



VIA Email: lloyd@lloydphillips.com

June 22, 2017

Our File Ref.: 170132.02

The Hindu Temple of Ottawa Carlton Inc.
c/o Lloyd Phillips & Associates Ltd.
1827 Woodward Drive, Suite 109,
Ottawa, Ontario K2C 0P9

Attention: Mr. Lloyd Phillips

Subject: Terrain Analysis - Proposed Assembly Hall
The Hindu Temple of Ottawa Carlton, 4835 Bank Street, Ottawa, Ontario

Dear Mr. Phillips,

LRL Associates Ltd. (LRL) has conducted a Terrain Analysis for the proposed Hindu Temple of Ottawa Carlton Assembly Hall to be constructed on the property located at 4835 Bank Street, Ottawa, Ontario (herein referred to as the "Site"). It is understood that it is proposed that a 2,100 m² Assembly Hall will be constructed at the eastern portion of the existing developed property which will have an available capacity of approximately 600 individuals, increasing the total occupancy of the site to an estimated 850.

The proposed Assembly Hall will be supplied by municipal water supply and a private septic as is the existing development on the Site.

The assessment was carried out to determine if the proposed development:

-) Has soil conditions that are suitable for onsite sewage disposal; and
-) Will not impair the use of groundwater resources on the Site or on adjacent lands.

The assessment was conducted according to Ontario Ministry of the Environment's and Climate Change (MOECC) "Hydrogeological Technical Information Requirements for Land Development Applications" (April 1995), which include the following guidelines and procedures:

-) Guideline D-5 Planning for Sewage and Water Services (August 1996); and
-) Procedure D-5-4 Technical Guideline for Individual On-site Sewage Systems: Water Quality Impact Risk Assessment (August 1996).

The assessment involved a desktop review of available information on the geology and hydrogeology of the Site and adjacent lands. The Site is serviced by municipal water supply, therefore a review of the local potential supply aquifer was not carried out. Although deemed not

necessary, neighbouring properties within 250 m of the Site were found to have records of supply wells present.

1 SITE AND AREA DESCRIPTION

The property is situated at the southern extents of the City of Ottawa at 4385 Bank Street. The property is legally described as Part Lot 22, Concession 5RF Gloucester Parts 1 & 2, 5R3156. The location of the subject site is shown in **Figure 1**. The Site's area is approximately 3.8 hectares (9.4 acres). The property is currently occupied by The Hindu Temple of Ottawa Carleton, approximately 1,060 m², which encompasses the western and central portions of the Site. The existing Temple is located at the western extent of the Site with the associated septic systems to the north and south of the Temple. Based on the previously prepared Use Permit, dated December 5, 1985, issued by the Ontario Ministry of the Environmental and Climate Change, and associated application, the existing septic systems were designed for 3,750 L/day, assuming occupancy of 250 individuals and the use of 15 L/day per individual.

The neighbouring land use is as follows:

-) Bank street, followed by light industrial/commercial business to the west; and
-) Vacant/treed land to the north, south and east.

The topography of the land is generally flat with an approximate elevation of 97 m above mean sea level.

These site features are shown in the **Figure 2**.

2 PROPOSED DEVELOPMENT

It is anticipated that an Assembly Hall be constructed at the eastern portion of the Site with the associated septic along the south of the proposed structure. Water supply will be obtained from municipal services. According to the City of Ottawa by-law requirements, and the proposed size of the new development and existing development (2,100 and 1,060 m², respectively), a total of 153 parking spaces will be required. No additional parking spaces are proposed as the current development on the Site is equipped with 176 parking spaces.

The proposed Assembly Hall is anticipated to include a dining area, a kitchen, lobby and two (2) halls. The proposed development will be equipped with a full basement as well.

The proposed development plan is shown in the **Figure 3**.

3 FIELDWORK

On May 8th, 2017, eight (8) test pits were advanced across the Site. The test pits were placed around the general perimeter of the Site so not to disrupt existing Site activities and services. The rationale for the test pits were to determine the general upper soil and perched water conditions. The test pits were advanced using a backhoe operated by a local contractor (Yelle Excavation, Ottawa) and under direct supervision by LRL field staff. The locations of the test pits are presented in **Figure 4** with the Test Pit Logs included in **Appendix A**.

An open tube piezometer was installed in select test pits locations (TP1, TP3, TP5 and TP7) to allow for the groundwater elevation measurement and sampling of the perched water found in the overburden, herein referred to as groundwater. Groundwater samples were collected from each

of the piezometers on May 8th, 2017, with the exception to TP5 which was found to have insufficient water available for sampling (i.e. dry). The samples collected were submitted for laboratory analyses for select nitrate species parameters. The laboratory Certificate of Analysis is included in Appendix B.

A soil sample from select test pits was submitted to LRL's material testing laboratory for sieve and hydrometer analyses. The sieve and hydrometer analysis certificates are included in Appendix C.

A ground surface elevation survey was carried out at each test pit location to obtain the elevation of the test pit ground surface and the piezometer stick-up. These elevations would aid in determining the groundwater elevations across the Site. An arbitrary benchmark was established at the top of the east arm of the hydrant located along the west of the southern entrance to the Site. The benchmark was given an elevation of 100.00 m. The elevations of summarized in **Table 1** and are presented in the Test Pit logs included in **Appendix A**.

4 TOPOGRAPHY, GEOLOGY AND HYDROGEOLOGY

Local topography indicates that the inferred overburden groundwater flow direction is east towards the North Castor River. The nearest open water body to the Site is an unnamed tributary that flows into the North Castor River, approximately 1.1 km east of the Site.

Surficial soil deposit mapping¹ indicates that the overburden consists of till, plain with local relief less than 5 m. Bedrock mapping² indicates that the underlying bedrock consists of dolomite and limestone, part of the Oxford Formation.

The test pits completed across the Site were found to have a thin layer of topsoil over fill material which extended to depths between 0.7 and 1.5 m thick. The fill was followed by silty sandy till with the exception to TP2, TP4, TP5 and TP6. TP2 was terminated in the fill stratum at a depth of 0.9 m bgs due to significant amounts of water infiltration, TP4 and TP5 were terminated over bedrock at a depth of 1.4 and 1.5 m, respectively, following the fill stratum and TP6 which encountered bedrock at a depth of 0.8 m bgs following the fill material. The remaining test pits extended into till followed by bedrock refusal at depths between 1.7 and 2.1 m bgs. With the exception of TP7 which extended to 1.8 m bgs, and was terminated due to a large stump limiting the excavation to extend further.

A representative till sample collected during the test pitting activities (TP3-6) was submitted for sieve analysis. The till sample was measured to be 39% Silt & Clay, 40% Sand, and 21% Gravel. A second representative till sample collected (TP1-3) was submitted for hydrometer analysis. The sample was measured to be 22% clay, 64% silt, 9% sand and 5% gravel. These results are presented in the sieve and hydrometer analysis certificates are included in **Appendix C** and are summarized in **Table 2**.

A search was conducted of the available well records from the MOECC Water Well Record Department. The search by UTM coordinates covered a 250 m radius from the site. The search

¹ St-Onge, D.A. (compilation), 2009: Surficial geology, lower Ottawa valley, Ontario-Quebec; Geological Survey of Canada, Map 2140A, scale 1:125000

² Harrison, J.E., 1976. Geological Survey of Canada, Generalized Bedrock Geology, Ottawa-Hull, Ontario and Quebec, Map 1508A, scale 1:125000.

returned records for nine (9) wells. The well records are included in **Appendix D** and their locations are presented in **Figure 5**.

Review of the records of the wells within 250 m of the site retrieved revealed that the wells are drilled wells extending to depths between 13.7 and 27.1 m. The well records shows that the geological conditions within 250 m are relatively similar, and consist generally of mixed till materials including sand, clay, gravel and boulders from 0 – 7.6 m. Unidentified soil conditions, “muck” and “soil” were found as overburden descriptions in a couple of well records, as noted in the table below. Bedrock conditions varied slightly between limestone, sandstone and occasionally shale. Bedrock starting depths also vary from 1.8 to 7.6 m.

The general subsurface conditions indicated in the well records within 500 m of the site are as follows:

MOE Well Number	Distance and Direction from Site (m)	Depth (m)	Overburden Details			Bedrock Details	Groundwater Encountered (m)	Static Water Level (m)	Type of water
			Sand/ Fill (m)	Clay/ Loam (m)	Gravel/ Till (m)				
1502181	110 N	14.0	--	--	0 – 6.4	6.4- 14.0 (Limestone)	14.0	2.4	Fresh
1502179	50 W	27.1	--	--	0 – 4.8	4.8- 7.62 (Limestone) 7.62 – 27.1 (Sandstone)	27.1	6.1	Fresh
1513436	100 SW	15	--	0 – 3.6 “Soil”	3.6 – 4.8	4.8 – 15 (Limestone)	14.6	4.3	Fresh
1502180	140 S	16.8	--	0 – 1.8 “Loam”	--	1.8 – 16.8 (Limestone)	16.8	1.8	Fresh
1502177	195 S	18.2	0 – 2.1	--	2.1 – 6.1	6.1 – 18.2 (Sandstone)	18.2	1.8	Fresh
1512375	230 S	22.5	0 – 2.7	--	--	2.7 – 22.5 (Sandstone)	22.5	3.6	Fresh
1502176	160 NW	13.7	--	0 – 5.4	--	5.4 – 13.7 (Limestone)	13.7	1.8	Fresh
1512265	245 S	14.6	--	0 – 0.9	--	0.9 – 14.6 (Limestone)	2.4, 6.4, 10.3	1.2	Fresh
1514664	220 SW	15.2	--	--	0 – 3.9	3.9 – 9.1 (Shale) 9.1 – 38.1 (Limestone)	9.7, 16.7	6.1	Fresh

4.1 Groundwater from Test Pits

Table 3 summarizes the water quality analysis from the test pit piezometers for nitrates, nitrites, ammonia and total kjeldahl nitrogen (TKN). The Laboratory Certificate of Analysis are included in **Appendix B**.

Nitrites were not detected (<0.05 mg/L) in any groundwater samples collected. Nitrate levels were found to be 0.5 mg/L in TP3 and <0.1 mg/L in both TP1 and TP5, below the ODWS of 10 mg/L. Ammonia was measured to be 0.28, 0.39 and 1.66 mg/L in TP2, TP3 and TP5, respectively. TKN values were reported as 78.1, 65.3 and 131 mg/L, in TP2, TP3 and TP5, respectively. There are no set ODWS for ammonia or TKN.

5 TERRAIN ANALYSIS

The terrain analysis was conducted to demonstrate that the unconsolidated material on the Site is appropriate for the construction of an on-site subsurface sewage disposal system, with consideration taken regarding the existing installation.

The subsurface conditions indicated for the site are considered suitable for a Class IV septic sewage disposal system with a fully raised leaching bed depending on the lot specific soil and groundwater conditions at the actual location of the proposed septic system leaching bed. The leaching bed should be constructed to conform to the specifications set out in the Ontario Building Code (OBC).

As part of this assessment, an analysis was carried out to ensure that sufficient space exists at the Site for the construction of a third septic system in accordance with the OBC which will service the proposed Assembly Hall.

As a conservative approach to determining the expected largest septic system envelope required to service the proposed Assembly Hall, a septic system envelope size was calculated assuming a fully raised bed with mantle, a percolation rate of 12 min/cm for the imported sand required and a daily sewage flow of 21,600 L.

The daily sewage flow was calculated assuming 850 persons visit the Site daily, of which approximately 600 individuals will occupy the proposed Assembly Hall. In accordance with Schedule 8 of the OBC, it is assumed that each individual which occupies the Site will discharge 36 L/day into the septic system. This is the set value for an Assembly Hall equipped with a kitchen facility. Both the existing and the proposed buildings are equipped, or will be equipped with a kitchen. As previously mentioned, the existing Temple is serviced with two (2) septic systems located at the north and south sides of the buildings, each constructed with 9,000 L fibreglass septic tanks and 8 runs of 13.3 m in length piping. The existing septic systems were designed for a combined sewage flow of 3,750 L/day, assuming occupancy of 250 individuals and the use of 15 L/day per individual.

The total length of pipe required for the proposed septic bed for the proposed Assembly Hall, assuming imported fill, was calculated as approximately 1,300 m:

$$L = QT/200$$

where L = length of pipe (m)

Q = daily sewage flow for the proposed assembly hall (L/day)

T = percolation rate of the imported sand fill material (min/cm)

Therefore an area of approximately 2,090 m² is required for the septic bed assuming 87 pipes each having a length of 15 m and a spacing of 1.6 m between the pipes. A mantle of 15 m in length would be required along the down gradient portion of the bed. Based on the total coverage of the septic bed (raised portion and mantle plus a replacement area) would be approximately 4,190 m².

The Site has a total area of 38,000 m². However, when the area of the proposed and existing buildings, septic systems and other site features (parking facility), are taken into consideration, an area of approximately 32,000 m² is available for the installation of a septic system in

accordance with the OBC to service an assembly hall with a design sewage flow of up to 21,600 L/day. The proposed site development plan is shown in **Figure 3**.

6 GROUNDWATER IMPACT ASSESSMENT

The groundwater impact assessment addresses the ability of the land to attenuate the sewage effluent created by the development. Three methods for conducting the assessment are outlined in MOE's *Procedure D-5-4 Technical Guideline for Individual On-Site Sewage Systems: Water Quality Impact Risk Assessment* (1996):

- J *Lot Size Consideration* for lot greater than 10 000 m² (1 hectare);
- J *System Isolation Consideration* for areas where the septic system is hydrogeologically isolated from the potable water source; and
- J *Contaminate Attenuation Consideration* for sites that do not meet the above two points.

Based on the review of the available information and site visit (above), the site is not obviously hydrogeologically sensitive (i.e. karstic areas, areas of fractured bedrock at the surface). Bedrock was encountered at depths between less than 2.0 m across the site, therefore the site is considered hydrogeologically sensitive with areas of thin soil over highly permeable soils (i.e. bedrock).

As mentioned above, the lot size is 38,000 m² with approximately 32,000 m² available for the installation of the proposed septic system. The lot size consideration for lots greater than 10 000 m² does not apply since the system is considered a large sewage disposal system based on the anticipated sewage demand of 25,350 L/day, including the existing system. Therefore, "**Contamination Attenuation**" was considered in this terrain analysis,

6.1 Contaminant Attenuation Method (Predictive Assessment)

The Contaminant Attenuation Method (Predictive Assessment) was used to determine the impact of the proposed on-Site septic systems at the boundary of the Site. This procedure assesses the risk that the individual on-site systems will cause the concentration of the nitrate-nitrogen exceed 10 mg/L at the property boundaries. Dilution is the attenuation mechanism considered for nitrates, with precipitation being the only source of infiltration. The following parameters and assumptions were used in the nitrate attenuation calculations:

- J Infiltration factors for the site;
 - o Flat topography;
 - o Infiltration Factors:
 - i. An assumption of Clay Loam was used for this calculation;
 - ii. Approximately 11,360 m² of the site is Wooded and the remaining 26,400 m² is considered Cultivated Land;
 - o Moisture Surplus:
 - i. The wooded land across an area of approximately 11,360 m² of the site is considered Closed Mature Forest cover, while the remaining cultivated land is considered Shallow Rooted Crops;
 - ii. Silt loam as defined by the sieve and hydrometer testing.
 - o The average background nitrate concentration was calculated to be 0.2 mg/L;

- Impervious areas (existing and proposed) were calculated to be of 3,240 m² for the buildings and 1,790 m² of paved driveway and parking areas; and
- Moisture surplus values from the Ottawa weather station (Environment Canada, 2011).

The moisture surplus printout is included in **Appendix E**. This value is considered representative of the site located at the south-central extent of the City of Ottawa, Ontario.

The detailed calculations for the proposed development are presented in the attached **Table 4A**.

Based on the total proposed sewage volume for the entire Site of 25,350 L/day, the existing lot size and soil conditions, the calculated levels of nitrates at the property limits is estimated as 23.03 mg/L. This is above the procedure's guideline of 10.0 mg/L at the properties boundaries. Based on the "**Contaminant Attenuation Method**" the current lot size and soil conditions are not suitable to attenuate the nitrate impacts generated by the septic systems on the development in accordance with current D-5-4 guidelines..

The above calculations are based on the current D-5-4 guideline which requires the use of 40 mg/L as the contaminant source as per section 5.6.2 (a). A wastewater treatment system such as "Bionest" is an advanced tertiary treatment system which has reported reductions to the waste water effluent total nitrogen levels of 68.75%. These results were obtained through the BNQ 3680-910 certification for Bionest system models (SA-3 to SA-6). This particular system is approved by the OBC and the Building Materials Evaluation Commission of the Ontario Ministry of Municipal Affairs and Housing. Furthermore, section 5.7 of the D-5-4 guideline states that the ministry recognises "that as research continues, information and technologies may become available which warrant minor or substantial revisions to this guideline". It is unknown at this time whether revisions are to be considered because of this available technology; however it is **LRL's professional opinion that this is a reasonable approach and should be considered as a possible solution**.

If "Bionest" systems (or equivalent), which can achieve the reduced levels of total nitrogen of 12.5 mg/L versus the D-5-4 guideline of 40 mg/L are mandated for the proposed assembly hall the nitrogen levels at the property boundaries is reduced to 9.58 mg/L which is more satisfactory in regards to the 10.0 mg/L requirement, **Table 4B**. It is thus the **professional opinion of LRL that if the "Bionest" systems (or equivalent) are mandated for the proposed development the current lot size and soil conditions are suitable to attenuate the nitrogen impacts generated by the treatment systems on the development**.

7 CONCLUSIONS

Based on our review of available information and the results of the groundwater sampling and laboratory analytical programs, we conclude the following:

1. Sufficient area exists on the property for the installation of a septic system in accordance with the OBC to service the proposed Assembly Hall with a design sewage flow of up to 20,600 L/day.
2. In accordance with the D-5-4 guideline, the lot area of the Site is not of sufficient size to attenuate the impacts of the proposed septic system based on the "**Contaminant Attenuation Method**" using 40 mg/L as the contaminant source as per section 7.1.



3. If one is to consider mandating the installation of BNQ 3680-910 certified treatment systems of Bionest system models (SA-3 to SA-6) which has a documented and measured output of 12.5 mg/L nitrate-nitrogen concentrations, the lot size is of sufficient size to attenuate the impacts of the proposed septic system based on the "**Contaminant Attenuation Method**" using the 12.5 mg/L instead of the 40 mg/L as the contaminant source as per section 5.6.2(a). The Site would have calculated nitrate-nitrogen concentration at the boundary of 9.58 mg/L.
4. Records of domestic wells were retrieved within 250 m of the site. The potable water source of these wells is the bedrock aquifer. A thin layer of either clay, gravel or till, with some sand in areas, being between 0.9 and 7.6 m thick over bedrock.

8 RECOMMENDATIONS

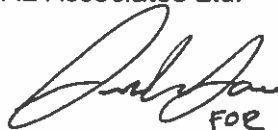
1. As new technologies are available, such as the Bionest system discuss above, mandating the installation of BNQ 3680-910 certified treatment systems of Bionest system models (SA-3 to SA-6) or equivalent, which have had a documented and measured output of 12.5 mg/L nitrate-nitrogen concentrations, the Site **will be** of sufficient size to attenuate the impacts of the proposed septic system based on the "Contaminant Attenuation Method" using the 12.5 mg/L instead of the 40 mg/L as the contaminant source as per section 5.6.2 (a). The property would have calculated nitrate-nitrogen concentration at the boundary of 9.58 mg/L. It should be noted that even if the proposed system fails by a factor of 1.2 it still meets the D-5-4 guideline of 10 mg/L at the properties boundary.
2. The reviewing authorities should consider that the level of conservatism is quite significant barring that treatment systems with measured and quantifiable reductions in nitrate-nitrogen have been measured and approved. The evaluation of nitrate-nitrogen the "**Contaminant Attenuation Method**" is based on many factors which are typically used, which LRL has completed, in a conservative manner.
3. The septic system should be placed at least 15 m from any drilled wells/water service and 30 m from any dug well. It is recommended that the water table be surveyed prior to installation.
4. The daily volume, calculated using the 36 L/day per individual value set out in the OBC, is in excess of 10,000 L. Therefore an Environmental Compliance Approval, issued by the MOECC, may be required.

9 LIMITATIONS

The findings contained in this report are based on data and information collected during the Terrain Analysis of the subject property conducted by LRL Associates Ltd. The conclusions and recommendations are based solely on site conditions encountered at the time of our fieldwork on May 8th, 2017, supplemented by historical information and data obtained as described in this report. The information presented in this report represents the groundwater conditions at the locations sampled. Due to natural variations in geological conditions, no inference is made to the soil or groundwater conditions between sampling points. No assurance is made regarding changes in conditions subsequent to the time of this investigation. If additional information is discovered or obtained, LRL Associates Ltd. should be requested to re-evaluate the conclusions presented in this report and to provide amendments as required.

In evaluating the subject property, LRL Associates Ltd. has relied in good faith on information provided by individuals as noted in this report. We assume that the information provided is factual and accurate. We accept no responsibility for any deficiencies, misstatements or inaccuracies contained in this report as a result of omissions, misinterpretation or fraudulent acts of the persons contacted.

Yours truly,
LRL Associates Ltd.



FOR

Jessica Arthurs
Senior Environmental Technician



Matthew Whitney, P. Eng.



Encl.

- Figure 1 – Site Location
- Figure 2 – Site Plan
- Figure 3 – Proposed Development Plan
- Figure 4 – Test Pit Locations, Groundwater Elevations and Groundwater Contours
- Figure 5 – Well Locations, Ontario Well Records
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- Table 2 – Summary of Sieve & Hydrometer Analyses
- Table 3 – Summary of Analysis of Water Samples Collected From the Test Pits
- Table 4A – Nitrate Attenuation Calculations
- Table 4B – Nitrate Attenuation Calculations
- Appendix A – Test Pit Logs
- Appendix B – Laboratory Certificates of Analysis
- Appendix C – Sieve & Hydrometer Analysis
- Appendix D – Ontario Well Record Printouts
- Appendix E – Moisture Surplus Printouts



FIGURES



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PROJECT

TERRAIN ANALYSIS - PROPOSED ASSEMBLY HALL
4835 BANK STREET
OTTAWA, ONTARIO

DRAWING TITLE

SITE LOCATION
(NOT TO SCALE)
SOURCE: GEOOTTAWA

CLIENT

THE HINDU TEMPLE OF OTTAWA CARLTON

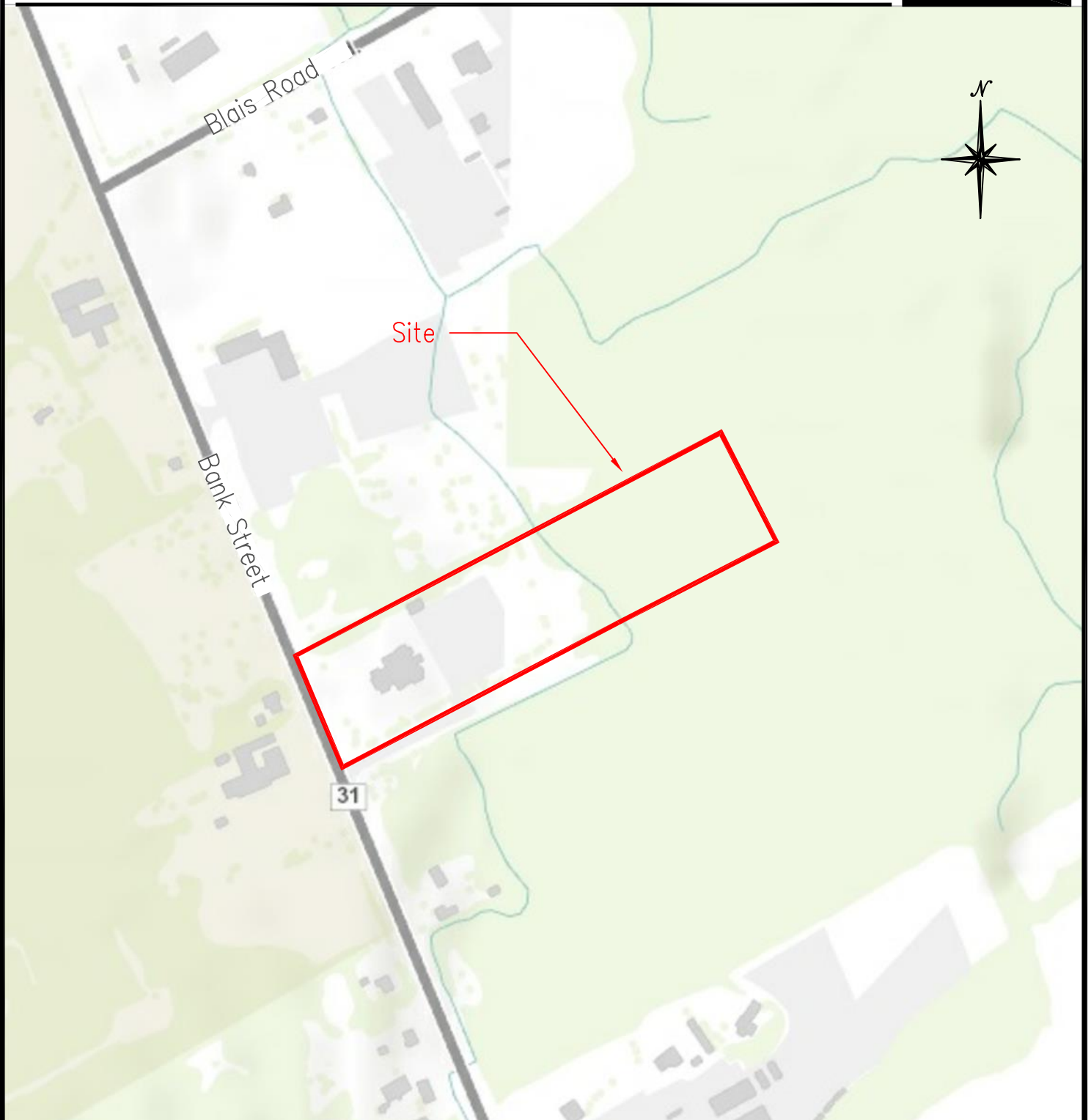
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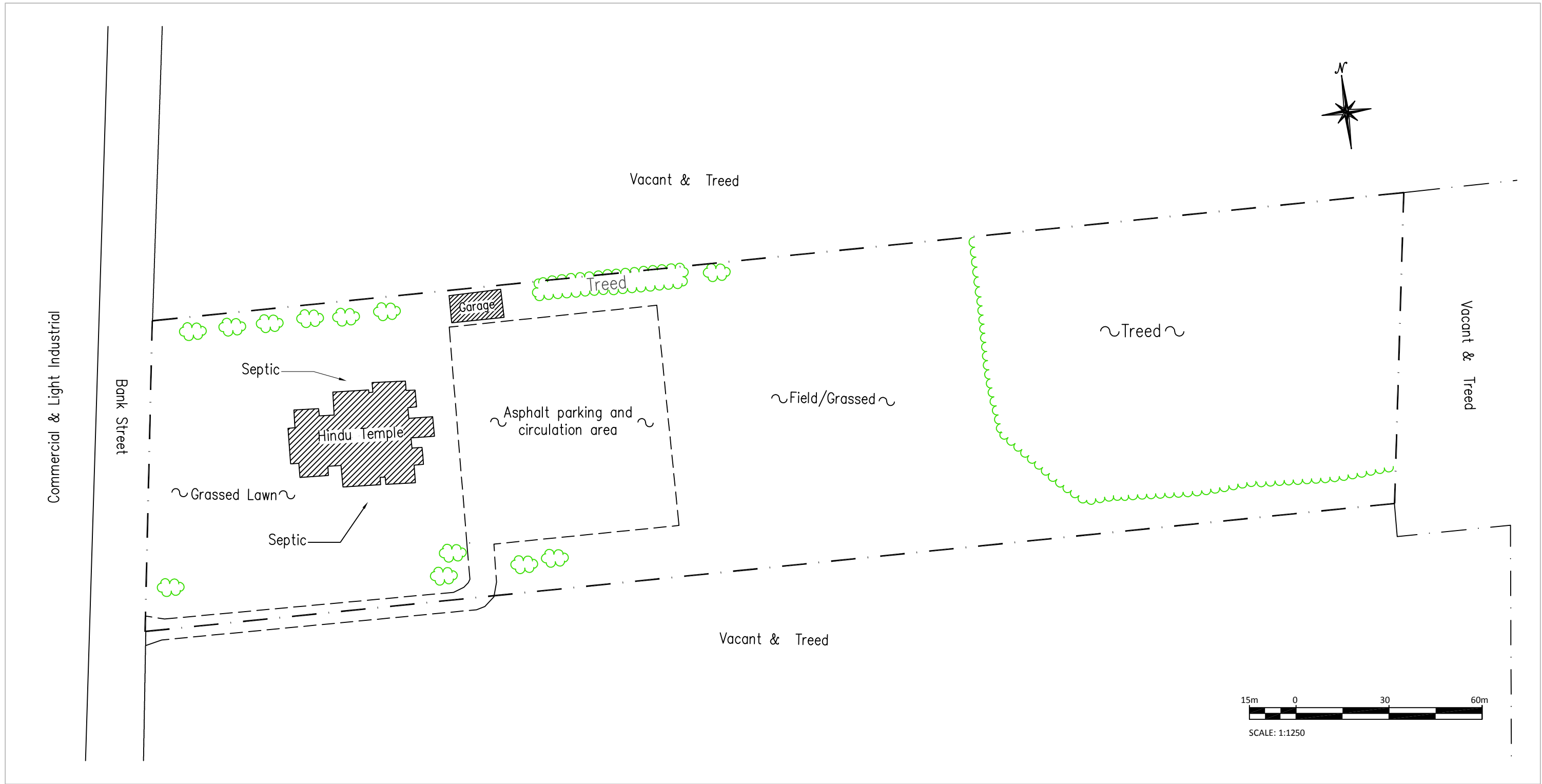
JUNE 2017

PROJECT

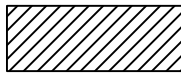
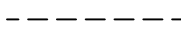
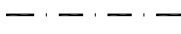


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FIGURE1





LEGEND

-  Existing Building
-  Division between various surface materials
-  Property Line
-  Tree Line
-  Tree

No.	REVISIONS	BY	DATE
01	ISSUED FOR REVIEW	A.S	05/18/17



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CLIENT
**THE HINDU TEMPLE OF OTTAWA
CARLTON**

DESIGNED BY: -- DRAWN BY: A.S APPROVED BY: M.W

PROJECT
**TERRAIN ANALYSIS - PROPOSED
ASSEMBLY HALL
4835 BANK STREET
OTTAWA, ONTARIO**

DRAWING TITLE
SITE PLAN

PROJECT NO.
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JUNE 2017

FIGURE2



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TERRAIN ANALYSIS - PROPOSED ASSEMBLY HALL
4835 BANK STREET
OTTAWA, ONTARIO

DRAWING TITLE

PROPOSED DEVELOPMENT PLAN
SOURCE: LLOYD PHILLIPS & ASSOCIATES LTD.
(NOT TO SCALE)

CLIENT

THE HINDU TEMPLE OF OTTAWA CARLTON

DATE

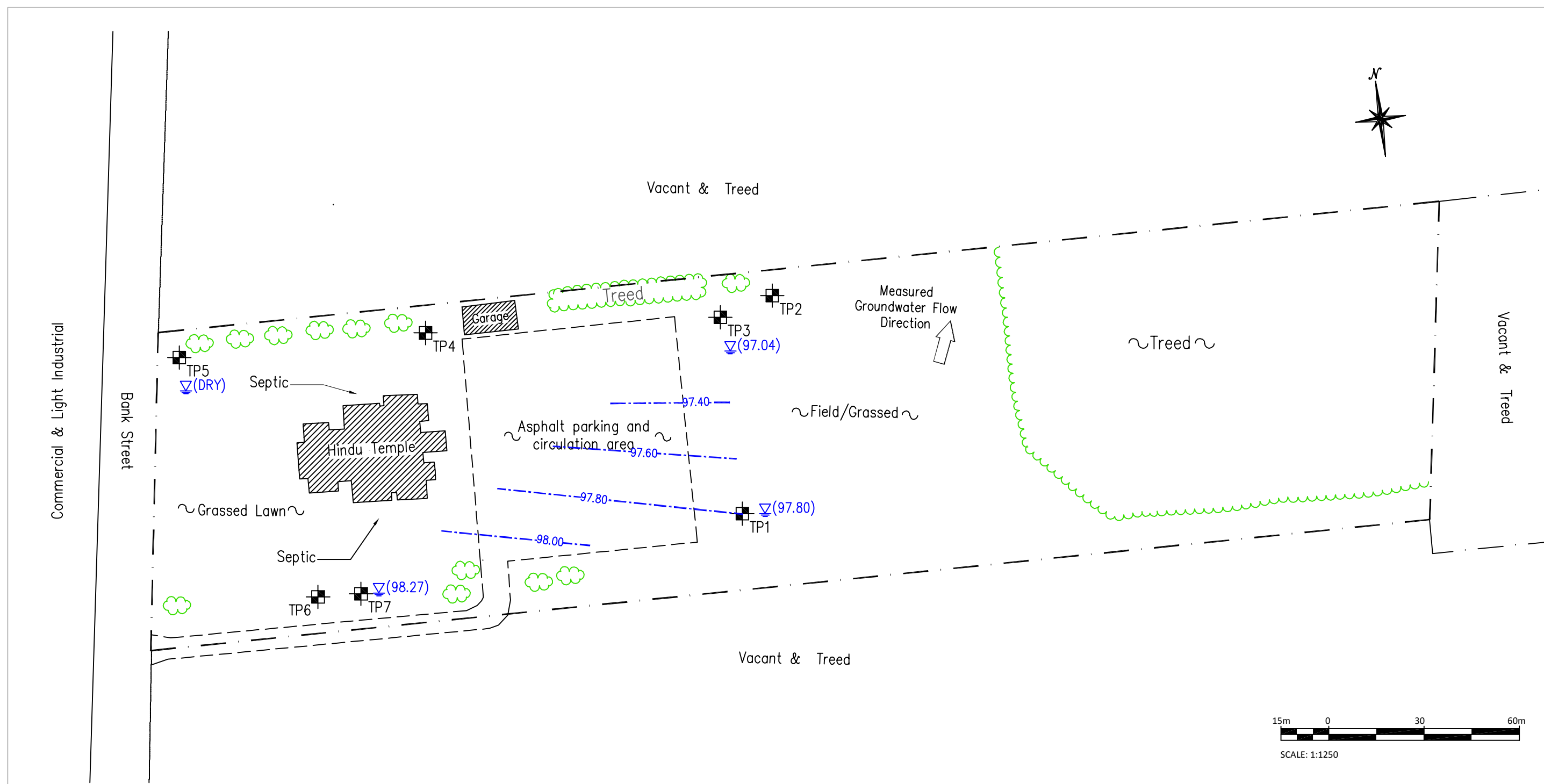
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PROJECT

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FIGURE 3





LEGEND	
	Existing Building
	Division between various surface materials
	Property Line
	Tree Line
	Tree
	Test Pit (May 2017)
	Groundwater Elevation (May 8, 2017)
	Groundwater Contour Line

No.	REVISIONS	BY	DATE
01	ISSUED FOR REVIEW	A.S	05/18/17



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CLIENT THE HINDU TEMPLE OF OTTAWA CARLTON		
DESIGNED BY: --	DRAWN BY: A.S	APPROVED BY: M.W
PROJECT TERRAIN ANALYSIS - PROPOSED ASSEMBLY HALL 4835 BANK STREET OTTAWA, ONTARIO		

DRAWING TITLE TEST PIT LOCATIONS, GROUNDWATER ELEVATIONS AND GROUNDWATER CONTOUR LINES	
PROJECT NO. 170132	FIGURE 4
DATE JUNE 2017	



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PROJECT

TERRAIN ANALYSIS - PROPOSED ASSEMBLY HALL
4835 BANK STREET
OTTAWA, ONTARIO

DRAWING TITLE

WELL LOCATIONS
ONTARIO WELL RECORDS
(NOT TO SCALE)

CLIENT

THE HINDU TEMPLE OF OTTAWA CARLTON

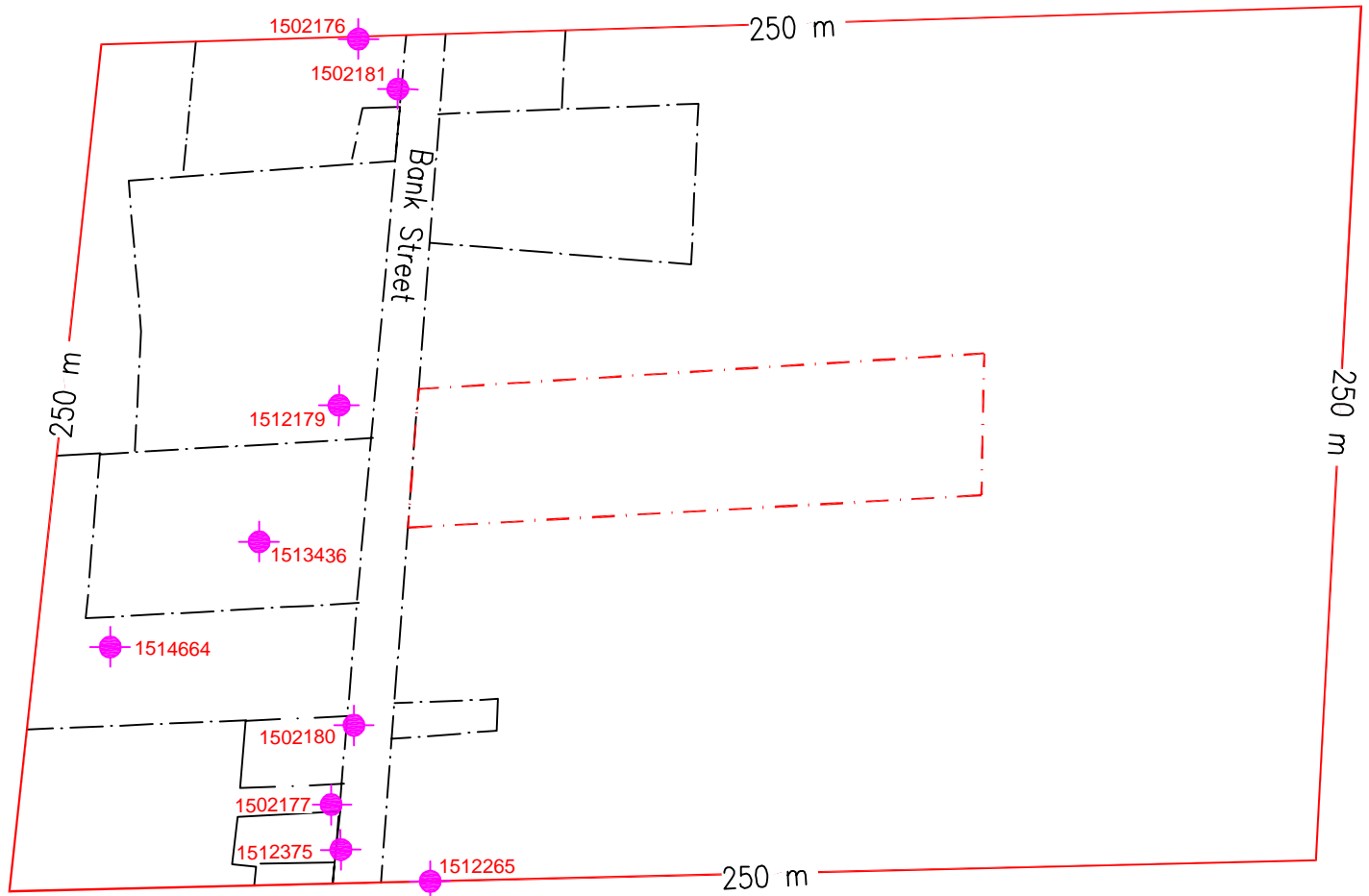
DATE

JUNE 2017

PROJECT

170132

FIGURE 5



Legend



XXXX

Well



Approximate Site Location



250 m radius from Site

TABLES

Table 1
Summary of Groundwater Elevations in Test Pits

Terrain Analysis - Proposed Assembly Hall

4835 Bank Street, Ottawa, Ontario

LRL File: 170132

Test Pit	Ground Surface Elevation ¹	Reference Elevation ²	Depth To Water Table (m)		Groundwater Elevation
	(m)	(m)	Reference Point	Ground Surface	(m)
TP1	98.21	99.15	1.35	0.41	97.80
TP2	97.09	--	--	--	--
TP3	97.75	98.98	1.94	0.71	97.04
TP4	99.54	--	--	--	--
TP5	98.78	99.02	DRY	--	--
TP6	99.38	--	--	--	--
TP7	99.60	100.79	2.52	1.33	98.27

NOTES

¹ Elevations are based off of a temporary benchmark established at the top of the east arm of the fire hydrant along the south of the Site (100.00 m).

² Reference elevation is top of piezometer.

Table 2
Summary of Sieve & Hydrometer Analyses
Terrain Analysis - Proposed Assembly Hall
Part of Lot 16, Concession 7, Hammond, Ontario
LRL File: 160833

		Sample Gradation ¹						Soil Texture Classification
		Percent Particles in Each Fraction						
		Gravel	Sand			Silt	Clay	
			Coarse	Medium	Fine			
Sample	Depth (m)	>4.75 mm	2.0 - 4.75 mm	425 µm - 2.0 mm	75 - 425 µm	2 - 75 µm	< 2µm	
TP1-3	1.8 - 2.0	4.8	1.2	1.8	6.5	63.8	22.0	Silt Loam
TP3-6	1.4 - 1.6	21.3	7.0	12.7	20.1	39.0		Fine Silty Sand

NOTES:

¹ Unified Soil Classification System

Table 3
Summary of analysis of water samples collected from the test pits.
Terrain Analysis - Proposed Assembly Hall
4835 Bank Street, Ottawa, Ontario
LRL File: 170132

Parameter	Units	MRL	Ontario Drinking Water Standards		Sample		
			Standard	Type	TP1	TP3	TP5
Sample Date (d/m/y)					05/08/2017	05/08/2017	05/08/2017
Ammonia	mg/L	0.01			0.28	0.39	1.66
Total Kjeldahl Nitrogen	mg/L	0.1			78.1	65.3	131
Nitrate as N	mg/L	0.1	10	MAC	<0.1	0.5	<0.1
Nitrite as N	mg/L	0.05	1	MAC	<0.05	<0.05	<0.05

NOTES

MAC Maximum Acceptable Concentration

MRL Minimum Reportable Limit

Table 4A
Nitrate Attenuation Calculations
Terrain Analysis - Proposed Assembly Hall
4835 Bank Street, Ottawa, Ontario
LRL File: 170132

1. Potential Infiltration

Weather Station Ottawa

Part No.	Section Area (m ²)	Infiltration Factor (IF) ¹							Moisture Surplus (MS)				Potential Infiltration (PI) (IF*MS) (mm)			
											Moisture Retention ²	Moisture Surplus ³	Section	Weighted		
		Topography	Value	Soil	Value	Cover	Value	Total	Ground Cover	Soil Type	(mm)	(mm)				
A	26,400	Flat	0.3	Clay Loam	0.2	Cultivated Land	0.1	0.6	Shallow Rooted Crops	3 Silt Loam	125	349	209.4	145.5		
B	11,360	Flat	0.3	Clay Loam	0.2	Woodland	0.2	0.7	Closed Mature Forest	3 Silt Loam	400	301	210.7	63.0		
Total		38,000													Total	208.5

2. Area Available for Infiltration

Number of Lots	n	1
Approximate footprint of existing temple	H	1060 m ²
Approximate footprint of existing garage	H	80 m ²
Approximate footprint of proposed assembly hall	H	2100 m ²
Approximate area of paved driveways and parking (proposed and existing)	d	1790 m ²
Approximate Length of Road	L	0 m
Approximate Width of Road	w	0 m
Total Area of Property		38000 m ²
Impervious Area		5030.0 m ²
Roads	l x w	0 m ²
Driveway	n x d	1790 m ²
Building	n x H	3240 m ²
Area available Infiltration	A	32,970 m²

3. Nitrate Dilution Calculations

Nitrate Concentration of Infiltration	C _i	0.2 mg/L ⁶
Site Infiltration	Q _i = A*PI	6873 m ³
Daily Sewage Volume - Existing	Q _{d,1}	3.75 m ³
Maximum Yearly Sewage Volume - Existing (water)	Q _{e,1} = 365*n*Q _d	1369 m ³
Nitrate Concentration in Sewage - Existing	C _{e,1}	40 mg/L
Daily Sewage Volume - Proposed New Development	Q _{d,2}	21.6 m ³
Maximum Yearly Sewage Volume (water) - Proposed New Development	Q _{e,2} = 365*n*Q _d	7884 m ³
Nitrate Concentration in Sewage - Proposed New Development	C _{e,2}	40 mg/L
Maximum Allowable Nitrate Concentration at Boundary	C _m	10.0 mg/L
Increase in Nitrate Concentration at Boundaries	C = (Q _{e,1} C _{e,1} + Q _{e,2} C _{e,2} + Q _i C _i) / (Q _{e,1} + Q _{e,2} + Q _i)	23.03 mg/L

NOTES

- 1 Table 2: Infiltration Factors, *Hydrological Technical Information Requirements for Land Development Applications*, Ministry of the Energy and Environment, April 1995.
- 2 Thornthwaite and Mather's (1957) Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance.
- 3 Moisture surplus for data for Mason Anger (Environment Canada Meteorological Service of Canada, 2010).

Table 4B
Nitrate Attenuation Calculations
Terrain Analysis - Proposed Assembly Hall
4835 Bank Street, Ottawa, Ontario
LRL File: 170132

1. Potential Infiltration

Weather Station Ottawa

Part No.	Section Area (m ²)	Infiltration Factor (IF) ¹							Moisture Surplus (MS)				Potential Infiltration (PI) (IF*MS) (mm)			
											Moisture Retention ²	Moisture Surplus ³	Section	Weighted		
		Topography	Value	Soil	Value	Cover	Value	Total	Ground Cover	Soil Type	(mm)	(mm)				
A	26,400	Flat	0.3	Clay Loam	0.2	Cultivated Land	0.1	0.6	Shallow Rooted Crops	3 Silt Loam	125	349	209.4	145.5		
B	11,360	Flat	0.3	Clay Loam	0.2	Woodland	0.2	0.7	Closed Mature Forest	3 Silt Loam	400	301	210.7	63.0		
Total		38,000													Total	208.5

2. Area Available for Infiltration

Number of Lots	n	1
Approximate footprint of existing temple	H	1060 m ²
Approximate footprint of existing garage	H	80 m ²
Approximate footprint of proposed assembly hall	H	2100 m ²
Approximate area of paved driveways and parking (proposed and existing)	d*	1790 m ²
Approximate Length of Road	L	0 m
Approximate Width of Road	w	0 m
Total Area of Property		38000 m ²
Impervious Area		5030.0 m ²
Roads	l x w	0 m ²
Driveway	n x d	1790 m ²
Building	n x H	3240 m ²
Area available Infiltration		A 32,970 m ²

3. Nitrate Dilution Calculations

Nitrate Concentration of Infiltration	C _i	0.2 mg/L ⁶
Site Infiltration	Q _i = A*PI	6873 m ³
Daily Sewage Volume - Existing	Q _{d,1}	3.75 m ³
Maximum Yearly Sewage Volume - Existing (water)	Q _{e,1} = 365*n*Q _d	1369 m ³
Nitrate Concentration in Sewage - Existing	C _{e,1}	40 mg/L
Daily Sewage Volume - Proposed New Development	Q _{d,2}	21.6 m ³
Maximum Yearly Sewage Volume (water) - Proposed New Development	Q _{e,2} = 365*n*Q _d	7884 m ³
Nitrate Concentration in Sewage - Proposed New Development	C _{e,2}	12.5 mg/L
Maximum Allowable Nitrate Concentration at Boundary	C _m	10.0 mg/L
Increase in Nitrate Concentration at Boundaries	C = (Q _{e,1} C _{e,1} + Q _{e,2} C _{e,2} + Q _i C _i) / (Q _{e,1} + Q _{e,2} + Q _i)	9.58 mg/L

NOTES

- ¹ Table 2: Infiltration Factors, *Hydrological Technical Information Requirements for Land Development Applications*, Ministry of the Energy and Environment, April 1995.
- ² Thornthwaite and Mather's (1957) Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance.
- ³ Moisture surplus for data for Mason Anger (Environment Canada Meteorological Service of Canada, 2010).

APPENDIX A

Test Pit Logs



Project No.: 170132

Client: Hindu Temple of Ottawa Carleton

Date: May 08, 2017

Excavation Method: Backhoe

Test Pit Log: TP1

Project: Terrain Analysis

Location: 4835 Bank Street, Ottawa, ON

Field Personnel: JA

Excavation Contractor: Maurice Yelle Excavation Ltd.

SUBSURFACE PROFILE		SAMPLE DATA					Water Level (Standpipe or Open Excavation)
Depth	Soil Description	Elev./Depth (m)	Lithology	Sample Number	Shear Strength (kPa)	Water Content (%) Liquid Limit (%)	
0 ft m 0	Ground Surface	98.21					
	TOPSOIL Sandy, dark brown, dry.	0.00					
		98.01					
1	FILL Sandy clay, dark brown, dry.	0.20					
2							
3	Silty Sand Trace clay, with clay seam from 1.7 to 1.8 m bgs, brown, dry.	97.31					
1		0.90		1			
	Sieve analysis completed.						
4							
5							
6				2			
7							
2							
7	End of Test Pit Refusal over inferred bedrock.	96.11		3			
		2.10					
8							

0.4 m bgs (08/05/17)

Easting: N/M

Northing: N/M

Site Datum: Top east arm of hydrant at south entrance (100.00 m)

Groundsurface Elevation: 98.21

Top of Riser Elev.: 99.15

Excavation Width: 1.2 m

Excavation Length: 1.5 m

NOTES:

BGS- Below Ground Surface



Project No.: 170132

Client: Hindu Temple of Ottawa Carleton

Date: May 08, 2017

Excavation Method: Backhoe

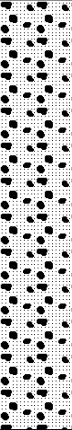
Project: Terrain Analysis

Location: 4835 Bank Street, Ottawa, ON

Field Personnel: JA

Excavation Contractor: Maurice Yelle Excavation Ltd.

Test Pit Log: TP2

SUBSURFACE PROFILE		SAMPLE DATA					Water Content			Water Level (Standpipe or Open Excavation)	
Depth	Soil Description	Elev./Depth (m)	Lithology	Sample Number	Shear Strength (kPa)		25	50	75		
							Liquid Limit (%)				
					50	150	25	50	75		
0 ft 0 m	Ground Surface	97.09									
	FILL Silty sand with some clay, brown, saturated with water infiltration at 0.4 m bgs.	0.00									
1	Buried metal structure/waste at approximately 0.9 m bgs.										
2											
3		96.19			4						
0 ft 1 m	End of Test Pit	0.90									
4											
5											
6											
0 ft 2 m											
7											
8											

Easting: N/M

Northing: N/M

Site Datum: Top east arm of hydrant at south entrance (100.00 m)

Groundsurface Elevation: 97.09

Top of Riser Elev.: --

Excavation Width: 1.2 m

Excavation Length: 1.5 m

NOTES:

Test pit terminated at 0.9 meters due to volume of water in pit.
BGS- Below Ground Surface



Project No.: 170132

Client: Hindu Temple of Ottawa Carleton

Date: May 08, 2017

Excavation Method: Backhoe

Test Pit Log: TP3

Project: Terrain Analysis

Location: 4835 Bank Street, Ottawa, ON

Field Personnel: JA

Excavation Contractor: Maurice Yelle Excavation Ltd.

SUBSURFACE PROFILE			SAMPLE DATA				Water Content			Water Level (Standpipe or Open Excavation)	
Depth	Soil Description	Elev./Depth (m)	Lithology	Sample Number	Shear Strength (kPa)	Liquid Limit (%)					
						25	50	75			
ft											
0	Ground Surface	97.75									
0	TOPSOIL	0.00									
	Sandy loam, dark brown, dry.										
	Brick debris found in top 0.2 m bgs.	97.55									
1	FILL	0.20									
	Sandy silt, trace boulders, brown, dry.										
	Tire debris found at approximately 0.8 m bgs.			5							
2											
		96.95									
3	TILL	0.80									
	Silty sand, trace gravel, cobbles and boulders, brown, dry.										
	Sieve analysis completed.										
4											
5											
				6							
6	End of Test Pit	96.05									
	Refusal at 1.7 m bgs over inferred bedrock.	1.70									
7											
8											

0.71 m bgs (08/05/17)

0.71 m bgs (08/05/17)

Easting: 0454091

Northing: 5017670

Site Datum: Top east arm of hydrant at south entrance (100.00 m)

Groundsurface Elevation: 97.75

Top of Riser Elev.: 98.98

Excavation Width: 1.2 m

Excavation Length: 1.5 m

NOTES:

BGS- Below Ground Surface



Project No.: 170132

Client: Hindu Temple of Ottawa Carleton

Date: May 08, 2017

Excavation Method: Backhoe

Project: Terrain Analysis

Location: 4835 Bank Street, Ottawa, ON

Field Personnel: JA

Excavation Contractor: Maurice Yelle Excavation Ltd.

Test Pit Log: TP4

SUBSURFACE PROFILE		SAMPLE DATA					Water Content (%)		Water Level (Standpipe or Open Excavation)
Depth	Soil Description	Elev./Depth (m)	Lithology	Sample Number	Shear Strength (kPa)		25	50	75
0 ft m 0	Ground Surface	99.54							
	TOPSOIL Silty loam, trace clay, dark brown, dry.	0.00							
1									
2	FILL Silty sand, trace cobbles and gravel, light brown, dry. Changing to dark brown sandy fill with trace boulders at approximately 0.8 m bgs.	99.04 0.50							
3				7					
4				8					
5	End of Test Pit Refusal at 1.4 m bgs over inferred bedrock or large concrete structure.	98.14 1.40							
6									
7									
8									

Easting: 0454005

Northing: 5017628

Site Datum: Top east arm of hydrant at south entrance (100.00 m)

Groundsurface Elevation: 99.54

Top of Riser Elev.: --

Excavation Width: N/M

Excavation Length: N/M

NOTES:

BGS- Below Ground Surface



Project No.: 170132

Client: Hindu Temple of Ottawa Carleton

Date: May 08, 2017

Excavation Method: Backhoe

Test Pit Log: TP5

Project: Terrain Analysis

Location: 4835 Bank Street, Ottawa, ON

Field Personnel: JA

Excavation Contractor: Maurice Yelle Excavation Ltd.

SUBSURFACE PROFILE		SAMPLE DATA					Water Level (Standpipe or Open Excavation)
Depth	Soil Description	Elev./Depth (m)	Lithology	Sample Number	Shear Strength (kPa)	Water Content (%) Liquid Limit (%)	
0 ft m 0	Ground Surface	98.78					 Dry at 1.53 m bgs
	TOPSOIL Silty loam some sand, dark brown, dry.	0.00					
		98.63		10			
	FILL Sand, some silt, trace cobbles, brown, dry.	0.15					
1	Waste debris of metal and asphalt pieces at approximately 0.9 m bgs.						
2							
3				9			
4							
5				11			
		97.28					
End of Test Pit	Refusal at 1.5 m bgs over inferred bedrock.	1.50					

Easting: 0453945

Northing: 5017595

Site Datum: Top east arm of hydrant at south entrance (100.00 m)

Groundsurface Elevation: 98.78

Top of Riser Elev.: 99.02

Excavation Width: N/M

Excavation Length: N/M

NOTES:

BGS- Below Ground Surface



Project No.: 170132

Client: Hindu Temple of Ottawa Carleton

Date: May 08, 2017

Excavation Method: Backhoe

Project: Terrain Analysis

Location: 4835 Bank Street, Ottawa, ON

Field Personnel: JA

Excavation Contractor: Maurice Yelle Excavation Ltd.

Test Pit Log: TP6

SUBSURFACE PROFILE			SAMPLE DATA									Water Level (Standpipe or Open Excavation)	
Depth	Soil Description	Elev./Depth (m)	Lithology	Sample Number	Shear Strength (kPa)	Water Content (%)			Liquid Limit (%)				
						25	50	75	25	50	75		
0	Ground Surface	99.38											
0	TOPSOIL Sandy loam, dark brown, dry.	0.00											
1	FILL Sand, some gravel, cobbles, boulders, silty seam at 0.7 m bgs, brown, dry.	99.23 0.15											
2	Refusal at 0.8 m bgs over inferred bedrock.			12									
		98.58 0.80		13									
3	End of Test Pit												
4													
5													
6													
7													
8													

Easting: 0454003

Northing: 5017542

Site Datum: Top east arm of hydrant at south entrance (100.00 m)

Groundsurface Elevation: 99.38

Top of Riser Elev.: --

Excavation Width: N/M

Excavation Length: N/M

NOTES:

BGS- Below Ground Surface



Project No.: 170132

Client: Hindu Temple of Ottawa Carleton

Date: May 08, 2017

Excavation Method: Backhoe

Test Pit Log: TP7

Project: Terrain Analysis

Location: 4835 Bank Street, Ottawa, ON

Field Personnel: JA

Excavation Contractor: Maurice Yelle Excavation Ltd.

SUBSURFACE PROFILE		SAMPLE DATA					Water Level (Standpipe or Open Excavation)
Depth	Soil Description	Elev./Depth (m)	Lithology	Sample Number	Shear Strength (kPa)	Water Content (%) Liquid Limit (%)	
0 ft m 0	Ground Surface	99.60					
	TOPSOIL Sandy loam, dark brown, dry.	0.00					
1	FILL Sand, brown, trace metal debris, dry.	99.40 0.20					
2							
3	TILL Silty sand, trace clay, boulders, grey, organics including tree stump, roots, black Refusal due to obstruction (tree stump).	98.90 0.70					
4							
5							
6							
7							
8							
	End of Test Pit	97.80 1.80					

1.33 m bgs (08/05/17)

Easting: 0454051

Northing: 5017564

Site Datum: Top east arm of hydrant at south entrance (100.00 m)

Groundsurface Elevation: 99.60

Top of Riser Elev.: 100.79

Excavation Width: N/M

Excavation Length: N/M

NOTES:

BGS- Below Ground Surface



Symbols and Terms Used on Borehole and Test Pit Logs

The following explains the data presented in the borehole and test pit logs.

1. Soil Description

The soil descriptions presented in this report are based on commonly accepted methods of classification and identification employed in geotechnical practice. Classification and identification of soil involves some judgement and LRL Associates Ltd. does not guarantee descriptions as exact, but infers accuracy to the extent that is common in current geotechnical practice. Boundaries between zones on the logs are often not distinct but transitional and were interpreted.

a. Proportion

The proportion of each constituent part, as defined by the grain size distribution, is denoted by the following terms:

Term	Proportions
%fine+	1% to 10%
%fine+ %silt+	10% to 20%
prefix (i.e. %sandy+silt)	20% to 35%
%sand+ (i.e. sand and gravel)	35% to 50%

b. Compactness and Consistency

The state of compactness of granular soils is defined on the basis of the Standard Penetration Test. See Section 2c for more details. The consistency of clayey or cohesive soils is based on the shear strength of the soil, as determined by field vane tests and by a visual and tactile assessment of the soil strength.

The state of compactness of granular soils is defined by the following terms:

State of Compactness Granular Soils	Standard Penetration Number "N"
Very loose	0 - 4
Loose	4 - 10
Compact or medium	10 - 30
Dense	30 - 50
Very dense	over - 50

The consistency of cohesive soils is defined by the following terms:

Consistency Cohesive Soils	Undrained Shear Strength (Cu) (kPa)
Very soft	under 10
Soft	10 - 25
Medium or firm	25 - 50
Stiff	50 - 100
Very stiff	100 - 200
Hard	over - 200

2. Sample Data

a. Elevation depth

This is a reference to the geodesic elevation of the soil or to a benchmark of an arbitrary elevation at the location of the borehole or test pit. The depth of geological boundaries is measured from ground surface.

b. Type

Symbol	Type	Letter Code
	Auger	AU
	Split spoon	SS
	Shelby tube	ST
	Rock Core	RC

c. Sample Number

Each sample taken from the borehole is numbered in the field as shown in this column.

LETTER CODE (as above) . Sample Number

d. Blows (N) or RQD

This column indicates the Standard Penetration Number (N) as per ASTM D-1586. This is used to determine the state of compactness of the soil sampled. It corresponds to the number of blows

required to drive 300 mm of the split spoon sampler using a 622 kg*m/s² hammer falling freely from a height of 760 mm. For a 600 mm long split spoon, the blow counts are recorded for every 150 mm. The %_N index is obtained by adding the number of blows from the 2nd and 3rd count. Technical refusal indicates a number of blows greater than 50.

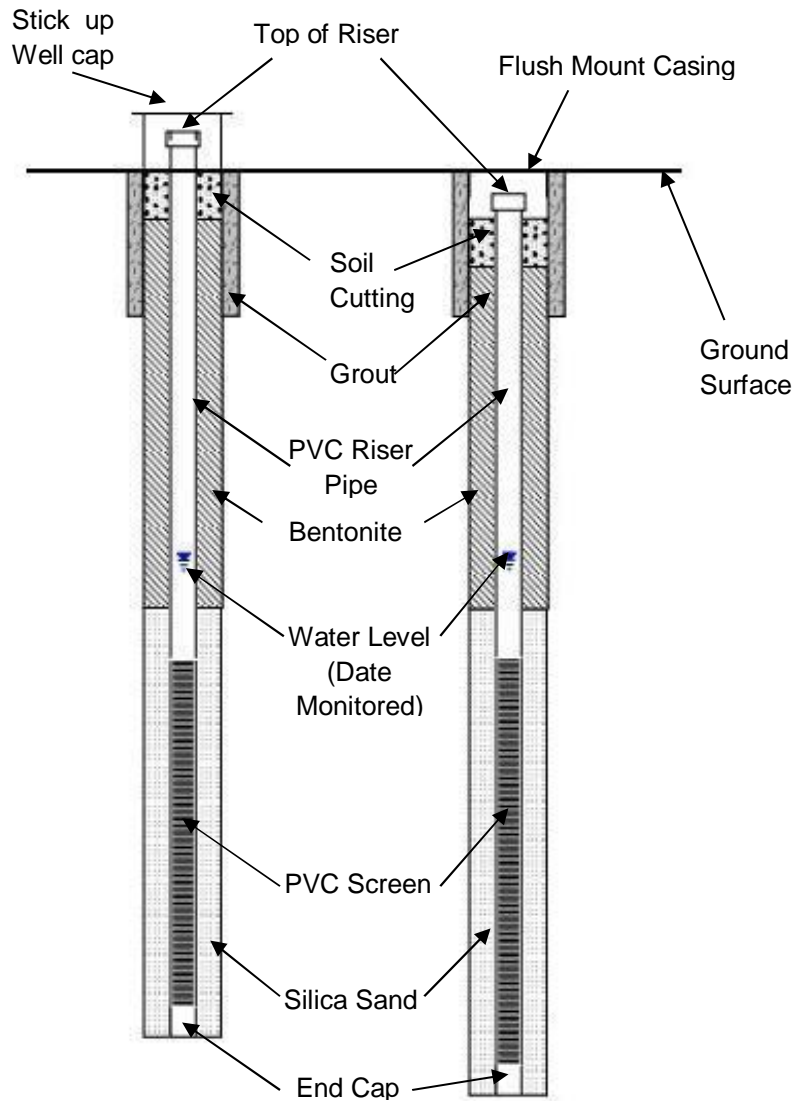
In the case of rock, this column presents the Rock Quality Designation (RQD). The RQD is calculated as the cumulative length of rock pieces recovered having lengths of 10 cm or more divided by the length of coring. The qualitative description of the bedrock based on RQD is given below.

Rock Quality Designation (RQD) (%)	Description of Rock Quality
0 . 25	very poor
25 . 50	poor
50 . 75	fair
75 . 90	good
90 . 100	excellent

e. Recovery (%)

For soil samples this is the percentage of the recovered sample obtained versus the length sampled. In the case of rock, the percentage is the length of rock core recovered compared to the length of the drill run.

3. General Monitoring Well Data



APPENDIX B
Laboratory Certificates of Analysis

Certificate of Analysis

LRL Associates Ltd.

5430 Canotek Road
Ottawa, ON K1J 9G2
Attn: Jessica Arthurs

Client PO:
Project: 170132
Custody: 32310

Report Date: 15-May-2017
Order Date: 11-May-2017

Order #: 1719377

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1719377-01	TP1
1719377-02	TP3
1719377-03	TP7

Approved By:



Dale Robertson, BSc
Laboratory Director

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 15-May-2017

Order Date: 11-May-2017

Project Description: 170132

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Ammonia, as N	EPA 351.2 - Auto Colour	12-May-17	12-May-17
Anions	EPA 300.1 - IC	12-May-17	12-May-17
Total Kjeldahl Nitrogen	EPA 351.2 - Auto Colour, digestion	12-May-17	15-May-17

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 15-May-2017

Order Date: 11-May-2017

Project Description: 170132

Client ID:	TP1	TP3	TP7	-
Sample Date:	08-May-17	08-May-17	08-May-17	-
Sample ID:	1719377-01	1719377-02	1719377-03	-
MDL/Units	Water	Water	Water	-

General Inorganics

Ammonia as N	0.01 mg/L	0.28	0.39	1.66	-
Total Kjeldahl Nitrogen	0.1 mg/L	78.1	65.3	131	-

Anions

Nitrate as N	0.1 mg/L	<0.1	0.5	<0.1	-
Nitrite as N	0.05 mg/L	<0.05	<0.05	<0.05	-

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 15-May-2017

Order Date: 11-May-2017

Project Description: 170132

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Nitrate as N	ND	0.1	mg/L						
Nitrite as N	ND	0.05	mg/L						
General Inorganics									
Ammonia as N	ND	0.01	mg/L						
Total Kjeldahl Nitrogen	ND	0.1	mg/L						

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 15-May-2017

Order Date: 11-May-2017

Project Description: 170132

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Nitrate as N	ND	0.1	mg/L	ND				20	
Nitrite as N	ND	0.05	mg/L	ND				20	
General Inorganics									
Ammonia as N	0.021	0.01	mg/L	0.022			2.4	8	
Total Kjeldahl Nitrogen	1.50	0.1	mg/L	1.52			1.8	10	

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 15-May-2017

Order Date: 11-May-2017

Project Description: 170132

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Nitrate as N	1.01	0.1	mg/L	ND	101	81-112			
Nitrite as N	1.02	0.05	mg/L	ND	102	76-117			
General Inorganics									
Ammonia as N	0.280	0.01	mg/L	0.022	103	81-124			
Total Kjeldahl Nitrogen	1.91	0.1	mg/L		95.7	81-126			

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 15-May-2017

Order Date: 11-May-2017

Project Description: 170132

Qualifier Notes:

Login Qualifiers :

Samples received submerged in water, possibly melted ice. This condition can compromise sample integrity.

Applies to samples: TP1, TP3, TP7

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

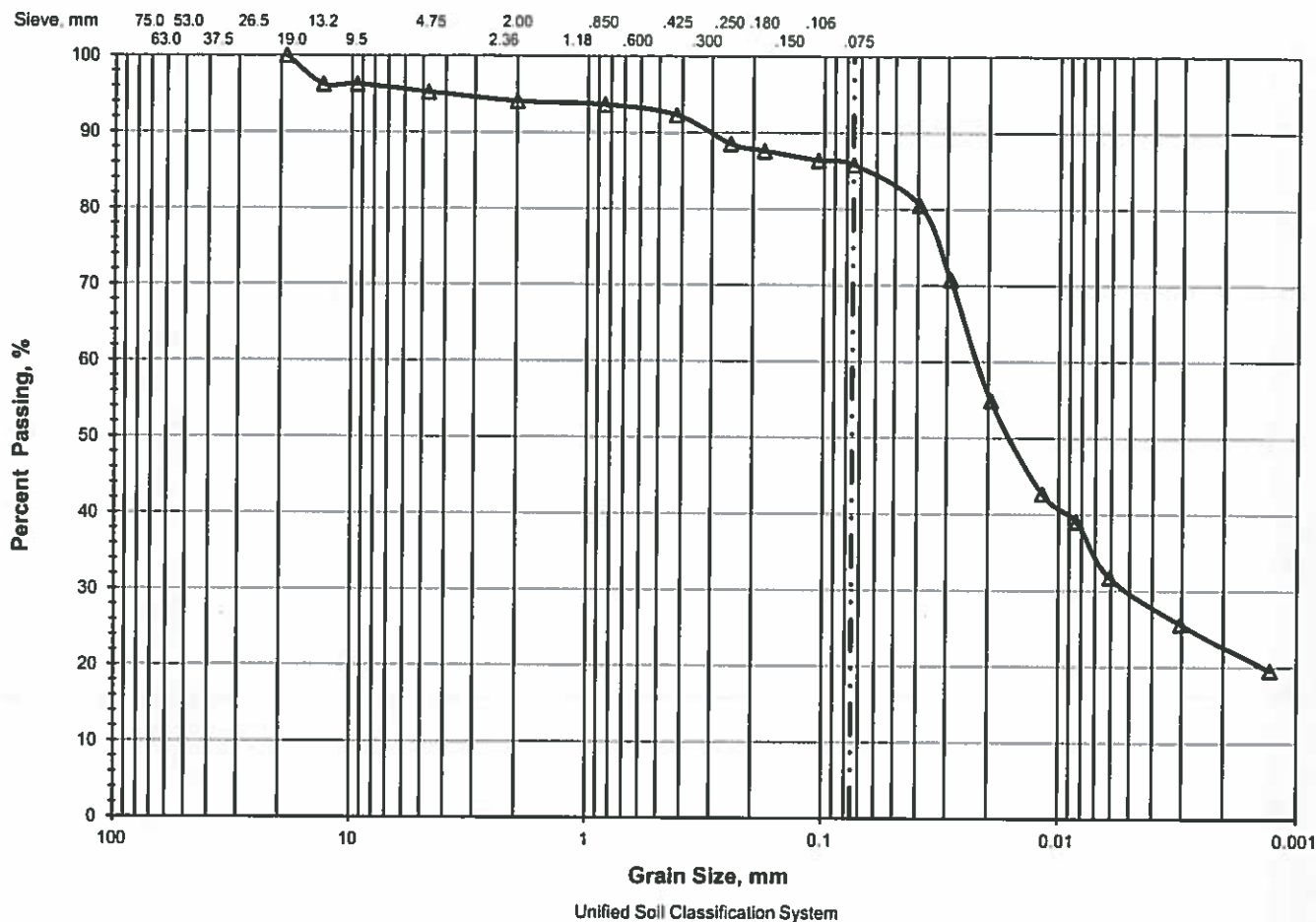
APPENDIX C
Sieve & Hydrometer Analysis



LRL Associates Ltd.
PARTICLE SIZE ANALYSIS

Client: Lloyd Phillips & Associates Ltd.
Project: Hydrogeological Assessment & Terrain Analysis
Location: 4835 Bank Street., Ottawa, ON.

File No.: 170132
Report No.: 1
Date: May 8, 2017



> 75 mm	% GRAVEL		% SAND			% FINES	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
Δ	0.0	4.8	1.2	1.8	6.5	63.8	22.0

Location	Sample	Depth, m	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
Δ	TP-1	3	1.80 - 2.00	0.0226	0.0164	0.0052			



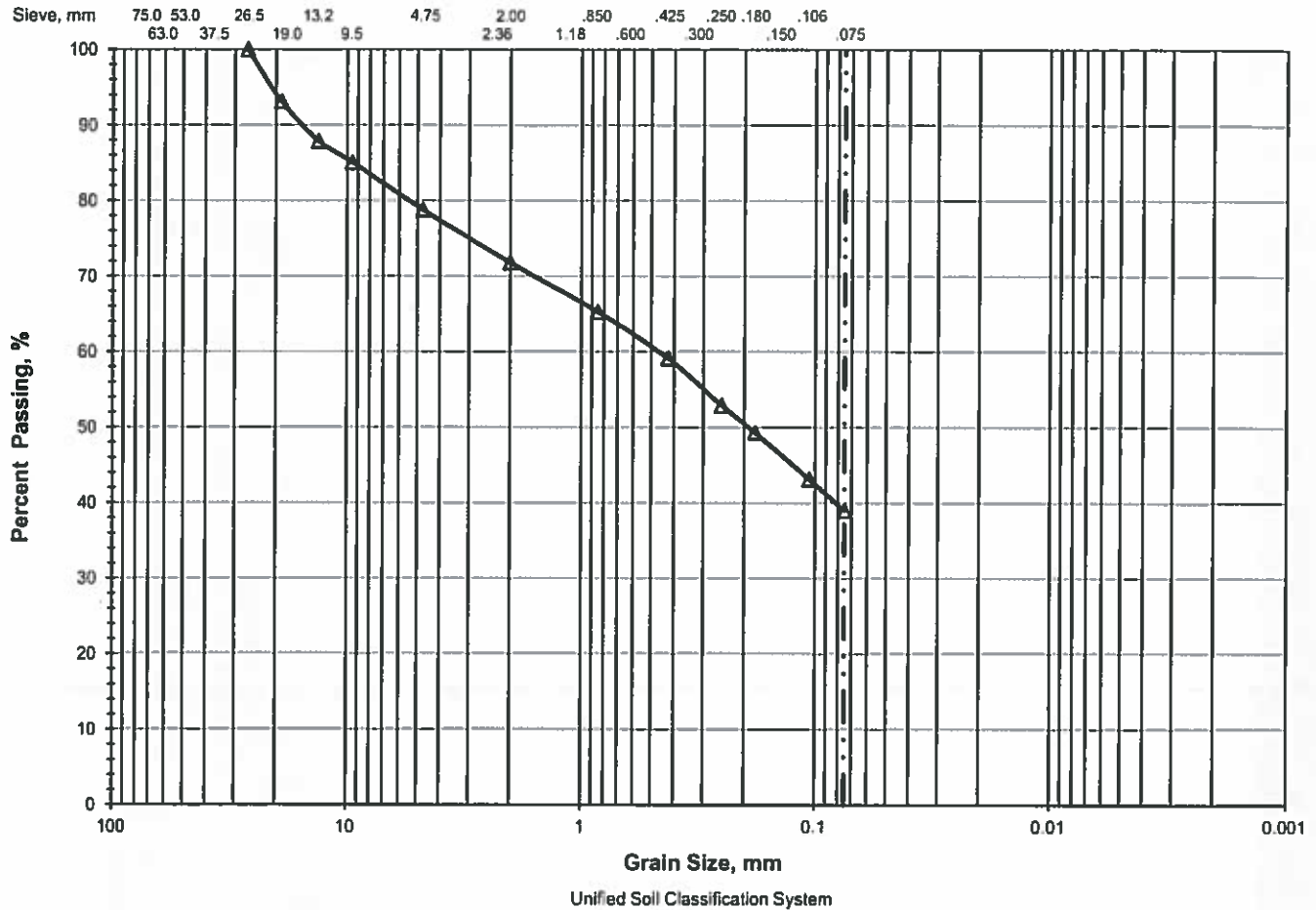
LRL Associates Ltd.

PARTICLE SIZE ANALYSIS

ASTM D 422 / LS-702

Client: Lloyd Phillips & Associates Ltd.
 Project: Hydrogeological Assessment & Terrain Analysis
 Location: 4835 Bank Street., Ottawa, ON.

File No.: 170132
 Report No.: 2
 Date: May 8, 2017



> 75 mm	% GRAVEL		% SAND			% FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt & Clay
0.0	6.0	15.3	7.0	12.7	20.1	39.0

Location	Sample	Depth, m	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
Δ	TP3	6	1.4 - 1.6	0.4855	0.1932				

APPENDIX D
Ontario Well Record Printouts

316/52



GROUND WATER BRANCH

SEP 15 1962

2176

ONTARIO WATER
RESOURCES COMMISSION

UTM 1182 4537610E

N 15R 561175610N

The Ontario Water Resources Commission Act

Elev: 4R 03115

WATER WELL RECORD

Basin 251 CARLETON

Township, Village, Town or City FLORESTER

Con. 4RF Lot 21

Date completed 20 JULY 62
(day month year)

Address BILLINGS BRIDGE

Casing and Screen Record

Inside diameter of casing 184
 Total length of casing 184
 Type of screen -
 Length of screen -
 Depth to top of screen -
 Diameter of finished hole 4

Pumping Test

Static level 6
 Test-pumping rate 6 G.P.M.
 Pumping level 8
 Duration of test pumping 1 HR
 Water clear or cloudy at end of test CL
 Recommended pumping rate 6 G.P.M.
 with pump setting of 30 feet below ground surface

Well Log

Water Record

Overburden and Bedrock Record

From
ft.To
ft.Depth(s) at
which water(s)
foundKind of water
(fresh, salty,
sulphur)

CLAY

0

18

Limestone

18

45

45

F

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

Home

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

U

Drilling or Boring Firm

M MEDSTER

Address 6 FORD

Licence Number 612

Name of Driller or Borer 511005

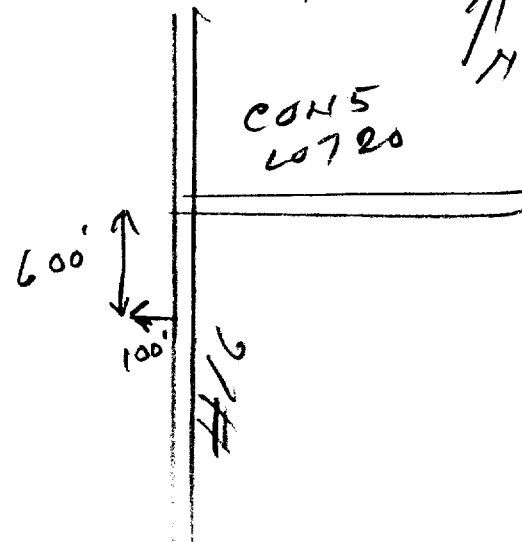
Address

Date AUG 28

(Signature of Licensed Drilling or Boring Contractor)

Location of Well

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

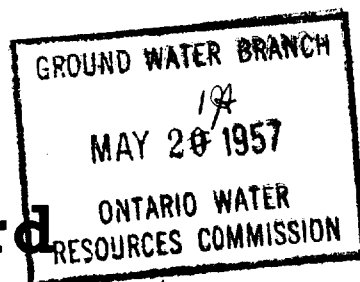


564
UTM 11824532710E
Rideau Front
5R 507710810N
Elev. 4R 03310
Basin 25 221



The Water-well Drillers Act, 1954
Department of Mines

15 No 2177



Water-Well Record

County or Territorial District Carlton Township, Village, Town or City Gloucester
in Village, Town or City)
Address 40 Lawrence St Ottawa
(day) (month) (year)

Pipe and Casing Record

Pumping Test

Casing diameter(s) <u>2"</u>	Static level <u>6</u>
Length(s) <u>21</u>	Pumping rate <u>800 G.P.H</u>
Type of screen	Pumping level <u>25 ft</u>
Length of screen	Duration of test <u>2 hr</u>

Well Log

Water Record

Overburden and Bedrock Record	From ft.	To ft.	Depth (s) at which water (s) found	No. of feet water rises	Kind of water (fresh, salty, or sulphur)
<u>Sand</u>	<u>0</u>	<u>7</u>	<u>60</u>	<u>54</u>	<u>Fresh</u>
<u>Boulders and Sand</u>	<u>7</u>	<u>20</u>			
<u>Wt Sand stone</u>	<u>20</u>	<u>60</u>			

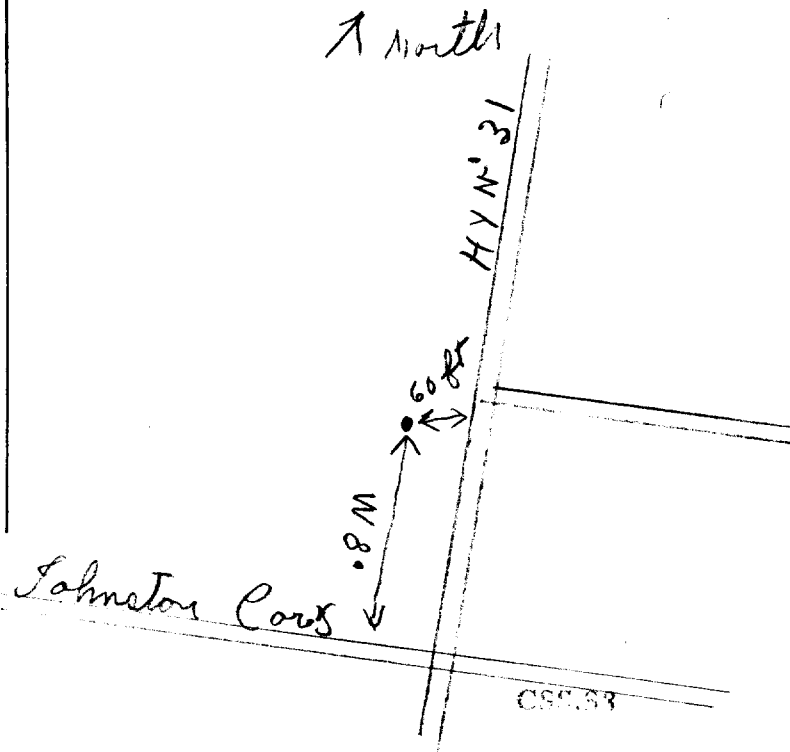
For what purpose(s) is the water to be used? House
Is water clear or cloudy? Clear
Is well on upland, in valley, or on hillside? Upland
Drilling firm L. R. Corbett
Address 1252 Borehole Rd
City of Ottawa
Name of Driller L. R. Corbett
Address
Licence Number 395

I certify that the foregoing statements of fact are true.

Date May 17/57 L. R. Corbett
Signature of Licensee

Location of Well

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



UTM 18Z 453810 10 ^E


Elev. 47 ^R 10325

Basin 25 ^L 1 ^R 22 ^N 310

County or District 4 R F Charleton Township, Village, Town or City Gloucester

Lot P.T.22 Date completed 6 10 1961
(day month year)

Address 28 Clarence St. Ottawa 2, Ont.



310/52

GROUND WATER BRANCH

NOV 14 1961

15

2170

ONTARIO WATER RESOURCES COMMISSION

WATER WELL RECORD

The Ontario Water Resources Commission Act

Casing and Screen Record

Inside diameter of casing 6 3/16

Total length of casing 21'

Type of screen NONE

Length of screen NONE

Depth to top of screen NONE

Diameter of finished hole 6"

Pumping Test

Static level 20'

Test-pumping rate 80 G.P.M.

Pumping level 70'

Duration of test pumping 1 hr.

Water clear or cloudy at end of test clear

Recommended pumping rate 80 G.P.M.

with pump setting of 80 feet below ground surface

Well Log			Water Record	
Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
Till and Boulder, Grey hard lime stone and sand stone.	0	16	85	fresh
SAND STONE	16	25		
SAND STONE	25	89		
<u>BOULDER TILL</u>	<u>0</u>	<u>16</u>		
<u>HARD GREY LIMESTONE</u>	<u>16</u>	<u>25</u>		
<u>SAND STONE</u>	<u>25</u>	<u>89</u>	<u>85</u>	<u>FRESH</u>

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

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

Drilling or Boring Firm J. B. Dufresne Co. Ltd.

Address Ottawa, Ontario.

Licence Number 194

Name of Driller or Borer W. Roy

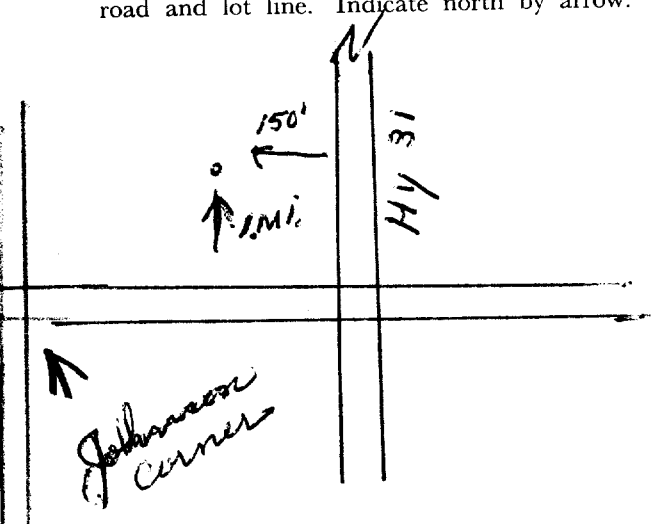
Address Hull

Date Oct 10/60

J.B. Dufresne
(Signature of Licensed Drilling or Boring Contractor)

Location of Well

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



Form 7 15M Sets 60-5930

OWRC COPY

000000

UTM 118^Z 45381010^E

316/52



GROUND WATER BRANCH

15 No.
SEP 5 1962

2481

ONTARIO WATER
RESOURCES COMMISSION

Elev. 5^R 501175310^N

The Ontario Water Resources Commission Act

Elev. 4^R 03115

WATER WELL RECORD

Basin 25 CHARLETON

Township, Village, Town or City GLoucester

Con. 4RF Lot 2122

Date completed 26 JULY 62
(day month year)

Address BILLINGS BRIDGE

Casing and Screen Record

Inside diameter of casing 4
Total length of casing 21
Type of screen -
Length of screen -
Depth to top of screen -
Diameter of finished hole 4

Pumping Test

Static level 8
Test-pumping rate 5 G.P.M.
Pumping level 10
Duration of test pumping 1 HR
Water clear or cloudy at end of test CC
Recommended pumping rate 5 G.P.M.
with pump setting of 30 feet below ground surface

Well Log

Water Record

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
<u>CLAY</u>	<u>0</u>	<u>21</u>		
<u>Limestone</u>	<u>21</u>	<u>46</u>	<u>46</u>	<u>F</u>

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

Home

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

✓

Drilling or Boring Firm

MMEACHER

Address OTTAWA

Licence Number 618

Name of Driller or Borer SDME

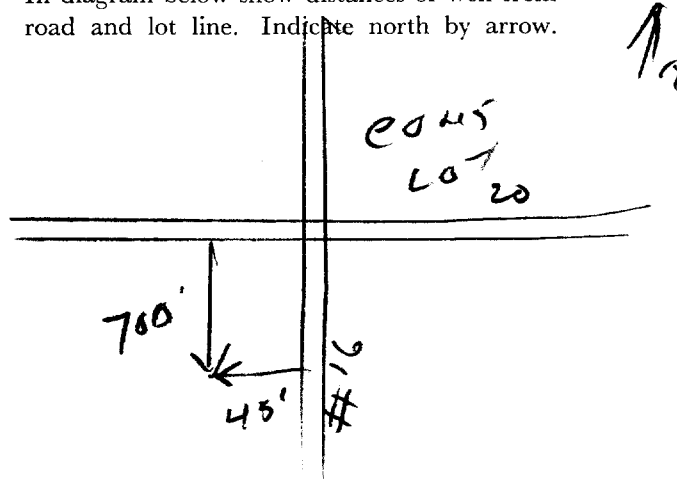
Address OTTAWA

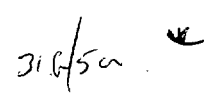
Date 03024

(Signature of Licensed Drilling or Boring Contractor)

Location of Well

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





las

23 24
25-27

22

257

OFFICE USE ONLY	DATA SOURCE		58	CONTRACTOR	59-62	DATE RECEIVED	63-68	69
	1			3002		150173		
	DATE OF INSPECTION			INSPECTOR				
				K				
REMARKS:							P K	
							WI	

AC COPY

Well ID Number: 1512375

Well Audit Number:

Well Tag Number:

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

Well Location

Address of Well Location	
Township	GLOUCESTER TOWNSHIP
Lot	022
Concession	RF 04
County/District/Municipality	OTTAWA-CARLETON
City/Town/Village	
Province	ON
Postal Code	n/a
UTM Coordinates	NAD83 — Zone 18
	Easting: 454020.70
	Northing: 5017262.00
Municipal Plan and Sublot Number	
Other	

Overburden and Bedrock Materials Interval

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To
BRWN	OBDR	SAND		0 ft	9 ft
WHIT	SNDS			9 ft	74 ft

Annular Space/Abandonment Sealing Record

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

Method of Construction & Well Use

Method of Construction	Well Use
Diamond	Domestic

Status of Well

Water Supply

Construction Record - Casing

Inside Diameter	Open Hole or material	Depth From	Depth To
2 inch	GALVANIZED		20 ft
	OPEN HOLE		74 ft

Construction Record - Screen

Outside Diameter	Material	Depth From	Depth To
------------------	----------	------------	----------

Well Contractor and Well Technician Information

Well Contractor's Licence Number: 1703

Results of Well Yield Testing

After test of well yield, water was	CLEAR
If pumping discontinued, give reason	
Pump intake set at	
Pumping Rate	8 GPM
Duration of Pumping	2 h:0 m
Final water level	12 ft
If flowing give rate	
Recommended pump depth	35 ft
Recommended pump rate	8 GPM
Well Production	PUMP
Disinfected?	

Draw Down & Recovery

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

Water Details

Water Found at Depth	Kind
74 ft	Fresh

Hole Diameter

Depth From	Depth To	Diameter
------------	----------	----------

Audit Number:

Date Well Completed: November 27, 1972

Date Well Record Received by MOE: March 07, 1973

Updated: March 20, 2017

Rate [Rate](#)

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Tags

- [Environment and energy](#).



WATER WELL RECORD

11

1513436

MUNICIP

COM

31/9/5a

C 64

COUNTY OR DISTRICT LETRIM <i>Ottawa - Caledonia</i>		TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE GLOUCESTER		CON., BLOCK, TRACT, SURVEY, ETC. <i>IV RF</i>		LOT 22	
OWNER (SURNAME FIRST) UNITED CO - OP OF ONTARIO		ADDRESS R. R. #6 OTTAWA, ONTARIO.		DATE COMPLETED DAY 16 MO. 8 YR. 73		48-53	
U T M ZONE 18 EASTING 453850		NORTHING 5017215		RC. 6 ELEVATION 0323		BASIN CODE 261	

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

[illegible]

31	00004692	0002469213	0006215105	00501115				
32								

WATER RECORD

WATER FOUND AT - FEET		KIND OF WATER			
0-48	10-13	1 <input checked="" type="checkbox"/> FRESH 2 <input type="checkbox"/> SALTY	3 <input type="checkbox"/> SULPHUR 4 <input type="checkbox"/> MINERAL	14	
	15-18	1 <input type="checkbox"/> FRESH 2 <input type="checkbox"/> SALTY	3 <input type="checkbox"/> SULPHUR 4 <input type="checkbox"/> MINERAL	19	
	20-23	1 <input type="checkbox"/> FRESH 2 <input type="checkbox"/> SALTY	3 <input type="checkbox"/> SULPHUR 4 <input type="checkbox"/> MINERAL	24	
	25-28	1 <input type="checkbox"/> FRESH 2 <input type="checkbox"/> SALTY	3 <input type="checkbox"/> SULPHUR 4 <input type="checkbox"/> MINERAL	29	
	30-33	1 <input type="checkbox"/> FRESH 2 <input type="checkbox"/> SALTY	3 <input type="checkbox"/> SULPHUR 4 <input type="checkbox"/> MINERAL	34	

CASING & OPEN HOLE RECORD

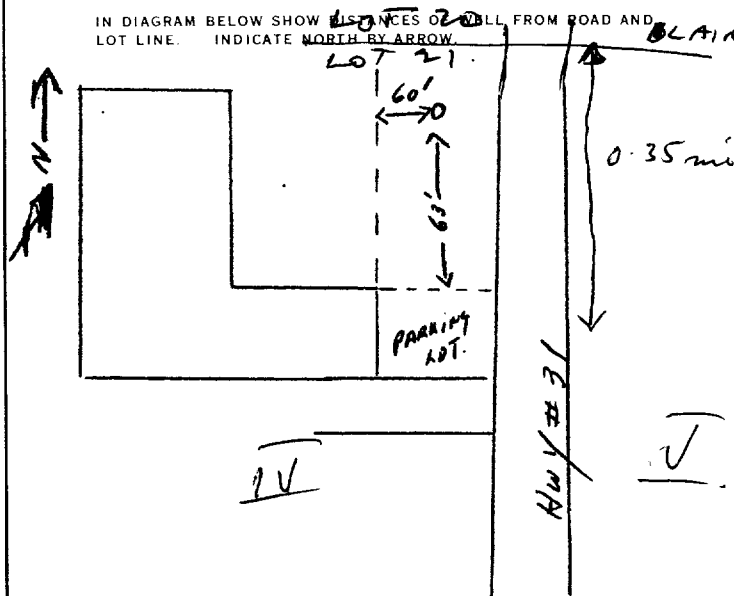
INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET	
			FROM	TO
06 10-11	1 <input checked="" type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE	12 .188	0	22 13-16
17-18	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE	19		0022 20-23
24-25	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE	26		27-30

PLUGGING & SEALING RECORD

DEPTH SET AT - FEET		MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER, ETC.)
FROM	TO	
10-13	14-17	
18-21	22-25	
26-29	30-33	80

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



DRILLERS REMARKS:

**FINAL
STATUS
OF WELL**

- 1 ☒ WATER SUPPLY 5 ☐ ABANDONED, INSUFFICIENT SUPPLY
2 ☐ OBSERVATION WELL 6 ☐ ABANDONED, POOR QUALITY
3 ☐ TEST HOLE 7 ☐ UNFINISHED
4 ☐ RECHARGE WELL



**WATER
USE**

- [illegible]

METHOD OF DRILLING

- | | |
|--|------------------------------------|
| 1 <input type="checkbox"/> CABLE TOOL | 6 <input type="checkbox"/> BORING |
| 2 <input type="checkbox"/> ROTARY (CONVENTIONAL) | 7 <input type="checkbox"/> DIAMOND |
| 3 <input type="checkbox"/> ROTARY (REVERSE) | 8 <input type="checkbox"/> JETTING |
| 4 <input checked="" type="checkbox"/> ROTARY (AIR) | 9 <input type="checkbox"/> DRIVING |
| 5 <input type="checkbox"/> AIR PERCUSSION | |

CONTRACTOR	NAME OF WELL CONTRACTOR		LICENCE NUMBER
	HAWTHORNE DRILLING LIMITED		2557
	ADDRESS		
	Box 4218 STATION "E" OTTAWA ONTARIO		
	NAME OF DRILLER OR BORER		LICENCE NUMBER
	YVON AUBIN		2557
	SIGNATURE OF CONTRACTOR	SUBMISSION DATE	
	<i>per [Signature]</i>	DAY 25 MO 09 YR 73	

OFFICE USE ONLY	DATA SOURCE	58	CONTRACTOR	59-62	DATE RECEIVED	63-68
	1		2557		28 09 79	
	DATE OF INSPECTION		INSPECTOR			
						
	REMARKS:					
						



316/5a

1514664

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CON.
RF

04

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COUNTY OR DISTRICT Carleton		TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE Gloucester		CON., BLOCK, TRACT, SURVEY, ETC. III RF IV		LOT 022	
OWNER (SURNAME FIRST) CDP		ADDRESS Hwy # 31		DATE COMPLETED 02		48-53	
Canadian Industries Ltd.		Ottawa Ont		DAY 20 MONTH 02		YEAR 25	
ZONE 18		EASTING 453793		NORTHING 5017090		RC 4	
UTM 21		ELEVATION 0340		RC 4		BASIN CODE 26	
						II III IV	

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

[illegible]

31	00136281113	0030817	0111215	0125118			
32							

41		10				14 15				21			
WATER RECORD													
WATER FOUND AT - FEET				KIND OF WATER									
10-13				1	<input checked="" type="checkbox"/>	FRESH	3	<input type="checkbox"/>	SULPHUR	14			
				2	<input type="checkbox"/>	SALTY	4	<input type="checkbox"/>	MINERAL				
15-18				1	<input checked="" type="checkbox"/>	FRESH	3	<input type="checkbox"/>	SULPHUR	19			
				2	<input type="checkbox"/>	SALTY	4	<input type="checkbox"/>	MINERAL				
20-23				1	<input type="checkbox"/>	FRESH	3	<input type="checkbox"/>	SULPHUR	24			
				2	<input type="checkbox"/>	SALTY	4	<input type="checkbox"/>	MINERAL				
25-28				1	<input type="checkbox"/>	FRESH	3	<input type="checkbox"/>	SULPHUR	29			
				2	<input type="checkbox"/>	SALTY	4	<input type="checkbox"/>	MINERAL				
30-33				1	<input type="checkbox"/>	FRESH	3	<input type="checkbox"/>	SULPHUR	34			
				2	<input type="checkbox"/>	SALTY	4	<input type="checkbox"/>	MINERAL				

51		CASING & OPEN HOLE RECORD			
INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET		
			FROM	TO	
10-11 6 1/4 86	<input checked="" type="checkbox"/> STEEL <input type="checkbox"/> GALVANIZED <input type="checkbox"/> CONCRETE <input type="checkbox"/> OPEN HOLE	12 188	0	13-16 22 0022	
17-18 7 1/2 86	<input type="checkbox"/> STEEL <input type="checkbox"/> GALVANIZED <input type="checkbox"/> CONCRETE <input checked="" type="checkbox"/> OPEN HOLE	19	22	20-23 0125	
24-25	<input type="checkbox"/> STEEL <input type="checkbox"/> GALVANIZED <input type="checkbox"/> CONCRETE <input type="checkbox"/> OPEN HOLE	26		27-30	

SCREEN	SIZE(S) OF OPENING (SLOT NO.)	31-33	DIAMETER	34-38	LENGTH	39-40
				INCHES		FEET
	MATERIAL AND TYPE		DEPTH TO TOP OF SCREEN		41-44	80
					FEET	

61		PLUGGING & SEALING RECORD	
DEPTH SET AT - FEET		MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)	
FROM	TO		
10-13	14-17		
18-21	22-25		
26-29	30-33	80	

PUMPING TEST	PUMPING TEST METHOD		10	PUMPING RATE		11-14	DURATION OF PUMPING	
	1 <input checked="" type="checkbox"/> PUMP 2 <input type="checkbox"/> BAILER		0012		GPM	01	15-16 HOURS	17-18 MINS
	STATIC LEVEL	WATER LEVEL END OF PUMPING	25		WATER LEVELS DURING			
					1 <input checked="" type="checkbox"/> PUMPING 2 <input type="checkbox"/> RECOVERY			
	19-21	22-24	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES		
	020	020	020	020	020	020		
	FEET	FEET	FEET	FEET	FEET	FEET		
IF FLOWING, GIVE RATE		38-41	PUMP INTAKE SET AT		WATER AT END OF TEST		42	
—		GPM	80					
RECOMMENDED PUMP TYPE		RECOMMENDED PUMP SETTING		43-45	RECOMMENDED PUMPING RATE		46-49	
<input type="checkbox"/> SHALLOW <input checked="" type="checkbox"/> DEEP		080		FEET	0008		GPM	
50-53		0240		GPM. / FT. SPECIFIC CAPACITY				

<p>FINAL STATUS OF WELL</p>	<p>54</p> <p>1 <input checked="" type="checkbox"/> WATER SUPPLY</p> <p>2 <input type="checkbox"/> OBSERVATION WELL</p> <p>3 <input type="checkbox"/> TEST HOLE</p> <p>4 <input type="checkbox"/> RECHARGE WELL</p>	<p>5 <input type="checkbox"/> ABANDONED, INSUFFICIENT SUPPLY</p> <p>6 <input type="checkbox"/> ABANDONED, POOR QUALITY</p> <p>7 <input type="checkbox"/> UNFINISHED</p>
<p>WATER USE</p>	<p>55-56</p> <p>1 <input type="checkbox"/> DOMESTIC</p> <p>2 <input type="checkbox"/> STOCK</p> <p>3 <input type="checkbox"/> IRRIGATION</p> <p>4 <input checked="" type="checkbox"/> INDUSTRIAL</p> <p><input type="checkbox"/> OTHER</p>	<p>5 <input type="checkbox"/> COMMERCIAL</p> <p>6 <input type="checkbox"/> MUNICIPAL</p> <p>7 <input type="checkbox"/> PUBLIC SUPPLY</p> <p>8 <input type="checkbox"/> COOLING OR AIR CONDITIONING</p> <p>9 <input type="checkbox"/> NOT USED</p>
<p>METHOD OF DRILLING</p>	<p>57</p> <p>1 <input type="checkbox"/> CABLE TOOL</p> <p>2 <input type="checkbox"/> ROTARY (CONVENTIONAL)</p> <p>3 <input type="checkbox"/> ROTARY (REVERSE)</p> <p>4 <input type="checkbox"/> ROTARY (AIR)</p> <p>5 <input checked="" type="checkbox"/> AIR PERCUSSION</p>	<p>6 <input type="checkbox"/> BORING</p> <p>7 <input type="checkbox"/> DIAMOND</p> <p>8 <input type="checkbox"/> JETTING</p> <p>9 <input type="checkbox"/> DRIVING</p>

LOCATION OF WELL 5517

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.

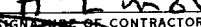
South Gloucester

Hy #31

750'

20'

DRILLERS REMARKS:

CONTRACTOR	NAME OF WELL CONTRACTOR		LICENCE NUMBER	
	Hawthorne Drilling Ltd		2558	
	ADDRESS			
	PO Box 4218 Stat. E.			
CONTRACTOR	NAME OF DRILLER OR BORER		LICENCE NUMBER	
	A. Emond		2558	
	SIGNATURE OF CONTRACTOR		SUBMISSION DATE	
			DAY 24 MO. 2 YR. 75	

OFFICE USE ONLY	DATA SOURCE	1	58	CONTRACTOR 2538	90-62	DATE RECEIVED 2 200 75	63-68
	DATE OF INSPECTION			INSPECTOR			
	REMARKS: CIS. 78						P ✓
							WI



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MECHANICS

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

[illegible]

31

32

WATER FOUND AT - FEET		KIND OF WATER	
10-13 32	1 <input checked="" type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERAL	14	
15-18 111	1 <input checked="" type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERAL	19	
20-23	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERAL	24	
25-28	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERAL	29	
30-33	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERAL	34	

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET	
			FROM	TO
10-11 6 1/4	1 <input checked="" type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE	12 188	0	13-16 22
17-18 5 7/8	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input checked="" type="checkbox"/> OPEN HOLE	19	22	20-23 125
24-25	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE	26		27-30

DEPTH SET AT - FEET		MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER, ETC.)
FROM	TO	
10-13	14-17	
18-21	22-25	
26-29	30-33	80

71

PUMPING TEST

PUMPING TEST	PUMPING TEST METHOD		10	PUMPING RATE		11-14	DURATION OF PUMPING	
	1 <input checked="" type="checkbox"/> PUMP 2 <input type="checkbox"/> BAILER			12		GPM	15-16 HOURS	17-18 MINS
	STATIC LEVEL	WATER LEVEL END OF PUMPING	25	WATER LEVELS DURING			1 <input type="checkbox"/> PUMPING 2 <input type="checkbox"/> RECOVERY	
	19-21	22-24	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES		
	20 FEET	20 FEET	20 ²⁶⁻²⁸ FEET	20 ²⁹⁻³¹ FEET	20 ³²⁻³⁴ FEET	20 ³⁵⁻³⁷ FEET		
	IF FLOWING GIVE RATE		38-41	PUMP INTAKE SET AT			WATER AT END OF TEST	
—		GPM	80 FEET			1 <input checked="" type="checkbox"/> CLEAR 2 <input type="checkbox"/> CLOUDY		
RECOMMENDED PUMP TYPE			RECOMMENDED PUMP SETTING			RECOMMENDED PUMPING RATE		
<input type="checkbox"/> SHALLOW <input checked="" type="checkbox"/> DEEP			80 FEET			8 GPM		
50-53			GPM / FT. SPECIFIC CAPACITY					

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.

South Gloucester

O.C. 4

Hy #31

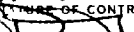
750' - - ->

20'

North Arrow

DRILLERS REMARKS:

DRILLERS REMARKS:

CONTRACTOR	NAME OF WELL CONTRACTOR		LICENCE NUMBER	
	Hawthorne Drilling Ltd		2558	
	ADDRESS			
	P.O. Box 4218 Stn. E.			
	NAME OF DRILLER OR BORER		LICENCE NUMBER	
	A. Emond		2558	
	SIGNATURE OF CONTRACTOR		SUBMISSION DATE	
			DAY 24 MO. 2 YR. 20	

OFFICE USE ONLY

DATA SOURCE	58	CONTRACTOR	59-62	DATE RECEIVED	63-68
DATE OF INSPECTION		INSPECTOR			
REMARKS:					P WI

APPENDIX E
Moisture Surplus Printouts

Ottawa Airport, ON Ottawa_50mm_WBNRMSD.txt
WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY... 50 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE..... 30 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	27	83	50	299
28- 2	-8.8	57	12	18	1	1	0	29	110	50	356
31- 3	-2.7	66	32	80	5	5	0	107	64	50	422
30- 4	5.9	72	67	69	32	32	0	104	0	50	494
31- 5	13.0	74	74	0	80	79	-1	13	0	32	568
30- 6	18.3	82	82	0	116	97	-19	4	0	14	651
31- 7	20.8	89	89	0	135	94	-41	3	0	5	740
31- 8	19.5	87	87	0	117	83	-34	1	0	9	827
30- 9	14.6	84	84	0	75	66	-9	7	0	20	912
31-10	8.1	77	76	0	36	35	-1	24	0	37	77
30-11	1.3	80	63	8	10	10	0	50	9	49	157
31-12	-7.0	78	26	15	1	1	0	38	47	50	236
AVE	5.9 TTL	911	705	205	608	503	-105	407			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	31	43	0	55
28- 2	2.6	29	15	27	1	1	0	37	59	0	59
31- 3	2.3	28	22	47	4	4	0	53	83	0	65
30- 4	1.7	31	31	84	8	8	0	84	0	2	74
31- 5	1.9	32	32	0	12	11	5	21	0	19	85
30- 6	1.2	38	38	0	9	26	26	17	0	19	93
31- 7	1.2	42	42	0	8	30	31	12	0	14	93
31- 8	1.3	39	39	0	8	30	32	5	0	16	107
30- 9	1.5	38	38	0	8	14	13	20	0	21	110
31-10	1.4	37	37	2	7	7	3	27	0	19	37
30-11	1.7	27	28	9	4	4	0	30	13	6	45
31-12	3.0	30	22	14	1	1	0	29	34	0	56

Ottawa Airport, ON Ottawa_75mm_WBNRMSD.txt
WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY... 75 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE..... 45 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	27	83	75	299
28- 2	-8.8	57	12	18	1	1	0	29	110	75	356
31- 3	-2.7	66	32	80	5	5	0	107	64	75	422
30- 4	5.9	72	67	69	32	32	0	104	0	75	494
31- 5	13.0	74	74	0	80	80	0	13	0	56	568
30- 6	18.3	82	82	0	116	107	-10	4	0	28	651
31- 7	20.8	89	89	0	135	104	-32	2	0	10	740
31- 8	19.5	87	87	0	117	85	-32	1	0	12	827
30- 9	14.6	84	84	0	75	66	-9	4	0	26	912
31-10	8.1	77	76	0	36	35	-1	15	0	52	77
30-11	1.3	80	63	8	10	10	0	42	9	71	157
31-12	-7.0	78	26	15	1	1	0	36	47	75	236
AVE	5.9 TTL	911	705	205	608	526	-84	384			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	30	43	0	55
28- 2	2.6	29	15	27	1	1	0	37	59	0	59
31- 3	2.3	28	22	47	4	4	0	53	83	0	65
30- 4	1.7	31	31	84	8	8	0	84	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	19	19	17	0	28	93
31- 7	1.2	42	42	0	8	28	30	11	0	22	93
31- 8	1.3	39	39	0	8	29	31	5	0	23	107
30- 9	1.5	38	38	0	8	14	14	17	0	29	110
31-10	1.4	37	37	2	7	7	2	23	0	28	37
30-11	1.7	27	28	9	4	4	0	33	13	11	45
31-12	3.0	30	22	14	1	1	0	30	34	3	56

Ottawa Airport, ON Ottawa_100mm_WBNRMSD.txt
WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY... 100 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE..... 60 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	25	83	99	299
28- 2	-8.8	57	12	18	1	1	0	28	110	99	356
31- 3	-2.7	66	32	80	5	5	0	106	64	100	422
30- 4	5.9	72	67	69	32	32	0	104	0	100	494
31- 5	13.0	74	74	0	80	80	0	13	0	81	568
30- 6	18.3	82	82	0	116	112	-4	4	0	47	651
31- 7	20.8	89	89	0	135	115	-21	2	0	19	740
31- 8	19.5	87	87	0	117	88	-29	1	0	18	827
30- 9	14.6	84	84	0	75	66	-8	3	0	32	912
31-10	8.1	77	76	0	36	35	-1	10	0	63	77
30-11	1.3	80	63	8	10	10	0	34	9	91	157
31-12	-7.0	78	26	15	1	1	0	33	47	97	236
AVE	5.9 TTL	911	705	205	608	545	-63	363			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	30	43	5	55
28- 2	2.6	29	15	27	1	1	0	37	59	3	59
31- 3	2.3	28	22	47	4	4	0	53	83	0	65
30- 4	1.7	31	31	84	8	8	0	84	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	12	11	17	0	34	93
31- 7	1.2	42	42	0	8	25	26	11	0	30	93
31- 8	1.3	39	39	0	8	29	30	5	0	30	107
30- 9	1.5	38	38	0	8	14	13	15	0	35	110
31-10	1.4	37	37	2	7	6	2	21	0	36	37
30-11	1.7	27	28	9	4	4	0	34	13	19	45
31-12	3.0	30	22	14	1	1	0	30	34	8	56

Ottawa Airport, ON Ottawa_125mm_WBNRMSD.txt
WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY...125 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE..... 75 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	24	83	122	299
28- 2	-8.8	57	12	18	1	1	0	28	110	123	356
31- 3	-2.7	66	32	80	5	5	0	105	64	125	422
30- 4	5.9	72	67	69	32	32	0	104	0	125	494
31- 5	13.0	74	74	0	80	80	0	13	0	106	568
30- 6	18.3	82	82	0	116	115	-1	4	0	69	651
31- 7	20.8	89	89	0	135	122	-13	2	0	33	740
31- 8	19.5	87	87	0	117	92	-25	1	0	28	827
30- 9	14.6	84	84	0	75	67	-7	3	0	41	912
31-10	8.1	77	76	0	36	35	-1	9	0	74	77
30-11	1.3	80	63	8	10	10	0	27	9	108	157
31-12	-7.0	78	26	15	1	1	0	29	47	119	236
AVE	5.9 TTL	911	705	205	608	560	-47	349			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	31	43	10	55
28- 2	2.6	29	15	27	1	1	0	37	59	8	59
31- 3	2.3	28	22	47	4	4	0	54	83	0	65
30- 4	1.7	31	31	84	8	8	0	84	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	9	4	17	0	39	93
31- 7	1.2	42	42	0	8	21	23	11	0	37	93
31- 8	1.3	39	39	0	8	26	28	5	0	38	107
30- 9	1.5	38	38	0	8	13	11	14	0	42	110
31-10	1.4	37	37	2	7	6	2	20	0	42	37
30-11	1.7	27	28	9	4	4	0	32	13	25	45
31-12	3.0	30	22	14	1	1	0	30	34	14	56

Ottawa Airport, ON Ottawa_150mm_WBNRMSD.txt
WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY... 150 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE..... 90 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	23	83	144	299
28- 2	-8.8	57	12	18	1	1	0	26	110	146	356
31- 3	-2.7	66	32	80	5	5	0	103	64	150	422
30- 4	5.9	72	67	69	32	32	0	104	0	150	494
31- 5	13.0	74	74	0	80	80	0	13	0	131	568
30- 6	18.3	82	82	0	116	116	0	4	0	93	651
31- 7	20.8	89	89	0	135	127	-8	2	0	52	740
31- 8	19.5	87	87	0	117	97	-19	1	0	41	827
30- 9	14.6	84	84	0	75	68	-6	3	0	54	912
31-10	8.1	77	76	0	36	36	-1	8	0	88	77
30-11	1.3	80	63	8	10	10	0	23	9	126	157
31-12	-7.0	78	26	15	1	1	0	26	47	140	236
AVE	5.9 TTL	911	705	205	608	573	-34	336			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	31	43	15	55
28- 2	2.6	29	15	27	1	1	0	37	59	12	59
31- 3	2.3	28	22	47	4	4	0	54	83	0	65
30- 4	1.7	31	31	84	8	8	0	84	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	8	1	17	0	41	93
31- 7	1.2	42	42	0	8	18	18	11	0	42	93
31- 8	1.3	39	39	0	8	22	23	5	0	44	107
30- 9	1.5	38	38	0	8	12	10	14	0	49	110
31-10	1.4	37	37	2	7	6	2	19	0	47	37
30-11	1.7	27	28	9	4	4	0	30	13	31	45
31-12	3.0	30	22	14	1	1	0	29	34	20	56

Ottawa Airport, ON Ottawa_200mm_WBNRMSD.txt
WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY...200 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE.....120 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	21	83	187	299
28- 2	-8.8	57	12	18	1	1	0	24	110	191	356
31- 3	-2.7	66	32	80	5	5	0	99	64	199	422
30- 4	5.9	72	67	69	32	32	0	103	0	200	494
31- 5	13.0	74	74	0	80	80	0	13	0	181	568
30- 6	18.3	82	82	0	116	116	0	4	0	143	651
31- 7	20.8	89	89	0	135	132	-3	2	0	97	740
31- 8	19.5	87	87	0	117	106	-11	1	0	78	827
30- 9	14.6	84	84	0	75	70	-4	3	0	89	912
31-10	8.1	77	76	0	36	36	0	7	0	123	77
30-11	1.3	80	63	8	10	10	0	19	9	164	157
31-12	-7.0	78	26	15	1	1	0	22	47	182	236
AVE	5.9 TTL	911	705	205	608	589	-18	318			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	30	43	24	55
28- 2	2.6	29	15	27	1	1	0	36	59	20	59
31- 3	2.3	28	22	47	4	4	0	55	83	4	65
30- 4	1.7	31	31	84	8	8	0	83	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	9	0	17	0	41	93
31- 7	1.2	42	42	0	8	11	10	11	0	48	93
31- 8	1.3	39	39	0	8	16	16	5	0	54	107
30- 9	1.5	38	38	0	8	10	8	14	0	59	110
31-10	1.4	37	37	2	7	6	1	19	0	55	37
30-11	1.7	27	28	9	4	4	0	29	13	41	45
31-12	3.0	30	22	14	1	1	0	28	34	29	56

Ottawa Airport, ON Ottawa_225mm_WBNRMSD.txt WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY...225 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE.....135 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	21	83	209	299
28- 2	-8.8	57	12	18	1	1	0	24	110	214	356
31- 3	-2.7	66	32	80	5	5	0	97	64	224	422
30- 4	5.9	72	67	69	32	32	0	103	0	225	494
31- 5	13.0	74	74	0	80	80	0	13	0	206	568
30- 6	18.3	82	82	0	116	116	0	4	0	168	651
31- 7	20.8	89	89	0	135	133	-2	2	0	121	740
31- 8	19.5	87	87	0	117	109	-8	1	0	99	827
30- 9	14.6	84	84	0	75	71	-4	3	0	109	912
31-10	8.1	77	76	0	36	36	0	7	0	143	77
30-11	1.3	80	63	8	10	10	0	18	9	185	157
31-12	-7.0	78	26	15	1	1	0	21	47	204	236
AVE	5.9 TTL	911	705	205	608	594	-14	314			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	30	43	28	55
28- 2	2.6	29	15	27	1	1	0	36	59	24	59
31- 3	2.3	28	22	47	4	4	0	56	83	7	65
30- 4	1.7	31	31	84	8	8	0	82	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	9	0	17	0	41	93
31- 7	1.2	42	42	0	8	10	7	11	0	49	93
31- 8	1.3	39	39	0	8	14	13	5	0	58	107
30- 9	1.5	38	38	0	8	10	7	14	0	63	110
31-10	1.4	37	37	2	7	6	1	19	0	58	37
30-11	1.7	27	28	9	4	4	0	29	13	44	45
31-12	3.0	30	22	14	1	1	0	28	34	33	56

Ottawa Airport, ON Ottawa_250mm_WBNRMSD.txt
WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY...250 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE.....150 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	20	83	232	299
28- 2	-8.8	57	12	18	1	1	0	23	110	238	356
31- 3	-2.7	66	32	80	5	5	0	96	64	248	422
30- 4	5.9	72	67	69	32	32	0	102	0	250	494
31- 5	13.0	74	74	0	80	80	0	13	0	231	568
30- 6	18.3	82	82	0	116	116	0	4	0	193	651
31- 7	20.8	89	89	0	135	134	-1	2	0	145	740
31- 8	19.5	87	87	0	117	111	-6	1	0	121	827
30- 9	14.6	84	84	0	75	72	-3	3	0	130	912
31-10	8.1	77	76	0	36	36	0	7	0	164	77
30-11	1.3	80	63	8	10	10	0	18	9	207	157
31-12	-7.0	78	26	15	1	1	0	20	47	226	236
AVE	5.9 TTL	911	705	205	608	598	-10	309			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	29	43	32	55
28- 2	2.6	29	15	27	1	1	0	36	59	27	59
31- 3	2.3	28	22	47	4	4	0	56	83	9	65
30- 4	1.7	31	31	84	8	8	0	82	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	9	0	17	0	41	93
31- 7	1.2	42	42	0	8	9	5	11	0	50	93
31- 8	1.3	39	39	0	8	12	11	5	0	61	107
30- 9	1.5	38	38	0	8	9	6	14	0	66	110
31-10	1.4	37	37	2	7	7	1	19	0	61	37
30-11	1.7	27	28	9	4	4	0	29	13	47	45
31-12	3.0	30	22	14	1	1	0	28	34	36	56

Ottawa Airport, ON Ottawa_265mm_WBNRMSD.txt
WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY...265 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE.....159 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	20	83	246	299
28- 2	-8.8	57	12	18	1	1	0	23	110	252	356
31- 3	-2.7	66	32	80	5	5	0	96	64	263	422
30- 4	5.9	72	67	69	32	32	0	102	0	265	494
31- 5	13.0	74	74	0	80	80	0	13	0	246	568
30- 6	18.3	82	82	0	116	116	0	4	0	208	651
31- 7	20.8	89	89	0	135	134	-1	2	0	160	740
31- 8	19.5	87	87	0	117	112	-5	1	0	135	827
30- 9	14.6	84	84	0	75	72	-3	3	0	144	912
31-10	8.1	77	76	0	36	36	0	7	0	177	77
30-11	1.3	80	63	8	10	10	0	18	9	221	157
31-12	-7.0	78	26	15	1	1	0	20	47	240	236
AVE	5.9 TTL	911	705	205	608	599	-9	309			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	29	43	34	55
28- 2	2.6	29	15	27	1	1	0	36	59	29	59
31- 3	2.3	28	22	47	4	4	0	56	83	10	65
30- 4	1.7	31	31	84	8	8	0	82	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	9	0	17	0	41	93
31- 7	1.2	42	42	0	8	8	4	11	0	51	93
31- 8	1.3	39	39	0	8	11	10	5	0	62	107
30- 9	1.5	38	38	0	8	9	5	14	0	68	110
31-10	1.4	37	37	2	7	7	1	19	0	62	37
30-11	1.7	27	28	9	4	4	0	29	13	49	45
31-12	3.0	30	22	14	1	1	0	28	34	38	56

Ottawa Airport, ON Ottawa_275mm_WBNRMSD.txt
WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY...275 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE.....165 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	19	83	255	299
28- 2	-8.8	57	12	18	1	1	0	23	110	261	356
31- 3	-2.7	66	32	80	5	5	0	96	64	272	422
30- 4	5.9	72	67	69	32	32	0	101	0	275	494
31- 5	13.0	74	74	0	80	80	0	13	0	256	568
30- 6	18.3	82	82	0	116	116	0	4	0	218	651
31- 7	20.8	89	89	0	135	135	-1	2	0	170	740
31- 8	19.5	87	87	0	117	113	-4	1	0	144	827
30- 9	14.6	84	84	0	75	72	-2	3	0	153	912
31-10	8.1	77	76	0	36	36	0	7	0	186	77
30-11	1.3	80	63	8	10	10	0	18	9	230	157
31-12	-7.0	78	26	15	1	1	0	20	47	249	236
AVE	5.9 TTL	911	705	205	608	601	-7	307			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	29	43	35	55
28- 2	2.6	29	15	27	1	1	0	36	59	30	59
31- 3	2.3	28	22	47	4	4	0	56	83	11	65
30- 4	1.7	31	31	84	8	8	0	81	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	9	0	17	0	41	93
31- 7	1.2	42	42	0	8	8	3	11	0	51	93
31- 8	1.3	39	39	0	8	11	9	5	0	63	107
30- 9	1.5	38	38	0	8	9	5	14	0	69	110
31-10	1.4	37	37	2	7	7	1	19	0	63	37
30-11	1.7	27	28	9	4	4	0	29	13	50	45
31-12	3.0	30	22	14	1	1	0	28	34	39	56

Ottawa Airport, ON Ottawa_280mm_WBNRMSD.txt
WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY...280 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE.....168 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	19	83	260	299
28- 2	-8.8	57	12	18	1	1	0	23	110	266	356
31- 3	-2.7	66	32	80	5	5	0	95	64	277	422
30- 4	5.9	72	67	69	32	32	0	101	0	280	494
31- 5	13.0	74	74	0	80	80	0	13	0	261	568
30- 6	18.3	82	82	0	116	116	0	4	0	223	651
31- 7	20.8	89	89	0	135	135	-1	2	0	175	740
31- 8	19.5	87	87	0	117	113	-4	1	0	148	827
30- 9	14.6	84	84	0	75	72	-2	3	0	157	912
31-10	8.1	77	76	0	36	36	0	7	0	191	77
30-11	1.3	80	63	8	10	10	0	18	9	234	157
31-12	-7.0	78	26	15	1	1	0	20	47	254	236
AVE	5.9 TTL	911	705	205	608	601	-7	306			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	29	43	35	55
28- 2	2.6	29	15	27	1	1	0	36	59	31	59
31- 3	2.3	28	22	47	4	4	0	56	83	12	65
30- 4	1.7	31	31	84	8	8	0	81	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	9	0	17	0	41	93
31- 7	1.2	42	42	0	8	8	3	11	0	52	93
31- 8	1.3	39	39	0	8	10	9	5	0	64	107
30- 9	1.5	38	38	0	8	9	5	14	0	69	110
31-10	1.4	37	37	2	7	7	1	19	0	64	37
30-11	1.7	27	28	9	4	4	0	29	13	50	45
31-12	3.0	30	22	14	1	1	0	28	34	39	56

Ottawa Airport, ON Ottawa_300mm_WBNRMSD.txt WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY...300 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE.....180 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	19	83	279	299
28- 2	-8.8	57	12	18	1	1	0	23	110	285	356
31- 3	-2.7	66	32	80	5	5	0	95	64	297	422
30- 4	5.9	72	67	69	32	32	0	101	0	300	494
31- 5	13.0	74	74	0	80	80	0	13	0	281	568
30- 6	18.3	82	82	0	116	116	0	4	0	243	651
31- 7	20.8	89	89	0	135	135	0	2	0	194	740
31- 8	19.5	87	87	0	117	114	-3	1	0	167	827
30- 9	14.6	84	84	0	75	73	-2	3	0	176	912
31-10	8.1	77	76	0	36	36	0	7	0	209	77
30-11	1.3	80	63	8	10	10	0	18	9	252	157
31-12	-7.0	78	26	15	1	1	0	20	47	272	236
AVE	5.9 TTL	911	705	205	608	603	-5	306			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	29	43	37	55
28- 2	2.6	29	15	27	1	1	0	36	59	33	59
31- 3	2.3	28	22	47	4	4	0	57	83	13	65
30- 4	1.7	31	31	84	8	8	0	81	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	9	0	17	0	41	93
31- 7	1.2	42	42	0	8	8	2	11	0	52	93
31- 8	1.3	39	39	0	8	10	8	5	0	65	107
30- 9	1.5	38	38	0	8	9	5	14	0	71	110
31-10	1.4	37	37	2	7	7	1	19	0	65	37
30-11	1.7	27	28	9	4	4	0	29	13	52	45
31-12	3.0	30	22	14	1	1	0	28	34	41	56

Ottawa Airport, ON Ottawa_400mm_WBNRMSD.txt
WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY... 400 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE..... 240 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	19	83	375	299
28- 2	-8.8	57	12	18	1	1	0	22	110	382	356
31- 3	-2.7	66	32	80	5	5	0	94	64	395	422
30- 4	5.9	72	67	69	32	32	0	99	0	400	494
31- 5	13.0	74	74	0	80	80	0	13	0	381	568
30- 6	18.3	82	82	0	116	116	0	4	0	343	651
31- 7	20.8	89	89	0	135	135	0	2	0	294	740
31- 8	19.5	87	87	0	117	116	-1	1	0	265	827
30- 9	14.6	84	84	0	75	74	-1	3	0	272	912
31-10	8.1	77	76	0	36	36	0	7	0	305	77
30-11	1.3	80	63	8	10	10	0	18	9	349	157
31-12	-7.0	78	26	15	1	1	0	19	47	369	236
AVE	5.9 TTL	911	705	205	608	606	-2	301			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	29	43	44	55
28- 2	2.6	29	15	27	1	1	0	36	59	39	59
31- 3	2.3	28	22	47	4	4	0	57	83	20	65
30- 4	1.7	31	31	84	8	8	0	80	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	9	0	17	0	41	93
31- 7	1.2	42	42	0	8	8	0	11	0	53	93
31- 8	1.3	39	39	0	8	8	4	5	0	69	107
30- 9	1.5	38	38	0	8	8	2	14	0	76	110
31-10	1.4	37	37	2	7	7	0	19	0	69	37
30-11	1.7	27	28	9	4	4	0	29	13	57	45
31-12	3.0	30	22	14	1	1	0	28	34	46	56