Untested ☐ Gas ☐ Other, specify	0	20	8 1/4"
	☐ Fresh ☐ Untested ☐ Gas ☐ Other, specify	0	130	6 1/4"
	☐ Fresh ☐ Untested ☐ Gas ☐ Other, specify			

Results of Well Yield Testing

After test of well yield, water was:
☒ Clear and sand free
☐ Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft): 127'

Pumping rate (l/min / GPM): 36 PM

Duration of pumping: 1 hrs + 00 min

Final water level end of pumping (m/ft): 33'

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft): 127'

Recommended pump rate (l/min / GPM): 36 PM

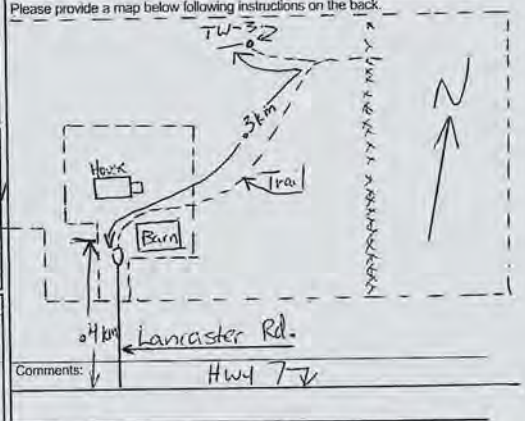
Well production (l/min / GPM): 2 1/2 GPM

Disinfected? ☒ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	0.1		
1	8'1	1	32'2
2	9'1	2	31'7
3	10'0	3	31'2
4	10'8	4	30'6
5	12'7	5	29'9
10	17'4	10	27'0
15	19'9	15	25'9
20	22'3	20	24'5
25	24'5	25	22'7
30	26'6	30	22'1
40	30'0	40	20'7
50	31'5	50	19'6
60	33'0	60	18'5

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
HERB LANG WELL DRILLING	3867

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
4852 HWY #7	OMEMEE	ON	K0L 2W0	

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)	Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
7057997088	MASK KEVIN	3160		2015/04/01

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☒ Yes ☐ No	2014/12/05	2015/04/01

Ministry Use Only

Audit No: Z 204179

0506E (2007/12) © Queen's Printer for Ontario, 2007

Ministry's Copy

Ontario — Ministry of the Environment

Measurements recorded in: ☐ Metric ☒ Imperial

Well Tag No. *(Place Sticker and/or Print Below)*
Tag#: A175895

Well Record
Regulation 903 Ontario Water Resources Act

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
Al	Demonte		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
2752 Old Norwood Rd.	Keene	ON	K9J 0G6	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
Lancaster Rd.	Otonabee	27	11

County/District/Municipality	City/Town/Village	Province	Postal Code
Peterborough	Peterborough	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	718622	4990216		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
GREY	CLAY GRAVEL	STONES	PACKED	0'	24'
GREY	CLAY GRAVEL	STONES	PACKED	24'	36'
GREY	LIMESTONE		HARD	36'	65'
GREY	SHALE LIMESTONE	SAND	LAYERED	65'	95'
GREY	LIMESTONE		HARD	95'	125'

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0'	20'	BENTONITE CHIPS	300LBS
		BENTONITE SLURRY	40 GAL

Method of Construction

☒ Cable Tool ☐ Diamond ☐ Rotary (Conventional) ☐ Jetting ☐ Rotary (Reverse) ☐ Driving ☐ Boring ☐ Digging ☐ Air percussion ☐ Other, specify

Well Use

☐ Public ☐ Commercial ☐ Not used ☒ Domestic ☐ Municipal ☐ Dewatering ☐ Livestock ☐ Test Hole ☐ Monitoring ☐ Irrigation ☐ Cooling & Air Conditioning ☐ Industrial ☐ Other, specify

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
6 1/4	Steel	.188	+2'	36'
6 1/4	open hole		36'	125'

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Status of Well

☒ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☐ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☐ Abandoned, other, specify ☐ Other, specify

Water Details

Water found at Depth (m/ft)	Kind of Water	Gas	Other, specify
125'	☒ Fresh ☒ Untested	☐	☐
Water found at Depth (m/ft)	Kind of Water	Gas	Other, specify
	☐ Fresh ☐ Untested	☐	☐
Water found at Depth (m/ft)	Kind of Water	Gas	Other, specify
	☐ Fresh ☐ Untested	☐	☐

Hole Diameter

Depth (m/ft) From	Depth (m/ft) To	Diameter (cm/in)
0'	20'	8"
20'	36'	6 5/8"
36'	125'	6"

Results of Well Yield Testing

After test of well yield, water was: ☒ Clear and sand free ☐ Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft): 120'

Pumping rate (l/min / GPM): 3.6 GPM

Duration of pumping: 1 hrs + 00 min

Final water level end of pumping (m/ft): 26'2

If flowing give rate (l/min / GPM):

Recommended pump depth (m/ft): 120'

Recommended pump rate (l/min / GPM): 3 GPM

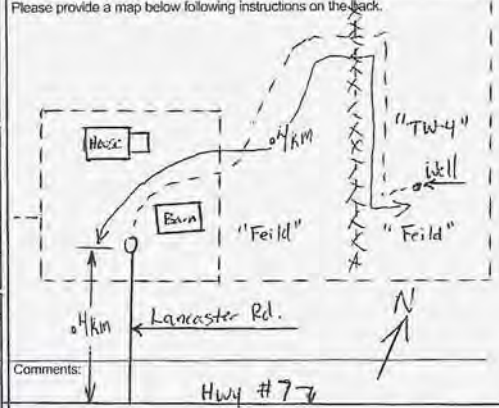
Well production (l/min / GPM): 2 GPM

Disinfected? ☒ Yes ☐ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level		7'3'		
1	1'13		1	22'9
2	1'17		2	22'2
3	12'1		3	21'6
4	12'5		4	21'1
5	12'9		5	20'7
10	15'7		10	18'8
15	18'0		15	17'7
20	19'6		20	16'9
25	20'7		25	16'2
30	21'8		30	15'6
40	23'6		40	14'9
50	25'1		50	14'0
60	26'2		60	13'4

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
HERB LANG WELL DRILLING	3167

Business Address (Street Number/Name)	Municipality
4852 HWY #7	OMEMEE

Province	Postal Code	Business E-mail Address
ON	K0L2W0	

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
7057997088	MASK ICEVEN

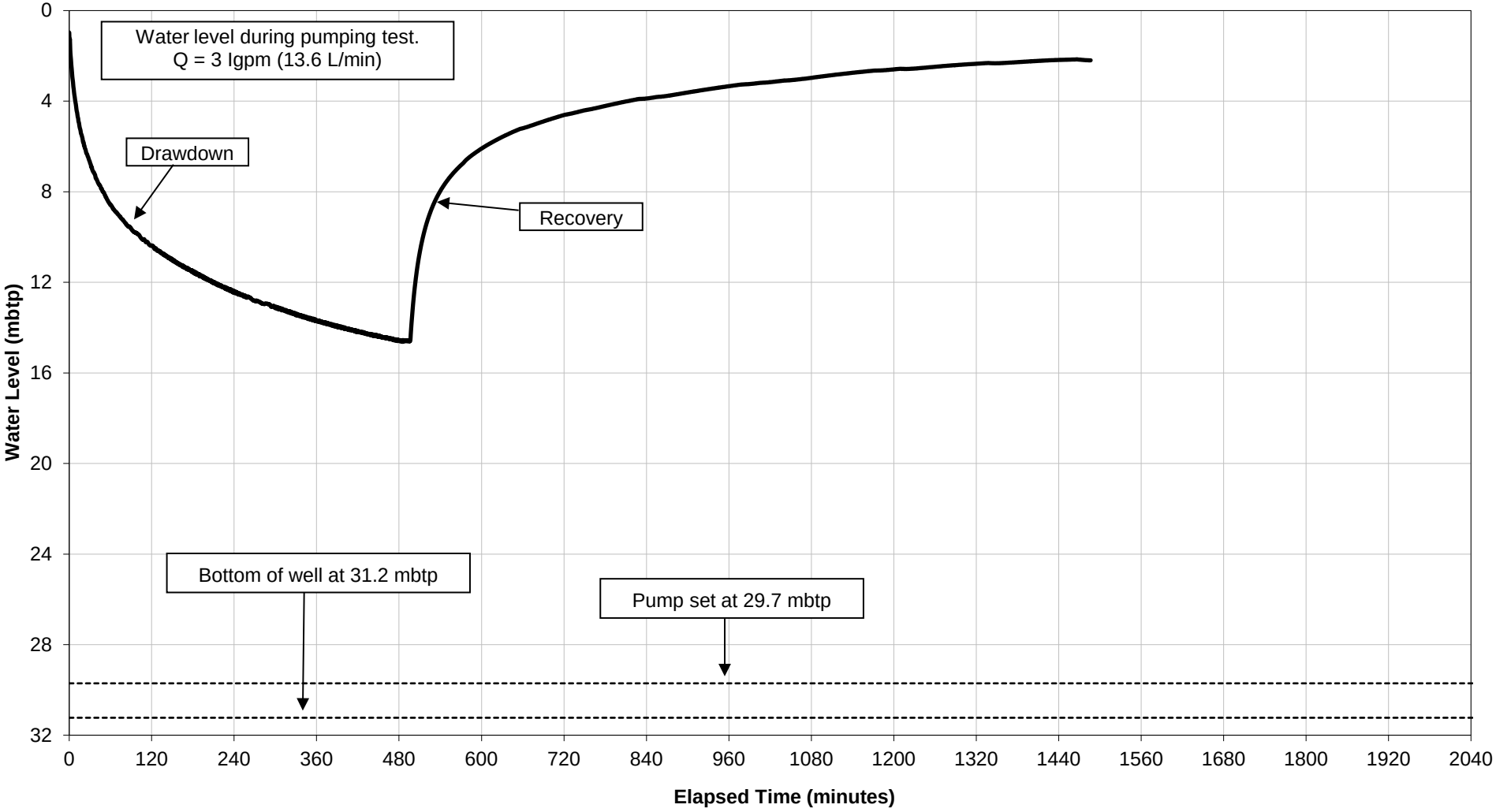
Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
3416		2015 03 18

Well owner's information package delivered	Date Package Delivered	Ministry Use Only
☒ Yes ☐ No	2015 1205	Audit No. Z 204174
	Date Work Completed: 2015 03 18	

Ministry's Copy

Appendix B
Aquifer Performance Testing Curves

PUMP HISTORY CURVE
TW-1: July 2-3, 2015



PUMP HISTORY CURVE

Drilled Well TW-1
MECP Well ID: A175906
Static Level = 0.97 mbtp (0.22 m)

Note: m = metres; mbtp = metres below top of pipe

DATE: APRIL 2020

LOCATION: Lancaster Rd., Peterborough

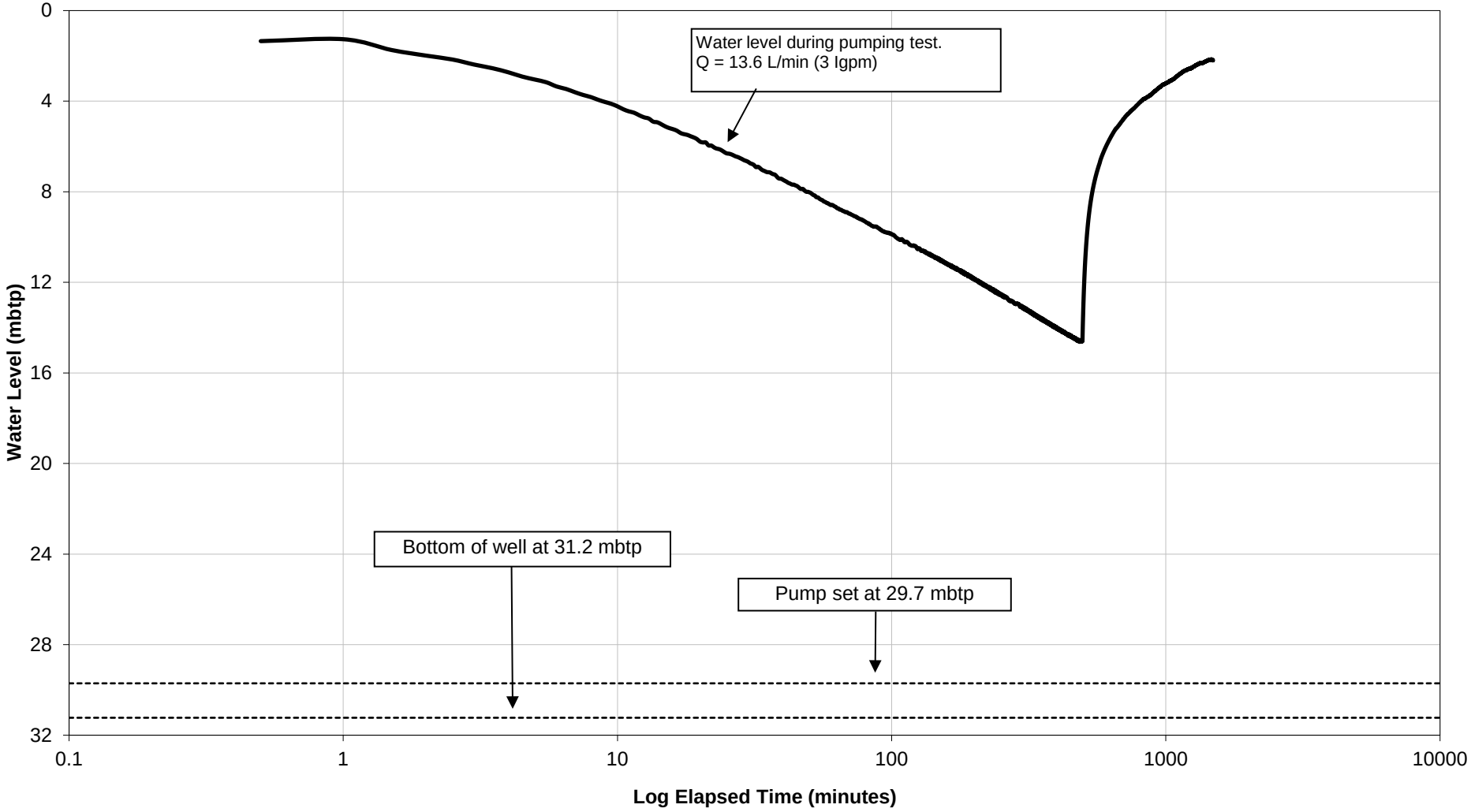
JOB NUMBER: 11207536-01

DRAWING NUMBER: B-1

GHD

347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 749-3317 FAX: (705) 749-9248 www.ghd.com

CONSTANT RATE TEST: WATER LEVEL vs. LOG ELAPSED TIME
TW-1: July 2-3, 2015



CONSTANT RATE

Drilled Well TW-1
MECP Well ID: A175906
Static Level = 0.97 mbtp (0.22 m)

Note: m = metres; mbtp = metres below top of pipe

DATE: APRIL 2020

LOCATION: Lancaster Rd., Peterborough

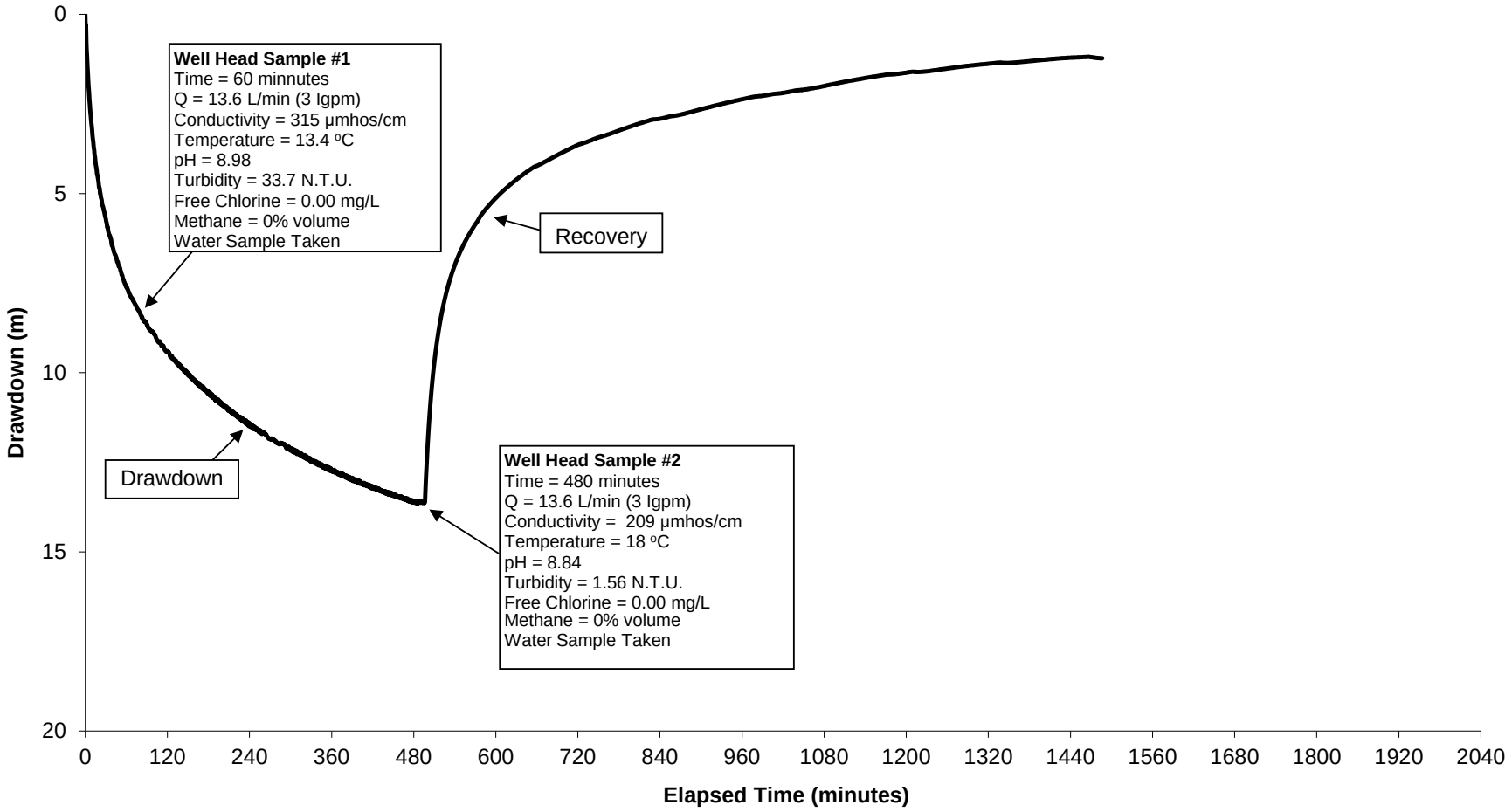
JOB NUMBER: 11207536-01

DRAWING NUMBER: B-2

GHD

347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 749-3317 FAX: (705) 749-9248 www.ghd.com

CONSTANT RATE DRAWDOWN, RECOVERY AND TESTING DETAILS
TW-1: July 2-3, 2015



CONSTANT RATE

Drilled Well TW-1
MECP Well ID: A175906
Static Level = 0.97 mbtp (0.22 m)

DATE: APRIL 2020

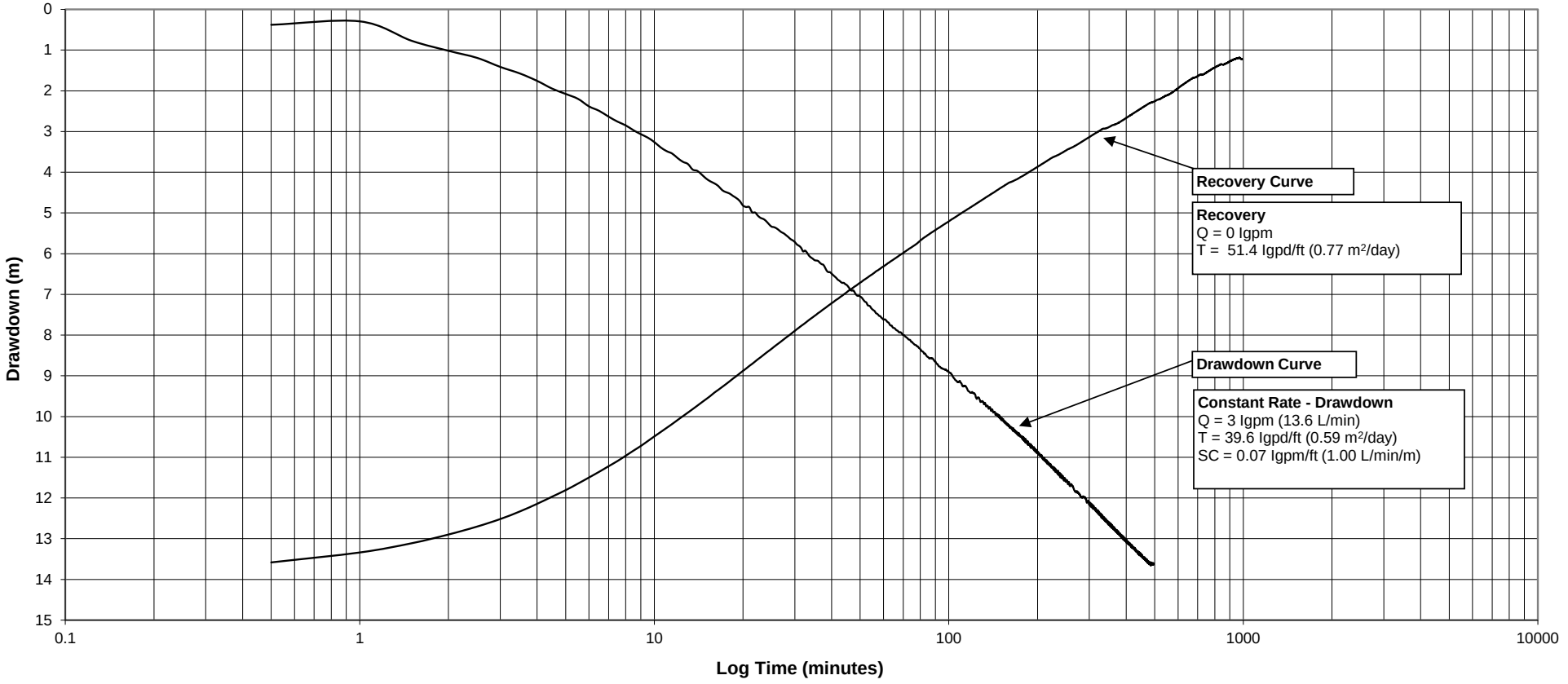
LOCATION: Lancaster Rd., Peterborough

JOB NUMBER: 11207536-01

DRAWING NUMBER: B-3

347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 749-3317 FAX: (705) 749-9248 www.ghd.com

Constant Rate Test: Drawdown and Recovery Curves vs Log Time
TW-1: July 2-3, 2015



CONSTANT RATE

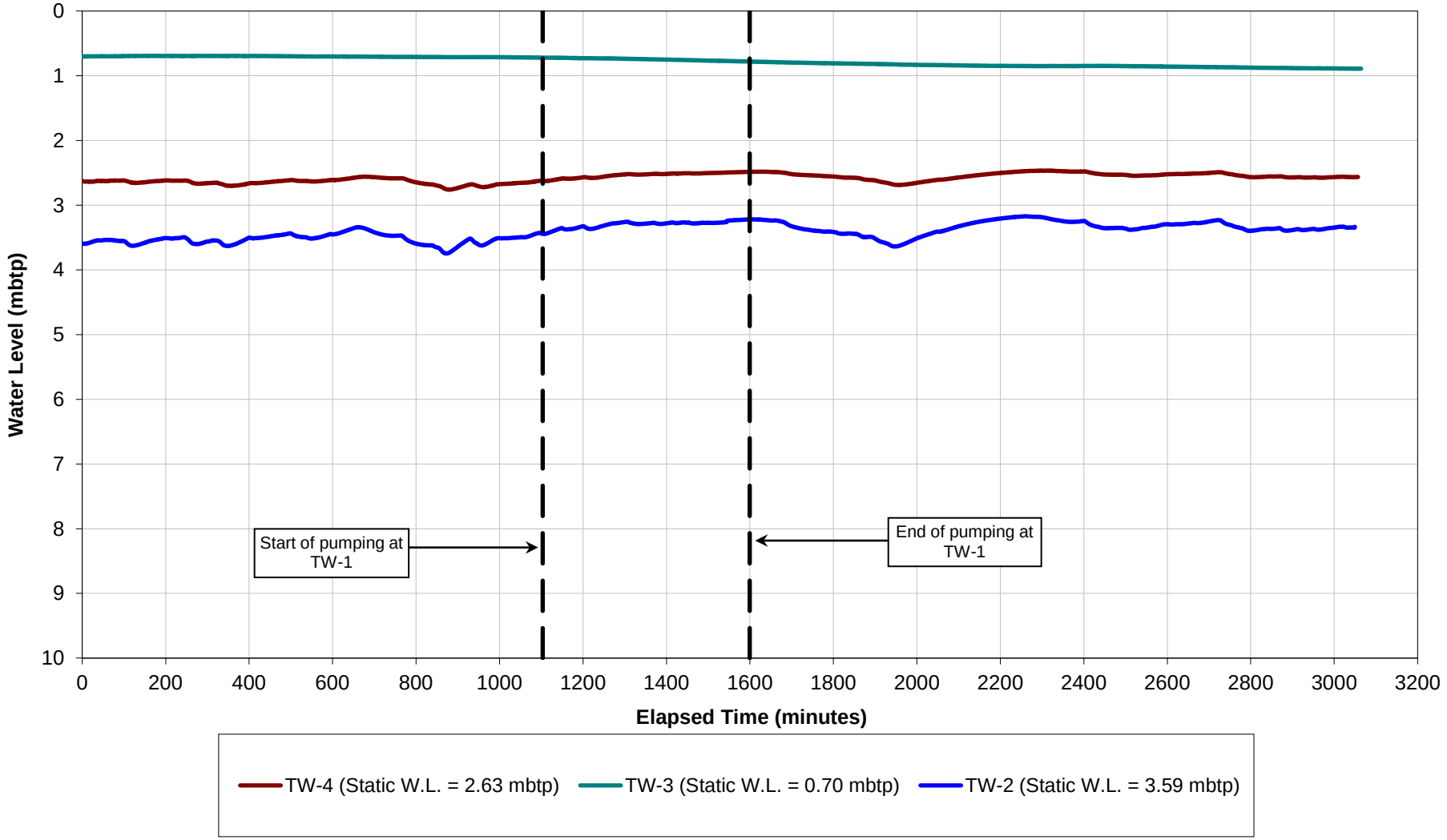
Drilled Well TW-1
MECp Well ID: A175906
Static Level = 0.97 mbtp (0.22 m)

LOG TIME VERSUS DRAWDOWN
Q = Pumping Rate
T = Transmissivity
SC = Specific Capacity

DATE: APRIL 2020
LOCATION: Lancaster Rd., Peterborough
JOB NUMBER: 11207536-01
DRAWING NUMBER: B-4

347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 749-3317 FAX: (705) 749-9248 www.ghd.com

OBSERVATION WELL CURVES
July 1-3, 2015



OBSERVATION WELL CURVES

Note: 0 minutes relates to a daytime of ~2:10 PM July 1, 2015.
mbtp = metres below top of pipe. W.L. = water level

DATE: APRIL 2020

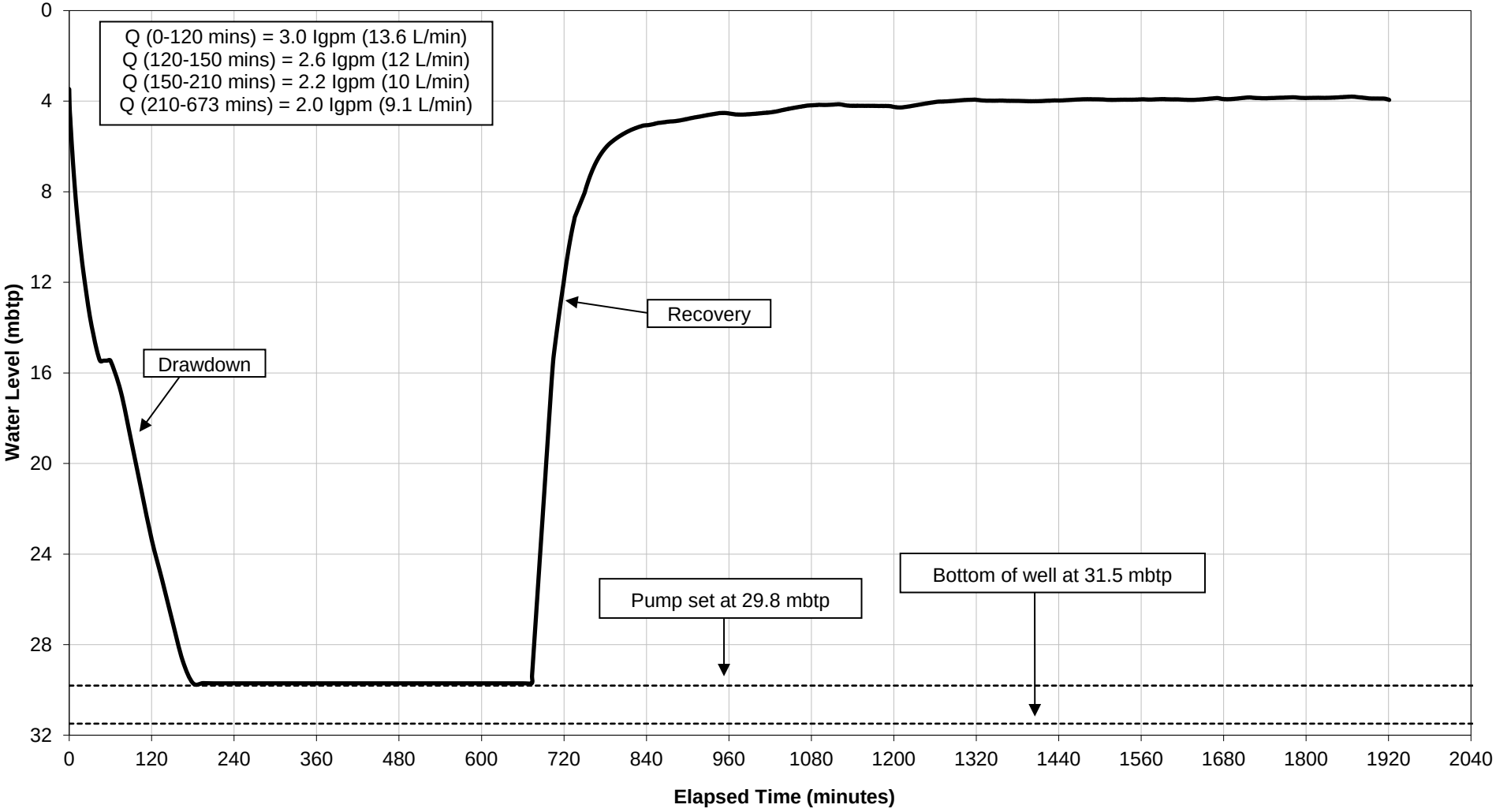
LOCATION: Lancaster Rd., Peterborough

JOB NUMBER: 11207536-01

DRAWING NUMBER: B-5

347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 749-3317 FAX: (705) 749-9248 www.ghd.com

PUMP HISTORY CURVE
TW-2: July 9-10, 2015



PUMP HISTORY CURVE

Drilled Well TW-2
MECP Well ID: A175907
Static Level = 3.47 mbtp (2.46 m)

Note: m = metres; mbtp = metres below top of pipe

DATE: APRIL 2020

LOCATION: Lancaster Rd., Peterborough

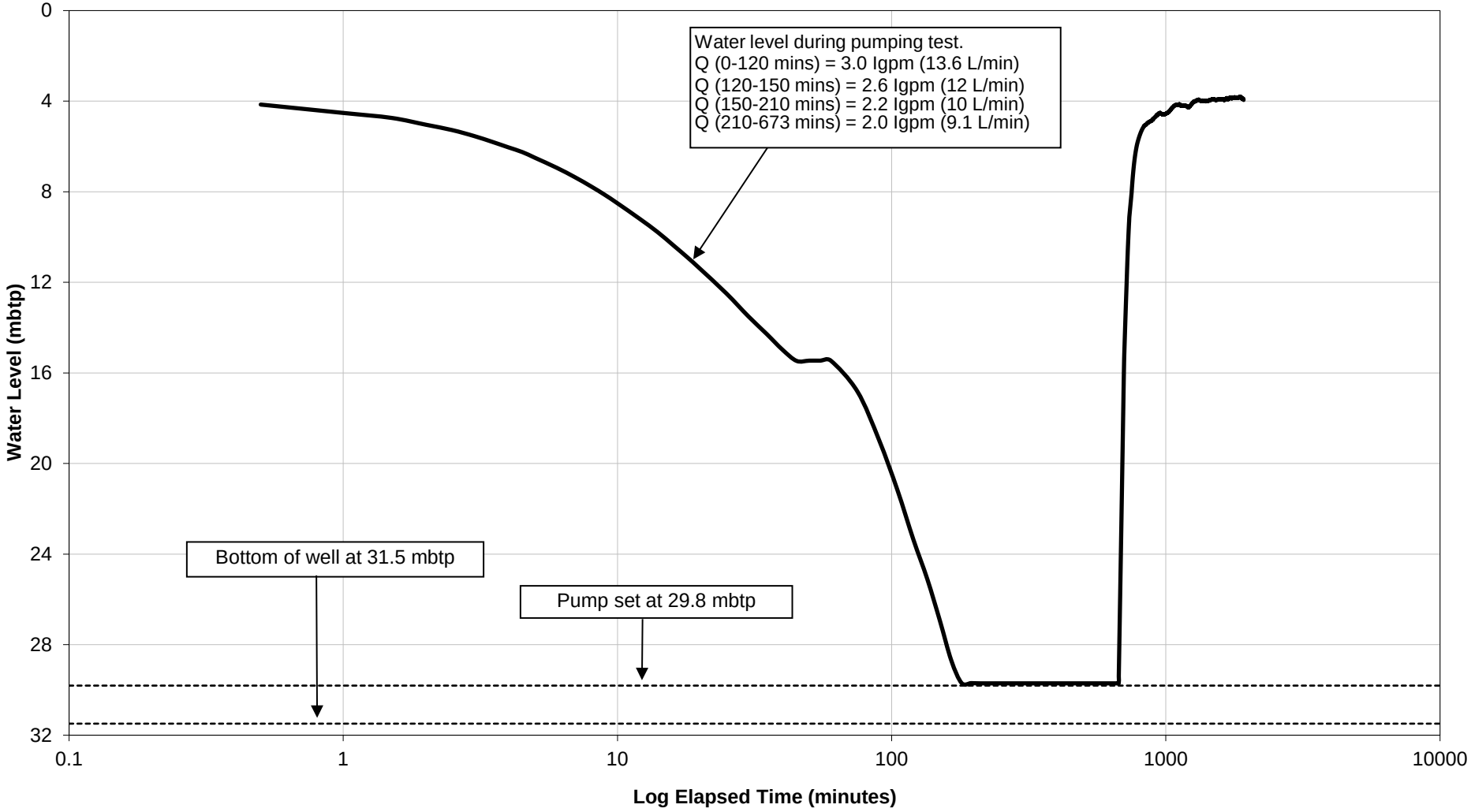
JOB NUMBER: 11207536-01

DRAWING NUMBER: B-6

GHD

347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 749-3317 FAX: (705) 749-9248 www.ghd.com

CONSTANT RATE TEST: WATER LEVEL vs. LOG ELAPSED TIME
TW-2: July 9-10, 2015



CONSTANT RATE

Drilled Well TW-2
MECP Well ID: A175907
Static Level = 3.47 mbtp (2.46 m)

Note: m = metres; mbtp = metres below top of pipe

DATE: APRIL 2020

LOCATION: Lancaster Rd., Peterborough

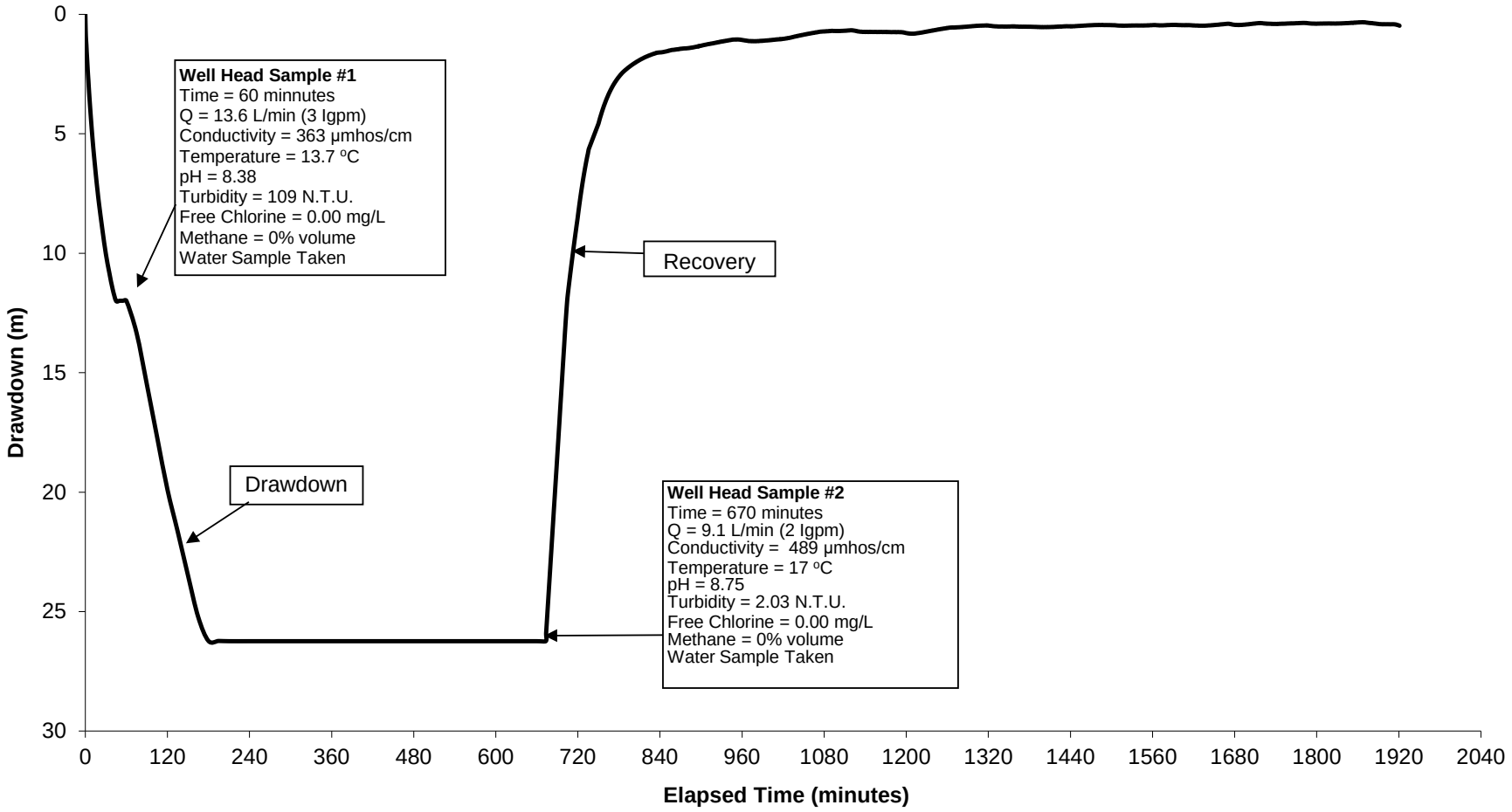
JOB NUMBER: 11207536-01

DRAWING NUMBER: B-7

GHD

347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 749-3317 FAX: (705) 749-9248 www.ghd.com

CONSTANT RATE DRAWDOWN, RECOVERY AND TESTING DETAILS
TW-2: July 9-10, 2015



CONSTANT RATE

Drilled Well TW-2
MECP Well ID: A175907
Static Level = 3.47 mbtp (2.46 m)

DATE: APRIL 2020

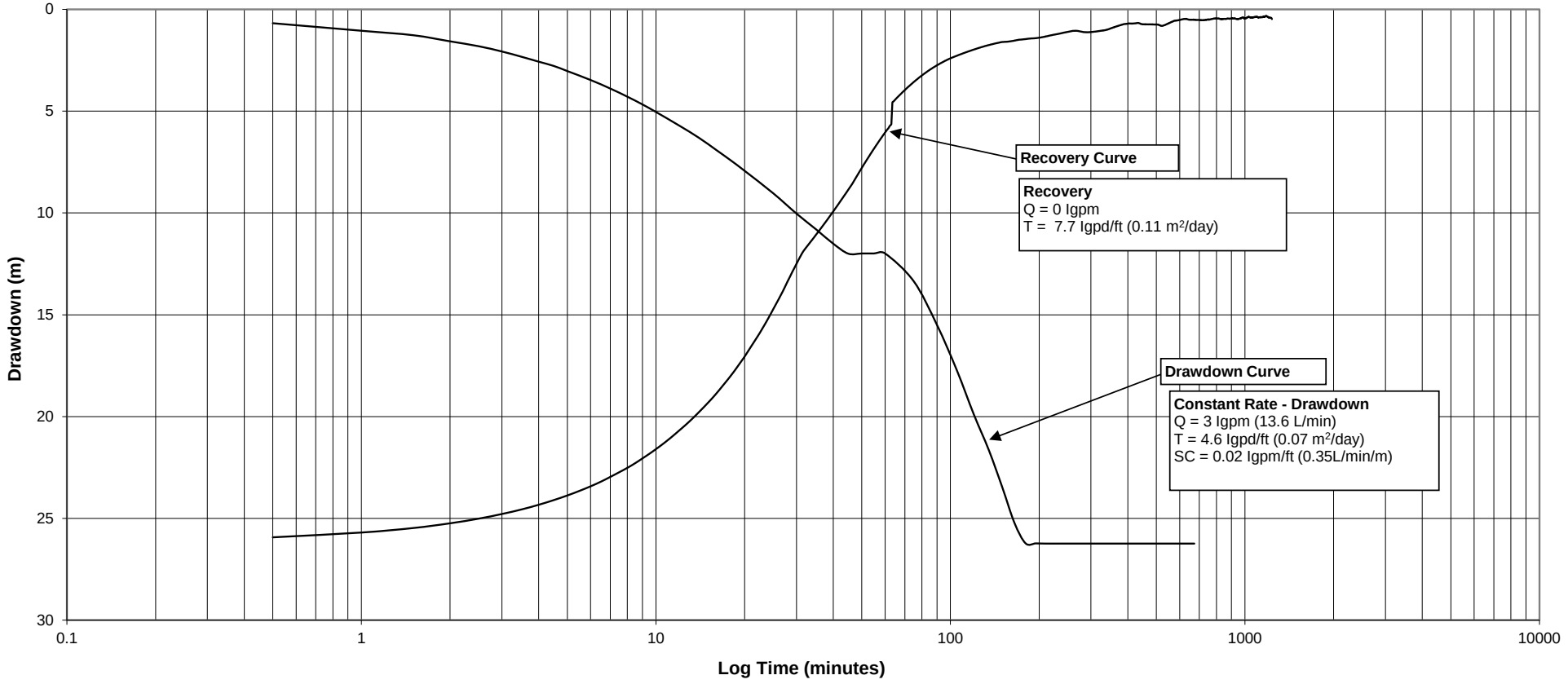
LOCATION: Lancaster Rd., Peterborough

JOB NUMBER: 11207536-01

DRAWING NUMBER: B-8

347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 749-3317 FAX: (705) 749-9248 www.ghd.com

Constant Rate Test: Drawdown and Recovery Curves vs Log Time
TW-2: July 9-10, 2015



CONSTANT RATE

Drilled Well TW-2

MECP Well ID: A175907

Static Level = 3.47 mbtp (2.46 m)

LOG TIME VERSUS DRAWDOWN

Q = Pumping Rate

T = Transmissivity

SC = Specific Capacity

DATE: APRIL 2020

LOCATION: Lancaster Rd., Peterborough

JOB NUMBER: 11207536-01

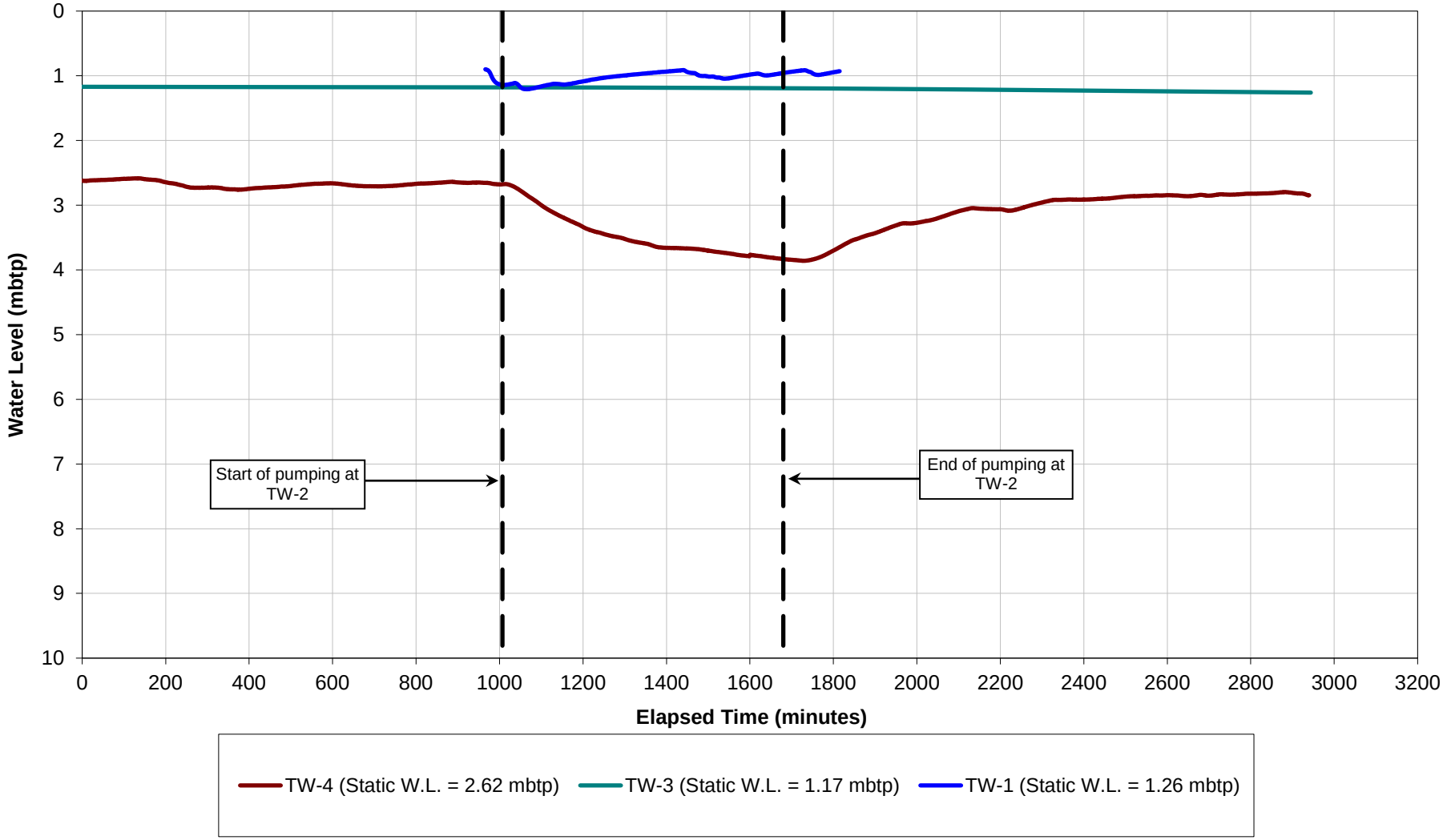
DRAWING NUMBER: B-9

347 PIDO ROAD, UNIT 29

PETERBOROUGH, ON K9J 6X7

(705) 749-3317 FAX: (705) 749-9248 www.ghd.com

OBSERVATION WELL CURVES
July 8-10, 2015



OBSERVATION WELL CURVES

Note: 0 minutes relates to a daytime of ~3:29 PM July 8, 2015.
mbtp = metres below top of pipe. W.L. = water level

DATE: APRIL 2020

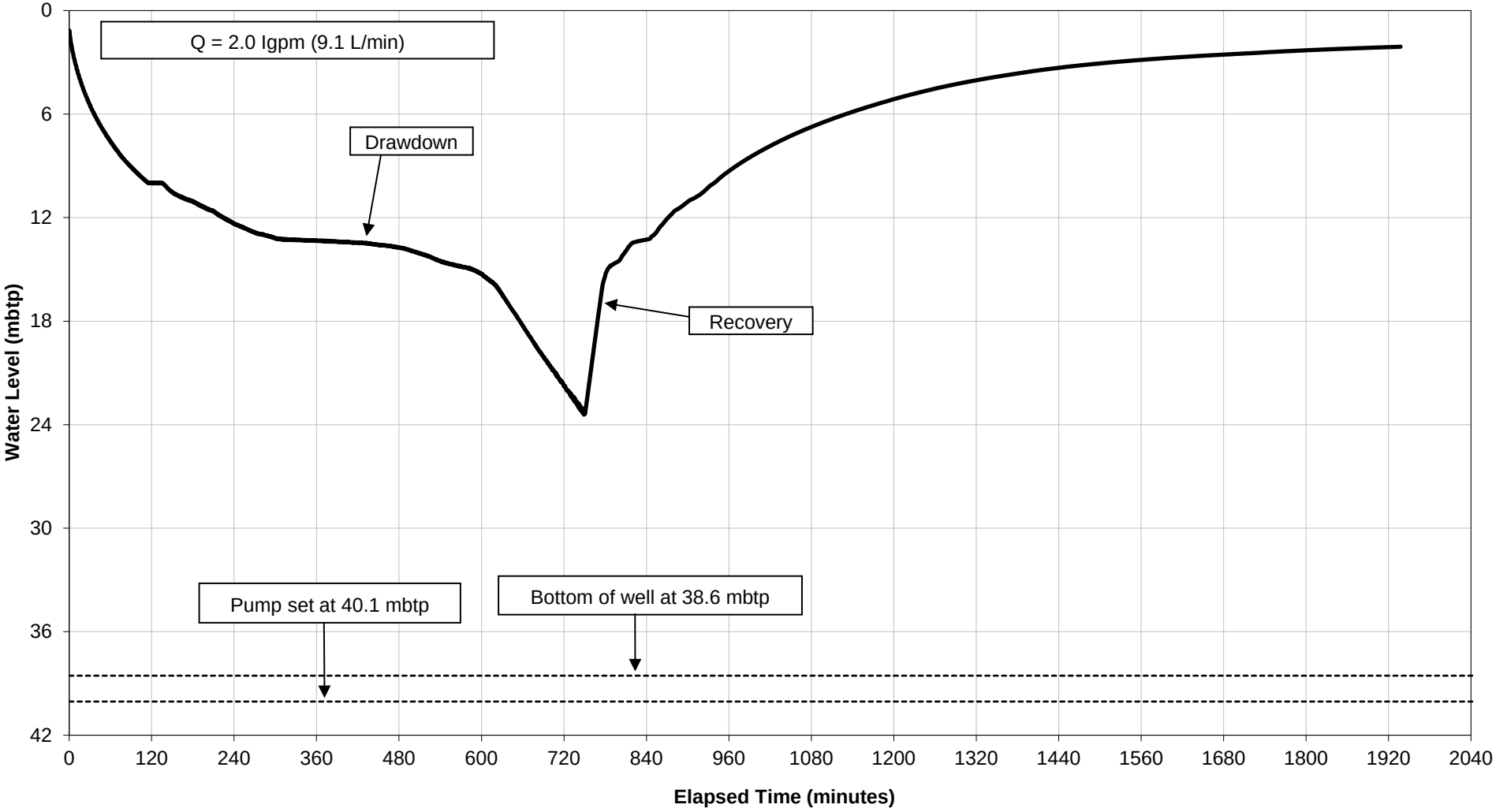
LOCATION: Lancaster Rd., Peterborough

JOB NUMBER: 11207536-01

DRAWING NUMBER: B-10

347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 749-3317 FAX: (705) 749-9248 www.ghd.com

PUMP HISTORY CURVE
TW-3: July 13-15, 2015



PUMP HISTORY CURVE

Drilled Well TW-3
MECP Well ID: A175901
Static Level = 1.15 mbtp (0.70 m)

Note: m = metres; mbtp = metres below top of pipe

DATE: APRIL 2020

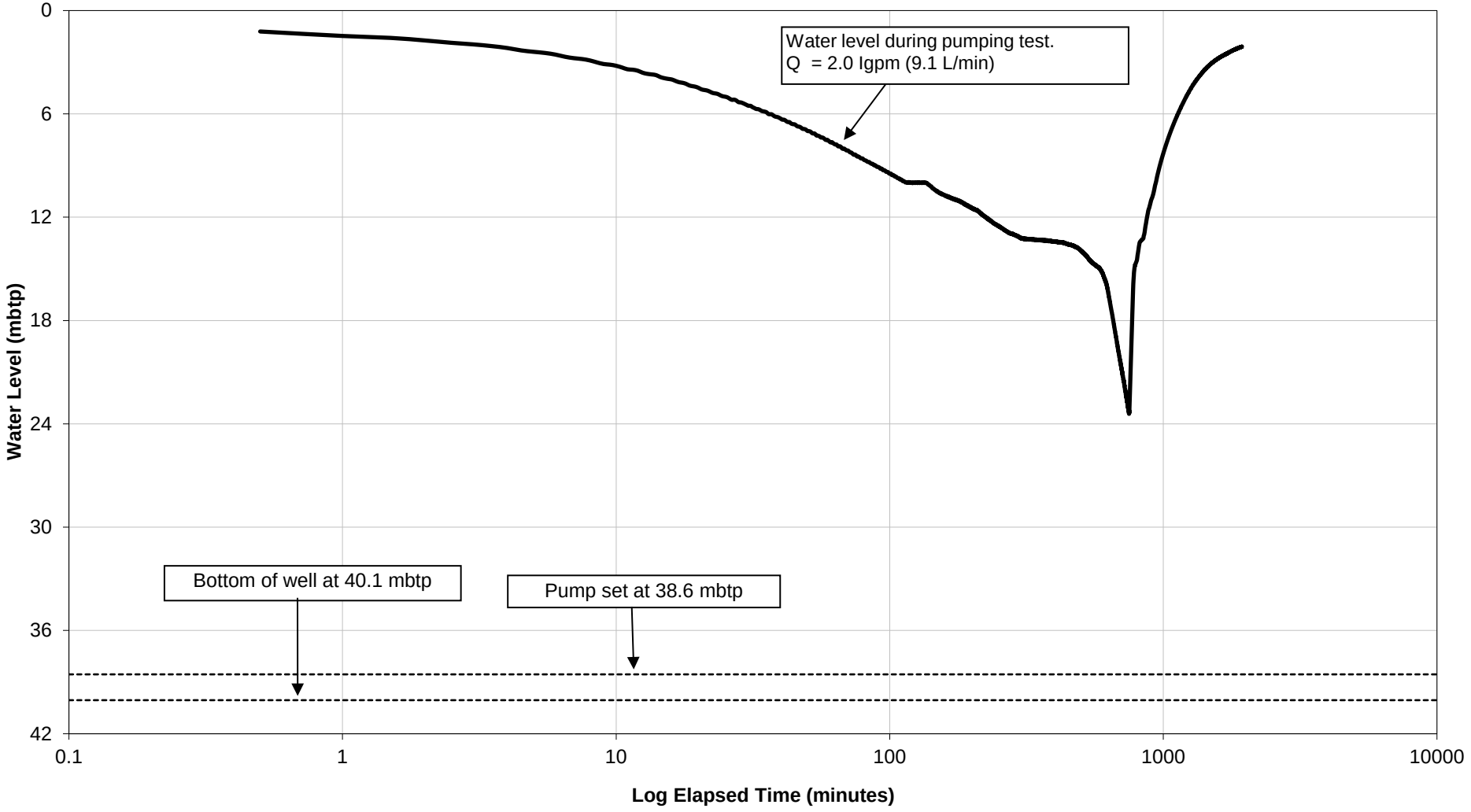
LOCATION: Lancaster Rd., Peterborough

JOB NUMBER: 11207536-01

DRAWING NUMBER: B-11

GHD
347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 749-3317 FAX: (705) 749-9248 www.ghd.com

CONSTANT RATE TEST: WATER LEVEL vs. LOG ELAPSED TIME
TW-3: July 13-15, 2015



CONSTANT RATE

Drilled Well TW-3
MECP Well ID: A175901
Static Level = 1.15 mbtp (0.70 m)

Note: m = metres; mbtp = metres below top of pipe

DATE: APRIL 2020

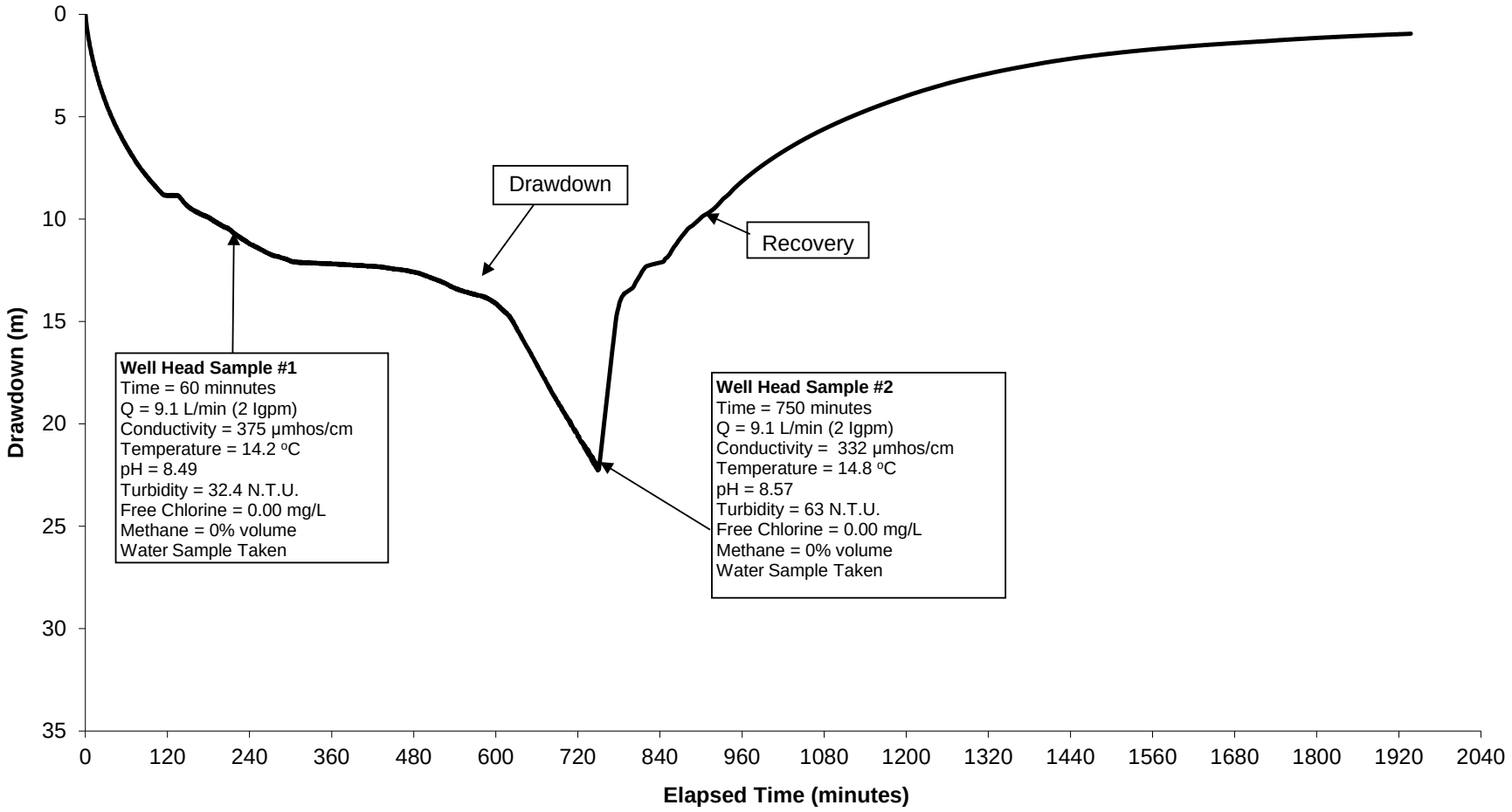
LOCATION: Lancaster Rd., Peterborough

JOB NUMBER: 11207536-01

DRAWING NUMBER: B-12

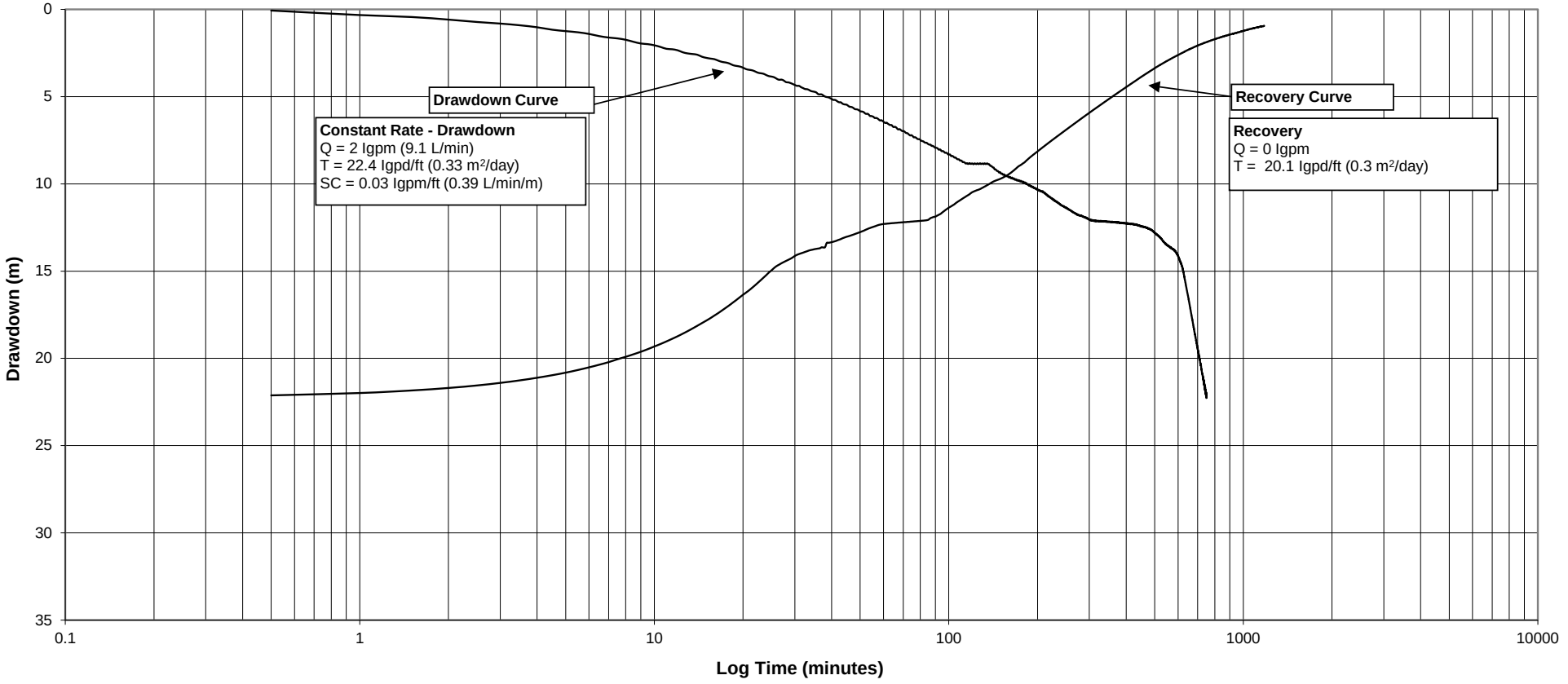
GHD
347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 749-3317 FAX: (705) 749-9248 www.ghd.com

CONSTANT RATE DRAWDOWN, RECOVERY AND TESTING DETAILS
TW-3: July 13-15, 2015



CONSTANT RATE Drilled Well TW-3 MECP Well ID: A175901 Static Level = 1.15 mbtp (0.70 m)	DATE: APRIL 2020 LOCATION: Lancaster Rd., Peterborough JOB NUMBER: 11207536-01 DRAWING NUMBER: B-13	GHD *347 PIDO ROAD, UNIT 29* *PETERBOROUGH, ON K9J 6X7* (705) 749-3317 FAX: (705) 749-9248 www.ghd.com

Constant Rate Test: Drawdown and Recovery Curves vs Log Time
TW-3: July 13-15, 2015



CONSTANT RATE

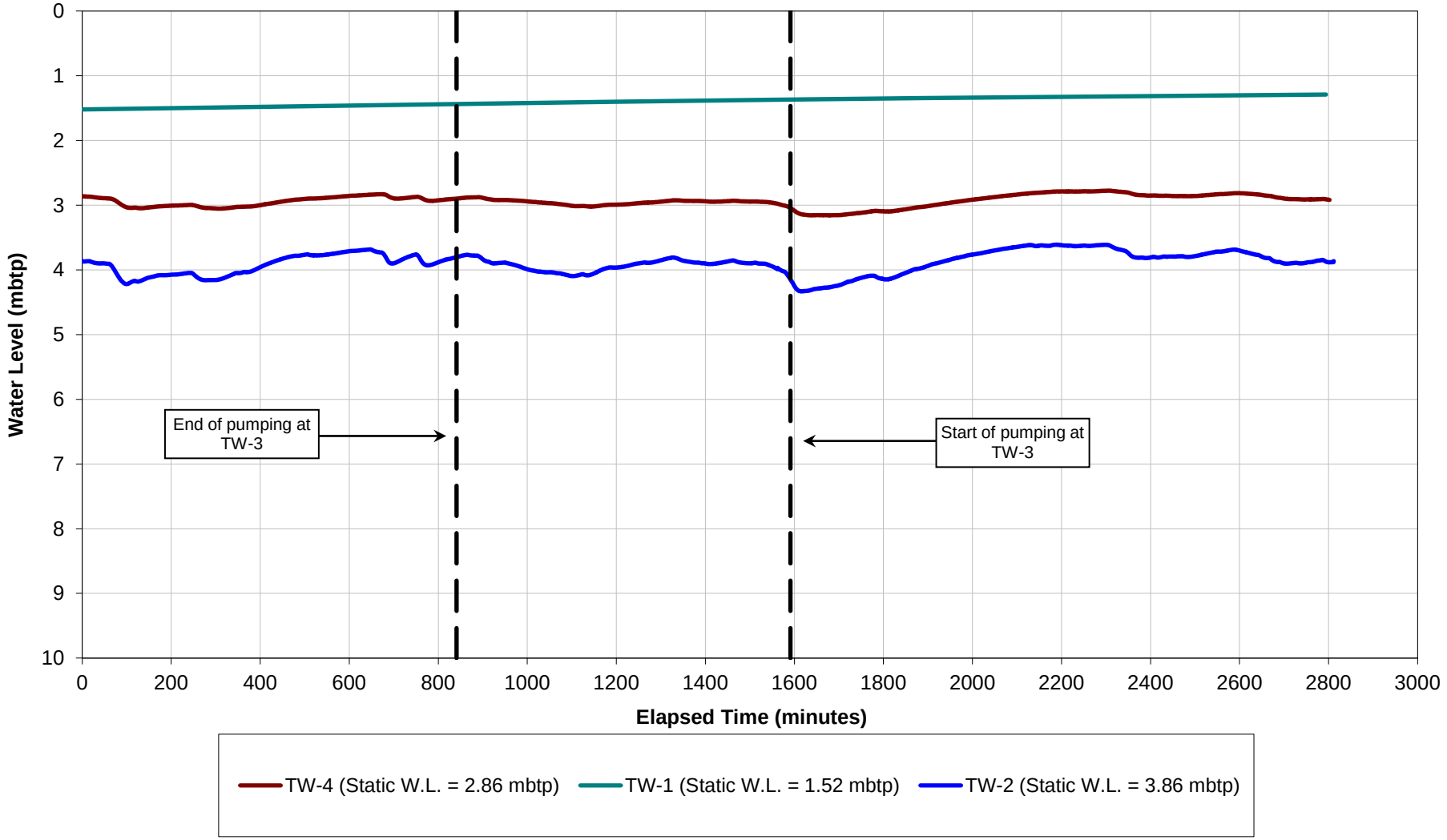
Drilled Well TW-3
MECP Well ID: A175901
Static Level = 1.15 mbtp (0.70 m)

LOG TIME VERSUS DRAWDOWN
Q = Pumping Rate
T = Transmissivity
SC = Specific Capacity

DATE: APRIL 2020
LOCATION: Lancaster Rd., Peterborough
JOB NUMBER: 11207536-01
DRAWING NUMBER: B-14

347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 749-3317 FAX: (705) 749-9248 www.ghd.com

OBSERVATION WELL CURVES
July 13-15, 2015



OBSERVATION CURVES

Note: 0 minutes relates to a daytime of ~5:08 PM July 13, 2015.
mbtp = metres below top of pipe. W.L. = water level

DATE: APRIL 2020

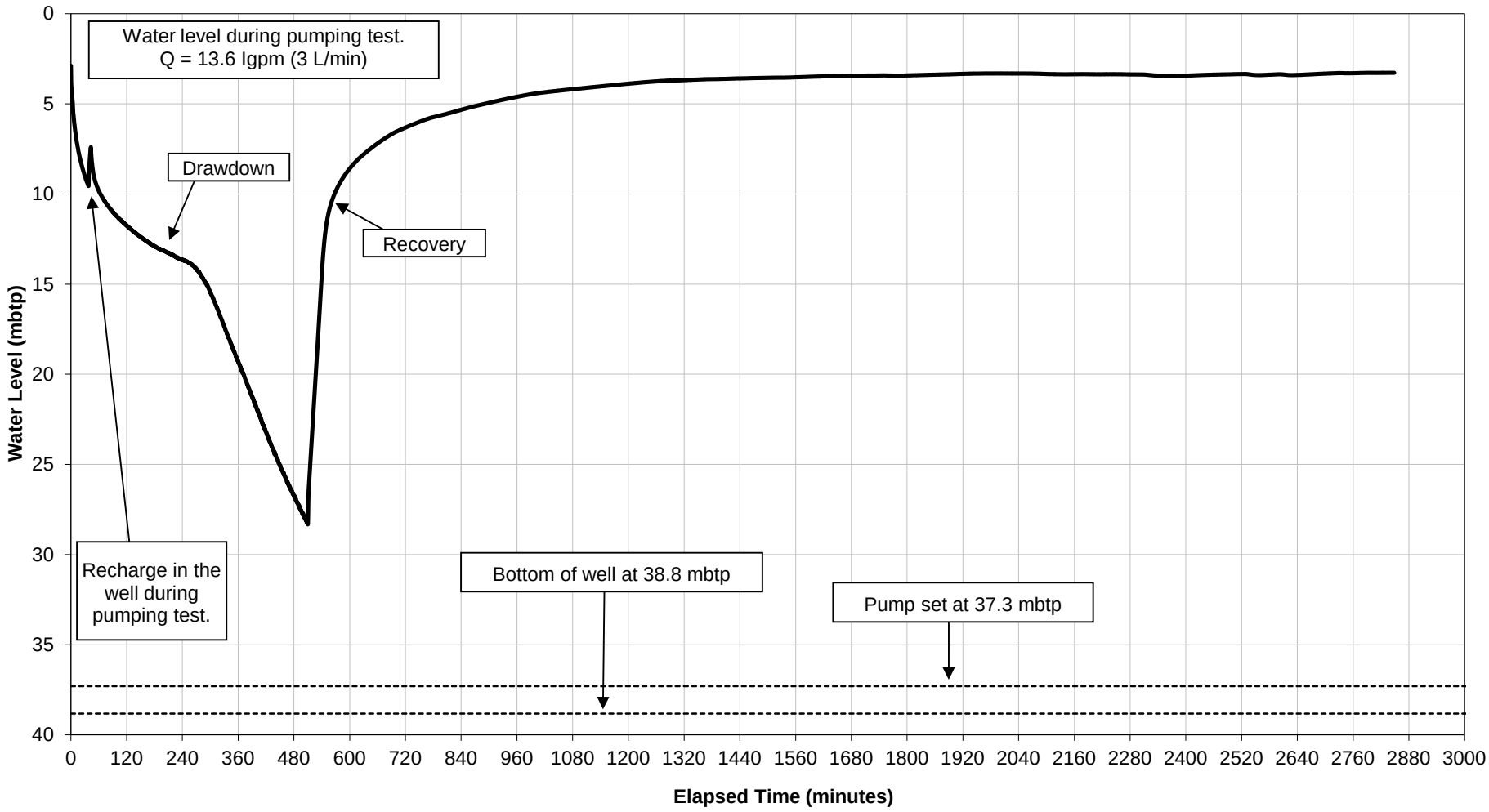
LOCATION: Lancaster Rd., Peterborough

JOB NUMBER: 11207536-01

DRAWING NUMBER: B-15

347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 749-3317 FAX: (705) 749-9248 www.ghd.com

PUMP HISTORY CURVE
TW-4: June 3-5, 2015



PUMP HISTORY CURVE

Drilled Well TW-4
MECP Well ID: A175895
Static Level = 2.89 mbtp (2.17 m)

Note: m = metres; mbtp = metres below top of pipe

DATE: APRIL 2020

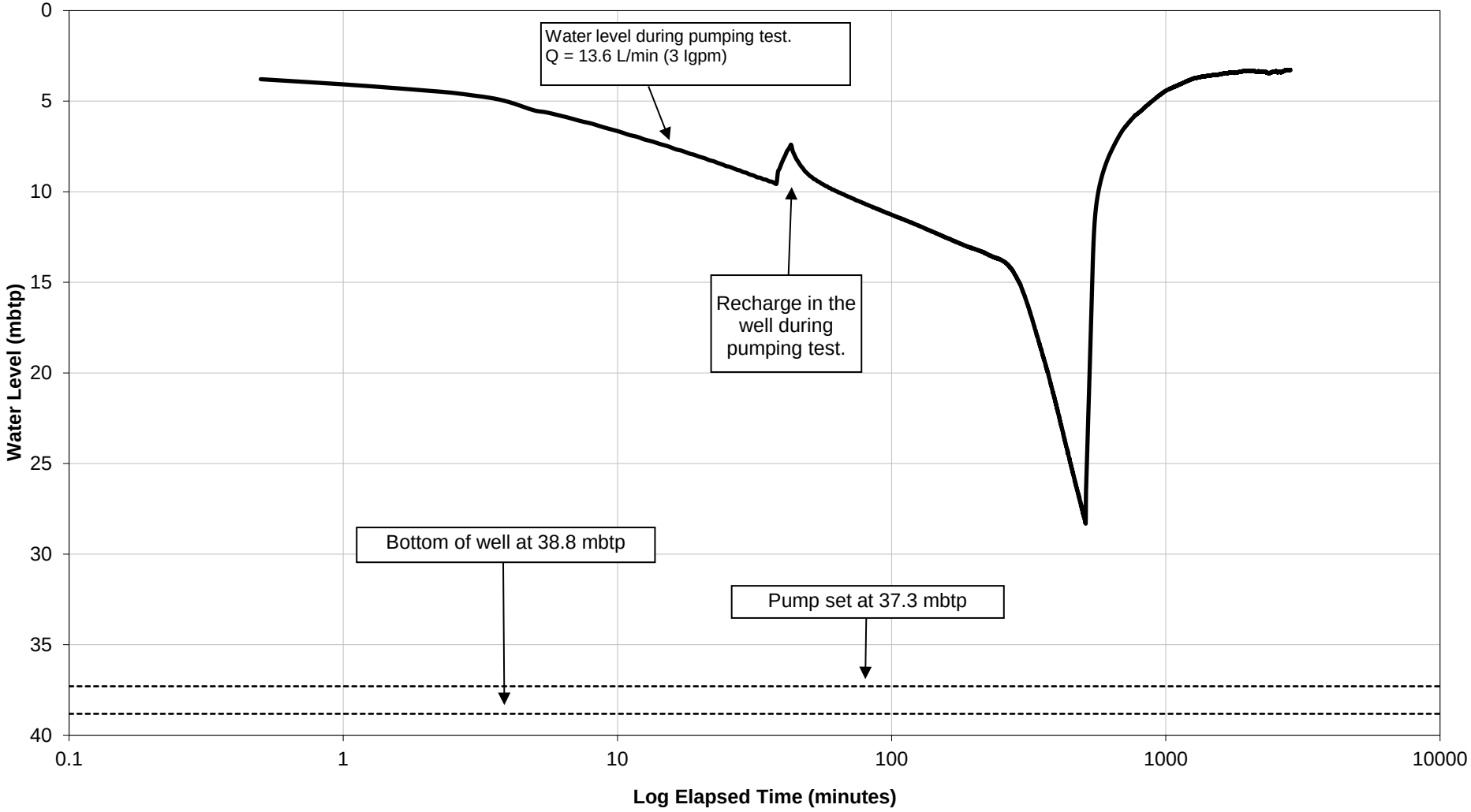
LOCATION: Lancaster Rd., Peterborough

JOB NUMBER: 11207536-01

DRAWING NUMBER: B-16

GHD
347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 749-3317 FAX: (705) 749-9248 www.ghd.com

CONSTANT RATE TEST: WATER LEVEL vs. LOG ELAPSED TIME
TW-4: June 3-4, 2015



CONSTANT RATE

Drilled Well TW-4
MECP Well ID: A175895
Static Level = 2.89 mbtp (2.17 m)

Note: m = metres; mbtp = metres below top of pipe

DATE: APRIL 2020

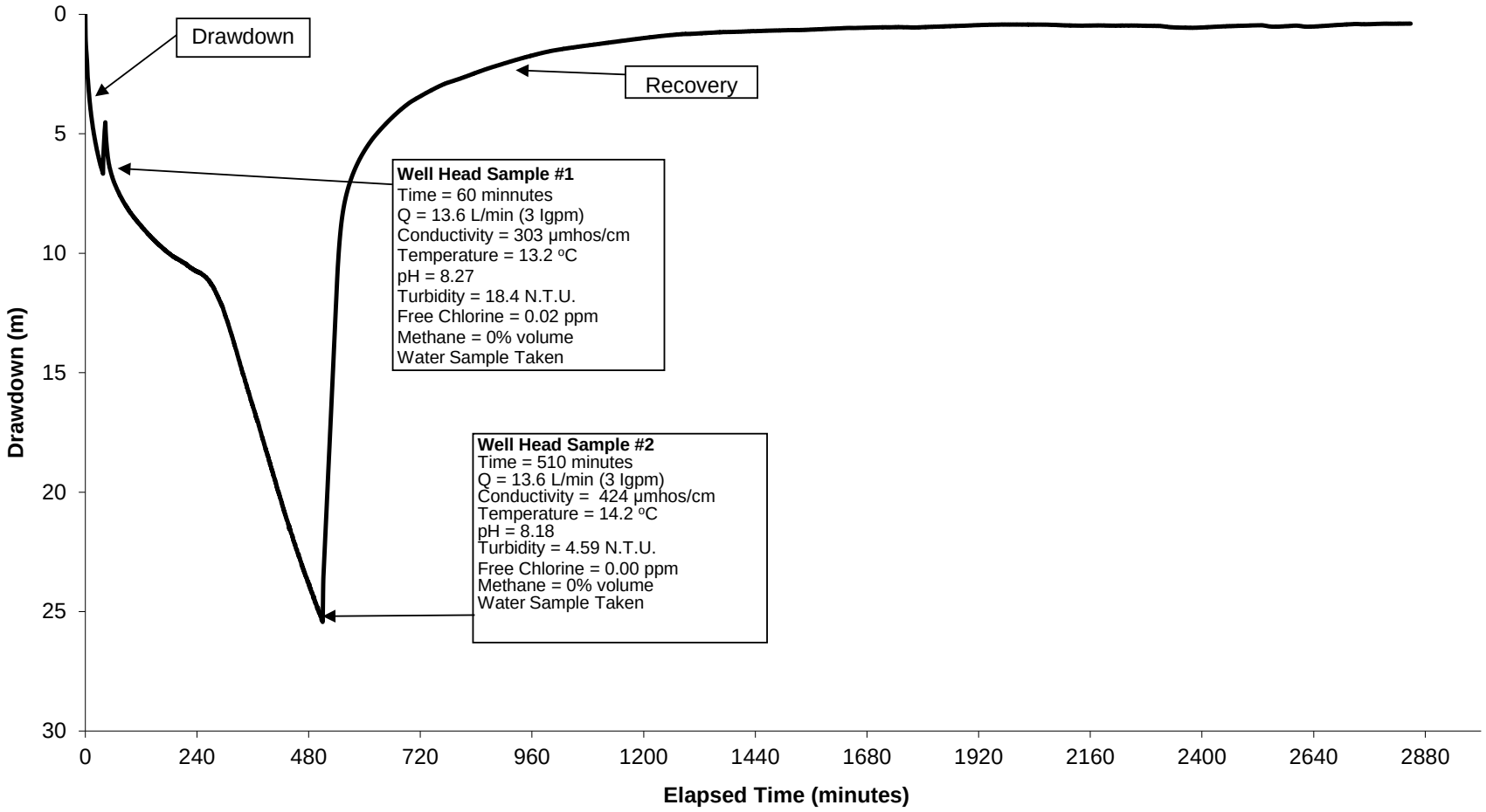
LOCATION: Lancaster Rd., Peterborough

JOB NUMBER: 11207536-01

DRAWING NUMBER: B-17

347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 749-3317 FAX: (705) 749-9248 www.ghd.com

CONSTANT RATE DRAWDOWN, RECOVERY AND TESTING DETAILS
TW-4: June 3-4, 2015



CONSTANT RATE

Drilled Well TW-4
MECP Well ID: A175895
Static Level = 2.89 mbtp (2.17 m)

DATE: APRIL 2020

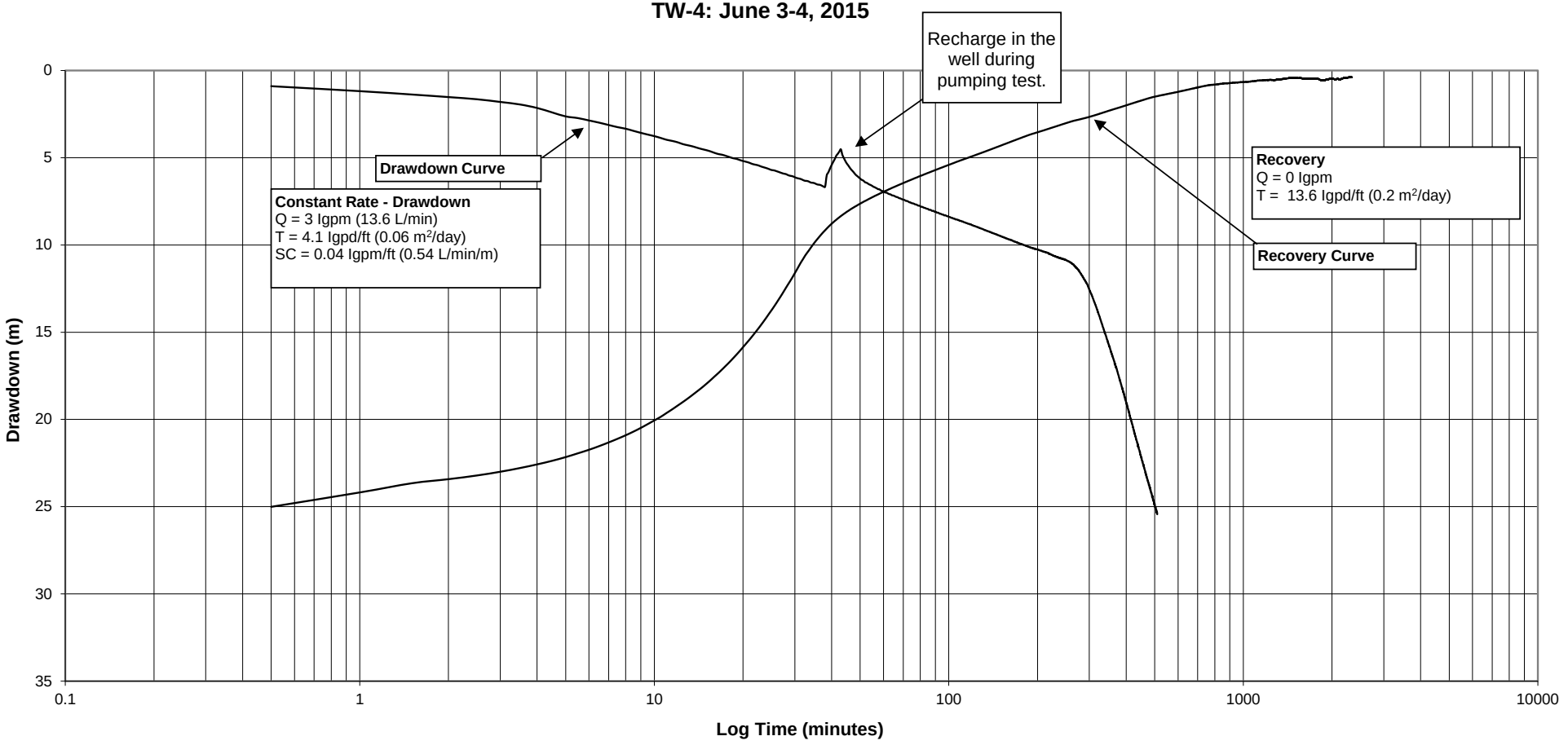
LOCATION: Lancaster Rd., Peterborough

JOB NUMBER: 11207536-01

DRAWING NUMBER: B-18

347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 749-3317 FAX: (705) 749-9248 www.ghd.com

Constant Rate Test: Drawdown and Recovery Curves vs Log Time
TW-4: June 3-4, 2015



CONSTANT RATE

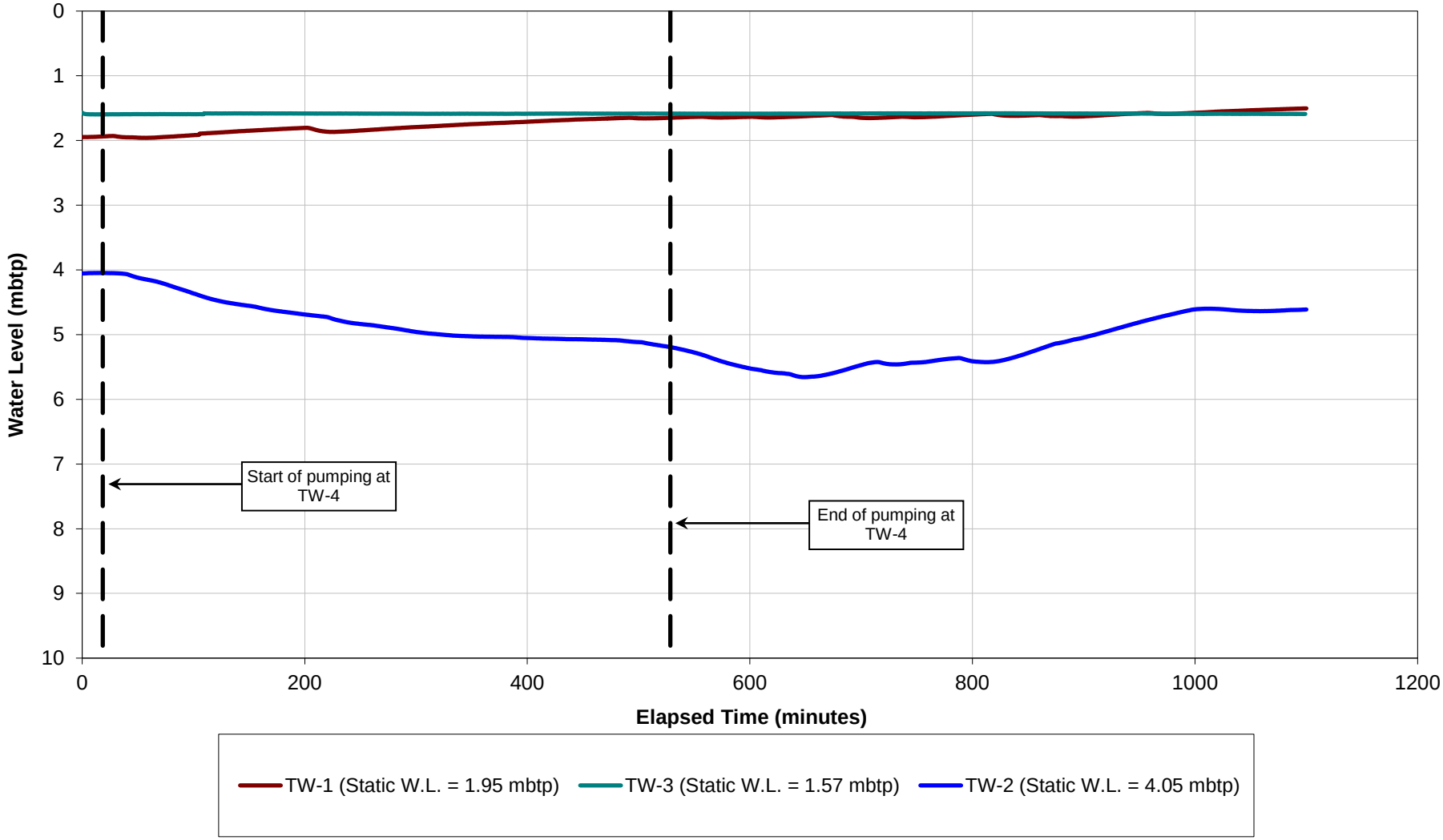
Drilled Well TW-4
MECP Well ID: A175895
Static Level = 2.89 mbtp (2.17 m)

LOG TIME VERSUS DRAWDOWN
Q = Pumping Rate
T = Transmissivity
SC = Specific Capacity

DATE: APRIL 2020
LOCATION: Lancaster Rd., Peterborough
JOB NUMBER: 11207536-01
DRAWING NUMBER: B-19

347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 749-3317 FAX: (705) 749-9248 www.ghd.com

OBSERVATION WELL CURVES
June 3-5, 2015



OBSERVATION WELL CURVES

Note: 0 minutes relates to a daytime of ~8:28 AM June 3, 2015.
mbtp = metres below top of pipe. W.L. = water level

DATE: APRIL 2020

LOCATION: Lancaster Rd., Peterborough

JOB NUMBER: 11207536-01

DRAWING NUMBER: B-20

347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 749-3317 FAX: (705) 749-9248 www.ghd.com

Appendix C
Certificates of Analyses

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

20-July-2015

GHD
Attn : Jason Geraldi

347 Pido Rd., Unit #29
Peterborough, ON
K9J 6Z8,

Phone: 705-749-3317
Fax:

Date Rec. : 03 July 2015
LR Report: **CA14036-JUL15**
Reference: G030377E1 PO#27715

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Approval Date	4: Analysis Approval Time	5: MAC	6: AO/OG	7: NR TW-1 1 Hour	8: NR TW-1 End
Sample Date & Time							02-Jul-15 09:30	02-Jul-15 16:30
Temperature Upon Receipt [°C]	---	---	---	---	---	---	7.0	7.0
UV Transmittance [%]	07-Jul-15	11:21	07-Jul-15	14:27	---	---	89.5	98.8
Alkalinity [mg/L as CaCO3]	06-Jul-15	07:02	06-Jul-15	15:34	---	30-500	98	95
Colour [TCU]	06-Jul-15	15:33	07-Jul-15	14:16	---	5	< 3	< 3
Conductivity [µS/cm]	06-Jul-15	07:02	06-Jul-15	15:34	---	---	318	281
pH [no unit]	06-Jul-15	07:02	06-Jul-15	15:34	---	6.5-8.5	8.21	8.18
Total Suspended Solids [mg/L]	06-Jul-15	11:55	07-Jul-15	14:30	---	---	11	< 2
Turbidity [NTU]	03-Jul-15	15:16	06-Jul-15	16:23	1	5	38.7	0.60
Organic Nitrogen [mg/L]	03-Jul-15	20:56	07-Jul-15	08:59	---	0.15	< 0.05	< 0.05
Total Kjeldahl Nitrogen [mg/L]	03-Jul-15	20:56	07-Jul-15	08:58	---	---	0.23	0.21
Ammonia+Ammonium (N) [mg/L]	03-Jul-15	20:05	06-Jul-15	12:53	---	---	0.21	0.24
Total Organic Carbon [mg/L]	03-Jul-15	19:59	09-Jul-15	09:28	---	5	1.2	1.2
Chloride [mg/L]	08-Jul-15	07:54	09-Jul-15	14:25	---	250	29	20
Fluoride [mg/L]	06-Jul-15	10:06	06-Jul-15	16:06	1.5	---	1.55	1.44
Nitrite (as N) [mg/L]	06-Jul-15	21:52	07-Jul-15	10:15	1	---	<0.003	<0.003
Nitrate (as N) [mg/L]	06-Jul-15	21:52	07-Jul-15	10:15	10	---	<0.006	<0.006
Sulphate [mg/L]	08-Jul-15	07:54	09-Jul-15	14:25	---	500	21	17
Hardness (dissolved) [mg/L as CaCO3]	07-Jul-15	12:00	09-Jul-15	13:38	---	80-100	35.4	32.7
Aluminum (dissolved) [mg/L]	07-Jul-15	12:00	09-Jul-15	13:38	---	0.1	0.014	0.023
Arsenic (dissolved) [mg/L]	07-Jul-15	12:00	09-Jul-15	13:38	0.025	---	0.0003	< 0.0002
Boron (dissolved) [mg/L]	07-Jul-15	12:00	09-Jul-15	13:38	5	---	0.323	0.311
Barium (dissolved) [mg/L]	07-Jul-15	12:00	09-Jul-15	13:38	1	---	0.0185	0.0192
Calcium (dissolved) [mg/L]	07-Jul-15	12:00	09-Jul-15	13:38	---	---	7.24	6.63
Cadmium (dissolved) [mg/L]	07-Jul-15	12:00	09-Jul-15	13:38	0.005	---	< 0.000003	< 0.000003
Copper (dissolved) [mg/L]	07-Jul-15	12:00	09-Jul-15	13:38	---	1	0.00028	0.00003
Chromium (dissolved) [mg/L]	07-Jul-15	12:00	09-Jul-15	13:38	0.05	---	0.00016	0.00009
Iron (dissolved) [mg/L]	07-Jul-15	12:00	09-Jul-15	13:38	---	0.3	2.56	0.024
Potassium (dissolved) [mg/L]	07-Jul-15	12:00	09-Jul-15	13:38	---	---	1.80	1.57
Magnesium (dissolved) [mg/L]	07-Jul-15	12:00	09-Jul-15	13:38	---	---	4.22	3.92
Manganese (dissolved) [mg/L]	07-Jul-15	12:00	09-Jul-15	13:38	---	0.05	0.0159	0.00130
Sodium (dissolved) [mg/L]	07-Jul-15	12:00	09-Jul-15	13:38	20*	200	51.7	45.6
Phosphorus (dissolved) [mg/L]	07-Jul-15	12:00	09-Jul-15	13:38	---	---	< 0.003	< 0.003
Lead (dissolved) [mg/L]	07-Jul-15	12:00	09-Jul-15	13:38	0.01	---	0.00003	0.00001
Antimony (dissolved) [mg/L]	07-Jul-15	12:00	09-Jul-15	13:38	0.006	---	0.0004	0.0002
Selenium (dissolved) [mg/L]	07-Jul-15	12:00	09-Jul-15	13:38	0.01	---	< 0.00004	< 0.00004
Uranium (dissolved) [mg/L]	07-Jul-15	12:00	09-Jul-15	13:38	0.02	---	0.000009	0.000002
Zinc (dissolved) [mg/L]	07-Jul-15	12:00	09-Jul-15	13:38	---	5	0.007	0.004

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

LR Report : **CA14036-JUL15**

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Approval Date	4: Analysis Approval Time	5: MAC	6: AO/OG	7: NR TW-1 1 Hour	8: NR TW-1 End
Cation sum [meq/L]	---	---	---	---	---	---	3.00	2.68
Anion Sum [meq/L]	---	---	---	---	---	---	3.21	2.81
Anion-Cation Balance [% difference]	---	---	---	---	---	---	-3.36	-2.51
Ion Ratio	---	---	---	---	---	---	0.94	0.95
Total Dissolved Solids (calculated) [mg/L]	---	---	---	---	---	---	174	152
Conductivity (calculated) [µS/cm]	---	---	---	---	---	---	311	275
Langelier's Index [@4°C]	---	---	---	---	---	---	-0.87	-0.95
Saturation pH [pHs @ 4°C]	---	---	---	---	---	---	9.08	9.13

MAC - Maximum Acceptable Concentration
AO/OG - Aesthetic Objective / Operational Guideline
NR - Not reportable under applicable Provincial drinking water regulations as per client.

Brian Graham B.Sc.
Project Specialist
Environmental Services, Analytical

OnLine LIMS

0000461694

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

LR Report : **CA14036-JUL15**

Quality Control Report

Inorganic Analysis												
Parameter	Reporting Limit	Unit	Method Blank		RPD	Acceptance Criteria	LCS / Spike Blank			Matrix Spike / Reference Material		
							Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
						%		Low	High		Low	High
Alkalinity - QCBatchID: EWL0050-JUL15												
Alkalinity	2	mg/L as Ca	< 2		1	10	107	90	110	NA		
Ammonia by SFA - QCBatchID: SKA0031-JUL15												
Ammonia+Ammonium (N)	0.04	mg/L	0.04		ND	10	98	90	110	NV	75	125
Anions by IC - QCBatchID: DIO0066-JUL15												
Nitrate (as N)	0.006	mg/L	<0.006		0	20	97	80	120	99	75	125
Nitrite (as N)	0.003	mg/L	<0.003		1	20	99	80	120	96	75	125
Anions by IC - QCBatchID: DIO0086-JUL15												
Chloride	0.04	mg/L	<0.04		ND	20	97	80	120	106	75	125
Sulphate	0.04	mg/L	<0.04		6	20	97	80	120	93	75	125
Carbon by SFA - QCBatchID: SKA0034-JUL15												
Total Organic Carbon	1.0	mg/L	-0.06		4	10	105	90	110	NV	75	125
Carbon by SFA - QCBatchID: SKA0067-JUL15												
Total Organic Carbon	1.0	mg/L	-0.8		4	10	98	90	110	112	75	125
Chlorine - QCBatchID: EWL0043-JUL15												
Residual chlorine	0.02	mg/L	< 0.02		0	20	95	90	110	NA		
Colour - QCBatchID: EWL0063-JUL15												
Colour	3	TCU	< 3		0	10	100	90	110	NA		
Conductivity - QCBatchID: EWL0050-JUL15												
Conductivity	2	µS/cm	< 2		2	10	99	90	110	NA		
Flouride by Specific Ion Electrode - QCBatchID: EWL0057-JUL15												
Fluoride	0.06	mg/L	<0.06		8	10	101	90	110	116	75	125
Metals in aqueous samples - ICP-MS - QCBatchID: EMS0024-JUL15												
Aluminum (dissolved)	0.001	mg/L	<0.001		ND	20	106	90	110			
Antimony (dissolved)	0.0002	mg/L	<0.0002		ND	20	102	90	110			
Arsenic (dissolved)	0.0002	mg/L	<0.0002		ND	20	100	90	110			
Barium (dissolved)	0.00002	mg/L	<0.00002		ND	20	97	90	110			
Boron (dissolved)	0.0002	mg/L	<0.0002		ND	20	109	90	110			
Cadmium (dissolved)	0.000003	mg/L	<0.000003		ND	20	98	90	110			
Calcium (dissolved)	0.01	mg/L	<0.01		ND	20	101	90	110			
Chromium (dissolved)	0.00003	mg/L	<0.00003		ND	20	99	90	110			
Copper (dissolved)	0.00002	mg/L	<0.00002		ND	20	99	90	110			
Iron (dissolved)	0.007	mg/L	<0.007		ND	20	107	90	110			
Lead (dissolved)	0.00001	mg/L	<0.00001		ND	20	97	90	110			
Magnesium (dissolved)	0.001	mg/L	<0.001		ND	20	97	90	110			
Manganese (dissolved)	0.00001	mg/L	<0.00001		ND	20	100	90	110			

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

LR Report : **CA14036-JUL15**

Inorganic Analysis												
Parameter	Reporting Limit	Unit	Method Blank		RPD	Acceptance Criteria	LCS / Spike Blank			Matrix Spike / Reference Material		
							Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
						%		Low	High		Low	High
Phosphorus (dissolved)	0.003	mg/L	<0.003		ND	20	100	90	110			
Potassium (dissolved)	0.003	mg/L	<0.003		ND	20	91	90	110			
Selenium (dissolved)	0.00004	mg/L	<0.00004		ND	20	95	90	110			
Sodium (dissolved)	0.01	mg/L	<0.01		ND	20	102	90	110			
Uranium (dissolved)	0.000002	mg/L	<0.000002		ND	20	96	90	110			
Zinc (dissolved)	0.002	mg/L	<0.002		ND	20	98	90	110			
pH - QCBatchID: EWL0050-JUL15												
pH	0.05	no unit	NA		0		100			NA		
Suspended Solids - QCBatchID: EWL0061-JUL15												
Total Suspended Solids	2	mg/L	< 2		2	10	98	90	110	NA		
Total Nitrogen - QCBatchID: SKA0033-JUL15												
Total Kjeldahl Nitrogen	0.05	mg/L	<0.05		ND	10	108	90	110	98	75	125
Turbidity - QCBatchID: EWL0044-JUL15												
Turbidity	0.10	NTU	< 0.10		2	10	100	90	110	NA		

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

06-July-2015

Geo-Logic Inc.
Attn : Jason Geraldi

347 Pido Rd., Unit #29, Peterborough
, K9J 6Z8
Phone: 705-749-3317, Fax:

Date Rec. : 03 July 2015
LR Report: **CA14037-JUL15**
Reference: G030377E1

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Sample ID	Sample Date & Time	Temperature Upon Receipt °C	Total Coliform cfu/100mL	E. Coli cfu/100mL	Fecal Coliform cfu/100mL
1: Analysis Start Date		---	03-Jul-15	03-Jul-15	03-Jul-15
2: Analysis Start Time		---	15:20	15:20	15:20
3: Analysis Approval Date		---	05-Jul-15	05-Jul-15	05-Jul-15
4: Analysis Approval Time		---	10:46	10:46	10:46
5: MAC		---			
6: NR TW-1 End	02-Jul-15 16:30	7.0	0	0	0

MAC - Maximum Acceptable Concentration
AO/OG - Aesthetic Objective / Operational Guideline
NR - Not reportable under applicable drinking water regulations as per client.

Deanna Edwards
Project Specialist
Environmental Services, Analytical

OnLine LIMS

0000449394

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

20-July-2015

GHD
Attn : Jason Geraldi

347 Pido Rd., Unit #29
Peterborough, ON
K9J 6Z8,

Phone: 705-749-3317
Fax:

Date Rec. : 10 July 2015
LR Report: **CA13270-JUL15**
Reference: G030377E1 PO. 27715

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Approval Date	4: Analysis Approval Time	5: MAC	6: AO/OG	7: NR TW-2 1hour	8: NR TW-2 End
Sample Date & Time							09-Jul-15 09:15	09-Jul-15 09:15
Temperature Upon Receipt [°C]	---	---	---	---	---	---	6.0	6.0
UV Transmittance [%]	13-Jul-15	15:02	14-Jul-15	11:13	---	---	56.4	96.6
Alkalinity [mg/L as CaCO3]	13-Jul-15	06:58	14-Jul-15	14:04	---	30-500	162	168
Colour [TCU]	13-Jul-15	14:22	14-Jul-15	15:46	---	5	< 3	3
Conductivity [µS/cm]	13-Jul-15	06:58	14-Jul-15	14:04	---	---	489	492
pH [no unit]	13-Jul-15	06:58	14-Jul-15	14:04	---	6.5-8.5	8.15	8.17
Total Suspended Solids [mg/L]	14-Jul-15	08:58	15-Jul-15	20:35	---	---	78	8
Turbidity [NTU]	10-Jul-15	13:38	13-Jul-15	08:50	1	5	150	0.38
Organic Nitrogen [mg/L]	13-Jul-15	20:00	14-Jul-15	11:13	---	0.15	< 0.05	< 0.05
Total Kjeldahl Nitrogen [mg/L]	13-Jul-15	20:00	14-Jul-15	11:12	---	---	0.24	0.29
Ammonia+Ammonium (N) [mg/L]	10-Jul-15	21:00	13-Jul-15	13:32	---	---	0.28	0.35
Total Organic Carbon [mg/L]	13-Jul-15	22:00	13-Jul-15	12:45	---	5	1.7	1.2
Chloride [mg/L]	14-Jul-15	08:33	17-Jul-15	11:42	---	250	55	49
Fluoride [mg/L]	10-Jul-15	21:37	13-Jul-15	11:24	1.5	---	0.39	0.37
Nitrite (as N) [mg/L]	13-Jul-15	09:06	14-Jul-15	15:26	1	---	<0.003	<0.003
Nitrate (as N) [mg/L]	13-Jul-15	09:06	14-Jul-15	15:26	10	---	<0.006	<0.006
Sulphate [mg/L]	14-Jul-15	08:33	15-Jul-15	16:25	---	500	29	27
Hardness (dissolved) [mg/L as CaCO3]	15-Jul-15	12:32	17-Jul-15	10:32	---	80-100	208	206
Aluminum (dissolved) [mg/L]	15-Jul-15	12:32	17-Jul-15	10:32	---	0.1	0.072	0.009
Arsenic (dissolved) [mg/L]	15-Jul-15	12:32	17-Jul-15	10:32	0.025	---	0.0008	0.0002
Boron (dissolved) [mg/L]	15-Jul-15	12:32	17-Jul-15	10:32	5	---	0.134	0.196
Barium (dissolved) [mg/L]	15-Jul-15	12:32	17-Jul-15	10:32	1	---	0.0962	0.0746
Calcium (dissolved) [mg/L]	15-Jul-15	12:32	17-Jul-15	10:32	---	---	26.4	26.5
Cadmium (dissolved) [mg/L]	15-Jul-15	12:32	17-Jul-15	10:32	0.005	---	0.000004	< 0.000003
Copper (dissolved) [mg/L]	15-Jul-15	12:32	17-Jul-15	10:32	---	1	0.00139	0.00037
Chromium (dissolved) [mg/L]	15-Jul-15	12:32	17-Jul-15	10:32	0.05	---	0.00048	0.00018
Iron (dissolved) [mg/L]	15-Jul-15	12:32	17-Jul-15	10:32	---	0.3	15.7	0.112
Potassium (dissolved) [mg/L]	15-Jul-15	12:32	17-Jul-15	10:32	---	---	2.01	2.21
Magnesium (dissolved) [mg/L]	15-Jul-15	12:32	17-Jul-15	10:32	---	---	34.4	34.0
Manganese (dissolved) [mg/L]	15-Jul-15	12:32	17-Jul-15	10:32	---	0.05	0.0601	0.00562
Sodium (dissolved) [mg/L]	15-Jul-15	12:32	17-Jul-15	10:32	20*	200	26.2	24.4
Phosphorus (dissolved) [mg/L]	15-Jul-15	12:32	17-Jul-15	10:32	---	---	0.022	0.012
Lead (dissolved) [mg/L]	15-Jul-15	12:32	17-Jul-15	10:32	0.01	---	0.00029	0.00002
Antimony (dissolved) [mg/L]	15-Jul-15	12:32	17-Jul-15	10:32	0.006	---	< 0.0002	< 0.0002
Selenium (dissolved) [mg/L]	15-Jul-15	12:32	17-Jul-15	10:32	0.01	---	< 0.00004	< 0.00004

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

LR Report : **CA13270-JUL15**

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Approval Date	4: Analysis Approval Time	5: MAC	6: AO/OG	7: NR TW-2 1hour	8: NR TW-2 End
Uranium (dissolved) [mg/L]	15-Jul-15	12:32	17-Jul-15	10:32	0.02	---	0.000044	0.000019
Zinc (dissolved) [mg/L]	15-Jul-15	12:32	17-Jul-15	10:32	---	5	0.039	0.007
Cation sum [meq/L]	---	---	---	---	---	---	5.34	5.24
Anion Sum [meq/L]	---	---	---	---	---	---	5.39	5.30
Anion-Cation Balance [% difference]	---	---	---	---	---	---	-0.48	-0.58
Ion Ratio	---	---	---	---	---	---	0.99	0.99
Total Dissolved Solids (calculated) [mg/L]	---	---	---	---	---	---	270	264
Conductivity (calculated) [µS/cm]	---	---	---	---	---	---	536	527
Langelier's Index [@4°C]	---	---	---	---	---	---	-0.17	-0.13
Saturation pH [pHs @ 4°C]	---	---	---	---	---	---	8.32	8.30

MAC - Maximum Acceptable Concentration
AO/OG - Aesthetic Objective / Operational Guideline
NR - Not reportable under applicable Provincial drinking water regulations as per client.

Brian Graham B.Sc.
Project Specialist
Environmental Services, Analytical

OnLine LIMS

0000461687

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

LR Report : **CA13270-JUL15**

Quality Control Report

Inorganic Analysis												
Parameter	Reporting Limit	Unit	Method Blank		RPD	Acceptance Criteria	LCS / Spike Blank			Matrix Spike / Reference Material		
							Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
						%		Low	High		Low	High
Alkalinity - QCBatchID: EWL0167-JUL15												
Alkalinity	2	mg/L as Ca	< 2		0	10	109	90	110	NA		
Ammonia by SFA - QCBatchID: SKA0099-JUL15												
Ammonia+Ammonium (N)	0.04	mg/L	-0.01		2	10	99	90	110	90	75	125
Anions by IC - QCBatchID: DIO0182-JUL15												
Nitrate (as N)	0.006	mg/L	<0.006		0	20	98	80	120	103	75	125
Nitrite (as N)	0.003	mg/L	<0.003		ND	20	99	80	120	88	75	125
Anions by IC - QCBatchID: DIO0202-JUL15												
Chloride	0.04	mg/L	<0.04		ND	20	98	80	120	101	75	125
Sulphate	0.04	mg/L	<0.04		2	20	96	80	120	98	75	125
Carbon by SFA - QCBatchID: SKA0101-JUL15												
Total Organic Carbon	1.0	mg/L	0.32		2	10	103	90	110	107	75	125
Chlorine - QCBatchID: EWL0153-JUL15												
Residual chlorine	0.02	mg/L	0.02		0	20	9.1	90	110	NA		
Colour - QCBatchID: EWL0177-JUL15												
Colour	3	TCU	< 3		0	10	105	90	110	NA		
Conductivity - QCBatchID: EWL0167-JUL15												
Conductivity	2	µS/cm	< 2		1	10	99	90	110	NA		
Flouride by Specific Ion Electrode - QCBatchID: EWL0165-JUL15												
Fluoride	0.06	mg/L	<0.06		3	10	96	90	110	95	75	125
Metals in aqueous samples - ICP-MS - QCBatchID: EMS0056-JUL15												
Aluminum (dissolved)	0.001	mg/L	<0.001		9	20	102	90	110	79	70	130
Antimony (dissolved)	0.0002	mg/L	<0.0002		ND	20	99	90	110	95	70	130
Arsenic (dissolved)	0.0002	mg/L	<0.0002		ND	20	99	90	110	99	70	130
Barium (dissolved)	0.00002	mg/L	<0.00002		1	20	96	90	110	102	70	130
Boron (dissolved)	0.0002	mg/L	<0.0002		1	20	104	90	110	NV	70	130
Cadmium (dissolved)	0.000003	mg/L	<0.000003		3	20	100	90	110	91	70	130
Calcium (dissolved)	0.01	mg/L	<0.01		5	20	103	90	110	101	70	130
Chromium (dissolved)	0.00003	mg/L	<0.00003		ND	20	100	90	110	103	70	130
Copper (dissolved)	0.00002	mg/L	<0.00002		7	20	99	90	110	94	70	130
Iron (dissolved)	0.007	mg/L	<0.007		16	20	103	90	110	NV	70	130
Lead (dissolved)	0.00001	mg/L	<0.00001		3	20	94	90	110	97	70	130
Magnesium (dissolved)	0.001	mg/L	<0.001		8	20	100	90	110	NV	70	130
Manganese (dissolved)	0.00001	mg/L	<0.00001		8	20	101	90	110	71	70	130
Phosphorus (dissolved)	0.003	mg/L	<0.003		ND	20	103	90	110	NV	70	130
Potassium (dissolved)	0.003	mg/L	<0.003		8	20	105	90	110	80	70	130

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

LR Report : **CA13270-JUL15**

Inorganic Analysis												
Parameter	Reporting Limit	Unit	Method Blank		RPD	Acceptance Criteria	LCS / Spike Blank			Matrix Spike / Reference Material		
							Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
						%		Low	High		Low	High
Selenium (dissolved)	0.00004	mg/L	<0.00004		4	20	97	90	110	101	70	130
Sodium (dissolved)	0.01	mg/L	<0.01		5	20	99	90	110	NV	70	130
Uranium (dissolved)	0.000002	mg/L	<0.000002		1	20	97	90	110	94	70	130
Zinc (dissolved)	0.002	mg/L	<0.002		9	20	98	90	110	78	70	130
pH - QCBatchID: EWL0167-JUL15												
pH	0.05	no unit	NA		1		100			NA		
Suspended Solids - QCBatchID: EWL0185-JUL15												
Total Suspended Solids	2	mg/L	< 2		6	10	97	90	110	NA		
Total Nitrogen - QCBatchID: SKA0100-JUL15												
Total Kjeldahl Nitrogen	0.05	mg/L	<0.05		ND	10	110	90	110	101	75	125
Turbidity - QCBatchID: EWL0160-JUL15												
Turbidity	0.10	NTU	< 0.10		10	10	98	90	110	NA		

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

14-July-2015

GHD
Attn : Jason Geraldi

347 Pido Rd., Unit #29
Peterborough, ON
K9J 6Z8,

Phone: 705-749-3317
Fax:

Date Rec. : 10 July 2015
LR Report: **CA13271-JUL15**
Reference: G030377E1 P.O> 27715

Copy: #1

CERTIFICATE OF ANALYSIS

Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Approval Date	4: Analysis Approval Time	5: MAC	6: NR TW-2 end
Sample Date & Time						09-Jul-15 19:15
Temperature Upon Receipt [°C]	---	---	---	---	---	6.0
Total Coliform [cfu/100mL]	10-Jul-15	15:50	13-Jul-15	10:05		0
E. Coli [cfu/100mL]	10-Jul-15	15:50	13-Jul-15	10:05		0
Fecal Coliform [cfu/100mL]	10-Jul-15	15:50	13-Jul-15	10:05		0

Deanna Edwards
Project Specialist
Environmental Services, Analytical

OnLine LIMS

00004559599

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

LR Report : **CA13271-JUL15**

MAC - Maximum Acceptable Concentration
AO/OG - Aesthetic Objective / Operational Guideline
NR - Not reportable under applicable drinking water regulations as per client.

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

21-July-2015

GHD
Attn : Jason Geraldi

347 Pido Rd., Unit #29
Peterborough, ON
K9J 6Z8,

Phone: 705-749-3317
Fax:

Date Rec. : 15 July 2015
LR Report: **CA14362-JUL15**
Reference: G030377E1 PO.#27715

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Analysis	3: Analysis Approval Date	4: Analysis Approval Time	5: MAC	6: AO/OG	7: NR TW-3 1hour	8: NR TW-3 End
Sample Date & Time					14-Jul-15 08:10	14-Jul-15 19:30
Temperature Upon Receipt [°C]	---	---	---	---	8.0	8.0
UV Transmittance [%]	17-Jul-15	16:15	---	---	74.6	75.1
Alkalinity [mg/L as CaCO3]	17-Jul-15	12:42	---	30-500	116	121
Colour [TCU]	16-Jul-15	15:56	---	5	< 3	3
Conductivity [µS/cm]	17-Jul-15	12:42	---	---	337	453
pH [no unit]	17-Jul-15	12:42	---	6.5-8.5	8.18	8.33
Total Suspended Solids [mg/L]	16-Jul-15	14:41	---	---	22	49
Turbidity [NTU]	16-Jul-15	10:08	1	5	51.3	42.8
Organic Nitrogen [mg/L]	17-Jul-15	14:08	---	0.15	0.09	0.10
Total Kjeldahl Nitrogen [mg/L]	17-Jul-15	14:08	---	---	0.26	0.40
Ammonia+Ammonium (N) [mg/L]	16-Jul-15	10:37	---	---	0.17	0.30
Total Organic Carbon [mg/L]	17-Jul-15	16:43	---	5	1.9	11.5
Chloride [mg/L]	21-Jul-15	11:17	---	250	20	64
Fluoride [mg/L]	17-Jul-15	15:50	1.5	---	0.58	0.64
Nitrite (as N) [mg/L]	21-Jul-15	07:45	1	---	<0.003	<0.003
Nitrate (as N) [mg/L]	21-Jul-15	07:45	10	---	<0.006	0.498
Sulphate [mg/L]	21-Jul-15	11:17	---	500	30	30
Hardness [mg/L as CaCO3]	17-Jul-15	11:23	---	80-100	98.8	139
Aluminum (dissolved) [mg/L]	17-Jul-15	11:23	---	0.1	0.087	0.593
Arsenic (dissolved) [mg/L]	17-Jul-15	11:23	0.025	---	0.0009	0.0006
Boron (dissolved) [mg/L]	17-Jul-15	11:23	5	---	0.148	0.156
Barium (dissolved) [mg/L]	17-Jul-15	11:23	1	---	0.0406	0.0500
Calcium (dissolved) [mg/L]	17-Jul-15	11:23	---	---	21.3	33.0
Cadmium (dissolved) [mg/L]	17-Jul-15	11:23	0.005	---	0.000004	< 0.000003
Copper (dissolved) [mg/L]	17-Jul-15	11:23	---	1	0.00049	0.00100
Chromium (dissolved) [mg/L]	17-Jul-15	11:23	0.05	---	0.00023	0.00116
Iron (dissolved) [mg/L]	17-Jul-15	11:23	---	0.3	4.66	0.539
Potassium (dissolved) [mg/L]	17-Jul-15	11:23	---	---	2.12	2.21
Magnesium (dissolved) [mg/L]	17-Jul-15	11:23	---	---	11.1	13.7
Manganese (dissolved) [mg/L]	17-Jul-15	11:23	---	0.05	0.0400	0.0239

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

LR Report : **CA14362-JUL15**

Analysis	3: Analysis Approval Date	4: Analysis Approval Time	5: MAC	6: AO/OG	7: NR TW-3 1hour	8: NR TW-3 End
Sodium (dissolved) [mg/L]	17-Jul-15	11:23	20*	200	31.6	47.3
Phosphorus (dissolved) [mg/L]	17-Jul-15	11:23	---	---	0.012	0.028
Lead (dissolved) [mg/L]	17-Jul-15	11:23	0.01	---	0.00010	0.00023
Antimony (dissolved) [mg/L]	17-Jul-15	11:23	0.006	---	< 0.0002	< 0.0002
Selenium (dissolved) [mg/L]	17-Jul-15	11:23	0.01	---	< 0.00004	< 0.00004
Uranium (dissolved) [mg/L]	17-Jul-15	11:23	0.02	---	0.000249	0.000095
Zinc (dissolved) [mg/L]	17-Jul-15	11:23	---	5	0.025	0.030
Cation sum [meq/L]	---	---	---	---	3.40	4.89
Anion Sum [meq/L]	---	---	---	---	3.50	4.85
Anion-Cation Balance [% difference]	---	---	---	---	-1.45	0.43
Ion Ratio	---	---	---	---	0.97	1.01
Total Dissolved Solids (calculated) [mg/L]	---	---	---	---	186	263
Conductivity (calculated) [µS/cm]	---	---	---	---	345	487
Langelier's Index [@4°C]	---	---	---	---	-0.36	-0.02
Saturation pH [pHs @ 4°C]	---	---	---	---	8.54	8.35

MAC - Maximum Acceptable Concentration
AO/OG - Aesthetic Objective / Operational Guideline
NR - Not reportable under applicable Provincial drinking water regulations as per client.

Brian Graham B.Sc.
Project Specialist
Environmental Services, Analytical

OnLine LIMS

0000462728

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

17-July-2015

GHD
Attn : Jason Geraldi

347 Pido Rd., Unit #29
Peterborough, ON
K9J 6Z8,

Phone: 705-749-3317
Fax:

Date Rec. : 15 July 2015
LR Report: **CA14361-JUL15**
Reference: G030377E1

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Approval Date	4: Analysis Approval Time	7: NR TW-3 End
Sample Date & Time					14-Jul-15 19:30
Temperature Upon Receipt [°C]	---	---	---	---	8.0
Total Coliform [cfu/100mL]	15-Jul-15	17:20	17-Jul-15	11:21	5
E. Coli [cfu/100mL]	15-Jul-15	17:20	17-Jul-15	11:21	0
Fecal Coliform [cfu/100mL]	15-Jul-15	17:20	17-Jul-15	11:21	0

NR - Not reportable under applicable Provincial drinking water regulations as per client.

Brian Graham B.Sc.
Project Specialist
Environmental Services, Analytical

OnLine LIMS

0000460763

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

12-June-2015

Geo-Logic Inc.
Attn : Jason Geraldi

347 Pido Rd., Unit #29
Peterborough, ON
K9J 6Z8,

Phone: 705-749-3317
Fax:

Date Rec. : 04 June 2015
LR Report: **CA12220-JUN15**
Reference: G030377E1 PO#27715

Copy: #2

CERTIFICATE OF ANALYSIS

Final Report - Reissue

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Approval Date	4: Analysis Approval Time	5: MAC	6: AO/OG	7: NR TW-4 1 Hour	8: NR TW-4 End
Sample Date & Time							03-Jun-15	03-Jun-15
Temperature Upon Receipt [°C]	---	---	---	---	---	---	8.0	8.0
UV Transmittance [%]	05-Jun-15	12:09	05-Jun-15	15:03	---	---	71.7	92.3
Alkalinity [mg/L as CaCO3]	05-Jun-15	15:16	08-Jun-15	15:14	---	30-500	159	163
Colour [TCU]	05-Jun-15	10:19	05-Jun-15	14:46	---	5	3	< 3
Conductivity [µS/cm]	05-Jun-15	15:16	08-Jun-15	15:14	---	---	407	570
pH [no unit]	05-Jun-15	15:16	08-Jun-15	15:14	---	6.5-8.5	8.24	8.23
Total Suspended Solids [mg/L]	06-Jun-15	07:29	08-Jun-15	15:25	---	---	20	3
Turbidity [NTU]	04-Jun-15	13:30	05-Jun-15	10:02	1	5	32.9	3.53
Organic Nitrogen [mg/L]	05-Jun-15	16:45	08-Jun-15	11:16	---	0.15	< 0.05	< 0.05
Total Kjeldahl Nitrogen [mg/L]	04-Jun-15	19:40	08-Jun-15	09:01	---	---	0.17	0.23
Ammonia+Ammonium (N) [mg/L]	05-Jun-15	06:20	08-Jun-15	11:16	---	---	0.14	0.27
Total Organic Carbon [mg/L]	05-Jun-15	20:17	08-Jun-15	13:25	---	5	1.8	< 1.0
Chloride [mg/L]	09-Jun-15	07:54	09-Jun-15	14:19	---	250	22	71
Fluoride [mg/L]	05-Jun-15	12:09	08-Jun-15	09:16	1.5	---	0.49	0.94
Nitrite (as N) [mg/L]	04-Jun-15	21:25	05-Jun-15	10:11	1	---	<0.003	<0.003
Nitrate (as N) [mg/L]	04-Jun-15	21:25	08-Jun-15	14:15	10	---	< 0.006	< 0.006

OnLine LIMS

0000432443

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

LR Report : **CA12220-JUN15**

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Approval Date	4: Analysis Approval Time	5: MAC	6: AO/OG	7: NR TW-4 1 Hour	8: NR TW-4 End
Sulphate [mg/L]	09-Jun-15	07:54	09-Jun-15	14:19	---	500	36	35
Hardness [mg/L as CaCO3]	05-Jun-15	14:40	08-Jun-15	13:19	---	80-100	167	170
Aluminum (dissolved) [mg/L]	05-Jun-15	14:40	08-Jun-15	13:19	---	0.1	0.063	0.038
Arsenic (dissolved) [mg/L]	05-Jun-15	14:40	08-Jun-15	13:19	0.025	---	0.0006	< 0.0002
Boron (dissolved) [mg/L]	05-Jun-15	14:40	08-Jun-15	13:19	5	---	0.239	0.306
Barium (dissolved) [mg/L]	05-Jun-15	14:40	08-Jun-15	13:19	1	---	0.0532	0.0601
Calcium (dissolved) [mg/L]	05-Jun-15	14:40	08-Jun-15	13:19	---	---	35.3	35.2
Cadmium (dissolved) [mg/L]	05-Jun-15	14:40	08-Jun-15	13:19	0.005	---	< 0.000003	< 0.000003
Copper (dissolved) [mg/L]	05-Jun-15	14:40	08-Jun-15	13:19	---	1	0.00049	0.00019
Chromium (dissolved) [mg/L]	05-Jun-15	14:40	08-Jun-15	13:19	0.05	---	0.00034	0.00007
Iron (dissolved) [mg/L]	05-Jun-15	14:40	08-Jun-15	13:19	---	0.3	5.39	0.381
Potassium (dissolved) [mg/L]	05-Jun-15	14:40	08-Jun-15	13:19	---	---	1.88	2.86
Magnesium (dissolved) [mg/L]	05-Jun-15	14:40	08-Jun-15	13:19	---	---	19.2	20.0
Manganese (dissolved) [mg/L]	05-Jun-15	14:40	08-Jun-15	13:19	---	0.05	0.0172	0.00627
Sodium (dissolved) [mg/L]	05-Jun-15	14:40	08-Jun-15	13:19	20*	200	26.9	50.0
Phosphorus (dissolved) [mg/L]	05-Jun-15	14:40	08-Jun-15	13:19	---	---	0.014	0.006
Lead (dissolved) [mg/L]	05-Jun-15	14:40	08-Jun-15	13:19	0.01	---	0.00028	0.00012
Antimony (dissolved) [mg/L]	05-Jun-15	14:40	08-Jun-15	13:19	0.006	---	< 0.0002	< 0.0002
Selenium (dissolved) [mg/L]	05-Jun-15	14:40	08-Jun-15	13:19	0.01	---	< 0.001	< 0.001
Uranium (dissolved) [mg/L]	05-Jun-15	14:40	08-Jun-15	13:19	0.02	---	0.000020	0.000010
Zinc (dissolved) [mg/L]	05-Jun-15	14:40	08-Jun-15	13:19	---	5	0.004	< 0.002
Cation sum [meq/L]	---	---	---	---	---	---	4.56	5.65
Anion Sum [meq/L]	---	---	---	---	---	---	4.54	5.99
Anion-Cation Balance [% difference]	---	---	---	---	---	---	0.16	-2.89
Ion Ratio	---	---	---	---	---	---	1.00	0.94
Total Dissolved Solids (calculated) [mg/L]	---	---	---	---	---	---	237	312
Conductivity (calculated) [µS/cm]	---	---	---	---	---	---	455	582
Langelier's Index [@4°C]	---	---	---	---	---	---	0.04	0.03
Saturation pH [pHs @ 4°C]	---	---	---	---	---	---	8.20	8.20

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

LR Report : **CA12220-JUN15**

MAC - Maximum Acceptable Concentration
AO/OG - Aesthetic Objective / Operational Guideline
NR - Not reportable under applicable Provincial drinking water regulations as per client.

Deanna Edwards
Project Specialist
Environmental Services, Analytical

OnLine LIMS

000043243

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

05-June-2015

Geo-Logic Inc.
Attn : Jason Geraldi

347 Pido Rd., Unit #29, Peterborough
, K9J 6Z8
Phone: 705-749-3317, Fax:

Date Rec. : 04 June 2015
LR Report: **CA12219-JUN15**
Reference: Project #G030377E
P.O.127715

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Approval Date	4: Analysis Approval Time	5: MAC	6: NR TW-4 End
Sample Date & Time						03-Jun-15
Temperature Upon Receipt [°C]	---	---	---	---	---	8.0
Total Coliform [cfu/100mL]	04-Jun-15	14:45	05-Jun-15	14:04		0
E. Coli [cfu/100mL]	04-Jun-15	14:45	05-Jun-15	14:04		0
Fecal Coliform [cfu/100mL]	04-Jun-15	14:45	05-Jun-15	14:04		0

NR - Not reportable under applicable drinking water regulations as per client.

Brian Graham B.Sc.
Project Specialist
Environmental Services, Analytical

OnLine LIMS

0000427317

Appendix D
Preliminary Hydrogeological Assessment Report

HYDROGEOLOGICAL ASSESSMENT REPORT

PROPOSED RESIDENTIAL DEVELOPMENT
PART LOT 27, CONCESSION 10
OTONABEE-SOUTH-MONAGHAN TOWNSHIP
PETERBOROUGH, ONTARIO
PROJECT NO. G024636E1

Prepared for:

Demonte Acres Inc.
c/o Al Demonte
R.R. #7
Peterborough, Ontario
K6J 6X8

GEO-LOGIC INC.

Geotechnical Engineers
and Hydrogeologists

Geo-Logic Inc.
347 Pido Road, Unit 29
Peterborough, Ontario
K9J 6X7

OCTOBER 2013

TABLE OF CONTENTS

ENCLOSURES

TABLES

APPENDICES

GEO-LOGIC INC.
347 Pido Road, Unit 29
Peterborough, Ontario, K9J 6X7
Tel: (705) 749-3317
Fax: (705) 749-9248
www.geo-logic.ca
QMS ISO 9001 : 2008

HYDROGEOLOGICAL ASSESSMENT REPORT
PROPOSED RESIDENTIAL DEVELOPMENT
PART LOT 27; CONCESSION 10
OTONABEE-SOUTH MONAGHAN TOWNSHIP
PETERBOROUGH, ONTARIO
PROJECT NO. G024636E1

1.0 INTRODUCTION

This report presents the results of a hydrogeological assessment that was completed for a proposed residential development located east of Burnham Line and north of Highway 7 in Otonabee-South Monaghan Township in Peterborough, Ontario. The property is located on Part-Lot 27, Concession 10 in Otonabee-South Monaghan Township and is herein referred to as "the Site". Geo-Logic Inc. (Geo-Logic) was retained by Al Demonte to complete this hydrogeological assessment under the authorization of Mr. Demonte in accordance with our proposal PG-2259 dated September 3, 2013.

The Site to be developed is 47.06 acres (19.0 hectares) and is comprised of undeveloped lands with vegetation comprised of pasture, trees, bushes and tall grasses. The lands are privately serviced for water and septic. A preliminary hydrogeologic and soils report was previously completed by Site Investigation Services Limited in 1990. The report summarized the topography, soils, geology and groundwater conditions in the area of the proposed subdivision to evaluate the suitability of the Site for domestic water supply and disposal of domestic septic waste. The report indicated that additional studies were required to confirm site conditions.

The location of the Site relative to nearby roads and watercourses is illustrated on the Vicinity Plan, Plate 1. The plan has been compiled from Centre for Topographic Information' map 31 D/8 dated 1996, published 1999 at a scale of 1:50,000.

More specific ground surface characteristics are depicted on the Site Plan, Plate 2 that has been produced by CRA under license from Ontario Ministry of Natural Resources, MNR NRVIS, 2013 at a scale of 1:10,000. The surrounding features were observed to have residentially developed areas to the south and west with agricultural lands surrounding the Site.

A Plot Plan, Plate 3 is provided showing the current property and adjacent lands based upon a recent aerial photograph from 2012. The Test Hole Location Plan, Plate 4 shows the locations of the test pits that were excavated at the Site.

2.0 PURPOSE AND SCOPE

The purpose of this assessment was to investigate the hydrogeological conditions of the Site and the potential for a future residential development including standard one- or two-storey dwellings on private servicing. The contents of this report must in no way be construed as an opinion of this Site's environmental status. The purpose of the hydrogeologic assessment was four-fold:

1. Define prevailing hydrogeologic conditions at the site, including, groundwater movement and local hydrochemistry, subsurface soil stratigraphy, and shallow groundwater movement;

2. Assess the availability of adequate groundwater supplies based on water well records and well survey;

3. Evaluate the suitability of the planned land use and assess existing and adjacent groundwater resources within the study area; and

4. Carry out engineering analyses to assess the potential impacts and provide appropriate recommendations for the site.

To accomplish the foregoing purposes, the following scope of work was carried out:

1. Reviewed available background information relevant to the Site such as geologic, physiographic and water resources reports and maps. The review included historical climatic data for the general area.

2. Carried out an inventory of available well record data on file with the Ministry of the Environment (MOE) for the immediate area to evaluate the physical characteristics of the aquifer complexes that underlie the region. A field survey of existing wells was carried out to assist in the evaluation of the local aquifer.

3. A walkover inspection was conducted to review surficial ground characteristics.

4. Underground services were cleared prior to advancing the test holes. The test holes were located as shown on the Test Hole Location Plan (Plate 4). The subsurface conditions were explored by advancing, sampling and logging a total of ten (10) test holes. The subsurface conditions were recorded and are summarized in detail on the logs attached in Appendix A. The test holes were advanced to a depth of 3.35 m.

5. A piezometer was installed in one test hole to facilitate water level measurements and water quality testing. Based upon the results of the water samples, a nitrate impact assessment was completed.

6. Completed a water balance considering pre- and post-development conditions and evaluated groundwater baseflow conditions.

7. Prepared a detailed report using engineering analyses of the acquired data outlining our conclusions and recommendations herein.

3.0 SITE CONDITIONS

3.1 GENERAL

The field program consisted of a site inspection, a soils exploration investigation and water levels at the installed piezometer. A site inspection was conducted on September 19, 2013 by Geo-Logic to observe the general surficial characteristics. The Site is comprised of undeveloped lands with vegetation comprised of pasture, trees, bushes and tall grasses. The southeast corner was forest. The area has hilly to rolling topography with relief on the order of approximately 10 to 15 m. No permanent surface water features were observed. Surface water runoff would flow toward the forested area from the central and eastern areas of the Site. A low-lying area where seasonally ponded water may occur was observed and suggests that the soil is relatively poorly draining. No evidence of seeps or springs was observed. Photographs are provided in Appendix B.

The surface conditions of the Site were observed to be dry at the time of our site inspection and field exploration work completed in September 2013.

3.2 SUBSURFACE CONDITIONS

3.2.1 REGIONAL GEOLOGY

The Peterborough area is underlain by thin, flat-lying, Middle Ordovician limestone. The limestone belongs to the Lindsay and Verulam formation as part of the Trenton-Black River Group. The glacial materials deposited over bedrock are from the Late Wisconsin period.

The Site is situated in the physiographic region known at the Peterborough Drumlin Field (Chapman and Putnam, 1984). In general, surrounding topography consists of hilly to rolling deposits of glacial drift (i.e. till). The till is typically comprised of a full range of soil particles from clay through boulders in size. The available MOE well records indicate limestone was encountered at depths ranging from 5.5 m (18 feet) to 38.1 m (125 feet). Physical and hydraulic data are presented on MOE well records in Appendix C.

3.2.2 LOCAL GEOLOGY

The subsurface stratigraphy was investigated by excavating ten (10) test pits on September 18, 2013. The locations of the test holes are illustrated on the Test Hole Plan, Plate 4. Details of the subsurface conditions encountered are presented graphically in Appendix A. It should be noted that the boundaries between the strata have been inferred from the test hole observations and non-continuous samples. They generally represent a transition from one soil type to another, and should not be inferred to represent an exact plane of geological change. Further, conditions may vary between and beyond the test holes.

The test holes typically encountered a surficial layer of topsoil, over native soils consisting of silty sand till with gravel. The till become increasingly more compact and dense with depth. No fill was encountered. Each test pit was terminated within the till. The topsoil contained an appreciable amount of organic matter and thus, is considered to be devoid of any structural engineering value. Representative samples of the material encountered were submitted to the soils laboratory for analysis and characterization. Grain size distribution analyses were carried out on three (3) representative soil samples from TP-4, TP-6 and TP-8 and are summarized below. The grain size curves are provided in Appendix A.

TABLE 1: GRAIN SIZE DISTRIBUTION SUMMARY

Location	Depth (m)	Grain Size Distribution			Soil Unit	Estimated K* (cm/s)
		%Gravel	%Sand	%Fines		
TP-4	1.2	26	34	40	Silty sand till	10^{-4} to 10^{-6}
TP-6	2.1	12	42	46	Silty sand till	10^{-4} to 10^{-6}
TP-8	2.4	26	43	31	Silty sand till	10^{-4} to 10^{-6}

Notes:
*K indicates hydraulic conductivity estimated based upon the field data.
%Fines indicates silt and clay particles.

3.3 GROUNDWATER

Groundwater was not encountered in any of the test holes with the exception of TP-3. The other test holes remained dry throughout the excavation activities. A water level of approximately 1.4 m below the existing grade was obtained on September 19, 2013 from the piezometer. Table 2 summarizes the shallow water level and piezometer information. The shallow groundwater flow direction at this location is inferred to be toward the southeast and the forested area based upon ground elevations interpolated from the topographical mapping provided (Site Plan, Plate 2)

TABLE 2: WATER LEVEL SUMMARY

Piezometer	Ground Elevation*	Stick up (m)	WL (mbeg)	GW Elevation (masl)	WL (mbeg)	GW Elevation (masl)
Date Measured			September 19, 2013		October 10, 2013	
TP-3	205	1.68	1.365	203.6	1.10	203.9

Notes: *Elevations estimated based on Site Plan, Plate 2. WL = water level; GW = groundwater; masl = metres above sea level; mbeg = metres above existing grade.

Significant quantities of groundwater within the shallow till are not expected at this Site. Stormwater infiltrated through the topsoil will sit above the underlying dense till until it can be drained horizontally along the till interface to ditches or gullies or drained vertically via fractures or fissures or sand seams within the till. It should be noted that groundwater levels are transient and tend to fluctuate with the seasons, periods of precipitation and temperature.

4.0 HYDROGEOLOGY

4.1 GENERAL

Information regarding groundwater resources of the immediate area was obtained from an inventory of well records on file with the MOE. In total, 37 representative water wells were identified within 250 m of the Site and included neighbouring Lots 27 and 28, Concession 10 of Otonabee Township in Peterborough, Ontario (Appendix C). Two of the well records did not provide information, thus the data from 35 wells will be summarized and evaluated.

4.2 EXISTING WATER SUPPLIES

Physical and hydraulic data are presented on MOE well records and the information indicates the presence of two (2) principal aquifer systems:

1. A confined aquifer within buried sand and gravel layers tapped by the overburden wells; and
2. A confined bedrock aquifer within limestone tapped by deeper drilled wells.

A summary of the MOE data is presented in Table 3. The information from the MOE data indicates that the majority of the wells are drilled: 20% are overburden wells and 77% are bedrock wells while one dug/bored well was identified. A total of 80% of the wells were reported to have “fresh” water (14% were “unknown” or “not indicated”; and 6% were indicated to have sulphur). Of the drilled wells within the overburden, an average yield of 56.4 L/min or 12.4 Igpm was recorded. The average depth of the overburden wells was 14.0 m (46 feet). On average, water was encountered at a depth of 13.1 m (42.9 feet) in the overburden wells. Of the drilled wells within the bedrock, an average yield of 22.3 L/min (4.9 Igpm) was recorded. The average depth of the overburden wells was 29.9 m (98.1 feet). On average, water was encountered at a depth of 18.8 m (61.8 feet) in the bedrock wells.

There was one dug/bored well tapping the shallow water table. The well yield at this one location was noted to be 5452 L/min which suggests an erroneous entry to the database. From a quantity perspective, shallow dug/bored wells would generally not provide sufficient quantity given the subsurface conditions observed at the Site.

Shallow dug/bored wells are susceptible to large seasonal fluctuations in the groundwater. The result is that shallow wells are also more prone to becoming dry in the winter and summer months. From a quality perspective, shallow dug/bored wells are generally difficult to seal at the surface and therefore considered to be susceptible to shallow sources of contamination.

TABLE 3: MOE WELL DATA SUMMARY

Total Number of Wells Inventoried:	35	
Dug/Bored Wells:	1	3%
Drilled Wells (Overburden):	7	20%
Drilled Wells (Bedrock):	27	77%

PARAMETERS	STATISTICAL SUMMARY Dug/Bored Well		STATSTICAL SUMMARY Drilled Overburden Wells		STATISTICAL SUMMARY Drilled Bedrock Wells	
	Metric Data	Imperial Data	Metric Data	Imperial Data	Metric Data	Imperial Data
WELL YIELDS						
Range	5452 L/min	1201 Igpm	9.1 to 182 L/min	2 to 40 Igpm	4.5 to 90.8 L/min	1 to 20 Igpm
Average	5452 L/min	1201 Igpm	56.4 L/min	12.4 Igpm	22.3 L/min	4.9 Igpm
REPORTED YIELDS	Frequency		Frequency		Frequency	
Not Reported	0	0%	0	0%	3	11%
Dry	0	0%	0	0%	0	0%
0 to 1 Igpm	0	0%	0	0%	2	7.5%
2 to 4 Igpm	0	0%	4	57%	11	41%
5 to 9 Igpm	0	0%	0	0%	9	33%
≥10 Igpm	1	100%	3	43%	2	7.5%
STATIC WATER LEVELS						
Range	--	--	0.9 to 14.3 m	3 to 47 ft	0.6 to 37.5 m	2 to 123 ft
Average	--	--	5.3 m	17.4 ft	6.2 m	20.4 ft
WATER ENCOUNTERED						
Range	1.4 m	4.5 ft	6.1 to 23.8 m	20 to 78 ft	5.5 to 36.9 m	18 to 121 ft
Average	1.4 m	4.5 ft	13.1 m	42.9 ft	18.8 m	61.8 ft
WELL DEPTH						
Range	8.7 m	28.5 ft	6.1 to 23.8 m	20 to 78 ft	5.5 to 38.1 m	18 to 125 ft
Average	8.7 m	28.5 ft	14 m	46 ft	16.8 m	55.0 ft

Notes: Data based on MOE well record information (see Appendix C). L/min represents litres per minute, Igpm indicates Imperial gallons per minute and m is metres.

Table 3 shows that the overburden wells produced good groundwater yields of fresh groundwater and at higher pumping rates compared with the bedrock wells. In general, groundwater encountered is on average at a depth of 13 to 20 m for the overburden and bedrock wells. The overburden and bedrock wells are inferred to be confined based upon deposits of till (i.e. clay) above the water bearing zones. The well records indicate that a low permeability till layer (i.e. confining layer) is generally present above the water bearing zones of sand and gravel and bedrock aquifer.

A door-to-door well survey was completed on September 23, 2013 by Geo-Logic. The well survey was conducted by going door-to-door to the homes neighbouring the proposed development and gathering information regarding the resident's well. The well survey information was used to supplement the MOE well record data. Residents within approximately 250 m of the proposed development were surveyed. Of the 26 residents surveyed, a total of 11 residents provided information. Eight of the wells were drilled and three were dug/bored. One of the wells in the area was a buried well and could not be accessed during the well survey. Two residents indicated periodic low E. coli issues, one location indicated hardness was an issue, one resident indicated salt was an issue (dug well), three residents indicated iron was an issue and two indicated sulphur was a problem. Several residents had water softeners, UV disinfection systems and other filtration systems installed to deal with these issues. Residents identified no major quantity issues with the exception of the dug/bored wells. The well survey information is provided in Appendix C along with a map showing the homes that were surveyed.

The potential for well impacts to dug/bored or drilled wells along Highway 7 and Burnham Line are expected to be low from this development. The deeper regional groundwater tapped by overburden and bedrock wells is inferred to flow in a southerly direction and minimal recharge of this aquifer is expected from this development area. Geo-Logic does not expect utility services to be installed at depths that would disrupt deeper water bearing sand and gravel layers.

The Site, based upon test holes, does not have significant discharge or recharge characteristics, and thus only a minor portion of the existing infiltration is expected to recharge the deeper aquifer complexes that are confined below the till deposits. A limited amount of the surface water is expected to infiltrate into the shallow overburden. The remainder of the surface water will be conveyed as overland flow via drainage ditches, gullies, or to low-lying areas.

4.3 BACKGROUND WATER QUALITY

The well records reviewed for this investigation generally reported fresh water supplies. The information from residents collected during the well survey indicated that the water of this area is generally of good quality.

Groundwater samples were taken from the drilled well at 2284 Lancaster Road and dug well at 2245 Burnham Line to evaluate background water quality. The locations of the sampled wells are depicted on the Well Survey Location Plan in Appendix D. The samples were collected directly from raw water taps at each house. The water samples were delivered to SGS Environmental Laboratories chemical analyses. The Certificates of Analysis is presented in Appendix E. The data is summarized and compared with the Ontario Drinking Water Standards (ODWS) in Table 4.

TABLE 4: WATER QUALITY SUMMARY

PARAMETER	ANALYTICAL DATA		ODWS	
	2284 Lancaster Road Drilled Well	**2245 Burnham Line Dug Well**	**MAC***	**AO/OG***
Alkalinity (mg/L as $CaCO_3$)	139	198	--	30 to 500
Aluminum (mg/L)	0.0098	0.0035	--	0.1
Antimony (mg/L)	0.0005	0.0004	0.006	--
Arsenic (mg/L)	0.0013	0.0005	0.025	--
Boron (mg/L)	0.0786	0.0247	5	--
Barium (mg/L)	0.0566	0.0756	1	--
Cadmium (mg/L)	0.000017	0.000118	0.005	--
Chloride (mg/L)	45	15	--	250
Chromium (mg/L)	0.0005	<0.0005	0.05	--
Colour (T.C.U.)	<3	<3	--	5
Copper (mg/L)	0.0350	0.0370	--	1
Fluoride (mg/L)	0.36	0.16	1.5	--
Hardness (mg/L as $CaCO_3$)	**199**	**225**	--	80-100
Iron (mg/L)	0.028	0.004	--	0.3
Lead (mg/L)	0.00068	0.00065	0.01	--
Magnesium (mg/L)	35.3	18.1	--	--
Manganese (mg/L)	0.00096	0.00056	--	0.05
Nitrate – N (mg/L)	0.317	1.6	10	--
Nitrite – N (mg/L)	<0.003	<0.003	1.0	--
Organic Nitrogen (mg/L)	<0.05	**0.38**	--	0.15
pH (no units)	8.21	8.15	--	6.5 to 8.5
Phosphorus (mg/L)	<0.009	<0.009	--	--
Selenium (mg/L)	<0.001	<0.001	0.01	--
Sodium (mg/L)	19.5	13.3	--	(20) 200
Sulphate (mg/L)	52	35	--	500
Turbidity (N.T.U.)	3.26	0.46	--	5
Uranium (mg/L)	0.000290	0.00178	0.02	--
Zinc (mg/L)	0.039	0.446	--	5

Notes: All units are ppm (mg/L) unless otherwise stated; (<) indicates levels that are below the detectable limits. Bolded values exceed their applicable ODWS.

In general, the analyses indicate the majority of parameters meeting the ODWS. The chemical results indicate that the following parameters exceeded the ODWS for their aesthetic objectives:

- Hardness (both locations); and
- Organic Nitrogen (2245 Burnham Line).

Elevated hardness is a common trait of groundwater supplies in Southern Ontario due to the presence of limestone bedrock and calcareous tills. If desired it can be reduced by the use of a water softener. Taste and odour problems are common with organic nitrogen levels.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 GENERAL

Supporting data upon which our recommendations are based have been presented in the foregoing sections of this report. The following recommendations are governed by the physical properties of the subsurface materials that were encountered at the site, and assumes that they are representative of the overall site conditions. It should be noted that these conclusions and recommendations are intended for use by the designers only. Contractors bidding on or undertaking any work at the site should examine the factual results of the investigation, satisfy themselves as to the adequacy of the information for construction, and make their own interpretation of this factual data as it affects their proposed construction techniques, equipment capabilities, costs, sequencing, and the like. Comments, techniques, or recommendations pertaining to construction should not be construed as instructions to the contractor.

Based on the results of our hydrogeologic review, it is our professional opinion that the Site is suitable for residential development. The shallow groundwater observed at TP-3 is expected to be localized and handled through good construction techniques. It is our professional opinion that there is minimal potential for groundwater and surface water impact as a result of the planned construction. It is recommended that good construction and mitigation techniques must be used to minimize the potential for any impact.

5.2 WATER BALANCE EVALUATION

An evaluation of the water balance has been completed to evaluate potential impacts that may occur relating to the proposed development. The computations consider parameters such as local precipitation (weather data collected at the Peterborough Airport from 1971 to 2000), regional evapotranspiration values, temperature and details observed during the subsurface exploration activities and the site inspection walkover.

The water balance also considers the area covered by impervious surfaces such as asphalt and roof tops; areas covered by lawns and areas that remain untouched (woodlands or natural areas). The water balance is preliminary in nature at this time as the development is still in its conceptual stages. Geo-Logic utilized procedures established in the Low Impact Development Stormwater Management Planning and Design Guide and Section 2.2.1 "Water Balance Management" of the City of Toronto Wet Weather Flow Management Guidelines for the water balance calculations.

The primary objective of the water balance is to capture and manage annual rainfall to preserve the pre-development hydrology consisting of runoff, infiltration and evapotranspiration. The preservation of the water balance is completed through a combination of infiltration, evapotranspiration, landscaping, rainwater re-use and other low impact development practices.

The preliminary water balance calculations for the Site are calculated. Ultimately, the flow of surface water is conveyed to the Otonabee River. It is assumed that these lands will change in their land use between pre- and post-development. Below is a summary of the expected pre-development water balance values for the Site. The Site was assumed to be approximately 19.0 ha based on discussion with the client and conceptual plans. The detailed pre-development calculations are found in Appendix F.

TABLE 5: PRE-DEVELOPMENT SUMMARY

1.	Total Precipitation (Peterborough A):	- 840.3 mm/year
2.	Regional Evapotranspiration:	- 566.3 mm/year
3.	Recharge Available:	- 274.0 mm/year
4.	Area of Recharge On-site:	- 19.0 ha
5.	Infiltration Factor:	- 0.55
6.	Estimated Annual Infiltration:	- 28,593 m^3/year
7.	Estimated Annual Runoff:	- 22,932 m^3/year

The infiltration factor for the current Site condition was determined based on an average value between hilly (>6% slope) and rolling topography slopes (2-6% slope), a vegetation cover of either pasture/ shrubs or forest and soil type (hydrologic soil group C) based upon the subsurface exploration program (silty sand with gravel till) and generalized to be a silt loam for purposes of these calculations.

The table of values presented in the "Land Development Guidelines" (MOEE, 1995) was used to determine the infiltration factor of 0.55 which is calculated by adding the values for slope (0.15), vegetation (0.15) and soil (0.25).

A preliminary computation of the water budget was repeated for the proposed development based on a proposed 34 lots (refer to the nitrate impact assessment calculations in Section 5.7). The anticipated impact of the development is related to increased runoff from imperious surfaces such as road surfaces and roof tops. A summary of the repeated computations is as follows with detailed calculations found in Appendix F:

TABLE 6: POST-DEVELOPMENT SUMMARY NO ENHANCEMENTS

1.	Total Precipitation (Peterborough A):	- 840.3 mm/year
2.	Regional Evapotranspiration:	- 566.3 mm/year
3.	Recharge Available:	- 274.0 mm/year
4.	Area of Recharge On-site:	- 19.0 ha
5.	Impervious surface area:	- 3.4 ha
6.	Pervious surface area:	- 15.6 ha
7.	Infiltration Factor:	- 0.42
8.	Estimated Annual Infiltration:	- 22,313 m^3/year
	Difference in Infiltration (pre- vs. post-):	- (-6,280) m^3/year
	% Difference (Infiltration pre- vs. post-):	- 22% decrease in infiltration
9.	Estimated Annual Runoff:	- 30,687 m^3/year
	Difference in Runoff (pre- vs. post-):	- 7,755 m^3/year
	% Difference (Runoff pre- vs. post-):	- 34% increase in runoff

Based on these calculations and the proposed post-development, the runoff difference has increased by 34% of the original water runoff volume while infiltration has dropped by 22% compared with pre-development values.

These post-development conditions indicate that mitigation techniques are required in order to maintain the infiltration capacity of the pre-development subsurface soil conditions. Therefore, the post-construction water budget computations should be repeated considering enhancements for the development. The primary enhancement is to promote infiltration and to move water from impervious surfaces to areas where infiltration can occur. Depending on the size and density of the proposed development, it is expected that the infiltration loss will be minor; however, development details will be required to confirm this (i.e. number of houses, area of paved surfaces, etc.).

It is Geo-Logic's opinion that the site will be suitable for this development based on preliminary concept plans. Our preliminary calculations indicate that some net loss to the baseflow is expected which is reasonable to expect since losses in baseflow are likely to occur due to the increase of impervious surfaces. However, there are various methodologies to promote infiltration and reduce runoff such as low impact development (LIDs) strategies that are currently being implemented. These strategies can be implemented to help achieve and potentially maintain pre-development water budget values and minimize groundwater baseflow losses. Geo-Logic utilized information from Section 2.2.1 "Water Balance Management" of the City of Toronto Wet Weather Flow Management Guidelines and Low Impact Development Stormwater Management Planning and Design Guide for the following calculations that consider the post-development Site with enhancements to improve infiltration and reduce runoff. The primary enhancements are to promote clean roof water to rear sodded lots and add 300 mm of soil (i.e. topsoil) to the lots. It is also assumed that asphalt surfaces will have 10% infiltration through cracks in the paved surface, infiltration at the side margins etc.

TABLE 7: POST-DEVELOPMENT SUMMARY WITH ENHANCEMENTS

1.	Total Precipitation (Peterborough A):	- 840.3 mm/year
2.	Regional Evapotranspiration:	- 566.3 mm/year
3.	Recharge Available:	- 274.0 mm/year
4.	Area of Recharge On-site:	- 19.0 ha
5.	Impervious surface area:	- 3.2 ha
6.	Pervious surface area:	- 15.8 ha
7.	Infiltration Factor:	- 0.51
8.	Estimated Annual Infiltration:	- 27,677 m^3/year
	Difference in Infiltration (pre- vs. post-):	- (-916) m^3/year
	% Difference (Infiltration pre- vs. post-):	- 3% decrease in infiltration
9.	Estimated Annual Runoff:	- 26,831 m^3/year
	Difference in Runoff (pre- vs. post-):	- 3,898 m^3/year
	% Difference (Runoff pre- vs. post-):	- 17% increase in runoff

Based on these calculations and the proposed post-development, the runoff difference has increased by 17% of the original water runoff volume while infiltration has dropped by 3% compared with pre-development values by directing water from roof tops to sodded lawns and 10% infiltration of the paved surfaces. Further infiltration can be accomplished through the implementation of a LID strategy such as infiltration trenches.

Further details regarding the proposed subdivision would be required; however, the infiltration losses can be reduced to 0% through the use of infiltration trenches. Assessment of potential trench locations would be required and can be considered at the detailed design stage. In general, it is best to incorporate LID features away from private lots and in areas where they can be maintained.

There will also be water added to the groundwater regime residential activities including from lawn watering, treated septic effluent and general water use. The water table will benefit from these activities.

It is our professional opinion that there will be little impact to the local groundwater and surface water regimes and their interactions due to the proposed development. It is Geo-Logic's professional opinion that the Site is a minor contributor to the shallow baseflow that supports dug/bored wells, creeks and wetlands that can be maintained with good construction and infiltration techniques. The Site is a very minor contributor to the overall baseflow of the Otonabee River and neighbouring deeper drilled drinking water wells as they are below the till layer and will have a negligible impact on these water bodies.

5.3 IMPACT ON GROUNDWATER RESOURCES

There is minimal net loss to the groundwater baseflow expected as little infiltration of groundwater through the till unit to the deeper water bearing units is expected. The nearest drinking water wells are predominantly drilled wells that draw from the deeper water bearing zone and are not expected to be impacted by the development. Only three dug wells were observed during the well survey.

5.4 IMPACT TO SURFACE WATER BODIES

The impacts to surface water bodies such as creeks within Mark S. Burnham Provincial Park are related to the reduction of the groundwater baseflow and water quality concerns related to human activities such as road salting, minor fuel and oil leaks, fertilizer application etc. The Site is a minor contributor of water to these water bodies; however, promotion of infiltration will reduce potential impacts to shallow surface water bodies.

It is expected that a stormwater management plan will be developed to provide appropriate treatment for both quality and quantity. The use of a stormwater management pond will be used to settle sediments from overland runoff and reduce stormwater impacts downstream. With the proper design and construction of the subdivision, contaminants will be minimized and impacts should be negligible.

5.5 MITIGATION MEASURES

Several mitigative techniques have been recommended in order to address concerns relating to the potential for impact to the base flow. The impact and mitigation measures can be arranged into two (2) distinct categories: construction phase and operational phase. During the course of the planned construction, there is the possibility of silt or other fine-grained soil particles becoming mobile and entering drainage channels during the construction phase of development.

Prior to construction, storm water management techniques will control additional surface water runoff and permit enhanced infiltration into the surrounding ground. This will minimize the potential for groundwater impact and also minimize the amount of runoff. The installation of strategically placed silt fences will filter any excess storm water runoff prior to entering the infiltration areas.

The stormwater management plan will be designed to reduce/minimize flooding impacts. It is recommended that to all extents practical that clean storm water be directed and discharged onto the ground surface to promote natural infiltration.

5.6 WATER SUPPLY

5.6.1 Groundwater Availability

Minimum well yield requirements are defined in MOE Procedure D-5-5. Ideally, the wells in the development should be capable of supplying water at a rate of 18.75 L/min (4.1 Igpm) for a peak period of two (2) hours. The minimum yield of 13.6 L/min must be attained for 6 hours. The ideal rate is based on a peak demand rate of 3.75 L/min/person and 450 litres per day per person requirement.

For a three-bedroom (i.e. 4 persons), single detached home, a subdivision of 34 dwellings would ideally supply a yield equivalent to a total flow of 61,200 L/day. This figure equates to a continuous flow of approximately 42.5 L/min (9.4 Igpm) over a 24-hour period. A typical household will use on the order of 1000 L/day (34,000 L/day for the entire proposed development) or approximately 23.6 L/min (5.2 Igpm). Based upon the information from this hydrogeologic assessment, it is expected that the Site can produce enough groundwater to support the proposed development and not affect other local residents.

5.6.2 Production Well Requirements

It is recommended that the proposed development be serviced by properly constructed drilled wells. The drilled wells are expected to be constructed at depths ranging from approximately 10 to 20 m. Large diameter (300 mm or greater) wells are not considered suitable as a source of water supply for this Site. The wells installed should be in accordance with Regulation 903 of the Ontario Water Resources Act and the following design specifics:

1. Each well must be developed by conventional techniques to obtain a minimum of 70% efficiency. It is recommended that a statement be provided that indicates the well is essentially sand-free (i.e. less than 5 mg/L sand). In addition, the statement should also include that the total drawdown in the well, comprising the pumping level plus the mutual interference from the other wells, is within a reasonable tolerance of the available drawdown.

2. A water sample must be collected from each new well and analyzed for the following, at a minimum, test parameters to meet the ODWS

- Iron	- Manganese	- Nitrate
- Sodium	- Hardness	- Turbidity
- Total Coliform	- E. *coli*	- Fecal coliform
- Chloride	- Total dissolved solids	- Fluoride

3. **It is recommended that each properly constructed well be pump tested by qualified hydrogeologic personnel prior to issuance of a building permit.** The well should be pump tested to determine a safe long-term yield and short-term capacity to ensure uninterrupted water supply for the development and to ensure that adjacent properties will not be impacted. A report should be prepared by a Professional Engineer or Professional Geoscientist verifying individual pump testing data.

The use of properly constructed drilled wells that are adequately sealed and certified by qualified hydrogeological personnel should be sufficient to provide ample quantities of potable water while preserving the long term water quality of the existing aquifer complexes. Any existing wells on the Site that will not be used should be abandoned in accordance with Regulation 903.

The use of groundwater heat pumps that extract water from the aquifer is not recommended. Geothermal drilling is unregulated and there are no mandatory requirements to seal boreholes that are drilled through or into aquifers. Therefore, unsealed or improperly sealed boreholes into the aquifer could put the water supply at risk.

5.7 SEPTIC WASTE DISPOSAL

5.7.1 General

A detailed assessment of the septic system suitability is required to determine the potential impact of individual sewage systems at the Site on groundwater resources since the proposed lot sizes are less than one (1) hectare in area on average. The Site is not considered to be hydrogeologically sensitive (Procedure D-5-4, MOE, 1996). The MOE dilution model was used to confirm that the projected post-development nitrate concentration meets the drinking water standard of 10 mg/L for nitrate. It is our professional opinion that the Site is suitable for the construction of septic waste disposal systems.

The overburden materials were investigated during the advancement of 10 test pits. The surficial layer consisted of topsoil underlain by silty sand with gravel till. Bedrock was not encountered. Based upon the subsurface soils in the area of the proposed leaching beds, it is recommended that the waste disposal systems be designed as fully raised bed systems. A detailed review of the expected waste disposal impacts and recommendations are presented in the following sections.

5.7.2 Developmental Impact

For the purposes of calculating the potential impact of the planned residential development, 1,000 L/day/household is considered to be an acceptable septic effluent loading rate.

Therefore, a proposed development of 34 lots is expected to generate about 34,000 L/day (34 m^3/day) of septic effluent. While most constituents in septic effluent are usually removed within a short distance of movement within soil, mobile constituents such as chlorides and nitrates will require sustained dilution to meet the drinking water standards of 10 mg/L N for nitrate.

The MOE normally considers sewage from a Class 4 waste disposal system will contain 40 mg/L of nitrate. For the purpose of assessing the impact of projected nitrate loading, the dilution requirement of 4:1 was utilized in the impact computations.

A summary of the applicable parameters that were considered in the waste disposal evaluation and the computation of the projected nitrate concentration are presented below in Table 8. The detailed calculations can be reviewed in Appendix F. The calculations used recharge rate of 200 mm/year based on exploratory test pits that encountered silty sand with gravel till material. A shallow water sample was collected from the piezometer installed at TP-3 on September 23, 2013 to define the existing shallow groundwater background nitrate concentration. The analytical result for nitrate was <0.006 mg/L (refer to Appendix E for the certificate of analysis).

Using dilution only, the nitrate concentration generated from sewage at the Site is calculated to be 9.83 mg/L. The proposed development meets the 10 mg/L drinking water standard for nitrate. Wells should be properly located in relation to the septic systems to minimize cross contamination. Table 8 provides a summary of the septic impact parameters for the proposed development:

TABLE 8: NITRATE IMPACT ASSESSMENT SUMMARY

1.	Recharge available for dilution based on soils:	- 200 mm/year
2.	Development Area:	- 19.0 ha
3.	Background Nitrate (TP-3)	- <0.006 mg/L
4.	Residential Nitrate Loading (40 mg/L x 34,000 L/day)	- 1,360,000 mg/day
5.	Projected Nitrate Concentration	- 9.83 mg/L

5.7.3 Waste Disposal Requirements

Based on the results of this assessment, it is our professional opinion that the Site is suitable for a private septic waste disposal system. Fill will be required and drainage patterns and storm drainage will be re-directed and controlled as part of the stormwater management plan.

It is recommended that the septic systems use fully raised absorption trench leaching beds. The waste disposal systems should meet Ontario Regulation 350/06 made under the Building Code Act, 1992 and incorporate the following design features:

1. Organics should be stripped from the area of the leaching beds and downgradient mantle.

2. The exposed subgrade below the tile beds should be trimmed and scarified, and provided with a gentle slope of 0.5% in the direction of the mantle.

3. The tile beds should be constructed as fully raised leaching type beds to the full height of at least 1 m above existing grade. The raised beds should consist of clean, granular fill capable of providing an in-place percolation rate (T-time) of 4 to 8 min/cm.

4. The mantle should be constructed along the downgradient margin of the raised beds. Each mantle should extend along the full width of the bed and for a minimum of 15 m downgradient from the bed. The mantle should consist of similar granular fill raised to a minimum of 250 mm above the surrounding grade. Surface runoff should be diverted away from the leaching beds by means of proper site drainage.

5. The waste disposal systems should be kept clear of surface drainage swales, roof leader drains, and other sources of surface water.

6. The tile beds should be kept away from shade trees and a healthy cover of vegetation should be developed and maintained over the beds to promote evapotranspiration.

7. When sighting tile beds on sloping ground, it is recommended that procedures outlined in the Building Code be followed closely.

8. Minimum set back distances from septic tank (plus 2 times height raised):
   a) Building – 1.5 m
   b) Property line – 3 m
   c) Drilled Well – 15 m
   d) Open water course – 15 m

9. Minimum set back distances from septic tile bed (plus 2 times height raised):
   a) Building – 5 m
   b) Property line – 3 m
   c) Drilled well, properly sealed – 15 m
   d) Shallow well – 30 m
   e) Open water course – 15 m

10. The layout, design and construction of the waste disposal bed should be subject to inspection by experienced hydrogeologic personnel.

New technologies are available that can reduce the size of the footprint of the conventional septic system. If other new technology septic systems are incorporated into the design, it is recommended that the systems be installed as per the Ontario Building Code.

5.8 SUMMARY CONCLUSIONS

In summary, the development is proposed to be serviced by private water and septic for the 19.0 ha parcel of land east of Burnham Line and north of Highway 7 in Otonabee-South Monaghan Township in Peterborough, Ontario. It is Geo-Logic's opinion that the Site is suitable for the proposed development of 34 lots. The following conclusions and recommendations are made in support of this report:

- A total of 10 test holes were excavated across the Site to depths of 3.35 m. Bedrock was not encountered in any of the test holes;
- The Site is characterized by topsoil underlain generally by silty sand with gravel till. Fill was not observed;
- The area has hilly to rolling topography with relief on the order of approximately 10 to 15 m;
- Shallow water was encountered at one location during the test pit activities (TP-3). No other shallow water was encountered;
- Infiltration at the Site is expected to recharge and provide water to shallow water features without significant impact to the deeper aquifer complexes. There is not expected to be any significant impact to the shallow water table from a quantity or quality perspective based upon the proposed development;
- Well records were reviewed of 35 wells in the local area. The wells were an average depth of approximately 14 to 17 m. Well yields reported were generally in excess of the minimum pumping requirement of 13.6 L/min;
- Water quality and quantity in the vicinity of the Site based upon the water well survey generally indicated good groundwater quantity and quality at surrounding homes. The majority of the wells are drilled wells and no impact is expected to existing wells;

- The water balance calculations suggest that a decrease of 3% in infiltration and an increase in runoff of 17% as a result of the proposed development and preliminary assumptions. Water should be directed to re-infiltrate the ground wherever possible to promote natural attenuation of precipitation and additional LID strategies may be considered to further increase infiltration and reduce runoff and can be incorporated at the detailed design stage;
- It is our professional opinion that there will be little impact to the local shallow water table, surface water regimes and deeper groundwater and their interactions due to the proposed development;
- Wells are recommended to be drilled wells constructed in accordance with Regulation 903;
- It is recommended that any existing wells on the Site that will not be used should be abandoned in accordance with Regulation 903. The wells should be abandoned prior to development of the Site;
- A nitrate impact assessment indicates that the installation of Class IV sewage disposal system will not result in unacceptable degradation of the shallow groundwater at the downgradient site boundary. Raised tile beds are recommended for the development; and,
- The use of groundwater heat pumps that extract water from the aquifer is not recommended as this practice may pose a risk to the quality of the aquifer.

In summary, provided that the waste disposal system is properly constructed, no significant impact is anticipated on downgradient baseline water quality functions or to the existing water bearing aquifers. The use of properly constructed drilled wells that are certified and adequately sealed, should be sufficient to provide ample quantities of potable groundwater while preserving the long-term water quality of the aquifer complex. It is Geo-Logic's opinion that the results of this hydrogeological assessment support the approval of the proposed residential subdivision at this Site.

Following the References section of this report is the Statement of Limitations. These limitations are an integral part of this report.

We trust this report meets your immediate needs. Should any questions arise regarding any aspect of our report, please contact our office.

Sincerely yours,

Geo-Logic Inc.
GEOTECHNICAL ENGINEERS
AND HYDROGEOLOGISTS

Robert Neck, M.Eng., P.Geo. (Limited)
Project Manager

Nyle C. McIlveen, P.Eng.
Senior Engineer

\tp\bn

6.0 REFERENCES

Chapman and Putnam, 1966. The Physiography of Southern Ontario, 2nd Edition. University of Toronto Press.

Chapman and Putnam, 1984. The Physiography of Southern Ontario, 3rd Edition. Ministry of Natural Resources.

Low Impact Development Stormwater Management Planning and Design Guide. 2010. Version 1.

Ministry of Natural Resource NRVIS. 2011.

Natural Resources Canada. 1999. Map 31 D/08. Edition 7.

Peterborough County On-Line Geographic Information System Mapping.

Site Investigation Services Limited. Preliminary Hydrogeology and Soils Report. Proposed Residential Subdivision, Part Lot 27, Conc. 10. Township of Otonabee. May 1990.

Wet Weather Flow Management Guidelines. November 2006.

7.0 STATEMENT OF LIMITATIONS

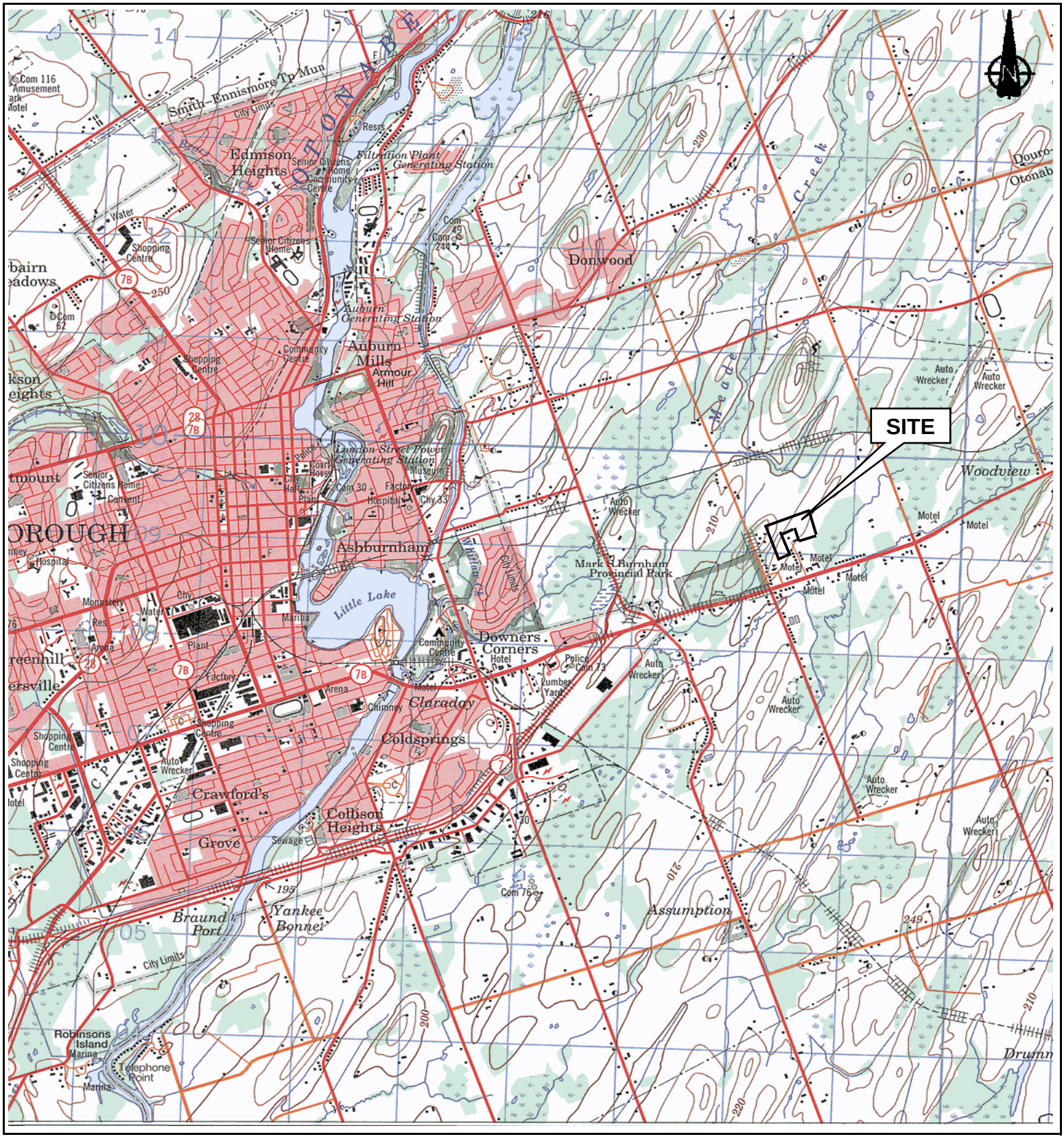
This report is intended solely for Mr. Al Demonte in assessing the hydrogeological concerns of the property identified as Part Lot 27, Concession 10, Otonabee-South Monaghan, Peterborough, Ontario, and is prohibited for use by others without Geo-Logic's prior written consent. This report is considered Geo-Logic's professional work product and shall remain the sole property of Geo-Logic. Any unauthorized reuse, redistribution of or reliance on the report shall be at the Client and recipient's sole risk, without liability to Geo-Logic. Client shall defend, indemnify and hold Geo-Logic harmless from any liability arising from or related to Client's unauthorized distribution of the report. No portion of this report may be used as a separate entity; it is to be read in its entirety and shall include all supporting drawings and appendices.

The recommendations made in this report are in accordance with our present understanding of the project, the current site use, ground surface elevations and conditions, and are based on the work scope approved by the Client and described in the report. The services were performed in a manner consistent with that level of care and skill ordinarily exercised by members of geotechnical engineering professions currently practicing under similar conditions in the same locality. No other representations, and no warranties or representations of any kind, either expressed or implied, are made. 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.

All details of design and construction are rarely known at the time of completion of a hydrogeological study. The recommendations and comments made in the study report are based on our subsurface investigation and resulting understanding of the project, as defined at the time of the study. We should be retained to review our recommendations when the drawings and specifications are complete. Without this review, Geo-Logic will not be liable for any misunderstanding of our recommendations or their application and adaptation into the final design.

Soil and groundwater conditions between and beyond the test locations may differ both horizontally and vertically from those encountered at the test locations and conditions may become apparent during construction which could not be detected or anticipated at the time of our investigation. Should any conditions at the site be encountered which differ from those found at the test locations, we request that we be notified immediately in order to permit a reassessment of our recommendations. If changed conditions are identified during construction, no matter how minor, the recommendations in this report shall be considered invalid until sufficient review and written assessment of said conditions by Geo-Logic is completed.

ENCLOSURES



VICINITY PLAN

Hydrogeological Assessment
Proposed Residential Development
Part Lot 27, Concession 10, Otonabee-South Monaghan Twp
Peterborough, Ontario

Base map complied from Centre for Topographic Information, Natural Resources Canada. Map 31 D/08 (current as of 1996, published 1999). Site boundary is approximate.

DATE: OCTOBER 2013

SCALE: 1 : 50000

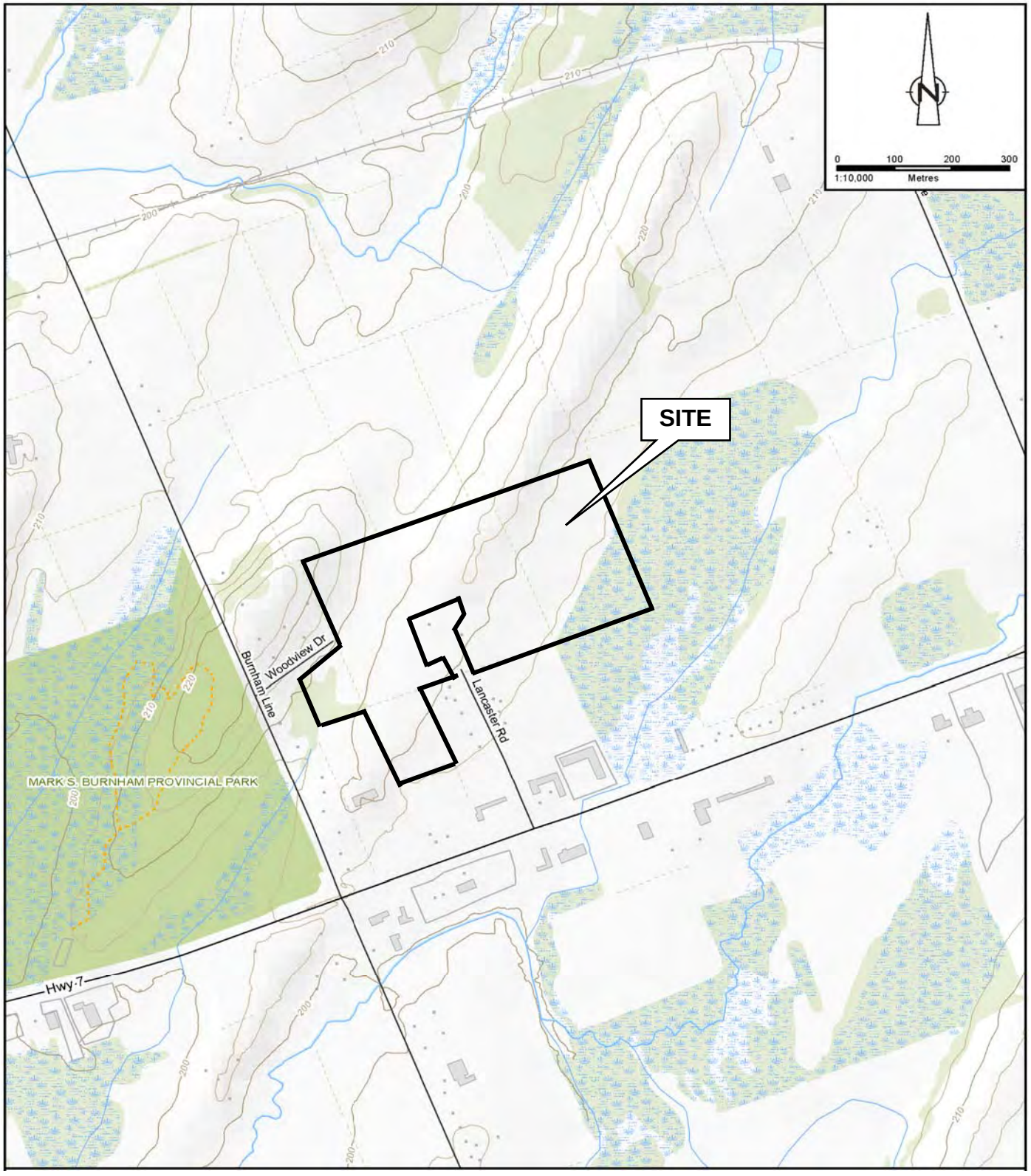
JOB NUMBER: G024636E1

DRAWING NUMBER: PLATE 1

GEO-LOGIC INC.

347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7

(705) 749-3317 FAX (705) 749-9248 www.geo-logic.ca



SITE PLAN

Hydrogeological Assessment
Proposed Residential Development
Part Lot 27, Concession 10, Otonabee-South Monaghan Twp
Peterborough, Ontario

Source: MNR NRVIS, 2013. Produced by CRA under license from Ontario Ministry of Natural Resources, © Queen's Printer 2013.
Coordinate System: NAD 1983 UTM Zone 17N

DATE: OCTOBER 2013

SCALE: REFER TO SCALE BAR

JOB NUMBER: G024636E1

DRAWING NUMBER: PLATE 2

GEO-LOGIC INC.
347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 749-3317 FAX (705) 749-9248 www.geo-logic.ca

PLOT PLAN

Hydrogeological Assessment

Proposed Residential Development

Part Lot 27, Concession 10, Otonabee-South Monaghan Twp

Peterborough, Ontario

Image obtained from Google Earth. Aerial Photo dated August 2012. Accessed October 2013. Site boundary is approximate.

DATE: OCTOBER 2013

SCALE: REFER TO SCALE BAR

JOB NUMBER: G024636E1

DRAWING NUMBER: PLATE 3

GEO-LOGIC INC.

347 PIDO ROAD, UNIT 29

PETERBOROUGH, ON K9J 6X7

(705) 749-3317 FAX (705) 749-9248 www.geo-logic.ca

TEST HOLE LOCATION PLAN

Hydrogeological Assessment

Proposed Residential Development

Part Lot 27, Concession 10, Otonabee-South Monaghan Twp

Peterborough, Ontario

Image obtained from Google Earth. Aerial Photo dated August 2012. Accessed October 2013. Site boundary is approximate.

DATE: OCTOBER 2013

SCALE: REFER TO SCALE BAR

JOB NUMBER: G024636E1

DRAWING NUMBER: PLATE 4

GEO-LOGIC INC.

347 PIDO ROAD, UNIT 29

PETERBOROUGH, ON K9J 6X7

(705) 749-3317 FAX (705) 749-9248 www.geo-logic.ca

APPENDIX A

SOILS EXPLORATION DATA

REFERENCE No.: G024636E1 ENCLOSURE No.: A-1

www.geo-logic.ca

TEST PIT No.: TP-01
ELEVATION:

TEST PIT REPORT

Page: 1 of 1

CLIENT: Al Demonte
PROJECT: Burnham Line
LOGGED BY: T. Palmer DATE: September 18, 2013
EXCAVATION COMPANY: Owner operated METHOD: Rubber Tire Backhoe
NOTES:

LEGEND
GS - GRAB SAMPLE
▼ - WATER LEVEL

Depth ft	Depth m	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content %	Shear test (Cu) △ Field / Sensitivity (S) □ Lab; ○ Water content (%); W_p W_l Atterberg limits (%) 10 20 30 40 50 60 70 80 90	COMMENTS
		0.0		GROUND SURFACE				
				TOPSOIL Dark brown topsoil with roolets				
		0.5		**TILL** Light brown silty sand with gravel till, compact to dense at 1.2m, moist, cobbles and boulders starting at 1.0m to depth	GS-1	9	○	No groundwater encountered in excavation.
					GS-2	11	○	
		3.4		END OF TEST PIT				

TEST PIT LOG GEOTECH G024636E1, 13-09-19, TESTPIT LOGS TP.GPJ GEOLOGIC.GDT 10/10/13

REFERENCE No.: G024636E1 ENCLOSURE No.: A-2

www.geo-logic.ca

TEST PIT No.: TP-02
ELEVATION:

TEST PIT REPORT

Page: 1 of 1

CLIENT: Al Demonte
PROJECT: Burnham Line
LOGGED BY: T. Palmer DATE: September 18, 2013
EXCAVATION COMPANY: Owner operated METHOD: Rubber Tire Backhoe
NOTES:

LEGEND
GS - GRAB SAMPLE
▼ - WATER LEVEL

Depth ft	Depth m	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content %	Shear test (Cu) △ Field / Sensitivity (S) ☐ Lab; ○ Water content (%); W_p W_l Atterberg limits (%) 10 20 30 40 50 60 70 80 90	COMMENTS
		0.0		GROUND SURFACE				
				TOPSOIL Dark brown topsoil with roolets				
		0.8		**TILL** Light brown silty sand with gravel till, compact to dense at 1.2m, moist, cobbles and boulders starting at 1.2m to depth				
4	1.0				GS-1	7	○	No groundwater encountered in excavation.
8	2.5				GS-2	9	○	
		3.4		END OF TEST PIT				

TEST PIT LOG GEOTECH G024636E1, 13-09-19, TESTPIT LOGS TP.GPJ GEOLOGIC.GDT 10/10/13

REFERENCE No.: G024636E1 ENCLOSURE No.: A-3

www.geo-logic.ca

TEST PIT No.: TP-03
ELEVATION:

TEST PIT REPORT

Page: 1 of 1

CLIENT: Al Demonte
PROJECT: Burnham Line
LOGGED BY: T. Palmer DATE: September 18, 2013
EXCAVATION COMPANY: Owner operated METHOD: Rubber Tire Backhoe
NOTES:

LEGEND
GS - GRAB SAMPLE
▼ - WATER LEVEL

Depth ft	Depth m	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content %	Shear test (Cu) △ Field / Sensitivity (S) □ Lab; ○ Water content (%); W_p W_l Atterberg limits (%) 10 20 30 40 50 60 70 80 90	COMMENTS
		0.0		GROUND SURFACE				
				TOPSOIL Dark brown topsoil with roolets				
	0.5	0.5		**TILL** Light brown silty sand with gravel till, compact to dense at 1.2m, moist, cobbles and boulders starting at 0.9m to depth Wet at 2.1m to depth	GS-1	34	○ at 30	32mm PVC well riser WL - 1.4 m September 19, 2013
	1.0							
	1.5							
	2.0							32mm PVC well screen (No. 10 slot)
	2.5				GS-2	11	○ at 10	Groundwater encountered in excavation at 2.7m.
	3.0							
	3.5	3.4		END OF TEST PIT				
	4.0							
	4.5							

TEST PIT LOG GEOTECH G024636E1, 13-09-19, TESTPIT LOGS TP.GPJ GEOLOGIC.GDT 10/10/13

REFERENCE No.: G024636E1 ENCLOSURE No.: A-4

www.geo-logic.ca

TEST PIT No.: TP-04
ELEVATION:

TEST PIT REPORT

Page: 1 of 1

CLIENT: Al Demonte
PROJECT: Burnham Line
LOGGED BY: T. Palmer DATE: September 18, 2013
EXCAVATION COMPANY: Owner operated METHOD: Rubber Tire Backhoe
NOTES:

LEGEND
GS - GRAB SAMPLE
▼ - WATER LEVEL

Depth ft	Depth m	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content %	Shear test (Cu) △ Field / Sensitivity (S) ☐ Lab; ○ Water content (%); w_p w_l Atterberg limits (%) 10 20 30 40 50 60 70 80 90	COMMENTS
		0.0		GROUND SURFACE				
				TOPSOIL Dark brown topsoil with roolets				
1		0.3		**TILL** Light brown silty sand with gravel till, dense, damp to moist with depth, cobbles and boulders starting at 0.3m to depth				No groundwater encountered in excavation.
2	0.5							
3								
4	1.0				GS-1	6	○	Grain Size Analysis: 24% Gravel, 36% Sand, 40% Silt/Clay
5	1.5							
6								
7	2.0				GS-2	10	○	
8	2.5							
9								
10	3.0							
11		3.4		END OF TEST PIT				
12	3.5							
13	4.0							
14								
	4.5							

TEST PIT LOG GEOTECH G024636E1, 13-09-19, TESTPIT LOGS TP.GPJ GEOLOGIC.GDT 10/10/13

REFERENCE No.: G024636E1 ENCLOSURE No.: A-5

www.geo-logic.ca

TEST PIT No.: TP-05
ELEVATION:

TEST PIT REPORT

Page: 1 of 1

CLIENT: Al Demonte
PROJECT: Burnham Line
LOGGED BY: T. Palmer DATE: September 18, 2013
EXCAVATION COMPANY: Owner operated METHOD: Rubber Tire Backhoe
NOTES:

LEGEND
GS - GRAB SAMPLE
▼ - WATER LEVEL

Depth ft	Depth m	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content %	Shear test (Cu) △ Field / Sensitivity (S) ☐ Lab; ○ Water content (%); W_p W_l Atterberg limits (%) 10 20 30 40 50 60 70 80 90	COMMENTS
		0.0		GROUND SURFACE				
				TOPSOIL Dark brown topsoil with roolets				
1		0.3		**TILL** Light brown silty sand with gravel till, compact to dense at 0.9m to depth, moist, cobbles and boulders starting at 0.6m to depth				No groundwater encountered in excavation.
2	0.5							
3								
4	1.0				GS-1	9	○	
5								
6	1.5							
7								
8	2.0							
9					GS-2	10	○	
10	2.5							
11		3.4		END OF TEST PIT				
12	3.0							
13								
14	3.5							
	4.0							
	4.5							

TEST PIT LOG GEOTECH G024636E1, 13-09-19, TESTPIT LOGS TP.GPJ GEOLOGIC.GDT 10/10/13

REFERENCE No.: G024636E1 ENCLOSURE No.: A-6

www.geo-logic.ca

TEST PIT No.: TP-06
ELEVATION:

TEST PIT REPORT

Page: 1 of 1

CLIENT: Al Demonte
PROJECT: Burnham Line
LOGGED BY: T. Palmer DATE: September 18, 2013
EXCAVATION COMPANY: Owner operated METHOD: Rubber Tire Backhoe
NOTES:

LEGEND
GS - GRAB SAMPLE
▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content (%)	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%) (△ Field, □ Lab)	COMMENTS
		0.0		GROUND SURFACE				
				TOPSOIL Dark brown topsoil with roolets				
		0.5		**TILL** Light brown silty sand with gravel till, compact to dense at 1.5m, moist, cobbles and boulders starting at 0.9m to depth				No groundwater encountered in excavation.
3	1.0				GS-1	10		
7	2.0				GS-2	9		Grain Size Analysis: 12% Gravel, 42% Sand, 46% Silt/Clay
		3.4		END OF TEST PIT				

TEST PIT LOG GEOTECH G024636E1, 13-09-19, TESTPIT LOGS TP.GPJ GEOLOGIC.GDT 10/10/13

REFERENCE No.: G024636E1 ENCLOSURE No.: A-7

www.geo-logic.ca

TEST PIT No.: TP-07
ELEVATION:

TEST PIT REPORT

Page: 1 of 1

CLIENT: Al Demonte
PROJECT: Burnham Line
LOGGED BY: T. Palmer DATE: September 18, 2013
EXCAVATION COMPANY: Owner operated METHOD: Rubber Tire Backhoe
NOTES:

LEGEND
GS - GRAB SAMPLE
▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content (%)	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%) (△ Field, □ Lab)	COMMENTS
		0.0		GROUND SURFACE			10 20 30 40 50 60 70 80 90	
				TOPSOIL Dark brown topsoil with roolets				
1		0.3		**TILL** Light brown silty sand with gravel till, compact to dense at 1.2m, moist, cobbles and boulders starting at 0.9m to depth				No groundwater encountered in excavation.
2	0.5							
3	1.0							
4					GS-1	9	○	
5	1.5							
6	2.0							
7								
8	2.5				GS-2	9	○	
9								
10	3.0							
11		3.4		END OF TEST PIT				
12	3.5							
13	4.0							
14								
	4.5							

TEST PIT LOG GEOTECH G024636E1, 13-09-19, TESTPIT LOGS TP.GPJ GEOLOGIC.GDT 10/10/13

REFERENCE No.: G024636E1 ENCLOSURE No.: A-8

www.geo-logic.ca

TEST PIT No.: TP-08
ELEVATION:

TEST PIT REPORT

Page: 1 of 1

CLIENT: Al Demonte
PROJECT: Burnham Line
LOGGED BY: T. Palmer DATE: September 18, 2013
EXCAVATION COMPANY: Owner operated METHOD: Rubber Tire Backhoe
NOTES:

LEGEND
GS - GRAB SAMPLE
▼ - WATER LEVEL

Depth ft	Depth m	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content %	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%) — △ Field ☐ Lab	COMMENTS
		0.0		GROUND SURFACE			10 20 30 40 50 60 70 80 90	
				TOPSOIL Dark brown topsoil with roolets				
		0.5		**TILL** Light brown silty sand with gravel till, dense, moist, cobbles and boulders starting at 0.9m to depth				No groundwater encountered in excavation.
					GS-1	8	○	
					GS-2	7	○	Grain Size Analysis: 26% Gravel, 43% Sand, 31% Silt/Clay
		3.4		END OF TEST PIT				

TEST PIT LOG GEOTECH G024636E1, 13-09-19, TESTPIT LOGS TP.GPJ GEOLOGIC.GDT 10/10/13

REFERENCE No.: G024636E1 ENCLOSURE No.: A-9

www.geo-logic.ca

TEST PIT No.: TP-09
ELEVATION:

TEST PIT REPORT

Page: 1 of 1

CLIENT: Al Demonte
PROJECT: Burnham Line
LOGGED BY: T. Palmer DATE: September 18, 2013
EXCAVATION COMPANY: Owner operated METHOD: Rubber Tire Backhoe
NOTES:

LEGEND
GS - GRAB SAMPLE
▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content (%)	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%) (△ Field, □ Lab)	COMMENTS
		0.0		GROUND SURFACE			10 20 30 40 50 60 70 80 90	
				TOPSOIL Dark brown topsoil with roolets				
1		0.3		**TILL** Light brown silty sand with gravel till, dense, moist, cobbles and boulders starting at 0.9m to depth				No groundwater encountered in excavation.
2	0.5							
3								
4	1.0				GS-1	10	○	
5								
6	1.5							
7								
8	2.0							
9								
10	2.5				GS-2	9	○	
11		3.4		END OF TEST PIT				
12	3.0							
13								
14	3.5							
	4.0							
	4.5							

TEST PIT LOG GEOTECH G024636E1, 13-09-19, TESTPIT LOGS TP.GPJ GEOLOGIC.GDT 10/10/13

REFERENCE No.: G024636E1 ENCLOSURE No.: A-10

www.geo-logic.ca

TEST PIT No.: TP-10
ELEVATION:

TEST PIT REPORT

Page: 1 of 1

CLIENT: Al Demonte
PROJECT: Burnham Line
LOGGED BY: T. Palmer DATE: September 18, 2013
EXCAVATION COMPANY: Owner operated METHOD: Rubber Tire Backhoe
NOTES:

LEGEND

GS - GRAB SAMPLE
▼ - WATER LEVEL

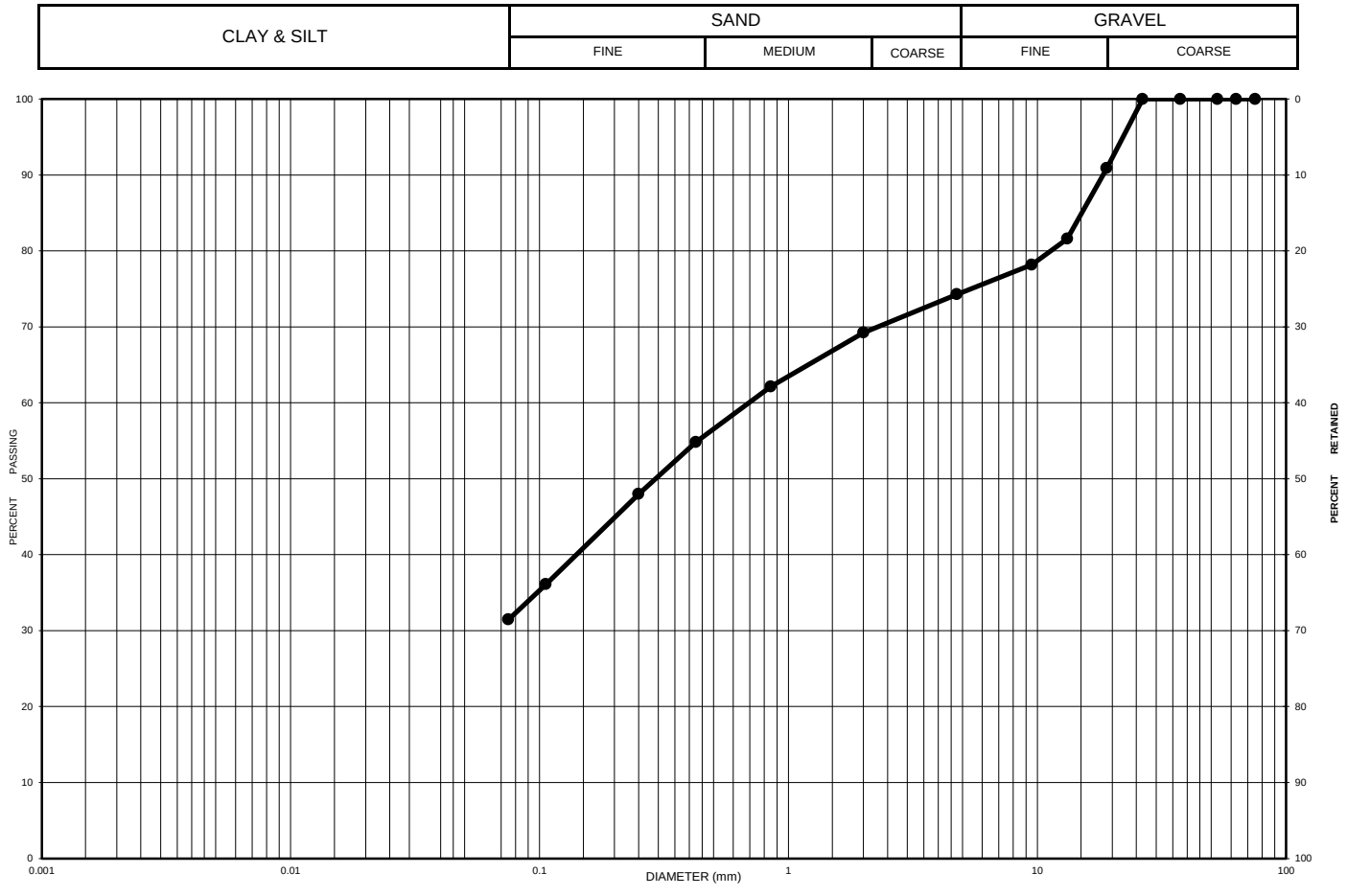
Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content (%)	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%) (△ Field, □ Lab)	COMMENTS
		0.0		GROUND SURFACE				
				TOPSOIL Dark brown topsoil with roolets				
		0.3		**TILL** Light brown silty sand with gravel till, dense, moist, cobbles and boulders starting at 0.3m to depth				No groundwater encountered in excavation.
3	1.0				GS-1	10		
9	3.0				GS-2	9		
11	3.5	3.4		END OF TEST PIT				

TEST PIT LOG GEOTECH G024636E1, 13-09-19, TESTPIT LOGS TP.GPJ GEOLOGIC.GDT 10/10/13

GEO-LOGIC INC. 347 Pido Road Unit 29 Peterborough, ON, K9J 6X7 Tel: (705) 749-3317 Fax: (705) 749-9248

GRAIN SIZE DISTRIBUTION CHART

Client:	*Al Demonte*	Ref No.:	*SS-13-140*
Project:	*G024636E1*	Location:	*Burnham Line, Peterborough*
Borehole No.:	*TP8*	Sample No.:	*GS2*
Depth:	*2.4 m*	Enclosure:	*A-11*



Sample No.	Depth	% Gravel	% Sand	% Silt / Clay
TP8,GS2	2.4 m	26	43	31

GEO-LOGIC INC. 347 Pido Road Unit 29 Peterborough, ON, K9J 6X7 Tel: (705) 749-3317 Fax: (705) 749-9248

GRAIN SIZE DISTRIBUTION CHART

Client:	*Al Demonte*	Ref No.:	*SS-13-140*
Project:	*G024636E1*	Location:	*Burnham Line, Peterborough*
Borehole No.:	*TP6*	Sample No.:	*GS2*
Depth:	*2.1 m*	Enclosure:	*A-12*

Sample No.	Depth	% Gravel	% Sand	% Silt / Clay
TP6,GS2	2.1 m	12	42	46

GEO-LOGIC INC. 347 Pido Road Unit 29 Peterborough, ON, K9J 6X7 Tel: (705) 749-3317 Fax: (705) 749-9248

GRAIN SIZE DISTRIBUTION CHART

Client:	*Al Demonte*	Ref No.:	*SS-13-140*
Project:	*G024636E1*	Location:	*Burnham Line, Peterborough*
Borehole No.:	*TP4*	Sample No.:	*GS1*
Depth:	*1.2 m*	Enclosure:	*A-13*

Sample No.	Depth	% Gravel	% Sand	% Silt / Clay
TP4,GS1	1.2 m	24	36	40

APPENDIX B

PHOTOGRAPHS

Photo 1: Looking east from location of TP-1.

Photo 2: Looking north at TP-1 area.

Photo 3: Looking south/southwest from northeastern area of Site.

Photo 4: Looking west along north property boundary.

Photo 5: Looking northeast along ridge near TP-4 area.

Photo 6: Low lying area between ridge and drumlin in the northwestern area of Site.

Photo 7: South area looking north/northeast along the ridge.

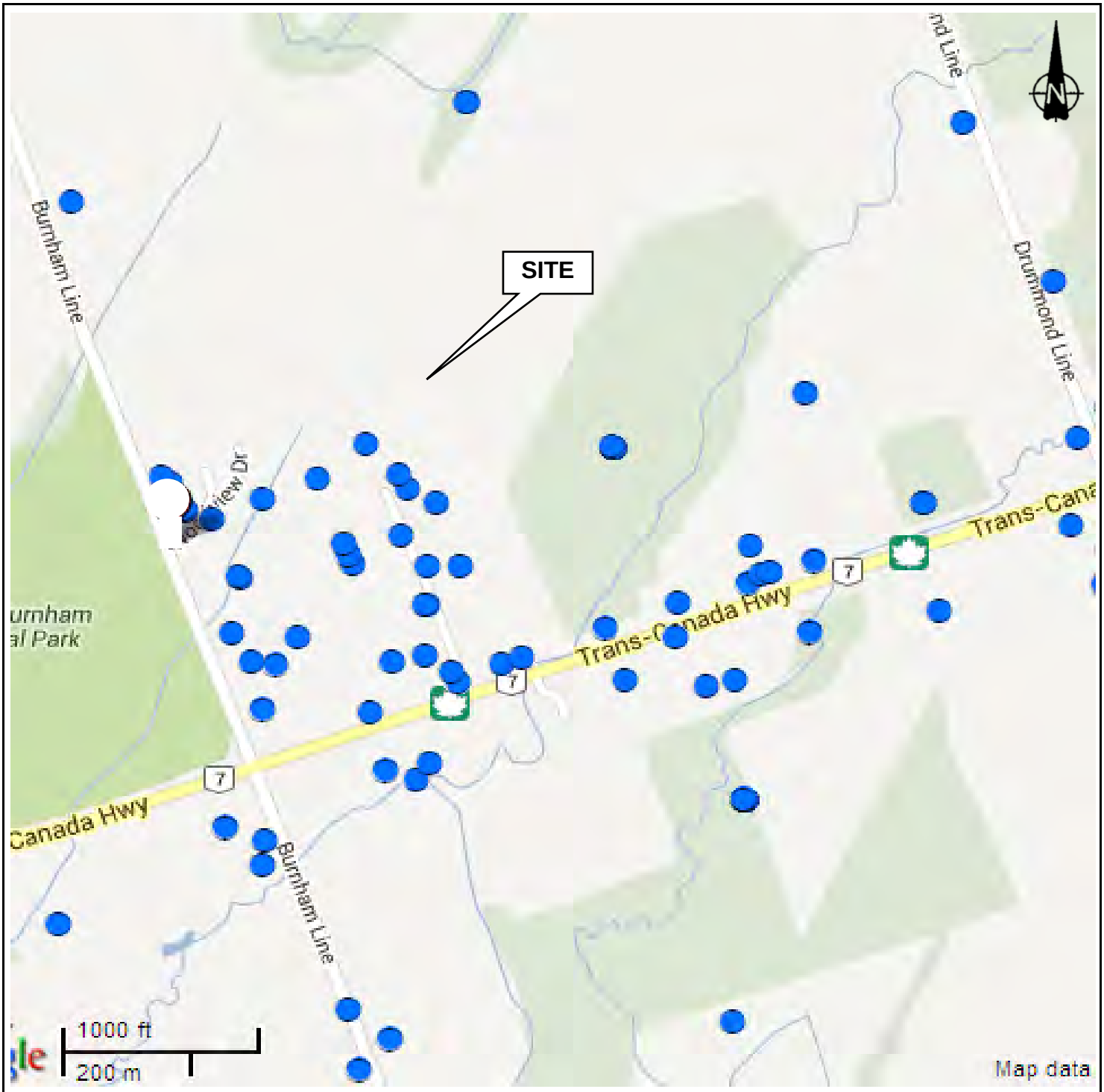
Photo 8: Looking east toward existing homes along Lancaster Road from south area of Site.

Photo 9: Looking south from southern area of Site.

Photo 10: Agricultural lands to the north viewed from the drumlin in northwest area.

APPENDIX C

MOE WELL RECORDS



LEGEND

MOE Well Location

MOE WELLS

Hydrogeological Assesment
Proposed Residential Development
Part Lot 27, Conc. 10, Oton.-S.Monaghan
Peterborough, Ontario

Base map compiled from MOE Well Records database.

DATE: OCTOBER 2013

SCALE: REFER TO SCALE BAR

JOB NUMBER: G024636E1

DRAWING NUMBER: APPENDIX C

GEO-LOGIC INC.

347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 749-3317 FAX (705) 749-9248 www.geo-logic.ca

APPENDIX C: WELL SUMMARY - DUG/BORED

Well Record Summary
Project No.: G024636E1
PETERBOROUGH, ONTARIO

Lot. No.	M.O.E. Well No.	Well Use	Water Found Feet	Water Found Metres	Static Level Feet	Static Level Metres	Test Rate Igpm	Test Rate L/min	Well Depth Feet	Well Depth Metres	Comments
(Conc. 10)											
27	5114272	Domestic	4.5	1.4	--	--	1201	5452.5	28.5	8.7	Fresh water at 4.5'; clay and stones from surface to 28.5'

Number of wells= 1

	Water Found Feet	Water Found Metres	Static Level Feet	Static Level Metres	Test Rate Igpm	Test Rate L/min	Well Depth Feet	Well Depth Metres
AVERAGE	4.5	1.4	--	--	1201.0	5452.5	28.5	8.7
MAXIMUM	4.5	1.4	--	--	1201.0	5452.5	28.5	8.7
MINIMUM	4.5	1.4	--	--	1201.0	5452.5	28.5	8.7

APPENDIX C: WELL SUMMARY - DRILLED BEDROCK

Well Record Summary
Project No.: G024636E1
PETERBOROUGH, ONTARIO

Lot No.	M.O.E. Well No.	Well Use	Water Found Feet	Water Found Metres	Static Level Feet	Static Level Metres	Pump Rate Igpm	Pump Rate L/min	Well Depth Feet	Well Depth Metres	Depth to Bedrock Feet	Depth to Bedrock Metres	Comments
(Conc. 10)													
27	5114272	Domestic	121	36.9	60	18.3	1	4.5	186	56.7	125	38.1	Fresh water at 121'; fill from surface to 4', then sand and gravel to 40', then clay and gravel to 121', then gravel to 125', then limestone to 186'
27	5107288	Domestic	98	29.9	30	9.1	2	9.1	150	45.7	97	29.6	Fresh water at 98'; loam from surfcae to 1', then clay and stones to 97', then shale to 98', then limestone to 150'
27	5102776	Domestic	55	16.8	35	10.7	2	9.1	100	30.5	65	19.8	Fresh water at 55', predug to 45'; then clay to 53', then gravel to 65', then limestone to 100'
27	5102772	Domestic	52	15.8	7	2.1	3	13.6	54	16.5	42	12.8	Fresh water at 52'; loam from surface to 1', then clay and medium sand to 10', then clay and stones to 28', then stones and gravel to 42', then limestone to 54'
27	5102779	Domestic	--	--	--	--	--	--	120	36.6	42	12.8	Loam from surface to 1', then clay and stones to 42', then limestone to 120'
27	5102777	Domestic	--	--	--	--	--	--	107	32.6	42	12.8	Loam from surface to 1', then clay and stones to 42', then limestone to 107'
27	5102778	Domestic	--	--	--	--	--	--	160	48.8	60	18.3	Loam from surface to 1', then clay and stones to 60', then limestone to 160'
27	5109893	Domestic	52	15.8	12	3.7	4	18.2	64	19.5	52	15.8	Fresh water at 52'; predug from surface to 52', then limestone to 64'
27	5104385	Domestic	38	11.6	7	2.1	5	22.7	45	13.7	38	11.6	Fresh water at 38'; clay and boulders from surface to 34', then gravel to 38', then limestone to 45'
27	5102774	Domestic	62	18.9	12	3.7	3	13.6	62	18.9	42	12.8	Fresh water at 62'; loam from surface to 2', then clay and stones to 20', the clay to 42', then limestone to 62'
27	5102783	Domestic	48	14.6	15	4.6	5	22.7	55	16.8	45	13.7	Fresh water found at 48'; clay from surface to 30', then gravel to 45', then limestone to 55'
27	5107645	Domestic	23	7.0	6	1.8	5	22.7	54	16.5	23	7.0	Fresh water found at 23' and 54', sand fill from surface to 8', then clay to 23', then limestone to 54'
27	5107251	Domestic	18	5.5	2	0.6	5	22.7	43	13.1	18	5.5	Fresh water found at 18' and 40', loam from surface to 1', then clay, gravel and boulders to 18', then limestone to 43'
27	5102780	Public	40	12.2	8	2.4	2	9.1	100	30.5	40	12.2	Fresh water found at 40'; loam from surface to 1', then medium sand and stones to 40', then grey limestone to 100'
27	5106084	Domestic	55	16.8	12	3.7	5	22.7	71	21.6	55	16.8	Water found at 55' and 70'; clay and stones from surface to 12', then gravel sand and silt to 25', then clay and stones to 54', then gravel and shale to 55', then limestone to 71'
27	5102775	Domestic	70	21.3	15	4.6	2	9.1	70	21.3	58	17.7	Fresh water at 70'; predug from surface to 23', then clay and stones to 33', then clay to 58', then limestone to 70'
27	5102787	Domestic	90	27.4	14	4.3	2	9.1	155	47.2	54	16.5	Fresh water at 90'; loam from surface to 2', then clay and stones to 54', then limestone to 155'
27	5102770	Public	60	18.3	123	37.5	1	4.5	374	114.0	60	18.3	Fresh water at 60'; loam from surface to 1', then clay and stones to 60', then limestone to 219'
27	5102786	Domestic	57	17.4	8	2.4	3	13.6	57	17.4	55	16.8	Fresh water at 57'; loam from surface to 2', then clay and boulders to 55', then limestone to 57'
27	5107615	Domestic	51	15.5	9	2.7	20	90.8	51	15.5	48	14.6	Fresh water at 51'; loam from surface to 2', then clay and stones to 26', then clay to 48', then limestone to 51'
27	5104587	Domestic	51	15.5	9	2.7	20	90.8	51	15.5	48	14.6	Fresh water at 51'; loam from surface to 2', then clay and stones to 26', then clay to 48', then limestone to 51'
27	5102784	Domestic	60	18.3	27	8.2	2	9.1	69	21.0	51	15.5	Fresh water at 60'; clay from surface to 51', then limestone to 69'
27	5102763	Domestic	105	32.0	24	7.3	2	9.1	106	32.3	105	32.0	Fresh water at 105'; clay, stones and medium sand from surface to 105', then limestone and gravel to 106'
27	5104589	Domestic	55	16.8	8	2.4	7	31.8	55	16.8	26	7.9	Sulphur water at 55'; loam from surface to 2', then clay and stones to 26', then limestone to 55'
27	5107625	--	55	16.8	8	2.4	7	31.8	55	16.8	26	7.9	Sulphur water at 55'; loam from surface to 2', then clay and stones to 26', then limestone to 55'
27	5102768	Domestic	120	36.6	30	9.1	5	22.7	186	56.7	120	36.6	Water found at 120' and 156'; loam from surface to 2', then clay and boulders to 35', then clay and stones to 115', then clay and medium sand to 120', then limestone to 186'
27	5109613	Domestic	48	14.6	8	2.4	5	22.7	50	15.2	48	14.6	Fresh water at 48'; predrilled from surface to 48', then limestone to 50'

Number of wells= 27
Wells with no information= 2

	Water Found Feet	Water Found Metres	Static Level Feet	Static Level Metres	Pump Rate Igpm	Pump Rate L/min	Well Depth Feet	Well Depth Metres	Depth to Bedrock Feet	Depth to Bedrock Metres
AVERAGE	61.8	18.8	20.4	6.2	4.9	22.3	98.1	29.9	55.0	16.8
MAXIMUM	121.0	36.9	123.0	37.5	20.0	90.8	374.0	114.0	125.0	38.1
MINIMUM	18.0	5.5	2.0	0.6	1.0	4.5	43.0	13.1	18.0	5.5

APPENDIX C: WELL SUMMARY - DRILLED OVERBURDEN

Well Record Summary
Project No.: G024636E1
PETERBOROUGH, ONTARIO

Lot No.	M.O.E. Well No.	Well Use	Water Found Feet	Water Found Metres	Static Level Feet	Static Level Metres	Test Rate Igpm	Test Rate L/min	Well Depth Feet	Well Depth Metres	Comments
(Conc. 10)											
28	7178556	Domestic	78	23.8	47	14.3	3	13.6	78	23.8	Fresh water at 78'; loam from surface to 1', then gravel and clay to 47', then stones and clay to 50', then gravel and clay to 78'
27	5102767	Domestic	46	14.0	8	2.4	4	18.2	46	14.0	Fresh water at 46'; loam from surface to 2', then clay with stones to 44', then clay with gravel to 46', then gravel to 47'
27	5102769	Commercial	20	6.1	3	0.9	15	68.1	20	6.1	Fresh water at 20'; loam from surface to 3', then clay to 19', then gravel to 20'
27	5102771	Commercial	28	8.5	5	1.5	40	181.6	28	8.5	Fresh water at 28'; fill from surface to 5', then clay to 24', then gravel to 28'
27	5107789	Public	21	6.4	3	0.9	20	90.8	23	7.0	Fresh water at 21'; clay and boulders from surface to 21', then sand and gravel to 23'
27	5106664	Not Used	38	11.6	26	7.9	2	9.1	58	17.7	Fresh water at 38'; loam from surface to 2', then clay and stones to 38', then gravel to 58'
27	5102764	Domestic	69	21.0	30	9.1	3	13.6	69	21.0	Fresh water at 69'; clay from surface to 69'

Number of wells= 7

	Water Found Feet	Water Found Metres	Static Level Feet	Static Level Metres	Test Rate Igpm	Test Rate L/min	Well Depth Feet	Well Depth Metres
AVERAGE	42.9	13.1	17.4	5.3	12.4	56.4	46.0	14.0
MAXIMUM	78.0	23.8	47.0	14.3	40.0	181.6	78.0	23.8
MINIMUM	20.0	6.1	3.0	0.9	2.0	9.1	20.0	6.1

Well ID Number: 7178556

Well Audit Number: *Z100892*
Well Tag Number: *A087749*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	Township	Lot	Concession
2293 BURNHAM LINE RR#7	Otonabee Township	028	CON 10
County/District/Municipality	**City/Town/Village**	**Province**	**Postal Code**
PETERBOROUGH	Peterborough	ON	n/a
UTM Coordinates	**Municipal Plan and Sublot Number**	**Other**	

NAD83 — Zone 17
Easting: 718095
Northing: 4909109

Overburden and Bedrock Materials Interval

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To
	LOAM			0 ft	1 ft
BRWN	GRVL	CLAY		1 ft	22 ft
GREY	GRVL	CLAY		22 ft	47 ft
GREY	STNS	CLAY		47 ft	50 ft
GREY	CLAY	GRVL		50 ft	76 ft
WHIT	GRVL	CLAY		76 ft	78 ft

Annular Space / Abandonment Sealing Record

Depth From	Depth To	Type of Sealant Used (Material and Type)	Volume Placed
0 ft	20 ft	HOLEPLUG GROUT	

Method of Construction
Cable Tool

Well Use
Domestic

Status of Well
Water Supply

Construction Record - Casing

Inside Diameter	Open Hole OR material	Depth From	Depth To
6.25 inch	STEEL	0 ft	76 ft
6 inch	OPEN HOLE	76 ft	78 ft

Construction Record - Screen

Outside Diameter	Material	Depth From	Depth To
	X		

Well Contractor and Well Technician Information

Well Contractor's Licence Number 4635

Results of Well Yield Testing

After test of well yield, water was
CLEAR

If pumping discontinued, give reason

Pump intake set at
77 ft

Pumping Rate
3 GPM

Duration of Pumping
2 h:0 m

Final water level
60 ft

If flowing give rate

Recommended pump depth
77 ft

Recommended pump rate
3 GPM

Well Production

Disinfected?
Y

Draw Down Time (min)	Draw Down Water level	Recovery Time (min)	Recovery Water level
SWL	47 ft		
1	49 ft	1	60 ft
2	50 ft	2	59 ft
3	50 ft	3	59 ft
4	50 ft	4	59 ft
5	51 ft	5	59 ft
10	52 ft	10	58 ft
15	53 ft	15	58 ft
20	54 ft	20	57 ft
25	56 ft	25	57 ft
30	57 ft	30	57 ft
40	59 ft	40	56 ft
45			
50	60 ft	50	56 ft
60	60 ft	60	55 ft

Water Details

Water Found at Depth	Kind
78 ft	Fresh

Hole Diameter

Depth From	Depth To	Diameter
0 ft	78 ft	6.25 inch

Audit Number: Z100892
Date Well Completed: June 28, 2011
Date Well Record Received by MOE: March 28, 2012

Well ID Number: 5118101

Abandoned Well-no other information

Well Audit Number: *204505*
Well Tag Number: *none*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	*Township*	*Lot*	*Concession*
not available	Otonabee Township	027	CON 10
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
PETERBOROUGH		ON	n/a
UTM Coordinates	*Municipal Plan and Sublot Number*	*Other*	

NAD83 — Zone 17
Easting: 718799.2
Northing: 4909181

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*Depth To*

Annular Space / Abandonment Sealing Record

Depth From	*Depth To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*

Method of Construction

Not Known

Well Use

Domestic

Status of Well

Abandoned-Other

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*Depth To*

Construction Record - Screen

Outside Diameter	*Material*	*Depth From*	*Depth To*
	X		

Well Contractor and Well Technician Information

Well Contractor's Licence Number 3367

Results of Well Yield Testing

	Draw Down Time (min)	*Draw Down Water level*	*Recovery Time (min)*	*Recovery Water level*
After test of well yield, water was				
		SWL		
If pumping discontinued, give reason		1		
		2		
Pump intake set at		3		
Pumping Rate		4		
Duration of Pumping		5		
		10		
Final water level		15		
If flowing give rate		20		
		25		
Recommended pump depth		30		
Recommended pump rate		40		
Well Production		45		
		50		
Disinfected?		60		

Water Details

Water Found at Depth	*Kind*

Hole Diameter

Depth From	*Depth To*	*Diameter*

Audit Number: 204505
Date Well Completed: April 13, 1999
Date Well Record Received by MOE: May 07, 1999

Well ID Number: 5114272

Well Audit Number: *73804*
Well Tag Number: *none*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	*Township*	*Lot*	*Concession*
not available	Otonabee Township	027	CON 10
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
PETERBOROUGH		ON	n/a
UTM Coordinates	*Municipal Plan and Sublot Number*	*Other*	

NAD83 — Zone 17
Easting: 718798.3
Northing: 4909181

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*Depth To*
BRWN	FILL			0 ft	4 ft
GREY	SAND	GRVL		4 ft	40 ft
GREY	CLAY	GRVL		40 ft	121 ft
GREY	GRVL			121 ft	125 ft
GREY	LMSN			125 ft	186 ft

Annular Space / Abandonment Sealing Record

Depth From	*Depth To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*

Method of Construction
Rotary (Air)

Well Use
Domestic

Status of Well
Water Supply

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*Depth To*
6 inch	STEEL		125 ft

Construction Record - Screen

Outside Diameter	*Material*	*Depth From*	*Depth To*
	X		

Well Contractor and Well Technician Information

Well Contractor's Licence Number 2104

Results of Well Yield Testing

After test of well yield, water was
CLEAR

If pumping discontinued, give reason

Pump intake set at

Pumping Rate
1 GPM

Duration of Pumping
3 h:0 m

Final water level
185 ft

If flowing give rate

Recommended pump depth
180 ft

Recommended pump rate
1 GPM

Well Production
PUMP

Disinfected?

Draw Down Time (min)	*Draw Down Water level*	*Recovery Time (min)*	*Recovery Water level*
SWL	60 ft		
1			
2			
3			
4			
5			
10			
15	90 ft	15	
20			
25			
30	110 ft	30	
40			
45	170 ft	45	
50			
60	180 ft	60	

Water Details

Water Found at Depth	*Kind*
121 ft	Fresh

Hole Diameter

Depth From	*Depth To*	*Diameter*

Audit Number: 73804
Date Well Completed: December 07, 1989
Date Well Record Received by MOE: December 19, 1989

Well ID Number: 5118766

Well Audit Number: *113020*
Well Tag Number: *none*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	*Township*	*Lot*	*Concession*
not available	Otonabee Township	027	CON 10
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
PETERBOROUGH		ON	n/a
UTM Coordinates	*Municipal Plan and Sublot Number*	*Other*	

NAD83 — Zone 17
Easting: 718796.2
Northing: 4909182

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*Depth To*

Annular Space / Abandonment Sealing Record

Depth From	*Depth To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*
0 ft	4 ft		
4 ft	34 ft		
34 ft	180 ft		

Method of Construction

Other Method

Well Use

Not Used

Status of Well

Not A Well

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*Depth To*
8 inch	STEEL		

Construction Record - Screen

Outside Diameter	*Material*	*Depth From*	*Depth To*
	X		

Results of Well Yield Testing

After test of well yield, water was	*Draw Down Time (min)*	*Draw Down Water level*	*Recovery Time (min)*	*Recovery Water level*
If pumping discontinued, give reason		SWL		
Pump intake set at		1		
Pumping Rate		2		
Duration of Pumping		3		
Final water level		4		
If flowing give rate		5		
Recommended pump depth		10		
Recommended pump rate		15		
Well Production		20		
Disinfected?		25		
		30		
		40		
		45		
		50		
		60		

Well Contractor and Well Technician Information

Well Contractor's Licence Number 6170

Water Details

Water Found at Depth	*Kind*

Hole Diameter

Depth From	*Depth To*	*Diameter*

Audit Number: 113020
Date Well Completed: June 23, 2001
Date Well Record Received by MOE: July 12, 2001

Well ID Number: 5107288

Well Audit Number: *none*
Well Tag Number: *none*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	*Township*	*Lot*	*Concession*
not available	Otonabee Township	027	CON 10
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
PETERBOROUGH		ON	n/a

UTM Coordinates — *Municipal Plan and Sublot Number* — *Other*

NAD83 — Zone 17
Easting: 718465.3
Northing: 4909123

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*Depth To*
BRWN	LOAM			0 ft	1 ft
BRWN	CLAY	STNS		1 ft	97 ft
GREY	SHLE			97 ft	98 ft
GREY	LMSN			98 ft	150 ft

Annular Space / Abandonment Sealing Record

Depth From	*Depth To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*

Method of Construction

Cable Tool

Well Use

Domestic

Status of Well

Water Supply

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*Depth To*
6 inch	STEEL		98 ft
6 inch	OPEN HOLE		150 ft

Construction Record - Screen

Outside Diameter	*Material*	*Depth From*	*Depth To*
	X		

Well Contractor and Well Technician Information

Well Contractor's Licence Number 1921

Results of Well Yield Testing

After test of well yield, water was

If pumping discontinued, give reason

Pump intake set at

Pumping Rate
2 GPM

Duration of Pumping
2 h:0 m

Final water level
140 ft

If flowing give rate

Recommended pump depth
145 ft

Recommended pump rate
2 GPM

Well Production
BAILER

Disinfected?

Draw Down Time (min)	*Draw Down Water level*	*Recovery Time (min)*	*Recovery Water level*
SWL	30 ft		
1			
2			
3			
4			
5			
10			
15	140 ft	15	
20			
25			
30	140 ft	30	
40			
45	140 ft	45	
50			
60	140 ft	60	

Water Details

Water Found at Depth	*Kind*
98 ft	Fresh

Hole Diameter

Depth From	*Depth To*	*Diameter*

Audit Number: *none*
Date Well Completed: December 14, 1974
Date Well Record Received by MOE: February 04, 1975

Well ID Number: 5102776

Well Audit Number: *none*
Well Tag Number: *none*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	*Township*	*Lot*	*Concession*
not available	Otonabee Township	027	CON 10
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
PETERBOROUGH		ON	n/a
UTM Coordinates	*Municipal Plan and Sublot Number*	*Other*	

NAD83 — Zone 17
Easting: 718478.3
Northing: 4909102

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*Depth To*
	PRDG			0 ft	45 ft
GREY	CLAY			45 ft	53 ft
	GRVL			53 ft	65 ft
GREY	LMSN			65 ft	100 ft

Annular Space / Abandonment Sealing Record

Depth From	*Depth To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*

Method of Construction

Cable Tool

Well Use

Domestic

Status of Well

Water Supply

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*Depth To*
			5 ft
6 inch	STEEL		65 ft
6 inch	OPEN HOLE		100 ft

Construction Record - Screen

Outside Diameter	*Material*	*Depth From*	*Depth To*
	X		

Well Contractor and Well Technician Information

Well Contractor's Licence Number 4814

Results of Well Yield Testing

After test of well yield, water was
CLEAR

If pumping discontinued, give reason

Pump intake set at

Pumping Rate
2 GPM

Duration of Pumping
8 h:0 m

Final water level
95 ft

If flowing give rate

Recommended pump depth
95 ft

Recommended pump rate
2 GPM

Well Production
PUMP

Disinfected?

Draw Down Time (min)	*Water level*	*Recovery Time (min)*	*Water level*
SWL	35 ft		
1			
2			
3			
4			
5			
10			
15			
20			
25			
30			
40			
45			
50			
60			

Water Details

Water Found at Depth	*Kind*
55 ft	Fresh

Hole Diameter

Depth From	*Depth To*	*Diameter*

Audit Number: *none*
Date Well Completed: August 24, 1960
Date Well Record Received by MOE: February 02, 1961

Well ID Number: 5102772

Well Audit Number: *none*
Well Tag Number: *none*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	*Township*	*Lot*	*Concession*
not available	Otonabee Township	027	CON 10
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
PETERBOROUGH		ON	n/a
UTM Coordinates	*Municipal Plan and Sublot Number*	*Other*	

NAD83 — Zone 17
Easting: 718523.3
Northing: 4909077

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*Depth To*
	LOAM			0 ft	1 ft
BRWN	CLAY	MSND		1 ft	10 ft
GREY	CLAY	STNS		10 ft	28 ft
	STNS	GRVL		28 ft	42 ft
GREY	LMSN			42 ft	54 ft

Annular Space / Abandonment Sealing Record

Depth From	*Depth To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*

Method of Construction

Cable Tool

Well Use

Domestic

Status of Well

Water Supply

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*Depth To*
6 inch	STEEL		44 ft
6 inch	OPEN HOLE		54 ft

Construction Record - Screen

Outside Diameter	*Material*	*Depth From*	*Depth To*
	X		

Well Contractor and Well Technician Information

Well Contractor's Licence Number 4814

Results of Well Yield Testing

After test of well yield, water was
CLEAR

If pumping discontinued, give reason

Pump intake set at

Pumping Rate
10 GPM

Duration of Pumping
3 h:0 m

Final water level
40 ft

If flowing give rate

Recommended pump depth
20 ft

Recommended pump rate
3 GPM

Well Production
PUMP

Disinfected?

Draw Down Time (min)	*Draw Down Water level*	*Recovery Time (min)*	*Recovery Water level*
SWL	7 ft		
1			
2			
3			
4			
5			
10			
15			
20			
25			
30			
40			
45			
50			
60			

Water Details

Water Found at Depth	*Kind*
52 ft	Fresh

Hole Diameter

Depth From	*Depth To*	*Diameter*

Audit Number: *none*
Date Well Completed: October 14, 1959
Date Well Record Received by MOE: January 08, 1960

Well ID Number: 5102779

Well Audit Number: *none*
Well Tag Number: *none*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	*Township*	*Lot*	*Concession*
not available	Otonabee Township	027	CON 10
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
PETERBOROUGH		ON	n/a

UTM Coordinates — *Municipal Plan and Sublot Number* — *Other*

NAD83 — Zone 17
Easting: 718384.3
Northing: 4909006

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*Depth To*
	LOAM			0 ft	1 ft
BRWN	CLAY	STNS		1 ft	10 ft
GREY	CLAY	STNS		10 ft	42 ft
GREY	LMSN			42 ft	120 ft

Annular Space / Abandonment Sealing Record

Depth From	*Depth To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*

Method of Construction

Cable Tool

Well Use

Status of Well

Abandoned-Supply

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*Depth To*
		6 inch	

Construction Record - Screen

Outside Diameter	*Material*	*Depth From*	*Depth To*
	X		

Well Contractor and Well Technician Information

Well Contractor's Licence Number 2113

Results of Well Yield Testing

	Draw Down Time (min)	*Draw Down Water level*	*Recovery Time (min)*	*Recovery Water level*
After test of well yield, water was		SWL		
If pumping discontinued, give reason		1		
Pump intake set at		2		
		3		
Pumping Rate		4		
Duration of Pumping		5		
		10		
Final water level		15		
If flowing give rate		20		
		25		
Recommended pump depth		30		
Recommended pump rate		40		
		45		
Well Production		50		
Disinfected?		60		

Water Details

Water Found at Depth	*Kind*

Hole Diameter

Depth From	*Depth To*	*Diameter*

Audit Number: *none*
Date Well Completed: October 07, 1960
Date Well Record Received by MOE: February 14, 1961

Well ID Number: 5102777

Well Audit Number: *none*
Well Tag Number: *none*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	*Township*	*Lot*	*Concession*
not available	Otonabee Township	027	CON 10
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
PETERBOROUGH		ON	n/a

UTM Coordinates — *Municipal Plan and Sublot Number* — *Other*

NAD83 — Zone 17
Easting: 718390.3
Northing: 4908987

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*Depth To*
	LOAM			0 ft	1 ft
BRWN	CLAY	STNS		1 ft	15 ft
GREY	CLAY	STNS		15 ft	42 ft
GREY	LMSN			42 ft	107 ft

Annular Space / Abandonment Sealing Record

Depth From	*Depth To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*

Method of Construction

Cable Tool

Well Use

Status of Well

Abandoned-Supply

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*Depth To*
		6 inch	

Construction Record - Screen

Outside Diameter	*Material*	*Depth From*	*Depth To*
	X		

Well Contractor and Well Technician Information

Well Contractor's Licence Number 2113

Results of Well Yield Testing

	Draw Down Time (min)	*Draw Down Water level*	*Recovery Time (min)*	*Recovery Water level*
After test of well yield, water was		SWL		
If pumping discontinued, give reason		1		
Pump intake set at		2		
		3		
Pumping Rate		4		
Duration of Pumping		5		
		10		
Final water level		15		
If flowing give rate		20		
		25		
Recommended pump depth		30		
Recommended pump rate		40		
		45		
Well Production		50		
Disinfected?		60		

Water Details

Water Found at Depth	*Kind*

Hole Diameter

Depth From	*Depth To*	*Diameter*

Audit Number: *none*
Date Well Completed: October 03, 1960
Date Well Record Received by MOE: February 14, 1961

Well ID Number: 5102778

Well Audit Number: *none*
Well Tag Number: *none*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	*Township*	*Lot*	*Concession*
not available	Otonabee Township	027	CON 10
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
PETERBOROUGH		ON	n/a

UTM Coordinates — *Municipal Plan and Sublot Number* — *Other*

NAD83 — Zone 17
Easting: 718396.3
Northing: 4908971

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*Depth To*
	LOAM			0 ft	1 ft
BRWN	CLAY	STNS		1 ft	20 ft
GREY	CLAY	STNS		20 ft	60 ft
GREY	LMSN			60 ft	160 ft

Annular Space / Abandonment Sealing Record

Depth From	*Depth To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*

Method of Construction

Cable Tool

Well Use

Status of Well

Abandoned-Supply

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*Depth To*
		6 inch	

Construction Record - Screen

Outside Diameter	*Material*	*Depth From*	*Depth To*
	X		

Well Contractor and Well Technician Information

Well Contractor's Licence Number 2113

Results of Well Yield Testing

	Draw Down Time (min)	*Draw Down Water level*	*Recovery Time (min)*	*Recovery Water level*
After test of well yield, water was		SWL		
If pumping discontinued, give reason		1		
Pump intake set at		2		
		3		
Pumping Rate		4		
Duration of Pumping		5		
		10		
Final water level		15		
If flowing give rate		20		
		25		
Recommended pump depth		30		
Recommended pump rate		40		
		45		
Well Production		50		
Disinfected?		60		

Water Details

Water Found at Depth — *Kind*

Hole Diameter

Depth From — *Depth To* — *Diameter*

Audit Number: *none*
Date Well Completed: October 05, 1960
Date Well Record Received by MOE: February 14, 1961

Well ID Number: 5102767

Well Audit Number: *none*
Well Tag Number: *none*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	*Township*	*Lot*	*Concession*
not available	Otonabee Township	027	CON 10
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
PETERBOROUGH		ON	n/a

UTM Coordinates — *Municipal Plan and Sublot Number* — *Other*

NAD83 — Zone 17
Easting: 718471.3
Northing: 4909021

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*Depth To*
	LOAM			0 ft	2 ft
BLUE	CLAY	STNS		2 ft	44 ft
BLUE	CLAY	GRVL		44 ft	46 ft
	GRVL			46 ft	47 ft

Annular Space / Abandonment Sealing Record

Depth From	*Depth To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*

Method of Construction

Cable Tool

Well Use

Domestic

Status of Well

Water Supply

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*Depth To*
6 inch	STEEL		46 ft

Construction Record - Screen

Outside Diameter	*Material*	*Depth From*	*Depth To*
	X		

Well Contractor and Well Technician Information

Well Contractor's Licence Number 2113

Results of Well Yield Testing

After test of well yield, water was CLEAR

If pumping discontinued, give reason

Pump intake set at

Pumping Rate 4 GPM

Duration of Pumping 2 h:0 m

Final water level 12 ft

If flowing give rate

Recommended pump depth

Recommended pump rate

Well Production PUMP

Disinfected?

Draw Down Time (min)	*Draw Down Water level*	*Recovery Time (min)*	*Recovery Water level*
SWL	8 ft		
1			
2			
3			
4			
5			
10			
15			
20			
25			
30			
40			
45			
50			
60			

Water Details

Water Found at Depth	*Kind*
46 ft	Fresh

Hole Diameter

Depth From	*Depth To*	*Diameter*

Audit Number: *none*
Date Well Completed: August 12, 1954
Date Well Record Received by MOE: December 28, 1954

Well ID Number: 5109893

Well Audit Number: *none*
Well Tag Number: *none*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	*Township*	*Lot*	*Concession*
not available	Otonabee Township	027	CON 10
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
PETERBOROUGH		ON	n/a

UTM Coordinates *Municipal Plan and Sublot Number* *Other*

NAD83 — Zone 17
Easting: 718515.3
Northing: 4908973

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*Depth To*
	PRDR			0 ft	52 ft
GREY	LMSN			52 ft	64 ft

Annular Space / Abandonment Sealing Record

Depth From	*Depth To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*

Method of Construction
Cable Tool

Well Use
Domestic

Status of Well
Water Supply

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*Depth To*
	OPEN HOLE		64 ft

Construction Record - Screen

Outside Diameter	*Material*	*Depth From*	*Depth To*
	X		

Well Contractor and Well Technician Information

Well Contractor's Licence Number 1904

Results of Well Yield Testing

After test of well yield, water was
CLEAR

If pumping discontinued, give reason

Pump intake set at

Pumping Rate
4 GPM

Duration of Pumping
2 h:0 m

Final water level
58 ft

If flowing give rate

Recommended pump depth
62 ft

Recommended pump rate
4 GPM

Well Production
BAILER

Disinfected?

Draw Down Time (min)	*Water level*	*Recovery Time (min)*	*Water level*
SWL	12 ft		
1			
2			
3			
4			
5			
10			
15			
20			
25			
30			
40			
45			
50			
60			

Water Details

Water Found at Depth	*Kind*
52 ft	Fresh

Hole Diameter

Depth From	*Depth To*	*Diameter*

Audit Number: *none*
Date Well Completed: October 25, 1979
Date Well Record Received by MOE: June 02, 1980

Well ID Number: 5104385

Well Audit Number: *none*
Well Tag Number: *none*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	*Township*	*Lot*	*Concession*
not available	Otonabee Township	027	CON 10
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
PETERBOROUGH		ON	n/a
UTM Coordinates	*Municipal Plan and Sublot Number*	*Other*	

NAD83 — Zone 17
Easting: 718565.3
Northing: 4908973

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*Depth To*
GREY	CLAY	BLDR		0 ft	34 ft
	GRVL			34 ft	38 ft
GREY	LMSN			38 ft	45 ft

Annular Space / Abandonment Sealing Record

Depth From	*Depth To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*

Method of Construction
Cable Tool

Well Use
Domestic

Status of Well
Water Supply

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*Depth To*
6 inch	STEEL		38 ft
6 inch	OPEN HOLE		45 ft

Construction Record - Screen

Outside Diameter	*Material*	*Depth From*	*Depth To*
	X		

Well Contractor and Well Technician Information

Well Contractor's Licence Number 1904

Results of Well Yield Testing

After test of well yield, water was
CLOUDY

If pumping discontinued, give reason

Pump intake set at

Pumping Rate
6 GPM

Duration of Pumping
4 h:0 m

Final water level
35 ft

If flowing give rate

Recommended pump depth
40 ft

Recommended pump rate
5 GPM

Well Production
PUMP

Disinfected?

Draw Down Time (min)	*Draw Down Water level*	*Recovery Time (min)*	*Recovery Water level*
SWL	7 ft		
1			
2			
3			
4			
5			
10			
15			
20			
25			
30			
40			
45			
50			
60			

Water Details

Water Found at Depth	*Kind*
38 ft	Fresh

Hole Diameter

Depth From	*Depth To*	*Diameter*

Audit Number: *none*
Date Well Completed: September 04, 1968
Date Well Record Received by MOE: January 21, 1969

Well ID Number: 5102774

Well Audit Number: *none*
Well Tag Number: *none*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	*Township*	*Lot*	*Concession*
not available	Otonabee Township	027	CON 10
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
PETERBOROUGH		ON	n/a
UTM Coordinates	*Municipal Plan and Sublot Number*	*Other*	

NAD83 — Zone 17
Easting: 718517.3
Northing: 4908907

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*Depth To*
	LOAM			0 ft	2 ft
	CLAY	STNS		2 ft	20 ft
BLUE	CLAY			20 ft	42 ft
	LMSN			42 ft	62 ft

Annular Space / Abandonment Sealing Record

Depth From	*Depth To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*

Method of Construction
Cable Tool

Well Use
Domestic

Status of Well
Water Supply

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*Depth To*
6 inch	STEEL		42 ft
6 inch	OPEN HOLE		62 ft

Construction Record - Screen

Outside Diameter	*Material*	*Depth From*	*Depth To*
	X		

Well Contractor and Well Technician Information

Well Contractor's Licence Number 4713

Results of Well Yield Testing

After test of well yield, water was
CLEAR

If pumping discontinued, give reason

Pump intake set at

Pumping Rate
10 GPM

Duration of Pumping
2 h:0 m

Final water level
52 ft

If flowing give rate

Recommended pump depth
40 ft

Recommended pump rate
3 GPM

Well Production
PUMP

Disinfected?

Draw Down Time (min)	*Water level*	*Recovery Time (min)*	*Water level*
SWL	12 ft		
1			
2			
3			
4			
5			
10			
15			
20			
25			
30			
40			
45			
50			
60			

Water Details

Water Found at Depth	*Kind*
62 ft	Fresh

Hole Diameter

Depth From	*Depth To*	*Diameter*

Audit Number: *none*
Date Well Completed: October 26, 1959
Date Well Record Received by MOE: January 04, 1960

Well ID Number: 5102783

Well Audit Number: *none*
Well Tag Number: *none*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	*Township*	*Lot*	*Concession*
not available	Otonabee Township	027	CON 10
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
PETERBOROUGH		ON	n/a
UTM Coordinates	*Municipal Plan and Sublot Number*	*Other*	

NAD83 — Zone 17
Easting: 718512.3
Northing: 4908907

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*Depth To*
	CLAY			0 ft	30 ft
	GRVL			30 ft	45 ft
	LMSN			45 ft	55 ft

Annular Space / Abandonment Sealing Record

Depth From	*Depth To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*

Method of Construction

Cable Tool

Well Use

Domestic

Status of Well

Water Supply

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*Depth To*
6 inch	STEEL		55 ft

Construction Record - Screen

Outside Diameter	*Material*	*Depth From*	*Depth To*
	X		

Well Contractor and Well Technician Information

Well Contractor's Licence Number 1904

Results of Well Yield Testing

After test of well yield, water was
CLEAR

If pumping discontinued, give reason

Pump intake set at

Pumping Rate
10 GPM

Duration of Pumping
1 h:30 m

Final water level
18 ft

If flowing give rate

Recommended pump depth
45 ft

Recommended pump rate
5 GPM

Well Production
PUMP

Disinfected?

Draw Down Time (min)	*Draw Down Water level*	*Recovery Time (min)*	*Recovery Water level*
SWL	15 ft		
1			
2			
3			
4			
5			
10			
15			
20			
25			
30			
40			
45			
50			
60			

Water Details

Water Found at Depth	*Kind*
48 ft	Fresh

Hole Diameter

Depth From	*Depth To*	*Diameter*

Audit Number: *none*
Date Well Completed: September 03, 1962
Date Well Record Received by MOE: October 02, 1962

Well ID Number: 5107645

Well Audit Number: *none*
Well Tag Number: *none*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	*Township*	*Lot*	*Concession*
not available	Otonabee Township	027	CON 10
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
PETERBOROUGH		ON	n/a

UTM Coordinates — *Municipal Plan and Sublot Number* — *Other*

NAD83 — Zone 17
Easting: 718665.3
Northing: 4908823

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*Depth To*
BRWN	SAND	FILL		0 ft	8 ft
GREY	CLAY			8 ft	23 ft
GREY	LMSN			23 ft	54 ft

Annular Space / Abandonment Sealing Record

Depth From	*Depth To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*

Method of Construction
Cable Tool

Well Use
Commerical

Status of Well
Water Supply

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*Depth To*
6 inch	STEEL		23 ft

Construction Record - Screen

Outside Diameter	*Material*	*Depth From*	*Depth To*
	X		

Well Contractor and Well Technician Information

Well Contractor's Licence Number 5102

Results of Well Yield Testing

After test of well yield, water was
CLEAR

If pumping discontinued, give reason

Pump intake set at

Pumping Rate
5 GPM

Duration of Pumping
1 h:40 m

Final water level
47 ft

If flowing give rate

Recommended pump depth
50 ft

Recommended pump rate
5 GPM

Well Production
BAILER

Disinfected?

Draw Down Time (min)	*Draw Down Water level*	*Recovery Time (min)*	*Recovery Water level*
SWL	6 ft		
1			
2			
3			
4			
5			
10			
15		15	15 ft
20			
25			
30		30	12 ft
40			
45		45	6 ft
50			
60		60	6 ft

Water Details

Water Found at Depth	*Kind*
23 ft	Fresh
54 ft	Fresh

Hole Diameter

Depth From	*Depth To*	*Diameter*

Audit Number: *none*
Date Well Completed: September 30, 1975
Date Well Record Received by MOE: October 20, 1975

Well ID Number: 5107251

Well Audit Number: *none*
Well Tag Number: *none*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	*Township*	*Lot*	*Concession*
not available	Otonabee Township	027	CON 10
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
PETERBOROUGH		ON	n/a

UTM Coordinates — *Municipal Plan and Sublot Number* — *Other*

NAD83 — Zone 17
Easting: 718637.3
Northing: 4908813

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*Depth To*
BLCK	LOAM			0 ft	1 ft
BRWN	CLAY	GRVL	BLDR	1 ft	18 ft
GREY	LMSN			18 ft	43 ft

Annular Space / Abandonment Sealing Record

Depth From	*Depth To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*

Method of Construction

Cable Tool

Well Use

Domestic

Status of Well

Water Supply

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*Depth To*
6 inch	STEEL		20 ft
6 inch	OPEN HOLE		43 ft

Construction Record - Screen

Outside Diameter	*Material*	*Depth From*	*Depth To*
	X		

Well Contractor and Well Technician Information

Well Contractor's Licence Number 5102

Results of Well Yield Testing

After test of well yield, water was: CLEAR

If pumping discontinued, give reason:

Pump intake set at:

Pumping Rate: 6 GPM

Duration of Pumping: 1 h:40 m

Final water level: 35 ft

If flowing give rate:

Recommended pump depth: 40 ft

Recommended pump rate: 5 GPM

Well Production: BAILER

Disinfected?:

Draw Down Time (min)	*Water level*	*Recovery Time (min)*	*Water level*
SWL	2 ft		
1			
2			
3			
4			
5			
10			
15		15	8 ft
20			
25			
30		30	2 ft
40			
45		45	2 ft
50			
60		60	2 ft

Water Details

Water Found at Depth	*Kind*
18 ft	Fresh
40 ft	Fresh

Hole Diameter

Depth From	*Depth To*	*Diameter*

Audit Number: *none*
Date Well Completed: December 23, 1974
Date Well Record Received by MOE: January 13, 1975

Well ID Number: 5102769

Well Audit Number: *none*
Well Tag Number: *none*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	*Township*	*Lot*	*Concession*
not available	Otonabee Township	027	CON 10
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
PETERBOROUGH		ON	n/a
UTM Coordinates	*Municipal Plan and Sublot Number*	*Other*	

NAD83 — Zone 17
Easting: 718568.3
Northing: 4908778

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*Depth To*
	LOAM			0 ft	3 ft
BRWN	CLAY			3 ft	10 ft
BLUE	CLAY			10 ft	19 ft
	GRVL			19 ft	20 ft

Annular Space / Abandonment Sealing Record

Depth From	*Depth To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*

Method of Construction

Cable Tool

Well Use

Commerical

Status of Well

Water Supply

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*Depth To*
6 inch	STEEL		20 ft

Construction Record - Screen

Outside Diameter	*Material*	*Depth From*	*Depth To*
	X		

Well Contractor and Well Technician Information

Well Contractor's Licence Number 4713

Results of Well Yield Testing

After test of well yield, water was CLEAR

If pumping discontinued, give reason

Pump intake set at

Pumping Rate 15 GPM

Duration of Pumping 2 h:0 m

Final water level 12 ft

If flowing give rate

Recommended pump depth

Recommended pump rate

Well Production PUMP

Disinfected?

Draw Down Time (min)	*Draw Down Water level*	*Recovery Time (min)*	*Recovery Water level*
SWL	3 ft		
1			
2			
3			
4			
5			
10			
15			
20			
25			
30			
40			
45			
50			
60			

Water Details

Water Found at Depth	*Kind*
20 ft	Fresh

Hole Diameter

Depth From	*Depth To*	*Diameter*

Audit Number: *none*
Date Well Completed: December 07, 1955
Date Well Record Received by MOE: January 13, 1956

Well ID Number: 5102771

Well Audit Number: *none*
Well Tag Number: *none*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	*Township*	*Lot*	*Concession*
not available	Otonabee Township	027	CON 10
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
PETERBOROUGH		ON	n/a
UTM Coordinates	*Municipal Plan and Sublot Number*	*Other*	

NAD83 — Zone 17
Easting: 718558.3
Northing: 4908796

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*Depth To*
	FILL			0 ft	5 ft
BRWN	CLAY			5 ft	15 ft
BLUE	CLAY			15 ft	24 ft
	GRVL			24 ft	28 ft

Annular Space / Abandonment Sealing Record

Depth From	*Depth To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*

Method of Construction

Cable Tool

Well Use

Commerical

Status of Well

Water Supply

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*Depth To*
8 inch	STEEL		28 ft

Construction Record - Screen

Outside Diameter	*Material*	*Depth From*	*Depth To*
	X		

Well Contractor and Well Technician Information

Well Contractor's Licence Number 4713

Results of Well Yield Testing

After test of well yield, water was: CLEAR

If pumping discontinued, give reason:

Pump intake set at:

Pumping Rate: 40 GPM

Duration of Pumping: 3 h:0 m

Final water level: 18 ft

If flowing give rate:

Recommended pump depth:

Recommended pump rate:

Well Production: PUMP

Disinfected?:

Draw Down Time (min)	*Draw Down Water level*	*Recovery Time (min)*	*Recovery Water level*
	SWL 5 ft		
	1		
	2		
	3		
	4		
	5		
	10		
	15		
	20		
	25		
	30		
	40		
	45		
	50		
	60		

Water Details

Water Found at Depth	*Kind*
28 ft	Fresh

Hole Diameter

Depth From	*Depth To*	*Diameter*

Audit Number: *none*
Date Well Completed: August 02, 1957
Date Well Record Received by MOE: January 14, 1958

Well ID Number: 5107789

Well Audit Number: *none*
Well Tag Number: *none*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	*Township*	*Lot*	*Concession*
not available	Otonabee Township	027	CON 10
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
PETERBOROUGH		ON	n/a

UTM Coordinates *Municipal Plan and Sublot Number* *Other*

NAD83 — Zone 17
Easting: 718515.3
Northing: 4908823

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*Depth To*
GREY	BLDR	CLAY	HARD	0 ft	21 ft
GREY	GRVL	SAND	WBRG	21 ft	23 ft

Annular Space / Abandonment Sealing Record

Depth From	*Depth To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*

Method of Construction

Cable Tool

Well Use

Public

Status of Well

Water Supply

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*Depth To*
6 inch	STEEL		19 ft

Construction Record - Screen

Outside Diameter	*Material*	*Depth From*	*Depth To*
6 inch	X	8 ft	12 ft

Well Contractor and Well Technician Information

Well Contractor's Licence Number 2104

Results of Well Yield Testing

After test of well yield, water was
CLEAR

If pumping discontinued, give reason

Pump intake set at

Pumping Rate
18 GPM

Duration of Pumping
8 h:0 m

Final water level
16 ft

If flowing give rate

Recommended pump depth
20 ft

Recommended pump rate
18 GPM

Well Production
PUMP

Disinfected?

Draw Down Time (min)	*Water level*	*Recovery Time (min)*	*Water level*
SWL	3 ft		
1			
2			
3			
4			
5			
10			
15	10 ft	15	
20			
25			
30	15 ft	30	
40			
45	15 ft	45	
50			
60	15 ft	60	

Water Details

Water Found at Depth	*Kind*
21 ft	Fresh

Hole Diameter

Depth From	*Depth To*	*Diameter*

Audit Number: *none*
Date Well Completed: January 14, 1976
Date Well Record Received by MOE: January 30, 1976

Well ID Number: 5102780

Well Audit Number: *none*
Well Tag Number: *none*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	*Township*	*Lot*	*Concession*
not available	Otonabee Township	027	CON 10
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
PETERBOROUGH		ON	n/a
UTM Coordinates	*Municipal Plan and Sublot Number*	*Other*	

NAD83 — Zone 17
Easting: 718465.3
Northing: 4908809

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*Depth To*
	LOAM			0 ft	1 ft
BRWN	MSND	STNS		1 ft	40 ft
GREY	LMSN			40 ft	100 ft

Annular Space / Abandonment Sealing Record

Depth From	*Depth To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*

Method of Construction

Cable Tool

Well Use

Public

Status of Well

Water Supply

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*Depth To*
6 inch	STEEL		40 ft
6 inch	OPEN HOLE		100 ft

Construction Record - Screen

Outside Diameter	*Material*	*X*	*Depth From*	*Depth To*

Well Contractor and Well Technician Information

Well Contractor's Licence Number 2113

Results of Well Yield Testing

After test of well yield, water was CLEAR

If pumping discontinued, give reason

Pump intake set at

Pumping Rate 2 GPM

Duration of Pumping 2 h:0 m

Final water level 96 ft

If flowing give rate

Recommended pump depth

Recommended pump rate

Well Production PUMP

Disinfected?

Draw Down Time (min)	*Draw Down Water level*	*Recovery Time (min)*	*Recovery Water level*
SWL	8 ft		
1			
2			
3			
4			
5			
10			
15			
20			
25			
30			
40			
45			
50			
60			

Water Details

Water Found at Depth	*Kind*
40 ft	Fresh

Hole Diameter

Depth From	*Depth To*	*Diameter*

Audit Number: *none*
Date Well Completed: October 08, 1960
Date Well Record Received by MOE: February 14, 1961

Well ID Number: 5106664

Well Audit Number: *none*
Well Tag Number: *none*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	*Township*	*Lot*	*Concession*
not available	Otonabee Township	027	CON 10
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
PETERBOROUGH		ON	n/a

UTM Coordinates — *Municipal Plan and Sublot Number* — *Other*

NAD83 — Zone 17
Easting: 718435.3
Northing: 4908723

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*Depth To*
	LOAM			0 ft	2 ft
BRWN	CLAY	STNS		2 ft	24 ft
BLUE	CLAY	STNS		24 ft	38 ft
	GRVL			38 ft	58 ft

Annular Space / Abandonment Sealing Record

Depth From	*Depth To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*

Method of Construction

Cable Tool

Well Use

Not Used

Status of Well

Abandoned-Supply

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*Depth To*
		6 inch	

Construction Record - Screen

Outside Diameter	*Material*	*Depth From*	*Depth To*
	X		

Well Contractor and Well Technician Information

Well Contractor's Licence Number 4713

Results of Well Yield Testing

After test of well yield, water was: CLEAR

If pumping discontinued, give reason:

Pump intake set at:

Pumping Rate: 2 GPM

Duration of Pumping: 2 h:0 m

Final water level: 58 ft

If flowing give rate:

Recommended pump depth: 58 ft

Recommended pump rate: 2 GPM

Well Production: PUMP

Disinfected?:

Draw Down Time (min)	*Draw Down Water level*	*Recovery Time (min)*	*Recovery Water level*
SWL	26 ft		
1			
2			
3			
4			
5			
10			
15			
20			
25			
30			
40			
45			
50			
60			

Water Details

Water Found at Depth	*Kind*
38 ft	Fresh

Hole Diameter

Depth From	*Depth To*	*Diameter*

Audit Number: *none*
Date Well Completed: May 16, 1968
Date Well Record Received by MOE: January 21, 1969

Well ID Number: 5106084

Well Audit Number: *none*
Well Tag Number: *none*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	*Township*	*Lot*	*Concession*
not available	Otonabee Township	027	CON 10
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
PETERBOROUGH		ON	n/a

UTM Coordinates *Municipal Plan and Sublot Number* *Other*

NAD83 — Zone 17
Easting: 718265.3
Northing: 4908723

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*To*
BRWN	CLAY	STNS		0 ft	12 ft
	GRVL	SAND	SILT	12 ft	25 ft
GREY	CLAY	STNS		25 ft	54 ft
	GRVL	SHLE		54 ft	55 ft
	LMSN			55 ft	71 ft

Annular Space / Abandonment Sealing Record

Depth From	*To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*

Method of Construction

Cable Tool

Well Use

Domestic

Status of Well

Water Supply

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*To*
6 inch	STEEL		55 ft
	OPEN HOLE		71 ft

Construction Record - Screen

Outside Diameter	*Material*	*Depth From*	*To*
	X		

Well Contractor and Well Technician Information

Well Contractor's Licence Number 1904

Results of Well Yield Testing

After test of well yield, water was
CLEAR

If pumping discontinued, give reason

Pump intake set at

Pumping Rate
7 GPM

Duration of Pumping
2 h:0 m

Final water level
55 ft

If flowing give rate

Recommended pump depth
65 ft

Recommended pump rate
5 GPM

Well Production
BAILER

Disinfected?

Draw Down Time (min)	*Water level*	*Recovery Time (min)*	*Water level*
SWL	12 ft		
1			
2			
3			
4			
5			
10			
15	55 ft	15	
20			
25			
30	55 ft	30	
40			
45	55 ft	45	
50			
60	55 ft	60	

Water Details

Water Found at Depth	*Kind*
55 ft	Fresh
70 ft	Fresh

Hole Diameter

Depth From	*To*	*Diameter*

Audit Number: *none*
Date Well Completed: June 26, 1972
Date Well Record Received by MOE: October 06, 1972

Well ID Number: 5102775

Well Audit Number: *none*
Well Tag Number: *none*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	*Township*	*Lot*	*Concession*
not available	Otonabee Township	027	CON 10
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
PETERBOROUGH		ON	n/a

UTM Coordinates — *Municipal Plan and Sublot Number* — *Other*

NAD83 — Zone 17
Easting: 718283.3
Northing: 4908799

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*Depth To*
	PRDG			0 ft	23 ft
GREY	CLAY	STNS		23 ft	33 ft
GREY	CLAY			33 ft	58 ft
GREY	LMSN			58 ft	70 ft

Annular Space / Abandonment Sealing Record

Depth From	*Depth To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*

Method of Construction

Cable Tool

Well Use

Domestic

Status of Well

Water Supply

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*Depth To*
			6 ft
6 inch	STEEL		58 ft
6 inch	OPEN HOLE		70 ft

Construction Record - Screen

Outside Diameter	*Material*	*Depth From*	*Depth To*
	X		

Well Contractor and Well Technician Information

Well Contractor's Licence Number 4814

Results of Well Yield Testing

After test of well yield, water was
CLEAR

If pumping discontinued, give reason

Pump intake set at

Pumping Rate
10 GPM

Duration of Pumping
5 h:0 m

Final water level
52 ft

If flowing give rate

Recommended pump depth
50 ft

Recommended pump rate
2 GPM

Well Production
PUMP

Disinfected?

Draw Down Time (min)	*Draw Down Water level*	*Recovery Time (min)*	*Recovery Water level*
SWL	15 ft		
1			
2			
3			
4			
5			
10			
15			
20			
25			
30			
40			
45			
50			
60			

Water Details

Water Found at Depth	*Kind*
70 ft	Fresh

Hole Diameter

Depth From	*Depth To*	*Diameter*

Audit Number: *none*
Date Well Completed: November 07, 1959
Date Well Record Received by MOE: January 08, 1960

Well ID Number: 5102787

Well Audit Number: *none*
Well Tag Number: *none*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	*Township*	*Lot*	*Concession*
not available	Otonabee Township	027	CON 10
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
PETERBOROUGH		ON	n/a

UTM Coordinates *Municipal Plan and Sublot Number* *Other*

NAD83 — Zone 17
Easting: 718244.3
Northing: 4908802

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*Depth To*
	LOAM			0 ft	2 ft
BRWN	CLAY	STNS		2 ft	27 ft
BLUE	CLAY	STNS		27 ft	54 ft
GREY	LMSN			54 ft	155 ft

Annular Space / Abandonment Sealing Record

Depth From	*Depth To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*

Method of Construction

Cable Tool

Well Use

Domestic

Status of Well

Water Supply

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*Depth To*
6 inch	STEEL		54 ft
6 inch	OPEN HOLE		155 ft

Construction Record - Screen

Outside Diameter	*Material*	*Depth From*	*Depth To*
	X		

Well Contractor and Well Technician Information

Well Contractor's Licence Number 4713

Results of Well Yield Testing

After test of well yield, water was
CLEAR

If pumping discontinued, give reason

Pump intake set at

Pumping Rate
2 GPM

Duration of Pumping
2 h:0 m

Final water level
155 ft

If flowing give rate

Recommended pump depth
155 ft

Recommended pump rate
2 GPM

Well Production
PUMP

Disinfected?

Draw Down Time (min)	*Draw Down Water level*	*Recovery Time (min)*	*Recovery Water level*
SWL	14 ft		
1			
2			
3			
4			
5			
10			
15			
20			
25			
30			
40			
45			
50			
60			

Water Details

Water Found at Depth	*Kind*
90 ft	Fresh

Hole Diameter

Depth From	*Depth To*	*Diameter*

Audit Number: *none*
Date Well Completed: February 07, 1967
Date Well Record Received by MOE: May 16, 1967

Well ID Number: 5102770

Well Audit Number: *none*
Well Tag Number: *none*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	*Township*	*Lot*	*Concession*
not available	Otonabee Township	027	CON 10
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
PETERBOROUGH		ON	n/a

UTM Coordinates *Municipal Plan and Sublot Number* *Other*

NAD83 — Zone 17
Easting: 718316.3
Northing: 4908846

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*To*
	LOAM			0 ft	1 ft
BRWN	CLAY	STNS		1 ft	22 ft
GREY	CLAY	STNS		22 ft	60 ft
BRWN	LMSN			60 ft	219 ft
BRWN	SNDS			219 ft	272 ft
GREY	LMSN			272 ft	301 ft
BRWN	SNDS			301 ft	330 ft
GREY	LMSN			330 ft	333 ft
GREN	LMSN			333 ft	339 ft
BRWN	LMSN			339 ft	341 ft
GREN	LMSN			341 ft	348 ft
RED	GRNT			348 ft	374 ft

Annular Space / Abandonment Sealing Record

Depth From	*To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*

Method of Construction

Cable Tool

Well Use

Public

Status of Well

Water Supply

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*To*
8 inch	STEEL		60 ft
8 inch	OPEN HOLE		374 ft

Construction Record - Screen

Outside Diameter	*Material*	*Depth From*	*To*
	X		

Well Contractor and Well Technician Information

Well Contractor's Licence Number 2113

Results of Well Yield Testing

After test of well yield, water was
CLEAR

If pumping discontinued, give reason

Pump intake set at

Pumping Rate
1 GPM

Duration of Pumping
6 h:0 m

Final water level
372 ft

If flowing give rate

Recommended pump depth

Recommended pump rate

Well Production
PUMP

Disinfected?

Draw Down Time (min)	*Water level*	*Recovery Time (min)*	*Water level*
SWL	123 ft		
1			
2			
3			
4			
5			
10			
15			
20			
25			
30			
40			
45			
50			
60			

Water Details

Water Found at Depth	*Kind*
60 ft	Fresh

Hole Diameter

Depth From	*To*	*Diameter*

Audit Number: *none*
Date Well Completed: August 23, 1956
Date Well Record Received by MOE:
September 19, 1956

Well ID Number: 5102786

Well Audit Number: *none*
Well Tag Number: *none*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	*Township*	*Lot*	*Concession*
not available	Otonabee Township	027	CON 10
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
PETERBOROUGH		ON	n/a

UTM Coordinates — *Municipal Plan and Sublot Number* — *Other*

NAD83 — Zone 17
Easting: 718212.3
Northing: 4908850

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*Depth To*
	LOAM			0 ft	2 ft
	CLAY	BLDR		2 ft	55 ft
GREY	LMSN			55 ft	57 ft

Annular Space / Abandonment Sealing Record

Depth From	*Depth To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*

Method of Construction
Cable Tool

Well Use
Domestic

Status of Well
Water Supply

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*Depth To*
6 inch	STEEL		55 ft
6 inch	OPEN HOLE		57 ft

Construction Record - Screen

Outside Diameter	*Material*	*Depth From*	*Depth To*
	X		

Well Contractor and Well Technician Information

Well Contractor's Licence Number 4713

Results of Well Yield Testing

After test of well yield, water was
CLEAR

If pumping discontinued, give reason

Pump intake set at

Pumping Rate
3 GPM

Duration of Pumping
2 h:0 m

Final water level
53 ft

If flowing give rate

Recommended pump depth
53 ft

Recommended pump rate
3 GPM

Well Production
PUMP

Disinfected?

Draw Down Time (min)	*Water level*	*Recovery Time (min)*	*Water level*
SWL	8 ft		
1			
2			
3			
4			
5			
10			
15			
20			
25			
30			
40			
45			
50			
60			

Water Details

Water Found at Depth	*Kind*
57 ft	Sulphur

Hole Diameter

Depth From	*Depth To*	*Diameter*

Audit Number: *none*
Date Well Completed: June 08, 1965
Date Well Record Received by MOE: September 21, 1965

Well ID Number: 5107615

Well Audit Number: *none*
Well Tag Number: *none*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	*Township*	*Lot*	*Concession*
not available	Otonabee Township	027	CON 10
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
PETERBOROUGH		ON	n/a
UTM Coordinates	*Municipal Plan and Sublot Number*	*Other*	

NAD83 — Zone 17
Easting: 718225.3
Northing: 4908943

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*Depth To*
	LOAM			0 ft	2 ft
BRWN	CLAY	STNS		2 ft	26 ft
BLUE	CLAY			26 ft	48 ft
GREY	LMSN			48 ft	51 ft

Annular Space / Abandonment Sealing Record

Depth From	*Depth To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*

Method of Construction
Cable Tool

Well Use
Domestic

Status of Well
Water Supply

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*Depth To*
6 inch	STEEL		48 ft

Construction Record - Screen

Outside Diameter	*Material*	*Depth From*	*Depth To*
	X		

Well Contractor and Well Technician Information

Well Contractor's Licence Number 2951

Results of Well Yield Testing

After test of well yield, water was
CLEAR

If pumping discontinued, give reason

Pump intake set at

Pumping Rate
28 GPM

Duration of Pumping
2 h:0 m

Final water level
40 ft

If flowing give rate

Recommended pump depth
45 ft

Recommended pump rate
20 GPM

Well Production
PUMP

Disinfected?

Draw Down Time (min)	*Draw Down Water level*	*Recovery Time (min)*	*Recovery Water level*
SWL	9 ft		
1			
2			
3			
4			
5			
10			
15			
20			
25			
30			
40			
45			
50			
60			

Water Details

Water Found at Depth	*Kind*
51 ft	Fresh

Hole Diameter

Depth From	*Depth To*	*Diameter*

Audit Number: *none*
Date Well Completed: September 04, 1968
Date Well Record Received by MOE: January 21, 1969

Well ID Number: 5104587

Well Audit Number: *none*
Well Tag Number: *none*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	*Township*	*Lot*	*Concession*
not available	Otonabee Township	027	CON 10
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
PETERBOROUGH		ON	n/a
UTM Coordinates	*Municipal Plan and Sublot Number*	*Other*	

NAD83 — Zone 17
Easting: 718222.2
Northing: 4908944

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*Depth To*
	LOAM			0 ft	2 ft
BRWN	CLAY	STNS		2 ft	26 ft
BLUE	CLAY			26 ft	48 ft
GREY	LMSN			48 ft	51 ft

Annular Space / Abandonment Sealing Record

Depth From	*Depth To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*

Method of Construction

Cable Tool

Well Use

Domestic

Status of Well

Water Supply

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*Depth To*
6 inch	STEEL		48 ft

Construction Record - Screen

Outside Diameter	*Material*	*Depth From*	*Depth To*
	X		

Well Contractor and Well Technician Information

Well Contractor's Licence Number 4713

Results of Well Yield Testing

After test of well yield, water was
CLEAR

If pumping discontinued, give reason

Pump intake set at

Pumping Rate
28 GPM

Duration of Pumping
2 h:0 m

Final water level
40 ft

If flowing give rate

Recommended pump depth
45 ft

Recommended pump rate
20 GPM

Well Production

Disinfected?

Draw Down Time (min)	*Draw Down Water level*	*Recovery Time (min)*	*Recovery Water level*
SWL	9 ft		
1			
2			
3			
4			
5			
10			
15			
20			
25			
30			
40			
45			
50			
60			

Water Details

Water Found at Depth	*Kind*
51 ft	Fresh

Hole Diameter

Depth From	*Depth To*	*Diameter*

Audit Number: *none*
Date Well Completed: June 06, 1968
Date Well Record Received by MOE: January 21, 1969

Well ID Number: 5102784

Well Audit Number: *none*
Well Tag Number: *none*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	*Township*	*Lot*	*Concession*
not available	Otonabee Township	027	CON 10
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
PETERBOROUGH		ON	n/a
UTM Coordinates	*Municipal Plan and Sublot Number*	*Other*	

NAD83 — Zone 17
Easting: 718412.3
Northing: 4909175

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*Depth To*
	CLAY			0 ft	51 ft
	LMSN			51 ft	69 ft

Annular Space / Abandonment Sealing Record

Depth From	*Depth To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*

Method of Construction
Cable Tool

Well Use
Domestic

Status of Well
Water Supply

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*Depth To*
6 inch	STEEL		51 ft
6 inch	OPEN HOLE		69 ft

Construction Record - Screen

Outside Diameter	*Material*	*Depth From*	*Depth To*
	X		

Well Contractor and Well Technician Information

Well Contractor's Licence Number 1904

Results of Well Yield Testing

After test of well yield, water was
CLEAR

If pumping discontinued, give reason

Pump intake set at

Pumping Rate
2 GPM

Duration of Pumping
3 h:0 m

Final water level
63 ft

If flowing give rate

Recommended pump depth
67 ft

Recommended pump rate
2 GPM

Well Production
PUMP

Disinfected?

Draw Down Time (min)	*Draw Down Water level*	*Recovery Time (min)*	*Recovery Water level*
SWL	27 ft		
1			
2			
3			
4			
5			
10			
15			
20			
25			
30			
40			
45			
50			
60			

Water Details

Water Found at Depth	*Kind*
60 ft	Fresh

Hole Diameter

Depth From	*Depth To*	*Diameter*

Audit Number: *none*
Date Well Completed: September 06, 1962
Date Well Record Received by MOE: October 02, 1962

Well ID Number: 5102764

Well Audit Number: *none*
Well Tag Number: *none*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	*Township*	*Lot*	*Concession*
not available	Otonabee Township	027	CON 10
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
PETERBOROUGH		ON	n/a
UTM Coordinates	*Municipal Plan and Sublot Number*	*Other*	

NAD83 — Zone 17
Easting: 718339.3
Northing: 4909112

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*Depth To*
	CLAY	STNS	MSND	0 ft	69 ft

Annular Space / Abandonment Sealing Record

Depth From	*Depth To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*

Method of Construction

Cable Tool

Well Use

Domestic

Status of Well

Water Supply

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*Depth To*
5 inch	STEEL		69 ft

Construction Record - Screen

Outside Diameter	*Material*	*Depth From*	*Depth To*
	X		

Well Contractor and Well Technician Information

Well Contractor's Licence Number 2116

Results of Well Yield Testing

After test of well yield, water was CLEAR

If pumping discontinued, give reason

Pump intake set at

Pumping Rate 3 GPM

Duration of Pumping 2 h:0 m

Final water level 59 ft

If flowing give rate

Recommended pump depth

Recommended pump rate

Well Production PUMP

Disinfected?

Draw Down Time (min)	*Water level*	*Recovery Time (min)*	*Water level*
SWL	30 ft		
1			
2			
3			
4			
5			
10			
15			
20			
25			
30			
40			
45			
50			
60			

Water Details

Water Found at Depth	*Kind*
69 ft	Fresh

Hole Diameter

Depth From	*Depth To*	*Diameter*

Audit Number: *none*
Date Well Completed: July 08, 1950
Date Well Record Received by MOE: June 05, 1951

Well ID Number: 5102763

Well Audit Number: *none*
Well Tag Number: *none*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	*Township*	*Lot*	*Concession*
not available	Otonabee Township	027	CON 10
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
PETERBOROUGH		ON	n/a

UTM Coordinates *Municipal Plan and Sublot Number* *Other*

NAD83 — Zone 17
Easting: 718255.3
Northing: 4909077

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*Depth To*
	CLAY	STNS	MSND	0 ft	105 ft
	GRVL	LMSN		105 ft	106 ft

Annular Space / Abandonment Sealing Record

Depth From	*Depth To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*

Method of Construction
Cable Tool

Well Use
Domestic

Status of Well
Water Supply

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*Depth To*
5 inch	STEEL		105 ft

Construction Record - Screen

Outside Diameter	*Material*	*Depth From*	*Depth To*
	X		

Well Contractor and Well Technician Information

Well Contractor's Licence Number 2116

Results of Well Yield Testing

After test of well yield, water was
CLEAR

If pumping discontinued, give reason

Pump intake set at

Pumping Rate
2 GPM

Duration of Pumping
3 h:0 m

Final water level
90 ft

If flowing give rate

Recommended pump depth

Recommended pump rate

Well Production
PUMP

Disinfected?

Draw Down Time (min)	*Water level*	*Recovery Time (min)*	*Water level*
SWL	24 ft		
1			
2			
3			
4			
5			
10			
15			
20			
25			
30			
40			
45			
50			
60			

Water Details

Water Found at Depth	*Kind*
105 ft	Fresh

Hole Diameter

Depth From	*Depth To*	*Diameter*

Audit Number: *none*
Date Well Completed: July 01, 1950
Date Well Record Received by MOE: June 05, 1951

Well ID Number: 5120758

Well Audit Number: *Z47763*
Well Tag Number: *A042670*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	*Township*	*Lot*	*Concession*
2283 BURNHAM	Harcourt Township	027	CON 10
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
HALIBURTON	OTONABEE	ON	n/a
UTM Coordinates	*Municipal Plan and Sublot Number*	*Other*	

NAD83 — Zone 17
Easting: 718177
Northing: 4909039

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*Depth To*
BLCK				0 ft	2 ft
BRWN	CLAY	STNS		2 ft	12 ft
BLUE	CLAY	STNS	ROCK	12 ft	28.5 ft

Annular Space / Abandonment Sealing Record

Depth From	*Depth To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*
0 ft	4 ft	CON-SEAL BENTONITE	

Method of Construction
Digging

Well Use
Domestic

Status of Well
Water Supply

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*Depth To*
	CONCRETE	0 ft	8.68 ft

Construction Record - Screen

Outside Diameter	*Material*	*Depth From*	*Depth To*
	X		

Well Contractor and Well Technician Information

Well Contractor's Licence Number 6593

Results of Well Yield Testing

After test of well yield, water was
CLEAR

If pumping discontinued, give reason

Pump intake set at

Pumping Rate
1201 GPM

Duration of Pumping
1 h:30 m

Final water level
8.6 ft

If flowing give rate

Recommended pump depth
8.2 ft

Recommended pump rate

Well Production

Disinfected?

Draw Down Time (min)	*Draw Down Water level*	*Recovery Time (min)*	*Recovery Water level*
SWL			
1			
2	1.5 ft	2	4.9 ft
3	1.8 ft	3	4.9 ft
4	2.1 ft	4	5 ft
5	2.4 ft	5	5 ft
10	2.9 ft	10	5.1 ft
15	3.1 ft	15	5.3 ft
20	3.2 ft	20	5.4 ft
25	3.5 ft	25	5.5 ft
30	3.9 ft	30	5.7 ft
40	4.5 ft	40	5.8 ft
45			
50	5.2 ft	50	5.9 ft
60	6 ft	60	6 ft

Water Details

Water Found at Depth	*Kind*
4.5 ft	Fresh

Hole Diameter

Depth From	*Depth To*	*Diameter*
0 ft	8.68 ft	91.44 inch

Audit Number: Z47763
Date Well Completed: June 02, 2006
Date Well Record Received by MOE: June 27, 2006

Well ID Number: 5104589

Well Audit Number: *none*
Well Tag Number: *none*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	*Township*	*Lot*	*Concession*
not available	Otonabee Township	027	CON 10
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
PETERBOROUGH		ON	n/a
UTM Coordinates	*Municipal Plan and Sublot Number*	*Other*	

NAD83 — Zone 17
Easting: 718132.2
Northing: 4909054

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*Depth To*
	LOAM			0 ft	2 ft
	CLAY	STNS		2 ft	26 ft
GREY	LMSN			26 ft	55 ft

Annular Space / Abandonment Sealing Record

Depth From	*Depth To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*

Method of Construction
Cable Tool

Well Use
Domestic

Status of Well
Water Supply

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*Depth To*

Construction Record - Screen

Outside Diameter	*Material*	*Depth From*	*Depth To*
	X		

Well Contractor and Well Technician Information

Well Contractor's Licence Number 4713

Results of Well Yield Testing

After test of well yield, water was
CLEAR

If pumping discontinued, give reason

Pump intake set at

Pumping Rate
7 GPM

Duration of Pumping
1 h:0 m

Final water level
45 ft

If flowing give rate

Recommended pump depth

Recommended pump rate

Well Production
PUMP

Disinfected?

Draw Down Time (min)	*Draw Down Water level*	*Recovery Time (min)*	*Recovery Water level*
SWL	8 ft		
1			
2			
3			
4			
5			
10			
15			
20			
25			
30			
40			
45			
50			
60			

Water Details

Water Found at Depth	*Kind*
55 ft	Sulphur

Hole Diameter

Depth From	*Depth To*	*Diameter*

Audit Number: *none*
Date Well Completed: May 14, 1968
Date Well Record Received by MOE: January 21, 1969

Well ID Number: 5107625

Well Audit Number: *none*
Well Tag Number: *none*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	*Township*	*Lot*	*Concession*
not available	Otonabee Township	027	CON 10
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
PETERBOROUGH		ON	n/a
UTM Coordinates	*Municipal Plan and Sublot Number*	*Other*	

NAD83 — Zone 17
Easting: 718135.3
Northing: 4909053

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*Depth To*
	LOAM			0 ft	2 ft
	CLAY	STNS		2 ft	26 ft
GREY	LMSN			26 ft	55 ft

Annular Space / Abandonment Sealing Record

Depth From	*Depth To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*

Method of Construction

Cable Tool

Well Use

Status of Well

Abandoned-Quality

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*Depth To*
		6 inch	

Construction Record - Screen

Outside Diameter	*Material*	*Depth From*	*Depth To*
	X		

Well Contractor and Well Technician Information

Well Contractor's Licence Number 2951

Results of Well Yield Testing

After test of well yield, water was CLEAR

If pumping discontinued, give reason

Pump intake set at

Pumping Rate 7 GPM

Duration of Pumping 1 h:0 m

Final water level 45 ft

If flowing give rate

Recommended pump depth

Recommended pump rate

Well Production PUMP

Disinfected?

Draw Down Time (min)	*Draw Down Water level*	*Recovery Time (min)*	*Recovery Water level*
SWL	8 ft		
1			
2			
3			
4			
5			
10			
15			
20			
25			
30			
40			
45			
50			
60			

Water Details

Water Found at Depth	*Kind*
55 ft	Sulphur

Hole Diameter

Depth From	*Depth To*	*Diameter*

Audit Number: *none*
Date Well Completed: May 14, 1968
Date Well Record Received by MOE: January 21, 1969

Well ID Number: 5102768

Well Audit Number: *none*
Well Tag Number: *none*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	Township	Lot	Concession
not available	Otonabee Township	027	CON 10
County/District/Municipality	**City/Town/Village**	**Province**	**Postal Code**
PETERBOROUGH		ON	n/a

UTM Coordinates *Municipal Plan and Sublot Number* *Other*

NAD83 — Zone 17
Easting: 718109.3
Northing: 4909100

Overburden and Bedrock Materials Interval

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To
	LOAM			0 ft	2 ft
BRWN	CLAY	BLDR		2 ft	35 ft
BLUE	CLAY	STNS		35 ft	115 ft
BLUE	CLAY	MSND		115 ft	120 ft
	LMSN			120 ft	186 ft

Annular Space / Abandonment Sealing Record

Depth From	Depth To	Type of Sealant Used (Material and Type)	Volume Placed

Method of Construction

Cable Tool

Well Use

Domestic

Status of Well

Water Supply

Construction Record - Casing

Inside Diameter	Open Hole OR material	Depth From	Depth To
6 inch	STEEL		120 ft
6 inch	OPEN HOLE		186 ft

Construction Record - Screen

Outside Diameter	Material X	Depth From	Depth To

Well Contractor and Well Technician Information

Well Contractor's Licence Number 4713

Results of Well Yield Testing

Draw Down Time (min)	Draw Down Water level	Recovery Time (min)	Recovery Water level
1			
2			
3			
4			
5			
10			
15			
20			
25			
30			
40			
45			
50			
60			

After test of well yield, water was: CLOUDY

If pumping discontinued, give reason: SWL 30 ft

Pump intake set at:

Pumping Rate: 5 GPM

Duration of Pumping: 2 h:0 m

Final water level: 176 ft

If flowing give rate:

Recommended pump depth:

Recommended pump rate:

Well Production: PUMP

Disinfected?:

Water Details

Water Found at Depth	Kind
120 ft	Fresh
156 ft	Fresh

Hole Diameter

Depth From	Depth To	Diameter

Audit Number: *none*
Date Well Completed: October 22, 1955
Date Well Record Received by MOE: November 21, 1955

Well ID Number: 5109613

Well Audit Number: *none*
Well Tag Number: *none*

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	*Township*	*Lot*	*Concession*
not available	Otonabee Township	026	CON 10
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
PETERBOROUGH		ON	n/a

UTM Coordinates — *Municipal Plan and Sublot Number* — *Other*

NAD83 — Zone 17
Easting: 719015.3
Northing: 4909023

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*Depth To*
	PRDR			0 ft	48 ft
GREY	SHLE	LMSN	HARD	48 ft	50 ft

Annular Space / Abandonment Sealing Record

Depth From	*Depth To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*

Method of Construction
Cable Tool

Well Use
Domestic

Status of Well
Water Supply

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*Depth To*
6 inch	STEEL		38 ft

Construction Record - Screen

Outside Diameter	*Material*	*Depth From*	*Depth To*
	X		

Well Contractor and Well Technician Information

Well Contractor's Licence Number 2104

Results of Well Yield Testing

After test of well yield, water was
CLEAR

If pumping discontinued, give reason

Pump intake set at

Pumping Rate
5 GPM

Duration of Pumping
6 h:30 m

Final water level
40 ft

If flowing give rate

Recommended pump depth
45 ft

Recommended pump rate
5 GPM

Well Production
BAILER

Disinfected?

Draw Down Time (min)	*Draw Down Water level*	*Recovery Time (min)*	*Recovery Water level*
SWL	8 ft		
1			
2			
3			
4			
5			
10			
15		15	8 ft
20			
25			
30		30	8 ft
40			
45		45	8 ft
50			
60		60	8 ft

Water Details

Water Found at Depth	*Kind*
48 ft	Fresh

Hole Diameter

Depth From	*Depth To*	*Diameter*

Audit Number: *none*
Date Well Completed: November 13, 1979
Date Well Record Received by MOE: November 21, 1979

APPENDIX D

WELL SURVEY INFORMATION

WELL SURVEY LOCATION PLAN

Hydrogeological Assesment

Proposed Residential Development

Part Lot 27, Concession 10, Otonabee-South Monaghan Township

Peterborough, Ontario

DATE: OCTOBER 2013

SCALE: REFER TO SCALE BAR

JOB NUMBER: G024636E1

DRAWING NO.: APPENDIX D

347 PIDO ROAD, UNIT 29

PETERBOROUGH, ON K9J 6X7

(705) 749-3317 FAX (705) 749-9248 www.geo-logic.ca

APPENDIX D: WATER WELL INFORMATION SURVEY

PROJECT: G024636E1

LOCATION: Lancaster Road, Burnham Line, Highway 7 and Woodview Drive - Peterborough, ON

DATE: September 23, 2013

Address	Well Type	Top of Well (m)	Water Level (m)	Depth (m)	Quality	Quantity	Comments
2284 Lancaster Road	Drilled	Grade	18.3	43	No issues	No issues	Well was previously dug to 15 m then drilled to depth. Homeowner has been at address for over 30 years. UV water treatment. Sample taken from kitchen tap.
2269 Lancaster Road	Drilled	--	--	--	Occasional low EColi	No issues	Well drilled in 1996. Originallly used dug well. UV filter
2268 Lancaster Road	--	--	--	--	--	--	Not home at time of well survey.
2266 Lancaster Road	--	--	--	--	--	--	Not home at time of well survey.
2262 Lancaster Line	--	--	--	--	--	--	Not home at time of well survey.
2261 Lancaster Road	Drilled	--	--	70 ft	No issues	No issue	Had well cleaned 4 years ago to improve flow rate (3GPM now 10GPM). Drilled in 1969. Homeowner stated no one on street has had water problems, good flow.
2257 Lancaster Road	--	--	--	--	--	--	Not home at time of well survey.
2255 Lancaster Road	--	Grade	--	--	No issues	No issues	Homeowners been at address since February 2013. High iron, filtered. Indicated well is buried in front yard.
2254 Lancaster Road	Drilled	--	--	--	Hard water, no other issues	No issues	UV and water softener
2252 Lancaster Road	Drilled	--	--	--	--	--	Did not want to take part in survey.
2235 Burnham Line	--	--	--	--	--	--	Not home at time of well survey.
2245 Burnham Line	Dug/Bored	--	--	--	High salt no other issue	Low, use of cistern	Homeowners been at address for approx 25 years. UV Filter and softener. Cistern located under garage. Water sample collected from "hard tap" with no treatment. Has water tested regularly
2249 Burnham Line	--	--	--	--	--	--	Not home at time of well survey.
2253 Burnham Line	--	--	--	--	--	--	Not home at time of well survey.
2257 Burnham Line	--	--	--	--	--	--	Not home at time of well survey.
2263 Burnham Line	--	--	--	--	--	--	Not home at time of well survey.
2273 Burnham Line	Dug/Bored	0.2	6.4	12.1	No issues	No issues	Owner uses water sparingly but has never gone dry
2285 Burnham Line	Drilled	0.5	16.5	48	Iron is high	No issues	Family has owned property for over 50 years
2293 Burnham Line	--	--	--	--	--	--	Not home at time of well survey.
958 Highway 7	Dug/Bored	Grade	12.5	25.9	High sulphur and iron	No issues	Hotel owner at this address owns the hotel on the south side of Highway 7 at 963 Highway 7. Has the same groundwater issues.
963 Highway 7	Drilled	--	--	--	High sulphur and iron	No issues	See comments for 958 Highway 7
950 Highway 7	--	--	--	--	--	--	Not home at time of well survey.
944 Highway 7	--	--	--	--	--	--	Not home at time of well survey.
9 Woodview Drive	--	--	--	--	--	--	Not home at time of well survey.
26 Woodview Drive	--	--	--	--	--	--	Not home at time of well survey.
30 Woodview Drive	Drilled	--	--	165 ft	Low EColi	No issues	UV and water softener. Never gone dry, occasional low EColi

APPENDIX E

ANALYTICAL DATA

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

04-October-2013

Geo-Logic Inc.
Attn : Todd Palmer

347 Pido Rd., Unit #29
Peterborough, ON
K9J 6Z8,

Phone: 705-749-3317
Fax:

Date Rec. : 24 September 2013
LR Report: **CA14777-SEP13**
Reference: G024636E1

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Analysis	3: Analysis Approval Date	4: Analysis Approval Time	5: MAC	6: AO/OG	7: NR MW-1	8: NR 2284 Lancaster Road	9: NR 2245 Burnham Line
Sample Date & Time					23-Sep-13 14:00	23-Sep-13 15:00	23-Sep-13 15:30
Temperature Upon Receipt [°C]	---	---	---	---	13.0	13.0	13.0
UV Transmittance [%]	27-Sep-13	12:59	---	---	---	94.4	94.3
Alkalinity [mg/L as CaCO3]	27-Sep-13	08:34	---	30-500	---	139	198
Colour [TCU]	27-Sep-13	12:58	---	5	---	< 3	< 3
Conductivity [µS/cm]	27-Sep-13	08:35	---	---	---	489	494
pH [no unit]	27-Sep-13	08:35	---	6.5-8.5	---	8.21	8.15
Total Suspended Solids [mg/L]	26-Sep-13	11:36	---	---	---	< 2	< 2
Turbidity [NTU]	27-Sep-13	11:53	1	5	---	3.26	0.46
Organic Nitrogen [mg/L]	26-Sep-13	14:45	---	0.15	---	< 0.05	0.38
Total Kjeldahl Nitrogen [mg/L]	26-Sep-13	14:43	---	---	---	< 0.05	0.46
Ammonia+Ammonium (N) [mg/L]	26-Sep-13	10:51	---	---	---	0.09	0.08
Total Organic Carbon [mg/L]	25-Sep-13	15:36	---	5	---	< 1.0	< 1.0
Chloride [mg/L]	27-Sep-13	12:13	---	250	---	45	15
Fluoride [mg/L]	26-Sep-13	13:55	1.5	---	---	0.36	0.16
Nitrite (as N) [mg/L]	25-Sep-13	15:41	1	---	< 0.003	< 0.003	< 0.003
Nitrate (as N) [mg/L]	25-Sep-13	15:41	10	---	< 0.006	0.317	1.60
Sulphate [mg/L]	27-Sep-13	12:13	---	500	---	52	35
Hardness (dissolved) [mg/L as CaCO3]	01-Oct-13	16:44	---	80-100	---	199	225

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

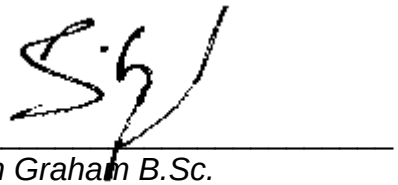
LR Report : **CA14777-SEP13**

Analysis	3: Analysis Approval Date	4: Analysis Approval Time	5: MAC	6: AO/OG	7: NR MW-1	8: NR 2284 Lancaster Road	9: NR 2245 Burnham Line
Aluminum [mg/L]	02-Oct-13	11:40	---	0.1	---	0.0098	0.0035
Arsenic [mg/L]	02-Oct-13	11:40	0.025	---	---	0.0013	0.0005
Boron [mg/L]	02-Oct-13	11:40	5	---	---	0.0786	0.0247
Barium (dissolved) [mg/L]	02-Oct-13	11:40	1	---	---	0.0566	0.0756
Calcium [mg/L]	01-Oct-13	16:45	---	---	---	25.4	61.2
Cadmium [mg/L]	02-Oct-13	11:40	0.005	---	---	0.000017	0.000118
Copper [mg/L]	02-Oct-13	11:40	---	1	---	0.0350	0.0370
Chromium (dissolved) [mg/L]	02-Oct-13	11:40	0.05	---	---	0.0005	< 0.0005
Iron (dissolved) [mg/L]	01-Oct-13	16:45	---	0.3	---	0.028	0.004
Potassium (dissolved) [mg/L]	01-Oct-13	16:45	---	---	---	1.44	2.14
Magnesium [mg/L]	01-Oct-13	16:45	---	---	---	35.3	18.1
Manganese [mg/L]	02-Oct-13	11:40	---	0.05	---	0.00096	0.00056
Sodium [mg/L]	01-Oct-13	16:45	20*	200	---	19.5	13.3
Phosphorus [mg/L]	01-Oct-13	16:45	---	---	---	< 0.009	< 0.009
Lead [mg/L]	02-Oct-13	11:41	0.01	---	---	0.00068	0.00065
Antimony [mg/L]	02-Oct-13	11:41	0.006	---	---	0.0005	0.0004
Selenium [mg/L]	02-Oct-13	11:41	0.01	---	---	< 0.001	< 0.001
Uranium [mg/L]	02-Oct-13	11:41	0.02	---	---	0.000290	0.00178
Zinc [mg/L]	02-Oct-13	11:41	---	5	---	0.039	0.446
Cation sum [meq/L]	---	---	---	---	---	5.06	5.18
Anion Sum [meq/L]	---	---	---	---	---	5.13	5.10
Anion-Cation Balance [% difference]	---	---	---	---	---	-0.70	0.69
Ion Ratio	---	---	---	---	---	0.99	1.01
Total Dissolved Solids (calculated) [mg/L]	---	---	---	---	---	262	264
Conductivity (calculated) [µS/cm]	---	---	---	---	---	509	514
Langelier's Index [@4°C]	---	---	---	---	---	-0.19	0.28
Saturation pH [pHs @ 4°C]	---	---	---	---	---	8.40	7.87

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

LR Report : **CA14777-SEP13**

MAC - Maximum Acceptable Concentration
AO/OG - Aesthetic Objective / Operational Guideline
NR - Not reportable under O.Reg 170/03 or 243/07 of the SDWA or O.Reg 318/08 & 319/08 of the HPPA as per client.



Brian Graham B.Sc.
Project Specialist
Environmental Services, Analytical

OnLine LIMS

0000032113

APPENDIX F

WATER BALANCE AND NITRATE IMPACT CALCULATIONS

Appendix F.1

Water Budget (Thornthwaite Method) - Average Values*

Peterborough 1971 - 2000 **Elevation:** 191 m

Month	T (^{o}C)	I	E (mm)	Daylight Factor	E adj. (mm)	Total Precip. (mm)	Surplus (mm)	Deficit (mm)
January	-8.9	0	0	0.82	0	58.4	58.40	
February	-7.7	0	0	0.82	0	50.6	50.60	
March	-2	0	0	1.03	0	65	65.00	
April	5.7	1.22	28.10	1.12	31.47	68.8	37.33	
May	12.4	3.96	61.96	1.27	78.69	73.2	0.00	5.49
June	16.8	6.26	84.39	1.28	108.02	76.7	0.00	31.32
July	19.4	7.79	97.69	1.3	127.00	66.7	0.00	60.30
August	18.2	7.07	91.55	1.2	109.86	83.2	0.00	26.66
September	13.5	4.50	67.56	1.04	70.26	78.4	8.14	
October	7.3	1.77	36.14	0.95	34.34	70	35.66	
November	1.7	0.20	8.21	0.81	6.65	79	72.35	
December	-5.3	0	0	0.78	0	70.3	70.30	
TOTAL	5.9	32.77	475.60		566.28	840.3	397.78	123.77

Therefore, the water surplus is: 274.0 mm

Notes:

*Average values of precipitation were used. Average values of temperature were also used.

$I = (T_i/5)^{1.514}$

E=0 when $T_i<0$ ^{o}C

$E=16(10T_i/I_{tot})^{a}$ when $0<T_i<26.5$ ^{o}C

$E=-415.85+32.24T_i-0.43T_i^{2}$ when $T_i>26.5$ ^{o}C

$a=6.7x10^{-7}I^{3}-7.71x10^{-5}I^{2}+1.79x10^{-2}I+0.49$

a = 1.017325

Appendix F.2: Pre-Development Water Balance Calculations

Soil Unit	Water Holding Capacity (mm)	Hydrologic Soil Group	Precipitation (mm)	ET (mm)	Surplus	Runoff (mm)	Infiltration (mm)	Infiltration Factor	Slope*	Veg.*	Soil*
Urban Lawns/Shallow Rooted Crops (spinach, beans, beets, carrots)											
Fine Sand	50	A	840.3	538.3	302.0	105.7	196.3	0.65	0.15	0.1	0.4
Fine Sandy Loam	75	B	840.3	548.3	292.0	131.4	160.6	0.55	0.15	0.1	0.3
Silt Loam	125	C	840.3	559.3	281.0	140.5	140.5	0.5	0.15	0.1	0.25
Clay Loam	100	CD	840.3	554.3	286.0	157.3	128.7	0.45	0.15	0.1	0.2
Clay	75	D	840.3	548.3	292.0	189.8	102.2	0.35	0.15	0.1	0.1
Moderately Rooted Crops (corn and cereal grains)											
Fine Sand	75	A	840.3	548.3	292.0	87.6	204.4	0.7	0.15	0.15	0.4
Fine Sandy Loam	150	B	840.3	562.3	278.0	111.2	166.8	0.6	0.15	0.15	0.3
Silt Loam	200	C	840.3	566.3	274.0	123.3	150.7	0.55	0.15	0.15	0.25
Clay Loam	200	CD	840.3	566.3	274.0	137.0	137.0	0.5	0.15	0.15	0.2
Clay	150	D	840.3	562.3	278.0	166.8	111.2	0.4	0.15	0.15	0.1
Pasture and Shrubs											
Fine Sand	100	A	840.3	554.3	286.0	85.8	200.2	0.7	0.15	0.15	0.4
Fine Sandy Loam	150	B	840.3	562.3	278.0	111.2	166.8	0.6	0.15	0.15	0.3
Silt Loam	250	C	840.3	569.3	271.0	122.0	149.1	0.55	0.15	0.15	0.25
Clay Loam	250	CD	840.3	569.3	271.0	135.5	135.5	0.5	0.15	0.15	0.2
Clay	200	D	840.3	566.3	274.0	164.4	109.6	0.4	0.15	0.15	0.1
Mature Forests											
Fine Sand	250	A	840.3	569.3	271.0	67.8	203.3	0.75	0.15	0.2	0.4
Fine Sandy Loam	300	B	840.3	571.3	269.0	94.2	174.9	0.65	0.15	0.2	0.3
Silt Loam	400	C	840.3	573.3	267.0	106.8	160.2	0.6	0.15	0.2	0.25
Clay Loam	400	CD	840.3	573.3	267.0	120.2	146.9	0.55	0.15	0.2	0.2
Clay	350	D	840.3	572.3	268.0	147.4	120.6	0.45	0.15	0.2	0.1

Notes:
*From Hydrogeological Technical Information Requirements for Land Development Applications, MOEE 1995.
Data provided above adapted from Table 3.1 in MOE's SWM Planning and Design Manual, Page 3-4.

Total Area of Site	**19.04**	**ha**	
Pasture and Shrubs	17.14	ha	90% of site
Urban Lawn/Shallow Rooted Crops	0.00	ha	0% of site
Mature Forest	1.90	ha	10% of site
Moderately Rooted Crops	0.00	ha	0% of site

Assumptions:
Pre-development area based upon Site Plan, Plate 2; Plot Plan, Plate 3 and client information.
Assume soil is best represented by Silt Loam "C"

INFILTRATION CALCULATIONS:

SUBWATERSHED #1

INFILTRATION CALCULATIONS:

Average Annual Infiltration for Urban Lawn/Shallow Rooted Crops:	0.0	m^3
Average Annual Infiltration for Pasture Area:	25542.9	m^3
Average Annual Infiltration for Moderately Rooted Crops:	0.0	m^3
Average Annual Infiltration for Mature Forest:	3050.4	m^3
Total Ave Annual Infiltration	28593.3	m^3

RUNOFF CALCULATIONS:

Average Annual Runoff for Urban Lawn/Shallow Rooted Crops:	0.0	m^3
Average Annual Runoff for Pasture Area:	20898.7	m^3
Average Annual Runoff for Moderately Rooted Crops:	0.0	m^3
Average Annual Runoff for Mature Forest:	2033.6	m^3
Total Ave Annual Runoff	22932.4	m^3

Total Precipitation:	159993.12	m^3
% Runoff of total precipitation =	14%	
% Infiltration of total precipitation =	18%	
Losses to evaporation and evapotranspiration =	68%	

Appendix F.3: Post-Development Water Balance Calculations - No Enhancements

Soil Unit	Water Holding Capacity (mm)	Hydrologic Soil Group	Precipitation (mm)	ET (mm)	Surplus	Runoff (mm)	Infiltration (mm)	Infiltration Factor	Slope*	Veg.*	Soil*
Urban Lawns/Shallow Rooted Crops (spinach, beans, beets, carrots)											
Fine Sand	50	A	840.3	538.3	302.0	105.7	196.3	0.65	0.15	0.1	0.4
Fine Sandy Loam	75	B	840.3	548.3	292.0	131.4	160.6	0.55	0.15	0.1	0.3
Silt Loam	125	C	840.3	559.3	281.0	140.5	140.5	0.5	0.15	0.1	0.25
Clay Loam	100	CD	840.3	554.3	286.0	157.3	128.7	0.45	0.15	0.1	0.2
Clay	75	D	840.3	548.3	292.0	189.8	102.2	0.35	0.15	0.1	0.1
Mature Forests											
Fine Sand	250	A	840.3	569.3	271.0	67.8	203.3	0.75	0.15	0.2	0.4
Fine Sandy Loam	300	B	840.3	571.3	269.0	94.2	174.9	0.65	0.15	0.2	0.3
Silt Loam	400	C	840.3	573.3	267.0	106.8	160.2	0.6	0.15	0.2	0.25
Clay Loam	400	CD	840.3	573.3	267.0	120.2	146.9	0.55	0.15	0.2	0.2
Clay	350	D	840.3	572.3	268.0	147.4	120.6	0.45	0.15	0.2	0.1

Notes:
*From Hydrogeological Technical Information Requirements for Land Development Applications, MOEE 1995.
Areas are based upon information from Site Plan, Plate 2; Plot Plan, Plate 3 and client information.

Site Data

Residential	15.23	ha	Assume area is residential except forest and street areas. 34 lots as per nitrate impact calcs.
Streets/Asphalt	1.90	ha	Not provided - assume 10%
Forest	1.90	ha	Assume 10% from pre-development
Total Area of Site	19.04	ha	

Assume soil is best represented by Silt Loam "C"
Assume roof top and driveway water is not infiltrated - NO ENHANCEMENTS

SUBWATERSHED #1

AVERAGE ANNUAL INFILTRATION and RUNOFF CALCULATIONS NO ENHANCEMENTS - POST-DEVELOPMENT

Impervious Areas	3.43	ha	**% Imperviousness =** 18%
Residential	1.52	ha	0% infiltration for roof tops - assume house and garage footprint covers 10% of each of 34 lots
Forest	0.00	ha	Zero impervious area. Runoff will occur as per chart outlined above depending upon soil type
Streets (asphalt)	1.90	ha	100% impervious for asphalt
Pervious Areas	15.61	ha	**%Perviousness =** 82%
Residential	13.71	ha	Area is 90% pervious.
Streets (asphalt)	0.00	ha	Area is 0% pervious
Forest	1.90	ha	100% pervious. Infiltration will occur as per chart outlined above depending upon soil type

OVERALL INFILTRATION AND RUNOFF

	Infiltration (Post-Dev)	*Infiltration (Pre-Dev.)*	*Runoff (Post-Dev)*	*Runoff (Pre-Dev.)*
Impervious Area	0.0 m^3	-- --	9391.1 m^3	-- --
Pervious Area	22312.5 m^3	28593.3 m^3	21295.7 m^3	22932.4 m^3
subtotal	22312.5 m^3	28593.3 m^3	30686.9 m^3	22932.4 m^3
Δ Pre- vs Post-	-6280.8 m^3		7754.5 m^3	
% Difference	-22%		34%	

Total Precipitation:	159993.12 m^3
% Runoff of total precipitation =	19%
% Infiltration of total precipitation =	14%
Losses to evaporation and evapotranspiration =	67%

Appendix F.4: Post-Development Water Balance Calculations - With Enhancements

Soil Unit	Water Holding Capacity (mm)	Hydrologic Soil Group	Precipitation (mm)	ET (mm)	Surplus	Runoff (mm)	Infiltration (mm)	Infiltration Factor	Slope*	Veg.*	Soil*
Urban Lawns/Shallow Rooted Crops (spinach, beans, beets, carrots)											
Fine Sand	50	A	840.3	538.3	302.0	105.7	196.3	0.65	0.15	0.1	0.4
Fine Sandy Loam	75	B	840.3	548.3	292.0	131.4	160.6	0.55	0.15	0.1	0.3
Silt Loam	125	C	840.3	559.3	281.0	140.5	140.5	0.5	0.15	0.1	0.25
Clay Loam	100	CD	840.3	554.3	286.0	157.3	128.7	0.45	0.15	0.1	0.2
Clay	75	D	840.3	548.3	292.0	189.8	102.2	0.35	0.15	0.1	0.1
Mature Forests											
Fine Sand	250	A	840.3	569.3	271.0	67.8	203.3	0.75	0.15	0.2	0.4
Fine Sandy Loam	300	B	840.3	571.3	269.0	94.2	174.9	0.65	0.15	0.2	0.3
Silt Loam	400	C	840.3	573.3	267.0	106.8	160.2	0.6	0.15	0.2	0.25
Clay Loam	400	CD	840.3	573.3	267.0	120.2	146.9	0.55	0.15	0.2	0.2
Clay	350	D	840.3	572.3	268.0	147.4	120.6	0.45	0.15	0.2	0.1

Notes:
*From Hydrogeological Technical Information Requirements for Land Development Applications, MOEE 1995.
Areas are based upon information from Site Plan, Plate 2; Plot Plan, Plate 3 and client information.
Enhancements based upon Low Impact Development Stormwater Management Planning and Design Guide (Version 1.0, 2010); AND
Wet Weather Flow Management Guidelines , November 2006.

Site Data

Residential	15.23	ha	Assume area is residential except forest and street areas. 34 lots as per nitrate impact calcs.
Streets/Asphalt	1.90	ha	Not provided - assume 10%
Forest	1.90	ha	Assume 10% from pre-development
Total Area of Site	19.04	ha	

Assume soil is best represented by Fine Sandy Loam "B" after adding 300 mm of "Typical Design Soil" as per Wet Weather Flow Management Guideline
*Information based upon Low Impact Development Stormwater Management Planning and Design Guide (2010)

Subwatershed (South Area)

AVERAGE ANNUAL INFILTRATION and RUNOFF CALCULATIONS WITH ENHANCEMENTS - POST-DEVELOPMENT

Impervious Areas	3.24	ha	**% Imperviousness =** 17%
Residential	1.52	ha	0% infiltration for roof tops - assume house and garage footprint covers 10% of each of the lots
Proposed Enhancement:			*Downspout disconnection & runoff reduction of 50% on HSG B soils**
Forest	0.00	ha	Zero impervious area. Runoff will occur as per chart outlined above depending upon soil type
Streets (asphalt)	1.71	ha	90% impervious for asphalt
Proposed Enhancement:			*10% infiltration to cracks, side margins etc.*
Pervious Areas	15.80	ha	**%Perviousness =** 83%
Residential	13.71	ha	Area is 90% pervious.
Streets (asphalt)	0.19	ha	90% impervious for asphalt
Proposed Enhancement:			*10% infiltration to cracks, side margins etc.*
Forest	1.90	ha	100% pervious. Infiltration will occur as per chart outlined above depending upon soil type

OVERALL INFILTRATION AND RUNOFF

	Infiltration (Post-Dev)	*Infiltration (Pre-Dev.)*	*Runoff (Post-Dev)*	*Runoff (Pre-Dev.)*
Impervious Area	2608.7 m^3	-- --	6782.5 m^3	-- --
Pervious Area	25068.1 m^3	28593.3 m^3	20048.1 m^3	22932.4 m^3
subtotal	27676.8 m^3	28593.3 m^3	26830.6 m^3	22932.4 m^3
Δ Pre- vs Post-	-916.6 m^3		3898.2 m^3	
% Difference	-3%		17%	

Total Precipitation:	159993.1	m^3
% Runoff of total precipitation =	17%	
% Infiltration of total precipitation =	17%	
Losses to evaporation and evapotranspiration =	66%	

APPENDIX F.5: Contaminant Attenuation Considerations

MASS BALANCE EQUATION

$Q_TC_T = Q_eC_e + Q_iC_i + Q_bC_b$

$C_T = (Q_eC_e + Q_iC_i + Q_bC_b)/Q_T$

Data to be Input

Lots =	34	lots
Average flow =	1000	L/day
Site area =	19.0	ha

SEWAGE EFFLUENT (Q_eC_e)

Q_e = Lots * Average Flow

Q_e = 34000 L/lot/day

C_e = Concentration of effluent

C_e = 40 mg/L

Q_eC_e = 1360000 mg/Lot/day

INFILTRATION (Q_iC_i)

Q_i = Infiltration volume

C_i = Concentration of infiltration

C_i = 0 mg/L

Therefore, $Q_iC_i = 0$ and drops from mass balance equation.

BACKGROUND GROUND WATER (Q_bC_b)

C_b = Concentration of aquifer

C_b = <0.006 mg/L From TP-3 piezometer

Note: The volume of insitu groundwater will ultimately be replaced by the infiltrating precipitation and therefore is not included in the mass balance equation (MOEE Hydrogeological Technical Info Requirements, page 5-6).

Therefore, $Q_bC_b = 0$ and drops from mass balance equation.

Therefore, $C_T = (Q_eC_e)/Q_T$

Where $Q_T = Q_e + Q_i$

Q_e = 34000 L/lot/day

Q_i = 200 mm/year (Infiltration rate based upon soil type observed at 10 test pits)

Q_i = 104328.8 L/day

Q_T = 138328.8 L/day

C_T = 9.83 mg/L (NO_3-N) for 34 lots

C_T = 10.05 mg/L (NO_3-N) for 35 lots

Therefore, 34 lots can be developed based upon the nitrate impact assessment.

Appendix E
Peer Review Correspondence

May 29, 2016 Reference No. G030377-02

Caitlin Robinson, B.E.S., Planner
County of Peterborough
470 Water Street
Peterborough ON K9H 3M3

Attn: Ms. Robinson:

Re: Response to Hydrogeology Comments
Hydrogeological Assessment Report
Proposed Residential Development
Part Lot 27, Concession 10, Otonabee Ward
Township of Otonabee-South Monaghan
County File No 15T-16002

GHD Limited (GHD) (formerly Geo-Logic) is pleased to present the following responses to hydrogeology comments prepared by Stantec Consulting Ltd (Stantec). The comments are dated March 8, 2016. There were several issues and concerns raised by Stantec. A summary of the Stantec issues and concerns are as follows (refer to the March 8, 2016 letter for details):

1. Shallow groundwater movement and the high groundwater table need to be defined to assist with the design of the proposed subdivision;
2. The nitrate loading assessment is not supported by Stantec. The assessment should be updated to reflect information in the Planning document and address differences in infiltration between the water balance assessment and nitrate loading assessment; and
3. The water supply assessment indicates the test wells produce water on the low end of the requirements by the MOECC. Stantec agrees that an engineering storage system and flow control can be implemented.

The following sections have been prepared to address Stantec's comments. Since the comments were provided to GHD, the lot fabric has been adjusted to 27 lots.

1. Shallow Groundwater and Flow Direction

During the original hydrogeological program, test holes were excavated at 10 locations. The shallow soil was till. Groundwater was not encountered with the exception of one location near the wetland area. To further assess shallow groundwater and flow direction, test pits were excavated at each lot in the presence of the local health unit for their assessment of implementing septic systems at each of the lots.

The test hole plan is provided on Figure 1 and shows the original 10 test pits and an additional 18 test pits excavated on May 12, 2016. Piezometers were installed at nine (9) locations. Test hole logs of

GHD Limited
347 Pido Road Unit 29 Peterborough Ontario K9J 6X7 Canada
T 705 749 3317 **F** 705 749 9248 **W** www.ghd.com
SMQ ISO 9001:2008

the 18 test holes excavated on May 12, 2016 are provided in Appendix A. The soil was topsoil over silty sand till with gravel.

The test pits were excavated in lower elevation areas of the lots (i.e. downgradient of potential well and house footprint locations) where septic systems are most likely to be constructed. Shallow water was observed in several of the test pits in the lower elevation test pit locations with minimal seepage at several locations. As indicated in the hydrogeological assessment report dated October 2013, the septic systems are recommended as fully raised beds. In the higher elevation areas of the lots where the house footprints are expected, no groundwater was observed. Any shallow groundwater that may be encountered around house foundations is expected to be minimal and can be handled by appropriate engineering techniques.

Groundwater level measurements were obtained on May 16 and May 27, 2016 from the piezometers. The following table summarizes the water levels. Groundwater contour elevations are provided on Figures 2A and 2B and show the flow direction of shallow water is radial from the central drumlin area. Existing ground elevations are estimated based upon topographic information presented on the Test Hole Plan, Figure 1.

Table 1: Water Level Summary

Location	Ground (masl)*	Pipe Stick Up (m)	May 16, 2016			May 27, 2016		
			Water Level (mbtp)	Water Level (m)	Water Level (masl)	Water Level (mbtp)	Water Level (m)	Water Level (masl)
TP-13	207	1.37	2.73	1.36	205.6	2.97	1.60	205.4
TP-14	208	1.63	2.40	0.77	207.2	Dry at 2.43**	--	--
TP-18	211	1.27	1.83	0.56	210.4	2.22	0.95	210.1
TP-20	214	1.18	2.24	1.06	212.9	2.40	1.22	212.8
TP-22	209.5	0.89	2.90	2.01	207.5	3.03	2.14	207.4
TP-24	206	1.14	Dry at 2.00*	--	--	Dry at 2.00*	--	--
TP-25	207	1.22	2.21	0.99	206.0	2.53	1.31	205.7
TP-27	208.5	1.24	2.62	1.38	207.1	2.98	1.74	206.8
TP-28	207	1.45	1.53	0.08	206.9	2.04	0.59	206.4

Notes:

masl = metres above sea level; mbtp = metres below top of pipe; m = metres

*Blockage in piezometer at 2.00 mbtp. Piezometer dry at that depth.

**Blockage in piezometer at 2.43 mbtp. Piezometer dry at that depth.

2. Nitrate Loading Assessment

This section of the report addresses nitrate loading for the proposed subdivision. The original nitrate loading assessment utilized at area provided to GHD of 19 hectares (ha) and a dilution value of 200 mm/year. Based upon updated planning documents, the area should have been 15.92 ha. This updated area of 15.92 ha will be used in the revised nitrate loading assessment. The revised nitrate assessment is provided in Appendix B.

GHD reviewed the test pit logs and gradation results which suggest a silty sand till material. Typical infiltration values for material comprised of silty sand / sandy silt is on the order of 150 to 200 mm/year. As 54% to 69% of the material is sand and gravel based upon the sieve test results, recharge values on the higher end of the range is in our opinion considered to be reasonable. It is our experience that infiltration through till can be quite variable due to the till's composition, vertical and horizontal fissure planes and shallow root holes. We have reduced our original recharge rate from 200 mm/year to 185 mm/year. It is our opinion that a recharge rate of 185 mm per year is reasonable. There will also be additional sand fill placed on each lot for the raised septic beds which will further increase dilution. At this recharge rate, 27 lots can be supported.

The original water balance suggests the site infiltration is on the lower end of 150 to 200 mm/year range and in the opinion of GHD the original water balance infiltration value is considered to be conservative. The water balance has been revised for the new site plan areas and also utilizes updated climatic normals for Peterborough (1981 – 2010 data). The revised water balance calculations are provided in Appendix C and indicate that the post-development conditions can meet pre-development conditions and infiltrate on the order of 185 mm per year.

3. Water Supply Assessment

No further work is required.

4. Conclusions

In response to the Stantec comments, GHD has provided additional information regarding shallow water and groundwater flow direction for the development and confirmed the nitrate impact and water balance calculations. A total of 27 lots can be supported by the Site based upon the calculations.

GHD concludes that the flow direction is radial from the central drumlin toward areas of lower elevation. Groundwater was not observed in the higher elevation areas of the Site where house footprints are expected. Shallow water was observed in some of the downgradient areas where potential septic systems may be constructed. Raised beds are recommended for each lot.

We trust that this letter report meets with your immediate requirements. Should you have any questions, please contact our office.

Sincerely,

GHD

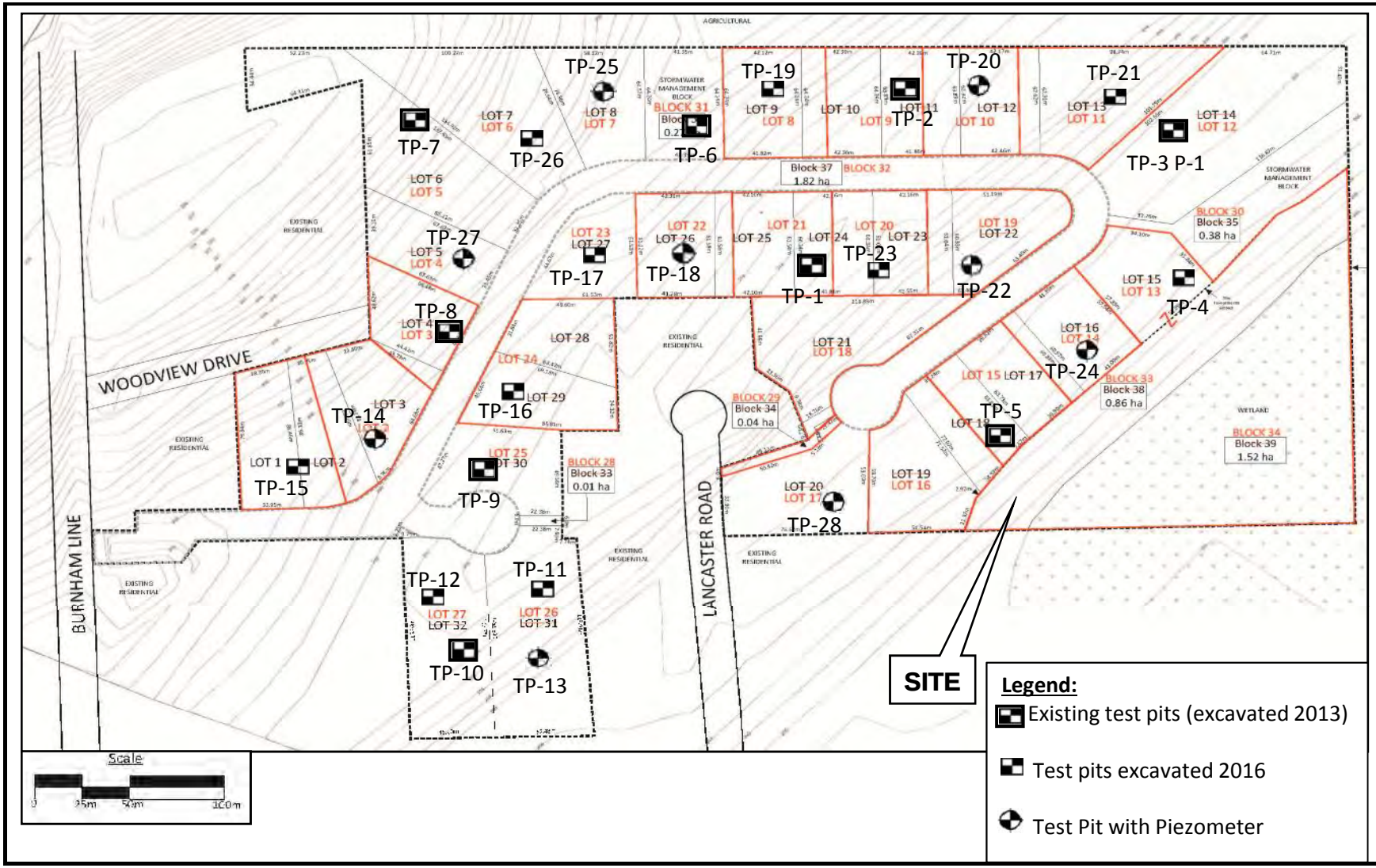
Robert Neck, M.Eng., P.Geo (Limited)

Nyle McIlveen, P.Eng.

/BN/nmc/01

Encl.
Appendix A: Subsurface Data
Appendix B: Revised Nitrate Impact Assessment Calculations
Appendix C: Revised Water Balance Calculations
Email – Al Demonte (aldemonte@hotmail.com)

Enclosures



Source: Provided by Bob Clark Consulting. Revised May 2016.

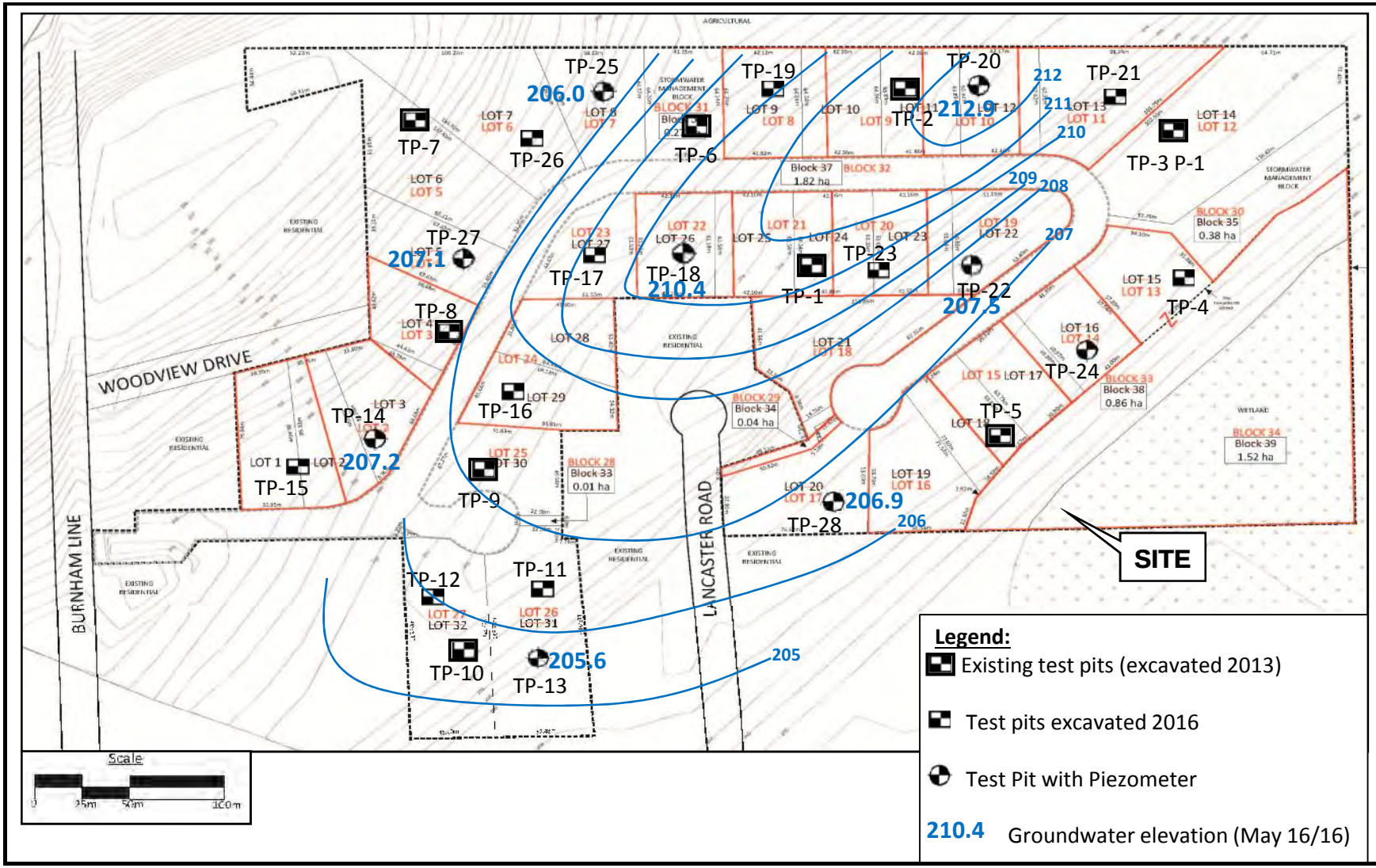
Scale:
Refer to Scale Bar
Coordinate System:
NAD 1983 UTM Zone 17

Demonte Acres Inc.
Pt. Lt. 27, Conc. 10, Otonabee
Response to Hydrogeology Comments

G030377-02
May 2016

Test Hole Plan

FIGURE 1



Source: Provided by Bob Clark Consulting. Lot fabric revised May 2016. Groundwater elevations based upon May 16, 2016 data.

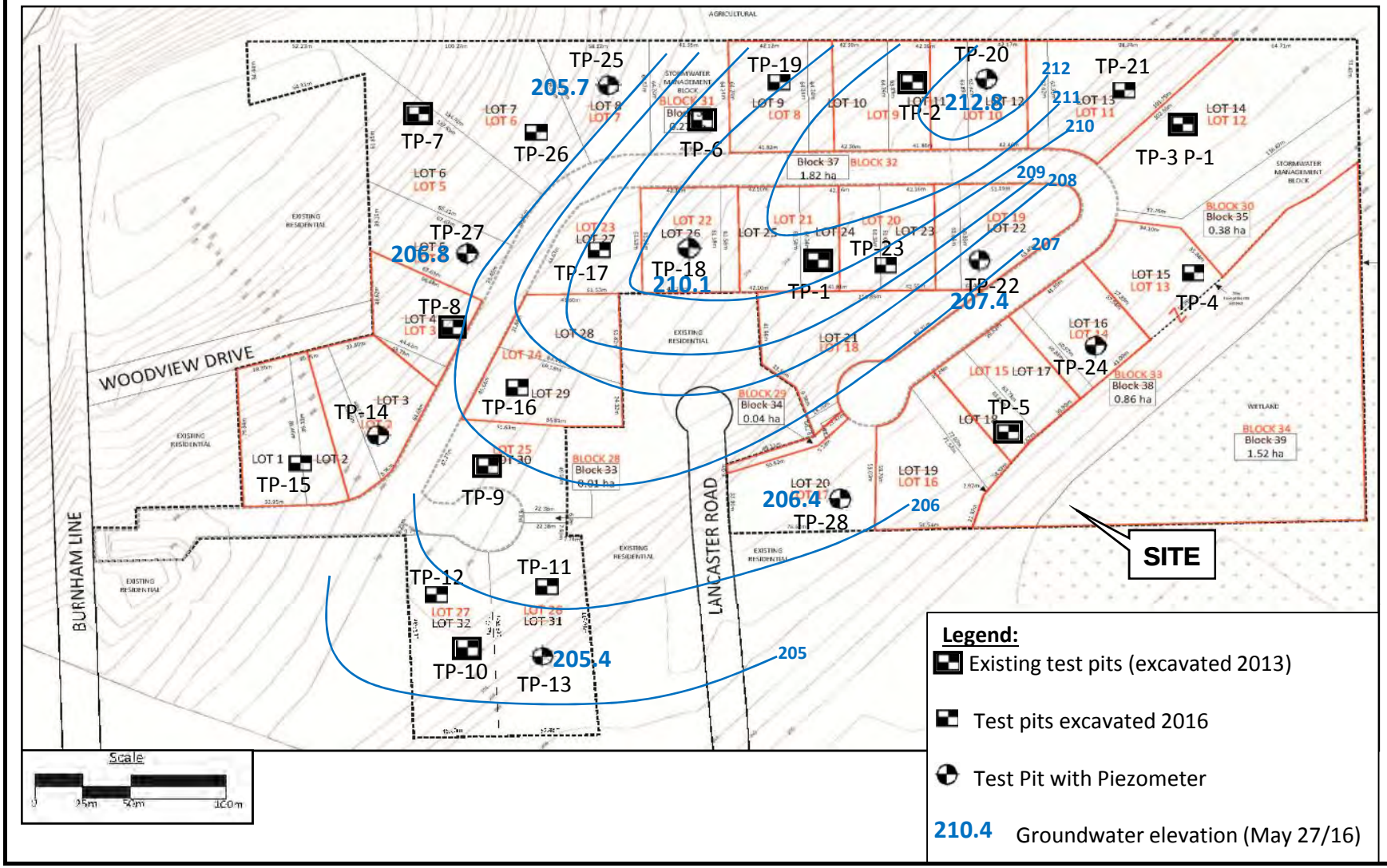
Scale:
Refer to Scale Bar
Coordinate System:
NAD 1983 UTM Zone 17

Demonte Acres Inc.
Pt. Lt. 27, Conc. 10, Otonabee
Response to Hydrogeology Comments

G030377-02
May 2016

Groundwater Elevations

FIGURE 2A



Source: Provided by Bob Clark Consulting. Lot fabric revised May 2016. Groundwater elevations based upon May 27, 2016 data.

Scale:
Refer to Scale Bar
Coordinate System:
NAD 1983 UTM Zone 17

Demonte Acres Inc.
Pt. Lt. 27, Conc. 10, Otonabee
Response to Hydrogeology Comments

G030377-02
May 2016

Groundwater Elevations

FIGURE 2B

Appendix A
Subsurface Data

REFERENCE No.: G030377-02 ENCLOSURE No.: A-1

TEST PIT No.: TP-11
ELEVATION: Existing Grade

TEST PIT REPORT

Page: 1 of 1

CLIENT: Demonte Acres Inc.
PROJECT: Response to Hydrogeology Comments
LOGGED BY: E. Wierdsma DATE: May 12, 2016
EXCAVATION COMPANY: Leahy Excavation Inc. METHOD: Rubber Tire Backhoe
NOTES:

LEGEND
GS - GRAB SAMPLE
▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content (%)	Vapours (ppm)	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (w_p w_l) — △ Field ☐ Lab: 10 20 30 40 50 60 70 80 90	COMMENTS
		0.0		GROUND SURFACE					
				Topsoil					
1		0.30		Light Brown Silty Sand TILL with Gravel, trace Cobbles and Boulders, Moist					
	0.5								
2									
3									
	1.0								
4									
5									Test pit dry upon completion.
	1.5								
6		1.83		END OF TEST PIT					
	2.0								
7									

TEST PIT LOG ENVIRO G030377-02, 16-05-31 GINT LOGS.GPJ GEOLOGIC.GDT 6/1/16

REFERENCE No.: G030377-02 ENCLOSURE No.: A-2

TEST PIT No.: TP-12
ELEVATION: Existing Grade

TEST PIT REPORT

Page: 1 of 1

CLIENT: Demonte Acres Inc.
PROJECT: Response to Hydrogeology Comments
LOGGED BY: E. Wierdsma DATE: May 12, 2016
EXCAVATION COMPANY: Leahy Excavation Inc. METHOD: Rubber Tire Backhoe
NOTES:

LEGEND
GS - GRAB SAMPLE
▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content (%)	Vapours (ppm)	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (w_p w_l) — △ Field ☐ Lab	COMMENTS
		0.0		GROUND SURFACE				10 20 30 40 50 60 70 80 90	
				Topsoil					
1		0.30		Light Brown Silty Sand TILL with Gravel, trace Cobbles and Boulders, Moist					
	0.5								
2									
3									
	1.0								
4									
5									
	1.5								
6		1.83		Minimal seepage at 1.8 m. No accumulation. END OF TEST PIT					
	2.0								
7									

TEST PIT LOG ENVIRO G030377-02, 16-05-31 GINT LOGS.GPJ GEOLOGIC.GDT 6/1/16

REFERENCE No.: G030377-02 ENCLOSURE No.: A-3

TEST PIT No.: TP-13
ELEVATION: 207 m

TEST PIT REPORT

Page: 1 of 1

CLIENT: Demonte Acres Inc.
PROJECT: Response to Hydrogeology Comments
LOGGED BY: E. Wierdsma DATE: May 12, 2016
EXCAVATION COMPANY: Leahy Excavation Inc. METHOD: Rubber Tire Backhoe
NOTES:

LEGEND
GS - GRAB SAMPLE
▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content (%)	Vapours (ppm)	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (w_p w_l) — △ Field □ Lab: 10 20 30 40 50 60 70 80 90	COMMENTS
		0.0		GROUND SURFACE					1.37 m
				Topsoil					
1		0.30		Light Brown Silty Sand TILL with Gravel, trace Cobbles and Boulders, Moist					
	0.5								
2									
3									
	1.0								
4									
5									Water Level - 1.60 m 5/27/2016
	1.5								
6		1.83		Minor seepage at 1.8 m. Minimal accumulation. END OF TEST PIT					
	2.0								
7									

REFERENCE No.: G030377-02 ENCLOSURE No.: A-4

TEST PIT No.: TP-14
ELEVATION: 208 m

TEST PIT REPORT

Page: 1 of 1

CLIENT: Demonte Acres Inc.
PROJECT: Response to Hydrogeology Comments
LOGGED BY: E. Wierdsma DATE: May 12, 2016
EXCAVATION COMPANY: Leahy Excavation Inc. METHOD: Rubber Tire Backhoe
NOTES:

LEGEND
GS - GRAB SAMPLE
▼ - WATER LEVEL

Depth (ft / m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content (%)	Vapours (ppm)	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (w_p w_l) — △ Field, □ Lab: 10 20 30 40 50 60 70 80 90	COMMENTS
ft / m	0.0		GROUND SURFACE		%	ppm		— 1.63 m
			Topsoil					
	0.20		Light Brown Silty Sand TILL with Gravel, trace Cobbles and Boulders, Moist					
1 / 0.5								
2								Water Level - 0.77 m 5/16/2016
3 / 1.0			Minor Seepage at 0.9 m.					
4								
5 / 1.5								
6								
7 / 2.0	2.13		END OF TEST PIT					

TEST PIT LOG ENVIRO G030377-02, 16-05-31 GINT LOGS.GPJ GEOLOGIC.GDT 6/1/16

REFERENCE No.: G030377-02 ENCLOSURE No.: A-5

TEST PIT No.: TP-15
ELEVATION: Existing Grade

TEST PIT REPORT

Page: 1 of 1

CLIENT: Demonte Acres Inc.
PROJECT: Response to Hydrogeology Comments
LOGGED BY: E. Wierdsma DATE: May 12, 2016
EXCAVATION COMPANY: Leahy Excavation Inc. METHOD: Rubber Tire Backhoe
NOTES:

LEGEND
GS - GRAB SAMPLE
▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content (%)	Vapours (ppm)	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (w_p w_l) — △ Field ☐ Lab	COMMENTS
		0.0		GROUND SURFACE				10 20 30 40 50 60 70 80 90	
				Topsoil					
1		0.30		Light Brown Silty Sand TILL with Gravel, trace Cobbles and Boulders, Moist					
	0.5								
2									
3				Minimal seepage at 0.9 m. No accumulation.					
	1.0								
4									
5	1.5								
6		1.83		END OF TEST PIT					
	2.0								
7									

TEST PIT LOG ENVIRO G030377-02, 16-05-31 GINT LOGS.GPJ GEOLOGIC.GDT 6/1/16

REFERENCE No.: G030377-02 ENCLOSURE No.: A-6

TEST PIT No.: TP-16
ELEVATION: Existing Grade

TEST PIT REPORT

Page: 1 of 1

CLIENT: Demonte Acres Inc.
PROJECT: Response to Hydrogeology Comments
LOGGED BY: E. Wierdsma DATE: May 12, 2016
EXCAVATION COMPANY: Leahy Excavation Inc. METHOD: Rubber Tire Backhoe
NOTES:

LEGEND
GS - GRAB SAMPLE
▼ - WATER LEVEL

Depth ft	Depth m	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content %	Vapours ppm	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (w_p w_l) — △ Field ☐ Lab: 10 20 30 40 50 60 70 80 90	COMMENTS
		0.0		GROUND SURFACE					
				Topsoil					
1		0.30		Light Brown Silty Sand TILL with Gravel, trace Cobbles and Boulders, Moist					
	0.5								
2				Minimal seepage at 0.6 m. No accumulation.					
3									
	1.0								
4									
5	1.5								
6		1.83		END OF TEST PIT					
	2.0								
7									

TEST PIT LOG ENVIRO G030377-02, 16-05-31 GINT LOGS.GPJ GEOLOGIC.GDT 6/1/16

REFERENCE No.: G030377-02 ENCLOSURE No.: A-7

TEST PIT No.: TP-17
ELEVATION: Existing Grade

TEST PIT REPORT

Page: 1 of 1

CLIENT: Demonte Acres Inc.
PROJECT: Response to Hydrogeology Comments
LOGGED BY: E. Wierdsma DATE: May 12, 2016
EXCAVATION COMPANY: Leahy Excavation Inc. METHOD: Rubber Tire Backhoe
NOTES:

LEGEND
GS - GRAB SAMPLE
▼ - WATER LEVEL

Depth ft	Depth m	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content %	Vapours ppm	Shear test (Cu) △ Field / Sensitivity (S) □ Lab / ○ Water content (%) / W_p W_l Atterberg limits (%) 10 20 30 40 50 60 70 80 90	COMMENTS
		0.0		GROUND SURFACE					
				Topsoil					
1		0.30		Light Brown Silty Sand TILL with Gravel, trace Cobbles and Boulders, Moist					
	0.5								
2									
3									
	1.0								
4									
5	1.5								Test pit dry upon completion.
6		1.83		END OF TEST PIT					
	2.0								
7									

TEST PIT LOG ENVIRO G030377-02, 16-05-31 GINT LOGS.GPJ GEOLOGIC.GDT 6/1/16

REFERENCE No.: G030377-02 ENCLOSURE No.: A-8

TEST PIT No.: TP-18
ELEVATION: 211 m

TEST PIT REPORT

Page: 1 of 1

CLIENT: Demonte Acres Inc.
PROJECT: Response to Hydrogeology Comments
LOGGED BY: E. Wierdsma DATE: May 12, 2016
EXCAVATION COMPANY: Leahy Excavation Inc. METHOD: Rubber Tire Backhoe
NOTES:

LEGEND
GS - GRAB SAMPLE
▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content (%)	Vapours (ppm)	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (w_p w_l) — △ Field □ Lab: 10 20 30 40 50 60 70 80 90	COMMENTS
		0.0		GROUND SURFACE					1.27 m
				Topsoil					
1		0.30		Light Brown Silty Sand TILL with Gravel, trace Cobbles and Boulders, Moist					
	0.5								
2									
				Minor seepage at 0.65 m.					
3									Water Level - 0.95 m 5/27/2016
	1.0								
4									
5	1.5								
6		1.83		END OF TEST PIT					
	2.0								
7									

TEST PIT LOG ENVIRO G030377-02, 16-05-31 GINT LOGS.GPJ GEOLOGIC.GDT 6/1/16

REFERENCE No.: G030377-02 ENCLOSURE No.: A-9

TEST PIT No.: TP-19
ELEVATION: Existing Grade

TEST PIT REPORT

Page: 1 of 1

CLIENT: Demonte Acres Inc.
PROJECT: Response to Hydrogeology Comments
LOGGED BY: E. Wierdsma DATE: May 12, 2016
EXCAVATION COMPANY: Leahy Excavation Inc. METHOD: Rubber Tire Backhoe
NOTES:

LEGEND
GS - GRAB SAMPLE
▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content (%)	Vapours (ppm)	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (w_p w_l) — △ Field ☐ Lab	COMMENTS
		0.0		GROUND SURFACE				10 20 30 40 50 60 70 80 90	
				Topsoil					
1		0.30		Light Brown Silty Sand TILL with Gravel, trace Cobbles and Boulders, Moist					
	0.5								
2				Minimal seepage at 0.75 m. No accumulation.					
3									
	1.0								
4									
5	1.5								
6		1.83		END OF TEST PIT					
	2.0								
7									

REFERENCE No.: G030377-02 ENCLOSURE No.: A-10

TEST PIT No.: TP-20
ELEVATION: 214 m

TEST PIT REPORT

Page: 1 of 1

CLIENT: Demonte Acres Inc.
PROJECT: Response to Hydrogeology Comments
LOGGED BY: E. Wierdsma DATE: May 12, 2016
EXCAVATION COMPANY: Leahy Excavation Inc. METHOD: Rubber Tire Backhoe
NOTES:

LEGEND
GS - GRAB SAMPLE
▼ - WATER LEVEL

Depth ft	Depth m	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content %	Vapours ppm	Shear test (Cu) △ Field / Sensitivity (S) □ Lab / ○ Water content (%) / W_p W_l Atterberg limits (%) 10 20 30 40 50 60 70 80 90	COMMENTS
		0.0		GROUND SURFACE					1.18 m
				Topsoil					
1		0.30		Light Brown Silty Sand TILL with Gravel, trace Cobbles and Boulders, Moist					
	0.5								
2									
3									
	1.0								
4									Water Level - 1.22 m 5/27/2016
				Minor seepage at 1.4 m.					
5	1.5								
6		1.83		END OF TEST PIT					
	2.0								
7									

TEST PIT LOG ENVIRO G030377-02, 16-05-31 GINT LOGS.GPJ GEOLOGIC.GDT 6/1/16

REFERENCE No.: G030377-02 ENCLOSURE No.: A-11

TEST PIT No.: TP-21
ELEVATION: Existing Grade

TEST PIT REPORT

Page: 1 of 1

CLIENT: Demonte Acres Inc.
PROJECT: Response to Hydrogeology Comments
LOGGED BY: E. Wierdsma DATE: May 12, 2016
EXCAVATION COMPANY: Leahy Excavation Inc. METHOD: Rubber Tire Backhoe
NOTES:

LEGEND
GS - GRAB SAMPLE
▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content (%)	Vapours (ppm)	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (w_p w_l) — △ Field ☐ Lab	COMMENTS
		0.0		GROUND SURFACE				10 20 30 40 50 60 70 80 90	
				Topsoil					
1		0.30		Light Brown Silty Sand TILL with Gravel, trace Cobbles and Boulders, Moist					
	0.5								
2									
3									
	1.0								
4									
5									
	1.5								
6									Test pit dry upon completion.
	2.0								
7		2.13		END OF TEST PIT					

REFERENCE No.: G030377-02 ENCLOSURE No.: A-12

TEST PIT No.: TP-22
ELEVATION: 209.5 m

TEST PIT REPORT

Page: 1 of 1

CLIENT: Demonte Acres Inc.
PROJECT: Response to Hydrogeology Comments
LOGGED BY: E. Wierdsma DATE: May 12, 2016
EXCAVATION COMPANY: Leahy Excavation Inc. METHOD: Rubber Tire Backhoe
NOTES:

LEGEND
GS - GRAB SAMPLE
▼ - WATER LEVEL

Depth ft	Depth m	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content %	Vapours ppm	Shear test (Cu) △ Field ☐ Lab; Sensitivity (S); ○ Water content (%); w_p w_l Atterberg limits (%) 10 20 30 40 50 60 70 80 90	COMMENTS
		0.0		GROUND SURFACE					— 0.89 m
				Topsoil					
		0.25		Light Brown Silty Sand TILL with Gravel, trace Cobbles and Boulders, Moist					
1									
	0.5								
2									
3									
	1.0								
4									
5									
	1.5								
6				Minor seepage at 1.8 m. Minimal accumulation.					
	2.0								
7		2.13		END OF TEST PIT					Water Level - 2.13 m 5/27/2016

TEST PIT LOG ENVIRO G030377-02, 16-05-31 GINT LOGS.GPJ GEOLOGIC.GDT 6/1/16

REFERENCE No.: G030377-02 ENCLOSURE No.: A-13

TEST PIT No.: TP-23
ELEVATION: Existing Grade

TEST PIT REPORT

Page: 1 of 1

CLIENT: Demonte Acres Inc.
PROJECT: Response to Hydrogeology Comments
LOGGED BY: E. Wierdsma DATE: May 12, 2016
EXCAVATION COMPANY: Leahy Excavation Inc. METHOD: Rubber Tire Backhoe
NOTES:

LEGEND
GS - GRAB SAMPLE
▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content (%)	Vapours (ppm)	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%) — △ Field ☐ Lab (10 20 30 40 50 60 70 80 90)	COMMENTS
		0.0		GROUND SURFACE					
				Topsoil					
1		0.30		Light Brown Silty Sand TILL with Gravel, trace Cobbles and Boulders, Moist					
	0.5								
2									
3									
	1.0								
4									
5									
	1.5								
6									Test pit dry upon completion.
	2.0								
7		2.13		END OF TEST PIT					

TEST PIT LOG ENVIRO G030377-02, 16-05-31 GINT LOGS.GPJ GEOLOGIC.GDT 6/1/16

REFERENCE No.: G030377-02 ENCLOSURE No.: A-14

TEST PIT No.: TP-24
ELEVATION: 206 m

TEST PIT REPORT

Page: 1 of 1

CLIENT: Demonte Acres Inc.
PROJECT: Response to Hydrogeology Comments
LOGGED BY: E. Wierdsma DATE: May 12, 2016
EXCAVATION COMPANY: Leahy Excavation Inc. METHOD: Rubber Tire Backhoe
NOTES:

LEGEND
GS - GRAB SAMPLE
▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content (%)	Vapours (ppm)	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%) (△ Field, □ Lab) 10 20 30 40 50 60 70 80 90	COMMENTS
		0.0		GROUND SURFACE					─ 1.14 m
				Topsoil					
1		0.30		Light Brown Silty Sand TILL with Gravel, trace Cobbles and Boulders, Moist					
	0.5								
2									
3									Piezometer blocked. Dry at 0.86 m.
	1.0								
4				Minor seepage at 1.35 m.					
5									
	1.5								
6									
	2.0	1.98		END OF TEST PIT					
7									

TEST PIT LOG ENVIRO G030377-02, 16-05-31 GINT LOGS.GPJ GEOLOGIC.GDT 6/1/16

REFERENCE No.: G030377-02 ENCLOSURE No.: A-15

TEST PIT No.: TP-25
ELEVATION: 207 m

TEST PIT REPORT

Page: 1 of 1

CLIENT: Demonte Acres Inc.
PROJECT: Response to Hydrogeology Comments
LOGGED BY: E. Wierdsma DATE: May 12, 2016
EXCAVATION COMPANY: Leahy Excavation Inc. METHOD: Rubber Tire Backhoe
NOTES:

LEGEND
GS - GRAB SAMPLE
▼ - WATER LEVEL

Depth ft	Depth m	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content %	Vapours ppm	Shear test (Cu) △ Field / Sensitivity (S) □ Lab / ○ Water content (%) / W_p W_l Atterberg limits (%) 10 20 30 40 50 60 70 80 90	COMMENTS
		0.0		GROUND SURFACE					1.22 m
				Topsoil					
1		0.30		Light Brown Silty Sand TILL with Gravel, trace Cobbles and Boulders, Moist					
	0.5								
2									
3									
	1.0								
4									Water Level - 1.31 m 5/27/2016
5									
	1.5								
6		1.83		END OF TEST PIT					
	2.0								
7									

TEST PIT LOG ENVIRO G030377-02, 16-05-31 GINT LOGS.GPJ GEOLOGIC.GDT 6/1/16

REFERENCE No.: G030377-02 ENCLOSURE No.: A-16

TEST PIT No.: TP-26
ELEVATION: Existing Grade

TEST PIT REPORT

Page: 1 of 1

CLIENT: Demonte Acres Inc.
PROJECT: Response to Hydrogeology Comments
LOGGED BY: E. Wierdsma DATE: May 12, 2016
EXCAVATION COMPANY: Leahy Excavation Inc. METHOD: Rubber Tire Backhoe
NOTES:

LEGEND
GS - GRAB SAMPLE
▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content (%)	Vapours (ppm)	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (%) (△ Field, □ Lab) 10 20 30 40 50 60 70 80 90	COMMENTS
		0.0		GROUND SURFACE					
				Topsoil					
1		0.30		Light Brown Silty Sand TILL with Gravel, trace Cobbles and Boulders, Moist					
	0.5								
2									
3									
	1.0								
4									
5	1.5								Test pit dry upon completion.
6		1.83		END OF TEST PIT					
	2.0								
7									

TEST PIT LOG ENVIRO G030377-02, 16-05-31 GINT LOGS.GPJ GEOLOGIC.GDT 6/1/16

REFERENCE No.: G030377-02 ENCLOSURE No.: A-17

TEST PIT No.: TP-27
ELEVATION: 208.5 m

TEST PIT REPORT

Page: 1 of 1

CLIENT: Demonte Acres Inc.
PROJECT: Response to Hydrogeology Comments
LOGGED BY: E. Wierdsma DATE: May 12, 2016
EXCAVATION COMPANY: Leahy Excavation Inc. METHOD: Rubber Tire Backhoe
NOTES:

LEGEND
GS - GRAB SAMPLE
▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content (%)	Vapours (ppm)	Shear test (Cu) / Sensitivity (S) / Water content (%) / Atterberg limits (w_p w_l) — △ Field □ Lab: 10 20 30 40 50 60 70 80 90	COMMENTS
		0.0		GROUND SURFACE					
				Topsoil					
1		0.30		Light Brown Silty Sand TILL with Gravel, trace Cobbles and Boulders, Moist					
	0.5								
2									
3									
	1.0								
4									
5									
	1.5			Minor seepage at 1.65 m. Minimal accumulation.					
6		1.83		END OF TEST PIT					
	2.0								
7									

— 1.24 m

Water Level - 1.74 m
5/27/2016

TEST PIT LOG ENVIRO G030377-02, 16-05-31 GINT LOGS.GPJ GEOLOGIC.GDT 6/1/16

REFERENCE No.: G030377-02 ENCLOSURE No.: A-18

TEST PIT No.: TP-28
ELEVATION: 207 m

TEST PIT REPORT

Page: 1 of 1

CLIENT: Demonte Acres Inc.
PROJECT: Response to Hydrogeology Comments
LOGGED BY: E. Wierdsma DATE: May 12, 2016
EXCAVATION COMPANY: Leahy Excavation Inc. METHOD: Rubber Tire Backhoe
NOTES:

LEGEND
GS - GRAB SAMPLE
▼ - WATER LEVEL

Depth (ft)	Depth (m)	m Below Existing Grade	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Moisture Content (%)	Vapours (ppm)
		0.0		GROUND SURFACE			
				Topsoil			
1		0.30		Light Brown Silty Sand TILL with Gravel, trace Cobbles and Boulders, Moist Minor seepage at 0.45 m.			
	0.5						
2							
3							
	1.0			Cave-in at 1.2 m.			
4		1.22		END OF TEST PIT			
	1.5						
5							
6							
	2.0						
7							

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_p W_l Atterberg limits (%)
10 20 30 40 50 60 70 80 90

COMMENTS

— 1.45 m

Water Level - 0.59 m
5/27/2016

TEST PIT LOG ENVIRO G030377-02, 16-05-31 GINT LOGS.GPJ GEOLOGIC.GDT 6/1/16

Appendix B
Revised Nitrate Impact Assessment Calculations

APPENDIX B.1: Contaminant Attenuation Considerations

MASS BALANCE EQUATION

$Q_TC_T = Q_eC_e + Q_iC_i + Q_bC_b$

$C_T = (Q_eC_e + Q_iC_i + Q_bC_b)/Q_T$

Data to be Input

Lots =	27	lots
Average flow =	1000	L/day
Site area =	15.92	ha

SEWAGE EFFLUENT (Q_eC_e)

Q_e = Lots * Average Flow

Q_e = 27000 L/lot/day

C_e = Concentration of effluent

C_e = 40 mg/L

Q_eC_e = 1080000 mg/Lot/day

INFILTRATION (Q_iC_i)

Q_i = Infiltration volume

C_i = Concentration of infiltration

C_i = 0 mg/L

Therefore, $Q_iC_i = 0$ and drops from mass balance equation.

BACKGROUND GROUND WATER (Q_bC_b)

C_b = Concentration of aquifer

C_b = <0.006 mg/L From TP-3 piezometer

Note: The volume of insitu groundwater will ultimately be replaced by the infiltrating precipitation and therefore is not included in the mass balance equation (MOEE Hydrogeological Technical Info Requirements, page 5-6).

Therefore, $Q_bC_b = 0$ and drops from mass balance equation.

Therefore, $C_T = (Q_eC_e)/Q_T$

Where $Q_T = Q_e + Q_i$

Q_e = 27000 L/lot/day

Q_i = 185 mm/year (Infiltration rate based upon soil type observed at 10 test pits)

Q_i = 80690.41 L/day

Q_T = 107690.4 L/day

C_T = 10.0 mg/L (NO_3-N) for 27 lots

Therefore, 27 lots can be developed based upon the nitrate impact assessment.

Appendix C
Revised Water Balance Calculations

Appendix C.1

Water Budget (Thornthwaite Method) - Average Values*

Peterborough A 1981 - 2010 **Elevation:** 191 m

Month	T (^{o}C)	I	E (mm)	Daylight Factor	E adj. (mm)	Total Precip. (mm)	Surplus (mm)	Deficit (mm)
January	-8.5	0	0	0.82	0	57.4	57.40	
February	-7	0	0	0.82	0	51.5	51.50	
March	-1.8	0	0	1.03	0	56.1	56.10	
April	5.9	1.28	28.76	1.12	32.22	68.6	36.38	
May	12.1	3.81	60.07	1.27	76.29	81.5	5.21	
June	17	6.38	85.13	1.28	108.96	79.9	0.00	29.06
July	19.6	7.91	98.50	1.3	128.05	70.6	0.00	57.45
August	18.3	7.13	91.81	1.2	110.17	77	0.00	33.17
September	13.9	4.70	69.25	1.04	72.02	85.3	13.28	
October	7.5	1.85	36.79	0.95	34.95	76.9	41.95	
November	1.9	0.23	9.00	0.81	7.29	86.4	79.11	
December	-4.4	0	0	0.78	0	64.2	64.20	
TOTAL	6.2	33.30	479.30		569.94	855.4	405.13	119.67

Therefore, the water surplus is: 285.5 mm

Notes:

*Average values of precipitation were used. Average values of temperature were also used.

$I = (T_i/5)^{1.514}$

E=0 when $T_i<0$ ^{o}C

$E=16(10T_i/I_{tot})^{a}$ when $0<T_i<26.5$ ^{o}C

$E=-415.85+32.24T_i-0.43T_i^2$ when $T_i>26.5$ ^{o}C

$a=6.7x10^{-7}I^3-7.71x10^{-5}I^2+1.79x10^{-2}I+0.49$

a = 1.025255

Appendix C.2: Pre-Development Water Balance Calculations

Soil Unit	Water Holding Capacity (mm)	Hydrologic Soil Group	Precipitation (mm)	ET (mm)	Surplus	Runoff (mm)	Infiltration (mm)	Infiltration Factor	Slope*	Veg.*	Soil*
Urban Lawns/Shallow Rooted Crops (spinach, beans, beets, carrots)											
Fine Sand	50	A	855.4	541.9	313.5	108.5	205.0	0.65	0.15	0.1	0.4
Fine Sandy Loam	75	B	855.4	551.9	303.5	136.6	166.9	0.55	0.15	0.1	0.3
Silt Loam	125	C	855.4	562.9	292.5	146.2	146.2	0.5	0.15	0.1	0.25
Clay Loam	100	CD	855.4	557.9	297.5	163.6	133.9	0.45	0.15	0.1	0.2
Clay	75	D	855.4	551.9	303.5	197.2	106.2	0.35	0.15	0.1	0.1
Moderately Rooted Crops (corn and cereal grains)											
Fine Sand	75	A	855.4	551.9	303.5	91.0	212.4	0.7	0.15	0.15	0.4
Fine Sandy Loam	150	B	855.4	565.9	289.5	115.8	173.7	0.6	0.15	0.15	0.3
Silt Loam	200	C	855.4	569.9	285.5	128.5	157.0	0.55	0.15	0.15	0.25
Clay Loam	200	CD	855.4	569.9	285.5	142.7	142.7	0.5	0.15	0.15	0.2
Clay	150	D	855.4	565.9	289.5	173.7	115.8	0.4	0.15	0.15	0.1
Pasture and Shrubs											
Fine Sand	100	A	855.4	557.9	297.5	89.2	208.2	0.7	0.15	0.15	0.4
Fine Sandy Loam	150	B	855.4	565.9	289.5	115.8	173.7	0.6	0.15	0.15	0.3
Silt Loam	250	C	855.4	572.9	282.5	127.1	155.4	0.55	0.15	0.15	0.25
Clay Loam	250	CD	855.4	572.9	282.5	141.2	141.2	0.5	0.15	0.15	0.2
Clay	200	D	855.4	569.9	285.5	171.3	114.2	0.4	0.15	0.15	0.1
Mature Forests											
Fine Sand	250	A	855.4	572.9	282.5	70.6	211.8	0.75	0.15	0.2	0.4
Fine Sandy Loam	300	B	855.4	574.9	280.5	98.2	182.3	0.65	0.15	0.2	0.3
Silt Loam	400	C	855.4	576.9	278.5	111.4	167.1	0.6	0.15	0.2	0.25
Clay Loam	400	CD	855.4	576.9	278.5	125.3	153.2	0.55	0.15	0.2	0.2
Clay	350	D	855.4	575.9	279.5	153.7	125.8	0.45	0.15	0.2	0.1

Notes:
*From Hydrogeological Technical Information Requirements for Land Development Applications, MOEE 1995.
Data provided above adapted from Table 3.1 in MOE's SWM Planning and Design Manual, Page 3-4.

Total Area of Site	**15.92 ha**	
Pasture and Shrubs	14.33 ha	90% of site
Urban Lawn/Shallow Rooted Crops	0.00 ha	0% of site
Mature Forest	1.59 ha	10% of site
Moderately Rooted Crops	0.00 ha	0% of site

Assumptions:
Pre-development area based upon Site Plan, Figure 1 and client information.
Assume soil is best represented by Sand Loam "B"

INFILTRATION CALCULATIONS:

SUBWATERSHED #1

INFILTRATION CALCULATIONS:

Average Annual Infiltration for Urban Lawn/Shallow Rooted Crops:	0.0 m^3
Average Annual Infiltration for Pasture Area:	24884.3 m^3
Average Annual Infiltration for Moderately Rooted Crops:	0.0 m^3
Average Annual Infiltration for Mature Forest:	3372.6 m^3
Total Ave Annual Infiltration	28256.9 m^3

RUNOFF CALCULATIONS:

Average Annual Runoff for Urban Lawn/Shallow Rooted Crops:	0.0 m^3
Average Annual Runoff for Pasture Area:	16589.6 m^3
Average Annual Runoff for Moderately Rooted Crops:	0.0 m^3
Average Annual Runoff for Mature Forest:	1124.2 m^3
Total Ave Annual Runoff	17713.8 m^3

Appendix B.3: Post-Development Water Balance Calculations - No Enhancements

Soil Unit	Water Holding Capacity (mm)	Hydrologic Soil Group	Precipitation (mm)	ET (mm)	Surplus	Runoff (mm)	Infiltration (mm)	Infiltration Factor	Slope*	Veg.*	Soil*
Urban Lawns/Shallow Rooted Crops (spinach, beans, beets, carrots)											
Fine Sand	50	A	855.4	541.9	313.5	109.7	203.7	0.65	0.15	0.1	0.4
Fine Sandy Loam	75	B	855.4	551.9	303.5	136.6	166.9	0.55	0.15	0.1	0.3
Silt Loam	125	C	855.4	562.9	292.5	146.2	146.2	0.5	0.15	0.1	0.25
Clay Loam	100	CD	855.4	557.9	297.5	163.6	133.9	0.45	0.15	0.1	0.2
Clay	75	D	855.4	551.9	303.5	197.2	106.2	0.35	0.15	0.1	0.1
Moderately Rooted Crops (corn and cereal grains)											
Fine Sand	75	A	855.4	551.9	303.5	91.0	212.4	0.7	0.15	0.15	0.4
Fine Sandy Loam	150	B	855.4	565.9	289.5	115.8	173.7	0.6	0.15	0.15	0.3
Silt Loam	200	C	855.4	569.9	285.5	128.5	157.0	0.55	0.15	0.15	0.25
Clay Loam	200	CD	855.4	569.9	285.5	142.7	142.7	0.5	0.15	0.15	0.2
Clay	150	D	855.4	565.9	289.5	173.7	115.8	0.4	0.15	0.15	0.1
Pasture and Shrubs											
Fine Sand	100	A	855.4	557.9	297.5	89.2	208.2	0.7	0.15	0.15	0.4
Fine Sandy Loam	150	B	855.4	565.9	289.5	115.8	173.7	0.6	0.15	0.15	0.3
Silt Loam	250	C	855.4	572.9	282.5	127.1	155.4	0.55	0.15	0.15	0.25
Clay Loam	250	CD	855.4	572.9	282.5	141.2	141.2	0.5	0.15	0.15	0.2
Clay	200	D	855.4	569.9	285.5	171.3	114.2	0.4	0.15	0.15	0.1
Mature Forests											
Fine Sand	250	A	855.4	572.9	282.5	70.6	211.8	0.75	0.15	0.2	0.4
Fine Sandy Loam	300	B	855.4	574.9	280.5	98.2	182.3	0.65	0.15	0.2	0.3
Silt Loam	400	C	855.4	576.9	278.5	111.4	167.1	0.6	0.15	0.2	0.25
Clay Loam	400	CD	855.4	576.9	278.5	125.3	153.2	0.55	0.15	0.2	0.2
Clay	350	D	855.4	575.9	279.5	153.7	125.8	0.45	0.15	0.2	0.1

Notes:
*From Hydrogeological Technical Information Requirements for Land Development Applications, MOEE 1995.
Areas are based upon information from Site Plan, Figure 1.

Site Data

Residential	11.02 ha	69%
Block 33 - Emergency access	0.01 ha	0%
Block 34 - Emergency access	0.04 ha	0%
Block 35 - Stormwater Management	0.38 ha	2%
Block 36 - Stormwater Management	0.27 ha	2%
Block 37 - Road right-of-way	1.82 ha	11%
Block 38 - Environmental setback	0.86 ha	5%
Block 39 - Wetland	1.52 ha	10%
Total Area of Site	15.92 ha	100%

Assume soil is best represented by Sand Loam "B"
Assume roof top and driveway water is not infiltrated - NO ENHANCEMENTS

AVERAGE ANNUAL INFILTRATION and RUNOFF CALCULATIONS NO ENHANCEMENTS - POST-DEVELOPMENT

Residential	11.02 ha	27 lots
Roof tops	0.54 ha	0% infiltration for roof top. Assume house & garage footprint is 2150 sq. ft (200 sq. m)
Lawn	10.48 ha	Remaining area assumed to be lawn / landscaping. Infiltration as per Urban Lawns
Block 33 - Emergency access	0.01 ha	Asphalt - zero infiltration
Block 34 - Emergency access	0.04 ha	Asphalt - zero infiltration
Block 35 - Stormwater Management	0.38 ha	Assume zero infiltration
Block 36 - Stormwater Management	0.27 ha	Assume zero infiltration
Block 37 - Road right-of-way	1.82 ha	Asphalt - zero infiltration
Block 38 - Environmental setback	0.86 ha	Infiltration as per Pasture and Shrubs
Block 39 - Wetland	1.52 ha	Infiltration as per Mature Forests

INFILTRATION AND RUNOFF SUMMARY

	Infiltration	*Runoff*
Pre-Development	28256.9 m^3	17713.8 m^3
Post-Dev. (no enhancements)	21756.0 m^3	29196.1 m^3
Δ Pre- vs Post-	-6500.9 m^3	11482.4 m^3
% Difference	-23%	65%

Appendix B.4: Post-Development Water Balance Calculations - With Enhancements

Soil Unit	Water Holding Capacity (mm)	Hydrologic Soil Group	Precipitation (mm)	ET (mm)	Surplus	Runoff (mm)	Infiltration (mm)	Infiltration Factor	Slope*	Veg.*	Soil*
Urban Lawns/Shallow Rooted Crops (spinach, beans, beets, carrots)											
Fine Sand	50	A	855.4	541.9	313.5	94.0	219.4	0.7	0.2	0.1	0.4
Fine Sandy Loam	75	B	855.4	551.9	303.5	121.4	182.1	0.6	0.2	0.1	0.3
Silt Loam	125	C	855.4	562.9	292.5	131.6	160.9	0.55	0.2	0.1	0.25
Clay Loam	100	CD	855.4	557.9	297.5	148.7	148.7	0.5	0.2	0.1	0.2
Clay	75	D	855.4	551.9	303.5	182.1	121.4	0.4	0.2	0.1	0.1
Moderately Rooted Crops (corn and cereal grains)											
Fine Sand	75	A	855.4	551.9	303.5	75.9	227.6	0.75	0.2	0.15	0.4
Fine Sandy Loam	150	B	855.4	565.9	289.5	101.3	188.1	0.65	0.2	0.15	0.3
Silt Loam	200	C	855.4	569.9	285.5	114.2	171.3	0.6	0.2	0.15	0.25
Clay Loam	200	CD	855.4	569.9	285.5	128.5	157.0	0.55	0.2	0.15	0.2
Clay	150	D	855.4	565.9	289.5	159.2	130.3	0.45	0.2	0.15	0.1
Pasture and Shrubs											
Fine Sand	100	A	855.4	557.9	297.5	74.4	223.1	0.75	0.2	0.15	0.4
Fine Sandy Loam	150	B	855.4	565.9	289.5	101.3	188.1	0.65	0.2	0.15	0.3
Silt Loam	250	C	855.4	572.9	282.5	113.0	169.5	0.6	0.2	0.15	0.25
Clay Loam	250	CD	855.4	572.9	282.5	127.1	155.4	0.55	0.2	0.15	0.2
Clay	200	D	855.4	569.9	285.5	157.0	128.5	0.45	0.2	0.15	0.1
Mature Forests											
Fine Sand	250	A	855.4	572.9	282.5	70.6	211.8	0.75	0.15	0.2	0.4
Fine Sandy Loam	300	B	855.4	574.9	280.5	98.2	182.3	0.65	0.15	0.2	0.3
Silt Loam	400	C	855.4	576.9	278.5	111.4	167.1	0.6	0.15	0.2	0.25
Clay Loam	400	CD	855.4	576.9	278.5	125.3	153.2	0.55	0.15	0.2	0.2
Clay	350	D	855.4	575.9	279.5	153.7	125.8	0.45	0.15	0.2	0.1

Notes:
*From Hydrogeological Technical Information Requirements for Land Development Applications, MOEE 1995.
Areas are based upon information from Site Plan, Figure 1.
Enhancements based upon Low Impact Development Stormwater Management Planning and Design Guide (Version 1.0, 2010); AND
Wet Weather Flow Management Guidelines , November 2006.

Site Data

Residential	11.02 ha	69%
Block 33 - Emergency access	0.01 ha	0%
Block 34 - Emergency access	0.04 ha	0%
Block 35 - Stormwater Management	0.38 ha	2%
Block 36 - Stormwater Management	0.27 ha	2%
Block 37 - Road right-of-way	1.82 ha	11%
Block 38 - Environmental setback	0.86 ha	5%
Block 39 - Wetland	1.52 ha	10%
Total Area of Site	15.92 ha	100%

Assume soil is best represented by Fine Sandy Loam "B" after adding 300 mm of topsoil
Lot levelling for urban lawn areas.
*Information based upon Low Impact Development Stormwater Management Planning and Design Guide (2010)

AVERAGE ANNUAL INFILTRATION and RUNOFF CALCULATIONS WITH ENHANCEMENTS - POST-DEVELOPMENT

Residential	11.02 ha	27 lots
Roof tops	0.54 ha	50% runoff reduction via downspout disconnection. Assume house & garage footprint is 2150 sq. ft (200 sq. m)
Lawn	10.48 ha	Remaining area assumed to be lawn / landscaping. Infiltration as per Urban Lawns
Block 33 - Emergency access	0.01 ha	Asphalt - assume 10% infiltration
Block 34 - Emergency access	0.04 ha	Asphalt - assume 10% infiltration
Block 35 - Stormwater Management	0.38 ha	Assume 1/2 of this block has pasture and shrubs; 1/2 of block has SWMP with 5% infiltration and 95% runoff
Block 36 - Stormwater Management	0.27 ha	Assume 1/2 of this block has pasture and shrubs; 1/2 of block has SWMP with 5% infiltration and 95% runoff
Block 37 - Road right-of-way	1.82 ha	Asphalt - assume 10% infiltration
Block 38 - Environmental setback	0.86 ha	Infiltration as per Pasture and Shrubs - no enhancements in this area
Block 39 - Wetland	1.52 ha	Infiltration as per Mature Forests - no enhancements in this area

INFILTRATION AND RUNOFF SUMMARY

	Infiltration	*Runoff*
Pre-Development	28256.9 m^3	17713.8 m^3
Post-Dev. (w enhancements)	27368.6 m^3	23583.5 m^3
Δ Pre- vs Post-	-888.3 m^3	5869.8 m^3
% Difference	-3%	33%

Stantec Consulting Ltd.
100-300 Hagey Boulevard, Waterloo ON N2L 0A4

July 5, 2016
File: 160900451

Attention: Ms. Caitlin Robinson, B.E.S., Planner
County of Peterborough
470 Water Street
Peterborough ON K9H 3M3

Dear Ms. Robinson,

Reference: Response to Hydrogeology Peer Review Responses by GHD Limited
Hydrogeology Assessment
Proposed Residential Development, Demonte Acres Inc.
Part Lot 27, Concession 10, Otonabee Ward Township of Otonabee-South Monaghan
(County File No. 15T-16002)

The County of Peterborough requested Stantec Consulting Ltd. (Stantec) to peer review the hydrogeology reports in support of the above noted development application and provided comments in a letter dated March 8, 2016. GHD Limited (GHD) responded to the Stantec comments, in a letter dated May 29, 2016. Our response is provided below. The following conclusions and recommendations were provided in the Stantec letter of March 8, 2016.

- Shallow groundwater movement and the high groundwater table need to be defined to assist with the design of the proposed subdivision.

- Stantec does not support the nitrate loading assessment, based on different input parameters used in the nitrate loading calculation, as compared to the area used in the Planning Report and the recharge (infiltration) rate used in the storm water management water balance assessment. It is recognized that the Geo-Logic report was prepared earlier than the Planning Report and Application and may not have been revised accordingly using the updated information. It is recommended that the nitrate impact assessment be updated to reflect the updated information in the Planning document and address the issue of the difference in the infiltration values between the water balance assessment and the nitrate loading assessment.

- The water supply assessment indicates the test wells produce water on low end of the requirements by the MOECC. Several wells produced less than the minimum requirement of 13.7 L/min. Geo-Logic has proposed that for the low producing wells, an engineered storage system and flow control for the well can be implemented. Stantec agrees that this is possible and MOECC Guidelines allow this. If the development does proceed to approval stage, it should be indicated to any potential purchaser that the water supply system may require additional engineering given the possibility of a low yielding well.

Reference: Response to Hydrogeology Peer Review Responses by GHD Limited
Hydrogeology Assessment
Proposed Residential Development, Demonte Acres Inc.
Part Lot 27, Concession 10, Otonabee Ward Township of Otonabee-South Monaghan
(County File No. 15T-16002)

In response to the first point, GHD conducted additional test pitting and installed piezometers at nine locations to obtain shallow water levels. Results indicate a radial flow pattern in the shallow groundwater, away from the topographically higher central portion of the Site. Water level data indicate that many areas of the proposed development show a depth to water between 0.5 metres below ground surface (mbgs) and 2.0 mbgs. Based on the shallow groundwater levels, GHD recommended raised septic beds for the development. We note that there was limited water level data, measured on two occasions in May, 2016. Water level data should continue to be collected to determine high water table conditions and refine the final design of the septic systems. We also note that the high water table conditions could impact the basement depths/elevations. The basement levels should be designed to minimize the potential to be within high water table conditions requiring continuous operation of sump pumps.

In response to the second point, GHD modified the area of the development and updated the infiltration rate. The area of the development used in the nitrate loading assessment was lowered from 19 hectares (ha) to 15.92 ha, based on the updated planning documents. The infiltration rate was lowered from 200 mm per year to 185 mm/year. Based on the changes to the nitrate loading assessment, it was concluded that the development could support 27 lots rather than 32 lots, to remain under the 10 mg/L nitrate concentration at the property boundary. It is our opinion that the updated water balance post-development infiltration may be optimistic, based on anticipated infiltration volumes from the development design. We would suggest that roof top run off into "soak away pits" or swales may aid in increasing infiltration.

Stantec does note that there is some complexity to the nitrate loading assessment, given that it is interpreted there is radial flow away from the centre of the Site, so the "downgradient" boundary for the nitrate loading assessment is a considerable portion of the boundary of the Site. Based on the setting of the Site, the level of natural protection of the bedrock aquifer, and the regional groundwater flow direction in the bedrock aquifer, the nitrate loading assessment is likely conservative, and further assessment is not required.

There was no response to the third point, as Stantec agreed to the approach for engineered storage and flow controls for any new wells. We would also recommend that any new wells be drilled into the bedrock aquifer and be cased and sealed in accordance with Ontario Regulation 903.

Reference: Response to Hydrogeology Peer Review Responses by GHD Limited
Hydrogeology Assessment
Proposed Residential Development, Demonte Acres Inc.
Part Lot 27, Concession 10, Otonabee Ward Township of Otonabee-South Monaghan
(County File No. 15T-16002)

STANTEC CONCLUSIONS

Based on our review of the hydrogeological investigations and the findings of the investigations, we find the currently proposed development to be acceptable, provided the recommendations presented during the review process are followed. These include:

- any potential purchaser should be advised that the water supply system may require additional engineering given the possibility of a low yielding well
- ultraviolet treatment for bacteria should be added to any treatment recommended as a precaution
- raised septic beds will be required for the development
- any new wells will be drilled into the bedrock aquifer and cased and sealed in accordance with Ontario Regulation 903
- water level data will continue to be collected to determine high water table conditions and to refine the final design of the septic systems
- storm water from roof top run off should be assessed to determine if "soak away pits" or swales may be used to aid in increasing infiltration
- basement levels/elevations should be designed to minimize the potential to be within high water table conditions

We trust these comments are sufficient for your purposes; however if you have any questions or require clarification, please do not hesitate to contact the undersigned.

Regards,

STANTEC CONSULTING LTD.

Roger Freymond
Senior Hydrogeologist
roger.freymond@stantec.com

Ray Blackport
Senior Hydrogeologist
ray.blackport@stantec.com

be n:\01609\active\160950451\planning\correspondence\let_robinson_20160705.docx

Appendix F
Health Unit Conditions

Peterborough Public Health

185 King Street
Peterborough, Ontario K9J 2R8
Tele: (705) 743-1000 - Fax (705) 743-1203

Application For Subdivision

Application #: 15T-16002 Receipt Number

Agency Through Which Application Is Entered County Land Division

Inspector: K. Shepherd Inspector's Title Chief Building Offic

Date Application Received: 08/02/2016 Date Reported: 08/02/2016 Condominium Proposal?

Owner and Location

Last Name: Demonte Initial: A Address 2752 Old Norwood Rd.

City/Town Keene Postal Code K0L2G0 Home Tele#: Office Tele#

Legal Description of Property

County/District Peterborough Twnshp/Municipal Otonabee Lot 27 Concession 10

Plan Number - Sublot - Address Burnham Line/Hwy 7 Town

Map Data

UTM #: Map Reference Map Date: # of Lots 32

Recommended for Approval

Description of Proposal

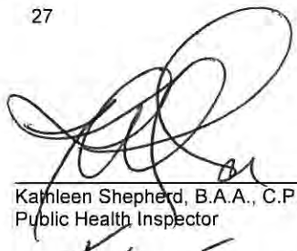
The subdivision proposal involves the creation of 27 residential lots to be serviced with individual Class 4 conventional sewage systems and individual wells, and 4 Blocks, situated on 15.92 hectares of land. The site to be developed is comprised of undeveloped lands with vegetation comprised of pasture, trees, bushes and tall grasses. The development surrounds residential properties located off of Woodview Drive and Lancaster Road.

Recommendations

Each proposed residential lot has been assessed for its' capability to accommodate Class 4 conventional sewage systems. Peterborough Public Health requires that each residential property created must have sufficient area for the installation of a Class 4 conventional sewage system to service a modest 3 bedroom dwelling. Due to the existing soil type, glacial till, raised beds are proposed and an area of 357 metres is required to accommodate a conventional Class 4 sewage system. Each lot has been inspected for it's suitability for the installation of a Class 4 conventional sewage system. This subdivision is approved by this office.

Lot # Table	Soil Type	Depth to High Water
1	0-1' Topsoil 1-2.5 ' Silty Sand Till	HWT @ 2.5'
2	0-8" Topsoil 8"-5' Silty Sand Till	HWT Damp @ 3'
3	0-1' Topsoil 1-6' Silty Sand Till	HWT @ 2'
4	0-1' Topsoil 1-6' Silty Sand Till	HWT @ 2'
5	0-1' Topsoil 1-2' Silty Sand Till	HWT @ 2'
6	0-1' Topsoil 1-3' Silty Sand Till	HWT @ 2.5'
7	0-1.5' Topsoil 1.5-5' Silty Sand Till	HWT @ 2.5'
8	0-1.5' Topsoil 1.5-2.5' Silty Sand Till	HWT @ 2.5'
9	0-1' Topsoil 1-5' Silty Sand Till	HWT @4.5'
10	0-1' Topsoil 1-2' Loam 2-5' Silty Sand Till	EST HWT @4.5'
11	0-1' Topsoil 1-3.5' Silty Sand Till	HWT @ 3.5'
12	0-1' Topsoil 1-5' Silty Sand Till	
13	0-1' Topsoil 1-5' Silty Sand Fill	
14	0-1' Topsoil 1-4.5' Silty Sand Till	HWT @ 4.5'
15	0-1' Topsoil	HWT @ 1'
16	0-1' Topsoil	HWT @ 1'
17	0-1' Topsoil	HWT @ 1'

18	0-18" Topsoil	HWT @ 18"
19	0-6" Topsoil 6"-6' Silty Sand Till	
20	0-6" Topsoil 6"-6' Silty Sand Till	
21	0-6" Topsoil 6"-6' Silty Sand Till	
22	0-6" Topsoil 6"-6' Silty Sand Till	
23	0-6" Topsoil 6"-6' Silty Sand Till	HWT @ 3'
24	0-1' Topsoil 1-5' Silty Sand Till	HWT @ 3'
25	0-1' Topsoil 1-5' Silty Sand Till	
26	0-1' Topsoil 1-5' Silty Sand Till	HWT @ 5'
27	0-1' Topsoil 1-5' Silty Sand Till	HWT @ 5'



Kathleen Shepherd, B.A.A., C.P.H.I. ©
Public Health Inspector

July 5, 2016
Date

about GHD

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental, and construction services to private and public sector clients.

Steve Gagne, H.S.Bc.
steve.gagne@ghd.com
705-768-6350

Robert Neck, P.Geo. (Limited)
robert.neck@ghd.com
249-494-0610

www.ghd.com