

Original: July, 2018

Updated: January 30, 2025

Venerable Jen Chun Kuan  
International Buddhist Progress Society of Ottawa-Carleton  
6688 Franktown Road  
Richmond ON, K0A 2Z0

Re: Hydrogeological Assessment, 6688 Franktown Road, Ottawa ON, Addendum 1  
Project #: CCO-17-0503

Egis Canada Ltd. ('Egis', previously McIntosh Perry Consulting Engineers) has been retained by Venerable Hui Tzu (the Client) of the International Buddhist Progress Society of Ottawa-Carleton to conduct a Hydrogeological Assessment (Addendum 1) in support of a Site Plan Application for the property located at 6688 Franktown Road in Ottawa, Ontario (the Site).

A Hydrogeological Assessment and Terrain Analysis was previously completed by Egis (previously McIntosh Perry Consulting Engineers) in July of 2018. At the time of the original investigation, the Site consisted of forested land with a cleared portion that would be utilized for the future development of a place of worship. The total area of the Site is approximately 39.89 hectares (ha). Since 2018, a one-storey interim place of worship and associated paved parking lot has been constructed and exists on-Site (Figure 2). It is our understanding that the Client intends to convert the interim facility into a community building with classrooms when the construction of the proposed additional development (a permanent place of worship) is complete. Additionally, the existing well on-Site (well tag #A252856) will service the existing and proposed additional development.

To satisfy the requirements of this Hydrogeological Assessment, Egis is relying on the water quality and quantity data that was collected from an existing drilled on-site water supply well (Test Well 1, TW1) as part of its previous report in 2018. TW1 was pumped for approximately six hours and was sampled twice in 2018. The pumping rate during the pumping test (approximately 92 L/min) is considered more than sufficient to supply the 2018 proposed development. The water quality at this test well was resampled on December 18, 2024, to ensure that there has been no change in water quality since the previous hydrogeological assessment was completed.

This addendum was written to update the previously completed Hydrogeological Assessment and Terrain Analysis completed by Egis in July, 2018.

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## 1.0 HYDROGEOLOGICAL ASSESSMENT (ADDENDUM 1)

### 1.1 Pre-Consultation

On June 4, 2024, Egis completed a pre-consultation with the City of Ottawa Peer Reviewer to discuss this Hydrogeological Assessment, as it was previously completed in June of 2018. The following items were discussed:

- The existing well (well tag #A252856 – previously tested in 2018) can be used to support the proposed on-Site development if an updated groundwater quality sample is collected for the parameters outlined within the *City of Ottawa Hydrogeological and Terrain Analysis Guidelines (March, 2021)* (HTAG, 2021), including Volatile Organic Compounds (VOCs).
- If the existing above noted well is used for the proposed development, a pumping test will not be required as the pumping test data collected in 2018 was at a flow rate of approximately 92 L/min indicating there are no issues with the proposed flow rate, given that the proposed development has a water demand less than the previously selected pumping rate.

### 1.2 Updated Water Well Record Review

The MECP's WWIS database indicated 44 water wells that are located within 500 m of the Site. Thirty-eight (38) of these wells are listed as being used solely for domestic purposes, one (1) for livestock, three (3) test holes, one (1) abandoned, and one (1) for deepening an existing well (A0144460). MECP WWIS records are shown on Figure 3, and data are summarized in Appendix B.

Forty-three (43) water supply wells were completed in bedrock at final depths ranging from 15.5 – 85.3 m below ground surface (bgs) with the average depth to bedrock reported to be 5.98 m bgs. One (1) water supply well was completed in the overburden, with a depth of 6.71 m bgs. Driller-reported static water levels were recorded at depths ranging from 0.9 – 58.8 m bgs. Driller-recommended well pumping rates ranged from 11.36 – 344.47 L/min.

TW1 (well tag #A252856), located at 6688 Franktown Road, was used as part of the water supply assessment. Based on the Well Record, TW1 was constructed with 6.71 m of casing, with a total well depth of 60.96 m. The depth to bedrock was reported as 3.05 m and the well yield was reported as 75.71 L/min.

### 1.3 Static Conditions

Prior to the collection of the groundwater sample, an updated water level was measured in the test well (TW1) on December 18, 2024. The static groundwater level was recorded in metres below top of casing (m btoc). This level was recorded as 4.050 m btoc. Assigning an arbitrary site benchmark of 100.00 m (local) to the top of the casing, the static water elevation in the well was 95.95 m above datum (ad).

Comparatively, the static groundwater level collected at the time of the pumping test on July 13, 2018, was recorded as 4.365 m btoc (95.635 m ad).

## 1.4 Well Yield and Water Demand

Based on the 6-hour pumping test completed on July 13, 2018 (Appendix A), 33,120 L of groundwater was pumped from the well at a rate of 92 L/min. It is important to note that a maximum drawdown of only 0.415 m btoC was measured at the flow rate of 92 L/min, demonstrating a highly productive well in terms of yield. Additionally, this pumping rate exceeds the total average day demand of 0.10 L/sec (6 L/min), the maximum day demand of 0.15 L/sec (9 L/min) and the peak hour demand of 0.273 L/sec (16.38 L/min) for the proposed development, as per Section 5.3 of the Site Servicing & Stormwater Management Report provided by EXP Services Inc.

The long-term yield calculations (Q20) were previously calculated within the 2018 report using Farvolden and Moell methods. Based on the long-term analysis, the calculated Q20 values were 6,532 L/min and 2,945 L/min, respectively (Appendix A).

Therefore, it is our professional opinion that the yield of TW1 is sufficient to support the existing and proposed additional development.

## 1.5 Groundwater Sampling

On December 18<sup>th</sup>, 2024, Egis collected an updated groundwater sample from the existing on-Site well ('TW1'). Previously, groundwater quality samples were collected from TW1 during the pumping test on July 13, 2018 (Appendix A).

The updated groundwater sample was taken from an untreated tap connected to the existing pressure tank. Approximately 1,200 L of groundwater was purged from the well before the field parameters stabilized. Therefore, the groundwater sample collected is representative of a fresh groundwater sample.

Water quality (pH, temperature, conductivity, turbidity, dissolved oxygen, total dissolved solids, residual chlorine) were also monitored and recorded in the field during the test using calibrated instruments (general parameters – Horiba U-52 multimeter and residual chlorine - Hach DR900). The calibration certificate for the Horiba U-52 is saved to Appendix D of this report. Additional visual and olfactory water quality observations of colour and odour were made and are presented in Table 1 appended to this report.

Prior to sample collection, the untreated tap was disinfected with a bleach solution. Residual chlorine was measured using a Hach DR900 colorimeter; the Hach DR900 was zero standardized prior to collecting samples. The instrument was zero standardized prior to reading each sample. Based on instrument calibration and specifications, the value of "0.02 mg/L" is the minimum detection limit for this instrumentation. No residual chlorine was detected within the groundwater sample taken from this well (TW1).

The current groundwater sample was collected unfiltered and unchlorinated, directly into clean bottles supplied by the analytical laboratories (Eurofins, Ottawa, ON). The sample was kept on ice and delivered to Eurofins under strict chain-of-custody procedures. The sample was received by the laboratory within 24 hours of collection.

Eurofins is fully accredited by the Standards Council of Canada/Canadian Association for Laboratory Accreditation (SCC/CALA).

## 1.6 Groundwater Quality

The Laboratory Certificate of Analysis for the on-site groundwater testing is presented in Appendix C. A summary of field and laboratory results from TW1 are presented in Table 1 and Table 2; for comparison purposes Table 2 also includes the analytical results for the 2018 testing. The sample was collected after flushing 1,200 L of water at TW1. The samples were tested for residual chlorine with a Hach DR900 colorimeter calibrated to detect chlorine residual (free chlorine). Prior to usage, the Hach DR900 was zero calibrated according to the manufacturer's printed instructions.

All analytical results were compared to the Ontario Drinking Water Standards, Objectives, and Guidelines (ODWSOG). Based on the analytical results from samples collected during the test at TW1, the following exceedances of ODWSOG were noted:

- **Colour** (Aesthetic Objective (AO) of 5 TCU): TW1 (10 TCU); and
- **Hardness** (Operational Guideline (OG) of 80-100 mg/L): TW1 (309 mg/L). Hardness values in excess of 300 mg/L are considered to be very hard as per the HTAG (2021).

It is important to note that hardness concentrations were 259 mg/L (TW1\_1) and 327 mg/L (TW1\_2) collected in July 2018. Colour concentrations were 3 TCU (TW1\_1) and 4 TCU (TW1\_2). (Appendix A).

## 1.7 Water Treatment

Colour exceeds the ODWSOG as outlined above, as well as the Maximum Concentration Considered Reasonably Treatable (MCCRT) of 7 TCU as per the HTAG (2021). It is noted that field measurements of turbidity were recorded at 3.2 NTU after 3 minutes of purging the groundwater and decreased to 0 NTU after 12 minutes of purging. Additionally, the laboratory measurement of turbidity was reported as 1.2 NTU, which are all below the AO of 5 NTU as per the ODWS. All metal parameters (specifically iron (Fe) and manganese (Mn)) which typically can affect colour were below the ODWS. Field observations for colour were recorded as clear. Historically, analytical testing performed 2018, indicated results for colour at 3 and 4 TCU. Therefore, it is unclear why colour exceeds the ODWSOG and the MCCRT as per the HTAG (2021). It is our professional opinion that the colour exceedance does not impact the groundwater quality at TW1.

Currently, a water softener and a UV system are installed at the Site. Both hardness and colour can be treated utilizing the existing water softener.



### 3.0 CONCLUSIONS

Based on the investigation undertaken above, it is our professional opinion that the aquifer into which the test well was completed within can adequately supply water to the existing and proposed additional development with respect to water quality and water quantity.

The following recommendations should be followed to ensure effective development of the Site with the existing well (TW1 - A0144460):

- Best Management Practices (BMP) for the construction of wells should be followed, per O.Reg. 903: Wells and the MECP document entitled "*Water Supply Wells: Requirements and Best Practices.*"
- Hardness can be treated using a conventional water softener.
- Colour can also be treated through water softening, or physical filtration (ie. carbon filter treatment system). Exceedances of colour are not expected to generate any significant impacts to the water quality.
- Currently, a water softener and a UV system are installed at the Site. Both hardness and colour can be treated utilizing the existing water softener.

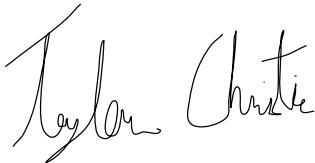
#### Closure

We trust that this information is satisfactory for your present requirements. Should you have any questions or require additional information, please do not hesitate to contact the undersigned.

Respectfully submitted,

#### Egis Canada Ltd.

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## Tables

Table 1: Summary of Field Parameters

Table 2: Summary of Laboratory Results

## Figures

Updated Figure 2: Updated Site Layout

Updated Figure 7: Updated MECP Well Record Locations

## Appendices

Appendix A: Hydrogeological Study 6688 Franktown Road (July 2018)

Appendix B: MECP Water Well Record Summary

Appendix C: Laboratory Certificate of Analysis

Appendix D: Certificate of Calibration

Appendix E: Site Plan Area of Development – GRC Architects (December 18, 2024)

## References

Site Servicing & Stormwater Management Report, IBPS Temple – 6688 Franktown Road, Ottawa ON, EXP Services Inc., dated December 18, 2024.

## **Limitations**

This report has been prepared, and the work referred to in this report has been undertaken by, Egis for the Client. It is intended for the sole, and exclusive use of the Client with respect to the stated purpose of the work carried out by Egis.

The report may not be relied upon by any other person or entity without the express written consent of Egis. Any use which a third party makes of this report, or any reliance on decisions made based on it, without a Reliance Letter, are the responsibility of such third parties. Egis accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report, or the information contained within it.

The investigation undertaken by Egis with respect to this report and any conclusions or recommendations made in this report reflect Egis' judgment based on the Site conditions observed at the time of the Site investigations, inspections, and/or sampling on the date(s) set out in this report, and on information available at the time of the preparation of this report. Conditions such as ground cover, weather, physical obstructions, etc. may influence conclusions or recommendations made in this report. Egis does not certify or warrant the environmental status of the property.

This report has been prepared for specific application to this Site and it may be based, in part, upon visual observation of the Site, subsurface investigation at discrete locations and depths, and/or specific analysis of specific chemical parameters and materials during a specific time interval, all as described in this report. Unless otherwise stated, the findings cannot be extended to previous or future Site conditions, portions of the Site which were unavailable for direct investigation, Site locations, subsurface or otherwise, which were not investigated directly, or chemical parameters, materials, or analysis which were not addressed or performed. Substances other than those addressed by the investigation described in this report may exist at the Site, substances addressed by the investigation may exist in areas of the Site not investigated, and concentrations of substances addressed which are different than those reported may exist in areas other than the locations from which samples were taken.

If Site conditions or applicable standards change, or if any additional information becomes available at a future date, modifications to the findings, conclusions and recommendations in this report may be necessary.

## TABLES

**Table 1**  
**Summary of Field Water Quality Parameters**

<b>Pumping Test at:</b>	Test Well 1 (TW1): 6688 Franktown Road			<b>Date:</b>	18-Dec-24						
Time Elapsed (min)	Temperature (°C)	pH	ORP (ORPmv)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	TDS (g/L)	Colour	Odour	Residual Chlorine (mg/L)	Flow Rate (L/min)
3	10.71	7.78	32	0.684	3.2	5.85	439	Clear	Sulphur	-	20
12	10.01	7.83	54	0.682	0	5.7	436	Clear	Sulphur	-	-
22	10.14	7.79	37	0.649	0	7.2	415	Clear	Sulphur	-	-
32	10.11	7.97	409	0.654	0	5.2	418	Clear	Sulphur	-	-
40	10.09	7.72	160	0.653	0	5.1	418	Clear	Sulphur	<0.02	-
50	10.09	7.72	68.00	0.66	0	5.16	420	Clear	Sulphur	-	-
55	10.09	7.72	68	0.653	0	5.2	417	Clear	Sulphur	-	-
Notes:	<i>Flow rate measured with bucket and stop watch</i>										

**NOTES:**

min Minutes  
 NTU Nephelometric Turbidity Units  
 mS/cm Millisiemens per centimetre  
 uS/cm Microsiemens per centimetre  
 (°C) Degrees celsius  
 g/L Grams per litre  
 ppm Parts per million  
 L/min Litres per minute  
 ORPmV ORP millivolts  
 - Not analyzed

**Table 2**  
**Summary of Laboratory Water Quality Results**

Sample ID	Units	ODWSOG	Limit Type	MDL	TW1-1	TW1-2	MDL	TW1
Sample Date					13-Jul-18	13-Jul-18		18-Dec-24
Location					6688 Franktown Road - Test Well 1	6688 Franktown Road - Test Well 1		6688 Franktown Road - Test Well 1
Parameter:								
<b>Microbiological Parameters</b>								
E. Coli	ct/100mL	0	MAC	1 CFU/100ml	<1	<1	0 ct/100ml	0
Fecal Coliforms	ct/100mL	-	-	1 CFU/100ml	<1	<1	0 ct/100ml	0
Total Coliforms	ct/100mL	0	MAC	1 CFU/100ml	<1	<1	0 ct/100ml	0
Heterotrophic Plate Count	ct/1mL	-	-	-	-	-	10 ct/100ml	0
<b>General Inorganics</b>								
Alkalinity, total	mg/L	30-500	OG	5	325	328	5	279
Ammonia as N	mg/L	-	-	0.01	0.12	0.12	0.02	0.115
Dissolved Organic Carbon	mg/L	5	AO	0.5	2.9	3.2	0.5	4
Colour	TCU	5	AO	2	3	4	2	10
Conductivity	uS/cm	-	-	5	697	834	5	630
Hardness	mg/L	80-100	OG		259	327	1	309
pH	pH Units	6.5-8.5	-	0.1	7.7	7.6	1	7.91
Phenolics	mg/L	-	-	0.001	<0.001	<0.001	0.001	<0.001
Total Dissolved Solids	mg/L	500	AO	10	380	486	1	410
Sulphide	mg/L	0.05	AO	0.02	<0.02	<0.02	0.01	<0.01
Tannin & Lignin	mg/L	-	-	0.1	0.1	0.1	0.1	0.1
Total Kjeldahl Nitrogen	mg/L	-	-	0.1	0.2	0.2	0.1	0.36
Turbidity	NTU	5	AO	0.1	1.5	1.4	0.1	1.2
<b>Anions</b>								
Chloride	mg/L	250	AO	1	24	65	1	14
Fluoride	mg/L	1.5	MAC	0.1	0.4	0.4	0.1	0.49
Nitrate as N	mg/L	10	MAC	0.1	<0.1	<0.1	0.1	<0.1
Nitrite as N	mg/L	1	MAC	0.05	<0.05	<0.05	0.1	<0.1
Sulphate	mg/L	500	AO 500	1	38	41	1	39
<b>Metals</b>								
Mercury	mg/L	0.001	MAC	-	-	-	0.0001	<0.0001
Aluminum	mg/L	0.10	OG	-	-	-	0.01	<0.01
Antimony	mg/L	0.01	MAC	-	-	-	0.0005	<0.01
Arsenic	mg/L	0.01	IMAC	-	-	-	0.001	<0.001
Barium	mg/L	1.00	MAC	-	-	-	0.01	0.1
Beryllium	mg/L	-	-	-	-	-	0.0005	<0.0005
Boron	mg/L	5.00	IMAC	-	-	-	0.01	0.21
Cadmium	mg/L	0.01	MAC	-	-	-	0.0001	<0.0001
Calcium	mg/L	-	-	0.1	55.7	75.4	1	76
Chromium	mg/L	0.05	MAC	-	-	-	0.001	<0.001
Cobalt	mg/L	-	-	-	-	-	0.0002	<0.0002
Copper	mg/L	1.00	AO	-	-	-	0.001	<0.001
Iron	mg/L	0.30	AO	0.1	0.1	0.1	0.03	0.23
Lead	mg/L	0.10	MAC	-	-	-	0.001	<0.001
Magnesium	mg/L	-	-	0.2	29.2	33.7	1	29
Manganese	mg/L	0.05	AO	0.005	0.006	0.006	0.01	<0.01
Molybdenum	mg/L	-	-	-	-	-	0.005	<0.005
Nickel	mg/L	-	-	-	-	-	0.005	<0.005
Potassium	mg/L	-	-	0.1	4.6	4.8	1	5
Selenium	mg/L	0.05	MAC	-	-	-	0.001	<0.001
Silver	mg/L	-	-	-	-	-	0.0001	<0.0001
Sodium	mg/L	20	AO	0.2	17.6	21.6	1	16
Thallium	mg/L	-	-	-	-	-	0.0001	<0.0001
Tin	mg/L	-	-	-	-	-	0.01	<0.01
Titanium	mg/L	-	-	-	-	-	0.01	<0.01
Tungsten	mg/L	-	-	-	-	-	0.002	<0.001
Uranium	mg/L	0.02	MAC	-	-	-	0.001	<0.001
Vanadium	mg/L	-	-	-	-	-	0.001	<0.002
Zinc	mg/L	5	AO	-	-	-	0.01	<0.01
<b>Volatile Organic Compounds</b>								
1,1,1,2-tetrachloroethane	ug/L	-	-	-	-	-	0.5	<0.5
1,1,1-trichloroethane	ug/L	-	-	-	-	-	0.4	<0.4
1,1,2,2-tetrachloroethane	ug/L	-	-	-	-	-	0.5	<0.5
1,1,2-trichloroethane	ug/L	-	-	-	-	-	0.4	<0.4
1,1-dichloroethane	ug/L	-	-	-	-	-	0.4	<0.4
1,1-dichloroethylene	ug/L	14 (0.014 mg/L)	MAC	-	-	-	0.5	<0.5
1,2-dichlorobenzene	ug/L	200 (0.2 mg/L)	MAC	-	-	-	0.4	<0.4
1,2-dichloroethane	ug/L	5	IMAC	-	-	-	0.5	<0.5
1,2-dichloropropane	ug/L	-	-	-	-	-	0.5	<0.5
1,3,5-trimethylbenzene	ug/L	-	-	-	-	-	0.3	<0.3
1,3-dichlorobenzene	ug/L	-	-	-	-	-	0.4	<0.4
1,3-Dichloropropylene (cis+trans)	ug/L	-	-	-	-	-	0.5	<0.5
1,4-dichlorobenzene	ug/L	5 (0.005 mg/L)	MAC	-	-	-	0.4	<0.4
Acetone	ug/L	-	-	-	-	-	5	<5
Benzene	ug/L	1 (0.001 mg/L)	MAC	-	-	-	0.5	<0.5
Bromodichloromethane	ug/L	-	-	-	-	-	0.3	<0.3

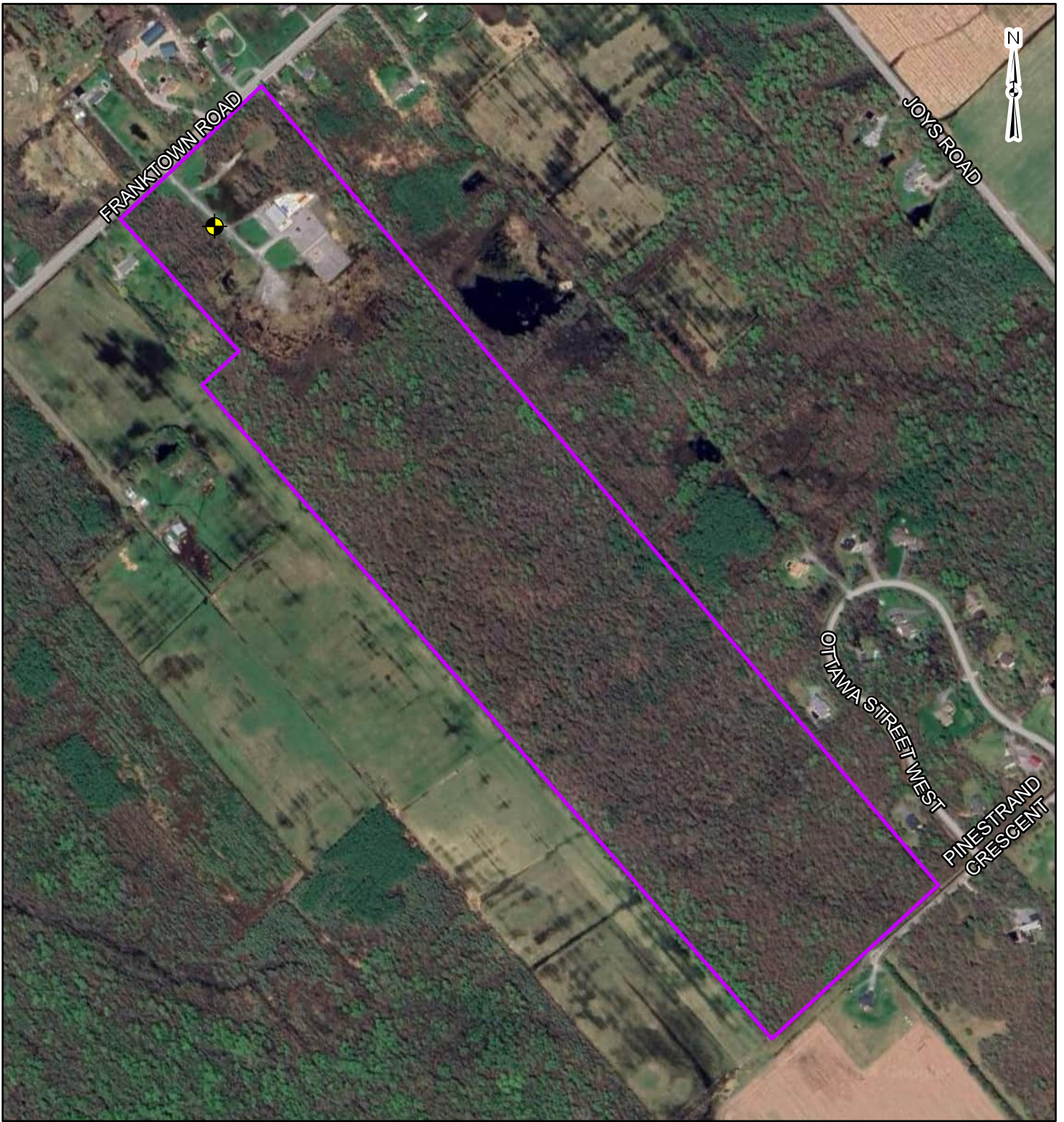
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**Summary of Laboratory Water Quality Results**

Sample ID	Units	ODWSOG	Limit Type	MDL	TW1-1	TW1-2	MDL	TW1
					13-Jul-18	13-Jul-18		18-Dec-24
Sample Date								
Location					6688 Franktown Road - Test Well 1	6688 Franktown Road - Test Well 1		6688 Franktown Road - Test Well 1
Parameter:								
Bromoform	ug/L	-	-	-	-	-	0.4	<0.4
Bromomethane	ug/L	-	-	-	-	-	0.5	<0.5
c-1,2-Dichloroethylene	ug/L	-	-	-	-	-	0.4	<0.4
c-1,3-Dichloropropylene	ug/L	-	-	-	-	-	0.5	<0.5
Carbon Tetrachloride	ug/L	2 (0.002 mg/L)	MAC	-	-	-	0.2	<0.2
Chloroethane	ug/L	-	-	-	-	-	0.5	<0.5
Chloroform	ug/L	-	-	-	-	-	0.5	<0.5
Dibromochloromethane	ug/L	-	-	-	-	-	0.3	<0.3
Dichlorodifluoromethane	ug/L	-	-	-	-	-	0.5	<0.5
Dichloromethane	ug/L	50 (0.05 mg/L)	MAC	-	-	-	4	<4.0
Ethylbenzene	ug/L	150 (0.15 mg/L)	MAC	-	-	-	0.5	<0.5
Ethylene Dibromide	ug/L	-	-	-	-	-	0.2	<0.2
Hexane	ug/L	-	-	-	-	-	5	<5
m/p-xylene	ug/L	-	-	-	-	-	0.4	<0.4
Methyl Ethyl Ketone (MEK)	ug/L	-	-	-	-	-	2	<2
Methyl Isobutyl Ketone (MIBK)	ug/L	-	-	-	-	-	5	<5
Methyl Tert Butyl Ether (MTBE)	ug/L	15 (0.015 mg/L)	AO	-	-	-	2	<2
Monochlorobenzene	ug/L	80 (0.080 mg/L)	MAC	-	-	-	0.5	<0.5
o-xylene	ug/L	-	-	-	-	-	0.4	<0.4
Styrene	ug/L	-	-	-	-	-	0.5	<0.5
t-1,2-Dichloroethylene	ug/L	-	-	-	-	-	0.4	<0.4
t-1,3-Dichloropropylene	ug/L	-	-	-	-	-	0.5	<0.5
Tetrachloroethylene	ug/L	10 (0.01 mg/L)	MAC	-	-	-	0.3	<0.3
Toluene	ug/L	60 (0.06 mg/L)	MAC	-	-	-	0.4	<0.2
Trichloroethylene	ug/L	5 (0.005 mg/L)	MAC	-	-	-	0.3	<0.3
Trichlorofluoromethane	ug/L	-	-	-	-	-	0.5	<0.5
Vinyl Chloride	ug/L	1 (0.001 mg/L)	MAC	-	-	-	0.2	<0.2
Xylene; total	ug/L	90 (0.090 mg/L)	MAC	-	-	-	0.5	<0.5

Notes:	
	Exceeds Ontario Drinking Water Standards, Objectives, and Guidelines
	Exceeds health warning limit for sodium (20,000 ug/L; 20 mg/L)
MDL	Method Detection Limit
ODWSOG	Ontario Drinking Water Standards, Objectives, and Guidelines (MOECC, 2003 rev. 2006; PIBs 4449e01)
AO	Aesthetic Objective
MAC	Maximum Allowable Concentration (Health-Related Parameter)
OG	Operational Guideline
IMAC	Interim Maximum Acceptable Concentration
ND	Non detectable (below MDL)
ug/L	Micrograms per litre
mg/L	Milligrams per litre
TCU	True Colour Units
uS/cm	Microseimens per centimeter
NTU	Nephelometric Turbidity Units
CFU/100 ml	Colony Forming Units per 100ml
Ct/100 ml	Count per 100 ml

## FIGURES



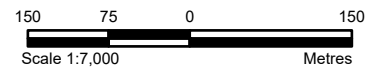


**LEGEND**

- Approximate Property Boundary
- TW1 (A252856)

**REFERENCE**

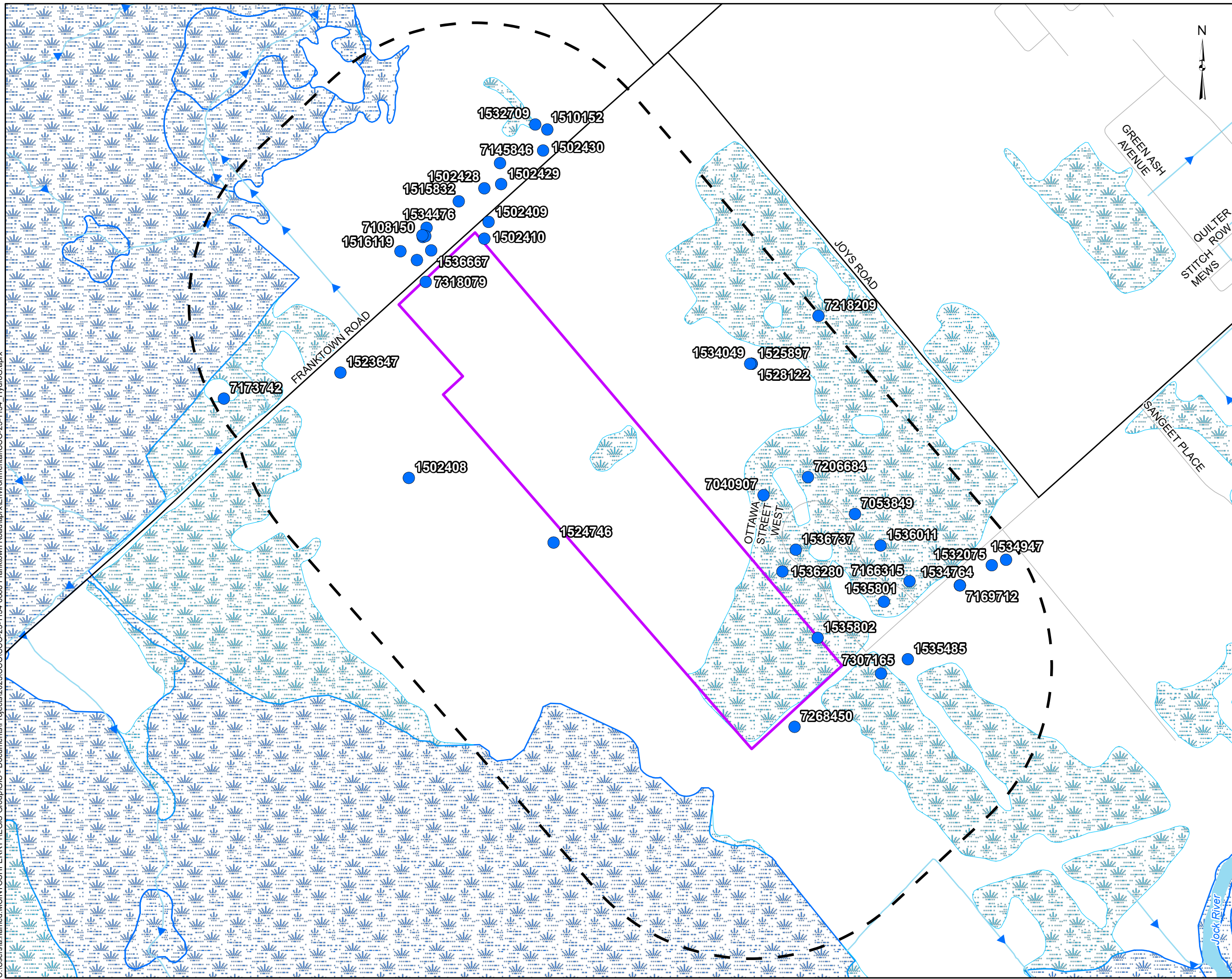
GIS data provided by the Ontario Ministry of Natural Resources and Forestry, 2024.



CLIENT:		<b>BING PROFESSIONAL ENGINEERING</b>	
PROJECT:		<b>HYDROGEOLOGICAL STUDY 6688 FRANKTOWN ROAD</b>	
TITLE:		<b>SITE LAYOUT</b>	
 <small>115 Walgreen Road, RR3, Carp, ON K0A1L0 Tel: 613-836-2184 Fax: 613-836-3742</small>		PROJECT NO: CCO-25-1134	FIGURE:
		Date	Dec., 18, 2024
		GIS	AH
Checked By	MB		2

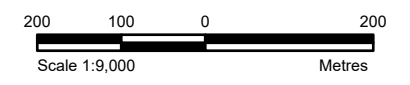


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- LEGEND**
- MECP Well Location
  - Approximate Property Boundary
  - Buffer500m
  - Local Road
  - Major Road
  - ~ Watercourse
  - Waterbody
  - Unevaluated Wetland
  - Provincially Significant Wetland

**REFERENCE**  
 GIS data provided by the Ontario Ministry of Natural Resources and Forestry, 2024.



CLIENT: <b>BING PROFESSIONAL ENGINEERING</b>	
PROJECT: <b>HYDROGEOLOGICAL STUDY 6688 FRANKTOWN ROAD</b>	
TITLE: <b>MECP WWIS SUMMARY</b>	
 <small>115 Walgreen Road, RR3, Carp, ON K0A1L0 Tel: 613-836-2184 Fax: 613-836-3742</small>	PROJECT NO: CCO-25-1134
	FIGURE: <b>7</b>
	Date: Dec., 18, 2024
	Checked By: MB
GIS: AH	

# APPENDIX A - HYDROGEOLOGICAL STUDY 6688 FRANKTOWN ROAD (JULY 2018)

# HYDROGEOLOGICAL STUDY 6688 FRANKTOWN ROAD



Project No.: CP-17-0503

Prepared for:

Bing Professional Engineering Inc.

Prepared by:

McIntosh Perry Consulting Engineers Ltd.

115 Walgreen Road

Carp, Ontario

K0A 1L0

July 2018

## Executive Summary

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McIntosh Perry Consulting Engineers Ltd. (McIntosh Perry) was retained by Mr. Bingfeng Li of Bing Professional Engineering Inc. (Bing Professional Engineering) to conduct a Hydrogeological Assessment and Terrain Analysis on a parcel of land located at 6688 Franktown Road in Ottawa, Ontario (the Site). The Site currently consists of forested land, with a cleared portion that will be utilized for future development of a place of worship. The total area of the Site is approximately 39.89 hectares (ha), while the proposed development will have a footprint of approximately 2.71 ha.

Ground surface at the Site is generally relatively flat. Regional relief appears to be sloped toward the Richmond Fen (Non-Sensitive Provincially Significant Wetland), which is located approximately 685 m south of the Site. Ground surface elevation at the Site varies between 106 and 113 m asl (above sea level). Drainage in the area of proposed development is interpreted to reflect surface topography, and is likely controlled by ditches along Jinkinson Road. Other areas of the Site likely drain to the south, toward the Richmond Fen. Regional groundwater is interpreted to flow to the south and east, toward the Jock River.

To satisfy the requirements of this hydrogeological assessment, McIntosh Perry tested a newly drilled, on-site water supply well (Test Well 1, TW1) for water quality and quantity. TW1 was pumped for approximately six hours, and was sampled twice during this time. The pumping rate during the pumping test (approximately 92 L/min) is considered more than sufficient to supply the proposed development.

No analyzed parameters in either pre-test or post-test samples (TW1\_1 and TW1\_2, respectively) exceed Ontario Drinking Water Quality Standards (ODWS). From a quality and quantity perspective, TW1 can supply sufficient water to support development.

On-site soils in the area of the proposed development appear to consist of a thick layer of sand with some areas of silt and clay. Overburden was observed to generally become coarser with depth, and limestone bedrock was encountered between 4.9 – 5.7 m below ground surface (bgs). Based on the general characterization of overburden in the vicinity of the proposed septic leaching bed, imported fill materials are likely necessary to provide the required vertical separation from groundwater. Further investigation of soil will likely be required to support the MOECP Sewage Works application process.

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## 1.0 INTRODUCTION

McIntosh Perry Consulting Engineers Ltd. (McIntosh Perry) was retained by Mr. Bingfeng Li of Bing Professional Engineering Inc. (Bing Professional Engineering) to conduct a Hydrogeological Assessment and Terrain Analysis on a parcel of land located at 6688 Franktown Road in Ottawa, Ontario (the Site). The Site currently consists of forested land, with a cleared portion that will be utilized for the future development of a place of worship. The total area of the Site is approximately 39.89 hectares (ha), while the proposed development will have a footprint of approximately 2.71 ha. Figures 1 and 2 present plans that depict the Site Location and Site Layout.

This work was conducted in general accordance with Ontario Ministry of Environment, Conservation and Parks (MOECP) guidance as follows:

- Procedure D-5-5: Technical Guideline for Private Wells: Water Supply Assessment (August 1996)

The Site address is 6688 Franktown Road (Ottawa, Ontario). The planned future use of the Site is as a place of worship, and will consist of two institutional structures and a large paved parking lot with an associated laneway.

The Site is legally described as Part Lot 19, Concession 3 East, Rural Plan 4R-7040; Part 1. A site plan of the proposed severance, prepared by Susan D. Smith Architect (March, 2018), has been submitted under separate cover (Appendix A).

This assessment considers the Site suitability for only the proposed development, which is located in the northwestern portion of the Site. The proposed development is approximately 2.71 ha, leaving a non-developed area of approximately 37.18 ha. This Hydrogeological Assessment addresses the following:

- General site setting information
- Geological and hydrogeological background
- Site specific conditions
- Water treatment options, and wastewater treatment and disposal options



## 2.0 INVESTIGATION

### 2.1 Site Setting

The Site is located within the City of Ottawa, and is designated as 'Rural General Industrial' (proposed development area), 'Rural Countryside' (non-developed portion), 'Environmental Protection' (non-developed portion – wetland), and 'Parks and Open Space' (non-developed portion – buried service corridor) in the City of Ottawa Zoning By-Law.

At the present time, the proposed development consists solely of cleared (previously forested) land, and is situated approximately 120 m from an on-site PSW, at its closest point. It is noted that the proposed building footprint is located significantly further from the PSW. The retained (non-developed) portion of the Site consists of forested areas (dry-fresh White Pine/Maple/Oak mixed forest), cultural meadows (buried service easement), and Provincially Significant Wetland (predominantly cattails). Based on a review of aerial photographs available on GeoOttawa, no signs of previous Site development can be seen (earliest photo is 1976). Based on Site conditions observed during fieldwork, it is further unlikely that the Site has seen any contemporary use, other than forest clearing for the gas easement.

The climate is humid continental with cool winters and warm summers. The 1981-2010 mean annual precipitation is approximately 919.5 mm with 175.4 cm as snow, and the mean daily temperature is 6.6 °C (Environment Canada Climate Normals for Ottawa, ON).

### 2.2 Neighbouring Properties and Land Uses

The Site is bound by forested land and low-density residential rural development to north and east, by agricultural fields to the south, and by a buried service corridor to the west (see Figure 3).

The nearest inhabited building relative to the proposed severance is located adjacent to the Site, at 6700 Franktown Road. Based on a review of MOECP well records, it appears that all serviced development in the area is privately serviced with wells and septic systems.

### 2.3 Hydrology

Ground surface at the Site is generally relatively flat. Regional relief appears to be sloped toward the Richmond Fen (Non-Sensitive Provincially Significant Wetland), which is located approximately 685 m south of the Site. Ground surface elevation at the Site varies between 106 and 113 m asl (above sea level). Drainage in the area of proposed development is interpreted to reflect surface topography, and is likely controlled by ditches along Jinkinson Road. Other areas of the Site likely drain to the south, toward the Richmond Fen. Regional groundwater is interpreted to flow to the south and east, toward the Jock River.

## 2.4 Terrain Analysis

### 2.4.1 General

A combination of hand auger probes and boreholes were advanced at various locations throughout the Site to assess the geotechnical characteristics and properties for the on-site overburden and underlying bedrock. In total, seven hand auger and three boreholes were utilized for this assessment.

### 2.4.2 On-Site Hand Auger Program

Based on a hand auger program carried out by McIntosh Perry personnel on May 2, 2018, shallow on-site soils can be generally described as coarse grained sand, with areas of silt and clay. From a surficial geology perspective, the Site can be delineated into three main zones (see Figure 4):

Zone 1: Medium brown sand, some to trace fines.

Zone 2: Silt and clay, trace sand.

Zone 3: Silty fine sand.

Details of the hand auger program can be found in Table 1.

### 2.4.3 On-Site Drilling Program

In addition to hand auger holes, McIntosh Perry personnel advanced three geotechnical boreholes (BH18-1, BH18-2, BH18-3) and three monitoring wells (MW18-1, MW18-2, MW18-3) at the Site on May 23-24, 2018 (see Figure 4).

Geotechnical borehole logs describe overburden in the vicinity of the proposed on-site structures as wet sand, with trace to some silt. Overburden was found to be approximately 4.6 – 5.7 m thick, after which point competent limestone bedrock was encountered.

Static water levels taken from MW18-1, MW18-2, and MW18-3 on May 29 and June 1, 2018 indicate that the on-site shallow groundwater gradient is small with groundwater flowing in a southeast direction. The static water levels were 0.3 m bgs for all three borehole locations.

## 2.5 Background Geology and Hydrology

### 2.5.1 Ontario Geological Survey (OGS) – Surficial Geology

Data taken from the OGS GIS Downloads website are generally consistent with on-site observations. Geological maps of the area classify the overburden at the Site as coarse-textured glaciomarine deposits, including sand, gravel, and minor silt and clay (see Figure 5). (OGS, 2018)

### **2.5.2 Ontario Geological Survey (OGS) – Bedrock Geology**

Geological maps of the area classify the bedrock under the Site as limestone, dolostone, shale, arkose, and sandstone of the Ottawa Group, Simcoe Group, and/or of the Shadow Lake Formation (see Figure 6). (OGS, 2018)

### **2.5.3 Recharge and Discharge Areas**

Based on a review of topographic data, geological maps, and a site visit, it is our interpretation that the Site is predominantly a groundwater discharge zone. Site drainage appears to be relatively poor in the area of proposed development; while no areas of ponded water were directly observed in the proposed building or laneway footprint, the Site was generally waterlogged during hand auger and drilling activities.

### **2.5.4 Hydrogeologically Sensitive Areas**

The Site has soil thicknesses generally exceeding 4.5 m and there were no observed areas of bedrock outcrop or karst conditions. While the proposed development area appears to be poorly drained, there were no areas of groundwater upwelling or significant discharge noted. The Site is therefore not considered to be a hydrogeologically sensitive area.

### **2.5.5 Water Well Record Review**

Forty-three water wells were located within approximately 500 m of the Site. Thirty-four were listed for water supply purposes, and other wells were for either test or 'other' purposes, or were unlisted. The MOECP Water Well Information System records are shown on Figure 7, and data are summarized in Appendix B.

The total well depths ranged from 6.7 to 85.3 m, with an average depth of 34.7 m. Overburden thickness ranged from 0 to 15.2 m, with the majority of observed overburden thicknesses listed above 3 m. Reported static water levels ranged from 0 (at surface) to 15.2 m bgs.

## **2.6 Potential Sources of Contamination**

A windshield survey of the surrounding area was conducted in combination with a review of maps and zoning information. The Site is located in a predominantly forested area with rural-residential properties and agriculture. None of these uses appear to pose any significant source of contamination to the Site.

The Site and surrounding properties are not connected to the City of Ottawa's wastewater treatment system. As such, there are likely private on-site wastewater systems at nearby developments.

### 3.0 METHODOLOGY – HYDROGEOLOGICAL ASSESSMENT

McIntosh Perry conducted a detailed hydrogeological investigation at the Site to assess the feasibility of servicing the proposed development. As noted in the above sections, the work generally followed the Guidance of MOECP Procedure D-5-5: Technical Guideline for Private Wells: Water Supply Assessment.

McIntosh Perry tested a newly drilled, on-site water supply well (Test Well 1, TW1), which is believed to be representative of the hydrogeological conditions across the proposed development area. According to the MOECP well record, the well extends approximately 61.0 m bgs, with a 0.159 m (6 ¼ inch) diameter casing extending approximately 6.1 m bgs. The MOECP Well Record for TW1 is included in Appendix C.

The initial estimation of TW1 yield was made based on a 1-hour pumping test completed by the driller (>55 L/min). McIntosh Perry personnel pumped the well at a rate of approximately 92 L/min during a 360 minute pumping test.

The pumping test was conducted at TW1 by McIntosh Perry staff on July 13, 2018. During the testing period, water levels in the well were measured using an electronic water level tape. Water quality (pH, temperature, conductivity, turbidity, dissolved oxygen, and oxidation-reduction potential) was also monitored and recorded in the field during the test, and two samples (TW1\_1 and TW1\_2) were collected for the 'subdivision supply' suite of parameters, in addition to a select suite of metals.

During the pumping test, turbidity was observed to decrease from 7.36 FNU to 0.0 FNU within the first hour of the test. Initial high turbidity measurements are considered to be a result of drilling the well.

All groundwater samples were collected unfiltered and unchlorinated, directly into clean bottles supplied by the analytical laboratories (Paracel Laboratories Ltd., Ottawa, ON). Chlorine indicator strips were used to ensure no chlorine residual remained in the sampled water. The samples were kept on ice and shipped directly to Paracel under strict chain of custody procedures. All of the samples were received by the laboratory within 12 hours of collection.

Paracel is fully accredited by SCC/CALA, and has accreditation for Ontario Safe Drinking Water Act (OSDWA) testing.

During the pumping test, water level monitoring consisted of manual readings of drawdown and recovery made with an electronic water level tape. Following pump shutoff, water levels were measured in TW1 until approximately 100% recovery was achieved (approximately 10 min post-shutoff).

Drawdown and recovery data from the pumping test were plotted and analyzed using the Cooper-Jacob and Theis Recovery methods, respectively. The hydraulic conductivity ( $K$ , m/s) and transmissivity ( $T$ , m<sup>2</sup>/d) of the aquifer were estimated. Storativity cannot be assessed properly without the use of an additional observation well, which was not available at the time of the test.

## 4.0 RESULTS

A drawdown curve and tabular data from the pumping test at TW1 are available in Appendix D and Table 1, respectively. A summary of recorded groundwater field parameter data and the official Laboratory Certificates of Analysis are available in Tables 2 and 3 and Appendix D, respectively.

### 4.1 Static Conditions

Prior to the initiation of pumping, water levels were measured in TW1. The static groundwater level was recorded at 4.365 m below top of casing (btoc) at the beginning of the pumping test ( $t=0$ ). Assigning an arbitrary site benchmark of 100.00 m to the top of the casing, the static water elevation in the well was 95.635 m (local).

No evidence of groundwater discharge was observed in the development area at the time of the pumping test.

### 4.2 Pumping Test

The pumping test was conducted at TW 1 under the supervision of McIntosh Perry personnel. Water was pumped directly from the test well using a pump and tubing supplied by Air Rock Drilling. The water discharge was directed away from the well, and was allowed to flow overland across the Site. At the time of the pumping test, the weather was approximately 25°C and clear.

All water level measurement data are presented in Table 4, appended to this report.

Based on a short-term pumping test completed by Air Rock Drilling upon completion of the well, it was estimated that a pumping rate exceeding 90 L/min would be sustainable at the well.

On July 13, 2018, following installation of the pumping equipment by Air Rock Drilling, a static water level of 4.365 m btoc was measured in the well. At approximately 08:07, the pump was turned on and the flow rate adjusted to approximately 92 L/min. This pumping rate was maintained with minimal variation for the duration of the test (360 minutes total).

The water level ranged between 95.217 m to 95.625 m local (4.375 to 4.783 m btoc), with a maximum drawdown of 0.418 m observed. 100% recovery was achieved in the well within 10 minutes of pump shut down.

### 4.3 Well Yield

The pumping test undertaken by McIntosh Perry provides a reasonable indication of the yield of TW1. During this test, approximately 33,120 L of water was pumped from the well, at a rate (92 L/min) that exceeds the estimated peak hourly demand for the development (17.4 L/min).

#### 4.4 Transmissivity

A summary of the well and hydrogeological properties determined during the testing work at the Site are presented in Appendix E. A transmissivity of approximately 734.56 m<sup>2</sup>/d was calculated using the Cooper-Jacob method. Assuming an aquifer thickness of 54.3 m (corresponding to the interval between the bottom of the casing and the bottom of the well) and fully horizontal groundwater flow, a hydraulic conductivity of  $1.57 \times 10^{-4}$  m/s was calculated using the Transmissivity equation ( $T=Kb$ ).

Storativity (S) could not be calculated as other wells for observation purposes were not available for measurement at the time of the pumping test.

#### 4.5 Long Term Yield

The long-term yield (maximum recommended pumping rate) of TW1 was estimated based on the following factors:

- Observations during six-hour pumping test
- Calculated properties
- Details of proposed development

By extrapolating the drawdown data on a semi-logarithmic scale, it is estimated that a conservatively maximum pumping rate of 92 L/min could be sustained for over 100,000 minutes (69 days) of continuous pumping with a maximum drawdown of under 1 m (see Appendix E). It is noted that this situation is inherently conservative, as the pump will cycle on and off on a much shorter time scale, allowing the well to recharge.

The long-term yield (Q20) was also calculated using the Farvolden and the Moell Methods. Based on this analysis the calculated Q20 values are 6,352 L/min and 2,945 L/min, respectively (see Appendix E).

Based on the available information, a long-term sustainable pumping rate of 92 L/min is considered appropriate for the well. This yield is sufficient to supply water to the proposed development at this Site, given that the peak hourly demand is currently estimated at 17.4 L/min.

#### 4.6 Water Quality

Laboratory Certificates of Analysis for on-site groundwater testing are presented in Appendix D. A summary of field and laboratory results from TW1 is presented in Tables 2 and 3. Samples were taken twice during the six-hour test on July 13, 2018. Pre- and post-test samples (TW1\_1 and TW1\_2, respectively) were taken directly from the on-site pump tubing. Analytical results were compared to the Ontario Drinking Water Standards, Objectives, and Guidelines (ODWS).

Based on the analytical results from July 13, 2018, there are no exceedances of ODWS, including maximum acceptable concentration (MAC) parameters, in TW1\_1 or TW1\_2.

## 5.0 WATER TREATMENT

The use of disinfection such as an ultraviolet (UV) system, although not required, may be desired. Based on the observed water quality there should not be any hindrances to UV disinfection.

For aesthetic reasons, water treatment such as softening may be desired. Softening of water can be achieved through reverse osmosis or ion exchange. It is noted that depending on which resin is used in the treatment system, softening with ion exchange will increase the concentrations of sodium or potassium relative to those noted in Table 3.

The Langelier Saturation Index (LSI) and Ryznar Stability Index (RSI) were calculated for TW1 (Appendix F). These results indicate that scale formation is possible, though not likely at the tested temperature. This is to be expected in areas of carbonate bedrock.

## 6.0 SEPTIC ASSESSMENT

As part of this investigation, an assessment with respect to the Site's ability to be serviced by a private on-site septic system was undertaken. Typically, for individual sites the septic assessment will follow the provision outlined within the MOECP document Procedure D-5-4 Technical Guideline for Individual On-Site Sewage System: Water Quality Risk Assessment (August 1996); however, as it is understood that the proposed development will be serviced by a septic system with a Daily Design Flow that will be greater than 10,000 litres per day(L/d), Procedure D-5-4 is not applicable.

Notwithstanding, the following concerns were considered: Lot Size, System Isolation and Contaminant Attenuation.

### *Lot Size*

The total area for the site is 39.89 ha, with approximately 2.71 ha slated for development. Accordingly, McIntosh Perry is of the opinion that sufficient spatial area exists on the property to accommodate a septic system designed for DDF exceeding 10,000 litres.

### *System Isolation*

As previously outlined McIntosh Perry conducted a hand auger and borehole program to determine overburden depth and soil characterization. Based on this investigation, it was determined that the on-site overburden was 4 m in depth or greater. Static water level at monitoring locations was noted to be in the order of 0.2 to 0.3 m bgs; note the supply aquifer for the area is located in the underlying bedrock.

Referencing MOECP Water Well Records for down gradient users (Pinestrand Crescent) reveals that these users are over 700 m away from the proposed development with supply wells completed into the underlying bedrock. Accordingly, McIntosh Perry is of the opinion that sufficient spatial separation exists between the proposed development and the down gradient users.

### *Contaminant Attenuation*

As the Site is proposed to be serviced with a septic system having a DDF greater than 10,000 L/d, attenuation will be governed through application of Reasonable Use Policies to the satisfaction of the MOECP. By following Guideline B-7: Incorporation of the Reasonable Use Concept into MOEE Groundwater Management, it has been determined that the proposed septic system and current lot size are sufficient to meet the target nitrate concentration. Refer to Appendix H for further details.



## 7.0 CONCLUSIONS

Based on the investigation undertaken, the following are noted:

- Groundwater users within the area typically utilize aquifer sources contained within the underlying bedrock formation and not the groundwater found within the overburden.
- The groundwater tested for the Site is suitable for potable purposes, as no exceedances of ODWS, including maximum acceptable concentration (MAC) parameters as well as aesthetic objectives (AO) and operational guidelines (OG) were detected through analytical testing.
- The aquifer into which the test well was completed can adequately supply water at the pumping test flow rate (92 L/min) based on observed and extrapolated drawdown and calculations to confirm safe well yield (Farvolden and Moell Methods).
- Langelier Saturation Index (LSI) and Ryznar Stability Index (RSI) calculations indicate that scale formation is possible, though not likely at the tested temperature. This is to be expected in areas of carbonate bedrock.
- The use of disinfection such as an ultraviolet (UV) system, although not required, may be desired. Based on the observed water quality there should not be any hindrances to UV disinfection.
- Overburden for the Site is of suitable characteristics to support an on-site septic system.
- Spatial separation vertically and horizontally is adequate to provide isolation from septic effluent for the bedrock supply aquifer as well as downgradient users.
- The proposed septic system and current lot size are sufficient to meet the target nitrate concentration as per Reasonable Use concept.

## 8.0 RECOMMENDATIONS

### 8.1 Water Supply

#### Well Construction

- Any newly installed wells should have at least 6.1 m of casing and adhere to all other requirements of O.Reg. 903, as amended.
- Any newly installed test wells should be appropriately developed and tested prior to domestic use.

#### Water Quality and Treatment

- Water from Test Well 1 meets all applicable health related standards at the present time.
- Field measurements of turbidity ranged from 7.36 to 0.0 FNU within the pumping test period.
- If water softening is desired, this can be achieved through reverse osmosis or ion exchange. It is noted that softening with ion exchange will increase the concentration of sodium or potassium depending on which resin is used in the treatment system.

### 8.2 Wastewater Treatment

#### Potential Septic Systems

- Approval for on-site septic treatment will be governed by the MOECP as it is understood that the Daily Design Flow proposed system will be greater than 10,000 litres per day.
- Based on the general characterization of overburden in the vicinity of the proposed septic leaching bed, imported fill materials will likely be necessary to provide the required vertical separation from groundwater. Further investigation of soil will likely be required to support the MOECP Sewage Works application process.
- Any septic systems must be constructed with all appropriate setbacks, treatment units and stipulations as per applicable Ontario Regulations.

#### Potential Lot Layout

- This hydrogeological assessment is in support of the proposed development described herein; this assessment does not address the potential for more than one water well or septic system at the Site. However, this report does address a sustained peak hourly demand for all proposed on-site structures associated with the development at the time of writing.

## 9.0 LIMITATIONS

This report has been prepared and the work referred to in this report has been undertaken by McIntosh Perry Consulting Engineers Ltd. for Bing Professional Engineering Inc. (Bing Professional Engineering). It is intended for the sole and exclusive use of Bing Professional Engineering, their affiliated companies and partners and their respective insurers, agents, employees, advisors, and reviewers. The report may not be relied upon by any other person or entity without the express written consent (Reliance Letter) of McIntosh Perry Consulting Engineers Ltd.

Any use which a third party makes of this report, or any reliance on decisions made based on it, without a reliance letter are the responsibility of such third parties. McIntosh Perry Consulting Engineers Ltd. accept no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

The investigation undertaken by McIntosh Perry Consulting Engineers Ltd. with respect to this report and any conclusions or recommendations made in this report reflect McIntosh Perry Consulting Engineers Ltd. judgment based on the Site conditions observed at the time of the site inspection on the date(s) set out in this report and on information available at the time of the preparation of this report.

This report has been prepared for specific application to this site and it is based, in part, upon visual observation of the Site, subsurface investigation at discrete locations and depths, and specific analysis of specific chemical parameters and materials during a specific time interval, all as described in this report. Unless otherwise stated, the findings cannot be extended to previous or future Site conditions, portions of the Site which were unavailable for direct investigation, subsurface locations which were not investigated directly, or chemical parameters, materials or analysis which were not addressed. Substances other than those addressed by the investigation described in this report may exist within the Site, substances addressed by the investigation may exist in areas of the Site not investigated and concentrations of substances addressed which are different than those reported may exist in areas other than the locations from which samples were taken.

If site conditions or applicable standards change or if any additional information becomes available at a future date, modifications to the findings, conclusions and recommendations in this report may be necessary.

We trust that this information is satisfactory for your present requirements. Should you have any questions or require additional information, please do not hesitate to contact the undersigned.

Respectfully submitted,

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OGS Earth, 2018. Ontario Ministry of Northern Development, Mines and Forestry, - Ontario Geological Survey Earth – for Google Earth. Bedrock classification data for Eastern Ontario.

Theis, C.V., 1935. The relation between the lowering of the piezometric surface and the rate and duration of discharge of a well using groundwater storage, Trans. Amer. Geophys. Union, Vol. 16, pp. 519-524.

MOE, 1996. Procedure D-5-5 Technical Guideline for Private Wells: Water Supply Assessment.

# TABLES

**Table 1**  
**Summary of Hand Auger Data**  
**New Development 6688 Franktown Road, Ottawa, Ontario**

Hand Auger ID	Soil Description	Depth (m bgs)	Refusal (Y/N)	Depth to Water (m bgs)
HA1	Topsoil	0.0 - 0.1	N	0.0
	Clay	0.1 - 1.1		
HA2	Topsoil	0.0 - 0.2	N	0.0
	Medium Br. Sand	0.2 - 0.5		
	Clay	0.5 - 1.1		
HA3	Topsoil	0.0 - 0.1	N	0.0
	Medium Br. Sand	0.1 - 0.9		
	Clay	0.9 - 1.0		
HA4	Topsoil	0.0 - 0.2	N	0.2
	Medium Br. Sand	0.2 - 1.2		
HA5	Topsoil	0.0 - 0.2	N	0.3
	Medium Br. Sand	0.2 - 1.2		
HA6	Topsoil	0.0 - 0.2	N	0.2
	Fine Br. Sand	0.2 - 1.2		
HA7	Topsoil	0.0 - 0.2	N	0.2
	Medium Br. Sand	0.2 - 0.8		

**NOTES:**

m bgs

Metres below ground surface

**Table 2**  
**Summary of Field Parameters**  
**New Development 6688 Franktown Road, Ottawa, Ontario**

Test Well 1

Pumping Test at:		TW1	Date:	13-Jul-18		
Time Elapsed (min)	Turbidity (NTU)	pH	Conductivity (us/cm)	Temperature (°C)	DO (mg/L)	Flow Rate (L/min)
Pump On						92
1	236	7.58	614	12.18	5.74	
2						
3						
4						
5						
9	9.3	7.49	577	8.97	3.83	92
15						
21	2.5	7.02	613	9.04	3.83	
30	1.8	6.92	631	9.06	4.06	
60	1.7	6.80	686	9.14	5.29	
120	2.1	6.77	728	9.16	6.26	
180	0.2	6.77	747	9.22	3.87	
240	0	6.72	727	9.20	3.87	
300	1.8	6.76	762	9.16	3.86	
360	0	6.76	765	9.17	3.85	
Notes:	<i>Flow rate measured with stopwatch and bucket</i>					

**NOTES:**

min                      Minutes  
 FTU                      Formazin Nephelometric Units  
 ms/cm                    Millisiemens per centimeter  
 (°C)                      Degrees celsius  
 mg/L                      Milligrams per litre  
 L/min                      Litres per minute



**Table 3**  
**Summary of Laboratory Results**  
**New Development, 6688 Franktown Road, Ottawa, ON**

Test Well 1

Sample ID	Units	MDL	ODWSOG	Limit Type	TW 1_1	TW 1_2
Sample Date					13-Jul-18	13-Jul-18
Location					Test Well 1	
Parameter:						
<i>Microbiological Parameters</i>						
E. Coli	CFU/100 mL	1	0	MAC	<1	<1
Fecal Coliforms	CFU/100 mL	1	-		<1	<1
Total Coliforms	CFU/100 mL	1	0	MAC	<1	<1
Heterotrophic Plate Count	CFU/mL	10	-		-	-
<i>General Inorganics</i>						
Alkalinity, total	mg/L	5	500	OG	325	328
Ammonia as N	mg/L	0.01	-		0.12	0.12
Dissolved Organic Carbon	mg/L	0.5	5	AO	2.9	3.2
Colour*	TCU	2	5	AO	3	4
Conductivity	uS/cm	5	-		697	834
Hardness	mg/L		-		259	327
pH	pH Units	0.1	-		7.7	7.6
Phenolics	mg/L	0.001	-		<0.001	<0.001
Total Dissolved Solids	mg/L	10	500	AO	380	486
Sulphide	mg/L	0.02	0.05	AO	<0.02	<0.02
Tannin & Lignin	mg/L	0.1	-		0.1	0.1
Total Kjeldahl Nitrogen	mg/L	0.1	-		0.2	0.2
Turbidity*	NTU	0.1	5	AO	1.5	1.4
<i>Anions</i>						
Chloride	mg/L	1	250	AO	24	65
Fluoride	mg/L	0.1	1.5	MAC	0.4	0.4
Nitrate as N	mg/L	0.1	10	MAC	<0.1	<0.1
Nitrite as N	mg/L	0.05	1	MAC	<0.05	<0.05
Sulphate	mg/L	1	500	AO	38	41
<i>Metals</i>						
Calcium	ug/L	0.1	-		55.7	75.4
Iron	ug/L	0.1	300	AO	0.1	0.1
Magnesium	ug/L	0.2	-		29.2	33.7
Manganese	ug/L	0.005	50	AO	0.006	0.006
Potassium	ug/L	0.1	-		4.6	4.8
Sodium	ug/L	0.2	200000	AO	17.6	21.6

NOTES:

- \* These parameters were analyzed outside of the accepted holding time
- MDL Method Detection Limit
- ODWSOG Ontario Drinking Water Standards, Objectives, and Guidelines (MOECC, 2003 rev. 2006; PIBs 4449e01)
- AO Aesthetic Objective
- MAC Maximum Allowable Concentration (Health-Related Parameter)
- OG Operational Guideline
- ND Non detectable (below MDL)
- mg/L Milligrams per litre
- TCU True Colour Units
- uS/cm Microsemens per centimeter
- NTU Nephelometric Turbidity Units
- ct/100 mL Number of bacteria-forming colonies per 100 mL

**Table 4**  
**Summary of Water Level Data**  
**Pumping Test - TW1 - 13-Jul-2018**

<b>TOC Elevation (assumed)</b>	100.000 m
<b>Static Water Level</b>	4.365 m BTOC
<b>Static Water Elevation</b>	95.635 m
<b>95% Recovery Level</b>	4.386 m BTOC
<b>95% Recovery Elevation</b>	95.614 m

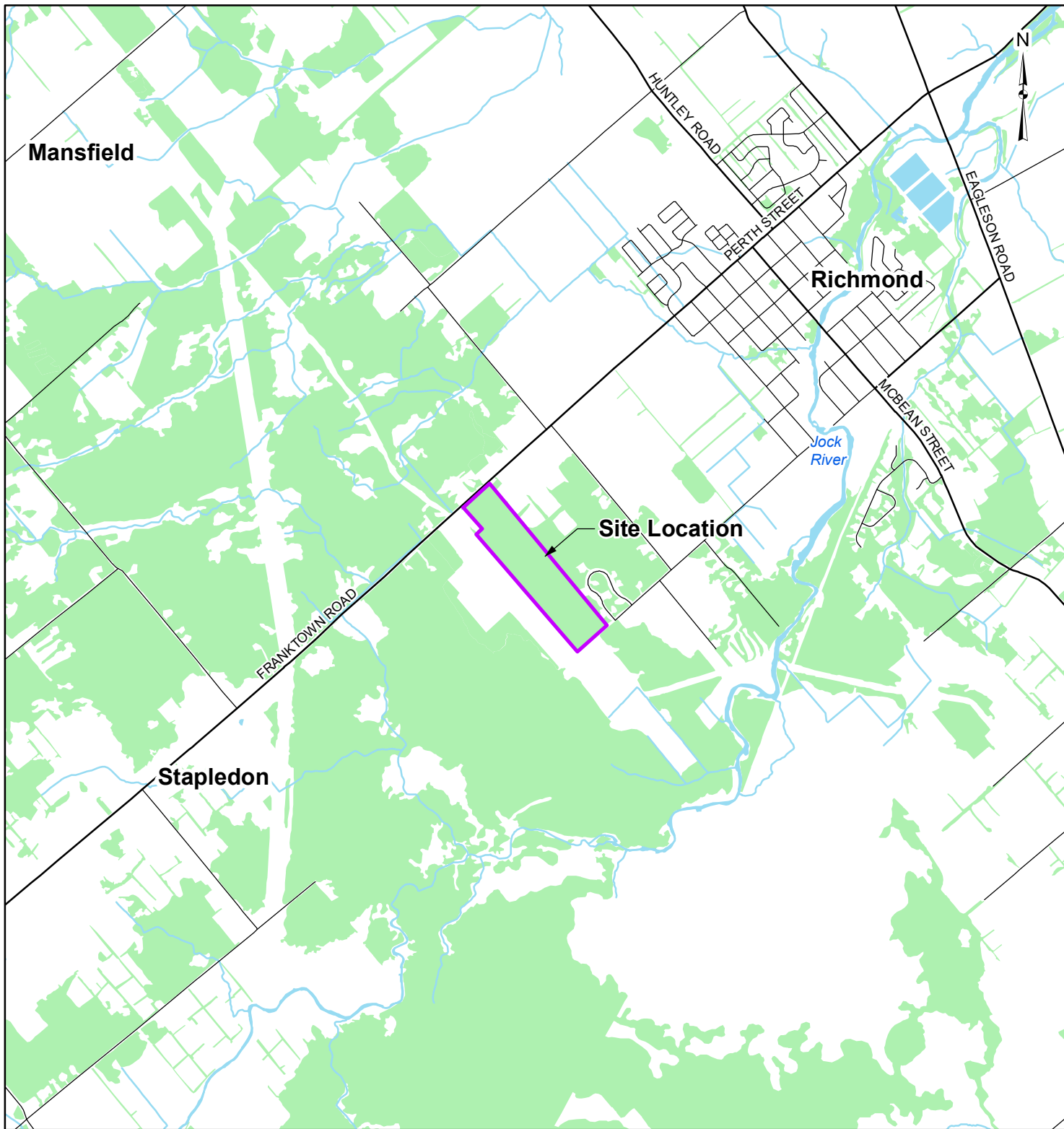
Elapsed Time (minutes)	24-Hr Time	Water Level (m BTOC)	Water Level (m ASL)	Drawdown (m)	Notes
0		4.365	95.635	0	
1	08:07	4.709	95.291	0.344	PUMP ON
2		4.716	95.284	0.351	
3		4.726	95.274	0.361	
4		4.733	95.267	0.368	92L/minute at 8:10 am
5		4.737	95.263	0.372	
6		4.740	95.26	0.375	
7		4.740	95.26	0.375	
8		4.744	95.256	0.379	
9		4.745	95.255	0.38	
10		4.745	95.255	0.38	
20		4.758	95.242	0.393	
30		4.761	95.239	0.396	
45		4.765	95.235	0.4	
60		4.769	95.231	0.404	
120		4.779	95.221	0.414	
180		4.783	95.217	0.418	
240		4.780	95.22	0.415	
300		4.748	95.252	0.383	
360	14:07	4.746	95.254	0.381	PUMP OFF
361		4.416	95.584	0.051	
362		4.406	95.594	0.041	
363		4.403	95.597	0.038	
364		4.399	95.601	0.034	
365		4.397	95.603	0.032	
366		4.395	95.605	0.03	
367		4.385	95.615	0.02	
368		4.382	95.618	0.017	
369		4.379	95.621	0.014	
370		4.375	95.625	0.01	

**NOTES**

TOC: Top of Casing

m BTOC: metres below top of casing

# FIGURES



**LEGEND**

- Approximate Property Boundary
- Local Road
- Major Road
- Watercourse
- Waterbody
- Wooded Area

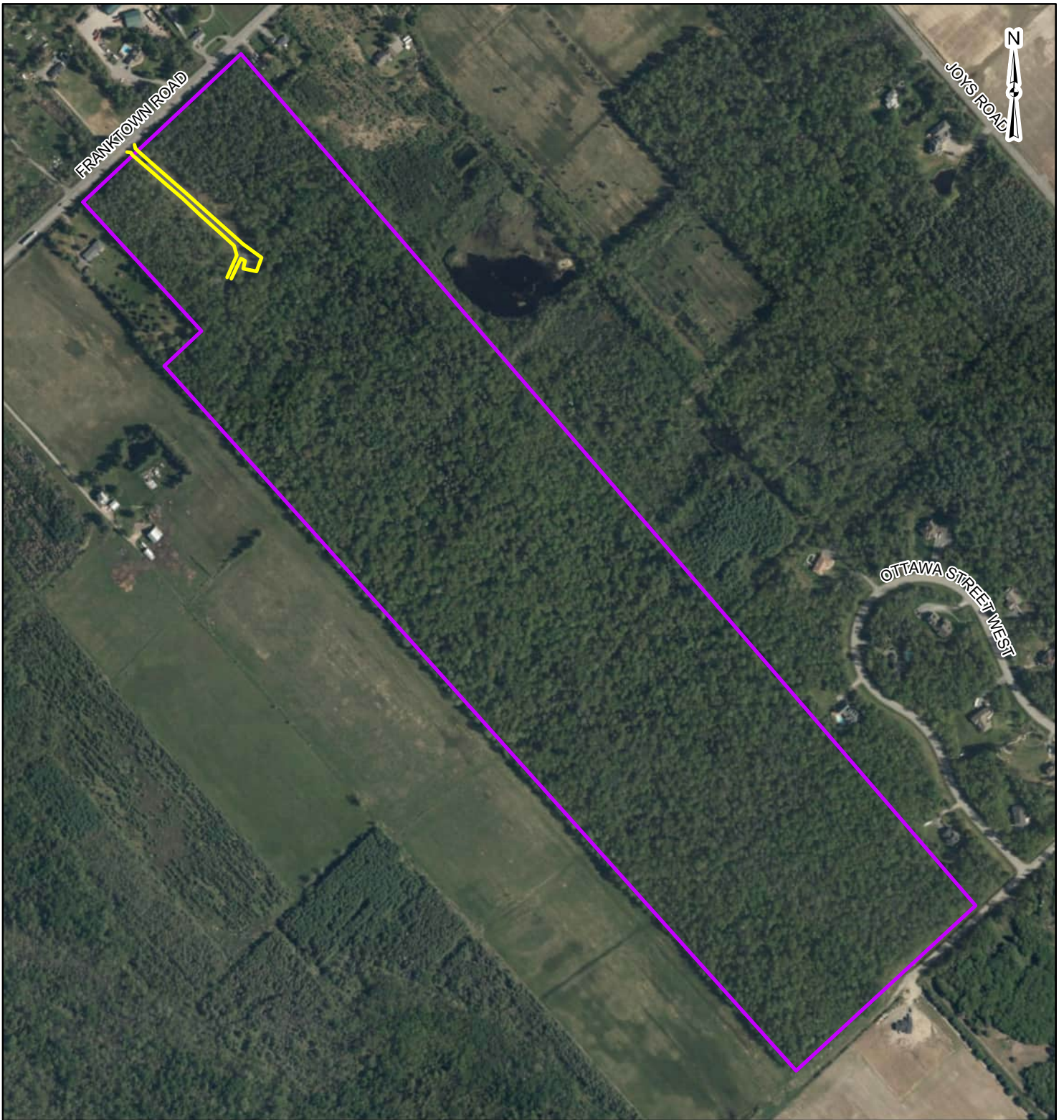
**REFERENCE**

GIS data provided by the Ontario Ministry of Natural Resources and Forestry, 2018.

CLIENT:		<b>BING PROFESSIONAL ENGINEERING</b>	
PROJECT:		<b>HYDROGEOLOGICAL STUDY 6688 FRANKTOWN ROAD</b>	
TITLE:		<b>SITE LOCATION</b>	
PROJECT NO: CP-17-0503		FIGURE:	
Date	Jul., 17, 2018	<b>1</b>	
GIS	JD		
Checked By	JB		

**McINTOSH PERRY**  
 115 Walgreen Road, RR3, Carp, ON K0A1L0  
 Tel: 613-836-2184 Fax: 613-836-3742  
 www.mcintoshperry.com

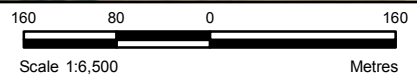
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FRANKTOWN ROAD

JOYS ROAD

OTTAWA STREET WEST



**LEGEND**

- Approximate Property Boundary
- Proposed Development

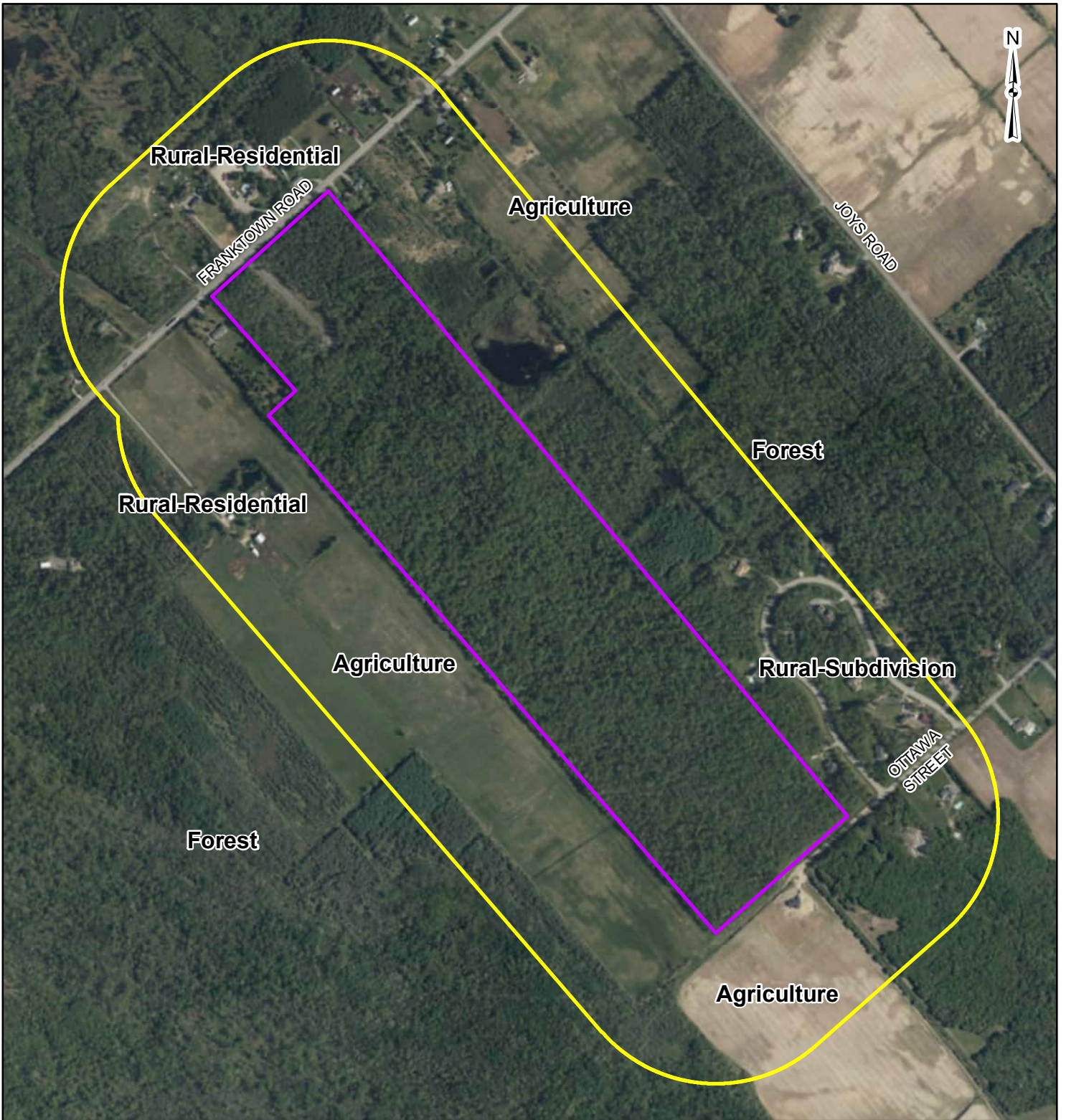
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GIS data provided by the Ontario Ministry of Natural Resources and Forestry, 2018.

CLIENT:		<b>BING PROFESSIONAL ENGINEERING</b>	
PROJECT:		<b>HYDROGEOLOGICAL STUDY 6688 FRANKTOWN ROAD</b>	
TITLE:		<b>SITE LAYOUT</b>	
<p>115 Walgreen Road, RR3, Carp, ON K0A1L0 Tel: 613-836-2184 Fax: 613-836-3742 www.mcintoshperry.com</p>		PROJECT NO: CP-17-0503	FIGURE:
		Date	Jul., 19, 2018
		Checked By	JB
		2	

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**LEGEND**

- Approximate Site Boundary
- 250m Buffer

**REFERENCE**

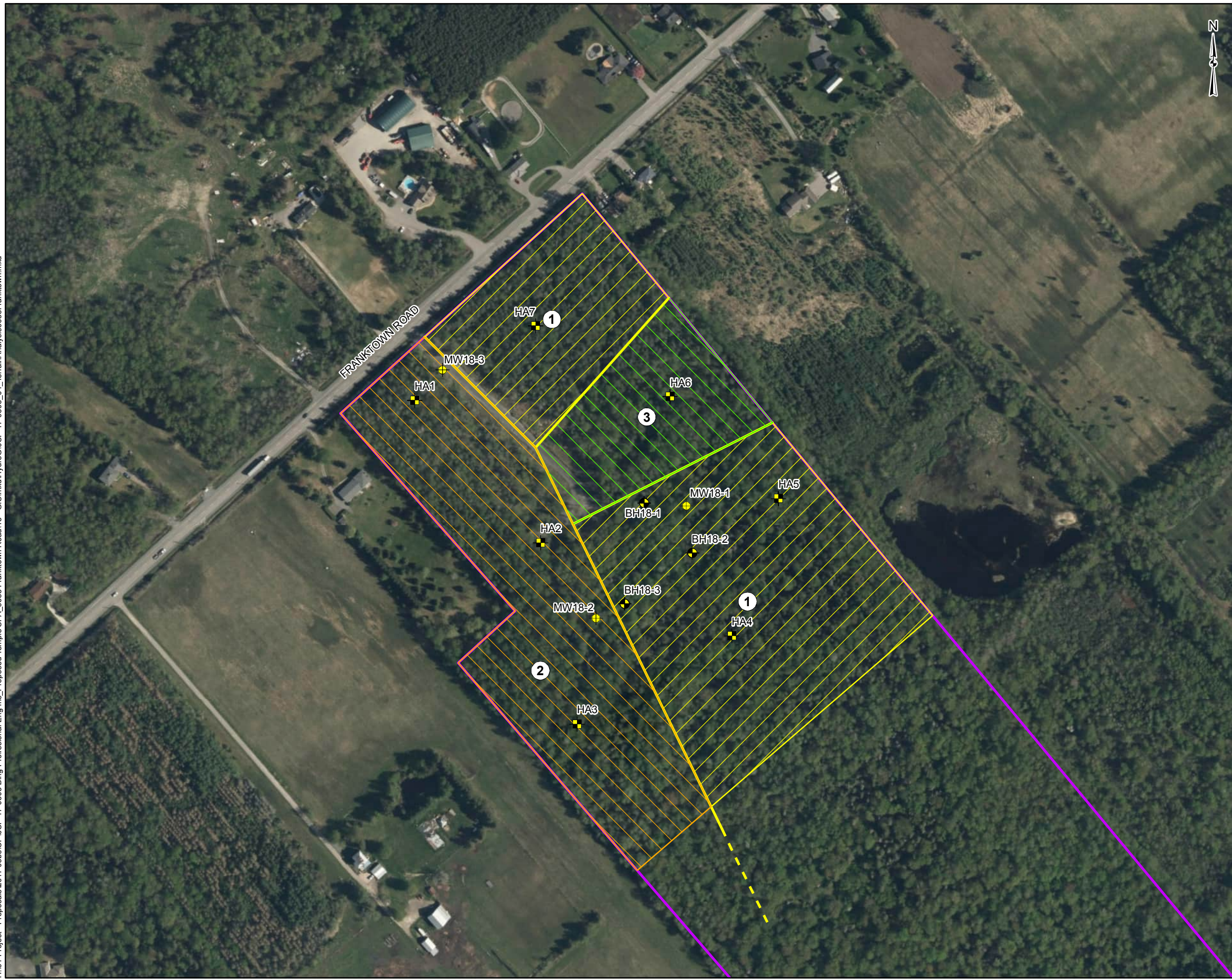
GIS data provided by the Ontario Ministry of Natural Resources and Forestry, 2018.



CLIENT:		<b>BING PROFESSIONAL ENGINEERING</b>	
PROJECT:		<b>HYDROGEOLOGICAL STUDY 6688 FRANKTOWN ROAD</b>	
TITLE:		<b>STUDY AREA AND SURROUNDING LAND USE</b>	
<b>McINTOSH PERRY</b> <small>115 Walgreen Road, RR3, Carp, ON K0A1L0          Tel: 613-836-2184 Fax: 613-836-3742          www.mcintoshperry.com</small>	PROJECT NO: CP-17-0503	FIGURE:	
	Date	Jul., 17, 2018	<b>3</b>
	Checked By	JD	



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**LEGEND**

- Hand Auger
- Borehole
- Monitoring Well
- Site Boundary
- Zone 1 - MEDIUM SAND, some to trace fines
- Zone 2 - SILT and CLAY, trace sand
- Zone 3 - Silty FINE SAND

**REFERENCE**

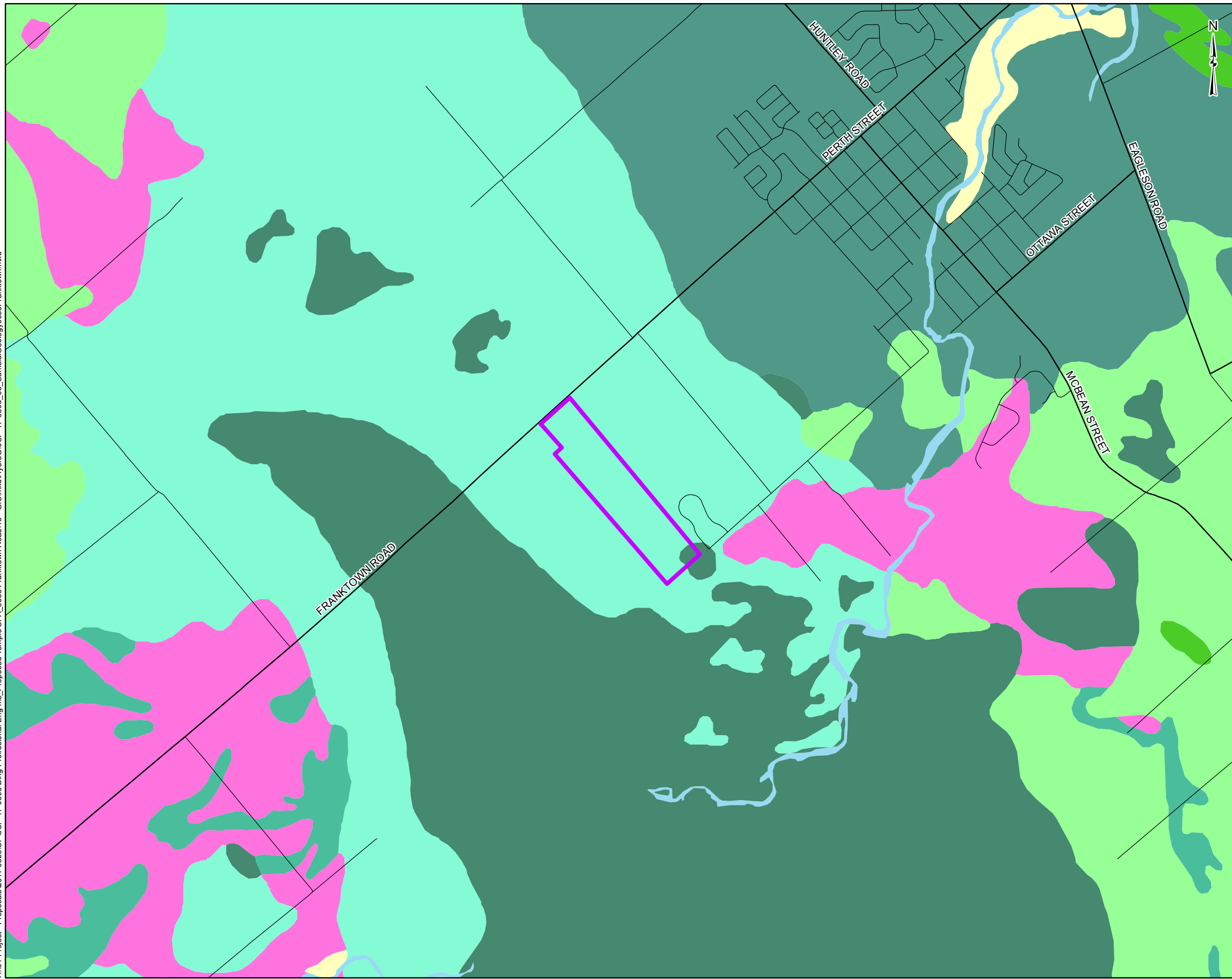
GIS data provided by the Ontario Ministry of Natural Resources and Forestry, 2018.

Scale 1:3,000 Metres

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PROJECT:		HYDROGEOLOGICAL STUDY 6688 FRANKTOWN ROAD	
TITLE:		TERRAIN ANALYSIS	
<b>McINTOSH PERRY</b> <small>115 Walgreen Road, RR3, Carp, ON K0A1L0 Tel: 613-836-2184 Fax: 613-836-3742 www.mcintoshperry.com</small>	PROJECT NO:	CP-17-0503	FIGURE:
	Date	Jul., 19, 2018	<b>4</b>
	GIS	JD	
	Checked By	JB	



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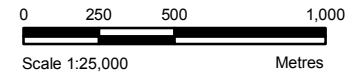


**LEGEND**

- Property Boundary
  - Local Road
  - Major Road
- Surficial geology**
- Description**
- Organic Deposits
  - Sand Dunes
  - Floodplains, sand, silt, clay
  - Fluvial Terraces, sand, silt
  - Reworked Marine Sediments
  - Beach Formations
  - Sand, reworked glaciofluvial
  - Deltaic and Estuarine Deposits
  - Marine Deposits, clay, silt
  - Erosional Terraces
  - Glaciofluvial Deposits
  - Till, plain
  - Till, drumlinized
  - Till, hummocky to rolling
  - Paleozoic Bedrock
  - Precambrian Bedrock
  - Water

**REFERENCE**

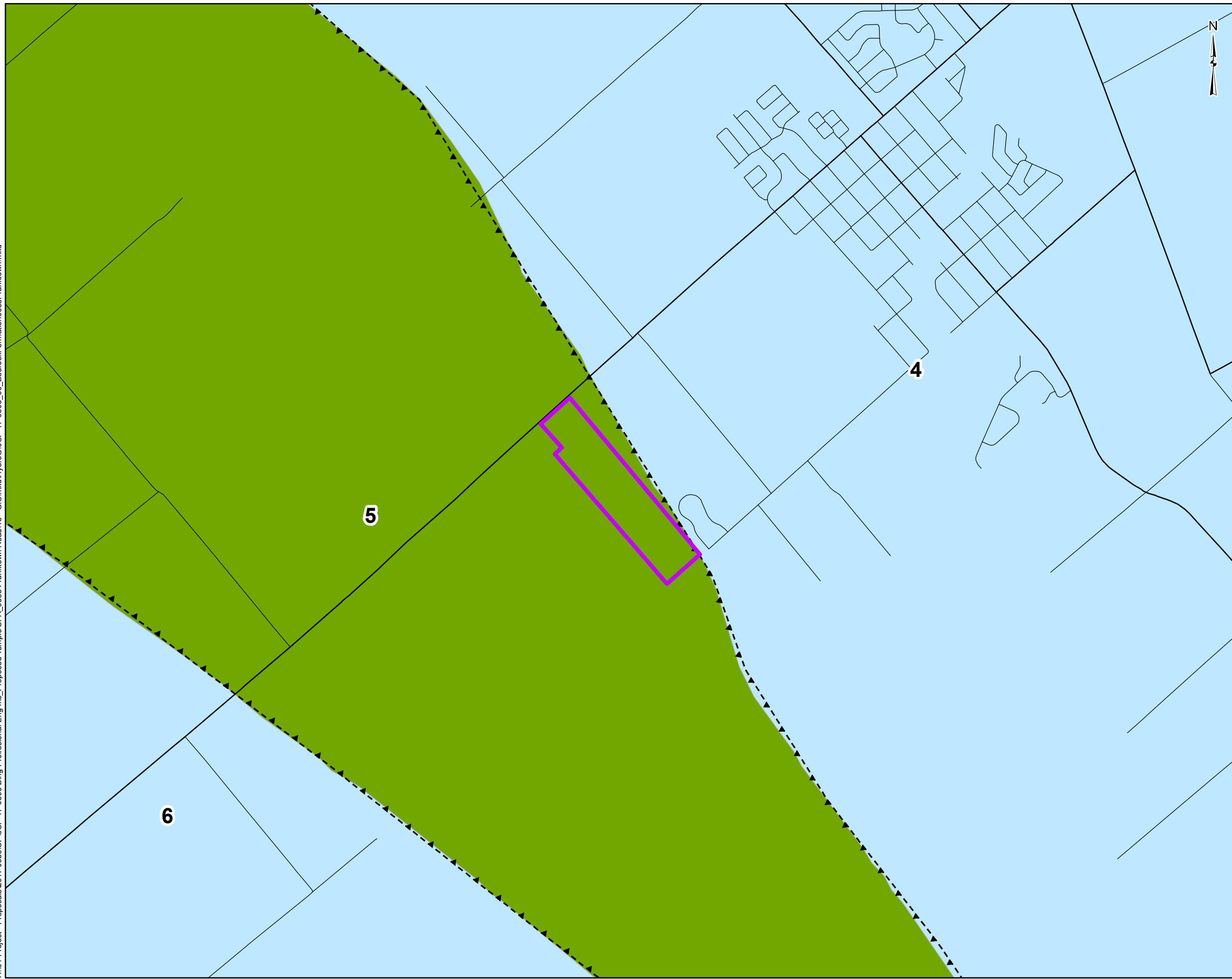
GIS data provided by the Ontario Ministry of Natural Resources and Forestry, 2018.  
 Surficial Geology of Southern Ontario provided by the Ontario Geological Survey, Miscellaneous Release - Data 128 - Revised




CLIENT:		<b>BING PROFESSIONAL ENGINEERING</b>	
PROJECT:		<b>HYDROGEOLOGICAL STUDY 6688 FRANKTOWN ROAD</b>	
TITLE:		<b>SURFICIAL GEOLOGY</b>	
<p style="font-size: 8px; margin: 0;">115 Walgreen Road, RR3, Carp, ON K0A1L0                  Tel: 613-836-2184 Fax: 613-836-3742                  www.mcintoshperry.com</p>	PROJECT NO: CP-17-0503	FIGURE:	
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	Checked By	JB	






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LEGEND

-  Property Boundary
-  Local Road
-  Major Road
-  Fault

Bedrock Geology

-  6 Gull River Formation: Interbedded silty dolomite, lithographic to fine crystalline limestone, oolitic limestone, shale, and fine-grained calcareous quartz sandstone
-  5 Rockliffe Formation: Interbedded fine-grained light greenish grey quartz sandstone, shaley limestone and shale, locally conglomerate at base, interbeds of calcarenite and silty dolostone in upper part
-  4 Oxford Formation: Sublithographic to fine crystalline dolostone



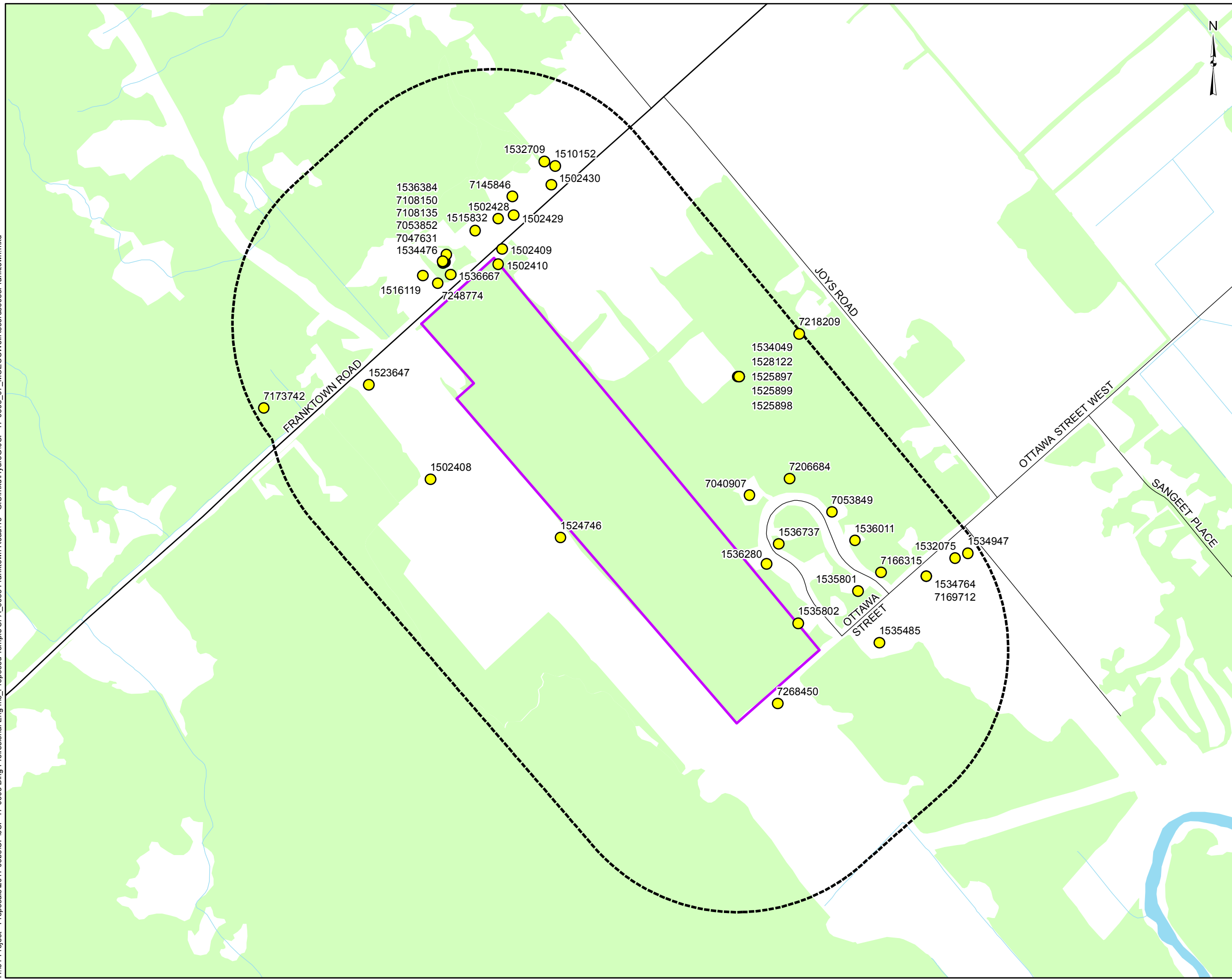
REFERENCE

GIS data provided by the Ontario Ministry of Natural Resources and Forestry, 2018.  
 Urban Geology of the National Capital Area, Bélanger, R; Geological Survey of Canada, Open File 5311, 2008



CLIENT: <b>BING PROFESSIONAL ENGINEERING</b>						
PROJECT: <b>HYDROGEOLOGICAL STUDY 6688 FRANKTOWN ROAD</b>						
TITLE: <b>BEDROCK FORMATION</b>						
<b>McINTOSH PERRY</b> <small>115 Walgreen Road, RR3, Carp, ON K0A1L0 Tel: 613-836-2184 Fax: 613-836-3742 www.mcintoshperry.com</small>	PROJECT NO: CP-17-0503					
	FIGURE: <b>6</b>					
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Date	Jul., 19, 2018					
GIS	JD					
Checked By	JB					

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**LEGEND**

- MOECC Well Record
- Site Boundary
- 500m Radius
- Local Road
- Major Road
- Watercourse
- Waterbody
- Wooded Area

**REFERENCE**

GIS data provided by the Ontario Ministry of Natural Resources and Forestry, 2018.

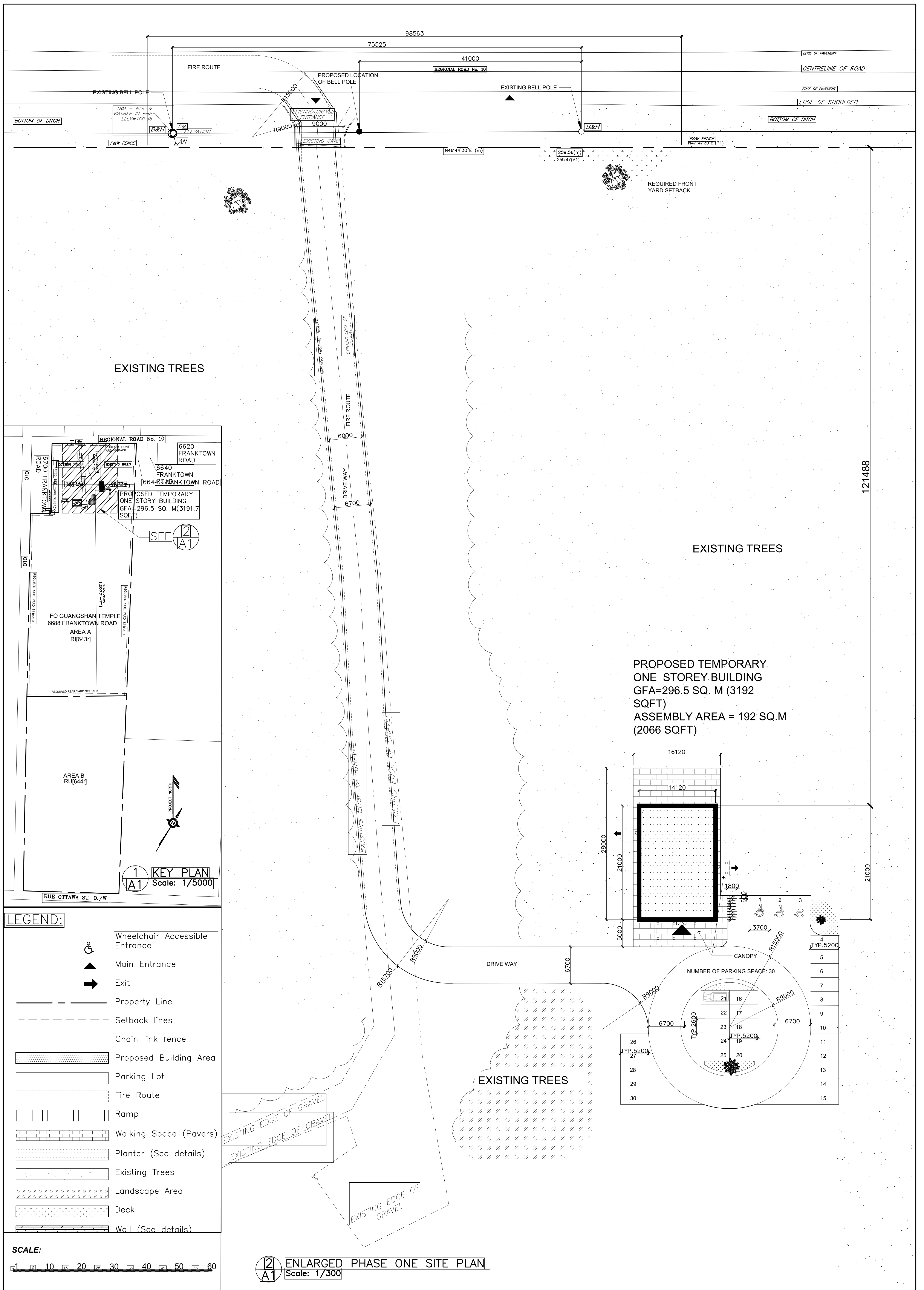
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CLIENT:		<b>BING PROFESSIONAL ENGINEERING</b>	
PROJECT:		<b>HYDROGEOLOGICAL STUDY 6688 FRANKTOWN ROAD</b>	
TITLE:		<b>MOECC WWIS SUMMARY</b>	
<b>McINTOSH PERRY</b> <small>115 Walgreen Road, RR3, Carp, ON K0A1L0 Tel: 613-836-2184 Fax: 613-836-3742 www.mcintoshperry.com</small>	PROJECT NO:	CP-17-0613	FIGURE:
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	Checked By	JB	

# APPENDICES

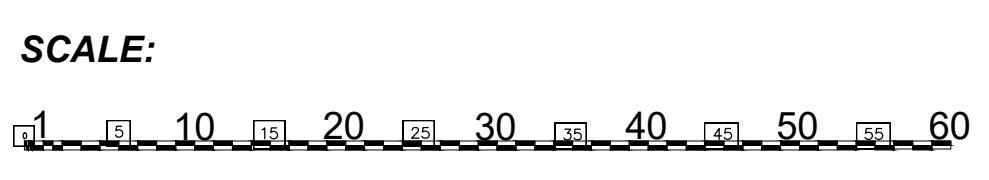
# APPENDIX A

## SITE PLAN



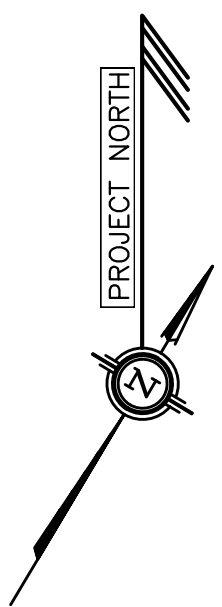
**LEGEND:**

	Wheelchair Accessible Entrance
	Main Entrance
	Exit
	Property Line
	Setback lines
	Chain link fence
	Proposed Building Area
	Parking Lot
	Fire Route
	Ramp
	Walking Space (Pavers)
	Planter (See details)
	Existing Trees
	Landscape Area
	Deck
	Wall (See details)



**2**  
**A1** ENLARGED PHASE ONE SITE PLAN  
Scale: 1/300

**PROPOSED  
FOGUANGSHAN TEMPLE  
NEW BUILDING AT  
6688 FRANKTOWN RD.  
OTTAWA, ON**



**SUSAN D. SMITH ARCHITECT**  
  
941 MERIVALE ROAD  
OTTAWA, ONTARIO  
K1Z 6A1  
613-722-5327  
s.smith@sdsarch.ca

**SITE PLAN**

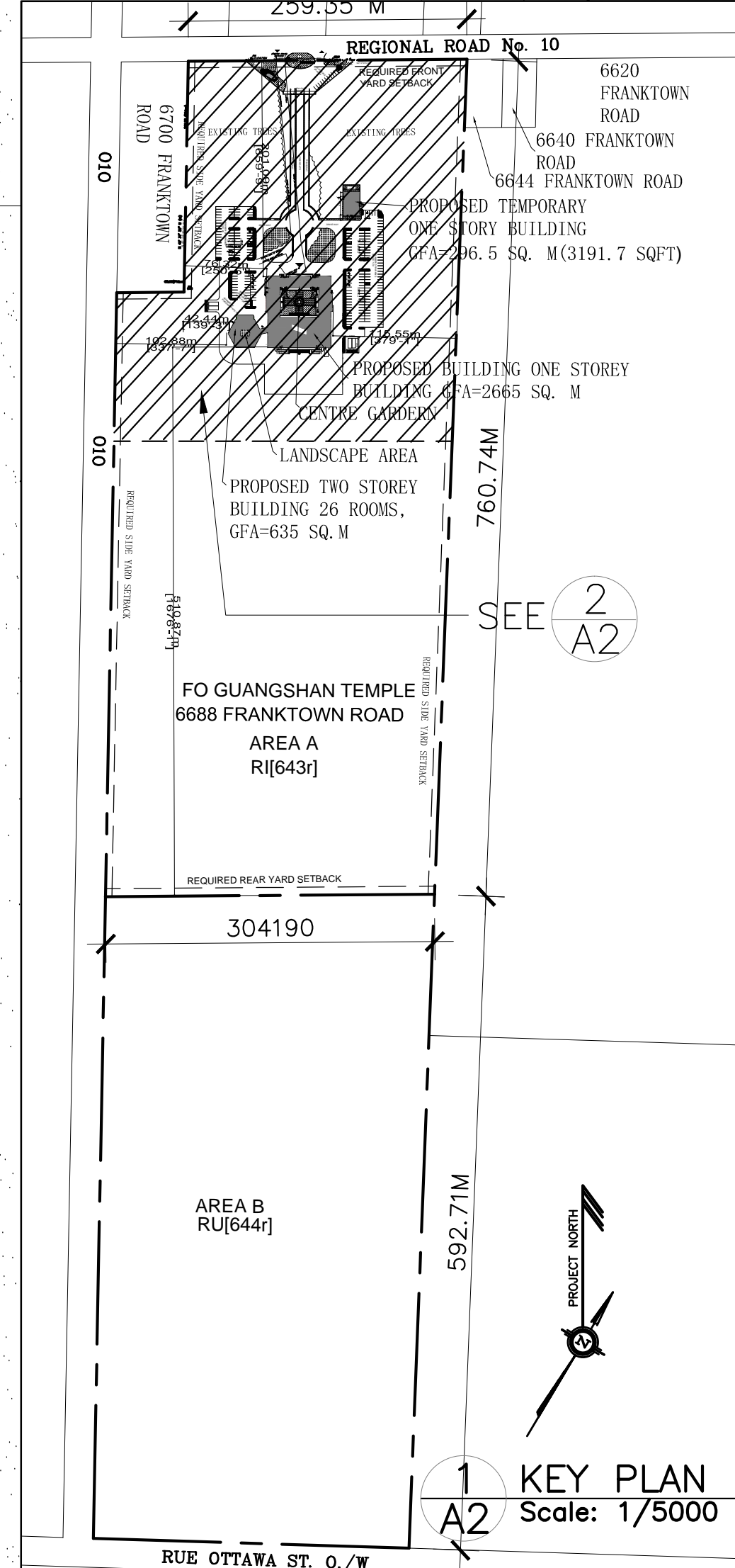
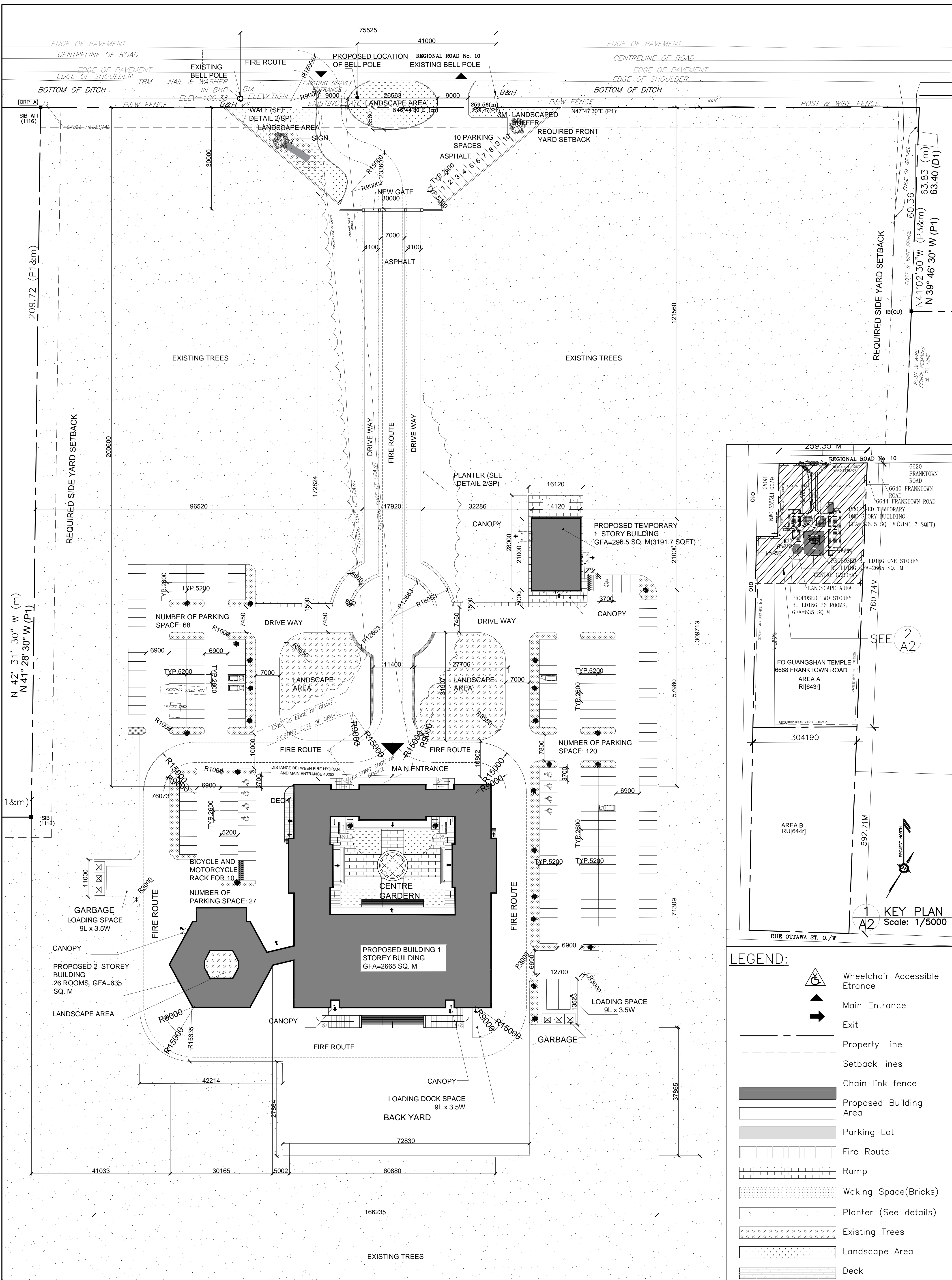
**NOTES:**  
1. All dimensions are to be checked on site. Discrepancies or ambiguities should be reported prior to work on site or ordering of materials.  
2. All work to be in accordance with the Ontario Building Code, latest edition.

**PRELIMINARY SITE PLAN**

<b>SCALE</b>	<b>AS NOTES</b>
Drawn	
Checked	
Date	MAR/2018
JOB #	

**A1**





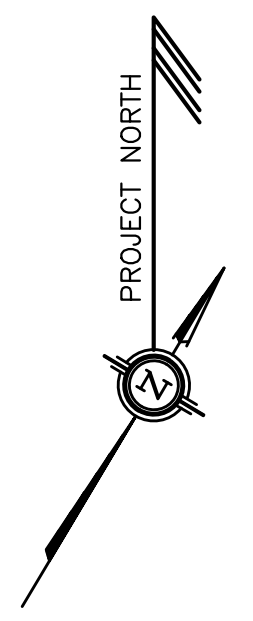
**LEGEND:**

- Wheelchair Accessible Entrance
- Main Entrance
- Exit
- Property Line
- Setback lines
- Chain link fence
- Proposed Building Area
- Parking Lot
- Fire Route
- Ramp
- Waking Space (Bricks)
- Planter (See details)
- Existing Trees
- Landscape Area
- Deck

**SCALE:**  
 1 10 20 30 40 50 60

**2** PRELIMINARY SITE PLAN  
 A2 Scale: 1/500

**PROPOSED  
 FOGUANGSHAN TEMPLE  
 NEW BUILDING AT  
 6688 FRANKTOWN RD.  
 OTTAWA, ON**



**SUSAN D. SMITH ARCHITECT**  
 1114 GLADSTONE AVE  
 OTTAWA, ONTARIO  
 K1Y 3H5  
 613-722-5327  
 sds@magma.ca

**SITE PLAN**

**NOTES:**  
 1. All dimensions are to be checked on site. Discrepancies or ambiguities should be reported prior to work on site or ordering of materials.  
 2. All work to be in accordance with the Ontario Building Code, latest edition.

**PRELIMINARY SITE PLAN**

SCALE	AS NOTES
Drawn	
Checked	
Date	MAR/2018
JOB #	

A2

# APPENDIX B

## MOECC WWIS DATA SUMMARY

## MOECC WWIS DATA SUMMARY

Well ID	Depth (m)	Depth to Bedrock (m)	Static WL	Status
1534764	36.9	7.9	3.8	Water Supply
1536667	26.2	0	0	Abandoned-Other
7248774	42.7	0	4.3	<Null>
1535485	22.3	8.2	2.3	Water Supply
1502410	6.7	0	2.4	Water Supply
1510152	15.5	3.7	0	Water Supply
1532709	67.1	4.9	1.8	Water Supply
1524746	27.4	4.9	3	Water Supply
7145846	71.9	0	2	Water Supply
1502409	19.8	2.4	1.2	Water Supply
1536384	50	8.2	1.3	Water Supply
7108135	30.5	0	7.3	Water Supply
7040907	18.6	3.4	0.8	Water Supply
7169712	61	0	0	Other Status
1528122	19.2	4.6	1.8	Water Supply
1525897	30.5	11	3.4	Test Hole
1502428	18.3	9.1	4.6	Water Supply
7166315	61.3	0	5.2	Water Supply
1536737	24.7	3	2.3	Water Supply
1534049	55.2	8.2	15.2	Water Supply
1536280	21.3	4.3	2.3	Water Supply
7218209	67	0	2.8	<Null>
1523647	22.9	15.2	1.8	Water Supply
7053852	18.3	0	0.4	Water Supply
7047631	43.3	0	8.6	Water Supply
1535801	18.3	8.2	3.3	Water Supply
1502430	18.3	5.2	4.6	Water Supply
7268450	48.8	0	2.6	<Null>
7053849	18.3	0	2.8	Water Supply
1502408	18.3	7.9	2.4	Water Supply
1534947	37.5	1.5	3.8	Water Supply
1515832	19.5	3.7	0	Water Supply
1534476	54.9	1.8	3.8	Water Supply
7206684	54.9	0	1.5	<Null>
1502429	27.7	2.7	0	Water Supply
1535802	18.9	7.3	4.8	Water Supply
1525899	19.2	1.2	3.7	Test Hole
1536011	18.9	4	3.7	Water Supply
1516119	32	4.6	1.8	Water Supply
1525898	31.4	4.6	3.7	Test Hole
7173742	85.3	0	3.7	Water Supply
7108150	54.9	0	6.9	Water Supply
1532075	36.6	2.7	3	Water Supply



# APPENDIX C

## MOECC WELL RECORD – TW1



CERTIFICATE OF WELL COMPLIANCE

I, Ken Desaulniers DO HEREBY CERTIFY that I am licensed to drill

wells in the Province of Ontario, and that I have supervised the drilling of a well on the

property of International Buddhist Progress Society of Ottawa

located at # 6688 FRANKTOWN ROAD, Richmond

Lot/Plan No.) in the City of Ottawa (Geographical Township of Goulbourn

Part 19 Conc 3 PLAN# RP-4R-7040 S/L # Part 1

CERTIFY FURTHER that, I am aware of the well drilling requirements, the guidelines, recommendations and regulations of the Ministry of the Environment governing well installations in the Province of Ontario, and the standards specified in any subdivision agreement and hydrogeological report applicable to this site and City Standards.

AND DO HEREBY CERTIFY THAT the said well has been drilled, cased, grouted (cement or bentonite) as applicable and constructed in strict conformity with the standards required.

Signed this 11<sup>TH</sup> day of JULY 2015

Kenny [Signature] Air Rock Drilling Co. Ltd.  
Well Driller/Company

The Engineer on behalf of the landowner set out above Certifies that he/she has inspected the well and it was constructed in accordance with the specifications in O.Reg.903, this report and the Hydrogeological Report with regards to casing length and grouting requirements.

SIGNED this \_\_\_\_\_ day of \_\_\_\_\_,

\_\_\_\_\_  
Engineer

2018372  
TAGA252856





Measurements recorded in:  Metric  Imperial

Page of

A252856

Well Owner's Information

First Name, Last Name / Organization, E-mail Address, Mailing Address (Street Number/Name), Municipality, Province, Postal Code, Telephone No. (inc. area code)

Well Location

Address of Well Location (Street Number/Name), Township, Lot, Concession, County/District/Municipality, City/Town/Village, Province, Postal Code, UTM Coordinates Zone, Easting, Northing, Municipal Plan and Sublot Number, Other

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

Table with columns: General Colour, Most Common Material, Other Materials, General Description, Depth (m/ft) From, To

Annular Space: Depth Set at (m/ft) From, To; Type of Sealant Used (Material and Type); Volume Placed (m³)

Results of Well Yield Testing: After test of well yield, water was; Draw Down (Time, Water Level, Recovery); Pumping rate (l/min / GPM); Duration of pumping; Final water level end of pumping; Recommended pump depth; Recommended pump rate; Well production; Disinfected?

Method of Construction: Cable Tool, Rotary (Conventional), Rotary (Reverse), Boring, Air percussion, Other; Well Use: Public, Commercial, Domestic, Municipal, Test Hole, Monitoring, Irrigation, Cooling & Air Conditioning, Other

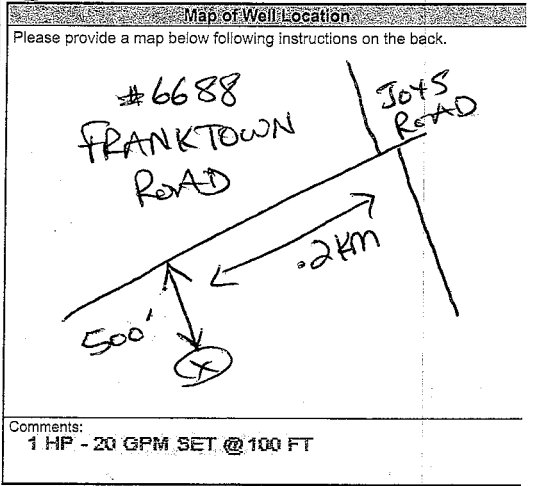
Construction Record - Casing: Inside Diameter (cm/in), Open Hole OR Material, Wall Thickness (cm/in), Depth (m/ft) From, To; Status of Well: Water Supply, Replacement Well, Test Hole, Recharge Well, Dewatering Well, Observation and/or Monitoring Hole, Alteration (Construction), Abandoned, Insufficient Supply, Abandoned, Poor Water Quality, Abandoned, other, specify

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

Water Details: Water found at Depth (m/ft), Kind of Water (Fresh, Gas, Other, specify), Hole Diameter (Depth (m/ft) From, To, Diameter (cm/in))

Well Contractor and Well Technician Information: Business Name of Well Contractor, Well Contractor's Licence No., Business Address (Street Number/Name), Municipality, Province, Postal Code, Business E-mail Address

Bus Telephone No. (inc. area code), Name of Well Technician (Last Name, First Name), Well Technician's Licence No., Signature of Technician and/or Contractor, Date Submitted



Comments: 1 HP - 20 GPM SET @ 100 FT; Well owner's information package delivered; Date Package Delivered; Date Work Completed; Ministry Use Only: Audit No. 2276984

# APPENDIX D

## LABORATORY CERTIFICATES OF ANALYSES

## Certificate of Analysis

### McIntosh Perry Consulting Eng. (Carp)

115 Walgreen Rd.  
Carp, ON K0A 1L0  
Attn: Justin Cameron

Client PO:  
Project: 17-0503  
Custody: 42032

Report Date: 19-Jun-2018  
Order Date: 15-Jun-2018

**Order #: 1824668**

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

Parcel ID	Client ID
1824668-01	Hydro G-BH18-3
1824668-02	Hydro G-BH-1R
1824668-03	Hydro G-BH-2R

Approved By:



Mark Foto, M.Sc.  
Lab Supervisor

Certificate of Analysis  
Client: McIntosh Perry Consulting Eng. (Carp)  
Client PO:

Report Date: 19-Jun-2018  
Order Date: 15-Jun-2018  
Project Description: 17-0503

### Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Anions	EPA 300.1 - IC	18-Jun-18	18-Jun-18

Certificate of Analysis

Report Date: 19-Jun-2018

Client: McIntosh Perry Consulting Eng. (Carp)

Order Date: 15-Jun-2018

Client PO:

Project Description: 17-0503

<b>Client ID:</b>	Hydro G-BH18-3	Hydro G-BH-1R	Hydro G-BH-2R	-
<b>Sample Date:</b>	06/15/2018 13:53	06/15/2018 14:08	06/15/2018 14:20	-
<b>Sample ID:</b>	1824668-01	1824668-02	1824668-03	-
<b>MDL/Units</b>	Water	Water	Water	-

**Anions**

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

Certificate of Analysis  
 Client: McIntosh Perry Consulting Eng. (Carp)  
 Client PO:

Report Date: 19-Jun-2018  
 Order Date: 15-Jun-2018  
 Project Description: 17-0503

**Method Quality Control: Blank**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Anions</b>									
Nitrate as N	ND	0.1	mg/L						
Nitrite as N	ND	0.05	mg/L						



Certificate of Analysis

Report Date: 19-Jun-2018

Client: McIntosh Perry Consulting Eng. (Carp)

Order Date: 15-Jun-2018

Client PO:

Project Description: 17-0503

**Method Quality Control: Duplicate**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Anions</b>									
Nitrate as N	ND	0.1	mg/L	ND				20	
Nitrite as N	ND	0.05	mg/L	ND				20	

Certificate of Analysis  
**Client: McIntosh Perry Consulting Eng. (Carp)**  
**Client PO:**

Report Date: 19-Jun-2018

Order Date: 15-Jun-2018

**Project Description: 17-0503**

### Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Anions</b>									
Nitrate as N	1.04	0.1	mg/L	ND	104	81-112			
Nitrite as N	0.903	0.05	mg/L	ND	90.3	76-117			

Certificate of Analysis

**Client: McIntosh Perry Consulting Eng. (Carp)**

**Client PO:**

Report Date: 19-Jun-2018

Order Date: 15-Jun-2018

**Project Description: 17-0503**

**Qualifier Notes:**

None

**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.



Client Name: <u>APCE</u>	Project Reference: <u>17-0503</u>	<b>Turnaround Time:</b> <input type="checkbox"/> 1 Day <input type="checkbox"/> 3 Day <input type="checkbox"/> 2 Day <input checked="" type="checkbox"/> Regular Date Required: _____
Contact Name: <u>Justin Cameron</u>	Quote #: <u>S/O</u>	
Address: <u>115 Wolgreen Road, Camp Hill PA 17010</u>	PO #: _____	
Telephone: <u>610-915-3752</u>	Email Address: <u>j.cameron@mcintoshperry.com</u>	

Criteria:  O. Reg. 153/04 (As Amended) Table \_\_\_  RSC Filing  O. Reg. 558/00  PWQO  CCME  SUB (Storm)  SUB (Sanitary) Municipality: \_\_\_\_\_  Other \_\_\_\_\_

Matrix Type: S (Soil Sed.) GW (Ground Water) SW (Surface Water) SS (Storm Sanitary Sewer) P (Paint) A (Air) O (Other)				Required Analyses												
Parcel Order Number: <u>1824668</u>	Matrix	Air Volume	# of Containers	Sample Taken		Nitrate (NO3)	Nitrite (NO2)									
				Date	Time											
1	HydroG-BH18-3	GW	-	1	15-Jun-18	1:53	-	-								
2	HydroG-BH-1R	GW	-	1	↓	2:08	-	-								
3	HydroG-BH-2R	GW	-	1	↓	2:20	-	-								
4																
5																
6																
7																
8																
9																
10																

Comments: \_\_\_\_\_ Method of Delivery: Walk-in

Relinquished By (Sign): <u>S. Aditi</u>	Received by Driver/Depot:	Received at Lab: <u>[Signature]</u>	Verified By: <u>[Signature]</u>
Relinquished By (Print): <u>Stefan Hahn</u>	Date/Time: _____	Date/Time: <u>15-Jun-18 4:03</u>	Date/Time: <u>15-Jun-18 4:34</u>
Date/Time: <u>15-Jun-18 4:03 pm</u>	Temperature: _____ °C	Temperature: <u>20</u> °C	pH Verified   By: _____

## Certificate of Analysis

### McIntosh Perry Consulting Eng. (Carp)

115 Walgreen Rd.  
RR#3 Carp, ON KOA 1L0  
Attn: Jordan Bowman

Client PO:  
Project: 17-0503  
Custody: 6644

Report Date: 16-Jul-2018  
Order Date: 13-Jul-2018

**Order #: 1828639**

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

Parcel ID	Client ID
1828639-01	TW1-1
1828639-02	TW1-2

Approved By:



Dale Robertson, BSc  
Laboratory Director

Certificate of Analysis  
**Client: McIntosh Perry Consulting Eng. (Carp)**  
**Client PO:**

Report Date: 16-Jul-2018

Order Date: 13-Jul-2018

**Project Description: 17-0503**

## Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Alkalinity, total to pH 4.5	EPA 310.1 - Titration to pH 4.5	16-Jul-18	16-Jul-18
Ammonia, as N	EPA 351.2 - Auto Colour	16-Jul-18	16-Jul-18
Anions	EPA 300.1 - IC	16-Jul-18	16-Jul-18
Colour	SM2120 - Spectrophotometric	16-Jul-18	16-Jul-18
Conductivity	EPA 9050A- probe @25 °C	16-Jul-18	16-Jul-18
Dissolved Organic Carbon	MOE E3247B - Combustion IR, filtration	16-Jul-18	16-Jul-18
E. coli	MOE E3407	13-Jul-18	14-Jul-18
Fecal Coliform	SM 9222D	13-Jul-18	14-Jul-18
Metals, ICP-MS	EPA 200.8 - ICP-MS	16-Jul-18	16-Jul-18
pH	EPA 150.1 - pH probe @25 °C	16-Jul-18	16-Jul-18
Phenolics	EPA 420.2 - Auto Colour, 4AAP	16-Jul-18	16-Jul-18
Subdivision Package	Hardness as CaCO <sub>3</sub>	16-Jul-18	16-Jul-18
Sulphide	SM 4500SE - Colourimetric	16-Jul-18	16-Jul-18
Tannin/Lignin	SM 5550B - Colourimetric	16-Jul-18	16-Jul-18
Total Coliform	MOE E3407	13-Jul-18	14-Jul-18
Total Dissolved Solids	SM 2540C - gravimetric, filtration	13-Jul-18	16-Jul-18
Total Kjeldahl Nitrogen	EPA 351.2 - Auto Colour, digestion	16-Jul-18	16-Jul-18
Turbidity	SM 2130B - Turbidity meter	16-Jul-18	16-Jul-18

Certificate of Analysis  
**Client: McIntosh Perry Consulting Eng. (Carp)**  
**Client PO:**

Report Date: 16-Jul-2018

Order Date: 13-Jul-2018

**Project Description: 17-0503**

<b>Client ID:</b>	TW1-1	TW1-2	-	-
<b>Sample Date:</b>	07/13/2018 08:20	07/13/2018 14:12	-	-
<b>Sample ID:</b>	1828639-01	1828639-02	-	-
<b>MDL/Units</b>	Drinking Water	Drinking Water	-	-

**Microbiological Parameters**

E. coli	1 CFU/100 mL	ND	ND	-	-
Fecal Coliforms	1 CFU/100 mL	ND	ND	-	-
Total Coliforms	1 CFU/100 mL	ND	ND	-	-

**General Inorganics**

Alkalinity, total	5 mg/L	325	328	-	-
Ammonia as N	0.01 mg/L	0.12	0.12	-	-
Dissolved Organic Carbon	0.5 mg/L	2.9	3.2	-	-
Colour	2 TCU	3 [1]	4 [1]	-	-
Conductivity	5 uS/cm	697	834	-	-
Hardness	mg/L	259	327	-	-
pH	0.1 pH Units	7.7	7.6	-	-
Phenolics	0.001 mg/L	<0.001	<0.001	-	-
Total Dissolved Solids	10 mg/L	380	486	-	-
Sulphide	0.02 mg/L	<0.02	<0.02	-	-
Tannin & Lignin	0.1 mg/L	0.1	0.1	-	-
Total Kjeldahl Nitrogen	0.1 mg/L	0.2	0.2	-	-
Turbidity	0.1 NTU	1.5 [1]	1.4 [1]	-	-

**Anions**

Chloride	1 mg/L	24	65	-	-
Fluoride	0.1 mg/L	0.4	0.4	-	-
Nitrate as N	0.1 mg/L	<0.1	<0.1	-	-
Nitrite as N	0.05 mg/L	<0.05	<0.05	-	-
Sulphate	1 mg/L	38	41	-	-

**Metals**

Calcium	0.1 mg/L	55.7	75.4	-	-
Iron	0.1 mg/L	0.1	0.1	-	-
Magnesium	0.2 mg/L	29.2	33.7	-	-
Manganese	0.005 mg/L	0.006	0.006	-	-
Potassium	0.1 mg/L	4.6	4.8	-	-
Sodium	0.2 mg/L	17.6	21.6	-	-

Certificate of Analysis

Report Date: 16-Jul-2018

Client: McIntosh Perry Consulting Eng. (Carp)

Order Date: 13-Jul-2018

Client PO:

Project Description: 17-0503

**Method Quality Control: Blank**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Anions</b>									
Chloride	ND	1	mg/L						
Fluoride	ND	0.1	mg/L						
Nitrate as N	ND	0.1	mg/L						
Nitrite as N	ND	0.05	mg/L						
Sulphate	ND	1	mg/L						
<b>General Inorganics</b>									
Alkalinity, total	ND	5	mg/L						
Ammonia as N	ND	0.01	mg/L						
Dissolved Organic Carbon	ND	0.5	mg/L						
Colour	ND	2	TCU						
Conductivity	ND	5	uS/cm						
Phenolics	ND	0.001	mg/L						
Total Dissolved Solids	ND	10	mg/L						
Sulphide	ND	0.02	mg/L						
Tannin & Lignin	ND	0.1	mg/L						
Total Kjeldahl Nitrogen	ND	0.1	mg/L						
Turbidity	ND	0.1	NTU						
<b>Metals</b>									
Calcium	ND	0.1	mg/L						
Iron	ND	0.1	mg/L						
Magnesium	ND	0.2	mg/L						
Manganese	ND	0.005	mg/L						
Potassium	ND	0.1	mg/L						
Sodium	ND	0.2	mg/L						
<b>Microbiological Parameters</b>									
E. coli	ND	1	CFU/100 mL						
Fecal Coliforms	ND	1	CFU/100 mL						
Total Coliforms	ND	1	CFU/100 mL						



Certificate of Analysis  
**Client: McIntosh Perry Consulting Eng. (Carp)**  
**Client PO:**

Report Date: 16-Jul-2018

Order Date: 13-Jul-2018

**Project Description: 17-0503**

### Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Anions</b>									
Chloride	23.9	1	mg/L	23.8			0.4	10	
Fluoride	0.44	0.1	mg/L	0.44			1.1	10	
Nitrate as N	ND	0.1	mg/L	ND			0.0	20	
Nitrite as N	ND	0.05	mg/L	ND				20	
Sulphate	38.7	1	mg/L	38.3			0.9	10	
<b>General Inorganics</b>									
Alkalinity, total	319	5	mg/L	325			1.9	14	
Ammonia as N	0.103	0.01	mg/L	0.120			14.7	17.7	
Dissolved Organic Carbon	2.8	0.5	mg/L	2.9			4.8	37	
Colour	3	2	TCU	3			0.0	12	
Conductivity	691	5	uS/cm	697			0.9	11	
pH	7.8	0.1	pH Units	7.7			0.6	10	
Phenolics	ND	0.001	mg/L	ND				10	
Total Dissolved Solids	54.0	10	mg/L	54.0			0.0	10	
Sulphide	1.16	0.04	mg/L	1.18			1.5	10	
Tannin & Lignin	ND	0.1	mg/L	ND			0.0	11	
Total Kjeldahl Nitrogen	0.16	0.1	mg/L	0.17			4.4	10	
Turbidity	1.5	0.1	NTU	1.5			0.7	10	
<b>Metals</b>									
Iron	0.1	0.1	mg/L	0.1			9.6	20	
Magnesium	30.4	0.2	mg/L	29.2			3.9	20	
Manganese	0.007	0.005	mg/L	0.006			3.1	20	
Potassium	4.8	0.1	mg/L	4.6			2.5	20	
Sodium	17.8	0.2	mg/L	17.6			1.3	20	
<b>Microbiological Parameters</b>									
E. coli	ND	1	CFU/100 mL	ND				30	
Fecal Coliforms	ND	1	CFU/100 mL	ND				30	
Total Coliforms	ND	1	CFU/100 mL	ND				30	

Certificate of Analysis  
**Client: McIntosh Perry Consulting Eng. (Carp)**  
**Client PO:**

Report Date: 16-Jul-2018

Order Date: 13-Jul-2018

**Project Description: 17-0503**

### Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Anions</b>									
Chloride	33.1	1	mg/L	23.8	92.6	78-112			
Fluoride	1.37	0.1	mg/L	0.44	92.3	73-113			
Nitrate as N	0.97	0.1	mg/L	ND	96.6	81-112			
Nitrite as N	0.911	0.05	mg/L	ND	91.1	76-107			
Sulphate	46.8	1	mg/L	38.3	84.3	75-111			
<b>General Inorganics</b>									
Ammonia as N	0.370	0.01	mg/L	0.120	100	81-124			
Dissolved Organic Carbon	12.6	0.5	mg/L	2.9	97.5	60-133			
Phenolics	0.022	0.001	mg/L	ND	89.9	69-132			
Total Dissolved Solids	106	10	mg/L		106	75-125			
Sulphide	0.50	0.02	mg/L		99.6	79-115			
Tannin & Lignin	1.1	0.1	mg/L	ND	111	71-113			
Total Kjeldahl Nitrogen	2.22	0.1	mg/L	0.17	103	81-126			
<b>Metals</b>									
Calcium	832		ug/L		83.2	80-120			
Iron	872		ug/L		87.2	80-120			
Magnesium	1050		ug/L		105	80-120			
Manganese	49.2		ug/L		98.3	80-120			
Potassium	1160		ug/L		116	80-120			
Sodium	1040		ug/L		104	80-120			

Certificate of Analysis  
**Client: McIntosh Perry Consulting Eng. (Carp)**  
**Client PO:**

Report Date: 16-Jul-2018

Order Date: 13-Jul-2018

**Project Description: 17-0503**

**Qualifier Notes:**

***Login Qualifiers :***

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

*Applies to samples: TW1-1, TW1-2*

***Sample Qualifiers :***

1 : This analysis was conducted after the accepted holding time had been exceeded.

***QC Qualifiers :***

**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.



Bldg. 4J8  
js.com

Parcel Order Number  
**1828639**

Chain Of Custody  
Ontario Drinking Water Samples  
No **6644**

Client Name: Melanok Perry Project Ref: 17-0503 Waterworks Name: \_\_\_\_\_  
 Contact Name: S. Bowman Quote #: 5/0 Waterworks Number: \_\_\_\_\_  
 Address: 115 Walsgreen Rd PO #: 17-0503 Address: \_\_\_\_\_  
 After Hours Contact: \_\_\_\_\_ E-mail: j.bowman@concretepaving.com  
 Telephone: 615 229 9528 Fax: \_\_\_\_\_ Public Health Unit: \_\_\_\_\_

Samples Taken By: S.H.  
 Name: S. H. Pike  
 Signature: \_\_\_\_\_  
 Page 1 of 1  
 Turn Around Time Required:  
 1 day  2 day  3 day  4 day

Samples Submitted Under: (Indicate ONLY one)  
 ON REG 170/03  ON REG 318/08  Private Well  
 ON REG 243/07  ON REG 319/08  Other: OWS  
 Have LSN forms been submitted to MOE/MOHLTC?:  Yes  No  N/A  
 Are these samples for human consumption?:  Yes  No  
**All information must be completed before samples will be processed.**

Sample Type: R = Raw; T = Treated; D = Distribution; P = Plumbing  
 Source Type: G = Ground Water; S = Surface Water  
 Reportable: Requires AWQI reporting as per Regulation - Y = Yes; N = No

LOCATION NAME	SAMPLE ID	Sample Type: R/T/D/P	Source Type: G/S	Reportable: Y/N	Resample	SAMPLE COLLECTED		# of Containers	Free/Combined Chlorine Residual mg/L	Standing / Flushed: S/ (REG 243)	Total Coliform/E. Coli	Required Analyses						
						DATE	TIME					HPC	Lead	THM	Subdiv.			
1	TW 1	TW 1-1	G	N		17-Jul-18	0820	8	No	F								
2	TW 1	TW 1-2	G	N		13-Jul-18	See Bottles	8	No	F								
3							2:12											
4																		
5																		
6																		
7																		
8																		
9																		
10																		

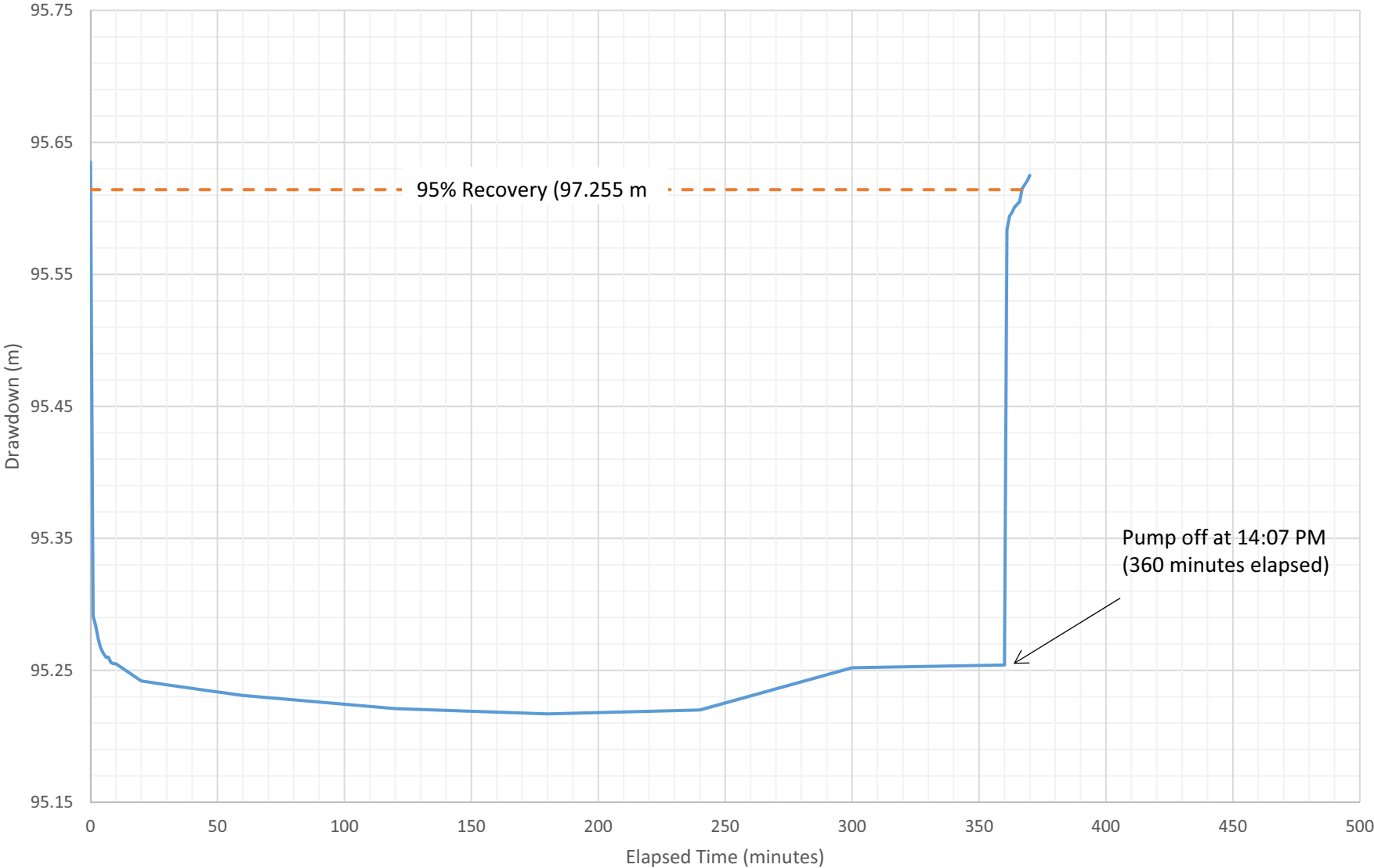
Comments: Please Rush Results. -- Sample submerged on the water, water in container defective.  
Wetkin.

Relinquished By (Sign): \_\_\_\_\_ Received By Driver/Depot: \_\_\_\_\_  
 Relinquished By (Print): J. Bowman Date/Time: \_\_\_\_\_  
 Date/Time: 13-Jul-2018 15:00 Temperature: \_\_\_\_\_  
 Date/Time: \_\_\_\_\_ Temperature: \_\_\_\_\_  
 Date/Time: July 18/18 4pm Temperature: 40.1  
 Date/Time: 13/7/18 pH Verified:  By: \_\_\_\_\_

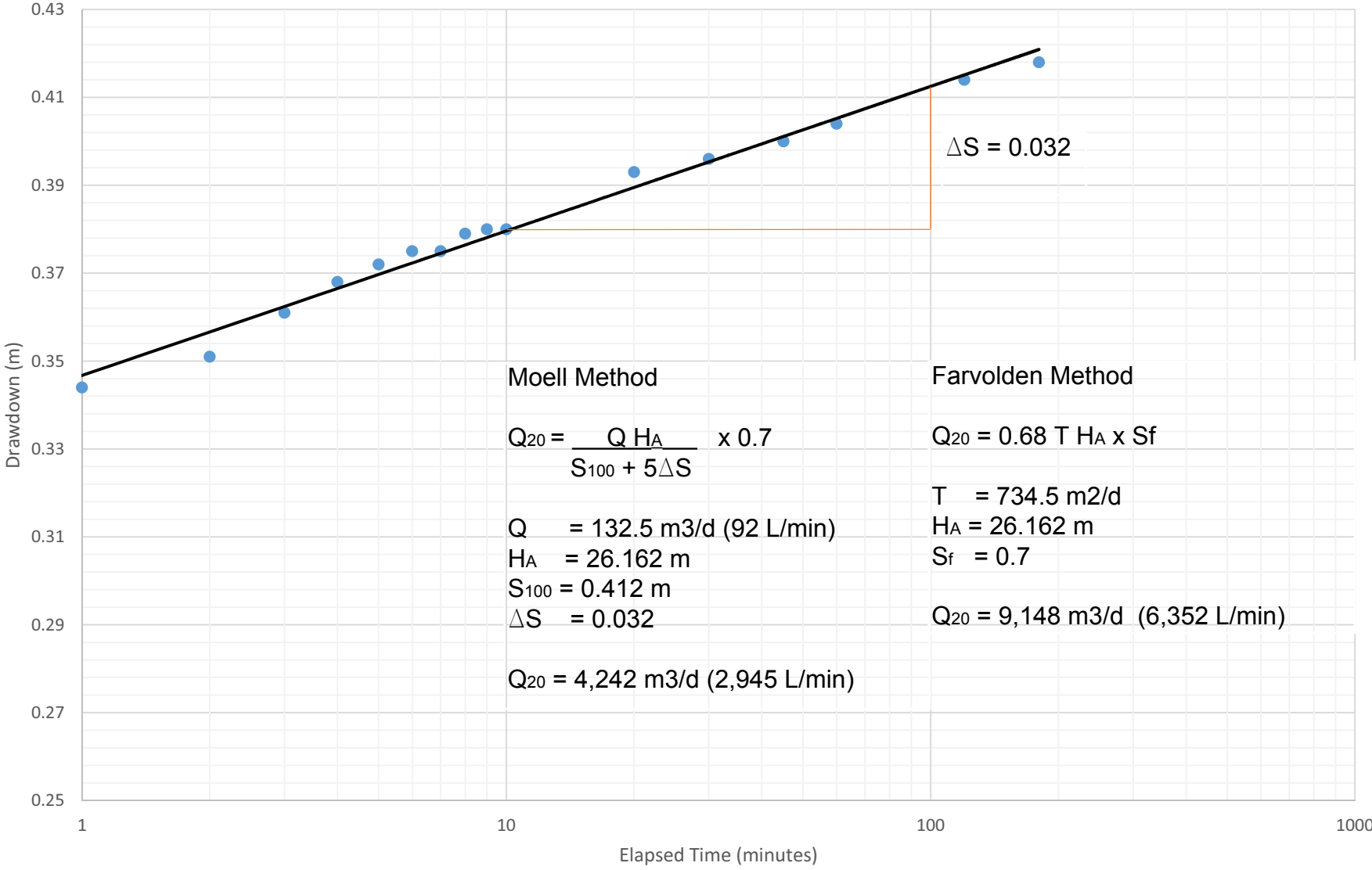
# APPENDIX E

## WATER LEVEL DATA AND ASSOCIATED ANALYSES

Drawdown vs Time  
TW1 Pumping Test (Drawdown), July 13, 2018  
6688 Franktown Road, Ottawa, ON



**Drawdown vs Log Time**  
**TW1 Pumping Test (Drawdown), July 13, 2018**  
**6688 Franktown Road, Ottawa, ON**



**Moell Method**

$$Q_{20} = \frac{Q H_A}{S_{100} + 5\Delta S} \times 0.7$$

**Q = 132.5 m<sup>3</sup>/d (92 L/min)**  
**H<sub>A</sub> = 26.162 m**  
**S<sub>100</sub> = 0.412 m**  
**ΔS = 0.032**

**Q<sub>20</sub> = 4,242 m<sup>3</sup>/d (2,945 L/min)**

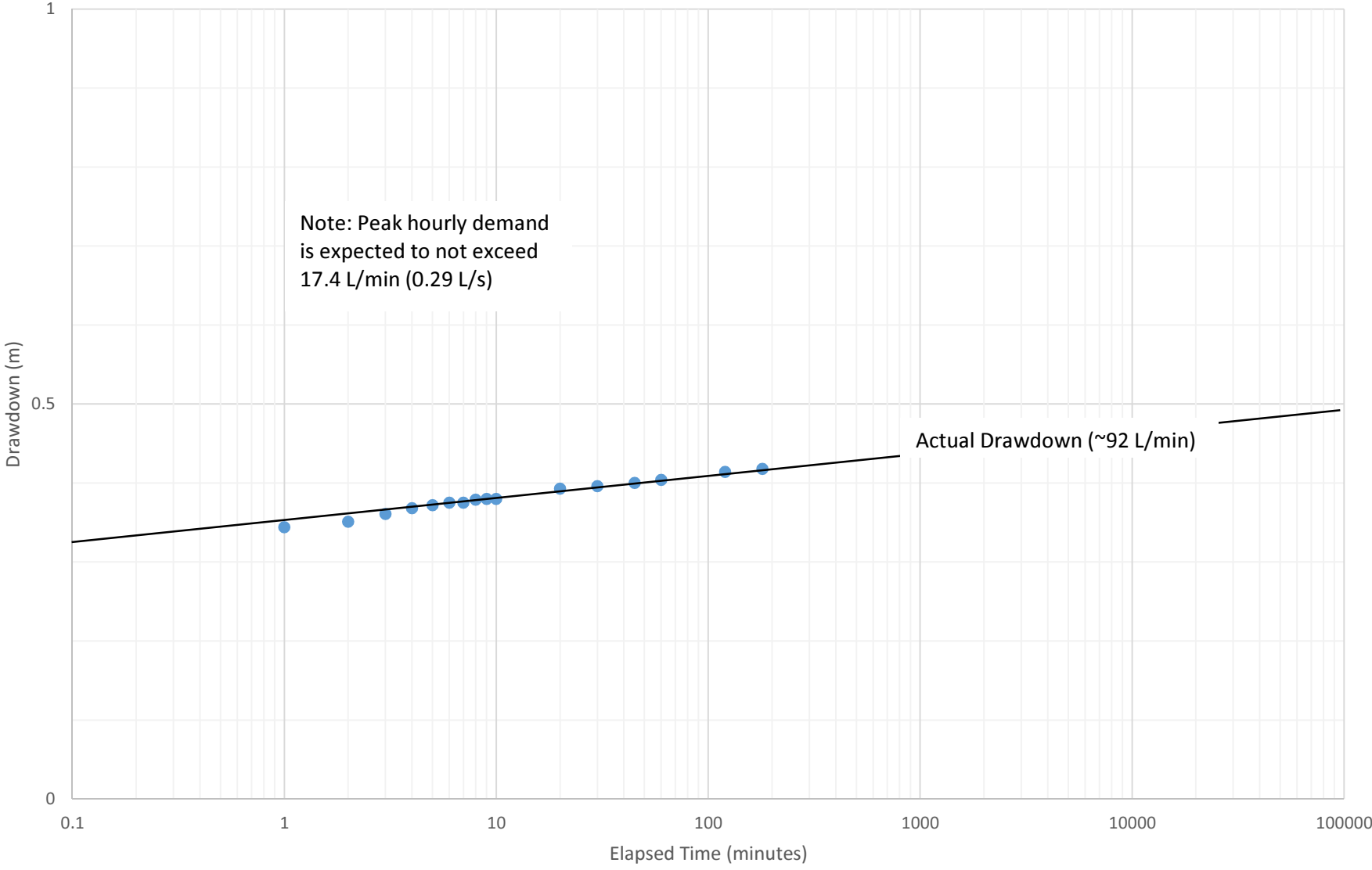
**Farvolden Method**

$$Q_{20} = 0.68 T H_A \times S_f$$

**T = 734.5 m<sup>2</sup>/d**  
**H<sub>A</sub> = 26.162 m**  
**S<sub>f</sub> = 0.7**

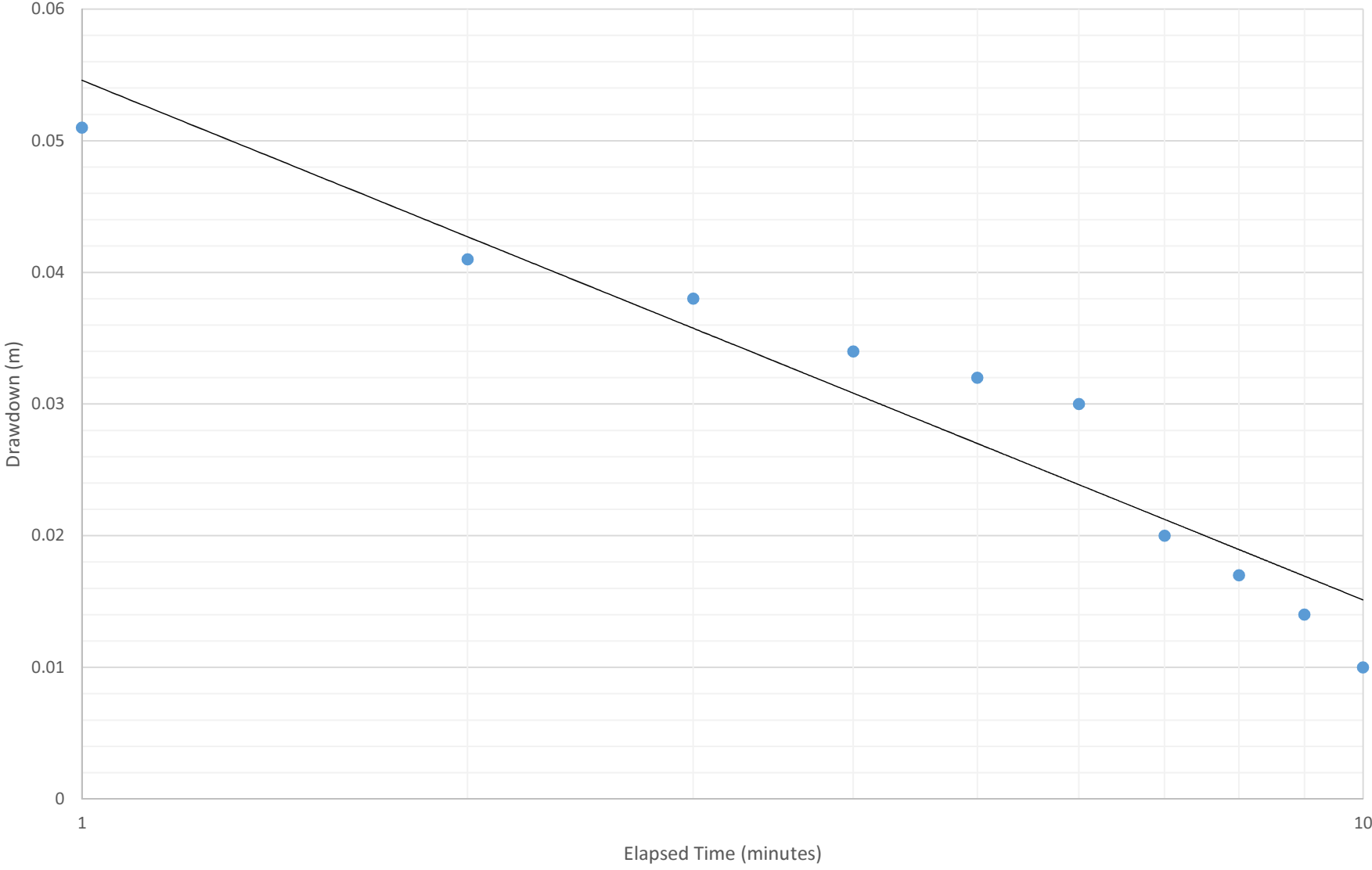
**Q<sub>20</sub> = 9,148 m<sup>3</sup>/d (6,352 L/min)**

Drawdown vs Log Time  
TW1 Pumping Test (Drawdown), July 13, 2018  
6688 Franktown Road, Ottawa, ON





Drawdown (Recovery) vs Log Time  
TW1 Pumping Test (Drawdown), July 13, 2018  
6688 Franktown Road, Ottawa, ON



# APPENDIX F

## LANGELIER SATURATION INDEX (LSI) AND RYZNAR STABILITY INDEX (RSI) CALCULATIONS

## Langelier Saturation Index (LSI)

If LSI is negative: No potential to scale, the water will dissolve CaCO<sub>3</sub>

If LSI is positive: Scale can form and CaCO<sub>3</sub> precipitation may occur

If LSI is close to zero: Borderline scale potential. Water quality or changes in temperature, or evaporation could change the index.

The LSI is probably the most widely used indicator of cooling water scale potential. It is purely an equilibrium index and deals only with the thermodynamic driving force for calcium carbonate scale formation and growth.

$$LSI = pH - pH_s$$

Where:

pH is the measured water pH

pH<sub>s</sub> is the pH at saturation in calcite or calcium carbonate and is defined as:

$$pH_s = (9.3 + A + B) - (C + D)$$

Where:

$$A = (\text{Log}_{10} [\text{TDS}] - 1) / 10$$

$$B = -13.12 \times \text{Log}_{10} (^{\circ}\text{C} + 273) + 34.55$$

$$C = \text{Log}_{10} [\text{Ca}^{2+} \text{ as CaCO}_3] - 0.4$$

$$D = \text{Log}_{10} [\text{alkalinity as CaCO}_3]$$

TW1_2					
pH	6.76			A	0.168664
TDS	486			B	2.399298
Hardness	327			C	2.114548
Alkalinity	328			D	2.515874
Temp.	9.17				
pHs =					7.23754
LSI =					-0.47754
RSI =					7.71508

## Ryznar Stability Index (RSI)

$$RSI = 2(pH_s) - pH$$

Where:

pH is the measured water pH

pH<sub>s</sub> is the pH at saturation in calcite or calcium carbonate

The empirical correlation of the Ryznar stability index can be summarized as follows:

RSI << 6 the scale tendency increases as the index decreases

RSI >> 7 the calcium carbonate formation probably does not lead to a protective corrosion inhibitor film

RSI >> 8 mild steel corrosion becomes an increasing problem.

# APPENDIX G

## PHOTOGRAPHIC LOG



*Photo 1: Site entrance, view of Franktown Road from MW18-3*



*Photo 2: On-site construction laneway, view from Franktown Road*



*Photo 3: On-site cleared area in vicinity of proposed*



# APPENDIX H

## REASONABLE USE ASSESSMENT

## MEMORANDUM

To: Bing Professional Engineering Inc.  
From: McIntosh Perry Consulting Engineers Ltd.  
Date: July 30, 2018  
Re: 6688 Franktown Road Reasonable Use Assessment

---

McIntosh Perry Consulting Engineers Ltd. (McIntosh Perry) was retained by Mr. Bingfeng Li of Bing Professional Engineering Inc. (Bing Professional Engineering) to conduct a Reasonable Use Assessment on a parcel of land located at 6688 Franktown Road in Ottawa, Ontario (the Site). The Site currently consists of forested land, with a cleared portion that will be utilized for future development of a place of worship. The total area of the Site is approximately 39.89 hectares (ha), while the proposed development will have a footprint of approximately 2.71 ha.

Ground surface at the Site is relatively flat. Drainage in the area of the proposed development is interpreted to reflect surface topography, and is likely controlled by ditches along Jinkinson Road. Other areas of the site likely drain to the south, toward the Richmond Fen. The regional groundwater is interpreted to flow to the south, and slightly east, toward the Jock River.

As part of the hydrogeological assessment at the site, two samples (TW1\_1 and TW1\_2) were collected from a newly drilled on-site water supply well (Test Well 1, TW1). The well, TW1, is located slightly south of the proposed driveway location, roughly 100 m east of Franktown Road. The samples were analyzed for the 'subdivision supply' suite of parameters, which includes nitrate, as well as a suite of metals. The nitrate concentration was below the laboratory detection limit (<0.1 mg/L) (**see laboratory results attached**) in both of the samples collected. The well extends approximately 61.0 m below ground surface, with bedrock detected from 3.05 m below ground surface to 61.0 m below ground surface. The well is believed to be representative of the hydrogeological conditions across the proposed development area.

A concern with rural development is the potential contamination of shallow aquifers with nitrates. As part of the terrain analysis conducted by McIntosh Perry, three monitoring wells (MW18-1, MW18-2, MW18-3) were advanced and sampled at the Site. Note that samples from MW18-1, MW18-2, and MW18-3 are referred to on the Chain of Custody as samples HydroG-BH18-1R, HydroG-BH18-2R, and HydroG-BH18-3, respectively. Each monitoring well was sampled for nitrates and nitrites (**see laboratory results attached**). The present background concentrations of nitrate on site is less than the laboratory method detection limit (<0.1 mg/L) (**see lab results attached**). For the purposes of calculating the nitrate dilution, half of the laboratory method detection limit of 0.05 mg/L was used as the background nitrate concentration. There appears to be limited upgradient sources of nitrate to groundwater in the area as most of the surrounding land is forested, and there are no large developments in the surround area on septic systems. Therefore, the potential nitrate contaminant increase from other sources has been determined to be 0 mg/L.

---

Large subsurface sewage disposal systems (systems with daily design flows greater than 10,000 L/day) are bound by the Ministry of the Environment, Conservation and Parks (MOECP) *Guideline B-7: Incorporation of the Reasonable Use Concept into MOEE Groundwater Management*. The maximum allowable boundary nitrate concentration is a fraction of the relevant drinking water standards. As per Guideline B-7, in this case, the maximum concentration of nitrate in groundwater is a correlation between one quarter of the health-related Ontario Drinking Water Quality Standards (ODWQS) limit for nitrate of 10 mg/L, and the background nitrate concentration. The maximum concentration of nitrate at the property boundary is calculated as follows:

$$C_m = C_b + x (C_r - C_b)$$

Where,

- $C_m$  is the maximum concentration of nitrate that would be acceptable in the groundwater beneath the adjacent property;
- $C_b$  is the background concentration of nitrate in the groundwater before it has been affected by human activity;
- $x$  is 0.25 for health-related parameters, and
- $C_r$  is the maximum concentration of nitrate in accordance with the Ontario water management guideline (ODWQS in this case), as per Guideline B-7.

Therefore,

$$C_m = 0.05 \text{ mg/L} + (0.25)(10 \text{ mg/L} - 0.05 \text{ mg/L})$$

$$C_m = 2.54 \text{ mg/L}$$

The lot size downgradient of the septic system distribution header (approximately 39.67 ha) is sufficiently large enough to accommodate the proposed septic system without increasing the nitrate concentrations above the property boundary nitrate concentration limit of 2.54 mg/L.

The nitrate concentration calculations are as follows (see nitrate concentration calculations attached for further details):

Land Area:

Approximate Land Area Downgradient of the Septic System Distribution Header (A) = 39.67 ha = 396,649.7 m<sup>2</sup>

Water Surplus:

$$\text{Water Surplus (Ws)} = \text{Precipitation} - \text{Evapotranspiration}$$

Where,

- Precipitation = 943.4 mm/year (Based off of Environment Canada's average yearly precipitation from 1981 to 2010 for the Ottawa MacDonald-Cartier International Airport), and
- Evapotranspiration = 609.52 mm/year (Based off of Thornthwaite Method, "Hydrology & Hydraulic Systems", Gupta).

Therefore,

$$Ws = 943.4 \text{ mm/year} - 609.52 \text{ mm/year}$$

$$Ws = 333.88 \text{ mm/year}$$

Infiltration Factor:

$$\text{Infiltration Factor (If)} = \sum \text{Topographic If} + \text{Soil If} + \text{Cover If}$$

Where,

- Topographic Infiltration Factor for Flat & Rolling Terrain= 0.275;
- Soil Infiltration Factor for Sand and Silt= 0.4, and
- Cover Infiltration Factor for Woodland / Meadow= 0.15 (MOEE Hydrogeological Technical Information Requirements for Land Development Applications, 1995).

Therefore,

$$If = \sum 0.275 + 0.4 + 0.15$$

$$If = 0.825$$

Infiltration:

$$\text{Infiltration (I)} = Ws * If$$

$$I = (333.88) * (0.825)$$

$$I = 275.45 \text{ mm/year} = 0.275 \text{ m/year}$$

Dilution Water Available:

$$\text{Dilution Water Available (Dw)} = A * I$$

$$Dw = (396,649.7 \text{ m}^2) * (0.275 \text{ m/year})$$

$$Dw = 109,256.3 \text{ m}^3/\text{year} \left| \frac{1000 \text{ L}}{1 \text{ m}^3} \right| \left| \frac{1 \text{ year}}{365 \text{ day}} \right| = 299,332.3 \text{ L/day}$$

Nitrate Concentrations:

$$Cw = Cm - Cp - Co$$

Where,

- Cw is the maximum nitrate concentration originating in the disposal site that can be permitted to reach the adjacent property and not cause Cm to be exceeded;

- $C_m$  is the maximum concentration of nitrate that would be acceptable in the groundwater beneath the adjacent property (2.54 mg/L);
- $C_p$  is the background concentration of nitrate in the groundwater (0.05 mg/L), and
- $C_o$  is the potential contaminant increase from other sources (0 mg/L).

Therefore,

$$C_w = 2.54 \text{ mg/L} - 0.05 \text{ mg/L} - 0 \text{ mg/L}$$

$$C_w = 2.49 \text{ mg/L}$$

#### Effluent Nitrate Concentration

$$\text{Effluent Nitrate Concentration } (C_e) = \frac{(C_w * D_w) + (C_w * Q_e)}{Q_e}$$

Where,

- $Q_e$  = Effluent Loading = 40,320 L/day/lot (Sewage daily design flow)

Using the above equation, the effluent nitrate concentration ( $C_e$ ) is calculated to be 20.95 mg/L. The typical nitrate concentration in domestic wastewater effluent without tertiary treatment (i.e. treated with a septic tank and leaching bed only) is 40 mg/L. The proposed septic system will consist of Waterloo Biofilters, which are Level IV treatment units which include a recirculation loop. Waterloo Biofilters typically can achieve a nitrate reduction of 50 % to 65 %. A 20.95 mg/L effluent nitrate concentration represents a 47.62 % reduction in nitrate from standard domestic wastewater effluent, which means that a minimum of 47.62 % reduction in nitrate concentration is required to achieve the required nitrate dilution to meet the target nitrate concentration ( $C_w$ ). Therefore, the nitrate reduction of 50 % to 65% for Waterloo Biofilters is sufficient to meet the required nitrate concentrations.

#### **Conclusions**

- The minimum reduction of nitrate is 47.62 % to meet an effluent nitrate concentration of 20.95 mg/L;
- The Waterloo Biofilters typically have a nitrate reduction of 50 % to 65 %, which exceeds the 47.62 % reduction requirement, and
- The current lot is a sufficient size to dilute the nitrogen to the required target nitrate concentration.

We trust that this information is acceptable and meets the current requirements for your project. Should you have any questions or require additional information, please do not hesitate to contact the undersigned.

Respectively submitted,



Eliza Walker, EIT  
McIntosh Perry Consulting Engineers Ltd.  
613-836-2184 ext. 2204  
[e.walker@mcintoshperry.com](mailto:e.walker@mcintoshperry.com)



Patrick Leblanc, P.Eng., Project Engineer  
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[p.leblanc@mcintoshperry.com](mailto:p.leblanc@mcintoshperry.com)

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## Certificate of Analysis

### McIntosh Perry Consulting Eng. (Carp)

115 Walgreen Rd.  
RR#3 Carp, ON KOA 1L0  
Attn: Jordan Bowman

Client PO:  
Project: 17-0503  
Custody: 6644

Report Date: 16-Jul-2018  
Order Date: 13-Jul-2018

**Order #: 1828639**

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

Parcel ID	Client ID
1828639-01	TW1-1
1828639-02	TW1-2

Approved By:



Dale Robertson, BSc  
Laboratory Director

Certificate of Analysis  
**Client: McIntosh Perry Consulting Eng. (Carp)**  
**Client PO:**

Report Date: 16-Jul-2018

Order Date: 13-Jul-2018

**Project Description: 17-0503**

## Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Alkalinity, total to pH 4.5	EPA 310.1 - Titration to pH 4.5	16-Jul-18	16-Jul-18
Ammonia, as N	EPA 351.2 - Auto Colour	16-Jul-18	16-Jul-18
Anions	EPA 300.1 - IC	16-Jul-18	16-Jul-18
Colour	SM2120 - Spectrophotometric	16-Jul-18	16-Jul-18
Conductivity	EPA 9050A- probe @25 °C	16-Jul-18	16-Jul-18
Dissolved Organic Carbon	MOE E3247B - Combustion IR, filtration	16-Jul-18	16-Jul-18
E. coli	MOE E3407	13-Jul-18	14-Jul-18
Fecal Coliform	SM 9222D	13-Jul-18	14-Jul-18
Metals, ICP-MS	EPA 200.8 - ICP-MS	16-Jul-18	16-Jul-18
pH	EPA 150.1 - pH probe @25 °C	16-Jul-18	16-Jul-18
Phenolics	EPA 420.2 - Auto Colour, 4AAP	16-Jul-18	16-Jul-18
Subdivision Package	Hardness as CaCO <sub>3</sub>	16-Jul-18	16-Jul-18
Sulphide	SM 4500SE - Colourimetric	16-Jul-18	16-Jul-18
Tannin/Lignin	SM 5550B - Colourimetric	16-Jul-18	16-Jul-18
Total Coliform	MOE E3407	13-Jul-18	14-Jul-18
Total Dissolved Solids	SM 2540C - gravimetric, filtration	13-Jul-18	16-Jul-18
Total Kjeldahl Nitrogen	EPA 351.2 - Auto Colour, digestion	16-Jul-18	16-Jul-18
Turbidity	SM 2130B - Turbidity meter	16-Jul-18	16-Jul-18

Certificate of Analysis  
**Client: McIntosh Perry Consulting Eng. (Carp)**  
**Client PO:**

Report Date: 16-Jul-2018

Order Date: 13-Jul-2018

**Project Description: 17-0503**

<b>Client ID:</b>	TW1-1	TW1-2	-	-
<b>Sample Date:</b>	07/13/2018 08:20	07/13/2018 14:12	-	-
<b>Sample ID:</b>	1828639-01	1828639-02	-	-
<b>MDL/Units</b>	Drinking Water	Drinking Water	-	-

**Microbiological Parameters**

E. coli	1 CFU/100 mL	ND	ND	-	-
Fecal Coliforms	1 CFU/100 mL	ND	ND	-	-
Total Coliforms	1 CFU/100 mL	ND	ND	-	-

**General Inorganics**

Alkalinity, total	5 mg/L	325	328	-	-
Ammonia as N	0.01 mg/L	0.12	0.12	-	-
Dissolved Organic Carbon	0.5 mg/L	2.9	3.2	-	-
Colour	2 TCU	3 [1]	4 [1]	-	-
Conductivity	5 uS/cm	697	834	-	-
Hardness	mg/L	259	327	-	-
pH	0.1 pH Units	7.7	7.6	-	-
Phenolics	0.001 mg/L	<0.001	<0.001	-	-
Total Dissolved Solids	10 mg/L	380	486	-	-
Sulphide	0.02 mg/L	<0.02	<0.02	-	-
Tannin & Lignin	0.1 mg/L	0.1	0.1	-	-
Total Kjeldahl Nitrogen	0.1 mg/L	0.2	0.2	-	-
Turbidity	0.1 NTU	1.5 [1]	1.4 [1]	-	-

**Anions**

Chloride	1 mg/L	24	65	-	-
Fluoride	0.1 mg/L	0.4	0.4	-	-
Nitrate as N	0.1 mg/L	<0.1	<0.1	-	-
Nitrite as N	0.05 mg/L	<0.05	<0.05	-	-
Sulphate	1 mg/L	38	41	-	-

**Metals**

Calcium	0.1 mg/L	55.7	75.4	-	-
Iron	0.1 mg/L	0.1	0.1	-	-
Magnesium	0.2 mg/L	29.2	33.7	-	-
Manganese	0.005 mg/L	0.006	0.006	-	-
Potassium	0.1 mg/L	4.6	4.8	-	-
Sodium	0.2 mg/L	17.6	21.6	-	-

Certificate of Analysis  
**Client: McIntosh Perry Consulting Eng. (Carp)**  
**Client PO:**

Report Date: 16-Jul-2018

Order Date: 13-Jul-2018

**Project Description: 17-0503**

### Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Anions</b>									
Chloride	ND	1	mg/L						
Fluoride	ND	0.1	mg/L						
Nitrate as N	ND	0.1	mg/L						
Nitrite as N	ND	0.05	mg/L						
Sulphate	ND	1	mg/L						
<b>General Inorganics</b>									
Alkalinity, total	ND	5	mg/L						
Ammonia as N	ND	0.01	mg/L						
Dissolved Organic Carbon	ND	0.5	mg/L						
Colour	ND	2	TCU						
Conductivity	ND	5	uS/cm						
Phenolics	ND	0.001	mg/L						
Total Dissolved Solids	ND	10	mg/L						
Sulphide	ND	0.02	mg/L						
Tannin & Lignin	ND	0.1	mg/L						
Total Kjeldahl Nitrogen	ND	0.1	mg/L						
Turbidity	ND	0.1	NTU						
<b>Metals</b>									
Calcium	ND	0.1	mg/L						
Iron	ND	0.1	mg/L						
Magnesium	ND	0.2	mg/L						
Manganese	ND	0.005	mg/L						
Potassium	ND	0.1	mg/L						
Sodium	ND	0.2	mg/L						
<b>Microbiological Parameters</b>									
E. coli	ND	1	CFU/100 mL						
Fecal Coliforms	ND	1	CFU/100 mL						
Total Coliforms	ND	1	CFU/100 mL						

Certificate of Analysis  
**Client: McIntosh Perry Consulting Eng. (Carp)**  
**Client PO:**

Report Date: 16-Jul-2018

Order Date: 13-Jul-2018

**Project Description: 17-0503**

### Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Anions</b>									
Chloride	23.9	1	mg/L	23.8			0.4	10	
Fluoride	0.44	0.1	mg/L	0.44			1.1	10	
Nitrate as N	ND	0.1	mg/L	ND			0.0	20	
Nitrite as N	ND	0.05	mg/L	ND				20	
Sulphate	38.7	1	mg/L	38.3			0.9	10	
<b>General Inorganics</b>									
Alkalinity, total	319	5	mg/L	325			1.9	14	
Ammonia as N	0.103	0.01	mg/L	0.120			14.7	17.7	
Dissolved Organic Carbon	2.8	0.5	mg/L	2.9			4.8	37	
Colour	3	2	TCU	3			0.0	12	
Conductivity	691	5	uS/cm	697			0.9	11	
pH	7.8	0.1	pH Units	7.7			0.6	10	
Phenolics	ND	0.001	mg/L	ND				10	
Total Dissolved Solids	54.0	10	mg/L	54.0			0.0	10	
Sulphide	1.16	0.04	mg/L	1.18			1.5	10	
Tannin & Lignin	ND	0.1	mg/L	ND			0.0	11	
Total Kjeldahl Nitrogen	0.16	0.1	mg/L	0.17			4.4	10	
Turbidity	1.5	0.1	NTU	1.5			0.7	10	
<b>Metals</b>									
Iron	0.1	0.1	mg/L	0.1			9.6	20	
Magnesium	30.4	0.2	mg/L	29.2			3.9	20	
Manganese	0.007	0.005	mg/L	0.006			3.1	20	
Potassium	4.8	0.1	mg/L	4.6			2.5	20	
Sodium	17.8	0.2	mg/L	17.6			1.3	20	
<b>Microbiological Parameters</b>									
E. coli	ND	1	CFU/100 mL	ND				30	
Fecal Coliforms	ND	1	CFU/100 mL	ND				30	
Total Coliforms	ND	1	CFU/100 mL	ND				30	

Certificate of Analysis  
**Client: McIntosh Perry Consulting Eng. (Carp)**  
**Client PO:**

Report Date: 16-Jul-2018

Order Date: 13-Jul-2018

**Project Description: 17-0503**

### Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Anions</b>									
Chloride	33.1	1	mg/L	23.8	92.6	78-112			
Fluoride	1.37	0.1	mg/L	0.44	92.3	73-113			
Nitrate as N	0.97	0.1	mg/L	ND	96.6	81-112			
Nitrite as N	0.911	0.05	mg/L	ND	91.1	76-107			
Sulphate	46.8	1	mg/L	38.3	84.3	75-111			
<b>General Inorganics</b>									
Ammonia as N	0.370	0.01	mg/L	0.120	100	81-124			
Dissolved Organic Carbon	12.6	0.5	mg/L	2.9	97.5	60-133			
Phenolics	0.022	0.001	mg/L	ND	89.9	69-132			
Total Dissolved Solids	106	10	mg/L		106	75-125			
Sulphide	0.50	0.02	mg/L		99.6	79-115			
Tannin & Lignin	1.1	0.1	mg/L	ND	111	71-113			
Total Kjeldahl Nitrogen	2.22	0.1	mg/L	0.17	103	81-126			
<b>Metals</b>									
Calcium	832		ug/L		83.2	80-120			
Iron	872		ug/L		87.2	80-120			
Magnesium	1050		ug/L		105	80-120			
Manganese	49.2		ug/L		98.3	80-120			
Potassium	1160		ug/L		116	80-120			
Sodium	1040		ug/L		104	80-120			



Certificate of Analysis  
**Client: McIntosh Perry Consulting Eng. (Carp)**  
**Client PO:**

Report Date: 16-Jul-2018

Order Date: 13-Jul-2018

**Project Description: 17-0503**

**Qualifier Notes:**

***Login Qualifiers :***

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

*Applies to samples: TW1-1, TW1-2*

***Sample Qualifiers :***

1 : This analysis was conducted after the accepted holding time had been exceeded.

***QC Qualifiers :***

**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.



Parcel ID: 1828639

Bldg. 4J8  
js.com

Parcel Order Number  
**1828639**

Chain Of Custody  
Ontario Drinking Water Samples  
No **6644**

Client Name:	McLanahan Perry	Project Ref:	17-0503	Waterworks Name:	
Contact Name:	S. Bowman	Quote #:	S/O	Waterworks Number:	
Address:	115 Walsgreen Rd	PO #:	17-0503	Address:	
After Hours Contact:		E-mail:	j.bowman@mcclanahanperry.com	Public Health Unit:	
Telephone:	615 229 9528	Fax:			

Samples Submitted Under: (Indicate ONLY one)

- ON REG 170/03  ON REG 318/08  Private Well
- ON REG 243/07  ON REG 319/08  Other: *OWS*

Have LSN forms been submitted to MOE/MOHLTC?  Yes  No  N/A

Are these samples for human consumption?  Yes  No

All information must be completed before samples will be processed.

Sample Type: R = Raw ; T = Treated ; D = Distribution ; P = Plumbing

Source Type: G = Ground Water; S = Surface Water

Reportable: Requires AWQI reporting as per Regulation - Y = Yes; N = No

LOCATION NAME	SAMPLE ID	Sample Type: R/T/D/P	Source Type: G/S	Reportable: Y/N	Resample	SAMPLE COLLECTED		# of Containers	Free/Combined Chlorine Residual mg/L	Standing / Flushed: S/REG 243	Total Coliform/E. Coli	Required Analyses						
						DATE	TIME					HPC	Lead	THM	Subdiv.			
1	TW 1	TW 1-1	G	N		17-Jul-18	0820	8	No	F								
2	TW 1	TW 1-2	G	N		13-Jul-18	See Bottles	8	No	F								
3							2:12											
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Comments: Please Rush Results. *Sample submerged in the water, water in container at bottom of bottle.*

Relinquished By (Sign):	Received By Driver/Depot:	Relinquished At Lab:	Verified By:
<i>S. Bowman</i>		<i>S. Bowman</i>	<i>Walker</i>

Date/Time: 13-Jul-2018 15:00	Temperature: °C	Date/Time: 13-Jul-18 4pm	Temperature: 4.1 °C	Date/Time: 13/7/18	By: <i>Walker</i>
------------------------------	-----------------	--------------------------	---------------------	--------------------	-------------------

## Certificate of Analysis

### McIntosh Perry Consulting Eng. (Carp)

115 Walgreen Rd.  
Carp, ON K0A 1L0  
Attn: Justin Cameron

Client PO:  
Project: 17-0503  
Custody: 42032

Report Date: 19-Jun-2018  
Order Date: 15-Jun-2018

**Order #: 1824668**

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

Parcel ID	Client ID
1824668-01	Hydro G-BH18-3
1824668-02	Hydro G-BH-1R
1824668-03	Hydro G-BH-2R

Approved By:



Mark Foto, M.Sc.  
Lab Supervisor

Certificate of Analysis  
Client: McIntosh Perry Consulting Eng. (Carp)  
Client PO:

Report Date: 19-Jun-2018  
Order Date: 15-Jun-2018  
Project Description: 17-0503

### Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Anions	EPA 300.1 - IC	18-Jun-18	18-Jun-18

Certificate of Analysis

Report Date: 19-Jun-2018

Client: McIntosh Perry Consulting Eng. (Carp)

Order Date: 15-Jun-2018

Client PO:

Project Description: 17-0503

<b>Client ID:</b>	Hydro G-BH18-3	Hydro G-BH-1R	Hydro G-BH-2R	-
<b>Sample Date:</b>	06/15/2018 13:53	06/15/2018 14:08	06/15/2018 14:20	-
<b>Sample ID:</b>	1824668-01	1824668-02	1824668-03	-
<b>MDL/Units</b>	Water	Water	Water	-

**Anions**

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

Certificate of Analysis  
**Client: McIntosh Perry Consulting Eng. (Carp)**  
**Client PO:**

Report Date: 19-Jun-2018

Order Date: 15-Jun-2018

**Project Description: 17-0503**

**Method Quality Control: Blank**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Anions</b>									
Nitrate as N	ND	0.1	mg/L						
Nitrite as N	ND	0.05	mg/L						

Certificate of Analysis  
**Client: McIntosh Perry Consulting Eng. (Carp)**  
**Client PO:**

Report Date: 19-Jun-2018

Order Date: 15-Jun-2018

**Project Description: 17-0503**

**Method Quality Control: Duplicate**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Anions</b>									
Nitrate as N	ND	0.1	mg/L	ND				20	
Nitrite as N	ND	0.05	mg/L	ND				20	



Certificate of Analysis  
**Client: McIntosh Perry Consulting Eng. (Carp)**  
**Client PO:**

Report Date: 19-Jun-2018

Order Date: 15-Jun-2018

**Project Description: 17-0503**

### Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Anions</b>									
Nitrate as N	1.04	0.1	mg/L	ND	104	81-112			
Nitrite as N	0.903	0.05	mg/L	ND	90.3	76-117			

Certificate of Analysis  
**Client: McIntosh Perry Consulting Eng. (Carp)**  
**Client PO:**

Report Date: 19-Jun-2018  
Order Date: 15-Jun-2018  
**Project Description: 17-0503**

**Qualifier Notes:**

None

**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.



Client Name: <u>APCE</u>	Project Reference: <u>17-0503</u>	<b>Turnaround Time:</b> <input type="checkbox"/> 1 Day <input type="checkbox"/> 3 Day <input type="checkbox"/> 2 Day <input checked="" type="checkbox"/> Regular Date Required: _____
Contact Name: <u>Justin Cameron</u>	Quote #: <u>S/O</u>	
Address: <u>115 Wolgreen Road, Camp Hill PA 17004</u>	PO #: _____	
Telephone: <u>610-915-3752</u>	Email Address: <u>j.cameron@mcintoshperry.com</u>	

Criteria:  O. Reg. 153/04 (As Amended) Table \_\_\_  RSC Filing  O. Reg. 558/00  PWQO  CCME  SUB (Storm)  SUB (Sanitary) Municipality: \_\_\_\_\_  Other \_\_\_\_\_

Matrix Type: S (Soil Sed.) GW (Ground Water) SW (Surface Water) SS (Storm Sanitary Sewer) P (Paint) A (Air) O (Other)				Required Analyses												
Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken		Nitrate (NO3)	Nitrite (NO2)									
				Date	Time											
1 Hydro G-BH18-3	GW	-	1	15 Jun 2018	1:53	-	-									
2 Hydro G-BH-1R	GW	-	1	↓	2:08	-	-									
3 Hydro G-BH-2R	GW	-	1		2:20	-	-									
4																
5																
6																
7																
8																
9																
10																

Comments: \_\_\_\_\_ Method of Delivery: Walk-in

Relinquished By (Sign): <u>S. Aditi</u>	Received by Driver/Depot: _____	Received at Lab: <u>[Signature]</u>	Verified By: <u>[Signature]</u>
Relinquished By (Print): <u>Stefan Hahn</u>	Date/Time: _____	Date/Time: <u>15 Jun 2018 4:03</u>	Date/Time: <u>15 Jun 2018 4:34</u>
Date/Time: <u>15 Jun 18 4:03 pm</u>	Temperature: _____ °C	Temperature: <u>20</u> °C	pH Verified   By: _____

OCP-17-0503  
 6688 Franktown Road, Ottawa Ontario  
 Nitrate Loading Calculations

Land Area 39.66497 ha (downgradient)  
 396649.7 m<sup>2</sup>

Water Surplus (Ws)  
 Ws = Precipitation - Evapotranspiration

Precipitation 943.4 mm/yr  
 Evapotranspiration 609.5239 mm/yr

Ws 333.8761 mm/yr  
 0.333876 m/yr

Infiltration Factor (If) per MOEE 1995

Topo Flat & Rolling 0.275  
 Soil Sand and Silt 0.4  
 Cover Woodland / Meadow 0.15

If = 0.825

Infiltration (I)

I = Ws \* If

I = 0.275448 m/yr

Dilution Water Available (Dw)

Dw = A \* I

Dw = 109256.3 m<sup>3</sup>/yr  
 299332.3 L/day

Background Nitrate Concentration (Cb) Cb = 0.05 mg/L

Boundary Nitrate Concentration (Cm) Cm = 2.5375 mg/L

Target Nitrate Concentration (Cw) Cw = 2.4875 mg/L

Effluent Nitrate Concentration (Ce)

$Ce = (Cw * Dw) + (Cw * Qe) / Qe$

Effluent Loading (Qe) Qe = 40320 L/day/Lot

Effluent Nitrate Concentration (Ce) Ce = 20.95507 mg/L

Qe = 40320 L/day/Lot  
 Ce = 20.95507 mg/L

### Potential Evapotranspiration

Thornthwaite Method, "Hydrology & Hydraulic Systems", Gupta

$Et_{month} = 1.62 (10 * T_m / I)^a$

where:

$a = 675 * 10^{-9} * I^3 - 771 * 10^{-7} * I^2 + 179 * 10^{-4} * I + 492 * 10^{-3}$

$I = \sum (T_m / 5)^{1.514}$

Stn: **Ottawa, Ontario (YOW)**

Month	Temp C	I	ET (cm) unadjusted	Daylight Factor	ET (cm) adjusted
January	-10.3				
Feb	-8.1				
March	-2.3				
April	6.3	1.4189	2.8610	1.13	3.2330
May	13.3	4.3982	6.4518	1.28	8.2583
June	18.5	7.2487	9.2396	1.29	11.9191
July	21	8.7821	10.6062	1.31	13.8942
Aug	19.8	8.0336	9.9484	1.21	12.0375
Sept	15	5.2767	7.3542	1.04	7.6483
Oct	8	2.0372	3.7105	0.94	3.4879
Nov	1.5	0.1616	0.6001	0.79	0.4741
Dec	-6.2				
I		37.35695	50.7719		<b>60.9524</b>
thus a =		1.0883			

Note: Daylight Factor is an adjustment factor for possible hours of sunshine based on latitude.

Monthly temperature from Environment Canada

Input data from user
Set value
Calculated by worksheet

# APPENDIX B - MECP WATER WELL RECORD SUMMARY

WELL_ID	COMPLETED	WELL DEPTH (m)	STATIC WATER LEVEL (m)	DEPTH TO BEDROCK (m)	BORE_HOLE_ID	FINAL STATUS	USE1	GEOLOGY	COLOR	FORMATION_T OP_DEPTH	FORMATION_EN D_DEPTH	UNITS OF MEASUREMENT
7047631	04-Jul-07	43.3	8.6	1.52	23047631	Water Supply	Domestic	CLAY,SANDY,		0	1.52	m
7047631	04-Jul-07				23047631	Water Supply	Domestic	LIMESTONE,,		1.52	43.28	m
7053849	13-Nov-07	18.3	2.8	4.27	23053849	Water Supply	Domestic	SAND,GRAVEL,		0	4.27	m
7053849	13-Nov-07				23053849	Water Supply	Domestic	LIMESTONE,,	GREY	4.27	18.29	m
1502408	10-Jan-62	18.3	2.4	7.9	10024451	Water Supply	Livestock	CLAY,,		0	2	ft
1502408	10-Jan-62				10024451	Water Supply	Livestock	MEDIUM SAND,,		2	26	ft
1502408	10-Jan-62				10024451	Water Supply	Livestock	LIMESTONE,,	GREY	26	60	ft
1502409	15-Aug-64	19.8	1.2	2.4	10024452	Water Supply	Domestic	CLAY,TOPSOIL,		0	8	ft
1502409	15-Aug-64				10024452	Water Supply	Domestic	SANDSTONE,,		8	65	ft
1502410	12-Jun-67	6.7	2.4	-	10024453	Water Supply	Domestic	TOPSOIL,BOULDERS,		0	6.10	ft
1502410	12-Jun-67				10024453	Water Supply	Domestic	GRAVEL,,		6.10	6.71	ft
1502428	16-Jun-48	18.3	4.6	9.1	10024471	Water Supply	Domestic	GRAVEL,,		0	30	ft
1502428	16-Jun-48				10024471	Water Supply	Domestic	LIMESTONE,,		30	60	ft
1502429	28-Jul-58	27.7	27.7	2.7	10024472	Water Supply	Domestic	CLAY,,		0	9	ft
1502429	28-Jul-58				10024472	Water Supply	Domestic	LIMESTONE,,		9	91	ft
1502430	24-Nov-60	18.3	4.6	5.2	10024473	Water Supply	Domestic	MEDIUM SAND,,	RED	0	17	ft
1502430	24-Nov-60				10024473	Water Supply	Domestic	LIMESTONE,,	GREY	17	60	ft
1510152	22-Jul-69	15.5	15.2	3.7	10032181	Water Supply	Domestic	MEDIUM SAND,,	BROWN	0	12	ft
1510152	22-Jul-69				10032181	Water Supply	Domestic	LIMESTONE,,	GREY	12	51	ft
1515832	18-Nov-76	19.5	18.9	3.7	10037772	Water Supply	Domestic	SAND,,	GREY	0	12	ft
1515832	18-Nov-76				10037772	Water Supply	Domestic	LIMESTONE,,	GREY	12	64	ft
1516119	27-Jul-77	32	1.8	4.6	10038054	Water Supply	Domestic	SAND,,	GREY	0	15	ft
1516119	27-Jul-77				10038054	Water Supply	Domestic	LIMESTONE,,	GREY	15	105	ft
1523647	10-Apr-89	22.9	1.8	15.2	10045421	Water Supply	Domestic	CLAY,,	GREY	0	50	ft
1523647	10-Apr-89				10045421	Water Supply	Domestic	LIMESTONE,,	GREY	50	75	ft
1524746	26-Jul-90	27.4	3	4.9	10046494	Water Supply	Domestic	SAND,PACKED,	BROWN	0	3	ft
1524746	26-Jul-90				10046494	Water Supply	Domestic	SAND,PACKED,	GREY	3	16	ft
1524746	26-Jul-90				10046494	Water Supply	Domestic	LIMESTONE,ME DIUM-GRAINED,	GREY	16	90	ft
1525897	01-Oct-91	30.5	3.4	11	10047632	Test Hole	Domestic	SAND,,	GREY	0	6	ft
1525897	01-Oct-91				10047632	Test Hole	Domestic	HARDPAN,GRAVEL,FRACTURED	GREY	6	36	ft
1525897	01-Oct-91				10047632	Test Hole	Domestic	LIMESTONE,,	GREY	36	100	ft
1525898	01-Oct-91	31.4	3.7	4.6	10047633	Test Hole	Domestic	SAND,,	GREY	0	6	ft
1525898	01-Oct-91				10047633	Test Hole	Domestic	HARDPAN,FRACTURED,GRAVEL	GREY	6	15	ft
1525898	01-Oct-91				10047633	Test Hole	Domestic	LIMESTONE,,	GREY	15	103	ft
1525899	01-Oct-91	19.2	3.7	1.2	10047634	Test Hole	Domestic	SAND,,	GREY	0	4	ft
1525899	01-Oct-91				10047634	Test Hole	Domestic	ROCK,FRACTURED,	GREY	4	8	ft

WELL_ID	COMPLETED	WELL DEPTH (m)	STATIC WATER LEVEL (m)	DEPTH TO BEDROCK (m)	BORE_HOLE_ID	FINAL STATUS	USE1	GEOLOGY	COLOR	FORMATION_T OP_DEPTH	FORMATION_EN D_DEPTH	UNITS OF MEASUREMENT
1525899	01-Oct-91				10047634	Test Hole	Domestic	LIMESTONE,,	GREY	8	63	ft
1528122	05-Jun-94	19.2	1.8	4.6	10049661	Water Supply	Domestic	CLAY,FILL,	GREY	0	3	ft
1528122	05-Jun-94				10049661	Water Supply	Domestic	SAND,,	RED	3	6	ft
1528122	05-Jun-94				10049661	Water Supply	Domestic	HARDPAN,,	GREY	6	15	ft
1528122	05-Jun-94				10049661	Water Supply	Domestic	LIMESTONE,,	GREY	15	63	ft
1532075	25-May-01	36.6	3	2.7	10516525	Water Supply	Domestic	SAND,,		0	9	ft
1532075	25-May-01				10516525	Water Supply	Domestic	LIMESTONE,,	GREY	9	120	ft
1532709	11-Mar-02	67.1	1.8	4.9	10523837	Water Supply	Domestic	SAND,,		0	16	ft
1532709	11-Mar-02				10523837	Water Supply	Domestic	LIMESTONE,,	GREY	16	176	ft
1532709	11-Mar-02				10523837	Water Supply	Domestic	SANDSTONE,,	GREY	176	220	ft
1534049	26-Aug-03	55.2	15.2	8.2	10543164	Water Supply	Domestic	SAND,,	GREY	0	27	ft
1534049	26-Aug-03				10543164	Water Supply	Domestic	LIMESTONE,,	GREY	27	170	ft
1534049	26-Aug-03				10543164	Water Supply	Domestic	SANDSTONE,,	WHITE	170	181	ft
1535485	18-Mar-05	22.3	2.3	8.2	11316024	Water Supply	Domestic	CLAY,PACKED,	BROWN	0	1.82	m
1535485	18-Mar-05				11316024	Water Supply	Domestic	SAND,DRY,	BROWN	1.82	3.65	m
1535485	18-Mar-05				11316024	Water Supply	Domestic	SAND,BOULDERS ,WATER-BEARING	GREY	3.65	8.22	m
1535485	18-Mar-05				11316024	Water Supply	Domestic	LIMESTONE,LAY ERED,	GREY	8.22	22.25	m
1534476	22-Dec-03	54.9	3.8	1.8	11104751	Water Supply	Domestic	TOPSOIL,FILL,	BLACK	0	1.83	m
1534476	22-Dec-03				11104751	Water Supply	Domestic	LIMESTONE,SAN DSTONE,	GREY	1.83	54.86	m
1534764	03-Jun-04	36.9	3.8	7.9	11172516	Water Supply	Domestic	SAND,GRAVEL,FI LL		0	2.4	m
1534764	03-Jun-04				11172516	Water Supply	Domestic	SAND,CLAY,	GREY	2.4	7.9	m
1534764	03-Jun-04				11172516	Water Supply	Domestic	LIMESTONE,,	GREY	7.9	36.9	m
1534947	05-Jul-04	37.5	3.8	1.5	11172699	Water Supply	Domestic	TOPSOIL,STONES ,PACKED	BROWN	0	1.52	m
1534947	05-Jul-04				11172699	Water Supply	Domestic	LIMESTONE,LAY ERED,HARD	GREY	1.52	37.48	m
1535801	22-Aug-05	18.3	3.3	8.2	11316340	Water Supply	Domestic	SAND,GRAVEL,		0	8.23	m
1535801	22-Aug-05				11316340	Water Supply	Domestic	LIMESTONE,,	GREY	8.23	18.29	m
1535802	25-Aug-05	18.9	4.8	7.3	11316341	Water Supply	Domestic	SAND,,		0	7.31	m
1535802	25-Aug-05				11316341	Water Supply	Domestic	LIMESTONE,,	GREY	7.31	18.9	m
1536011	26-Oct-05	18.9	3.7	4	11316550	Water Supply	Domestic	SAND,,		0	4.1	m
1536011	26-Oct-05				11316550	Water Supply	Domestic	LIMESTONE,,	GREY	4.1	18.9	m
1536280	10-Mar-06	21.3	2.3	4.3	11550346	Water Supply	Domestic	SAND,CLAY,		0	4.26	m
1536280	10-Mar-06				11550346	Water Supply	Domestic	LIMESTONE,,	GREY	4.26	21.33	m
1536384	21-Apr-06	50	1.3	8.2	11550450	Water Supply	Domestic	SAND,BOULDERS ,		0	8.23	m
1536384	21-Apr-06				11550450	Water Supply	Domestic	LIMESTONE,,	GREY	8.23	36.57	m
1536384	21-Apr-06				11550450	Water Supply	Domestic	SANDSTONE,,	GREY	36.57	49.98	m
1536667	22-Jun-06	26.2	-	3.7	11691761	Abandoned-Other		,,		0	26.21	m
1536737	06-Sep-06	24.7	2.3	3	11691831	Water Supply	Domestic	SAND,,		0	3.05	m



WELL_ID	COMPLETED	WELL DEPTH (m)	STATIC WATER LEVEL (m)	DEPTH TO BEDROCK (m)	BORE_HOLE_ID	FINAL STATUS	USE1	GEOLOGY	COLOR	FORMATION_T OP_DEPTH	FORMATION_EN D_DEPTH	UNITS OF MEASUREMENT
1536737	06-Sep-06				11691831	Water Supply	Domestic	LIMESTONE,,		3.05	24.69	m
7040907	24-Dec-06	18.6	0.9	3.4	11763343	Water Supply	Domestic	SAND,BOULDERS		0	3.35	m
7040907	24-Dec-06				11763343	Water Supply	Domestic	LIMESTONE,,	GREY	3.35	18.59	m
7108135	03-Jun-08	30.5	7.3	0.91	1001657826	Water Supply	Domestic	SAND,,		0	0.91	m
7108135	03-Jun-08				1001657826	Water Supply	Domestic	LIMESTONE,,	GREY	0.91	30.47	m
7108150	28-May-08	54.9	6.9	13.41	1001658004	Water Supply	Domestic	SAND,GRAVEL,B OULDER		0	13.41	m
7108150	28-May-08				1001658004	Water Supply	Domestic	LIMESTONE,,	GREY	13.41	47.24	m
7108150	28-May-08				1001658004	Water Supply	Domestic	SANDSTONE,,	GREY	47.24	54.86	m
7145846	19-Mar-10	71.9	2	6.7	1002987488	Water Supply	Domestic	SAND,,	BROWN	0	22	ft
7145846	19-Mar-10				1002987488	Water Supply	Domestic	LIMESTONE,,	GREY	22	172	ft
7145846	19-Mar-10				1002987488	Water Supply	Domestic	SANDSTONE,,	GREY	172	236	ft
7166315	27-Jun-11	61.3	5.2	11.6	1003541650	Water Supply	Domestic	CLAY,STONES,PA CKED	BROWN	0	6	ft
7166315	27-Jun-11				1003541650	Water Supply	Domestic	CLAY,SAND,PAC KED	GREY	6	38	ft
7166315	27-Jun-11				1003541650	Water Supply	Domestic	LIMESTONE,SAN DSTONE,HARD	GREY	38	184	ft
7166315	27-Jun-11				1003541650	Water Supply	Domestic	SANDSTONE,,HA RD	GREY	184	201	ft
7169712	02-Aug-11	61	58.8	3.7	1003577881	Other Status		,,		0	12	ft
7169712	02-Aug-11				1003577881	Other Status		LIMESTONE,,	GREY	12	161	ft
7169712	02-Aug-11				1003577881	Other Status		SANDSTONE,,	WHITE	161	200	ft
7173742	25-Nov-11	85.3	3.7	21.9	1003622203	Water Supply	Domestic	CLAY,,	BLUE	0	48	ft
7173742	25-Nov-11				1003622203	Water Supply	Domestic	SAND,,	RED	48	68	ft
7173742	25-Nov-11				1003622203	Water Supply	Domestic	GRAVEL,,		68	72	ft
7173742	25-Nov-11				1003622203	Water Supply	Domestic	LIMESTONE,,	GREY	72	253	ft
7173742	25-Nov-11				1003622203	Water Supply	Domestic	LIMESTONE,,	GREY	253	263	ft
7173742	25-Nov-11				1003622203	Water Supply	Domestic	SANDSTONE,,	WHITE	263	272	ft
7173742	25-Nov-11				1003622203	Water Supply	Domestic	SANDSTONE,,	WHITE	272	280	ft
7206684	16-Jul-13	54.9	1.5	4.3	1004535762	Water Supply	Domestic	SAND,,		0	14	ft
7206684	16-Jul-13				1004535762	Water Supply	Domestic	LIMESTONE,,	GREY	14	102	ft
7206684	16-Jul-13				1004535762	Water Supply	Domestic	LIMESTONE,,	GREY	102	154	ft
7206684	16-Jul-13				1004535762	Water Supply	Domestic	LIMESTONE,,	GREY	154	172	ft
7206684	16-Jul-13				1004535762	Water Supply	Domestic	LIMESTONE,,	GREY	172	180	ft
7218209	13-Mar-13	67	2.8	4.57	1004724784	Water Supply	Domestic	SAND,,DRY	BROWN	0	2.43	m
7218209	13-Mar-13				1004724784	Water Supply	Domestic	TOPSOIL,,SANDY	GREY	2.43	4.57	m
7218209	13-Mar-13				1004724784	Water Supply	Domestic	LIMESTONE,,HA RD	GREY	4.57	42.66	m
7218209	13-Mar-13				1004724784	Water Supply	Domestic	SANDSTONE,,HA RD	GREY	42.66	67.05	m
7248774	03-Aug-15	42.7	4.3	4.9	1005699380	Water Supply	Domestic	CLAY,,		0	16	ft



WELL_ID	COMPLETED	WELL DEPTH (m)	STATIC WATER LEVEL (m)	DEPTH TO BEDROCK (m)	BORE_HOLE_ID	FINAL STATUS	USE1	PUMP TEST	PUMPING RATE	RECOM RATE	WATER STATE AFTER TEST	PUMP METHOD	PUMPING DURATION (h)
7047631	04-Jul-07	43.3	8.6	1.52	23047631	Water Supply	Domestic	8.56,24.72,36.57 m	56.78 LPM	56.78LPM	CLOUDY	PUMP	1 h
7053849	13-Nov-07	18.3	2.8	4.27	23053849	Water Supply	Domestic	2.8,6.27,12.19 m	91 LPM	91LPM	No information	PUMP	1 h
1502408	10-Jan-62	18.3	2.4	7.9	10024451	Water Supply	Livestock	8,10,20 ft	8 GPM	10GPM	CLOUDY	PUMP	1 h
1502409	15-Aug-64	19.8	1.2	2.4	10024452	Water Supply	Domestic	4,28,52 ft	10 GPM	5GPM	CLEAR	PUMP	0 h
1502410	12-Jun-67	6.7	2.4	-	10024453	Water Supply	Domestic	8,12,18 ft	5 GPM	5GPM	CLEAR	PUMP	1 h
1502428	16-Jun-48	18.3	4.6	9.1	10024471	Water Supply	Domestic	15,, ft	GPM	3GPM	CLEAR	PUMP	1 h
1502429	28-Jul-58	27.7	27.7	2.7	10024472	Water Supply	Domestic	No information	100 GPM	No information	CLEAR	PUMP	0.5 h
1502430	24-Nov-60	18.3	4.6	5.2	10024473	Water Supply	Domestic	15,20,20 ft	1 GPM	5GPM	CLEAR	PUMP	0.5 h
1510152	22-Jul-69	15.5	15.2	3.7	10032181	Water Supply	Domestic	0,20,25 ft	20 GPM	10GPM	CLEAR	BAILER	1 h
1515832	18-Nov-76	19.5	18.9	3.7	10037772	Water Supply	Domestic	0,50,50 ft	6 GPM	5GPM	CLOUDY	PUMP	1 h
1516119	27-Jul-77	32	1.8	4.6	10038054	Water Supply	Domestic	6,25,25 ft	20 GPM	10GPM	CLOUDY	PUMP	1 h
1523647	10-Apr-89	22.9	1.8	15.2	10045421	Water Supply	Domestic	6,30,30 ft	20 GPM	10GPM	CLOUDY	PUMP	1 h
1524746	26-Jul-90	27.4	3	4.9	10046494	Water Supply	Domestic	10,40,75 ft	20 GPM	5GPM	CLEAR	PUMP	1 h
1525897	01-Oct-91	30.5	3.4	11	10047632	Test Hole	Domestic	11,60,50 ft	50 GPM	50GPM	CLOUDY	PUMP	1 h
1525898	01-Oct-91	31.4	3.7	4.6	10047633	Test Hole	Domestic	12,80,80 ft	15 GPM	15GPM	CLOUDY	PUMP	1 h
1525899	01-Oct-91	19.2	3.7	1.2	10047634	Test Hole	Domestic	12,60,60 ft	6 GPM	6GPM	CLOUDY	PUMP	1 h
1528122	05-Jun-94	19.2	1.8	4.6	10049661	Water Supply	Domestic	6,40,40 ft	20 GPM	15GPM	CLOUDY	PUMP	1 h
1532075	25-May-01	36.6	3	2.7	10516525	Water Supply	Domestic	10,110,110 ft	10 GPM	10GPM	CLOUDY	PUMP	1 h
1532709	11-Mar-02	67.1	1.8	4.9	10523837	Water Supply	Domestic	6,100,100 ft	30 GPM	30GPM	CLOUDY	PUMP	1 h
1534049	26-Aug-03	55.2	15.2	8.2	10543164	Water Supply	Domestic	50,170,170 ft	5 GPM	5GPM	CLOUDY	PUMP	1 h
1535485	18-Mar-05	22.3	2.3	8.2	11316024	Water Supply	Domestic	2.31,2.98,7.61 m	54.6 LPM	45.5LPM	CLEAR	PUMP	1 h
1534476	22-Dec-03	54.9	3.8	1.8	11104751	Water Supply	Domestic	3.8,43,30.5 m	75.7 LPM	189.3LPM	CLEAR	PUMP	1 h
1534764	03-Jun-04	36.9	3.8	7.9	11172516	Water Supply	Domestic	3.82,18.33,33.5 m	68.25 LPM	68.25LPM	CLEAR	PUMP	1 h
1534947	05-Jul-04	37.5	3.8	1.5	11172699	Water Supply	Domestic	3.82,5.68,22.85 m	54.6 LPM	45.5LPM	CLEAR	PUMP	1 h
1535801	22-Aug-05	18.3	3.3	8.2	11316340	Water Supply	Domestic	3.31,3.47,10.97 m	91 LPM	91LPM	CLOUDY	PUMP	1 h
1535802	25-Aug-05	18.9	4.8	7.3	11316341	Water Supply	Domestic	4.77,10.67,15.24 m	91 LPM	91LPM	CLOUDY	PUMP	1 h
1536011	26-Oct-05	18.9	3.7	4	11316550	Water Supply	Domestic	3.74,9.37,15.2 m	91 LPM	91LPM	CLOUDY	PUMP	1 h
1536280	10-Mar-06	21.3	2.3	4.3	11550346	Water Supply	Domestic	2.26,3.66,15.23 m	91 LPM	91LPM	CLOUDY	PUMP	1 h
1536384	21-Apr-06	50	1.3	8.2	11550450	Water Supply	Domestic	1.3,2.04,42.67 m	91 LPM	91LPM	CLOUDY	PUMP	1 h
1536667	22-Jun-06	26.2	-	3.7	11691761	Abandoned		-	-	-	No information	No information	No information
1536737	06-Sep-06	24.7	2.3	3	11691831	Water Supply	Domestic	2.34,3.95,21.33 m	30.28 LPM	30.28LPM	CLOUDY	PUMP	1 h
7040907	24-Dec-06	18.6	0.9	3.4	11763343	Water Supply	Domestic	0.86,1.86,15.24 m	91 LPM	91LPM	CLOUDY	PUMP	1 h
7108135	03-Jun-08	30.5	7.3	0.91	1001657826	Water Supply	Domestic	7.32,7.64,24.38 m	91 LPM	91LPM	No information	No information	1 h
7108150	28-May-08	54.9	6.9	13.41	1001658004	Water Supply	Domestic	6.93,17.6,30.47 m	91 GPM	91GPM	No information	No information	1 h
7145846	19-Mar-10	71.9	2	6.7	1002987488	Water Supply	Domestic	6.6,6.7,100 ft	20 GPM	20GPM	OTHER	No information	1 h
7166315	27-Jun-11	61.3	5.2	11.6	1003541650	Water Supply	Domestic	16.9,37.4,120 ft	17 GPM	10GPM	CLEAR	No information	1 h
7169712	02-Aug-11	61	58.8	3.7	1003577881	Other Status	Deepening of Existing Well	-	-	-	No information	No information	No information
7173742	25-Nov-11	85.3	3.7	21.9	1003622203	Water Supply	Domestic	12,95.333,150 ft	16 GPM	16GPM	No information	No information	1 h
7206684	16-Jul-13	54.9	1.5	4.3	1004535762	Water Supply	Domestic	4.8,8.3,100 ft	15 GPM	15GPM	No information	No information	1 h
7218209	13-Mar-13	67	2.8	4.57	1004724784	Water Supply	Domestic	2.75,5.8,15.23 m	50.05 LPM	45.5LPM	CLEAR	No information	1 h
7248774	03-Aug-15	42.7	4.3	4.9	1005699380	Water Supply	Domestic	14.25,43.67,120 ft	20 GPM	20GPM	No information	No information	1 h

WELL_ID	COMPLETED	WELL DEPTH (m)	STATIC WATER LEVEL (m)	DEPTH TO BEDROCK (m)	BORE_HOLE_ID	FINAL STATUS	USE1	PUMP TEST	PUMPING RATE	RECOM RATE	WATER STATE AFTER TEST	PUMP METHOD	PUMPING DURATION (h)
7268450	03-Jun-16	48.8	2.6	11.9	1006196544	Water Supply	Domestic	8.583,9,100 ft	20 GPM	20GPM	No information	No information	1 h
7307165	02-Oct-17	35	2.9	7.01	1006998312	Water Supply	Domestic	2.9,4.15,15.23 m	54.6 LPM	45.5LPM	CLEAR	No information	1 h
7318079	11-Jul-18	61	4.3	3	1007285584	Water Supply	Domestic	14.2,15.5,100 ft	20 GPM	20GPM	No information	No information	1 h

# APPENDIX C - LABORATORY CERTIFICATE OF ANALYSIS



**Certificate of Analysis**

Client: Egis Canada Ltd.  
115 Walgreen Rd., R.R. #3  
Carp, ON  
K0A 1L0  
Attention: Ms. Rebecca Leduc  
PO#:  
Invoice to: EGIS Canada Ltd.

Report Number: 3013373  
Date Submitted: 2024-12-18  
Date Reported: 2024-12-27  
Project: 25-1134  
COC #: 918293

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**Dear Rebecca Leduc:**

**Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).**

Report Comments:

APPROVAL: \_\_\_\_\_  
Addrine Thomas, Inorganics Supervisor

All analysis is completed at Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) unless otherwise indicated.

Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on the scope of accreditation. The scope is available at: <https://directory.cala.ca/>.

Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is licensed by the Ontario Ministry of the Environment, Conservation, and Parks (MECP) for specific tests in drinking water (license #2318). A copy of the license is available upon request.

Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is accredited by the Ontario Ministry of Agriculture, Food, and Rural Affairs for specific tests in agricultural soils.

Please note: Field data, where presented on the report, has been provided by the client and is presented for informational purposes only. Guideline values listed on this report are provided for ease of use (informational purposes) only. Eurofins recommends consulting the official provincial or federal guideline as required. Unless otherwise stated, measurement uncertainty is not taken into account when determining guideline or regulatory exceedances.

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Group	Analyte	MRL	Units	Guideline	Result
				Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1754616 GW 2024-12-18 TW1
Anions	Cl	1	mg/L	AO 250	14
	F	0.10	mg/L	MAC 1.5	0.49
	N-NO2	0.10	mg/L	MAC 1.0	<0.10
	N-NO3	0.10	mg/L	MAC 10.0	<0.10
	SO4	1	mg/L	AO 500	39
General Chemistry	Alkalinity as CaCO3	5	mg/L	OG 30-500	279
	Colour (Apparent)	2	TCU	AO 5	10*
	Conductivity	5	uS/cm		630
	DOC	0.5	mg/L	AO 5	4.0
	pH	1.00		6.5-8.5	7.91
	Phenols	0.001	mg/L		<0.001
	S2-	0.01	mg/L	AO 0.05	<0.01
	Tannin & Lignin	0.1	mg/L		0.1
	TDS (COND - CALC)	1	mg/L	AO 500	410
Turbidity	0.1	NTU	AO 5	1.2	
Hardness	Hardness as CaCO3	1	mg/L	OG 80-100	309*
Indices/Calc	Ion Balance	0.01			1.03
Metals	Ag	0.0001	mg/L		<0.0001
	Al	0.01	mg/L	OG 0.1	<0.01
	As	0.001	mg/L	IMAC 0.01	<0.001
	B	0.01	mg/L	IMAC 5.0	0.21
	Ba	0.01	mg/L	MAC 1.0	0.10
	Be	0.0005	mg/L		<0.0005
	Ca	1	mg/L		76
	Cd	0.0001	mg/L	MAC 0.005	<0.0001

Guideline = ODWSOG

\* = Guideline Exceedence

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Lab I.D. 1754616  
 Sample Matrix GW  
 Sample Type  
 Sampling Date 2024-12-18  
 Sample I.D. TW1

Group	Analyte	MRL	Units	Guideline	
Metals	Co	0.0002	mg/L		<0.0002
	Cr	0.001	mg/L	MAC 0.05	<0.001
	Cu	0.001	mg/L	AO 1	<0.001
	Fe	0.03	mg/L	AO 0.3	0.23
	Hg	0.0001	mg/L	MAC 0.001	<0.0001
	K	1	mg/L		5
	Mg	1	mg/L		29
	Mn	0.01	mg/L	AO 0.05	<0.01
	Mo	0.005	mg/L		<0.005
	Na	1	mg/L	AO 200	16
	Ni	0.005	mg/L		<0.005
	Pb	0.001	mg/L	MAC 0.010	<0.001
	Sb	0.0005	mg/L	IMAC 0.006	<0.0005
	Se	0.001	mg/L	MAC 0.05	<0.001
	Sn	0.01	mg/L		<0.01
	Sr	0.001	mg/L		2.60
	Ti	0.01	mg/L		<0.01
	Tl	0.0001	mg/L		<0.0001
	U	0.001	mg/L	MAC 0.02	<0.001
	V	0.001	mg/L		<0.001
W	0.002	mg/L		<0.002	
Zn	0.01	mg/L	AO 5	<0.01	
Microbiology	Escherichia Coli	0	ct/100mL	MAC 0	0
	Faecal Coliforms	0	ct/100mL		0
	Heterotrophic Plate Count	0	ct/1mL		0

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Lab I.D. 1754616  
 Sample Matrix GW  
 Sample Type  
 Sampling Date 2024-12-18  
 Sample I.D. TW1

Group	Analyte	MRL	Units	Guideline	
Microbiology	Total Coliforms	0	ct/100mL	MAC 0	0
Nutrients	N-NH3	0.020	mg/L		0.115
	Total Kjeldahl Nitrogen	0.100	mg/L		0.360
VOCs Surrogates	1,2-dichloroethane-d4	0	%		103
	4-bromofluorobenzene	0	%		76
	Toluene-d8	0	%		122
Volatiles	1,1,1,2-tetrachloroethane	0.5	ug/L		<0.5
	1,1,1-trichloroethane	0.4	ug/L		<0.4
	1,1,2,2-tetrachloroethane	0.5	ug/L		<0.5
	1,1,2-trichloroethane	0.4	ug/L		<0.4
	1,1-dichloroethane	0.4	ug/L		<0.4
	1,1-dichloroethylene	0.5	ug/L	MAC 14	<0.5
	1,2-dichlorobenzene	0.4	ug/L	MAC 200	<0.4
	1,2-dichloroethane	0.5	ug/L	IMAC 5	<0.5
	1,2-dichloropropane	0.5	ug/L		<0.5
	1,3,5-trimethylbenzene	0.3	ug/L		<0.3
	1,3-dichlorobenzene	0.4	ug/L		<0.4
	1,3-Dichloropropylene (cis+trans)	0.5	ug/L		<0.5
	1,4-dichlorobenzene	0.4	ug/L	MAC 5	<0.4
	Acetone	5	ug/L		<5
	Benzene	0.5	ug/L	MAC 1	<0.5
	Bromodichloromethane	0.3	ug/L		<0.3
	Bromoform	0.4	ug/L		<0.4
Bromomethane	0.5	ug/L		<0.5	
c-1,2-Dichloroethylene	0.4	ug/L		<0.4	

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Lab I.D.  
 Sample Matrix  
 Sample Type  
 Sampling Date  
 Sample I.D.

1754616  
 GW  
 2024-12-18  
 TW1

Group	Analyte	MRL	Units	Guideline	
Volatiles	c-1,3-Dichloropropylene	0.5	ug/L		<0.5
	Carbon Tetrachloride	0.2	ug/L	MAC 2	<0.2
	Chloroethane	0.5	ug/L		<0.5
	Chloroform	0.5	ug/L		<0.5
	Dibromochloromethane	0.3	ug/L		<0.3
	Dichlorodifluoromethane	0.5	ug/L		<0.5
	Dichloromethane	4.0	ug/L	MAC 50	<4.0
	Ethylbenzene	0.5	ug/L	MAC 140	<0.5
	Ethylene Dibromide	0.2	ug/L		<0.2
	Hexane	5	ug/L		<5
	m/p-xylene	0.4	ug/L		<0.4
	Methyl Ethyl Ketone (MEK)	2	ug/L		<2
	Methyl Isobutyl Ketone (MIBK)	5	ug/L		<5
	Methyl Tert Butyl Ether (MTBE)	2	ug/L	AO 15	<2
	Monochlorobenzene	0.5	ug/L	MAC 80	<0.5
	o-xylene	0.4	ug/L		<0.4
	Styrene	0.5	ug/L		<0.5
	t-1,2-Dichloroethylene	0.4	ug/L		<0.4
	t-1,3-Dichloropropylene	0.5	ug/L		<0.5
	Tetrachloroethylene	0.3	ug/L	MAC 10	<0.3
	Toluene	0.4	ug/L	MAC 60	<0.4
	Trichloroethylene	0.3	ug/L	MAC 5	<0.3
Trichlorofluoromethane	0.5	ug/L		<0.5	
Vinyl Chloride	0.2	ug/L	MAC 1	<0.2	
Xylene; total	0.5	ug/L	MAC 90	<0.5	

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**QC Summary**

Analyte	Blank	QC % Rec	QC Limits
<b>Run No</b> 470279 <b>Analysis/Extraction Date</b> 2024-12-19 <b>Analyst</b> L V <b>Method</b> AMBCOLM1			
Escherichia Coli			
Faecal Coliforms			
Heterotrophic Plate Count			
Total Coliforms			
<b>Run No</b> 470314 <b>Analysis/Extraction Date</b> 2024-12-19 <b>Analyst</b> SKH <b>Method</b> EPA 350.1			
N-NH3	<0.020 mg/L	109	80-120
<b>Run No</b> 470322 <b>Analysis/Extraction Date</b> 2024-12-19 <b>Analyst</b> IP <b>Method</b> SM5530D/EPA420.2			
Phenols	<0.001 mg/L	105	50-120
<b>Run No</b> 470323 <b>Analysis/Extraction Date</b> 2024-12-19 <b>Analyst</b> M B <b>Method</b> C SM2130B			
Turbidity	<0.1 NTU	103	70-130
<b>Run No</b> 470360 <b>Analysis/Extraction Date</b> 2024-12-19 <b>Analyst</b> AaN <b>Method</b> EPA 200.8			
Silver	<0.0001 mg/L	112	80-120
Aluminum	<0.01 mg/L	113	80-120

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**QC Summary**

Analyte	Blank	QC % Rec	QC Limits
Arsenic	<0.001 mg/L	99	80-120
Boron (total)	<0.01 mg/L	101	80-120
Barium	<0.01 mg/L	97	80-120
Beryllium	<0.0005 mg/L	104	80-120
Cadmium	<0.0001 mg/L	101	80-120
Cobalt	<0.0002 mg/L	109	80-120
Chromium Total	<0.001 mg/L	97	80-120
Copper	<0.001 mg/L	109	80-120
Iron	<0.03 mg/L	100	80-120
Mercury	<0.0001 mg/L	103	80-120
Manganese	<0.01 mg/L	108	80-120
Molybdenum	<0.005 mg/L	107	80-120
Nickel	<0.005 mg/L	112	80-120
Lead	<0.001 mg/L	109	80-120
Antimony	<0.0005 mg/L	82	80-120
Selenium	<0.001 mg/L	97	80-120
Sn	<0.01 mg/L	92	80-120
Strontium	<0.001 mg/L	98	80-120

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**QC Summary**

Analyte	Blank	QC % Rec	QC Limits
Titanium	<0.01 mg/L	100	80-120
Thallium	<0.0001 mg/L	107	80-120
Uranium	<0.001 mg/L	98	80-120
Vanadium	<0.001 mg/L	102	80-120
W	<0.002 mg/L	95	80-120
Zinc	<0.01 mg/L	108	80-120
<b>Run No</b> 470425 <b>Analysis/Extraction Date</b> 2024-12-23 <b>Analyst</b> IP			
<b>Method</b> SM 4110			
Chloride	<1 mg/L	100	90-110
N-NO2	<0.10 mg/L	106	90-110
N-NO3	<0.10 mg/L	99	90-110
SO4	<1 mg/L	100	90-110
<b>Run No</b> 470446 <b>Analysis/Extraction Date</b> 2024-12-23 <b>Analyst</b> AsA			
<b>Method</b> C SM4500-S2-D			
S2-	<0.01 mg/L	87	80-120
<b>Run No</b> 470468 <b>Analysis/Extraction Date</b> 2024-12-23 <b>Analyst</b> SKH			
<b>Method</b> EPA 351.2			
Total Kjeldahl Nitrogen	<0.100 mg/L	98	70-130

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**Certificate of Analysis**

Client: Egis Canada Ltd.  
 115 Walgreen Rd., R.R. #3  
 Carp, ON  
 K0A 1L0  
 Attention: Ms. Rebecca Leduc  
 PO#:   
 Invoice to: EGIS Canada Ltd.

Report Number: 3013373  
 Date Submitted: 2024-12-18  
 Date Reported: 2024-12-27  
 Project: 25-1134  
 COC #: 918293

**QC Summary**

Analyte	Blank	QC % Rec	QC Limits
<b>Run No</b> 470469 <b>Analysis/Extraction Date</b> 2024-12-23 <b>Analyst</b> AsA <b>Method</b> SM2320,2510,4500H/F			
Alkalinity (CaCO3)	<5 mg/L	99	90-110
Conductivity	<5 uS/cm	100	90-110
F	<0.10 mg/L	107	90-110
pH		99	90-110
<b>Run No</b> 470472 <b>Analysis/Extraction Date</b> 2024-12-23 <b>Analyst</b> AsA <b>Method</b> SM 5310B			
DOC	<0.5 mg/L	99	80-120
<b>Run No</b> 470473 <b>Analysis/Extraction Date</b> 2024-12-24 <b>Analyst</b> AsA <b>Method</b> C SM2120C			
Colour (Apparent)	<2 TCU	105	90-110
<b>Run No</b> 470478 <b>Analysis/Extraction Date</b> 2024-12-24 <b>Analyst</b> Z S <b>Method</b> M SM3120B-3500C			
Calcium	<1 mg/L	98	90-110
Potassium	<1 mg/L	103	87-113
Magnesium	<1 mg/L	94	76-124
Sodium	<1 mg/L	99	82-118

**Guideline = ODWSOG**

**\* = Guideline Exceedence**

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**QC Summary**

Analyte	Blank	QC % Rec	QC Limits
<b>Run No</b> 470480 <b>Analysis/Extraction Date</b> 2024-12-24 <b>Analyst</b> Z S <b>Method</b> C SM2340B			
Hardness as CaCO3			
Ion Balance			
TDS (COND - CALC)			
<b>Run No</b> 470483 <b>Analysis/Extraction Date</b> 2024-12-24 <b>Analyst</b> AsA <b>Method</b> C SM5550B			
Tannin & Lignin	<0.1 mg/L	90	80-120
<b>Run No</b> 470537 <b>Analysis/Extraction Date</b> 2024-12-20 <b>Analyst</b> H S <b>Method</b> EPA 8260			
Tetrachloroethane, 1,1,1,2-	<0.5 ug/L	116	60-130
Trichloroethane, 1,1,1-	<0.4 ug/L	113	60-130
Tetrachloroethane, 1,1,2,2-	<0.5 ug/L	85	60-130
Trichloroethane, 1,1,2-	<0.4 ug/L	109	60-130
Dichloroethane, 1,1-	<0.4 ug/L	101	60-130
Dichloroethylene, 1,1-	<0.5 ug/L	112	60-130
Dichlorobenzene, 1,2-	<0.4 ug/L	98	60-130
Dichloroethane, 1,2-	<0.5 ug/L	120	60-130
Dichloropropane, 1,2-	<0.5 ug/L	87	60-130

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**QC Summary**

Analyte	Blank	QC % Rec	QC Limits
1,3,5-trimethylbenzene	<0.3 ug/L	89	60-130
Dichlorobenzene, 1,3-	<0.4 ug/L	93	60-130
Dichlorobenzene, 1,4-	<0.4 ug/L	102	60-130
Acetone	<5 ug/L	103	60-130
Benzene	<0.5 ug/L	99	60-130
Bromodichloromethane	<0.3 ug/L	121	60-130
Bromoform	<0.4 ug/L	118	60-130
Bromomethane	<0.5 ug/L	88	60-130
Dichloroethylene, 1,2-cis-	<0.4 ug/L	99	60-130
Dichloropropene, 1,3-cis-	<0.5 ug/L	76	60-130
Carbon Tetrachloride	<0.2 ug/L	120	60-130
Chloroethane	<0.5 ug/L	106	60-130
Chloroform	<0.5 ug/L	112	60-130
Dibromochloromethane	<0.3 ug/L	113	60-130
Dichlorodifluoromethane	<0.5 ug/L	99	60-130
Methylene Chloride	<4.0 ug/L	97	60-130
Ethylbenzene	<0.5 ug/L	102	60-130
Ethylene dibromide	<0.2 ug/L	119	60-130

**Guideline = ODWSOG**

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**QC Summary**

Analyte	Blank	QC % Rec	QC Limits
Hexane (n)	<5 ug/L	83	60-130
m/p-xylene	<0.4 ug/L	102	60-130
Methyl Ethyl Ketone	<2 ug/L	110	60-130
Methyl Isobutyl Ketone	<5 ug/L	118	60-130
Methyl tert-Butyl Ether (MTBE)	<2 ug/L	109	60-130
Chlorobenzene	<0.5 ug/L	114	60-130
o-xylene	<0.4 ug/L	92	60-130
Styrene	<0.5 ug/L	103	60-130
Dichloroethylene, 1,2-trans-	<0.4 ug/L	93	60-130
Dichloropropene, 1,3-trans-	<0.5 ug/L	91	60-130
Tetrachloroethylene	<0.3 ug/L	127	60-130
Toluene	<0.4 ug/L	104	60-130
Trichloroethylene	<0.3 ug/L	99	60-130
Trichlorofluoromethane	<0.5 ug/L	123	60-130
Vinyl Chloride	<0.2 ug/L	107	60-130
<b>Run No</b> 470540 <b>Analysis/Extraction Date</b> 2024-12-27 <b>Analyst</b> H S <b>Method</b> EPA 8260			
Xylene Mixture			

**Guideline = ODWSOG**

**\* = Guideline Exceedence**

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**QC Summary**

Analyte	Blank	QC % Rec	QC Limits
Run No 470541	Analysis/Extraction Date 2024-12-27	Analyst H S	
Method EPA 8260			
Dichloropropene, 1,3-			

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## APPENDIX D - CERTIFICATE OF CALIBRATION



25-0583 + 25-1134



# CERTIFICATE OF CALIBRATION

The HORIBA Instrument listed below has been inspected and calibrated following the Manufacturer's specifications and methods.

Instrument Model: **HORIBA U-52**      Serial Number: **X8RGLCRY**      Calibration Date: **December 11, 2024**

<u>2-POINT pH</u>	<u>CONDUCTIVITY</u>	<u>TURBIDITY</u>	<u>DISSOLVED OXYGEN</u>	<u>OXIDIZATION-REDUCTION POTENTIAL</u>	<u>TEMPERATURE</u>
4.00 pH, 7.00 pH	4.49mS/cm ZERO CHECKED	0 & 100 NTU	8.26 mg/L @ 25.0 DegC SODIUM SULFITE ZERO	240mV	Fisher Scientific s/n 230606647
AutoCal 4.00 pH Solution LOT # 4GI0133	AutoCal Solution LOT # 4GI0133	AutoCal Solution LOT# 4GI0133	Oakton Zero Solution LOT# 805004	Hanna ORP LOT # 9289	
Expiry Date: September 1, 2025	Expiry Date: September 1, 2025	Expiry Date: September 1, 2025	Expiry Date: June 1, 2026	Expiry Date: October 1, 2028	
pH 7.00 LOT # 4GF0046	@25 DegC LOT # 4GI0133	Turb. 100 NTU LOT # A4152			
Expiry Date: June 1, 2026		Expiry Date: June 1, 2026			

The calibration standard used is considered to be a certified standard and is traceable to the National Institute of Standards and Technology (NIST). Certificate of Analysis is available upon request.

The instrument indicated above is now certified to be operating within the Manufacturer's specifications. This does not eliminate the requirement for regular maintenance and pre-use sensor response checks in order to ensure continued complete and accurate operating condition.

Certified By: Jason Ashe

## MAXIM Environmental and Safety Inc.

[sales@maximenvironmental.com](mailto:sales@maximenvironmental.com)  
[www.maximenvironmental.com](http://www.maximenvironmental.com)



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9 - 148 Colonnade Rd., Ottawa, ON K2E 7R4  
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APPENDIX E - SITE PLAN AREA OF  
DEVELOPMENT- GRC ARCHITECTS  
(DECEMBER 18, 2024)



