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December 18, 2015

Mr. David Walter, C.E.T.
WMI & Associates Limited
119 Collier Street
Barrie, Ontario
L4M 1H5

Wilson Associates
Consulting Hydrogeologists

Dear Mr. Walter:

Re: Updated Hydrogeological Study and Water Balance Analysis
Proposed 221 Fox Street Residential Development
Queen's Court Homes
Town of Penetanguishene

It is proposed to develop a 12.01ha property at 221 Fox Street, in the Town of Penetanguishene, as 87 single family residential lots and a medium-density townhome block.

Further to the Wilson Associates December 19, 2012 Hydrogeological Function Analysis report, it is understood that the Town of Penetanguishene has required that the report be updated to the June 2013 "Hydrogeological Assessment Submissions: Conservation Authority Guidelines for Development Applications" (the CA Guideline).

Provided for this updated study were the following documentation:

- Functional Servicing & Preliminary Stormwater Management Report, WMI & Associates Limited (WMI). January 2013.
- Preliminary Geotechnical Investigation, Peto MacCallum Ltd. (PML). November 2012.
- Draft Plan of Subdivision, Lucas & Associates. May 16, 2014.

LOCATION AND HYDROGEOLOGICAL SETTING

The subject lands are located in the undeveloped space between Fox Street and Church Street, south of Broad Street, within the northern periphery of the Town of Penetanguishene. The lands slope steeply westwards, with a north-south trending raised shore bluff situated in the eastern half of the site, which divides the site into a low-lying, western half and a steeply-sloped eastern half. The lands are currently mainly forested. No permanent surface water bodies are mapped on-site, although portions of the low-lying western half of the site are understood to become seasonally wet. Penetang Harbour is located about 300m west of the western property line and St. Andrews Lake is located on the uplands about 1,300m to the east.

The subject lands are located within the Simcoe Uplands physiographic region of southern Ontario, an area of northern Simcoe County characterized by till upland plains and steep-sided, flat floored valleys. The raised shore bluff was once the shore of glacial Lake Algonquin.

According to Ontario Geological Survey Open File Map 194 "Quaternary Geology of the Penetanguishene and Christian Island Areas", the upper soils in the eastern highland portion of the site consist of glaciofluvial deposits of fine sand. The upper soils in the western lower portion of the site consist of lacustrine deposits of fine sand. The PML report identified a variable sequence of granular deposits, fine-grained deposits mainly of silty sand with occasional clayey silt and sand till deposits, in the lowland portion of the site.

As the area is municipally serviced, few water well records are available in the close vicinity from which to characterize the sequence of overburden formations. However, a small number of well records are mapped in the general area, and the attached geological cross-section has been prepared using the available data plus the PML report data. Generally, the overburden beneath the eastern portion of the site, and beneath the uplands east of the site, is indicated by the available water well records to consist almost entirely of granular deposits of sand or gravel. Occasional minor, discontinuous fine-grained lenses are reported at various depths. In the western, lower portion of the site, the PML boreholes have identified a variable sequence of granular deposits, fine-grained deposits mainly of silty sand with occasional clayey silt and sand till deposits.

The PML borehole records and representative water well record print-outs utilized for the preparation of the cross-section are attached.

According to interpretation provided by the 2005 North Simcoe Municipal Groundwater Study (NSMGS), the bedrock beneath the site is situated at an approximate elevation of 150m above sea level (asl) (per Figure 4.5.2 of the NSMGS). As such, the overburden will be in the range of 37m deep beneath the western, lowland portion of the site, and in the range of 70m deep at the upper, eastern periphery of the site. The NSMGS also reports the majority of the overburden to be granular.

HYDROGEOLOGICAL SETTING

Water levels were observed in the three borehole monitoring wells by PML on October 16, 2012. The following table provides a summary of the PML water level observations:

Borehole	Ground Elevation (m asl)	Water Level (m below grade)	Water Level Elevation (m asl)
BH1	189.65	1.9	187.75
BH2	187.73	4.4	183.33
BH3	187.83	2.2	185.63

The attached map shows the locations of the three PML boreholes, contours of the watertable surface in the vicinity of the three boreholes and inferred direction of groundwater flow. The inferred direction of shallow groundwater flow is generally westerly towards Penetang Harbour.

Locally (i.e. the area between Penetang Harbour and St. Andrews Lake), Figures 4.4.1 and

4.4.2 of the NSMGS indicates a westward direction of groundwater flow. Both Figures 4.4.1 and 4.4.2 of the NSMGS indicate a groundwater level of about 180m asl to 190m asl from west-to-east across the site. Figure 4.4.5 of the NSGMS classifies the western, lower half of the site as a major groundwater discharge area. As shown on the attached cross-section, the regional watertable surface slopes westwards from about 193 to 195 m asl near St. Andrews Lake, to about 185m asl in the lower portion of the subject lands, to about 178m asl at Penetang Harbour.

It should be noted that perched watertable conditions in the close vicinity of St. Andrews Lake east of the site appear to support the small lake, this localized aquifer perched well above the regional watertable surface.

GROUNDWATER QUALITY

To establish background shallow groundwater quality, typically a monitoring well installed during the geotechnical investigation is sampled. However, none of the 2012 PML monitoring wells could be located during several site reconnaissances in 2015. WMI & Associates Limited arranged for the installation of a shallow monitoring well at the location shown on the attached diagram for the purposes of establishing background groundwater quality per the CA Guideline. The monitoring well consisted of 3.8cm-diameter ABS pipe with saw-cut screen installed in a backfilled test pit to an approximate depth of 2.5 metres.

The monitoring well was sampled by Wilson Associates on November 5, 2015. The well was purged of all standing water and allowed to recover prior to sampling using a Waterra inertial pump. Water samples were collected in laboratory-supplied bottles, stored in an ice-packed cooler and submitted to Maxxam Analytics Inc. the same day for an analysis of general chemistry and heavy metals parameters.

The analytical results indicate that for the parameters determined, all (except DOC) were at levels typical of shallow groundwater in a municipally-serviced area. The dissolved organic carbon content of the sample was somewhat elevated at 42mg/L (above the Ontario Drinking Water Quality Standard of 5mg/L), but is not unexpected in a low-lying, seasonally wet area.

A copy of the analytical results are attached.

WATER BUDGET ANALYSIS

The following assumptions are made for this assessment:

- Overall drainage from the site is generally westwards following site topography, and for water budget analysis, the site is assumed to act as one catchment in two slope environments and two soil environments. The upper portion of the site (~50% of the site area) is considered to exhibit a hilly topography and sandy soil conditions. The lower portion of the site (~50% of the site area) is considered to exhibit a rolling to hilly topography and soils of a medium combination of clay and loam.

- The entire un-developed existing site is assumed to be pervious. Impervious area calculations are provided by WMI & Associates Limited, and are indicated to be 35% imperviousness under full build-out.

- The water surplus for the site is assumed to be 466mm/year, as identified for sub-watershed N-05 by Table 6.7 of the 2005 NSMGS. Normal precipitation for the area is 1040.6mm/year (1981-2010 precipitation normal for the closest Environment Canada weather station - Midland WPCP weather station).

The following tables provide a water budget analysis following the general guidance of the April 2013 Conservation Authority Guidelines for Hydrogeological Assessments.

Table 1 - Water Budget - Current Conditions

Catchment Designation	Site		
	Existing Upland Pervious	Existing Lowland Pervious	Totals
Area (m^2)	60050	60050	120100
Pervious Area (m^2)	60050	60050	120100
Impervious Area (m^2)	0	0	0
Impervious Factors (Per MOECC Guidelines)			
Topography Infiltration Factor	Hilly 0.1	Rolling to Hilly 0.15	
Soil Infiltration Factor	Sand 0.4	Medium 0.2	
Land Cover Infiltration Factor	Woodland 0.2	Woodland 0.2	
MOECC Infiltration Factor	0.7	0.55	
Actual Infiltration Factor	0.7	0.55	
Run-Off Coefficient	0.3	0.45	
Runoff from Impervious Surfaces*	0	0	
Inputs (per Unit Area)			
Precipitation (mm/year)	1041	1041	1041
Run-On (mm/year)	0	0	0
Other Inputs (mm/year)	0	0	0
Total Inputs (mm/year)	1041	1041	1041
Outputs (per Unit Area)			
Precipitation Surplus (mm/year)	466	466	466
Net Surplus (mm/year)	466	466	466
Evapotranspiration (mm/year)	575	575	575

Infiltration (mm/year)	326	256	291
Impervious Area Infiltration (mm/year)	0	0	0
Total Infiltration (mm/year)	326	256	291
Runoff Pervious Areas (mm/year)	140	210	175
Runoff Impervious Areas (mm/year)	0	0	0
Total Runoff (mm/year)	140	210	175
Total Outputs (mm/year)	1041	1041	1041
Difference (Inputs - Outputs) (mm/year)	0	0	0
Inputs (Volume)			
Precipitation (m^3/year)	62512	62512	125024
Run-On (m^3/year)	0	0	0
Other Inputs (m^3/year)	0	0	0
Total Inputs (m^3/year)	62512	62512	125024
Outputs (Volume)			
Precipitation Surplus (m^3/year)	27983	27983	55966
Net Surplus (m^3/year)	27983	27983	55966
Evapotranspiration (m^3/year)	34529	34529	69058
Infiltration (m^3/year)	19576	15373	34949
Impervious Area Infiltration (m^3/year)	0	0	0
Total Infiltration (m^3/year)	19576	15373	34949
Runoff Pervious Areas (m^3/year)	8407	12611	21018
Runoff Impervious Areas (m^3/year)	0	0	0
Total Runoff (m^3/year)	8407	12611	21018

Total Outputs (m^3/year)	62512	62513	125025
Difference (Inputs - Outputs) (m^3/year)	0	-1**	-1**

Note: ** Minor differences attributable to rounding.

Table 2 - Water Budget - Post-Development Conditions

Under Post-Development conditions, based on information provided by WMI & Associates Limited it is estimated that approximately ⅔ of the site's impervious areas will be situated in the lowland portion of the site (~28,023m^2), and that approximately ⅓ of the site's impervious areas will be situated in the upland portion of the site (~14,012m^2). In the upland portion of the site, 2.47ha of the pervious area will remain as woodland, the remainder assumed to be cleared. In the lowland portion of the site, 1.03ha of the pervious area will remain as woodland, the remainder is assumed to be cleared. These remaining woodland areas are accounted for in the Land Cover Infiltration Factors in the table below.

Catchment Designation	Site				
	Upland Pervious	Upland Impervious	Lowland Pervious	Lowland Impervious	Totals
Area (m^2)	46038	14012	32027	28023	120100
Pervious Area (m^2)	46038	0	32027	0	78065
Impervious Area (m^2)	0	14012	0	28023	42035
Impervious Factors (Per MOECC Guidelines)					
Topography Infiltration Factor	Hilly 0.1	Hilly	Rolling to Hilly 0.15	Rolling to Hilly 0.15	
Soil Infiltration Factor	Sand 0.4	Sand 0.4	Medium 0.2	Medium 0.2	
Land Cover Infiltration Factor	Cleared / Woodland 0.15	0	Cleared / Woodland 0.13	0	
MOECC Infiltration Factor	0.65	0	0.48	0	
Actual Infiltration Factor	0.65	0	0.48	0	
Run-Off Coefficient	0.35	1	0.52	1	
Runoff from Impervious Surfaces*	0	0.8	0	0.8	
Inputs (per Unit Area)					
Precipitation (mm/year)	1041	1041	1041	1041	1041
Run-On (mm/year)	0	0	0	0	0

Other Inputs (mm/year)	0	0	0	0	0
Total Inputs (mm/year)	1041	1041	1041	1041	1041
Outputs (per Unit Area)					
Precipitation Surplus (mm/year)	466	833	466	833	595
Net Surplus (mm/year)	466	833	466	833	595
Evapotranspiration (mm/year)	575	208	575	208	447
Infiltration (mm/year)	303	0	224	0	176
Impervious Area Infiltration (mm/year)	0	0	0	0	0
Total Infiltration (mm/year)	303	0	224	0	176
Runoff Pervious Areas (mm/year)	163	0	242	0	127
Runoff Impervious Areas (mm/year)	0	833	0	833	292
Total Runoff (mm/year)	163	833	242	833	417
Total Outputs (mm/year)	1041	1041	1041	1041	1040
Difference (Inputs - Outputs) (mm/year)	0	0	0	0	1**
Inputs (Volume)					
Precipitation (m^3/year)	47926	14586	33340	29172	125024
Run-On (m^3/year)	0	0	0	0	0
Other Inputs (m^3/year)	0	0	0	0	0
Total Inputs (m^3/year)	47926	14586	33340	29172	125024
Outputs (Volume)					
Precipitation Surplus (m^3/year)	21454	11672	14925	23343	71394
Net Surplus (m^3/year)	21454	11672	14925	23343	71394
Evapotranspiration (m^3/year)	26472	2914	18416	5829	53631

Infiltration (m^3/year)	13950	0	7174	0	21124
Impervious Area Infiltration (m^3/year)	0	0	0	0	0
Total Infiltration (m^3/year)	13950	0	7174	0	21124
Runoff Pervious Areas (m^3/year)	7504	0	7750	0	15254
Runoff Impervious Areas (m^3/year)	0	11672	0	23343	35015
Total Runoff (m^3/year)	7504	11672	7750	23343	50269
Total Outputs (m^3/year)	47926	14586	33340	29172	125024
Difference (Inputs - Outputs) (m^3/year)	0	0	0	0	0

Note: * Per guidelines, evaporation from impervious areas assumed to be 20% of precipitation.
** Minor differences attributable to rounding.

Table 3 - Water Budget - Post-Development Conditions with Mitigation

Based on the above assessment, approximately 40% of the runoff from the impervious areas of the site will need to be infiltrated on the site in order to maintain the overall rate of infiltration relative to pre-development conditions. The viability of infiltrating this volume of water is discussed below.

Catchment Designation	Site				
	Upland Pervious	Upland Impervious	Lowland Pervious	Lowland Impervious	Totals
Area (m^2)	46038	14012	32027	28023	120100
Pervious Area (m^2)	46038	0	32027	0	78065
Impervious Area (m^2)	0	14012	0	28023	42035
Impervious Factors (Per MOECC Guidelines)					
Topography Infiltration Factor	Hilly 0.1	Hilly	Rolling to Hilly 0.15	Rolling to Hilly 0.15	
Soil Infiltration Factor	Sand 0.4	Sand 0.4	Medium 0.2	Medium 0.2	
Land Cover Infiltration Factor	Cleared / Woodland 0.15	0	Cleared / Woodland 0.13	0	
MOECC Infiltration Factor	0.65	0	0.48	0	
Actual Infiltration Factor	0.65	0	0.48	0	
Run-Off Coefficient	0.35	1	0.52	1	
Runoff from Impervious Surfaces*	0	0.8	0	0.8	
Inputs (per Unit Area)					
Precipitation (mm/year)	1041	1041	1041	1041	1041
Run-On (mm/year)	0	0	0	0	0
Other Inputs (mm/year)	0	0	0	0	0
Total Inputs (mm/year)	1041	1041	1041	1041	1041

Outputs (per Unit Area)					
Precipitation Surplus (mm/year)	466	833	466	833	595
Net Surplus (mm/year)	466	833	466	833	595
Evapotranspiration (mm/year)	575	208	575	208	447
Infiltration (mm/year)	303	0	224	0	176
Impervious Area Infiltration (mm/year)	0	333	0	333	117
Total Infiltration (mm/year)	303	333	224	333	292
Runoff Pervious Areas (mm/year)	163	0	242	0	127
Runoff Impervious Areas (mm/year)	0	500	0	500	175
Total Runoff (mm/year)	163	500	242	500	302
Total Outputs (mm/year)	1041	1041	1041	1041	1041
Difference (Inputs - Outputs) (mm/year)	0	0	0	0	0
Inputs (Volume)					
Precipitation (m^3/year)	47926	14586	33340	29172	125024
Run-On (m^3/year)	0	0	0	0	0
Other Inputs (m^3/year)	0	0	0	0	0
Total Inputs (m^3/year)	47926	14586	33340	29172	125024
Outputs (Volume)					
Precipitation Surplus (m^3/year)	21454	11672	14925	23343	71394
Net Surplus (m^3/year)	21454	11672	14925	23343	71394
Evapotranspiration (m^3/year)	26472	2914	18416	5829	53631
Infiltration (m^3/year)	13950	0	7174	0	21124
Impervious Area Infiltration (m^3/year)	0	4666	0	9332	13998

Total Infiltration (m^3/year)	13950	4666	7174	9332	35122
Runoff Pervious Areas (m^3/year)	7504	0	7750	0	15254
Runoff Impervious Areas (m^3/year)	0	7006	0	14012	21018
Total Runoff (m^3/year)	7504	7006	7750	14012	36272
Total Outputs (m^3/year)	47926	14586	33340	29173	125025
Difference (inputs - Outputs) (m^3/year)	0	0	0	-1**	-1**

Note: * Per guidelines, evaporation from impervious areas assumed to be 20% of precipitation.
** Minor differences attributable to rounding.

Table 4 - Water Budget Summary

Characteristic	Site				
	Current	Post-Development	% Change (Current to Post)	Post Development with Mitigation	Change (Current to Post with Mitigation)
Inputs (Volumes)					
Precipitation (m^3/year)	125024	125024	0**	125024	0**
Run-On (m^3/year)	0	0	0	0	0
Other Inputs (m^3/year)	0	0	0	0	0
Total Inputs (m^3/year)	125024	125024	0**	125024	0**
Outputs (Volumes)					
Precipitation Surplus (m^3/year)	55966	71394	+28	71394	+28
Net Surplus (m^3/year)	55966	71394	+28	71394	+28
Evapotranspiration (m^3/year)	69058	53631	-22	53631	-22
Infiltration (m^3/year)	34949	21124	-40	21124	-40
Impervious Area Infiltration (m^3/year)	0	0	0	13998	+100
Total Infiltration (m^3/year)	34949	21124	-40	35122	+2
Runoff Pervious Areas (m^3/year)	21018	15254	-27	15254	-27
Runoff Impervious Areas (m^3/year)	0	35015	+35015 m^3/year	21018	+21018 m^3/year
Total Runoff (m^3/year)	21018	50269	+139	36272	+73
Total Outputs (m^3/year)	125025	125024	0**	125025	0

** Minor differences attributable to rounding.

Mitigation assumes that 40% of runoff from the impervious areas of the site can be infiltrated on-site, or about 13,998m^3/year. It is assumed that most of this will be infiltrated in the lowland portion of the site due to the drainage characteristics of the site. According to the grain-size analyses provided in the PML report (attached), the predominant native soils in the lowland area (i.e. a silty fine sand) will exhibit a percolation rate (T-time) in the range of 15 to 20 min/cm (based on the Hazen Formula for a Unified Soil Classification "SM"), or about 0.72m/day. Conservatively assuming that the impervious area drainage of 13,998m^3/year is to be infiltrated over 30 days throughout the year, approximately 467m^3 of water needs to be infiltrated per day. Based on an infiltration rate of 0.72m/day, an infiltration system with a footprint of at least 650m^2 is required. It is understood from WMI that soak-away pits are proposed to include the single family residential lots and the medium-density townhouse block. The proposed SWM pond (Block 89) is indicated to be 0.38ha (3,800m^2) in area, and alone will be more than capable of infiltrating this volume of water within a 30-day period, and also with a substantial safety factor if the permeability of the SWM is reduced over time due to sedimentation. The SWM pond must incorporate some manner of retention to promote infiltration.

SUMMARY

1. The overburden in the vicinity of the site is reported to be primarily granular, with discontinuous fine-grained lenses in the lowland portion of the site.

2. Based on a review of the PML borehole data, local water well records and the 2005 NSMGS, the regional watertable surface slopes westward with a gradient of about 0.004m/m. The surface of the regional watertable is situated near ground surface beneath the westerly, lowland portion of the site.

3. The westerly lowland area is mapped by the NSMGS as a groundwater discharge area.

4. It is our opinion that the wet area in the westerly, lowland portion of the site functions primarily as a seasonal emergence feature/discharge zone of the regional watertable surface. Groundwater emergence/discharge will be most pronounced in wet years with a high watertable surface, and most limited in dry years with a lowered watertable surface.

5. Shallow groundwater quality is typical of shallow groundwater in a municipally-serviced area with few indicators of urban impact. The dissolved organic carbon content of shallow was somewhat elevated at 42mg/L (above the Ontario Drinking Water Quality Standard of 5mg/L), but is not unexpected in a low-lying, seasonally wet area.

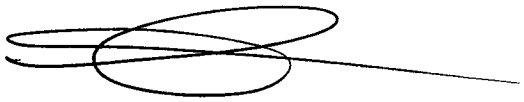
6. Based on known site conditions (i.e. sandy or medium silt/sand till soils, hilly relief, woodland cover), an MOECC infiltration factor of 0.55 to 0.7 is indicated for the undeveloped site.

7. Water budget analysis indicates that the development proposal of the site will reduce overall infiltration by about 40% from current conditions.

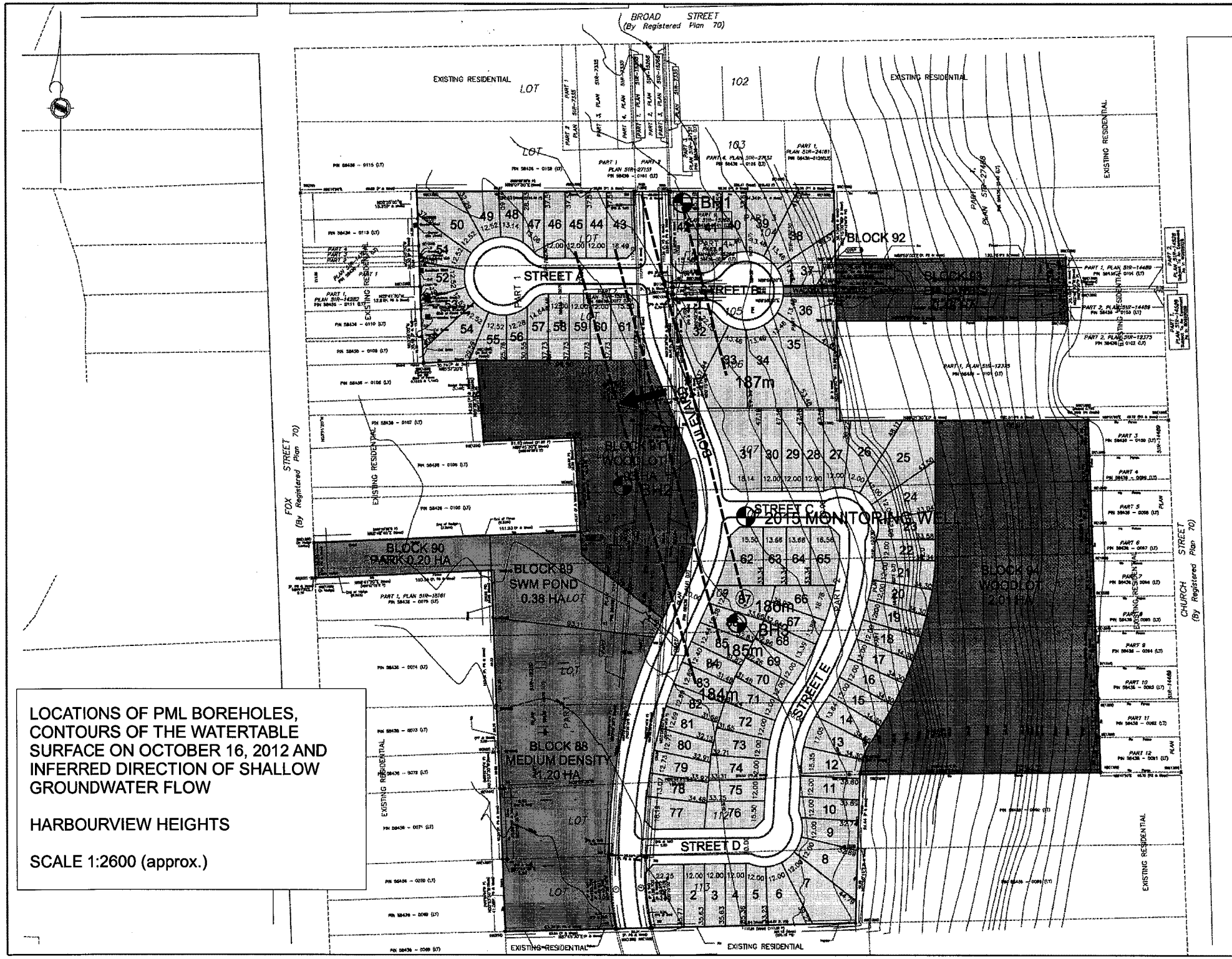
8. Due to the calculated loss in overall infiltration of the development proposal in comparison to existing conditions, infiltration enhancement measures must be adopted in the lowland portion of the site. The proposed SWM pond plus soak-away pits that are proposed for the single family residential lots and the medium-density townhouse block will be more than adequate to infiltrate the required volume of water per year. The infiltration measures need to be maintained in a low-silt condition to avoid infiltration loss over time.

Should there be any questions regarding the above information and analysis, please feel free to contact this office.

Yours sincerely.
IAN D. WILSON ASSOCIATES LIMITED



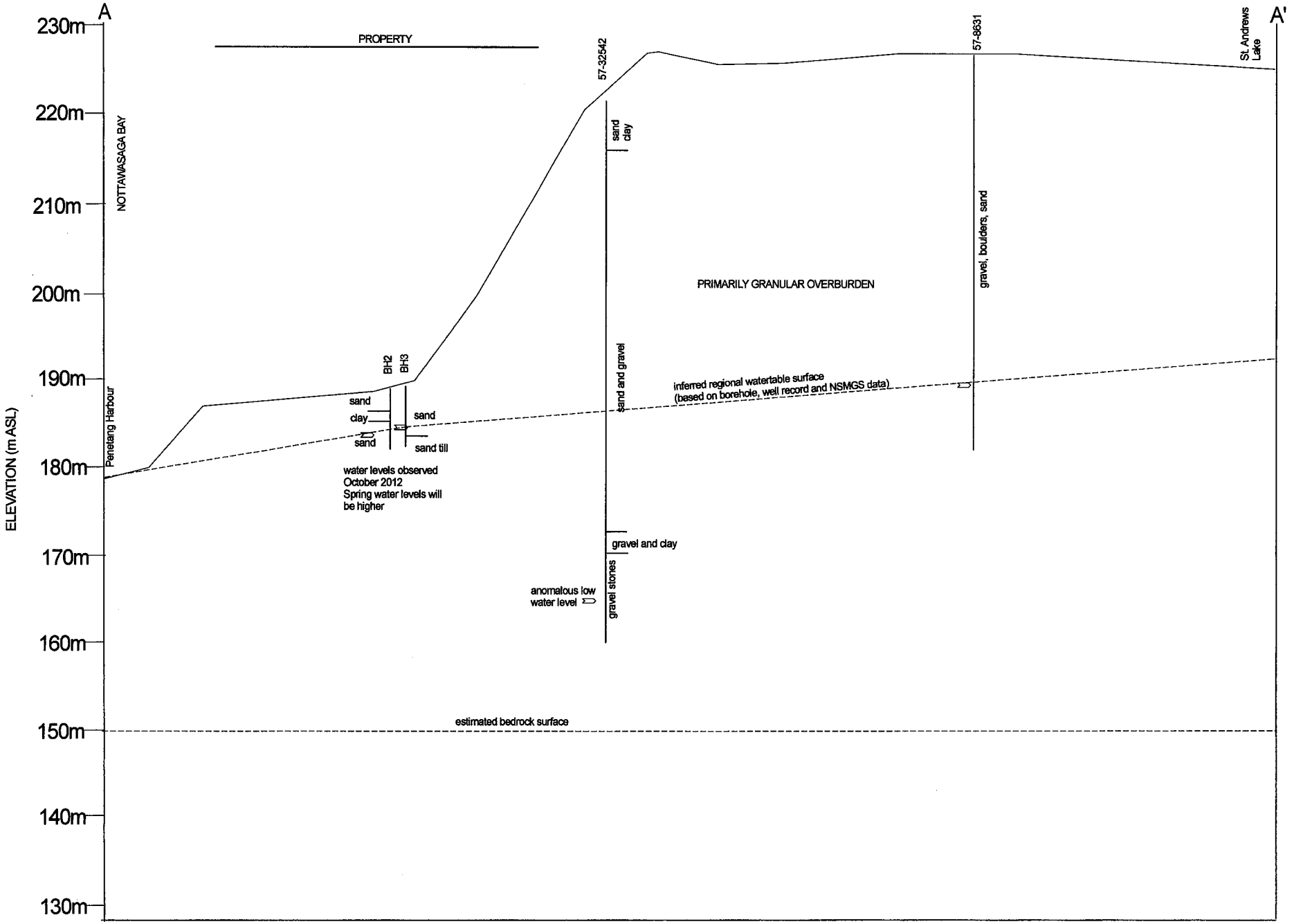
Geoffrey Rether, P.Geo.



LOCATIONS OF PML BOREHOLES, CONTOURS OF THE WATERTABLE SURFACE ON OCTOBER 16, 2012 AND INFERRED DIRECTION OF SHALLOW GROUNDWATER FLOW

HARBOURVIEW HEIGHTS

SCALE 1:2600 (approx.)



SCHEMATIC CROSS SECTION FROM SHORE OF PENTANG HARBOUR TO SHORE OF ST. ANDREWS LAKE, VIEWING NORTH
TOWN OF PENETANGUISHENE

HORIZONTAL SCALE 1:10,000, VERTICAL SCALE 1:600, VERTICAL EXAGGERATION 17x

IAN D. WILSON ASSOCIATES LIMITED

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 1

PROJECT Proposed Residential Development
LOCATION 221 Fox Street, Penetanguishene, Ontario
BORING METHOD Continuous Flight Solid Stem Augers
BORING DATE: October 11, 2012
OUR PROJECT NO. 12BF046
ENGINEER GW
TECHNICIAN TP

DEPTH In METRES	DESCRIPTION (GROUND ELEVATION)	LEGEND	NUMBER	TYPE	BLOWS/0.3m N - VALUES	ELEVATION SCALE
0.0						
0.15	TOPSOIL: Dark brown, silty sand, trace roots, moist		1	SS	5	
	SAND: Loose, light brown, sand, trace silt, moist to wet					
0.80	CLAYEY SILT: Firm, brown, clayey silt, some sand, WTPL		2	SS	6	
1.4	SAND: Compact to loose, silty sand, trace gravel, saturated		3	SS	10	
			4	SS	12	
			5	SS	8	
4.0	TILL: Dense to very dense, brown, silty sand, trace gravel, cobbles and boulders, wet to moist		6	SS	31	
6.2	BOREHOLE TERMINATED AT 6.2 m		7	SS	50/126 mm	

SHEAR STRENGTH C_u (kPa) 20 40 60 80
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
BLOWS/0.3M 20 40 60 80

LIQUID LIMIT ____ W_L
PLASTIC LIMIT ____ W_P
WATER CONTENT ___ W
W_P W W_L
WATER CONTENT % 10 20 30

UNIT WEIGHT γ kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

Bentonite
Slotted pipe
Filter sand

Upon completion of augering
Wet cave at 5.8 m

Water Level Readings

Date	Depth (m)
Oct 16	1.9 m

NOTES:

+ SENSITIVITY
+ UNDISTURBED FIELD VANE
⊕ REMOLDED FIELD VANE
⊗ LAB SHEAR TEST
▲ POCKET PENETROMETER

CHECKED BY

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 2

PROJECT Proposed Residential Development
LOCATION 221 Fox Street, Penetanguishene, Ontario
BORING METHOD Continuous Flight Solid Stem Augers
BORING DATE: October 11, 2012
OUR PROJECT NO. 12BF046
ENGINEER GW
TECHNICIAN TP

DEPTH In METRES	DESCRIPTION (GROUND ELEVATION)	LEGEND	NUMBER	TYPE	BLOWS/0.3m N - VALUES	ELEVATION SCALE
0.0						
0.15	TOPSOIL: Dark brown, silty sand, trace roots, moist		1	SS	4	
	SAND: Loose, light brown, sand, trace silt, moist to saturated					
1.0	Sandy silt layers		2	SS	7	
	Becoming silty sand, trace clay		3	SS	7	
2.0						
			4	SS	8	
2.9	CLAYEY SILT: Soft, brown, clayey silt, APL to WTPL					
3.0			5	SS	3	
4.0	SAND: Compact to dense, grey, sand, some silt, trace gravel, saturated					
5.0			6	SS	15	
6.0			7	SS	31	
6.5	BOREHOLE TERMINATED AT 6.5 m					
7.0						
8.0						
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						

SHEAR STRENGTH C_u (kPa) 20 40 60 80
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
BLOWS/0.3M 20 40 60 80

LIQUID LIMIT ____ W_L
PLASTIC LIMIT ____ W_P
WATER CONTENT ____ W
W_P W W_L
WATER CONTENT % 10 20 30

UNIT WEIGHT γ kN/m³

GROUND WATER OBSERVATIONS AND REMARKS
GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

Bentonite
Slotted pipe
Filter sand

Upon completion of augering
Water at 3.0 m
Cave at 5.2 m

Water Level Readings

Date	Depth (m)
Oct 16	4.4 m

NOTES:

SENSITIVITY
UNDISTURBED FIELD VANE
REMOLDED FIELD VANE
LAB SHEAR TEST
POCKET PENETROMETER

CHECKED BY

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 3

PROJECT Proposed Residential Development
LOCATION 221 Fox Street, Penetanguishene, Ontario
BORING METHOD Continuous Flight Solid Stem Augers
BORING DATE: October 11, 2012
OUR PROJECT NO. 12BF046
ENGINEER GW
TECHNICIAN TP

DEPTH In METRES	DESCRIPTION (GROUND ELEVATION)	LEGEND	NUMBER	TYPE	BLOWS/0.3m N - VALUES	ELEVATION SCALE
0.0						
0.15	TOPSOIL: Dark brown, silty sand, trace roots, moist		1	SS	6	
	SAND: Compact to very loose, brown, sand, trace silt, sandy silt layers, moist		2	SS	11	
1.0						
	Becoming silty sand, trace clay, saturated		3	SS	7	
2.0						
			4	SS	3	
3.0						
			5	SS	2	
4.0	Becoming sand, trace to some silt, trace gravel					
			6	SS	12	
5.0						
5.5	TILL: Compact, brown, silty sand, trace gravel, cobbles and boulders, wet					
6.0			7	SS	21	
6.5	BOREHOLE TERMINATED AT 6.5 m					
7.0						
8.0						
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						

SHEAR STRENGTH C_u (kPa) 20 40 60 80
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
BLOWS/0.3M 20 40 60 80

LIQUID LIMIT ____ W_L
PLASTIC LIMIT ____ W_P
WATER CONTENT ___ W
W_P W W_L
WATER CONTENT % 10 20 30

UNIT WEIGHT γ kN/m³

GROUND WATER OBSERVATIONS AND REMARKS

GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

Bentonite

Slotted pipe
Filter sand

Upon completion of augering
Wet cave at 4.9 m

Water Level Readings

Date	Depth (m)
Oct 16	2.2 m

NOTES:

SENSITIVITY
UNDISTURBED FIELD VANE
REMOLDED FIELD VANE
LAB SHEAR TEST
POCKET PENETROMETER

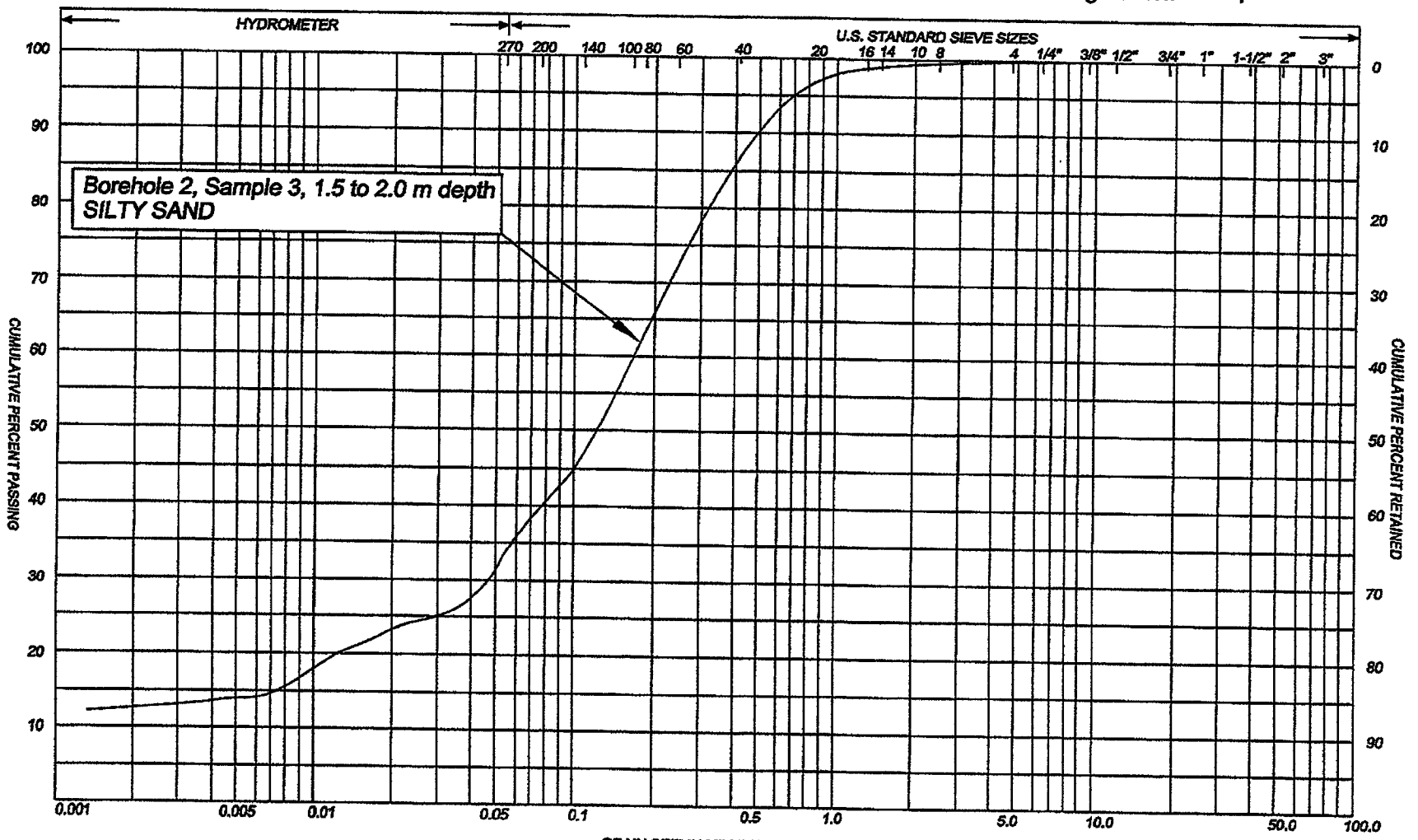
CHECKED BY

Peto MacCallum Ltd.

CONSULTING ENGINEERS

PARTICLE SIZE DISTRIBUTION CHART

PML Ref.: 12BF046
Lab No.: L20340
Figure No.: 1



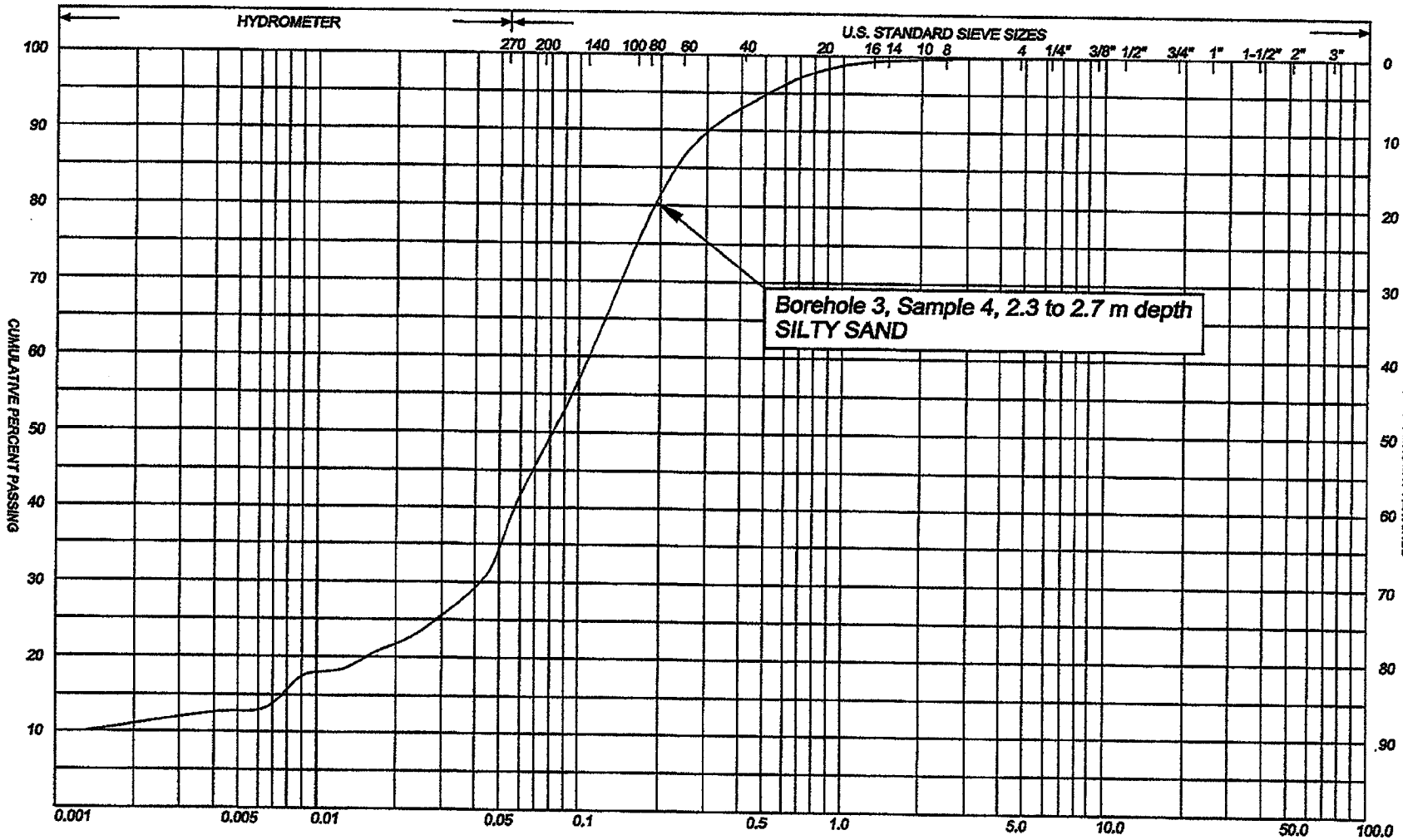
SILT & CLAY				FINE	MEDIUM	COARSE	GRAVEL		COB BLES	UNIFIED
CLAY	FINE	MEDIUM	COARSE	SAND						
	SILT			FINE	MEDIUM	COARSE	GRAVEL		COBBLES	M.I.T.
CLAY	SILT			SAND			GRAVEL			U.S. BUREAU
				V. FINE	FINE	MED	COARSE			

Peto MacCallum Ltd.

CONSULTING ENGINEERS

PARTICLE SIZE DISTRIBUTION CHART

PML Ref.: 12BF046
Lab No.: L20341
Figure No.: 2



SILT & CLAY				FINE	MEDIUM	COARSE	GRAVEL	COBBLES	UNIFIED
				SAND					
CLAY	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	GRAVEL	COBBLES	M.I.T.
	SILT			SAND					
CLAY	SILT			V. FINE	FINE	MED	COARSE	GRAVEL	U.S. BUREAU
				SAND					

Well ID Number: 5708631

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	Tay Township	120	PR E 02
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
SIMCOE		ON	n/a

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

NAD83 — Zone 17
Easting: 585389.2
Northing: 4960421

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*Depth To*
BRWN	LOAM			0 ft	2 ft
BRWN	GRVL	BLDR		2 ft	145 ft
YLLW	GRVL	SAND		145 ft	148 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		148 ft

Construction Record - Screen

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

Well Contractor and Well Technician Information

Well Contractor's Licence Number 2514

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:30 m

Final water level 140 ft

If flowing give rate

Recommended pump depth 145 ft

Recommended pump rate 10 GPM

Well Production BAILER

Disinfected?

Draw Down Time (min)	*Draw Down Water level*	*Recovery Time (min)*	*Recovery Water level*
SWL	124 ft		
1			
2			
3			
4			
5			
10			
15		15	124 ft
20			
25			
30		30	124 ft
40			
45		45	124 ft
50			
60		60	124 ft

Water Details

Water Found at Depth	*Kind*
145 ft	Fresh

Hole Diameter

Depth		*Diameter*
From	*To*	

Audit Number: *none*
Date Well Completed: January 15, 1972
Date Well Record Received by MOE: February 14, 1972

Well ID Number: 5732542

Well Audit Number: *176791*
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	Penetanguishene Town		
County/District/Municipality	*City/Town/Village*	*Province*	*Postal Code*
SIMCOE		ON	n/a

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

NAD83 — Zone 17
Easting: 584900.7
Northing: 4960057

Overburden and Bedrock Materials Interval

General Colour	*Most Common Material*	*Other Materials*	*General Description*	*Depth From*	*Depth To*
	FILL			0 ft	3 ft
BRWN	SAND	CLAY		3 ft	15 ft
BRWN	SAND	GRVL		15 ft	160 ft
BRWN	GRVL	CLAY		160 ft	170 ft
BRWN	GRVL	STNS	HARD	170 ft	203 ft

Annular Space/Abandonment Sealing Record

Depth From	*Depth To*	*Type of Sealant Used (Material and Type)*	*Volume Placed*
0 ft	190 ft		
190 ft	203 ft		

Method of Construction

Rotary (Air)

Well Use

Status of Well

Construction Record - Casing

Inside Diameter	*Open Hole OR material*	*Depth From*	*Depth To*
6 inch	OPEN HOLE		20 ft
2 inch	PLASTIC		193 ft

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 173 ft		
		1		
Pump intake set at		2		
Pumping Rate		3		
		4		
Duration of Pumping		5		
Final water level		10		
If flowing give rate		15		
		20		
Recommended pump depth		25		
Recommended pump rate		30		
		40		
Well Production		45		

2 inch	193 ft	203 ft	*Disinfected?*	50
				60

Well Contractor and Well Technician Information

Well Contractor's Licence Number 2514

Water Details

Water Found at Depth *Kind*

Hole Diameter

Depth *Diameter*

From *To*

Audit Number: 176791

Date Well Completed: November 08, 1996

Date Well Record Received by MOE: November 18, 1996

Maxxam
A Bureau Veritas Group Company

Your Project #: FOX STREET
Your C.O.C. #: 69227

Attention:Geoff Rether

Ian D Wilson Associates Ltd
PO Box 299
76722 Airport Rd
Clinton, ON
N0M 1L0

Report Date: 2015/11/13
Report #: R3766871
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B5M7356
Received: 2015/11/05, 15:20

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Alkalinity	1	N/A	2015/11/07	CAM SOP-00448	SM 22 2320 B m
Carbonate, Bicarbonate and Hydroxide	1	N/A	2015/11/09	CAM SOP-00102	APHA 4500-CO2 D
Chloride by Automated Colourimetry	1	N/A	2015/11/09	CAM SOP-00463	EPA 325.2 m
Conductivity	1	N/A	2015/11/07	CAM SOP-00414	SM 22 2510 m
Dissolved Organic Carbon (DOC) (1)	1	N/A	2015/11/06	CAM SOP-00446	SM 22 5310 B m
Hardness (calculated as CaCO3)	1	N/A	2015/11/09	CAM SOP 00102/00408/00447	SM 2340 B
Lab Filtered Metals by ICPMS	1	2015/11/06	2015/11/09	CAM SOP-00447	EPA 6020A m
Ion Balance (% Difference)	1	N/A	2015/11/09		
Anion and Cation Sum	1	N/A	2015/11/09		
Total Ammonia-N	1	N/A	2015/11/12	CAM SOP-00441	EPA GS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (2)	1	N/A	2015/11/11	CAM SOP-00440	SM 22 4500-NO3I/NO2B
pH	1	N/A	2015/11/07	CAM SOP-00413	SM 4500H+ B m
Orthophosphate	1	N/A	2015/11/09	CAM SOP-00461	EPA 365.1 m
Sat. pH and Langelier Index (@ 20C)	1	N/A	2015/11/09		
Sat. pH and Langelier Index (@ 4C)	1	N/A	2015/11/09		
Sulphate by Automated Colourimetry	1	N/A	2015/11/09	CAM SOP-00464	EPA 375.4 m
Total Dissolved Solids (TDS calc)	1	N/A	2015/11/09		

Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act.

Maxxam Analytics is accredited for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Maxxam
A Bureau Veritas Group Company

Your Project #: FOX STREET
Your C.O.C. #: 69227

Attention:Geoff Rether

Ian D Wilson Associates Ltd
PO Box 299
76722 Airport Rd
Clinton, ON
N0M 1L0

Report Date: 2015/11/13
Report #: R3766871
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B5M7356
Received: 2015/11/05, 15:20

(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key Antonella Brasil
13 Nov 2015 16:47:55 -05:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Stephen McMillan, Project Manager
Email: xxsmcmillan@maxxam.ca
Phone# (905)817-5700 Ext:5735

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam
A Bureau Veritas Group Company

Maxxam Job #: B5M7356
Report Date: 2015/11/13

Ian D Wilson Associates Ltd
Client Project #: FOX STREET

RCAP - COMPREHENSIVE (LAB FILTERED)

Maxxam ID		BHJ788		
Sampling Date		2015/11/05 12:00		
	UNITS	QUEENS COURT	RDL	QC Batch
Calculated Parameters				
Anion Sum	me/L	8.01	N/A	4260739
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	360	1.0	4260020
Calculated TDS	mg/L	430	1.0	4260561
Carb. Alkalinity (calc. as CaCO3)	mg/L	1.2	1.0	4260020
Cation Sum	me/L	8.75	N/A	4260739
Hardness (CaCO3)	mg/L	420	1.0	4261075
Ion Balance (% Difference)	%	4.44	N/A	4260738
Langelier Index (@ 20C)	N/A	0.743		4260740
Langelier Index (@ 4C)	N/A	0.495		4260741
Saturation pH (@ 20C)	N/A	6.81		4260740
Saturation pH (@ 4C)	N/A	7.06		4260741
Inorganics				
Total Ammonia-N	mg/L	0.50	0.050	4266655
Conductivity	umho/cm	730	1.0	4262853
Dissolved Organic Carbon	mg/L	42	0.20	4262345
Orthophosphate (P)	mg/L	ND	0.010	4263259
pH	pH	7.55	N/A	4262857
Dissolved Sulphate (SO4)	mg/L	33	1.0	4263258
Alkalinity (Total as CaCO3)	mg/L	360	1.0	4262852
Dissolved Chloride (Cl)	mg/L	5.2	1.0	4263256
Nitrite (N)	mg/L	ND	0.010	4263255
Nitrate (N)	mg/L	ND	0.10	4263255
Metals				
Dissolved Aluminum (Al)	ug/L	19	5.0	4262285
Dissolved Antimony (Sb)	ug/L	ND	0.50	4262285
Dissolved Arsenic (As)	ug/L	ND	1.0	4262285
Dissolved Barium (Ba)	ug/L	150	2.0	4262285
Dissolved Beryllium (Be)	ug/L	ND	0.50	4262285
Dissolved Boron (B)	ug/L	15	10	4262285
Dissolved Cadmium (Cd)	ug/L	0.10	0.10	4262285
Dissolved Calcium (Ca)	ug/L	120000	200	4262285
Dissolved Chromium (Cr)	ug/L	ND	5.0	4262285
Dissolved Cobalt (Co)	ug/L	0.82	0.50	4262285
Dissolved Copper (Cu)	ug/L	4.2	1.0	4262285

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
ND = Not detected

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

RCAP - COMPREHENSIVE (LAB FILTERED)

Maxxam ID		BHJ788		
Sampling Date		2015/11/05 12:00		
	UNITS	QUEENS COURT	RDL	QC Batch
Dissolved Iron (Fe)	ug/L	ND	100	4262285
Dissolved Lead (Pb)	ug/L	ND	0.50	4262285
Dissolved Magnesium (Mg)	ug/L	28000	50	4262285
Dissolved Manganese (Mn)	ug/L	200	2.0	4262285
Dissolved Molybdenum (Mo)	ug/L	1.7	0.50	4262285
Dissolved Nickel (Ni)	ug/L	2.7	1.0	4262285
Dissolved Phosphorus (P)	ug/L	ND	100	4262285
Dissolved Potassium (K)	ug/L	2700	200	4262285
Dissolved Selenium (Se)	ug/L	ND	2.0	4262285
Dissolved Silicon (Si)	ug/L	6300	50	4262285
Dissolved Silver (Ag)	ug/L	ND	0.10	4262285
Dissolved Sodium (Na)	ug/L	5300	100	4262285
Dissolved Strontium (Sr)	ug/L	250	1.0	4262285
Dissolved Thallium (Tl)	ug/L	ND	0.050	4262285
Dissolved Titanium (Ti)	ug/L	ND	5.0	4262285
Dissolved Uranium (U)	ug/L	26	0.10	4262285
Dissolved Vanadium (V)	ug/L	1.2	0.50	4262285
Dissolved Zinc (Zn)	ug/L	20	5.0	4262285

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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Maxxam
A Bureau Veritas Group Company

Maxxam Job #: B5M7356
Report Date: 2015/11/13

Ian D Wilson Associates Ltd
Client Project #: FOX STREET

TEST SUMMARY

Maxxam ID: BHJ788
Sample ID: QUEENS COURT
Matrix: Water

Collected: 2015/11/05
Shipped:
Received: 2015/11/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	4262852	N/A	2015/11/07	Yogesh Patel
Carbonate, Bicarbonate and Hydroxide	CALC	4260020	N/A	2015/11/09	Automated Statchk
Chloride by Automated Colourimetry	KONE	4263256	N/A	2015/11/09	Deonarine Ramnarine
Conductivity	AT	4262853	N/A	2015/11/07	Yogesh Patel
Dissolved Organic Carbon (DOC)	TOCV/NDIR	4262345	N/A	2015/11/06	Anastasia Hamanov
Hardness (calculated as CaCO3)		4261075	N/A	2015/11/09	Automated Statchk
Lab Filtered Metals by ICPMS	ICP/MS	4262285	2015/11/06	2015/11/09	John Bowman
Ion Balance (% Difference)	CALC	4260738	N/A	2015/11/09	Automated Statchk
Anion and Cation Sum	CALC	4260739	N/A	2015/11/09	Automated Statchk
Total Ammonia-N	LACH/NH4	4266655	N/A	2015/11/12	Chandra Nandlal
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	4263255	N/A	2015/11/11	Chandra Nandlal
pH	AT	4262857	N/A	2015/11/07	Yogesh Patel
Orthophosphate	KONE	4263259	N/A	2015/11/09	Alina Dobreanu
Sat. pH and Langelier Index (@ 20C)	CALC	4260740	N/A	2015/11/09	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	4260741	N/A	2015/11/09	Automated Statchk
Sulphate by Automated Colourimetry	KONE	4263258	N/A	2015/11/09	Alina Dobreanu
Total Dissolved Solids (TDS calc)	CALC	4260561	N/A	2015/11/09	Automated Statchk

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GENERAL COMMENTS

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
4262285	JBW	Matrix Spike	Dissolved Aluminum (Al)	2015/11/09		102	%	80 - 120
			Dissolved Antimony (Sb)	2015/11/09		109	%	80 - 120
			Dissolved Arsenic (As)	2015/11/09		100	%	80 - 120
			Dissolved Barium (Ba)	2015/11/09		NC	%	80 - 120
			Dissolved Beryllium (Be)	2015/11/09		101	%	80 - 120
			Dissolved Boron (B)	2015/11/09		99	%	80 - 120
			Dissolved Cadmium (Cd)	2015/11/09		103	%	80 - 120
			Dissolved Calcium (Ca)	2015/11/09		NC	%	80 - 120
			Dissolved Chromium (Cr)	2015/11/09		95	%	80 - 120
			Dissolved Cobalt (Co)	2015/11/09		97	%	80 - 120
			Dissolved Copper (Cu)	2015/11/09		99	%	80 - 120
			Dissolved Iron (Fe)	2015/11/09		98	%	80 - 120
			Dissolved Lead (Pb)	2015/11/09		93	%	80 - 120
			Dissolved Magnesium (Mg)	2015/11/09		NC	%	80 - 120
			Dissolved Manganese (Mn)	2015/11/09		97	%	80 - 120
			Dissolved Molybdenum (Mo)	2015/11/09		103	%	80 - 120
			Dissolved Nickel (Ni)	2015/11/09		94	%	80 - 120
			Dissolved Phosphorus (P)	2015/11/09		110	%	80 - 120
			Dissolved Potassium (K)	2015/11/09		103	%	80 - 120
			Dissolved Selenium (Se)	2015/11/09		98	%	80 - 120
			Dissolved Silicon (Si)	2015/11/09		105	%	80 - 120
			Dissolved Silver (Ag)	2015/11/09		94	%	80 - 120
			Dissolved Sodium (Na)	2015/11/09		NC	%	80 - 120
			Dissolved Strontium (Sr)	2015/11/09		NC	%	80 - 120
			Dissolved Thallium (Tl)	2015/11/09		93	%	80 - 120
			Dissolved Titanium (Ti)	2015/11/09		100	%	80 - 120
			Dissolved Uranium (U)	2015/11/09		97	%	80 - 120
			Dissolved Vanadium (V)	2015/11/09		98	%	80 - 120
			Dissolved Zinc (Zn)	2015/11/09		97	%	80 - 120
4262285	JBW	Spiked Blank	Dissolved Aluminum (Al)	2015/11/09		100	%	80 - 120
			Dissolved Antimony (Sb)	2015/11/09		102	%	80 - 120
			Dissolved Arsenic (As)	2015/11/09		99	%	80 - 120
			Dissolved Barium (Ba)	2015/11/09		101	%	80 - 120
			Dissolved Beryllium (Be)	2015/11/09		98	%	80 - 120
			Dissolved Boron (B)	2015/11/09		96	%	80 - 120
			Dissolved Cadmium (Cd)	2015/11/09		100	%	80 - 120
			Dissolved Calcium (Ca)	2015/11/09		98	%	80 - 120
			Dissolved Chromium (Cr)	2015/11/09		93	%	80 - 120
			Dissolved Cobalt (Co)	2015/11/09		97	%	80 - 120
			Dissolved Copper (Cu)	2015/11/09		96	%	80 - 120
			Dissolved Iron (Fe)	2015/11/09		99	%	80 - 120
			Dissolved Lead (Pb)	2015/11/09		97	%	80 - 120
			Dissolved Magnesium (Mg)	2015/11/09		101	%	80 - 120
			Dissolved Manganese (Mn)	2015/11/09		97	%	80 - 120
			Dissolved Molybdenum (Mo)	2015/11/09		96	%	80 - 120
			Dissolved Nickel (Ni)	2015/11/09		96	%	80 - 120
			Dissolved Phosphorus (P)	2015/11/09		106	%	80 - 120
			Dissolved Potassium (K)	2015/11/09		101	%	80 - 120
			Dissolved Selenium (Se)	2015/11/09		97	%	80 - 120
			Dissolved Silicon (Si)	2015/11/09		101	%	80 - 120
			Dissolved Silver (Ag)	2015/11/09		95	%	80 - 120
			Dissolved Sodium (Na)	2015/11/09		100	%	80 - 120
			Dissolved Strontium (Sr)	2015/11/09		99	%	80 - 120
			Dissolved Thallium (Tl)	2015/11/09		97	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Titanium (Ti)	2015/11/09		96	%	80 - 120
			Dissolved Uranium (U)	2015/11/09		101	%	80 - 120
			Dissolved Vanadium (V)	2015/11/09		94	%	80 - 120
			Dissolved Zinc (Zn)	2015/11/09		98	%	80 - 120
4262285	JBW	Method Blank	Dissolved Aluminum (Al)	2015/11/09	ND, RDL=5.0		ug/L	
			Dissolved Antimony (Sb)	2015/11/09	ND, RDL=0.50		ug/L	
			Dissolved Arsenic (As)	2015/11/09	ND, RDL=1.0		ug/L	
			Dissolved Barium (Ba)	2015/11/09	ND, RDL=2.0		ug/L	
			Dissolved Beryllium (Be)	2015/11/09	ND, RDL=0.50		ug/L	
			Dissolved Boron (B)	2015/11/09	ND, RDL=10		ug/L	
			Dissolved Cadmium (Cd)	2015/11/09	ND, RDL=0.10		ug/L	
			Dissolved Calcium (Ca)	2015/11/09	ND, RDL=200		ug/L	
			Dissolved Chromium (Cr)	2015/11/09	ND, RDL=5.0		ug/L	
			Dissolved Cobalt (Co)	2015/11/09	ND, RDL=0.50		ug/L	
			Dissolved Copper (Cu)	2015/11/09	ND, RDL=1.0		ug/L	
			Dissolved Iron (Fe)	2015/11/09	ND, RDL=100		ug/L	
			Dissolved Lead (Pb)	2015/11/09	ND, RDL=0.50		ug/L	
			Dissolved Magnesium (Mg)	2015/11/09	ND, RDL=50		ug/L	
			Dissolved Manganese (Mn)	2015/11/09	ND, RDL=2.0		ug/L	
			Dissolved Molybdenum (Mo)	2015/11/09	ND, RDL=0.50		ug/L	
			Dissolved Nickel (Ni)	2015/11/09	ND, RDL=1.0		ug/L	
			Dissolved Phosphorus (P)	2015/11/09	ND, RDL=100		ug/L	
			Dissolved Potassium (K)	2015/11/09	ND, RDL=200		ug/L	
			Dissolved Selenium (Se)	2015/11/09	ND, RDL=2.0		ug/L	
			Dissolved Silicon (Si)	2015/11/09	ND, RDL=50		ug/L	
			Dissolved Silver (Ag)	2015/11/09	ND, RDL=0.10		ug/L	
			Dissolved Sodium (Na)	2015/11/09	ND, RDL=100		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Strontium (Sr)	2015/11/09	ND, RDL=1.0		ug/L	
			Dissolved Thallium (Tl)	2015/11/09	ND, RDL=0.050		ug/L	
			Dissolved Titanium (Ti)	2015/11/09	ND, RDL=5.0		ug/L	
			Dissolved Uranium (U)	2015/11/09	ND, RDL=0.10		ug/L	
			Dissolved Vanadium (V)	2015/11/09	ND, RDL=0.50		ug/L	
			Dissolved Zinc (Zn)	2015/11/09	ND, RDL=5.0		ug/L	
4262285	JBW	RPD	Dissolved Calcium (Ca)	2015/11/09	2.5		%	20
			Dissolved Iron (Fe)	2015/11/09	NC		%	20
			Dissolved Magnesium (Mg)	2015/11/09	1.2		%	20
4262345	AHA	Matrix Spike	Dissolved Organic Carbon	2015/11/06		99	%	80 - 120
4262345	AHA	Spiked Blank	Dissolved Organic Carbon	2015/11/06		100	%	80 - 120
4262345	AHA	Method Blank	Dissolved Organic Carbon	2015/11/06	ND, RDL=0.20		mg/L	
4262345	AHA	RPD	Dissolved Organic Carbon	2015/11/06	0.52		%	20
4262852	YPA	Spiked Blank	Alkalinity (Total as CaCO3)	2015/11/07		95	%	85 - 115
4262852	YPA	Method Blank	Alkalinity (Total as CaCO3)	2015/11/07	ND, RDL=1.0		mg/L	
4262852	YPA	RPD	Alkalinity (Total as CaCO3)	2015/11/07	10		%	25
4262853	YPA	Spiked Blank	Conductivity	2015/11/07		101	%	85 - 115
4262853	YPA	Method Blank	Conductivity	2015/11/07	1.2, RDL=1.0		umho/cm	
4262853	YPA	RPD	Conductivity	2015/11/07	0.68		%	25
4262857	YPA	Spiked Blank	pH	2015/11/07		101	%	98 - 103
4262857	YPA	RPD	pH	2015/11/07	0.60		%	N/A
4263255	C_N	Matrix Spike	Nitrite (N)	2015/11/11		108	%	80 - 120
			Nitrate (N)	2015/11/11		108	%	80 - 120
4263255	C_N	Spiked Blank	Nitrite (N)	2015/11/11		101	%	80 - 120
			Nitrate (N)	2015/11/11		102	%	80 - 120
4263255	C_N	Method Blank	Nitrite (N)	2015/11/11	ND, RDL=0.010		mg/L	
			Nitrate (N)	2015/11/11	ND, RDL=0.10		mg/L	
4263255	C_N	RPD	Nitrite (N)	2015/11/11	NC		%	25
			Nitrate (N)	2015/11/11	NC		%	25
4263256	DRM	Matrix Spike	Dissolved Chloride (Cl)	2015/11/09		NC	%	80 - 120
4263256	DRM	Spiked Blank	Dissolved Chloride (Cl)	2015/11/09		102	%	80 - 120
4263256	DRM	Method Blank	Dissolved Chloride (Cl)	2015/11/09	ND, RDL=1.0		mg/L	
4263256	DRM	RPD	Dissolved Chloride (Cl)	2015/11/09	3.2		%	20
4263258	ADB	Matrix Spike	Dissolved Sulphate (SO4)	2015/11/09		71 (1)	%	75 - 125
4263258	ADB	Spiked Blank	Dissolved Sulphate (SO4)	2015/11/09		95	%	80 - 120
4263258	ADB	Method Blank	Dissolved Sulphate (SO4)	2015/11/09	ND, RDL=1.0		mg/L	
4263258	ADB	RPD	Dissolved Sulphate (SO4)	2015/11/09	0.039		%	20
4263259	ADB	Matrix Spike	Orthophosphate (P)	2015/11/09		115	%	75 - 125
4263259	ADB	Spiked Blank	Orthophosphate (P)	2015/11/09		101	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
4263259	ADB	Method Blank	Orthophosphate (P)	2015/11/09	ND, RDL=0.010		mg/L	
4263259	ADB	RPD	Orthophosphate (P)	2015/11/09	NC		%	25
4266655	C_N	Matrix Spike	Total Ammonia-N	2015/11/12		100	%	80 - 120
4266655	C_N	Spiked Blank	Total Ammonia-N	2015/11/12		103	%	85 - 115
4266655	C_N	Method Blank	Total Ammonia-N	2015/11/12	ND, RDL=0.050		mg/L	
4266655	C_N	RPD	Total Ammonia-N	2015/11/12	0.36		%	20

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

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Maxxam Job #: B5M7356
Report Date: 2015/11/13

Ian D Wilson Associates Ltd
Client Project #: FOX STREET

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Brad Newman, Scientific Specialist

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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