

December 21, 2018

File: 60369.15

Touchstone Contracting and Engineering Ltd.
P.O Box 124
Greely, Ontario
K4P 1N4

Attention: Mr. David Kurosky

**Re: Hydrogeological Investigation and Terrain Analysis
Proposed Warehouse Building
9460 Mitch Owens Road
5606, 5630, 5592 Boundary Road
Ottawa, Ontario**

This letter presents comments and updates for a previously completed hydrogeological investigation for the above noted subject site by Houle Chevrier Engineering Ltd. (HCEL) entitled "Well Evaluation Report, Mitch Owens and Boundary Road, Ottawa, Ontario" dated November 11, 2010. No new field work was performed for this update.

1.0 WATER QUANTITY

As part of the original study, the water supply well was pumped at a rate of approximately 14 litres per minute for a period greater than six (6) hours. The measured drawdown of the water level in the water supply well was approximately 4.8 metres which represents approximately 18 percent of the available drawdown in the water supply well. The resulting groundwater withdrawal was approximately 5,180 litres.

Based on the results of the pumping test and site plan details at the time of the investigation, sufficient quantities of water are available from the water supply well for a 'typical' commercial development. If the water demand for the proposed development exceeds the previous pumping test rate, then additional pump testing or well drilling may be required.

2.0 WATER QUALITY

Water quality samples were collected for 'subdivision package' parameters on September 23, 2010 during the 6-hour pumping test. The aesthetic objectives and operational guideline exceedances are summarized below; it is noted that no health-related maximum acceptable concentrations were exceeded. Refer to the Well Evaluation Report for further comments on the water quality.

The following Aesthetic Objectives (AO) were exceeded:

- Chloride
- Colour
- Hydrogen Sulphide
- Sulphate
- Total Dissolved Solids
- Turbidity
- Sodium
- Iron

The following Operational Guideline (OG) was exceeded:

- Hardness

The water quality does not meet the Ontario Drinking Water Standards (ODWS), Maximum Acceptable Concentrations, and the Maximum Concentration Considered Reasonably Treatable (MCCRT) for the following parameters:

- Chloride (311 and 314 mg/L) exceeds the ODWS aesthetic objective of 250 mg/L and the Maximum Reasonable Treatable Limit of 250 mg/L.
- Sodium (476 and 426 mg/L) exceeds the ODWS aesthetic objective of 200 mg/L and should be reported to the local Medical Officer of Health.

Based on a review of the Well Evaluation Report, the water quality does not meet the ODWS and MCCRT as outlined in MOECC Procedure D-5-5 for chloride and is considered to be aesthetically poor. The use of multiple water treatment systems is required to provide potable water for the proposed development; alternatively, groundwater can be used for the plumbing system only and potable water (e.g. bottled water) can be provided to employees.

The groundwater test well was drilled on August 11, 2010 and during the 6-hour pumping test completed on September 23, 2010, no total coliform, e.coli, fecal coliform or fecal streptococcus was detected; however, it is noted that the heterotrophic plate count was greater than 500 ct/100mL. It is our understanding that the test well has not been in use since 2010 and as such, the well should be chlorinated, circulated and tested for bacteriological parameters to ensure the groundwater meets the Ontario Drinking Water Standards for bacteria.

3.0 TERRAIN EVALUATION

The City of Ottawa requires a Hydrogeological Investigation and Terrain Analysis. It is understood that at the time of Well Evaluation Report preparation in 2010, an impact assessment was not required for commercial septic systems less than 10,000 litres per day.

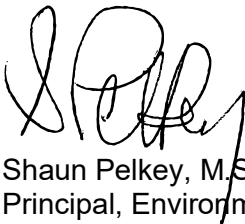
Geology maps from the urban geology database of Canada's National Capital Region (Geological Survey of Canada, Open File 2878, 1994) indicate that the subsurface conditions are expected to consist of overburden deposits of sand underlain by marine deposits of silty clay. The bedrock is mapped as shale of the Carlsbad formation at depths of between 15 and 25 metres.

A total for five (5) boreholes were advanced as part of the geotechnical investigation carried out at the subject site, entitled "Geotechnical Investigation, Proposed Warehouse Building, 9460 Mitch Owens Road, 5606, 5630, 5592 Boundary Road, Ottawa, Ontario" dated December 18, 2018. Two (2) deep boreholes (BH10-1 and 10-2), completed to depths of 6.71 and 15.85 metres below ground surface, encountered 6.26 and 15.44 metres of silty clay below ground surface. Borehole logs and grain size analysis are attached for reference. Based on a review of geologic mapping and the thick silty clay encountered at the subject site, the site is not anticipated to be hydrogeologically sensitive and no negative septic impacts are anticipated to the water supply aquifer.

We trust this letter provides sufficient information for your present purposes. If you have any questions concerning this letter, please do not hesitate to contact our office.



Andrius Paznekas, M.Sc.
Environmental Scientist



Shaun Pelkey, M.Sc.E., P.Eng.
Principal, Environmental Engineer

Attachments: Borehole Logs, Grain Size Analysis, HCEL Well Evaluation Report

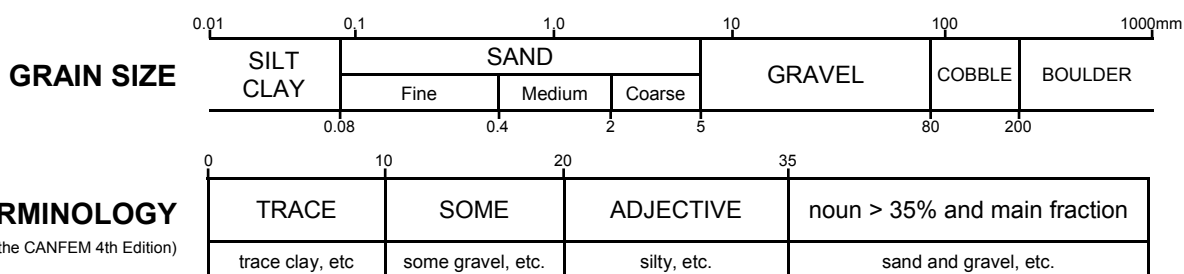
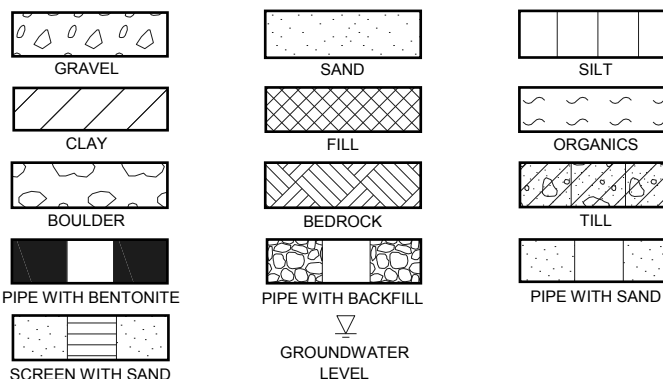
ABBREVIATIONS AND TERMINOLOGY USED ON RECORDS OF BOREHOLES AND TEST PITS

SAMPLE TYPES	
AS	Auger sample
CA	Casing sample
CS	Chunk sample
BS	Borros piston sample
GS	Grab sample
MS	Manual sample
RC	Rock core
SS	Split spoon sampler
ST	Slotted tube
TO	Thin-walled open shelby tube
TP	Thin-walled piston shelby tube
WS	Wash sample

SOIL TESTS	
w	Water content
PL, w_p	Plastic limit
LL, w_L	Liquid limit
C	Consolidation (oedometer) test
D_R	Relative density
DS	Direct shear test
G_s	Specific gravity
M	Sieve analysis for particle size
MH	Combined sieve and hydrometer (H) analysis
MPC	Modified Proctor compaction test
SPC	Standard Proctor compaction test
OC	Organic content test
UC	Unconfined compression test
γ	Unit weight

PENETRATION RESISTANCE	
Standard Penetration Resistance, N The number of blows by a 63.5 kg (140 lb) hammer dropped 760 millimetres (30 in.) required to drive a 50 mm split spoon sampler for a distance of 300 mm (12 in.). For split spoon samples where less than 300 mm of penetration was achieved, the number of blows is reported over the sampler penetration in mm.	
Dynamic Penetration Resistance The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) to drive a 50 mm (2 in.) diameter 60° cone attached to 'A' size drill rods for a distance of 300 mm (12 in.).	
WH	Sampler advanced by static weight of hammer and drill rods
WR	Sampler advanced by static weight of drill rods
PH	Sampler advanced by hydraulic pressure from drill rig
PM	Sampler advanced by manual pressure

COHESIONLESS SOIL Compactness		COHESIVE SOIL Consistency	
SPT N-Values	Description	C_u , kPa	Description
0-4	Very Loose	0-12	Very Soft
4-10	Loose	12-25	Soft
10-30	Compact	25-50	Firm
30-50	Dense	50-100	Stiff
>50	Very Dense	100-200	Very Stiff
		>200	Hard



DESCRIPTIVE TERMINOLOGY

(Based on the CANFEM 4th Edition)

PROJECT: 10-203

RECORD OF BOREHOLE 10-1

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Local

BORING DATE: June 9, 2010

SPT HAMMER: 63.5 kg; drop 0.76 m

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT, PERCENT					
								Cu, kPa				nat. V - + Q - ● rem. V - ⊕ U - ○					
								20	40	60	80	20	40	60			80
0		Ground Surface		99.88													
		Brown SILTY SAND		99.43 0.45													
		Stiff, reddish brown SILTY CLAY			1	50 D.O.	6										
2		Soft, grey SILTY CLAY		98.05 1.83	2	50 D.O.	2										
		- occasional grey silty sand seams throughout						⊕	+								
								⊕	+								
								⊕	+								
4	Power Auger 200 mm Diameter Hollow Stem				3	T.P. PH		+						○	C, MH		
5					4	T.P. PH		+									
6								⊕	+								
									+								
		End of borehole		93.17 6.71				⊕	+								
7																	
8																	
9																	
10																	

Groundwater level is 0.62 metres below original ground surface. Sampled on June 17, 2010.

BOREHOLE RECORD GINT LOGS 10-203.GPJ HCE DATA TEMPLATE GDT 2/2/11

DEPTH SCALE

1 to 50

Houle Chevrier Engineering Ltd.

LOGGED: M.L.

CHECKED: *jc*

Groundwater
level is 0.62
metres
below
orginal
ground
surface.
Sampled on
June 17,
2010.

PROJECT: 10-203

RECORD OF BOREHOLE 10-2

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Local

BORING DATE: June 9, 2010

SPT HAMMER: 63.5 kg; drop 0.76 m

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT, PERCENT					
								Cu, kPa		nat. V - + Q - ● rem. V - ⊕ U - ○							
								20	40	60	80	10 ⁻⁷	10 ⁻⁶	10 ⁻⁵			10 ⁻⁴
0		Ground Surface		99.89													
		Brown SILTY SAND		99.48													
				0.41													
1		Stiff, reddish brown SILTY CLAY			1	50 D.O.	5										
2				98.06	2	50 D.O.	2										
				1.83													
3		Soft to firm, Grey SILTY CLAY															
		- occasional silty sand seams throughout			3	T.P. PH											
4																	
5					4	50 D.O.	1										
6					5	50 D.O.	1										
7					6	T.P. PH											
8																	
9																	
10																	
11																	
12																	
				87.85													
				12.04													
13		Firm, dark grey SILTY CLAY			8	50 D.O. WH											
14																	
15																	
16		End of borehole		84.04													
				15.85													
17																	
18																	
19																	
20																	

Power Auger
200 mm Diameter Hollow Stem

<

BOREHOLE RECORD GINT LOGS 10-203.GPJ HCE DATA TEMPLATE.GDT 2/2/11

DEPTH SCALE

1 to 100

Houle Chevrier Engineering Ltd.

LOGGED: M.L.

CHECKED: *je*

Groundwater level is 1.55 metres below original ground surface. Sampled on June 17, 2010.

Bentonite seal
2" Diameter slotted well screen

Native Soil

PROJECT: 10-203

RECORD OF BOREHOLE 10-3

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Local

BORING DATE: June 10, 2010

SPT HAMMER: 63.5 kg; drop 0.76 m

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT, PERCENT					
								Cu, kPa		nat. V - + Q - ● rem. V - ⊕ U - ○		Wp — W — WI					
0	Power Auger 200 mm Diameter Hollow Stem	Ground Surface		100.16													
		Brown SILTY SAND															
1				99.09 1.07	1	50 D.O.	9										
		Stiff, reddish brown SILTY CLAY															
2				98.27 1.89	2	50 D.O.	3										
		Soft to firm, grey SILTY CLAY, trace silt seams															
3		End of borehole		97.26 2.90	3	50 D.O.	WH										
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Groundwater
conditions
not
observed

DEPTH SCALE

1 to 50

Houle Chevrier Engineering Ltd.

LOGGED: M.L.

CHECKED: *fe*

BOREHOLE RECORD GINT LOGS 10-203.GPJ HCE DATA TEMPLATE GDT 1/25/11

PROJECT: 10-203

RECORD OF BOREHOLE 10-4

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Local

BORING DATE: June 10, 2010

SPT HAMMER: 63.5 kg; drop 0.76 m

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT, PERCENT					
								Cu, kPa	nat. V - rem. V -	+ ⊕	Q - U -	Wp	W			WI	
0		Ground Surface		100.04													
	Power Auger 200 mm Diameter Hollow Stem	Brown SILTY SAND															
1																	
		Stiff, reddish brown SILTY CLAY, trace silt seams		98.97 1.07	1	50 D.O.	6										
		Soft to firm, Grey SILTY CLAY, trace silt seams		98.36 1.68	2	50 D.O.	2										
2		End of borehole		97.91 2.13													
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Groundwater
conditions
not
observed

DEPTH SCALE

1 to 50

Houle Chevrier Engineering Ltd.

LOGGED: M.L.

CHECKED: *jc*

PROJECT: 10-203

RECORD OF BOREHOLE 10-5

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Local

BORING DATE: June 10, 2010

SPT HAMMER: 63.5 kg; drop 0.76 m

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION									
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT, PERCENT													
								20		40		60		80			10 ⁻⁷		10 ⁻⁶		10 ⁻⁵		10 ⁻⁴		
								SHEAR STRENGTH Cu, kPa		nat. V - rem. V -		+ ⊕		Q - U -			Wp		W		Wi				
								20	40	60	80														
0	Power Auger 200 mm Diameter Hollow Stem	Ground Surface		100.87																					
		Loose, dark brown silty sand some gravel, trace clay [Fill Material]																							
1					1	50 D.O.	4																		
		Loose, brown SILTY SAND		99.45 1.42																					
2		Stiff, reddish brown SILTY CLAY		99.04 1.83	2	50 D.O.	6																		
		Soft to firm, grey SILTY CLAY, trace sandy silt seams		98.43 2.44	3	50 D.O.	1																		
3		End of borehole		97.97 2.90																					
4																									
5																									
6																									
7																									
8																									
9																									
10																									

Groundwater
conditions
not
observed

DEPTH SCALE

1 to 50

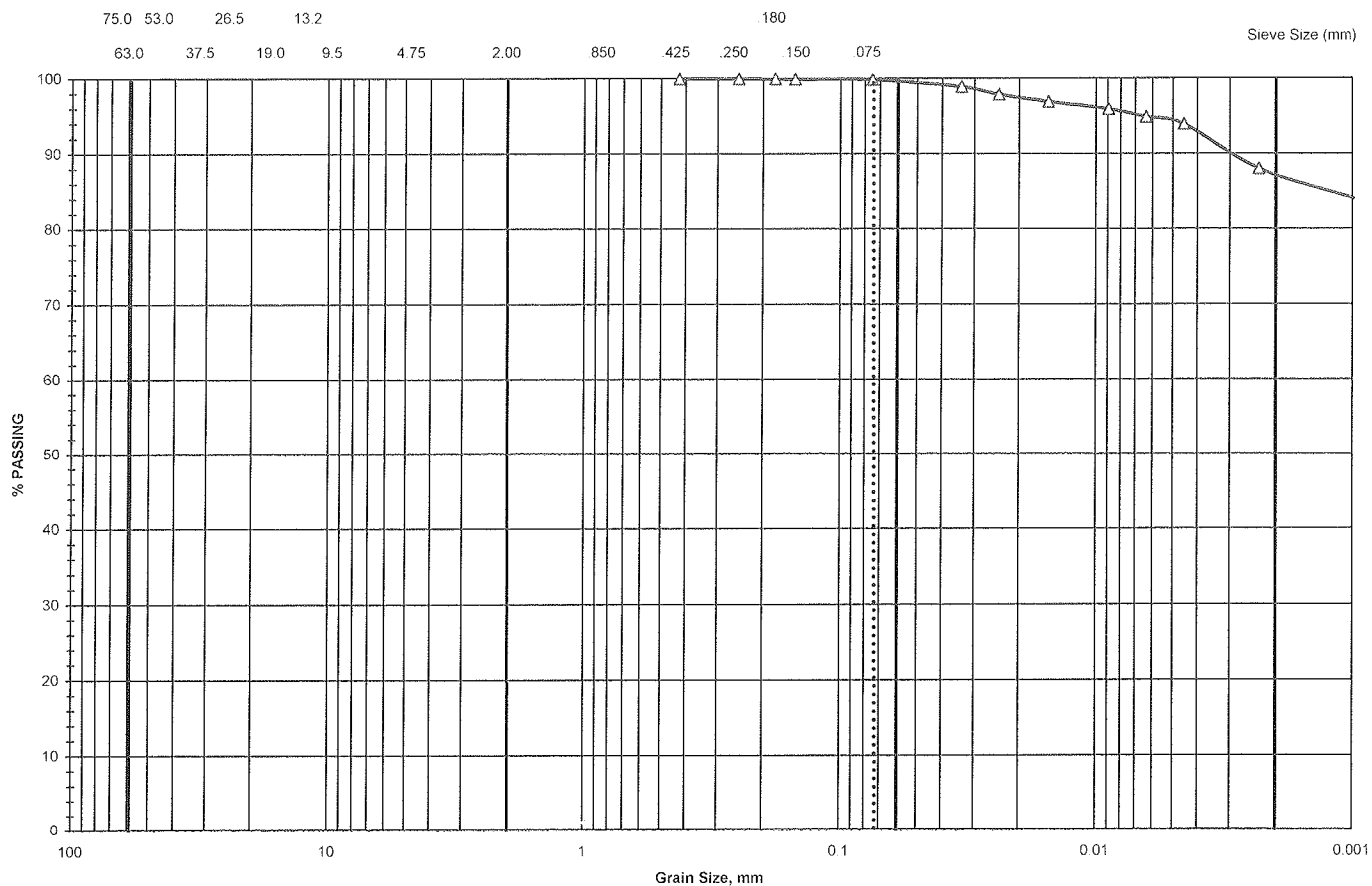
Houle Chevrier Engineering Ltd.

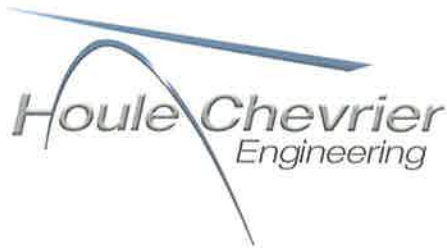
LOGGED: M.L.

CHECKED: *je*

GRAIN SIZE ANALYSIS

FIGURE A1





Houle Chevrier Engineering Ltd.

180 Wescar Lane

R.R. 2

Carp, Ontario K0A 1L0

Tel.: (613) 836-1422

Fax: (613) 836-9731

www.hceng.ca

REPORT ON

WELL EVALUATION REPORT MITCH OWENS AND BOUNDARY ROAD OTTAWA, ONTARIO

Submitted to:

O'Leary's Ltd.
3200 Rideau Road
Gloucester, Ontario
K1G 3N4

DISTRIBUTION:

4 copies - O'Leary's Ltd.

2 copies - Houle Chevrier Engineering Ltd.

November 2010

Our Ref: 10-203



Houle Chevrier Engineering Ltd.
180 Wescar Lane
R.R. 2
Carp, Ontario K0A 1L0
Tel.: (613) 836-1422
Fax: (613) 836-9731
www.hceng.ca

November 11, 2010

Our ref: 10-203

O'Leary's Ltd.
3200 Rideau Road
Gloucester, Ontario
K1G 3N4

Attention: Mr. Tony Cerquozzi

RE: HYDROGEOLOGICAL EVALUATION
MITCH OWENS ROAD AND BOUNDARY ROAD
OTTAWA, ONTARIO

Dear Sir:

This letter presents the results of a well evaluation carried out for a newly drilled well at a vacant property located to the southwest of the intersection of Mitch Owens Road and Boundary Road in Ottawa, Ontario (refer to Figure 1 - Key Plan). Additionally, the impact of the proposed septic system on the subsurface environment is investigated.

The purpose of the investigation was to confirm the following:

- That the well has been constructed in accordance with the Ministry of Environment requirements;
- That the quality of the water meets the Ministry of the Environment (MOE) Regulations, Standards, Guidelines and Objectives;
- That there is sufficient quantity for the intended use;
- The site is suitable for onsite disposal of wastewater using onsite septic disposal systems.

BACKGROUND

A new drinking water well was drilled on the site on August 11, 2010, by Olympic Drilling Co. Ltd. Copies of the Water Well and Well Compliance Records are provided in Attachment A following the tables of this letter. The approximate location of the well is indicated on the Site Plan, Figure 2.

A six (6) hour pump test was conducted on September 23, 2010, on the test well by Houle Chevrier Engineering Ltd. (HCEL) and water samples were collected during the third and final hour of pumping. The water samples were submitted to Exova Accutest laboratory for analysis of subdivision package parameters in accordance with MOE Procedure D-5-5.

The following sections provide the results of the six (6) hour duration pump test carried out on September 23, 2010.

WELL CONSTRUCTION

The drinking water well was drilled on August 11, 2010, by a licensed MOE well contractor (Olympic Drilling Co. Ltd.) using a rotary air percussion drill rig. A copy of the MOE Water Well Record is provided in Attachment A.

The well was constructed using a 150 millimetre diameter, No. 35 slot steel well screen set approximately 0.6 metres in the bedrock and approximately 2.4 metres in the overburden (that is, straddling the bedrock and overburden interface). A steel 150 millimetre well casing was set in place from the top of the well screen to approximately 0.6 metres above ground surface. Clear filter stone was placed from the bottom of the well screen to approximately 1.5 metres above the top of the well screen. Approximately 0.6 metres of bentonite hole plug was placed on top of the clear filter stone. The remainder of the annular space around the well casing was grouted using mixture of General Use Type 1 cement with 5% bentonite.

The grouting of the steel well casing was observed by Houle Chevrier Engineering Ltd. staff and a Certificate of Well Compliance was prepared certifying that the well casing has been constructed in accordance with MOE requirements (refer to Attachment A).

The construction details from the MOE Water Well Record are summarized in the following table:

Well Construction Details	
Depth to Bedrock	28.3 metres
Length of Well Screen	3.0 metres
Length of Well Casing	26.5 metres
Length of Well Casing below ground surface	25.9 metres
Length of Casing set into Bedrock	0.0 metres
Depth Water Found	Not Reported
Total Well Depth	29.0 metres

GROUNDWATER QUANTITY

A pumping test was carried out on the water well on September 23, 2010 to determine the characteristics of the water supply aquifer. As per MOE Guideline D-5-5, the well was pumped at a constant flow rate greater than 13.7 litres per minute for a minimum of 6 hours. The well was pumped at a constant rate of 14.2 litres per minute by HCEL.

Water level measurements were taken at regular intervals throughout the six (6) hour pumping test. Water levels were also taken during recovery phase of the pumping test (after the pump was turned off). The drawdown and recovery data and drawdown graph are provided in Attachment B. The drawdown data contained herein was measured with reference to the top of the well casing. Please note that the discharge rate on the drawdown data and graph sheets is listed as variable because the recovery period, where the discharge rate is zero, is included in

the same data set as the drawdown period. However, the actual discharge during the pumping of the water well was conducted at a constant rate greater than 13.7 litres per minute.

The transmissivity of the water supply aquifer was estimated based on a Theis analyses of the pump test drawdown and recovery data using Aquifer Test Pro 4.2, a commercially available software program from Waterloo Hydrogeologic Inc. The results of the Aquifer Test Pro 4.2 analysis is provided in Attachment C. The results of the analysis indicate that the expected transmissivity of the water supply aquifer ranges from approximately 0.8 to 2.4 m²/day.

Based on the results of the pumping test(s), there is sufficient quantity of groundwater available at the site for the intended use (reported to be a small commercial building).

GROUNDWATER QUALITY

Water samples were collected at three (3) and six (6) hours of pumping from the water well on September 23, 2010, by HCEL and submitted to Exova Accutest laboratory for analysis of subdivision package parameters. A copy of the laboratory certificates of analysis for the water samples is provided in Attachment D.

Field measurements for temperature, pH, conductivity, Total Dissolved Solids (TDS), turbidity and total chlorine were taken at regular intervals throughout the pumping test and are summarized in Table 1 following the text of this report. The laboratory results for the water samples collected at three (3) and six (6) hours are summarized in Table 2 following the text of this letter.

The results of the laboratory analysis on the water samples were compared to applicable standards provided in the Ontario Drinking Water Standards (ODWS). The results of the water quality analysis indicates that the water is suitable for consumption, with the exception of some aesthetic objective and operational guideline exceedances. The following comments are provided regarding the drinking water quality and exceedances of the ODWS:

Bacteriological Results

The results of the bacteriological analysis of the August 2010 water samples indicate that the well water meets all the standards of the ODWS for bacteriological parameters. In addition, the concentration of other bacteria indicator species such as faecal coliform and faecal streptococcus bacteria were determined to be non-detectable.

Total chlorine measurements made at regular intervals during the pumping test confirmed that total chlorine concentrations in the well water were non-detectable at the time of bacteriological sampling.

Chemical Results

The result of the chemical testing on the water samples indicates the aesthetic objectives for chloride, colour, hydrogen sulphide, pH (3 hour sample only), sulphate, total dissolved solids, turbidity, sodium and iron were exceeded. The operational guideline for hardness was also exceeded.

The above noted exceedances are discussed in the follow sections:

Chloride

The concentration of chloride in the water samples ranged from 311 to 314 mg/L and exceeded the aesthetic objective of 250 mg/L. Chloride is a non-toxic material in small amounts in drinking water and produces a detectable salty taste at the aesthetic objective level of 250 mg/L. Chloride is widely distributed in nature, generally as the sodium (NaCl), potassium (KCl) and calcium (CaCl₂) salts.

Point of Use (POU) reverse osmosis systems are capable of effectively removing up to 96 percent of chloride in drinking water. A reverse osmosis system treating the raw water would reduce chloride concentrations in the water at the subject site to levels well below the aesthetic objective. Therefore, the level of chloride in the water is considered to be reasonably treatable by POU reverse osmosis.

Colour

The level of colour in the water samples was 5 TCU which is equal to the aesthetic objective of 5 TCU. The MOE Procedure D-5-5 document indicates that the maximum concentration considered reasonably treatable by charcoal filters is 7 TCU. Therefore, the level of colour in the water is considered to be reasonably treatable by charcoal filters.

Hydrogen Sulphide

The concentrations of hydrogen sulphide in the water samples was <0.1 and 0.08 mg/L, respectively, and exceeded the Ontario Drinking Water Standards (ODWS) aesthetic objective of 0.05 mg/L.

Elevated concentrations of hydrogen sulphide are typically characterized by an unpleasant odour (rotten egg smell) and, when in present in association with iron, can produce black stains on laundered items and black deposits on pipes and fixtures.

The Ministry of Environment document entitled "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines" indicates that low levels of hydrogen sulphide can be removed effectively from most well water by aeration. Hydrogen sulphide can also be effectively treated through the use of activated charcoal filters, chlorination, manganese greensand filters and other forms of oxidizing treatment.

Based on the relatively low levels of hydrogen sulphide detected in the water samples (that is, less than 1.0 mg/L), the level of hydrogen sulphide in the well water is considered to be reasonably treatable by aeration.

pH

The level of pH in the water sample collected at 3 hours was 8.51 and exceeded the operational guideline of 8.5. The level of pH in the water sample collected at 6 hours was 8.44 was within the permissible range specified by the operational guideline. Field measurements collected during the pumping test show that pH was below the operational guideline and exhibited a downward trend.

Based on the results of the 6 hour sample and the field pH measurements, the level of pH in the water available from the test well is acceptable.

Sulphate

The concentration of sulphate in the water samples ranged from 509 to 519 mg/L and exceeded the aesthetic objective of 500 mg/L. At levels above the aesthetic objective, sulphate may have a laxative effect, however, regular users adapt to high levels of sulphate in drinking water and problems are usually experienced by only visitors and new consumers. The presence of sulphate in drinking water above 150 mg/L may result in noticeable taste, however, this depends on the associated metals present in the water. In addition, sulphate may be converted to sulphide by some anaerobic bacteria creating odour problems.

Point of Use (POU) reverse osmosis systems are capable of effectively removing up to 99 percent of sulphate in drinking water. A reverse osmosis system treating the raw water would reduce sulphate concentrations in the water at the subject site to levels well below the aesthetic objective. Therefore, the level of sulphate in the water is considered to be reasonably treatable by POU reverse osmosis.

Total Dissolved Solids

The concentration of Total Dissolved Solids (TDS) in the water samples ranged from 1,810 to 1,820 mg/L and exceeded the aesthetic objective of 500 mg/L. The term total dissolved solids refers mainly to inorganic substances dissolved in water. The principal constituents of TDS are chloride, sulphates, calcium, magnesium and bicarbonates. Excessive hardness, taste, mineral deposition or corrosion are common properties of highly mineralized water.

As per Table 3 in the Appendix of the MOE Guideline D-5-5, rationale must be provided that corrosion, encrustation or taste problems will not occur when there are exceedances of the ODWS for TDS.

To determine the corrosive nature of the groundwater, the Langelier Saturation Index (LSI) and the Ryznar Stability Index (RSI) were calculated for the samples obtained from the well. These values are based on the TDS, temperature, pH, alkalinity (as CaCO₃), calcium (as CaCO₃), chloride and sulphate levels observed in the samples. The LSI was calculated to be 0.70 and the RSI was calculated to be 7.0. Information from the American Water Works Association indicates that the desired range of LSI and RSI values to prevent corrosion and scaling is an LSI greater than 0 and an RSI between 5.0 and 7.0. Based on the LSI and RSI values for samples from this well, the groundwater from the test well is within the desired range, therefore, the degree of corrosion and scaling of plumbing should be acceptable and we do not anticipate any discernable taste problems.

Turbidity

Laboratory measurements of turbidity from the water samples ranged from 20.4 to 28 NTU and exceeded the ODWS aesthetic objective of 5.0 NTU. Field measurements made during the pumping test on September 23, 2010 indicate that the turbidity of the water ranged from 29 to 243 NTU and exceeded the ODWS aesthetic objective of 5.0 NTU. Turbidity levels in excess of 5.0 NTU become visible to the naked eye and as such a majority of consumers may object to its presence.

Additional pumping of the well was carried out during the period of September 23 to 27, 2010 to demonstrate that turbidity levels, as measured in the field, would continue to decrease until the level of turbidity in the well water was below the ODWS aesthetic objective.

The additional pumping from September 23 to 27, 2010 was carried out at a flow rate of 14.2 litres per minute by Olympic Drilling Co. Ltd. The results of the field turbidity measurements on September 24 and 27, 2010 are provided in Table 3 following the text of this report. Following the additional pumping, the turbidity in the field was demonstrated to be 0.0 NTU on September 27, 2010.

Therefore, as the turbidity level of the well water has been demonstrated to have been reduced below the ODWS aesthetic objective through additional pumping, the level of turbidity in the test well is not considered to be of concern.

Hardness

The hardness of the water samples ranged from 226 to 246 mg/L as CaCO_3 and exceeded the ODWS operational guideline for hardness. Water having a hardness above 100 milligrams per litre as CaCO_3 is often softened for domestic use. Water softeners are widely used throughout rural areas to treat hardness and there is no upper treatable limit for hardness.

Water softening by conventional sodium ion exchange water softeners that use sodium chloride may introduce relatively high concentrations of sodium into the drinking water that may be of concern to persons on a sodium restricted diet. The use of potassium chloride in the water softener (which adds potassium to the water instead of sodium); could be considered as a means of reducing sodium in the water.

Sodium

The concentration of sodium in the water samples in the water samples ranged from 426 to 476 mg/L and exceeded the aesthetic objective of 200 mg/L. At concentrations exceeding the aesthetic objective, a salty taste can be detected. In addition, concentrations of sodium above 20 mg/L may be of concern for persons on sodium restricted diets.

Point of Use (POU) reverse osmosis systems are capable of effectively removing up to 97 percent of sodium in drinking water. A reverse osmosis system treating the raw water would reduce sodium concentrations in the water at the subject site to levels well below the aesthetic objective. Therefore, the level of sodium in the water is considered to be reasonably treatable by POU reverse osmosis.

Iron

The iron concentration water samples ranged from 0.56 to 0.75 mg/L and exceeded the aesthetic objective of 0.3 mg/L listed by the ODWS.

MOE Procedure D-5-5 indicates that iron concentrations up to 5.0 mg/L are considered treatable by conventional water softeners. The iron concentrations in the onsite water well are well below the treatable limit for water softeners provided by MOE Procedure D-5-5.

IMPACT ASSESSMENT

An impact assessment is not required for commercial septic systems less than 10,000 litres per day. Therefore, the septic system for the commercial building is required to be less than 10,000 litres per day. The design of the septic disposal system for this building is in progress by HCEL. It is expected that the septic system design flow will be much less than 10,000 litres per day.

CONCLUSIONS

Based on the results of the six (6) hour pumping test carried out on September 23, 2010, the quantity of water from the test well is considered to be sufficient for the proposed development.


The laboratory analysis and field measurements of water quality indicate that the water meets the ODWS standards, guidelines and objectives, with the exception of some aesthetic objective and operational guidelines exceedances. All parameter exceedances of the ODWS were found to be reasonably treatable using conventional water softeners, charcoal filters, aeration and point of use reverse osmosis treatment systems.

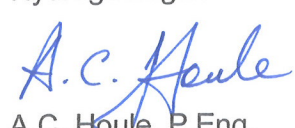
Based on the results of our investigation, the onsite test well has been constructed in accordance with MOE requirements, the water quality meets the ODWS guidelines, objectives and standards (with the exception of several parameter exceedances which were determined to be within treatable limits) and the well has demonstrated that there is sufficient quantity of water available at the subject site for the proposed development.

We trust that this letter is sufficient for your purposes. If you require additional information or if we could be of further assistance to you on this project, please do not hesitate to call.

Yours truly,

HOULE CHEVRIER ENGINEERING LTD.


James McEwen, B.Sc., B.Eng.
Hydrogeologist


A.C. Houle, P.Eng.
Principal

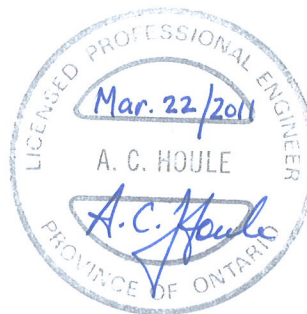


Figure 1 - Key Plan

Figure 2 - Site Plan

Table 1 - Field Measurements

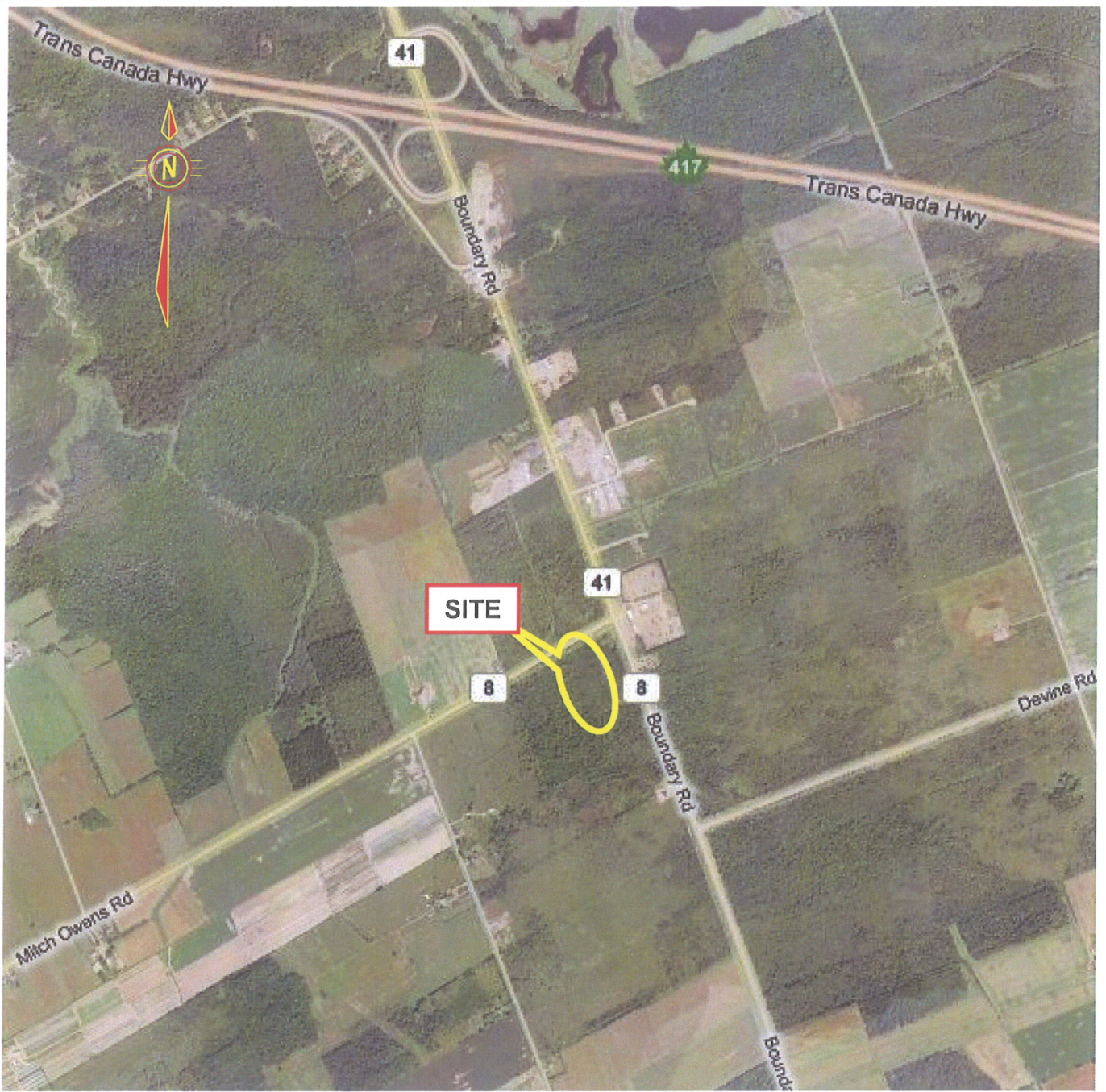
Table 2 - Summary of Laboratory Analysis

Table 3 - Additional Field Measurements

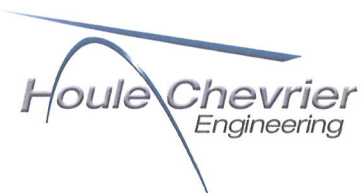
Attachments A, B, C and D

KEY PLAN

FIGURE 1



N.T.S



Date: June 2010
Project: 10-203



LEGEND

 TW 1 APPROXIMATE TEST WELL LOCATION IN PLAN, CURRENT INVESTIGATION BY HOULE CHEVRIER ENGINEERING LTD.

 PROPERTY BOUNDARY

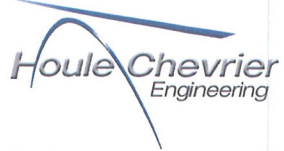
Client O'LEARY'S LTD.		Location MITCH OWENS ROAD AND BOUNDARY ROAD OTTAWA, ON	Revision 0
Drawn by D.J.R	Approved by A.C.H.	Project No. 10-203	Approx. Scale 1:2000
		Title SITE PLAN	
		Date November 2010	FIGURE 2

Table 1 - Summary of Test Well Field Measurements - September 23, 2010

Time from Start of Pumping (hours)	Temperature (°C)	Turbidity (NTU)	Total Chlorine (mg/L)	pH	Conductivity (uS)	Total Dissolved Solids (ppm)
1	10.4	243	0.0	8.48	2445	1224
2	10.4	125	0.0	8.47	2461	1227
3	11.1	90	0.0	8.45	2468	1241
4	11.5	53	0.0	8.45	2488	1243
5	11.6	48	0.0	8.42	2484	1240
6	11.5	29	0.0	8.36	2479	1238

Table 2 - Summary of Test Well Laboratory Reports Analysis - September 23, 2010

PARAMETER	UNITS	TW1 - 3hr	TW1 - 6hr	ONTARIO DRINKING WATER STANDARD	TYPE OF STANDARD
Total Coliforms	ct/100mL	0	0	0	MAC ⁽¹⁾
Escherichia Coli	ct/100mL	0	0	0	MAC
Heterotrophic Plate Count	ct/1mL	>500	>500	-	-
Faecal Coliforms	ct/100mL	0	0	-	-
Faecal Streptococcus	ct/100mL	0	0	-	-
Alkalinity as CaCO ₃	mg/L	280	290	30-500	OG ⁽²⁾
Chloride	mg/L	311	314	250	AO ⁽³⁾
Colour	TCU	5	5	5	AO
Conductivity	µS/cm	2410	2430	-	-
Dissolved Organic Carbon	mg/L	2.7	2.8	5.0	AO
Fluoride	mg/L	0.68	0.67	1.5	MAC
Hydrogen Sulphide	mg/L	<0.1	0.08	0.05	AO
N-NH ₃ (Ammonia)	mg/L	1.30	1.27	-	-
N-NO ₂ (Nitrite)	mg/L	<0.10	<0.10	0.1 ⁽⁴⁾	MAC
N-NO ₃ (Nitrate)	mg/L	<0.10	<0.10	10 ⁽⁴⁾	MAC
pH		8.51	8.44	6.5-8.5	OG
Phenols	mg/L	<0.001	<0.001	-	-
Sulphate	mg/L	519	509	500	AO
Tannin & Lignin	mg/L	0.2	0.2	-	-
TDS (COND - CALC)	mg/L	1810	1820	500	AO
Total Kjeldahl Nitrogen	mg/L	1.31	1.25	-	-
Turbidity	NTU	28	20.4	5	AO
Hardness as CaCO ₃	mg/L	246	226	80-100	OG
Ion Balance		1.04	0.94	-	-
Calcium	mg/L	31	28	-	-
Magnesium	mg/L	41	38	-	-
Potassium	mg/L	21	21	-	-
Sodium	mg/L	476	426	200 ⁽⁵⁾	AO
Iron	mg/L	0.75	0.56	0.3	AO
Manganese	mg/L	0.03	0.02	0.05	AO
Organic Nitrogen	mg/L	0.01	0.00	0.15	OG

NOTES:

1. MAC = Maximum Acceptable Concentration
2. OG = Operational Guideline
3. AO = Aesthetic Objective
4. The total of Nitrate and Nitrite should not exceed 10 mg/litre
5. The aesthetic objective for sodium is 200 mg/litre. The local medical officer of health should be notified when the sodium concentration exceeds 20 mg/litre for persons on sodium restricted diets.
6. Organic Nitrogen is calculated as the difference between total Kjeldahl nitrogen and ammonia nitrogen.
7. '-' signifies no value provided in the ODWS guideline.

Table 3 - Summary of Additional Turbidity Field Measurements - September 24 - 27, 2010

Date and Time	Turbidity (NTU)
September 24, 2010, 3:00 pm	11.80
September 24, 2010, 3:05 pm	8.12
September 24, 2010, 3:10 pm	11.29
September 24, 2010, 3:15 pm	9.63
September 27, 2010, 4:00 pm	0.00

ATTACHMENT A
ONTARIO MINISTRY OF THE ENVIRONMENT
WATER WELL RECORD
AND
CERTIFICATE OF WELL COMPLIANCE

Instructions for Completing Form

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

• All metre measurements shall be reported to 1/10 th of a metre.						Ministry Use Only																					
• Please print clearly in blue or black ink only.						MUN						CON						LOT									
Well Owner's Information and Location of Well Information																											
First Name <i>O'Leary's Limited</i>				Last Name				Mailing Address (Street Number/Name, RR/Lot, Concession) <i>5630 Boundary Rd</i>																			
County/District/Municipality <i>Ottawa Carleton</i>						Township/City/Town/Village <i>Ottawa</i>						Province <i>Ontario</i>				Postal Code				Telephone Number (include area code)							
Address of Well Location (County/District/Municipality) <i>5630 Boundary Rd</i>												Township <i>Osgoode</i>				Lot <i>1</i>		Concession <i>11</i>									
RR#/Street Number/Name												City/Town/Village <i>Ottawa</i>				Site/Compartment/Block/Tract etc. <i>Plan # 5R-13558</i>											
GPS Reading		NAD	Zone	Easting	Northing	Unit/Make/Model				Mode of Operation:				<input type="checkbox"/> Undifferentiated				<input type="checkbox"/> Averaged									
		R13	18	721115.1	4481136.91									<input type="checkbox"/> Differentiated, specify													

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth	Metres
				From	To
Brown	Some sand	some stones		0	12
Grey	clay	with silt layers		12	81'
Grey	Hard pan	with stones		81'	93'
Grey	shale	rock very soft		93'	95'

Hole Diameter			Construction Record				Test of Well Yield				
Depth	Metres	Diameter	Inside diam. centimetres	Material	Wall thickness centimetres	Depth		Metres	Pumping test method	Draw Down	Recovery
From	To	Centimetres				From	To			Time min	Water Level Metres
95	0	12"							<i>pumped</i>		
									Pump intake set at - (metres)	Static Level	
									Pumping rate - (litres/min)		
									Duration of pumping		
									1 hrs + 0 min		
									Final water level end of pumping metres		
									Recommended pump type		
									<input type="checkbox"/> Shallow <input checked="" type="checkbox"/> Deep		
									Recommended pump depth		
									90' metres		
									Recommended pump rate		
									10 g.p.m. (litres/min)		
									If flowing give rate - (litres/min)		
									25		
									If pumping discontinued, give reason.		
									30		
									40		
									50		
									60		

[illegible]

Method of Construction				
<input type="checkbox"/> Cable Tool	<input checked="" type="checkbox"/> Rotary (air)	<input type="checkbox"/> Diamond	<input type="checkbox"/> Digging	
<input type="checkbox"/> Rotary (conventional)	<input type="checkbox"/> Air percussion	<input type="checkbox"/> Jetting	<input type="checkbox"/> Other	
<input type="checkbox"/> Rotary (reverse)	<input type="checkbox"/> Boring	<input type="checkbox"/> Driving		

Water Use			
<input checked="" type="checkbox"/> Domestic	<input type="checkbox"/> Industrial	<input type="checkbox"/> Public Supply	<input type="checkbox"/> Other
<input type="checkbox"/> Stock	<input checked="" type="checkbox"/> Commercial	<input type="checkbox"/> Not used	
<input type="checkbox"/> Irrigation	<input type="checkbox"/> Municipal	<input type="checkbox"/> Cooling & air conditioning	

Final Status of Well			
<input checked="" type="checkbox"/> Water Supply	<input type="checkbox"/> Recharge well	<input type="checkbox"/> Unfinished	<input type="checkbox"/> Abandoned, (Other)
<input type="checkbox"/> Observation well	<input type="checkbox"/> Abandoned, insufficient supply	<input type="checkbox"/> Dewatering	
<input type="checkbox"/> Test Hole	<input type="checkbox"/> Abandoned, poor quality	<input type="checkbox"/> Replacement well	

Well Contractor/Technician Information		
Name of Well Contractor	Well Contractor's Licence No.	
Olympe Drilling Ltd	4006	
Business Address (street name, number, city, etc.)		
6667 Bank St Metcalfe	01	
Name of Well Technician (last name, first name)	Well Technician's Licence No.	
Wayne Kenwick	377	
Signature of Technician/Contractor	Date Submitted	
Wayne Kenwick	YYY MM DD	

Location of Well

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

371

N

M. C. H. J. W. S.

Audit No.	Z 40182	Date Well Completed	YYY	MM	D
Was the well owner's information package delivered?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Date Delivered	YYY	MM	D

Ministry Use Only									
Data Source					Contractor				
Date Received YYYY MM DD					Date of Inspection YYYY MM DD				
Remarks					Well Record Number				

ATTACHMENT B
PUMP TEST
DRAWDOWN AND RECOVERY DATA



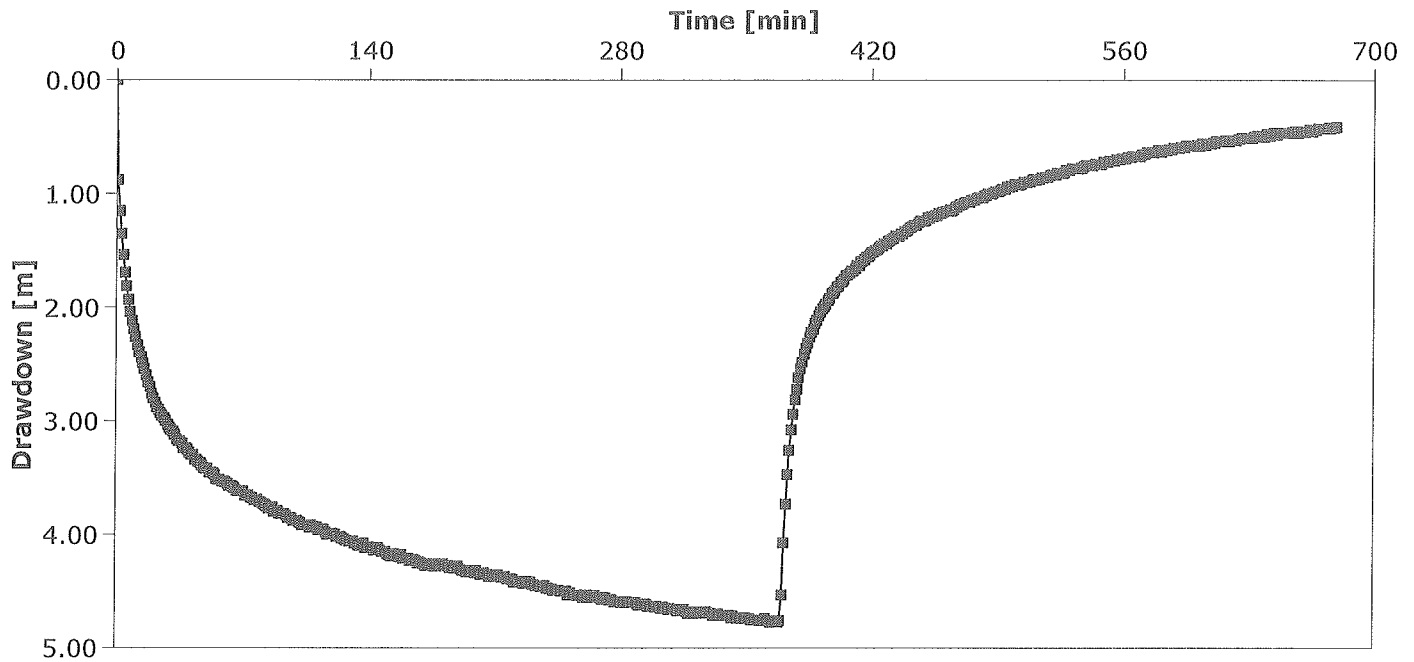
Pumping Test Analysis Report

Project: Boundary Road Hydrogeological Investigation

Number: 10-203

Client: O'Leary's Limited

Location:	Pumping Test: TW1	Pumping Well: Well 1
Test Conducted by: RA		Test Date: 9/23/2010
Analysis Performed by: JM	Time vs. Drawdown	Analysis Date: 10/27/2010
Aquifer Thickness:	Discharge: variable, average rate 0.0052682 [m ³ /min]	



**Pumping Test - Water Level Data**

Page 1 of 13

Project: Boundary Road Hydrogeological Investigation

Number: 10-203

Client: O'Leary's Limited

Location:	Pumping Test: TW1	Pumping Well: Well 1
Test Conducted by: RA	Test Date: 9/23/2010	Discharge: variable, average rate 0.0052682 [m³/min]
Observation Well: Well 1	Static Water Level [m]: 3.62	Radial Distance to PW [m]: -

	Time [min]	Water Level [m]	Drawdown [m]
1	0	3.62	0.00
2	1	4.50	0.88
3	2	4.77	1.15
4	3	4.97	1.35
5	4	5.16	1.54
6	5	5.31	1.69
7	6	5.43	1.81
8	7	5.55	1.93
9	8	5.66	2.04
10	9	5.74	2.12
11	10	5.81	2.19
12	11	5.88	2.26
13	12	5.95	2.33
14	13	6.01	2.39
15	14	6.06	2.44
16	15	6.11	2.49
17	16	6.16	2.54
18	17	6.22	2.60
19	18	6.28	2.66
20	19	6.32	2.70
21	20	6.38	2.76
22	21	6.42	2.80
23	22	6.46	2.84
24	23	6.50	2.88
25	24	6.52	2.90
26	25	6.55	2.93
27	26	6.57	2.95
28	27	6.59	2.97
29	28	6.62	3.00
30	29	6.65	3.03
31	30	6.68	3.06
32	31	6.70	3.08
33	32	6.71	3.09
34	33	6.74	3.12
35	34	6.78	3.16
36	35	6.80	3.18
37	36	6.80	3.18
38	37	6.82	3.20
39	38	6.86	3.24
40	39	6.86	3.24
41	40	6.87	3.25
42	41	6.90	3.28
43	42	6.92	3.30
44	43	6.92	3.30
45	44	6.96	3.34
46	45	6.96	3.34
47	46	6.98	3.36
48	47	6.99	3.37
49	48	7.01	3.39
50	49	7.03	3.41
51	50	7.04	3.42



Pumping Test - Water Level Data

Page 2 of 13

Project: Boundary Road Hydrogeological Investigation

Number: 10-203

Client: O'Leary's Limited

	Time [min]	Water Level [m]	Drawdown [m]
52	51	7.04	3.42
53	52	7.07	3.45
54	53	7.07	3.45
55	54	7.08	3.46
56	55	7.09	3.47
57	56	7.13	3.51
58	57	7.14	3.52
59	58	7.14	3.52
60	59	7.15	3.53
61	60	7.15	3.53
62	61	7.16	3.54
63	62	7.17	3.55
64	63	7.19	3.57
65	64	7.19	3.57
66	65	7.20	3.58
67	66	7.21	3.59
68	67	7.23	3.61
69	68	7.24	3.62
70	69	7.24	3.62
71	70	7.24	3.62
72	71	7.24	3.62
73	72	7.28	3.66
74	73	7.28	3.66
75	74	7.27	3.65
76	75	7.29	3.67
77	76	7.30	3.68
78	77	7.32	3.70
79	78	7.32	3.70
80	79	7.31	3.69
81	80	7.33	3.71
82	81	7.34	3.72
83	82	7.35	3.73
84	83	7.36	3.74
85	84	7.37	3.75
86	85	7.39	3.77
87	86	7.38	3.76
88	87	7.38	3.76
89	88	7.42	3.80
90	89	7.41	3.79
91	90	7.41	3.79
92	91	7.43	3.81
93	92	7.44	3.82
94	93	7.44	3.82
95	94	7.44	3.82
96	95	7.45	3.83
97	96	7.47	3.85
98	97	7.47	3.85
99	98	7.48	3.86
100	99	7.50	3.88
101	100	7.50	3.88
102	101	7.50	3.88
103	102	7.51	3.89
104	103	7.52	3.90
105	104	7.54	3.92
106	105	7.54	3.92
107	106	7.54	3.92



Pumping Test - Water Level Data

Page 3 of 13

Project: Boundary Road Hydrogeological Investigation

Number: 10-203

Client: O'Leary's Limited

	Time [min]	Water Level [m]	Drawdown [m]
108	107	7.54	3.92
109	108	7.56	3.94
110	109	7.54	3.92
111	110	7.55	3.93
112	111	7.56	3.94
113	112	7.56	3.94
114	113	7.58	3.96
115	114	7.58	3.96
116	115	7.57	3.95
117	116	7.58	3.96
118	117	7.60	3.98
119	118	7.62	4.00
120	119	7.61	3.99
121	120	7.62	4.00
122	121	7.61	3.99
123	122	7.62	4.00
124	123	7.64	4.02
125	124	7.64	4.02
126	125	7.64	4.02
127	126	7.65	4.03
128	127	7.66	4.04
129	128	7.67	4.05
130	129	7.67	4.05
131	130	7.68	4.06
132	131	7.68	4.06
133	132	7.68	4.06
134	133	7.70	4.08
135	134	7.70	4.08
136	135	7.71	4.09
137	136	7.72	4.10
138	137	7.71	4.09
139	138	7.70	4.08
140	139	7.74	4.12
141	140	7.74	4.12
142	141	7.73	4.11
143	142	7.74	4.12
144	143	7.74	4.12
145	144	7.76	4.14
146	145	7.75	4.13
147	146	7.74	4.12
148	147	7.76	4.14
149	148	7.77	4.15
150	149	7.77	4.15
151	150	7.77	4.15
152	151	7.79	4.17
153	152	7.80	4.18
154	153	7.81	4.19
155	154	7.80	4.18
156	155	7.79	4.17
157	156	7.80	4.18
158	157	7.81	4.19
159	158	7.82	4.20
160	159	7.80	4.18
161	160	7.83	4.21
162	161	7.83	4.21
163	162	7.83	4.21



Pumping Test - Water Level Data

Page 4 of 13

Project: Boundary Road Hydrogeological Investigation

Number: 10-203

Client: O'Leary's Limited

	Time [min]	Water Level [m]	Drawdown [m]
164	163	7.83	4.21
165	164	7.85	4.23
166	165	7.84	4.22
167	166	7.84	4.22
168	167	7.85	4.23
169	168	7.87	4.25
170	169	7.86	4.24
171	170	7.87	4.25
172	171	7.88	4.26
173	172	7.89	4.27
174	173	7.88	4.26
175	174	7.88	4.26
176	175	7.89	4.27
177	176	7.89	4.27
178	177	7.90	4.28
179	178	7.88	4.26
180	179	7.88	4.26
181	180	7.88	4.26
182	181	7.89	4.27
183	182	7.88	4.26
184	183	7.90	4.28
185	184	7.90	4.28
186	185	7.89	4.27
187	186	7.91	4.29
188	187	7.90	4.28
189	188	7.91	4.29
190	189	7.92	4.30
191	190	7.90	4.28
192	191	7.92	4.30
193	192	7.93	4.31
194	193	7.94	4.32
195	194	7.94	4.32
196	195	7.95	4.33
197	196	7.94	4.32
198	197	7.94	4.32
199	198	7.94	4.32
200	199	7.94	4.32
201	200	7.96	4.34
202	201	7.94	4.32
203	202	7.96	4.34
204	203	7.97	4.35
205	204	7.97	4.35
206	205	7.96	4.34
207	206	7.97	4.35
208	207	7.97	4.35
209	208	7.99	4.37
210	209	7.98	4.36
211	210	7.98	4.36
212	211	7.98	4.36
213	212	7.99	4.37
214	213	7.98	4.36
215	214	7.99	4.37
216	215	8.00	4.38
217	216	7.99	4.37
218	217	7.99	4.37
219	218	8.01	4.39



Pumping Test - Water Level Data

Page 5 of 13

Project: Boundary Road Hydrogeological Investigation

Number: 10-203

Client: O'Leary's Limited

	Time [min]	Water Level [m]	Drawdown [m]
220	219	8.01	4.39
221	220	8.01	4.39
222	221	8.02	4.40
223	222	8.04	4.42
224	223	8.03	4.41
225	224	8.03	4.41
226	225	8.04	4.42
227	226	8.03	4.41
228	227	8.05	4.43
229	228	8.04	4.42
230	229	8.03	4.41
231	230	8.04	4.42
232	231	8.04	4.42
233	232	8.06	4.44
234	233	8.06	4.44
235	234	8.07	4.45
236	235	8.07	4.45
237	236	8.07	4.45
238	237	8.08	4.46
239	238	8.08	4.46
240	239	8.07	4.45
241	240	8.09	4.47
242	241	8.09	4.47
243	242	8.10	4.48
244	243	8.10	4.48
245	244	8.11	4.49
246	245	8.11	4.49
247	246	8.11	4.49
248	247	8.11	4.49
249	248	8.12	4.50
250	249	8.12	4.50
251	250	8.12	4.50
252	251	8.12	4.50
253	252	8.15	4.53
254	253	8.13	4.51
255	254	8.15	4.53
256	255	8.15	4.53
257	256	8.15	4.53
258	257	8.16	4.54
259	258	8.15	4.53
260	259	8.15	4.53
261	260	8.17	4.55
262	261	8.15	4.53
263	262	8.16	4.54
264	263	8.15	4.53
265	264	8.17	4.55
266	265	8.16	4.54
267	266	8.17	4.55
268	267	8.16	4.54
269	268	8.17	4.55
270	269	8.17	4.55
271	270	8.18	4.56
272	271	8.19	4.57
273	272	8.17	4.55
274	273	8.18	4.56
275	274	8.19	4.57



Pumping Test - Water Level Data

Page 6 of 13

Project: Boundary Road Hydrogeological Investigation

Number: 10-203

Client: O'Leary's Limited

	Time [min]	Water Level [m]	Drawdown [m]
276	275	8.20	4.58
277	276	8.19	4.57
278	277	8.20	4.58
279	278	8.21	4.59
280	279	8.21	4.59
281	280	8.21	4.59
282	281	8.21	4.59
283	282	8.22	4.60
284	283	8.22	4.60
285	284	8.22	4.60
286	285	8.21	4.59
287	286	8.22	4.60
288	287	8.22	4.60
289	288	8.22	4.60
290	289	8.22	4.60
291	290	8.22	4.60
292	291	8.23	4.61
293	292	8.24	4.62
294	293	8.24	4.62
295	294	8.23	4.61
296	295	8.23	4.61
297	296	8.24	4.62
298	297	8.25	4.63
299	298	8.25	4.63
300	299	8.25	4.63
301	300	8.25	4.63
302	301	8.26	4.64
303	302	8.25	4.63
304	303	8.26	4.64
305	304	8.27	4.65
306	305	8.26	4.64
307	306	8.27	4.65
308	307	8.27	4.65
309	308	8.28	4.66
310	309	8.27	4.65
311	310	8.28	4.66
312	311	8.28	4.66
313	312	8.28	4.66
314	313	8.29	4.67
315	314	8.29	4.67
316	315	8.29	4.67
317	316	8.29	4.67
318	317	8.28	4.66
319	318	8.30	4.68
320	319	8.31	4.69
321	320	8.30	4.68
322	321	8.30	4.68
323	322	8.30	4.68
324	323	8.31	4.69
325	324	8.30	4.68
326	325	8.31	4.69
327	326	8.31	4.69
328	327	8.31	4.69
329	328	8.31	4.69
330	329	8.30	4.68
331	330	8.31	4.69



Pumping Test - Water Level Data

Page 7 of 13

Project: Boundary Road Hydrogeological Investigation

Number: 10-203

Client: O'Leary's Limited

	Time [min]	Water Level [m]	Drawdown [m]
332	331	8.31	4.69
333	332	8.31	4.69
334	333	8.33	4.71
335	334	8.32	4.70
336	335	8.32	4.70
337	336	8.32	4.70
338	337	8.33	4.71
339	338	8.33	4.71
340	339	8.33	4.71
341	340	8.33	4.71
342	341	8.33	4.71
343	342	8.33	4.71
344	343	8.35	4.73
345	344	8.34	4.72
346	345	8.35	4.73
347	346	8.36	4.74
348	347	8.36	4.74
349	348	8.35	4.73
350	349	8.35	4.73
351	350	8.35	4.73
352	351	8.35	4.73
353	352	8.36	4.74
354	353	8.36	4.74
355	354	8.37	4.75
356	355	8.37	4.75
357	356	8.37	4.75
358	357	8.37	4.75
359	358	8.37	4.75
360	359	8.38	4.76
361	360	8.38	4.76
362	361	8.38	4.76
363	362	8.36	4.74
364	363	8.38	4.76
365	364	8.38	4.76
366	365	8.39	4.77
367	366	8.38	4.76
368	367	8.39	4.77
369	368	8.38	4.76
370	369	8.39	4.77
371	370	8.38	4.76
372	371	8.15	4.53
373	372	7.69	4.07
374	373	7.35	3.73
375	374	7.09	3.47
376	375	6.88	3.26
377	376	6.70	3.08
378	377	6.56	2.94
379	378	6.43	2.81
380	379	6.34	2.72
381	380	6.24	2.62
382	381	6.16	2.54
383	382	6.10	2.48
384	383	6.03	2.41
385	384	5.98	2.36
386	385	5.93	2.31
387	386	5.88	2.26

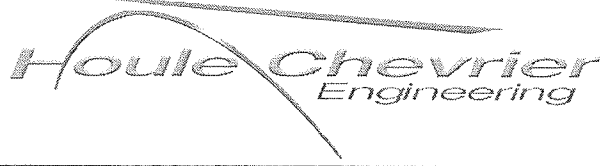


Project: Boundary Road Hydrogeological Investigation

Number: 10-203

Client: O'Leary's Limited

	Time [min]	Water Level [m]	Drawdown [m]
388	387	5.84	2.22
389	388	5.81	2.19
390	389	5.76	2.14
391	390	5.73	2.11
392	391	5.69	2.07
393	392	5.66	2.04
394	393	5.63	2.01
395	394	5.61	1.99
396	395	5.59	1.97
397	396	5.56	1.94
398	397	5.54	1.92
399	398	5.50	1.88
400	399	5.49	1.87
401	400	5.47	1.85
402	401	5.44	1.82
403	402	5.43	1.81
404	403	5.40	1.78
405	404	5.39	1.77
406	405	5.37	1.75
407	406	5.34	1.72
408	407	5.33	1.71
409	408	5.32	1.70
410	409	5.30	1.68
411	410	5.30	1.68
412	411	5.28	1.66
413	412	5.25	1.63
414	413	5.25	1.63
415	414	5.22	1.60
416	415	5.21	1.59
417	416	5.20	1.58
418	417	5.18	1.56
419	418	5.17	1.55
420	419	5.16	1.54
421	420	5.14	1.52
422	421	5.13	1.51
423	422	5.12	1.50
424	423	5.11	1.49
425	424	5.09	1.47
426	425	5.08	1.46
427	426	5.08	1.46
428	427	5.06	1.44
429	428	5.06	1.44
430	429	5.04	1.42
431	430	5.03	1.41
432	431	5.02	1.40
433	432	5.01	1.39
434	433	4.99	1.37
435	434	4.99	1.37
436	435	4.99	1.37
437	436	4.97	1.35
438	437	4.97	1.35
439	438	4.95	1.33
440	439	4.95	1.33
441	440	4.94	1.32
442	441	4.92	1.30
443	442	4.91	1.29

**Pumping Test - Water Level Data**

Page 9 of 13

Project: Boundary Road Hydrogeological Investigation

Number: 10-203

Client: O'Leary's Limited

	Time [min]	Water Level [m]	Drawdown [m]
444	443	4.90	1.28
445	444	4.90	1.28
446	445	4.89	1.27
447	446	4.87	1.25
448	447	4.86	1.24
449	448	4.86	1.24
450	449	4.86	1.24
451	450	4.85	1.23
452	451	4.83	1.21
453	452	4.83	1.21
454	453	4.82	1.20
455	454	4.82	1.20
456	455	4.81	1.19
457	456	4.81	1.19
458	457	4.79	1.17
459	458	4.79	1.17
460	459	4.78	1.16
461	460	4.78	1.16
462	461	4.77	1.15
463	462	4.77	1.15
464	463	4.76	1.14
465	464	4.77	1.15
466	465	4.76	1.14
467	466	4.74	1.12
468	467	4.73	1.11
469	468	4.72	1.10
470	469	4.71	1.09
471	470	4.71	1.09
472	471	4.70	1.08
473	472	4.69	1.07
474	473	4.69	1.07
475	474	4.69	1.07
476	475	4.68	1.06
477	476	4.67	1.05
478	477	4.67	1.05
479	478	4.66	1.04
480	479	4.65	1.03
481	480	4.65	1.03
482	481	4.65	1.03
483	482	4.64	1.02
484	483	4.63	1.01
485	484	4.62	1.00
486	485	4.62	1.00
487	486	4.62	1.00
488	487	4.61	0.99
489	488	4.60	0.98
490	489	4.60	0.98
491	490	4.60	0.98
492	491	4.59	0.97
493	492	4.58	0.96
494	493	4.58	0.96
495	494	4.58	0.96
496	495	4.56	0.94
497	496	4.56	0.94
498	497	4.55	0.93
499	498	4.55	0.93

**Pumping Test - Water Level Data**

Page 10 of 13

Project: Boundary Road Hydrogeological Investigation

Number: 10-203

Client: O'Leary's Limited

	Time [min]	Water Level [m]	Drawdown [m]
500	499	4.54	0.92
501	500	4.54	0.92
502	501	4.54	0.92
503	502	4.54	0.92
504	503	4.53	0.91
505	504	4.52	0.90
506	505	4.52	0.90
507	506	4.52	0.90
508	507	4.51	0.89
509	508	4.51	0.89
510	509	4.50	0.88
511	510	4.49	0.87
512	511	4.50	0.88
513	512	4.49	0.87
514	513	4.49	0.87
515	514	4.48	0.86
516	515	4.48	0.86
517	516	4.47	0.85
518	517	4.47	0.85
519	518	4.47	0.85
520	519	4.46	0.84
521	520	4.45	0.83
522	521	4.45	0.83
523	522	4.45	0.83
524	523	4.44	0.82
525	524	4.44	0.82
526	525	4.44	0.82
527	526	4.44	0.82
528	527	4.43	0.81
529	528	4.41	0.79
530	529	4.41	0.79
531	530	4.41	0.79
532	531	4.40	0.78
533	532	4.40	0.78
534	533	4.40	0.78
535	534	4.40	0.78
536	535	4.40	0.78
537	536	4.39	0.77
538	537	4.39	0.77
539	538	4.38	0.76
540	539	4.37	0.75
541	540	4.37	0.75
542	541	4.37	0.75
543	542	4.37	0.75
544	543	4.37	0.75
545	544	4.36	0.74
546	545	4.36	0.74
547	546	4.36	0.74
548	547	4.36	0.74
549	548	4.36	0.74
550	549	4.34	0.72
551	550	4.34	0.72
552	551	4.34	0.72
553	552	4.33	0.71
554	553	4.33	0.71
555	554	4.33	0.71



Project: Boundary Road Hydrogeological Investigation

Number: 10-203

Client: O'Leary's Limited

	Time [min]	Water Level [m]	Drawdown [m]
556	555	4.33	0.71
557	556	4.32	0.70
558	557	4.32	0.70
559	558	4.32	0.70
560	559	4.31	0.69
561	560	4.31	0.69
562	561	4.31	0.69
563	562	4.30	0.68
564	563	4.30	0.68
565	564	4.30	0.68
566	565	4.29	0.67
567	566	4.29	0.67
568	567	4.29	0.67
569	568	4.29	0.67
570	569	4.29	0.67
571	570	4.28	0.66
572	571	4.27	0.65
573	572	4.27	0.65
574	573	4.26	0.64
575	574	4.26	0.64
576	575	4.26	0.64
577	576	4.25	0.63
578	577	4.26	0.64
579	578	4.25	0.63
580	579	4.24	0.62
581	580	4.25	0.63
582	581	4.25	0.63
583	582	4.24	0.62
584	583	4.24	0.62
585	584	4.24	0.62
586	585	4.23	0.61
587	586	4.23	0.61
588	587	4.23	0.61
589	588	4.22	0.60
590	589	4.22	0.60
591	590	4.22	0.60
592	591	4.22	0.60
593	592	4.21	0.59
594	593	4.21	0.59
595	594	4.21	0.59
596	595	4.20	0.58
597	596	4.20	0.58
598	597	4.20	0.58
599	598	4.20	0.58
600	599	4.20	0.58
601	600	4.20	0.58
602	601	4.19	0.57
603	602	4.19	0.57
604	603	4.20	0.58
605	604	4.18	0.56
606	605	4.18	0.56
607	606	4.19	0.57
608	607	4.18	0.56
609	608	4.18	0.56
610	609	4.18	0.56
611	610	4.17	0.55



Pumping Test - Water Level Data

Page 12 of 13

Project: Boundary Road Hydrogeological Investigation

Number: 10-203

Client: O'Leary's Limited

	Time [min]	Water Level [m]	Drawdown [m]
612	611	4.17	0.55
613	612	4.16	0.54
614	613	4.16	0.54
615	614	4.16	0.54
616	615	4.16	0.54
617	616	4.16	0.54
618	617	4.15	0.53
619	618	4.16	0.54
620	619	4.16	0.54
621	620	4.15	0.53
622	621	4.15	0.53
623	622	4.15	0.53
624	623	4.15	0.53
625	624	4.14	0.52
626	625	4.14	0.52
627	626	4.13	0.51
628	627	4.13	0.51
629	628	4.13	0.51
630	629	4.13	0.51
631	630	4.13	0.51
632	631	4.13	0.51
633	632	4.13	0.51
634	633	4.12	0.50
635	634	4.12	0.50
636	635	4.11	0.49
637	636	4.12	0.50
638	637	4.11	0.49
639	638	4.11	0.49
640	639	4.12	0.50
641	640	4.10	0.48
642	641	4.11	0.49
643	642	4.11	0.49
644	643	4.10	0.48
645	644	4.09	0.47
646	645	4.09	0.47
647	646	4.10	0.48
648	647	4.09	0.47
649	648	4.09	0.47
650	649	4.09	0.47
651	650	4.09	0.47
652	651	4.09	0.47
653	652	4.09	0.47
654	653	4.09	0.47
655	654	4.08	0.46
656	655	4.08	0.46
657	656	4.07	0.45
658	657	4.09	0.47
659	658	4.09	0.47
660	659	4.08	0.46
661	660	4.08	0.46
662	661	4.07	0.45
663	662	4.08	0.46
664	663	4.07	0.45
665	664	4.06	0.44
666	665	4.07	0.45
667	666	4.07	0.45



Project: Boundary Road Hydrogeological Investigation

Number: 10-203

Client: O'Leary's Limited

	Time [min]	Water Level [m]	Drawdown [m]
668	667	4.06	0.44
669	668	4.06	0.44
670	669	4.05	0.43
671	670	4.05	0.43
672	671	4.05	0.43
673	672	4.05	0.43
674	673	4.05	0.43
675	674	4.05	0.43
676	675	4.04	0.42
677	676	4.05	0.43
678	677	4.04	0.42
679	678	4.04	0.42
680	679	4.03	0.41

ATTACHMENT C
AQUIFER TEST PRO 4.2
THEIS ANALYSIS



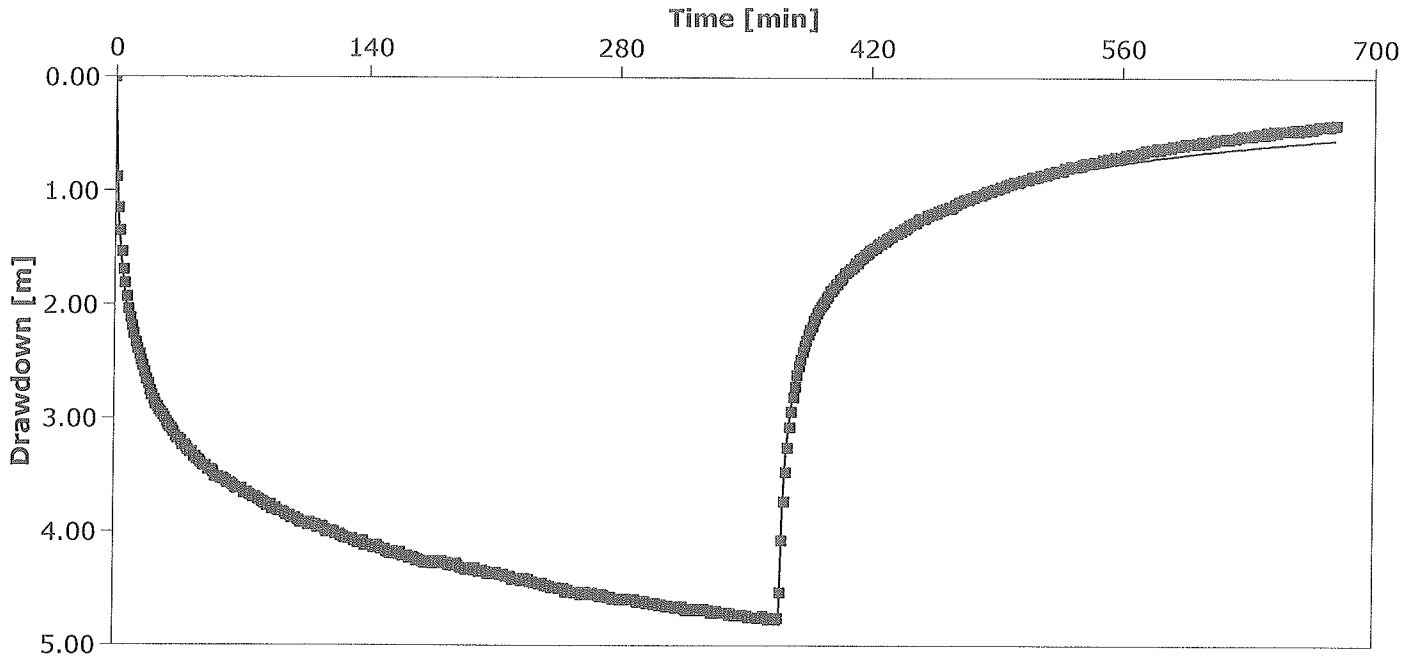
Pumping Test Analysis Report

Project: Boundary Road Hydrogeological Investigation

Number: 10-203

Client: O'Leary's Limited

Location:	Pumping Test: TW1	Pumping Well: Well 1
Test Conducted by: RA		Test Date: 9/23/2010
Analysis Performed by: JM	Theis Analysis	Analysis Date: 10/27/2010
Aquifer Thickness:	Discharge: variable, average rate 0.0052682 [m³/min]	



Calculation after Theis

Observation Well	Transmissivity [m²/d]	Storage coefficient	Radial Distance to PW [m]	
Well 1	2.35×10^0	2.37×10^{-1}	0.08	



Pumping Test Analysis Report

Project: Boundary Road Hydrogeological Investigation

Number: 10-203

Client: O'Leary's Limited

Location:

Pumping Test: TW1

Pumping Well: Well 1

Test Conducted by: RA

Test Date: 9/23/2010

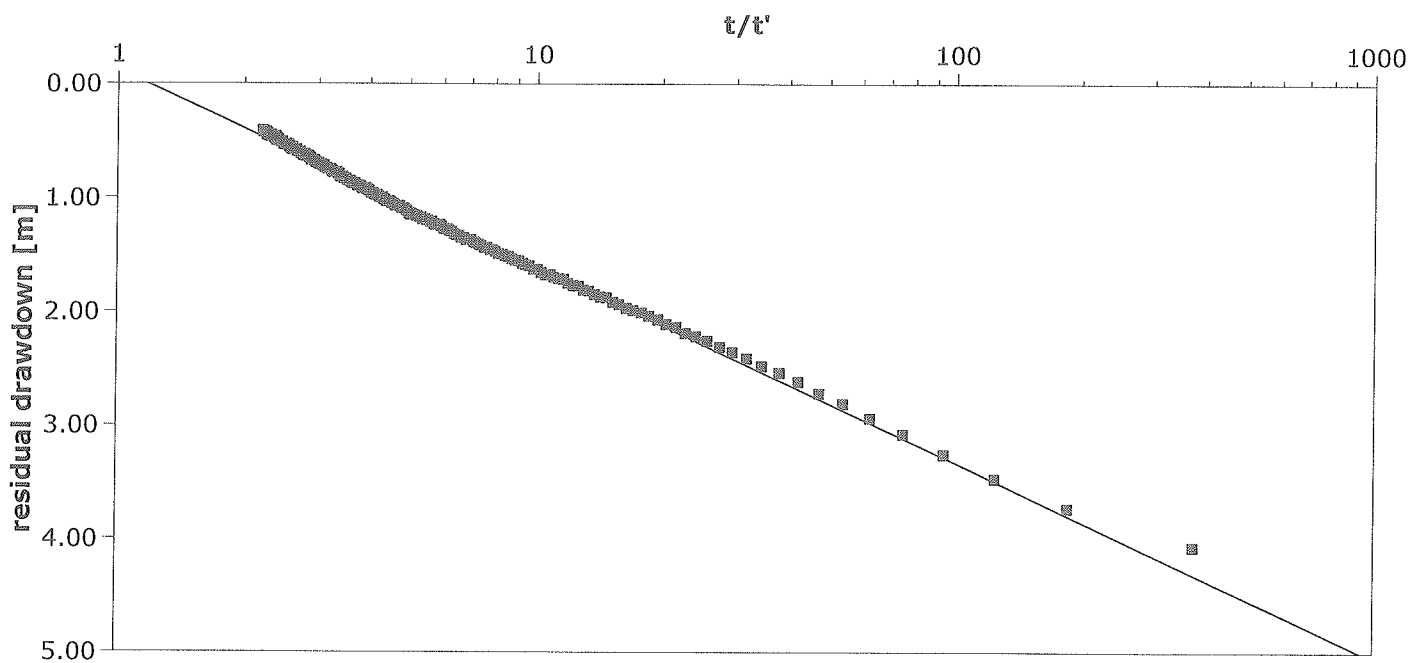
Analysis Performed by: JM

Theis Recovery

Analysis Date: 10/27/2010

Aquifer Thickness:

Discharge: variable, average rate 0.0052682 [m³/min]



Calculation after Theis & Jacob

Observation Well	Transmissivity [m²/d]	Radial Distance to PW [m]	
Well 1	8.05×10^{-1}	0.08	

ATTACHMENT D

EXOVA ACCUTEST LABORATORY CERTIFICATE OF ANALYSIS

Client: Houle Chevrier Engineering
180 Wescar Lane, R.R. #2
Carp, ON
K0A 1L0

Attention: Mr. James McEwen

Report Number: 1023227
Date: 2010-09-27
Date Submitted: 2010-09-23
Project: 10-203

Chain of Custody Number: 133008

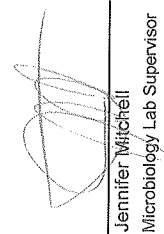
P.O. Number:
Matrix:

Water

PARAMETER	LAB ID: Sample Date: Sample ID:	UNITS	MRL	831152		831153		TYPE	LIMIT	UNITS	GUIDELINE
				2010-09-23 TW1-3Hr		2010-09-23 TW1-6Hr					
Total Coliforms		CFU/100mL		0		0		MAC	0	CFU/100mL	ODWSOG
Escherichia Coli		CFU/100mL		0		0		MAC	0	CFU/100mL	
Heterotrophic Plate Count		CFU/1mL		>500		>500					
Faecal Coliforms		CFU/100mL		0		0					
Faecal Streptococcus		CFU/100mL		0		0					

MRL = Method Reporting Limit INC = Incomplete AO = Aesthetic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration
Comment:

APPROVAL:


Jennifer Mitchell
Microbiology Lab Supervisor

Methods references and/or additional QA/QC information available on request.



Client: Houle Chevrier Engineering
180 Wescar Lane, R.R. #2
Carp, ON
K0A 1L0
Attention: Mr. James McEwen

Report Number: 1023228
Date: 2010-09-30
Date Submitted: 2010-09-23
Project: 10-203

Chain of Custody Number: 133008

P.O. Number:
Matrix:

PARAMETER		LAB ID:		831154	831155	GUIDELINE	
		Sample Date:	Sample ID:	2010-09-23 TW1-3Hr	2010-09-23 TW1-6Hr	ODWSOG	
		UNITS	MRL			TYPE	LIMIT
Alkalinity as CaCO3		mg/L	5	280	290	OG	500
Chloride		mg/L	1	311	314	AO	250
Colour		TCU	2	5	5	AO	5
Conductivity		uS/cm	5	2410	2430		
Dissolved Organic Carbon		mg/L	0.5	2.7	2.8	AO	5
Fluoride		mg/L	0.1	0.68	0.67	MAC	1.5
Hydrogen Sulphide		mg/L	0.01	<0.1	0.08	AO	0.05
N-NH3 (Ammonia)		mg/L	0.02	1.30	1.27		
N-NO2 (Nitrite)		mg/L	0.1	<0.10	<0.10	MAC	1.0
N-NO3 (Nitrate)		mg/L	0.1	<0.10	<0.10	MAC	10.0
pH				8.51	8.44		6.5-8.5
Phenols		mg/L	0.001	<0.001	<0.001		
Sulphate		mg/L	1	519	509	AO	500
Tannin & Lignin		mg/L	0.1	0.2	0.2		
Total Dissolved Solids (COND - CALC)		mg/L	5	1810	1820	AO	500
Total Kjeldahl Nitrogen		mg/L	0.1	1.31	1.25		
Turbidity		NTU	0.1	27.8	20.4	MAC	1.0
Hardness as CaCO3		mg/L	1	246	226	OG	100
Ion Balance			0.01	1.04	0.94		
Calcium		mg/L	1	31	28		
Magnesium		mg/L	1	41	38		
Potassium		mg/L	1	21	21		
Sodium		mg/L	2	476	426		
Iron		mg/L	0.03	0.75	0.56	AO	200
Manganese		mg/L	0.01	0.03	0.02	AO	0.3
						AO	0.05

MRL = Method Reporting Limit INC = Incomplete AO = Aesthetic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration
Comment: 831154: H2S MRL elevated due to sample turbidity.

APPROVAL:
Ewan McRobbie
Inorganic Lab Supervisor

Results relate only to the parameters tested on the samples submitted.