May 9, 2024

PH4650-LET.03

Brofort Investments Inc.
2161 Thurston Drive
Ottawa, Ontario
K1G 6C9

Attention: **Phil Klugman**

Subject: **Hydrogeological Assessment**
Proposed Commercial Development
6165 Thunder Road, Ottawa, Ontario

PATERSON GROUP
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Geotechnical Engineering
Environmental Engineering
Hydrogeology
Materials Testing
Building Science
Rural Development Design
Retaining Wall Design
Noise and Vibration Studies

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Introduction

Further to your request, Paterson Group (Paterson) has completed a Hydrogeological Assessment in support of Site Plan application for a proposed commercial development to be located at 6165 Thunder Road in Ottawa, Ontario. Please refer to the Key Plan attached for the approximate Site location.

The purpose of this Assessment has been to determine the suitability of the water supply aquifer underlying the site to support the Site Plan Application for the proposed commercial development.

This Hydrogeological Assessment is completed with the understanding that potable water will be provided from the Carlsbad Trickle Feed system (municipal supply), and non-potable water will be provided by the onsite drilled well.

It is a requirement that the non-potable water is sufficiently treated in accordance with the Ministry of the Environment, Conservation and Parks (MECP) Consent Not to Abandon Water Supply Well (A342424) located at 6165 Thunder Road, Ottawa, Ontario, (CNTAWSW) attached to this report.

Description of the Site

The subject site (Site) is located at 6165 Thunder Road, situated between Thunder Road and Boundary Road, with the 417 on/off ramp to the north, in Carlsbad Springs (Ottawa), Ontario. The Site is an approximately 1.65 ha in size and is currently vacant. The Site Plan application is for a proposed commercial development consisting of a warehouse

building with associated infrastructure to be constructed on the currently undeveloped land. Please refer to Figure-1 Key Plan and Stewart and Tsai Architects Inc Preliminary Site Plan dated April 8, 2024, attached, for the proposed site location and site layout.

As there were no existing drilled wells onsite, a licensed well contractor (Air Rock Drilling) was retained to install a new drilled well on site on March 2, 2023. The new drilled well, hereby referred to as TW1, was submitted to a pumping test in support of the Site Plan application and was able to provide a sufficient volume of groundwater for the proposed development.

Available geological mapping of the subject site indicates that the bedrock underlying the subject site consists of shale and limestone of the Carlsbad Formation. The bedrock aquifers accessed through the Carlsbad Formation are known to be of poor quality.

A new sewage system to service the commercial building has been proposed. A septic flow calculation was completed as part of the Ottawa Sepic System Office (OSSO) Septic System Installation Permit application and resulted in a total daily design sanitary sewage flow (TDDSSF) volume of 5,415 L/day. A septic design has been completed and the design drawings completed by Paterson titled PH4650-1(rev.1) - Sewage System Layout Plan and PH4650-2(rev.1) - Sewage System Details and Notes are attached to this report. An approved OSSO sewage system permit will be submitted with the Site Plan application.

The suitability of the aquifer to supply the subject site was assessed using the methodology provided in City of Ottawa Hydrogeological and Terrain Analysis Guidelines (HTAG).

Raisin-South Nation Source Protection Plan

The Raisin-South Nation Source Protection Plan (RSNSPP) provides guidance as to which policies apply to a given property, municipality or specific activity and if there are specific designations that apply to the area. The subject site and surrounding areas have been designated as a Significant Groundwater Recharge Area (SGRA), and a Highly Vulnerable Aquifer (HVA) within the RSNSPP and are identified as two of four groundwater related vulnerable areas identified within the Clean Water Act (2006). The four vulnerable areas consist of SGRA, HVA, Intake Protection Zone (IPZ) and Wellhead Protection Area (WHPA).

Based upon the designation of an SGRA and HVA, the RSNSPP provides a list of activities that are prohibited, managed or encouraged to change dependent upon the vulnerable area type. There is no prohibition of land uses on the subject site based upon its current proposed usage.

Therefore, there are no related requirements for an HVA or SGRA at this location.

Karst

Available Karst mapping (OGS GRS005) was reviewed a part of this assessment. The available mapping does not indicate the presence of any inferred or potential karstic features. Furthermore, no indication of karstic features were observed during the site visits completed by Paterson personnel.

Mineralized Well Water Report

As part of the pumping test of TW1, groundwater samples were collected from the onsite well and submitted to an accredited laboratory for comprehensive testing of bacteriological, chemical and physical water quality parameters consistent with the standard “Subdivision Supply” suite of parameters, trace metals and Volatile Organic Compounds (VOC’s). The geochemical test results from the well indicated that the well encountered a mineralized aquifer, as defined by O.Reg 903 (Wells regulation), due to chlorides greater than 500 mg/L. As the groundwater supply available onsite is considered mineralized, an application to the Ministry of the Environment, Conservation, and Parks (MECP) to retain the well producing mineralized water was completed and can be found attached to this report.

As the intention of the mineralized well clause is to prevent contamination of a good quality aquifer, Paterson has determined that the quality in the surficial and bedrock aquifer will not be further impacted by the use of TW1. As per previous discussions with the City of Ottawa (City) and MECP, the bedrock aquifer in the area is known for its poor quality, which is why the Carlsbad Trickle System was installed. There are no known aquifers available, based on our review and anecdotal evidence, that provide a groundwater with sufficient quality to meet the required guidelines.

The mineralized well will not be used as a drinking water supply and on-site treatment is required by the MECP’s CNTAWSW to allow the groundwater to be usable for non-potable uses (toilets, hand washing, hoses, etc). Potable water will be supplied by the Carlsbad Trickle System. The subject site was allocated one connection to the Carlsbad Trickle System which will provide up to 2,700 L/d of potable water. There will be no consumption of the non-potable water supply and signs will be posted to indicate that there should be no consumption from the bathroom faucets. Access to bathrooms will not be available to the public and as such it is not considered a public supply.

A Mineralized Well Water Report (MWWR) was completed by Paterson as part of the MECP application to retain a well producing mineralized water. The report is titled Mineralized Well Water Report - 6165 Thunder Road, Ottawa, Ontario; with File number PH4650-LET.02.Rev.01; and dated October 31, 2023. Please refer to the aforementioned report for details regarding the application to retain a well producing mineralized water.

The MECP granted permission to retain the Mineralized Well with WWR ID A342424, however they listed conditions for approval in their letter titled “Approval Letter; Re:Consent Not to Abandon Water Supply Well (A342424), Located at 6165 Thunder

Road, Ottawa, Ontario" dated December 4, 2023. The reader should refer to the aforementioned attached letter for the conditions required by the MECP to retain the onsite mineralized well.

Field Program

A new drilled well (Tag # A342424) was constructed by Air Rock Drilling on March 2, 2023 (referred to as TW1). It was constructed close to the eastern side of the site, by Boundary Road and is located approximately 40 m away from the proposed sewage system and septic area.

The MECP Water Well Record (WWR) indicates that the well extends to approximately 55 m below ground surface (bgs). The 158.75 mm steel casing is recorded to extend to 23.2 m bgs, with a 0.61 m stick up. Shale bedrock was encountered at 23.2 m bgs. See Stewart and TSAI Architects INC. dated May 7, 2024 (attached) for the approximate location of TW1. The overburden material around the well casing was recorded to consist of clay down to a depth of approximately 23 m, with some gravel encountered at 19.5 m bgs. The onsite WWR demonstrates a sufficient clay thickness (>10 m) to be used in support of a system isolation approach for the Terrain Analysis in accordance with the City of Ottawa Hydrogeological Assessment and Terrain Analysis Guidelines (HTAG). A copy of the WWR can be found attached.

As a means to evaluate the water supply aquifer intercepted by the new drilled well, the well was subjected to an 8-hour constant rate pumping test. The pumping test was conducted on March 14, 2023 under the full-time supervision of Paterson personnel. The pumping test was carried out at a pumping rate of 38 L/min for a duration of 8 hours.

During the pump test, the pumping rate was periodically measured using the time volume correlation method. The pump rate was maintained within 5% of the selected pump rate. The static water level was recorded and an electronic datalogger (VanEssen TD-DIVER) was installed in the test well prior to the start of the pumping test. The data logger recorded water levels at 20 second intervals. In addition, manual water level readings were taken at periodic intervals during the test.

Air Rock Drilling Co. Ltd was retained to supply a submersible pump and generator for the pumping test. The discharge hose was directed away from the well towards the southwest.

Groundwater samples were collected 4 hours and 8 hours after the commencement of the pumping test. Prior to the collection of the groundwater samples, the free chlorine residual was tested and found to be non-detectable. The water samples were submitted for comprehensive testing of bacteriological, chemical, and physical water quality parameters consistent with the standard "Subdivision Supply" suite of parameters, trace metals, and VOCs as per the HTAG.

Aquifer Analysis

Water Quantity

Pumping test data from the pumping test performed at TW1 was analyzed using AQTESOLV Pro Version 4 aquifer analysis software package by HydroSOLVE Inc. Drawdown data was measured using an electronic water level tape and an electronic datalogger unit.

Table 1: SUMMARY OF WATER SUPPLY AQUIFER CHARACTERISTICS OF TW1	
AQUIFER PARAMETER	RESULT OF ANALYSIS
Transmissivity (m^2/day)	39.3
Pumping Rate (L/min)	38
Pre-test Static Water Level (m TOC)	3.9
Post-test Static Water Level (m TOC)	15.5
Available Drawdown (m)	51.1
% Drawdown During Pump Test (%)	23
Specific Capacity (L/min/m drawdown)	3.3

The drawdown data was analyzed using the Theis and Cooper Jacob methods of analysis. Aquifer transmissivity is estimated to be 39.3 m^2/day. Refer to the Theis and Cooper Jacob methods of analysis data sheets attached to this report.

The pumping test results show that TW1 has a high yield to support the water demands that may be required. Overall maximum drawdown at a constant pumping rate for a period of 8 hours was approximately 11.6 m (23 % of the available drawdown). 95 % recovery was achieved approximately 70 minutes after the end of pumping.

The total volume of water pumped during the 8-hour pumping event was approximately 18,240 L. The maximum Total Daily Design Sanitary Sewage Flows (TDDSSF) were determined to be approximately 5,415 L/d, based on Ontario Building Code 8.2.1.3 (Refer to PH4650-2(rev.1) - Sewage System Details and Notes, attached). The TDDSSF will comprise of 2,700 L/day from the Carlsbad Trickle Feed System and 2,715 L/day from TW1.

The total volume of water pumped during the 8 hour pumping event is approximately 7 times the anticipated water taking volume from TW1 required to support the Site Plan application.

The suitability of the aquifer to supply the proposed Site Plan Application for the proposed commercial modification was assessed using the methodology provided in the City of Ottawa Hydrogeological and Terrain Analysis Guidelines (HTAG).

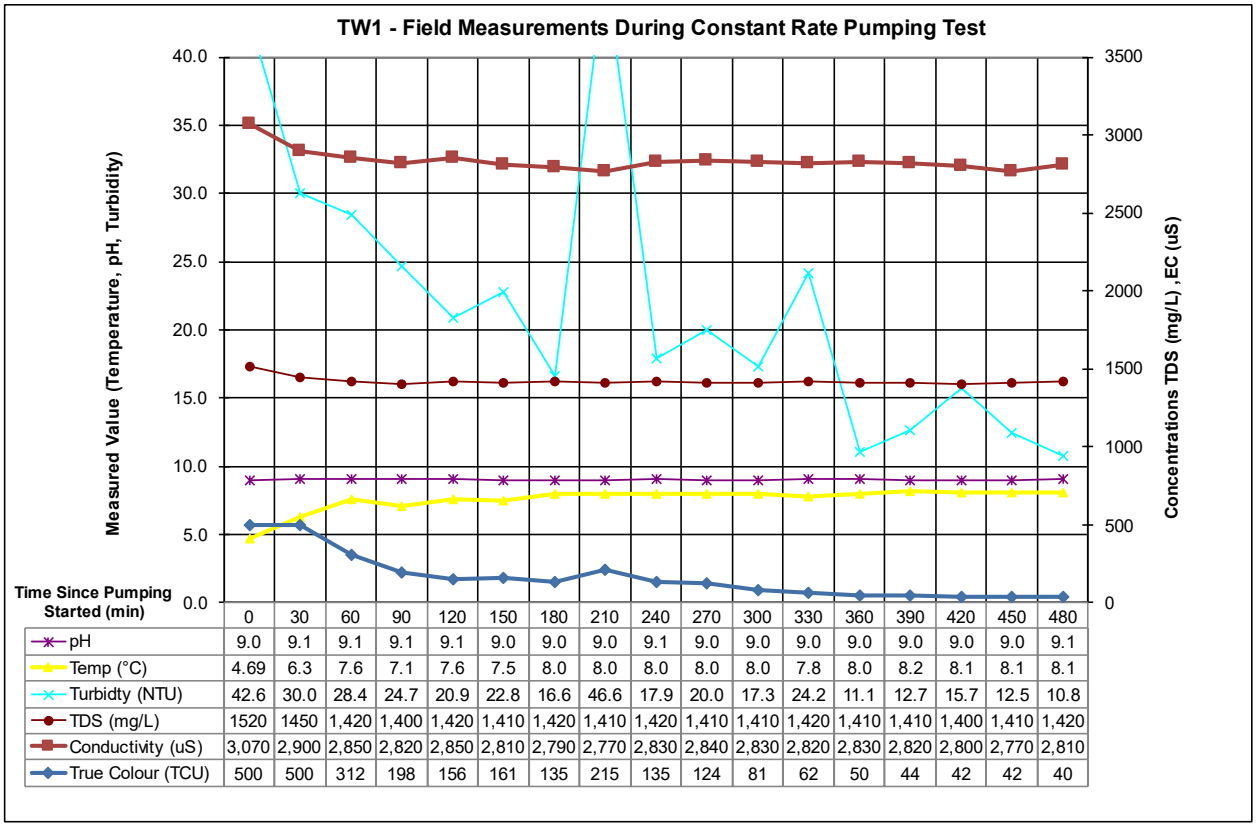
Based on the information summarized in Table 1, it is readily apparent that the water supply well has intercepted an adequately strong water supply aquifer which has sufficient quantity to service the proposed Site Plan application.

Given the analyses presented and summarized above, it is our opinion that there is an adequate supply of water to support the proposed Site Plan application.

Water Quality

Field Data

Turbidity, electrical conductivity, total dissolved solids (TDS), pH, true colour, and temperature were measured at the wellhead during the pumping test. The measurements and time intervals for each of these parameters are summarized on the graphical representation below. In addition, a HACH Pocket Colorimeter II chlorine reader was used to measure the free chlorine residual level. No chlorine residual was detected in the discharge water prior to the collection of the water samples.



Time Since Pumping Started (min)	0	30	60	90	120	150	180	210	240	270	300	330	360	390	420	450	480
pH	9.0	9.1	9.1	9.1	9.1	9.0	9.0	9.0	9.1	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.1
Temp (°C)	4.69	6.3	7.6	7.1	7.6	7.5	8.0	8.0	8.0	8.0	8.0	7.8	8.0	8.2	8.1	8.1	8.1
Turbidty (NTU)	42.6	30.0	28.4	24.7	20.9	22.8	16.6	46.6	17.9	20.0	17.3	24.2	11.1	12.7	15.7	12.5	10.8
TDS (mg/L)	1520	1450	1,420	1,400	1,420	1,410	1,420	1,410	1,420	1,410	1,410	1,420	1,410	1,410	1,400	1,410	1,420
Conductivity (uS)	3,070	2,900	2,850	2,820	2,850	2,810	2,790	2,770	2,830	2,840	2,830	2,820	2,830	2,820	2,800	2,770	2,810
True Colour (TCU)	500	500	312	198	156	161	135	215	135	124	81	62	50	44	42	42	40

Laboratory Data

The laboratory water quality results from the subdivision package are provided in Table 2a and the trace metal results are provided in Table 2b below. VOC laboratory analytical testing were completed and measured to be non-detect or below the regulatory limits in the sample results. The full laboratory analyses results can be found attached.

The bacteriological test results (Certificate of Analysis – Report No.1994690) indicated that the test samples at the 4 and 8 hour interval were non-detect (0 ct/100 mL) for E.Coli and Total Coliforms.

It is a requirement that the non-potable water supply is treated to meet MECP non-potable water standards as outlined in PH4650.LET02.REV.01 – Mineralized Well Report, attached to this report.

TABLE 2A: GROUNDWATER GEOCHEMISTRY (TW1)					
PARAMETER	UNITS	ODWS		TW1	
		LIMIT	TYPE	GW1 2023-03-14	GW2 2023-03-14
MICROBIOLOGICAL					
Escherichia Coli (E.Coli)	ct/100mL	0	MAC	0	0
Total Coliforms	ct/100mL	0	MAC	0	0
GENERAL CHEMICAL - HEALTH RELATED					
Fluoride	mg/L	1.5(2.4)	MAC	1.44	1.44
N-NO2 (Nitrite)	mg/L	1	MAC	<0.10	<0.10
N-NO3 (Nitrate)	mg/L	10	MAC	<0.10	<0.10
Turbidity (Laboratory)	NTU	1.0 (5.0)	MAC/AO	49.8	22.30
N-NH3 (Ammonia)	mg/L	-	-	0.4	0.50
Total Kjeldahl Nitrogen	mg/L	-	-	1.47	1.43
GENERAL CHEMICAL - AESTHETIC RELATED					
Hardness (as $CaCO_3$)	mg/L	100	OG	45	40
Ion Balance	unitless	-	-	0.92	0.96
Total Dissolved Solids	mg/L	500	AO	1850	1,870
Alkalinity (as $CaCO_3$)	mg/L	500	OG	696	688
Chloride	mg/L	250	AO	502	519
Colour	TCU	5	AO	209	90
Conductivity	uS/cm	-	-	2850	2870
pH	unitless	6.5-8.5	AO	8.49	8.37
Sulphide	mg/L	0.05	AO	36	43
Sulphate	mg/L	500	AO	51	56
Phenols	mg/L	-	-	0.001	<0.001
Tannin & Lignin	mg/L	-	-	2.7	1.7
Dissolved Organic Carbon	mg/L	5	AO	18.7	12.1

1. ODWS identifies the following types of parameters:
   MAC=Maximum Allowable Concentration
   AO = Aesthetic Objective
   OG= Operational Guideline
2. Shaded Concentration Indicates an Exceedance of the ODWS Objective

TABLE 2B: GROUNDWATER GEOCHEMISTRY (TW1)					
PARAMETER	UNITS	ODWS		TW1	
		LIMIT	TYPE	GW1 2023-03-14	GW2 2023-03-14
METALS					
Aluminum (Al)	mg/L	0.1	OG	0.84	0.72
Antimony (Sb)	mg/L	0.006	IMAC	<0.0005	<0.0005
Arsenic (As)	mg/L	0.01	IMAC	<0.001	<0.001
Barium (Ba)	mg/L	1	MAC	0.24	0.24
Beryllium (Be)	mg/L	-	-	<0.0005	<0.0005
Boron (B)	mg/L	5	IMAC	1.07	1.08
Cadmium (Cd)	mg/L	0.005	MAC	<0.0001	<0.0001
Calcium (Ca)	mg/L	-	-	3	3
Chromium (Cr)	mg/L	0.05	MAC	0.002	0.001
Cobalt (Co)	mg/L	-	-	0.0005	0.0004
Copper (Cu)	mg/L	1	AO	<0.001	<0.001
Iron (Fe)	mg/L	0.3	AO	1.77	1.21
Lead (Pb)	mg/L	0.01	MAC	<0.001	<0.001
Magnesium (Mg)	mg/L	-	-	9	8
Manganese (Mn)	mg/L	0.05	AO	0.14	0.09
Mercury (Hg)	mg/L	0.01	MAC	0.0001	<0.0001
Molybdenum (Mo)	mg/L	-	-	<0.005	<0.005
Nickle (Ni)	mg/L	-	-	<0.005	<0.005
Potassium (K)	mg/L	-	-	13	13
Selenium (Se)	mg/L	0.05	MAC	0.003	0.002
Silver (Ag)	mg/L	-	-	<0.0001	<0.0001
Sodium (Na)	mg/L	200	AO	653	652
Strontium (Sr)	mg/L	-	-	0.787	0.818
Thallium (Tl)	mg/L	-	-	<0.0001	<0.0001
Uranium (U)	mg/L	0.02	MAC	<0.001	<0.001
Vanadium (V)	mg/L	-	-	0.001	0.001
Zinc (Z)	mg/L	5	AO	<0.01	<0.01

1. ODWS identifies the following types of parameters:
   MAC=Maximum Allowable Concentration
   AO = Aesthetic Objective
   OG= Operational Guideline
2. Shaded Concentration Indicates an Exceedance of the ODWS Objective

The water quality of the new drilled well meets all the Ontario Drinking Water Standards (ODWS) maximum acceptable concentrations (MAC) with the exception of turbidity. Furthermore, the water meets all of the aesthetic objectives (AO) and operational guidelines (OG) with the exception of the following:

- TDS (Total Dissolved Solids);
- DOC (Dissolved Organic Carbon);
- Chloride;
- Colour;
- Iron;
- Sodium;
- Sulfide;
- Alkalinity;
- Aluminium;
- Manganese

Exceedances of the above parameters are typical of the water supply in the subject aquifer.

A discussion of the above noted ODWS exceedances as it relates to aesthetic qualities and treatability is not completed as part of this report as the water supply is for **non-potable use** with the exception of a Langelier calculation. All potable water for the subject site will be provided by municipal supply, the Carlsbad Trickle Feed System.

Furthermore, minimum treatment requirements are outlined in the MWWR and further addressed in the MECP's CNTAWSW, attached to this report.

There will be **no consumption** of the non-potable water supply, and signs will be posted to indicate that there should be no consumption from the bathroom faucets. The public will not have access to the proposed bathroom facilities.

The Langelier Saturation Index (Langelier, 1936) is used to predict the calcium carbonate stability of water. It indicates whether calcium carbonate will precipitate, dissolve, or be in equilibrium with the water. The results of the Langelier calculation (LSI = 0.5) indicate that the water is super saturated and tends to precipitate a scale layer of calcium carbonate (slightly scale forming but not corrosive). Should the owner desire, a standard commercial grade water softener could be used to reduce the hardness of the water and thereby reduce the amount of scaling which may occur. See the attached Langelier calculations for further details.

Conclusions

The following statements and conclusions are based upon a review of the available information and analysis contained within this letter report:

- The water supply aquifer intercepted by TW1 is considered to be adequate to support the water quantity demands for the proposed development.
- Potable water will be supplied through a municipal source, the Carlsbad Trickle Feed System.
- The water supply aquifer intercepted by TW1 is mineralized as per O.Reg 903 due to an exceedance in chlorides (chlorides greater than 500 mg/L). As such it is considered to be a non-potable water supply. Approval was obtained from the MECP to retain the mineralized well (see attached Approval Letters).
- TW1 must be maintained in accordance with the MECP conditions for the use of a mineralized water well supply.
- In accordance with the MECP Consent Not to Abandon Water Supply Well (A342424) located at 6165 Thunder Road, Ottawa, Ontario, the services of a water treatment specialist shall be retained and shall install, operate and maintain a water treatment system in the distribution system, in accordance with recommendations of the water treatment specialist, to remove any hydrogen sulphide prior to the water being used in the building.
- **The onsite drilled well water supply is to be used as a non-potable water supply only.** Signs indicating that the water is to be used for hand washing and toilet use only must be posted. Access to bathrooms will not be available to the public and is not considered a public supply.
- Potable water will be supplied by the Carlsbad Trickle System, and signs indicating which sources are potable must be posted.
- The results of the water supply assessment have provided satisfactory evidence that the water supply aquifer underlying the subject lands can support the developed property with respect to water quantity and quality for the proposed usage of handwashing and toilet flushing.

We trust that the current submission satisfies your immediate requirements.

Best Regards,

Paterson Group Inc.

Alexander Schopf, PhD, EIT

Erik Ardley, P.Geo

Attachments:

- ❑ Key Plan
- ❑ TW1 Water Well Record
- ❑ MECP Water Well Records (Surrounding 500 m radius)
- ❑ PH4650-1 – MECP Water Well Location Plan
- ❑ Stewart + TSAI Architects INC. Proposed Site Plan Dated May 7, 2024
- ❑ Eurofins Certificate of Analysis
- ❑ Langelier Saturation Index Calculations
- ❑ AQTESOLV – Pumping Test Reports
- ❑ MECP Consent Not to Abandon Water Supply Well (A342424), Located at 6165 Thunder Road, Ottawa, Ontario
- ❑ PH4650-1(rev.1) - Sewage System Layout Plan
- ❑ PH4650-2(rev.1) - Sewage System Details and Notes

FIGURE 1

KEY PLAN

PATERSON GROUP

Ontario — Ministry of the Environment, Conservation and Parks

Tag#:A342424 (Print Below)

A342424

TW1

Well Record

Regulation 903 Ontario Water Resources Act

Measurements recorded in: ☐ Metric ☒ Imperial

Page ____ of ____

Well Owner's Information

First Name	Last Name/Organization	E-mail Address	☐ Well Constructed by Well Owner
	Brofort Investments Inc		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
2161 Thurston Drive	Ottawa	ON	K1G 6C9	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
6165 Thunder Road	Cumberland	P/L 1	9

County/District/Municipality	City/Town/Village	Province	Postal Code
Ottawa Carleton	Carlsbad Springs	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	465182	5021482	5R-11663	

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
	Clay			0	64
	Clay	& Gravel		64	76
Grey & Black	Shale			76	148
Grey & Black	Shale			148	174
Grey & Black	Shale			174	180

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
20	0	Neat cement	12.48

Method of Construction

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

Well Use

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

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
6 1/4"	Steel	.188"	+2	76
6"	Open Hole		76	180

Construction Record - Screen

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

Status of Well

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

Water Details

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

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	20	9 3/4"
20	76	6 1/4"
76	180	6"

Results of Well Yield Testing

After test of well yield, water was: ☐ Clear and sand free ☐ Other, specify Not tested

If pumping discontinued, give reason: X

Pump intake set at (m/ft): 170

Pumping rate (l/min / GPM): 184.5

Duration of pumping: 1 hrs + 0 min

Final water level end of pumping (m/ft): 50.6"

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

Recommended pump depth (m/ft): 140' / 100'

Recommended pump rate (l/min/GPM): 10 / 15

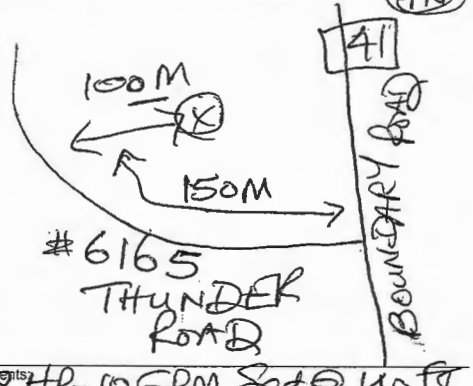
Well production (l/min/GPM): 15

Disinfected? ☒ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	10'4"		50.6"
1	20.5	1	38.6
2	26.4	2	33.2
3	30.9	3	29.2
4	34.4	4	25.8
5	37.7	5	23.1
10	46.9	10	15.4
15	50.3	15	12.2
20	50.4	20	11.7
25	50.4	25	11.3
30	50.5	30	10.9
40	50.6	40	10.6
50	50.6	50	10.4
60	50.6"	60	10.4"

Map of Well Location

Please provide a map below following instructions on the back. AN



Comments: 1 1/2 HP-10GPM Set @ 140 FT
3/4 HP--15GPM Set @ 100 FT

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Air Rock Drilling Co. Ltd.	7681

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
6659 Franktown Road	Richmond	ON	K0A 2Z0	air-rock@sympatico.ca

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
6138382170	

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted (Y Y Y Y M M D D)
		2023 03 31

Well owner's information package delivered	Date Package Delivered (Y Y Y Y M M D D)
☒ Yes ☐ No	2023 03 31

Ministry Use Only

Audit No. Z394531

Received

Ministry of the Environment
Ontario
OTTAWA - CARLETON

The Ontario Water Resources Act

WATER WELL RECORD

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

11 1525164 MUNICIP 15002 CON. CON 09

COUNTY OR DISTRICT [redacted] | TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE Gloucester | CON, BLOCK, TRACT, SURVEY, ETC 9 | LOT 1

[redacted] Carlsbad Springs | DATE COMPLETED DAY 3 MO 5 YR 90

RC ELEVATION RC BASIN CODE

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
Yellow	Sand	Loam	Loose	0	2
Blue	Clay		Dense	2	70
Grey	Till		Packed	70	77
Grey	Limestone		Layered	77	100

31

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
95	1 ☐ FRESH 2 ☐ SALTY 3 ☒ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
6¼	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	188	0	77
6	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE 5 ☐ PLASTIC		77	100
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER INCHES	LENGTH FEET

MATERIAL AND TYPE | DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	DEPTH SET AT - FEET TO	MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER, ETC.)
2	77	Clay

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☒ PUMP 2 ☐ BAILER

PUMPING RATE: 25 GPM

DURATION OF PUMPING: 1 HOURS 0 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 1 ☒ PUMPING 2 ☐ RECOVERY			
		15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
6 FEET	40 FEET	16 FEET	26 FEET	36 FEET	40 FEET

IF FLOWING, GIVE RATE: GPM

PUMP INTAKE SET AT: 40 FEET

WATER AT END OF TEST: 1 ☐ CLEAR 2 ☒ CLOUDY

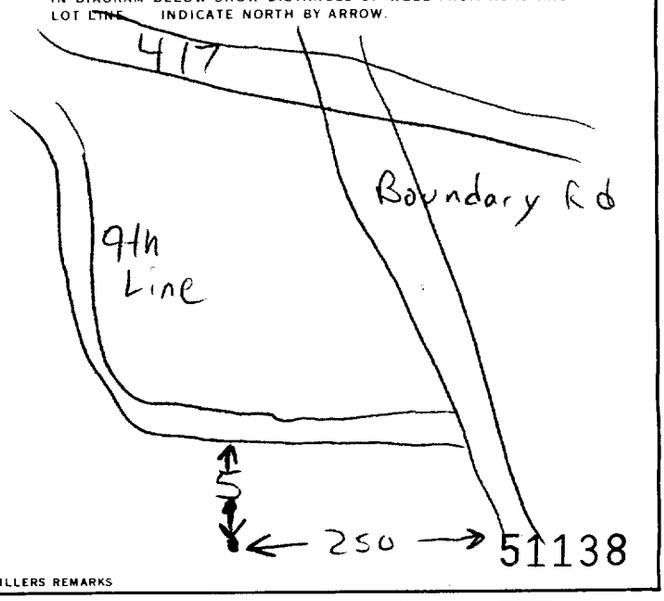
RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP

RECOMMENDED PUMP SETTING: 40 FEET

RECOMMENDED PUMPING RATE: 25 GPM

LOCATION OF WELL

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



DRILLERS REMARKS

FINAL STATUS OF WELL

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

WATER USE

1 ☐ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL ☐ OTHER 5 ☒ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED

METHOD OF CONSTRUCTION

1 ☐ CABLE TOOL 2 ☐ ROTARY (CONVENTIONAL) 3 ☐ ROTARY (REVERSE) 4 ☒ ROTARY (AIR) 5 ☐ AIR PERCUSSION 6 ☐ BORING 7 ☐ DIAMOND 8 ☐ JETTING 9 ☐ DRIVING ☐ DIGGING ☐ OTHER

CONTRACTOR

NAME OF WELL CONTRACTOR: Roy's LBR Ltd | WELL CONTRACTOR'S LICENCE NUMBER: 4609

ADDRESS: Cornwall

NAME OF WELL TECHNICIAN: Roger Rox | WELL TECHNICIAN'S LICENCE NUMBER: T-0330

SIGNATURE OF TECHNICIAN/CONTRACTOR | SUBMISSION DATE DAY ____ MO. ____ YR. ____

OFFICE USE ONLY

DATA SOURCE | CONTRACTOR 4609 | DATE RECEIVED DEC 04 1990

DATE OF INSPECTION | INSPECTOR

REMARKS

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

Ontario — Ministry of the Environment

Measurements recorded in: ☐ Metric ☒ Imperial

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

Well Record

Regulation 903 Ontario Water Resources Act

Page ____ of ____

[redacted]

Address of Well Location (Street Number/Name): 6000 Nineth Line Rd

Township: Cumberland

Lot: 2

Concession: 9

County/District/Municipality: Ottawa Region

City/Town/Village: Carlsbad Springs

Province: Ontario

Postal Code: K0A 1K0

UTM Coordinates: NAD 83 Zone 18 Easting 464462 Northing 5021884

Municipal Plan and Sublot Number:

Other:

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
		Clean Stone		0	12
		Betonite Hole Plug		12	14

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m^3/ft^3)

Method of Construction

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

Well Use

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

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To

Construction Record - Screen

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

Status of Well

☐ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☐ Abandoned, other, *specify*: Not in use
☐ Other, *specify*

Water Details

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

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)

Results of Well Yield Testing

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

If pumping discontinued, give reason:

Pump intake set at *(m/ft)*

Pumping rate *(l/min / GPM)*

Duration of pumping ____ hrs + ____ min

Final water level end of pumping *(m/ft)*

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

Recommended pump depth *(m/ft)*

Recommended pump rate *(l/min / GPM)*

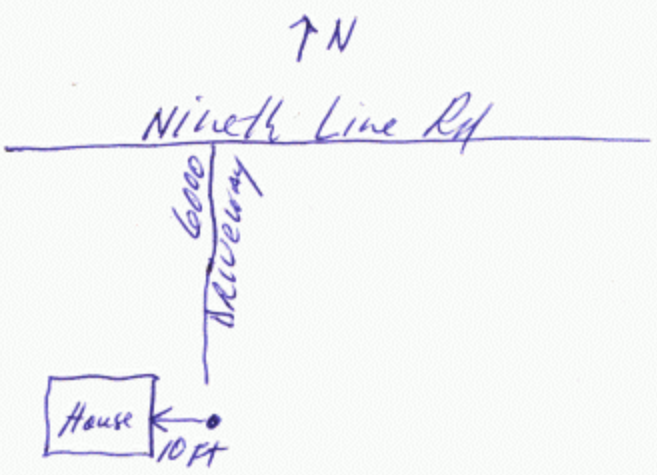
Well production *(l/min / GPM)*

Disinfected? ☒ Yes ☐ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level				
1			1	
2			2	
3			3	
4			4	
5			5	
10			10	
15			15	
20			20	
25			25	
30			30	
40			40	
50			50	
60			60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments: Cement Casing Dug well Abandone.

Well Contractor and Well Technician Information

Business Name of Well Contractor: Raymond Pump + Well

Well Contractor's Licence No.: 7260

Business Address (Street Number/Name): 47 Main St, St-Albert Ont

Municipality: Nation

Province: Ont.

Postal Code: K0A3C0

Business E-mail Address:

Bus. Telephone No. *(inc. area code)*: 6139872399

Name of Well Technician (Last Name, First Name): Raymond Jacques

Well Technician's Licence No.: 0264

Signature of Technician and/or Contractor:

Date Submitted: 2008 09 15

Well owner's information package delivered: ☐ Yes ☒ No

Date Package Delivered: Y Y Y Y M M D D

Date Work Completed: 2008 09 15

Ministry Use Only

Audit No. Z 87900

SEP 24 2009

Received

0506E (12/2007)

Ministry's Copy

Ontario — Ministry of the Environment and Climate Change

Well Tag No. (A 236242) Tag#: A 236242

Well Record

Regulation 903 Ontario Water Resources Act

Measurements recorded in: ☒ Metric ☐ Imperial

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
	Boundry Road Development Inc.	N/A	

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
16766 Transcanadienne Suite 500	Kirland	Qc.	H9H4M7	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
5371 Boundry Road	Cumberland	21	11

County/District/Municipality	City/Town/Village	Province	Postal Code
Ottawa	Cumberland Spring	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	465300	5021483		

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Brown	Fill	clay, Stone	Hard	0	1.8
Brown	clay	Silt	Hard	1.8	3.9
Grey	clay		Soft	3.9	21.0
Grey	gravel	Silt, Sand	packed	21.0	60.96
					22.25
Grey	shale		layered	22.25	60.96

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	24.99	cinent grout	1.5 m³

Method of Construction

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

Well Use

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

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To
15.55	Steel	.48	4.6	24.99
15.32	Open Hole		24.99	60.96

Construction Record - Screen

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

Status of Well

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

Water Details

Water found at Depth (m/ft)	Kind of Water	
27 (m/ft)	☐ Gas	☐ Fresh ☒ Untested ☐ Other, specify ____
52 (m/ft)	☐ Gas	☐ Fresh ☒ Untested ☐ Other, specify ____
(m/ft)	☐ Gas	☐ Fresh ☐ Untested ☐ Other, specify ____

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	24.99	24.9
24.99	60.9	

Results of Well Yield Testing

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

If pumping discontinued, give reason:

Pump intake set at (m/ft): 60

Pumping rate (l/min / GPM): 42

Duration of pumping: 1 hrs + ____ min

Final water level end of pumping (m/ft): 5.75

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft): 58

Recommended pump rate (l/min / GPM): 66

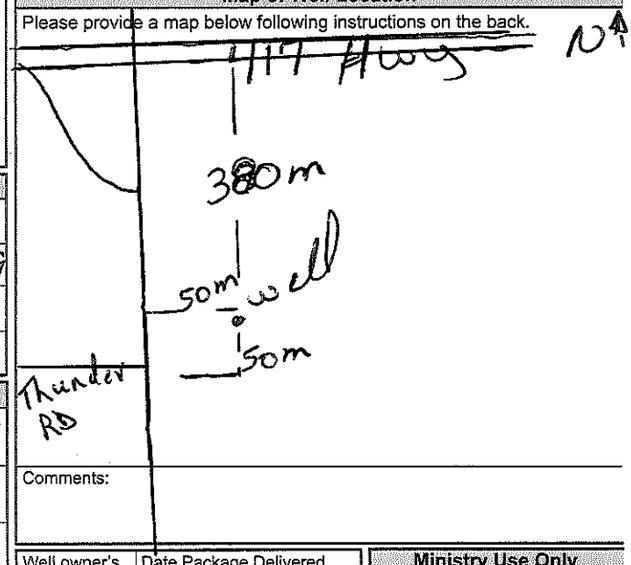
Well production (l/min / GPM): 75

Disinfected? ☒ Yes ☐ No

Draw Down Time (min)	Water Level (m/ft)	Recovery Time (min)	Water Level (m/ft)
Static Level	3.83		5.75
1	4.42	1	4.64
2	4.61	2	4.36
3	4.75	3	4.26
4	4.78	4	4.23
5	4.79	5	4.18
10	4.96	10	4.10
15	5.16	15	4.03
20	5.24	20	3.95
25	5.31	25	3.89
30	5.32	30	3.85
40	5.62	40	3.83
50	5.70	50	3.83
60	5.75	60	3.83

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Bourgeois Well Drilling Ltd.	7417

Business Address (Street Number/Name)	Municipality
14245 Conc. 10-11	Crysler

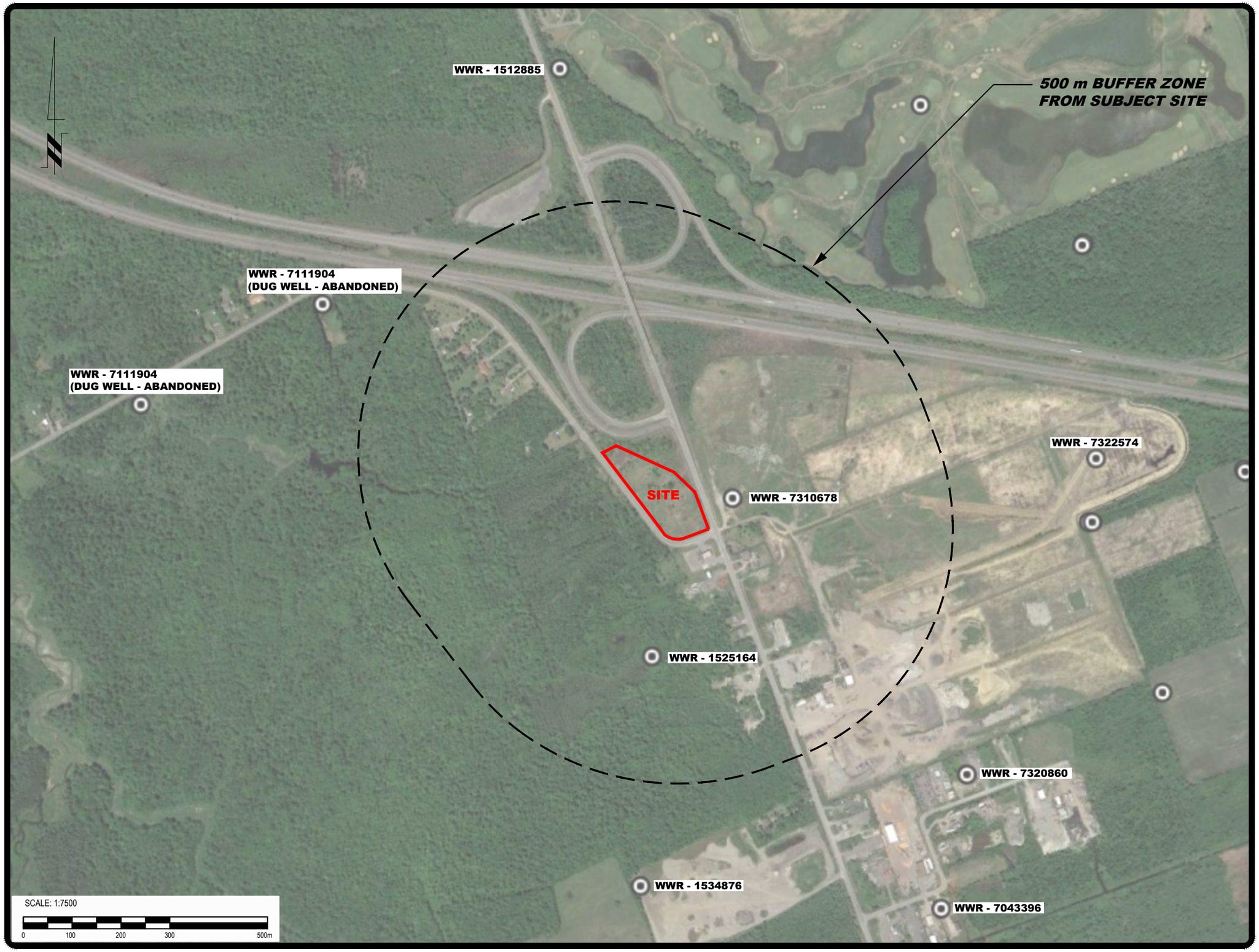
Province	Postal Code	Business E-mail Address
On	K0A1R0	N/A

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
6139875291	GENIER, MICHAEL

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
3493		2018 03 26

Well owner's information package delivered	Date Package Delivered	Ministry Use Only
☒ Yes ☐ No	2018 03 27	Audit No. Z276189
	Date Work Completed: 2018 03 23	MAY 07 2018 Received

0506E (2014/11) Ministry's Copy



LEGEND:

WATER WELL LOCATION

Date	Description	Rev.

Client:

BROFORT INVESTMENTS INC.

Consultant:

PATERSON GROUP
9 AURIGA DRIVE
OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

Address:

6165 THUNDER ROAD
CARLSBAD SPRINGS, ONTARIO

Drawing:

MECP WATER WELL LOCATION PLAN PLAN

Scale:	Date:
1:7500	03/2023
Drawn by:	**Checked by:**
NK	AS
Report No.:	**Approved by:**
PG4650-LET.02	EA

Drawing No.:

PH4650-1

p:\autocad drawings\hydrogeology\ph46xx\ph4650 - brofort investments - 6165 thunder road - prelim mw\ph4650-1 site plan.dwg

SITE INFORMATION

ADDRESS
6165 THUNDER ROAD

LEGAL DESCRIPTION
PART OF LOT 1 CONCESSION 9 (OTTAWA FRONT) PART 1 PLAN 5R-11663
PIN 04324-0163

TOTAL SITE AREA* 16,480.59 sq m
*based on GeoOttawa property report

ZONING
RC RURAL COMMERICAL

SETBACKS
Front Yard
Minimum Required: 10.00 m
Interior Side Yard
Minimum Required: 3.00 m
Corner Side Yard
Minimum Required: 6.00 m
Rear Yard
Minimum Required: 10.00 m

BUILDING HEIGHT
Maximum Height 11.00 m

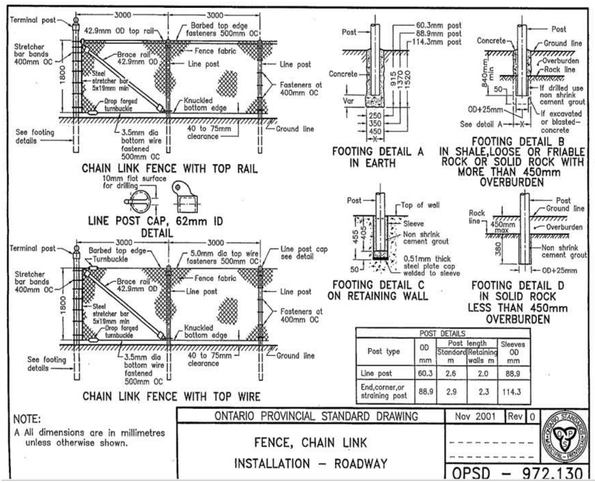
GROSS FLOOR AREA

Building	Proposed	3,686 sq m
TOTAL		3,686 sq m

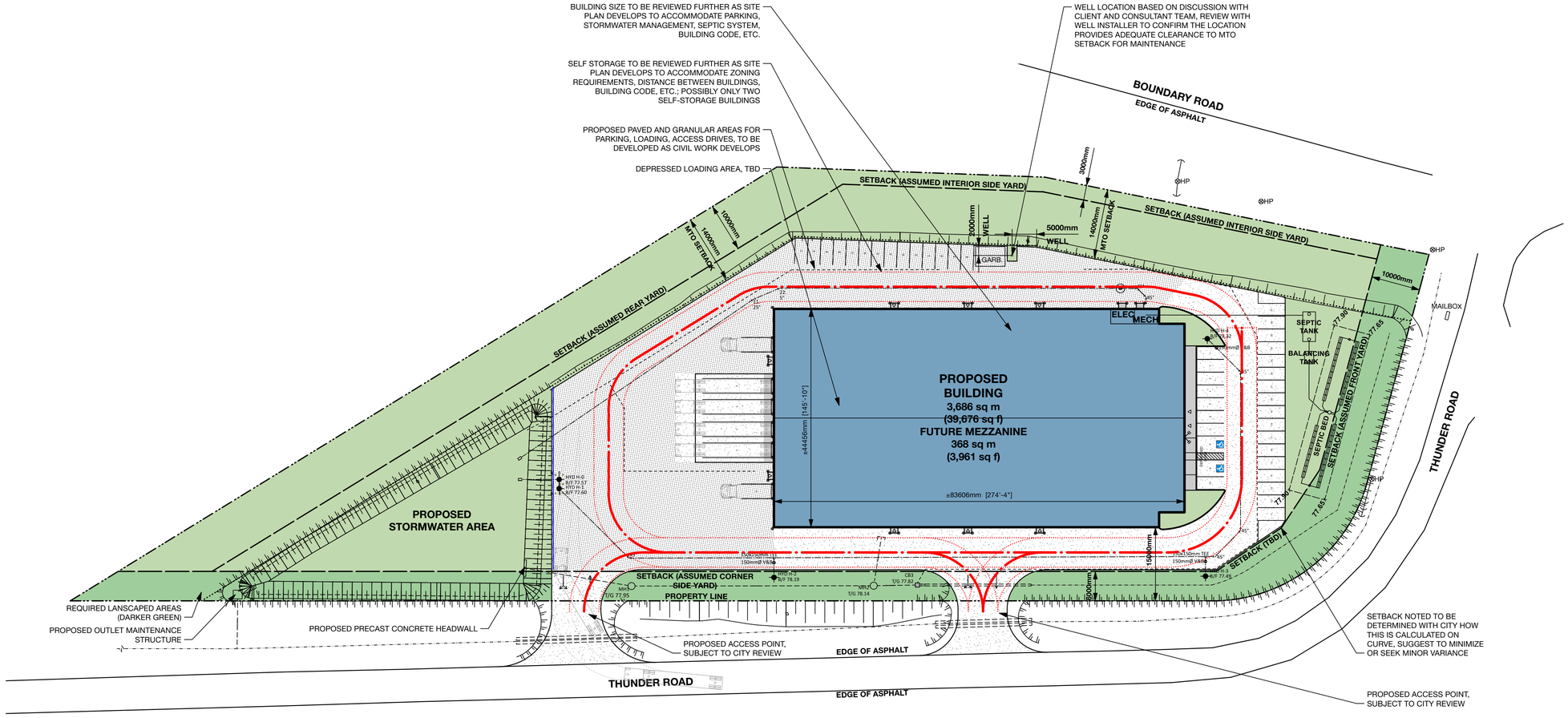
LOT COVERAGE
Proposed 22.4%
Maximum Allowed 25.0%

LANDSCAPED AREA
Landscaping of yards: Required front and corner side yards to be landscaped, except for driveways crossing the front or corner side yard leading to a parking area.

NOTE: FUTURE MEZZANINE(S) IN BUILDING TO BE ADDED TO GROSS FLOOR AREAS



2 SP-01 SECURITY FENCE (MTO)
Scale: N.T.S.



1 SP-01 SITE PLAN
Scale: 1:500

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 M

LEGEND
- PROPERTY LINE
- SETBACK LINE
- FIRE ROUTE
- LANDSCAPED AREA
- REQUIRED LANDSCAPED SETBACK
- TO BE REMOVED OR DEMOLISHED AS NOTED
- FIRE HYDRANT

STEWART + TSAI ARCHITECTS INC.
t: 613.686.5910
f: 613.686.6216
e: info@stewarttsai.com

SEAL

CONSULTANTS

KEY PLAN

ISSUE / REVISION		*DATE*
01	REVIEW & COORDINATION	FEB 23, 2023
02	REVIEW & COORDINATION	MAR 01, 2023
03	REVIEW & COORDINATION	JUN 28, 2023
04	REVIEW & COORDINATION	SEP 28, 2023
05	REVIEW	JAN 17, 2024
06	REVIEW & COORDINATION	APR 8, 2024
07	REVIEW & COORDINATION	MAY 7, 2024

PROJECT NAME

THUNDER ROAD DEVELOPMENT
6165 THUNDER ROAD
OTTAWA, ON

SHEET TITLE

PROPOSED SITE PLAN

PROJECT NO: 22003
DRAWN BY GS
CHECKED BY GS

SHEET

SP-01

2024 May 7
22003 6165Thunder.vwx

Certificate of Analysis

Client: Paterson Group
9 Auriga Dr
Nepean, ON
K2E 7T9
Attention: Mr. Alex Schopf
PO#: 57017
Invoice to: Paterson Group

Report Number: 1994690
Date Submitted: 2023-03-15
Date Reported: 2023-03-22
Project: PH4650
COC #: 906100

Dear Alex Schopf:

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: R Zafari Raheleh Zafari 2023.03.22 17:35:19 -04'00'

Raheleh Zafari, Environmental Chemist

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.

Certificate of Analysis

eurofins | Environment Testing

Client: Paterson Group
9 Auriga Dr
Nepean, ON
K2E 7T9
Attention: Mr. Alex Schopf
PO#: 57017
Invoice to: Paterson Group

Report Number: 1994690
Date Submitted: 2023-03-15
Date Reported: 2023-03-22
Project: PH4650
COC #: 906100

Group	Analyte	MRL	Units	Guideline	Lab I.D. / Sample Matrix / Sample Type / Sampling Date / Sample I.D.	1677714 GW 2023-03-14 GW1	1677715 GW 2023-03-14 GW2
Anions	Cl	1	mg/L	AO 250		502*	519*
	F	0.10	mg/L	MAC 1.5		1.44	1.44
	N-NO2	0.10	mg/L	MAC 1.0		<0.10	<0.10
	N-NO3	0.10	mg/L	MAC 10.0		<0.10	<0.10
	SO4	1	mg/L	AO 500		51	56
General Chemistry	Alkalinity as CaCO3	5	mg/L	OG 30-500		696*	688*
	Colour (Apparent)	2	TCU	AO 5		209*	90*
	Conductivity	5	uS/cm			2850	2870
	DOC	0.5	mg/L	AO 5		18.7*	12.1*
	pH	1.00		6.5-8.5		8.49	8.37
	Phenols	0.001	mg/L			0.001	<0.001
	S2-	2	mg/L	AO 0.05		36*	43*
	TDS (COND - CALC)	1	mg/L	AO 500		1850*	1870*
	Turbidity	0.1	NTU	AO 5		49.8*	22.3*
Hardness	Hardness as CaCO3	1	mg/L	OG 80-100		45*	40*
Indices/Calc	Ion Balance	0.01				1.01	1.00
Metals	Ag	0.0001	mg/L			<0.0001	<0.0001
	Al	0.01	mg/L	OG 0.1		0.84*	0.72*
	As	0.001	mg/L	IMAC 0.01		<0.001	<0.001
	B	0.01	mg/L	IMAC 5.0		1.07	1.08
	Ba	0.01	mg/L	MAC 1.0		0.24	0.24
	Be	0.0005	mg/L			<0.0005	<0.0005
	Ca	1	mg/L			3	3
	Cd	0.0001	mg/L	MAC 0.005		<0.0001	<0.0001
	Co	0.0002	mg/L			0.0005	0.0004

Guideline = ODWSOG *** = Guideline Exceedence**

Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Certificate of Analysis

eurofins | Environment Testing

Client: Paterson Group
9 Auriga Dr
Nepean, ON
K2E 7T9
Attention: Mr. Alex Schopf
PO#: 57017
Invoice to: Paterson Group

Report Number: 1994690
Date Submitted: 2023-03-15
Date Reported: 2023-03-22
Project: PH4650
COC #: 906100

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1677714 GW 2023-03-14 GW1	1677715 GW 2023-03-14 GW2
Metals	Cr	0.001	mg/L	MAC 0.05		0.002	0.001
	Cu	0.001	mg/L	AO 1		<0.001	<0.001
	Fe	0.03	mg/L	AO 0.3		1.77*	1.21*
	Hg	0.0001	mg/L	MAC 0.001		0.0001	<0.0001
	K	1	mg/L			13	13
	Mg	1	mg/L			9	8
	Mn	0.01	mg/L	AO 0.05		0.14*	0.09*
	Mo	0.005	mg/L			<0.005	<0.005
	Na	1	mg/L	AO 200		653*	652*
	Ni	0.005	mg/L			<0.005	<0.005
	Pb	0.001	mg/L	MAC 0.010		<0.001	<0.001
	Sb	0.0005	mg/L	IMAC 0.006		<0.0005	<0.0005
	Se	0.001	mg/L	MAC 0.05		0.003	0.002
	Sr	0.001	mg/L			0.787	0.818
	Tl	0.0001	mg/L			<0.0001	<0.0001
	U	0.001	mg/L	MAC 0.02		<0.001	<0.001
	V	0.001	mg/L			0.001	0.001
	Zn	0.01	mg/L	AO 5		<0.01	<0.01
Microbiology	Escherichia Coli	0	ct/100mL	MAC 0		0	0
	Total Coliforms	0	ct/100mL	MAC 0		0	0
Nutrients	N-NH3	0.020	mg/L			0.400	0.496
	Total Kjeldahl Nitrogen	0.100	mg/L			1.47	1.43
Subcontract-Inorg	Tannin & Lignin	0.5	mg/L			2.7	1.7
VOCs Surrogates	1,2-dichloroethane-d4	0	%			125	
	4-bromofluorobenzene	0	%			88	

Guideline = ODWSOG *** = Guideline Exceedence**

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Certificate of Analysis

Client: Paterson Group
9 Auriga Dr
Nepean, ON
K2E 7T9
Attention: Mr. Alex Schopf
PO#: 57017
Invoice to: Paterson Group

Report Number: 1994690
Date Submitted: 2023-03-15
Date Reported: 2023-03-22
Project: PH4650
COC #: 906100

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1677714 GW 2023-03-14 GW1	1677715 GW 2023-03-14 GW2
VOCs Surrogates	Toluene-d8	0	%			80	
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	30	ug/L			<30	
	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	
	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	

Guideline = ODWSOG *** = Guideline Exceedence**

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Attention: Mr. Alex Schopf
PO#: 57017
Invoice to: Paterson Group

Report Number: 1994690
Date Submitted: 2023-03-15
Date Reported: 2023-03-22
Project: PH4650
COC #: 906100

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1677714 GW 2023-03-14 GW1	1677715 GW 2023-03-14 GW2
Volatiles	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			0.7	
	Methyl Ethyl Ketone (MEK)	2	ug/L			<2	
	Methyl Isobutyl Ketone (MIBK)	10	ug/L			<10	
	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		1.2	
	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		0.7	

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Report Number: 1994690
Date Submitted: 2023-03-15
Date Reported: 2023-03-22
Project: PH4650
COC #: 906100

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 438707 **Analysis/Extraction Date** 2023-03-15 **Analyst** AaN **Method** C SM2130B			
Turbidity	<0.1 NTU	100	70-130
Run No 438712 **Analysis/Extraction Date** 2023-03-16 **Analyst** L V **Method** AMBCOLM1			
Escherichia Coli			
Total Coliforms			
Run No 438745 **Analysis/Extraction Date** 2023-03-16 **Analyst** SKH **Method** EPA 350.1			
N-NH3	<0.020 mg/L	113	80-120
Run No 438764 **Analysis/Extraction Date** 2023-03-16 **Analyst** SKH **Method** EPA 351.2			
Total Kjeldahl Nitrogen	<0.100 mg/L	118	70-130
Run No 438765 **Analysis/Extraction Date** 2023-03-16 **Analyst** Z S **Method** M SM3120B-3500C			
Calcium	<1 mg/L	100	90-110
Potassium	<1 mg/L	104	87-113
Magnesium	<1 mg/L	98	76-124
Sodium	<1 mg/L	104	82-118

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COC #: 906100

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 438786 **Analysis/Extraction Date** 2023-03-16 **Analyst** SD **Method** EPA 200.8			
Aluminum	<0.01 mg/L	114	80-120
Arsenic	<0.001 mg/L	92	80-120
Boron (total)	<0.01 mg/L	107	80-120
Barium	<0.01 mg/L	97	80-120
Beryllium	<0.0005 mg/L	105	80-120
Cadmium	<0.0001 mg/L	101	80-120
Cobalt	<0.0002 mg/L	101	80-120
Chromium Total	<0.001 mg/L	98	80-120
Copper	<0.001 mg/L	102	80-120
Iron	<0.03 mg/L	106	80-120
Manganese	<0.01 mg/L	112	80-120
Molybdenum	<0.005 mg/L	87	80-120
Nickel	<0.005 mg/L	103	80-120
Lead	<0.001 mg/L	103	80-120
Antimony	<0.0005 mg/L	112	80-120
Selenium	<0.001 mg/L	102	80-120

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Date Submitted: 2023-03-15
Date Reported: 2023-03-22
Project: PH4650
COC #: 906100

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Strontium	<0.001 mg/L	95	80-120
Thallium	<0.0001 mg/L	99	80-120
Uranium	<0.001 mg/L	99	80-120
Vanadium	<0.001 mg/L	94	80-120
Zinc	<0.01 mg/L	108	80-120
Run No 438806 **Analysis/Extraction Date** 2023-03-16 **Analyst** AaN **Method** SM 4110			
N-NO2	<0.10 mg/L	107	90-110
N-NO3	<0.10 mg/L	107	90-110
SO4	<1 mg/L	110	90-110
Run No 438833 **Analysis/Extraction Date** 2023-03-17 **Analyst** SD **Method** EPA 200.8			
Silver	<0.0001 mg/L	99	80-120
Mercury	<0.0001 mg/L	114	80-120
Run No 438837 **Analysis/Extraction Date** 2023-03-20 **Analyst** AaN **Method** C SM2120C			
Colour (Apparent)	<2 TCU	98	90-110
Run No 438853 **Analysis/Extraction Date** 2023-03-17 **Analyst** AaN **Method** SM 4110			

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Date Reported: 2023-03-22
Project: PH4650
COC #: 906100

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Chloride	<1 mg/L	100	90-110
Run No 438881 **Analysis/Extraction Date** 2023-03-17 **Analyst** PJ **Method** EPA 8260			
Tetrachloroethane, 1,1,1,2-	<0.5 ug/L	98	60-130
Trichloroethane, 1,1,1-	<0.4 ug/L	91	60-130
Tetrachloroethane, 1,1,2,2-	<0.5 ug/L	99	60-130
Trichloroethane, 1,1,2-	<0.4 ug/L	97	60-130
Dichloroethane, 1,1-	<0.4 ug/L	92	60-130
Dichloroethylene, 1,1-	<0.5 ug/L	81	60-130
Dichlorobenzene, 1,2-	<0.4 ug/L	94	60-130
Dichloroethane, 1,2-	<0.5 ug/L	92	60-130
Dichloropropane, 1,2-	<0.5 ug/L	92	60-130
1,3,5-trimethylbenzene	<0.3 ug/L	99	60-130
Dichlorobenzene, 1,3-	<0.4 ug/L	90	60-130
Dichloropropene,1,3-			
Dichlorobenzene, 1,4-	<0.4 ug/L	90	60-130
Acetone	<30 ug/L		60-130
Benzene	<0.5 ug/L	94	60-130

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Attention: Mr. Alex Schopf
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Report Number: 1994690
Date Submitted: 2023-03-15
Date Reported: 2023-03-22
Project: PH4650
COC #: 906100

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Bromodichloromethane	<0.3 ug/L	92	60-130
Bromoform	<0.4 ug/L	94	60-130
Bromomethane	<0.5 ug/L	81	60-130
Dichloroethylene, 1,2-cis-	<0.4 ug/L	90	60-130
Dichloropropene,1,3-cis-	<0.5 ug/L	82	60-130
Carbon Tetrachloride	<0.2 ug/L	93	60-130
Chloroethane	<0.5 ug/L	83	60-130
Chloroform	<0.5 ug/L	93	60-130
Dibromochloromethane	<0.3 ug/L	93	60-130
Dichlorodifluoromethane	<0.5 ug/L	72	60-130
Methylene Chloride	<4.0 ug/L	97	60-130
Ethylbenzene	<0.5 ug/L	90	60-130
Ethylene dibromide	<0.2 ug/L	99	60-130
Hexane (n)	<5 ug/L	100	60-130
m/p-xylene	<0.4 ug/L	97	60-130
Methyl Ethyl Ketone	<2 ug/L	110	60-130
Methyl Isobutyl Ketone	<10 ug/L		60-130
Methyl tert-Butyl Ether (MTBE)	<2 ug/L	90	60-130

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Report Number: 1994690
Date Submitted: 2023-03-15
Date Reported: 2023-03-22
Project: PH4650
COC #: 906100

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Chlorobenzene	<0.5 ug/L	93	60-130
o-xylene	<0.4 ug/L	92	60-130
Styrene	<0.5 ug/L	89	60-130
Dichloroethylene, 1,2-trans-	<0.4 ug/L	93	60-130
Dichloropropene,1,3-trans-	<0.5 ug/L	86	60-130
Tetrachloroethylene	<0.3 ug/L	90	60-130
Toluene	<0.4 ug/L	88	60-130
Trichloroethylene	<0.3 ug/L	89	60-130
Trichlorofluoromethane	<0.5 ug/L	80	60-130
Vinyl Chloride	<0.2 ug/L	79	60-130
Run No 438884 **Analysis/Extraction Date** 2023-03-20 **Analyst** PJ **Method** EPA 8260			
Xylene Mixture			
Run No 438916 **Analysis/Extraction Date** 2023-03-20 **Analyst** AET **Method** SM2320,2510,4500H/F			
Alkalinity (CaCO3)	<5 mg/L	97	90-110
Conductivity	<5 uS/cm	100	90-110
F	<0.10 mg/L	100	90-110

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QC Summary

Analyte	Blank	QC % Rec	QC Limits
pH		100	90-110
Run No 438926 **Analysis/Extraction Date** 2023-03-21 **Analyst** AaN **Method** C SM4500-S2-D			
S2-	<0.01 mg/L	85	80-120
Run No 438927 **Analysis/Extraction Date** 2023-03-20 **Analyst** AET **Method** SM 5310B			
DOC	<0.5 mg/L	87	80-120
Run No 438932 **Analysis/Extraction Date** 2023-03-21 **Analyst** AET **Method** C SM2340B			
Hardness as CaCO3			
Ion Balance			
TDS (COND - CALC)			
Run No 438936 **Analysis/Extraction Date** 2023-03-21 **Analyst** IP **Method** SM5530D/EPA420.2			
Phenols	<0.001 mg/L	102	50-120
Run No 439017 **Analysis/Extraction Date** 2023-03-22 **Analyst** AET **Method** SUBCONTRACT-CA-INORG			
Tannin & Lignin			

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patersongroup

6165 Thunder Road

PH4650

TW1 inputs

pH	8.37	A	0.23
TDS	1870	B	2.42
Hardness	40	C	1.20
Alkalinity	688	D	2.84
Temp.	8.1		
		pHs =	7.908481437

Langelier Saturation Index (LSI) Calculation

(Langelier, 1936)

LSI = pH - pHs

pHs = (9.3 + A + B) - (C + D)

Where:

A = (Log10 [TDS] - 1) / 10

B = -13.12 x Log10 (oC + 273) + 34.55

C = Log10 [Ca2+ as CaCO3] - 0.4

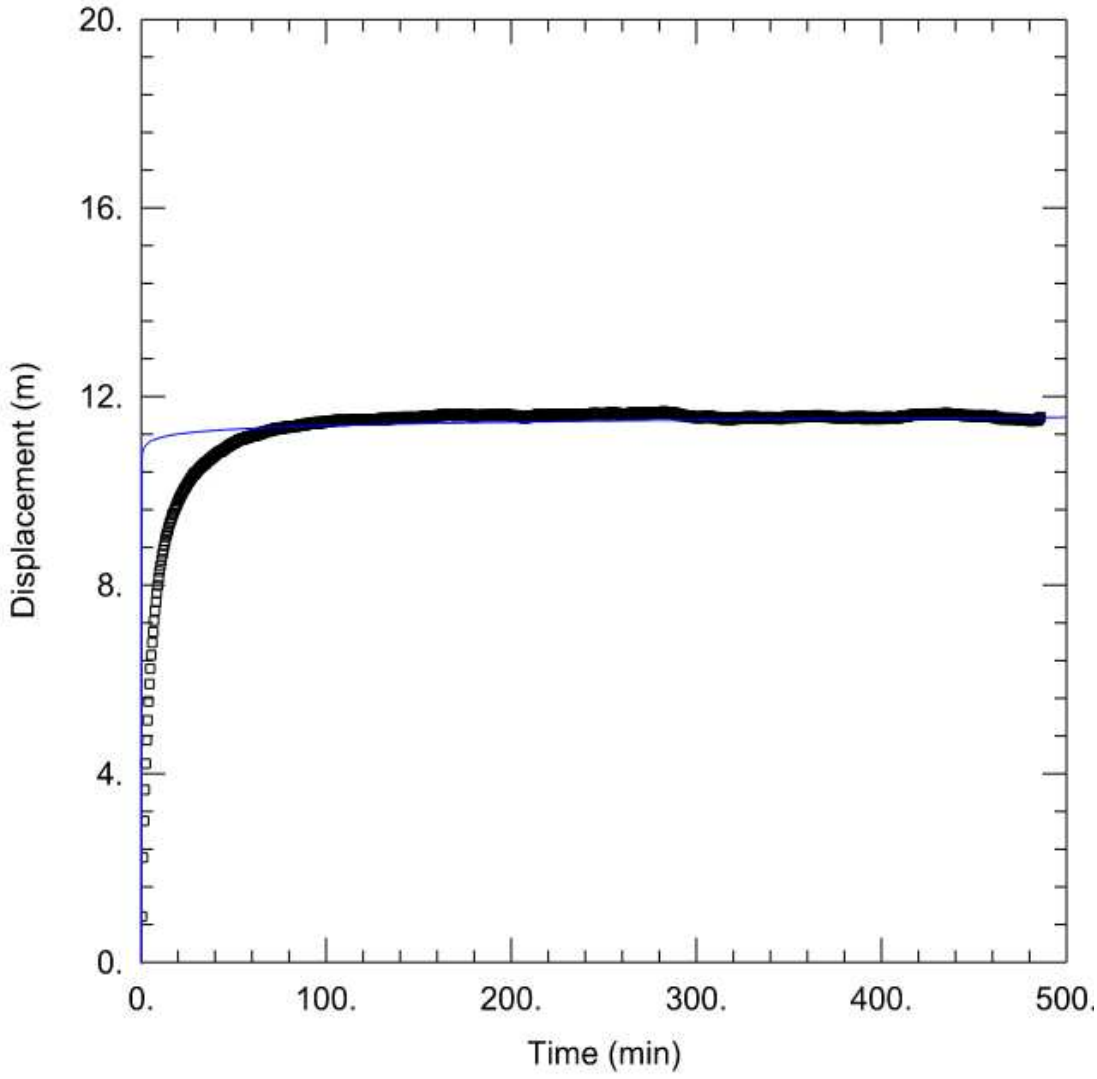
D = Log10 [alkalinity as CaCO3]

LSI = 0.5

LSI	Effect
0.5 to 2	**Water is super saturated and tends to precipitate a scale layer of calcium carbonate (scale forming but non-corrosive)**
0 to 0.5	**Water is super saturated and tends to precipitate a scale layer of calcium carbonate (slightly scale forming and corrosive).**
0	Water is saturated (in equilibrium) with calcium carbonate. A scale layer of calcium carbonate is neither precipitated nor dissolved.
0 to -0.5	Water is under saturated and tends to dissolve solid calcium carbonate (slightly corrosivebut non-scale forming).
-0.5 to -2	Water is under saturated and tends to dissolve solid calcium carbonate (seriously corrosive).

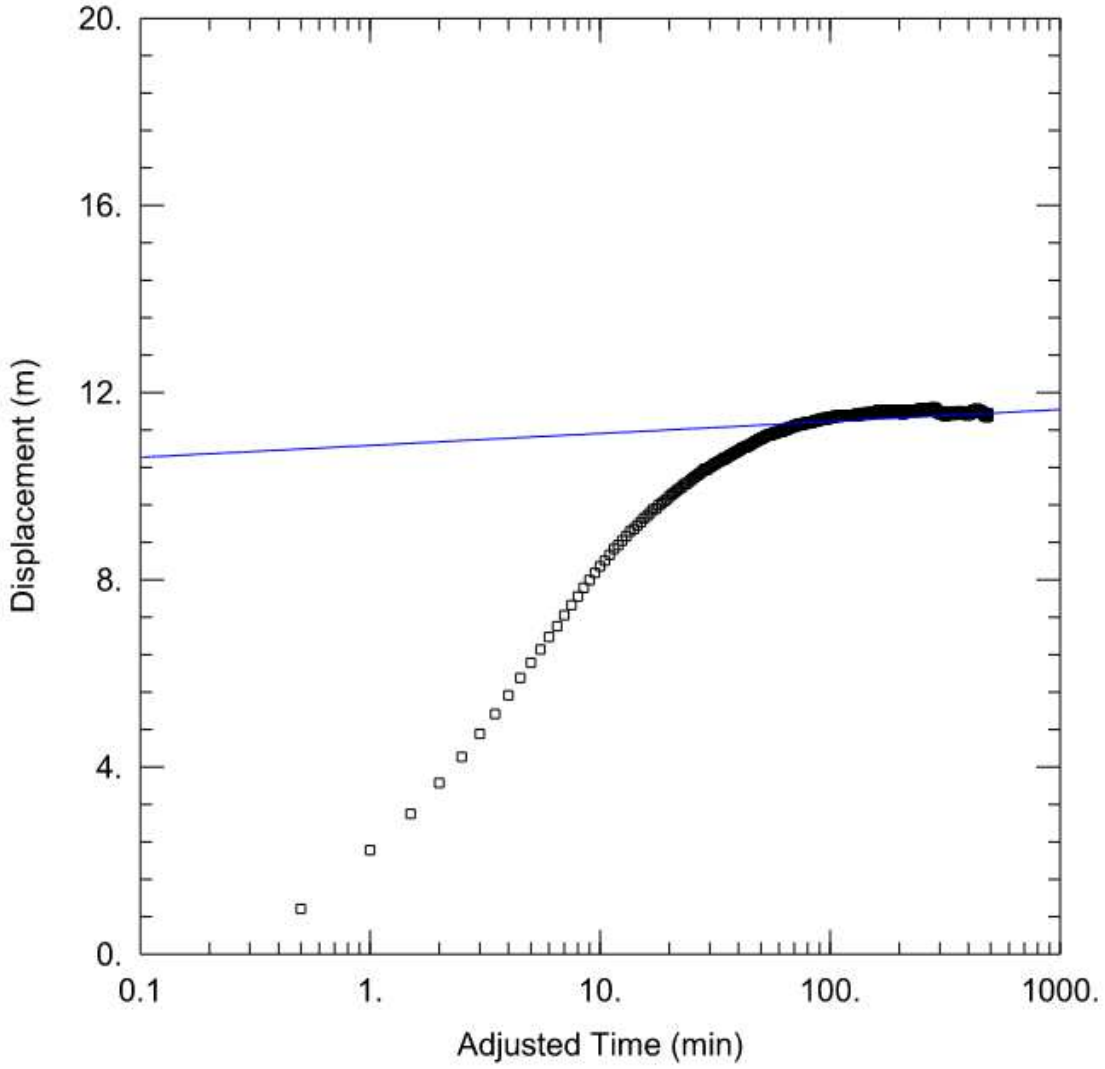
Pumping Test Analysis Report

File No.	PH4650	Well ID:	TW1
Date:	Tuesday, March 14, 2023	Solution Method:	**Theis**
Client:	Brofort Investments	Transmissitivity (m2/day):	39.26
Site Address:	6165 Thunder Road	Discharge Rate (L/min)	38
Project:	Site Plan Control Application	Analysis performed by:	AS



Pumping Test Analysis Report

File No.	PH4650	Well ID:	TW1
Date:	Tuesday, March 14, 2023	Solution Method:	**Cooper-Jacob**
Client:	Brofort Investments	Transmissitivity (m2/day):	39.26
Site Address:	6165 Thunder Road	Discharge Rate (L/min)	38
Project:	Site Plan Control Application	Analysis performed by:	AS



Pumping Test Analysis Report

File No.	PH4650
Date:	Tuesday, March 14, 2023
Client:	Brofort Investments
Site Address:	6165 Thunder Road
Project:	Site Plan Control Application

Summary Table:

Solution Method:	Well ID:	Transmissitivity (m2/day):
Theis	TW1	39.26
Cooper-Jacob	TW1	39.26
Average:		**39.26**

Ministry of the Environment, Conservation and Parks

Environmental Monitoring and Reporting Branch
125 Resources Road
Toronto ON M9P 3V6

Ministère de l'Environnement, de la Protection de la nature et des Parcs

Direction de la surveillance environnementale
125, chemin Resources
Toronto ON M9P 3V6

Ontario

December 4, 2023

Brofort Investments Inc.
c/o Philip Klugman
2161 Thurston Drive
Ottawa, Ontario
K1G 6C9

Dear Mr. Philip Klugman:

Re: **Consent Not to Abandon Water Supply Well (A342424), Located at 6165 Thunder Road, Ottawa, Ontario**

You have submitted a request under subsection 21(10) of R.R.O 1990, Regulation 903: Wells, as amended (**"Wells Regulation"**), made under the *Ontario Water Resources Act*, R.S.O. 1990, c. O.40 (**"OWRA"**) for a written consent permitting you to not abandon one (1) well identified by well record number A342424. The well produces mineralized water[1] and accordingly would otherwise be required to be abandoned per section 21 (4) of the Wells Regulation.

You retained the services of Paterson Group Consulting Engineer Services ("Paterson Group") to provide the Ministry of the Environment, Conservation and Parks (the "Ministry") with a hydrogeological report regarding the potential impact of not abandoning the well located at 6165 Thunder Road, Ottawa, ON ("Subject Site").

The location of the well is described in Schedule A – PH4650-1 MECP Water Well Location Plan hereto, and forms part of this letter.

[1] "Mineralized water" means means water containing in excess of 6,000 milligrams per litre total dissolved solids or 500 milligrams per litre chlorides or 500 milligrams per litre sulphates, subsection 1(1) of R.R.O. 1990, Regulation 903 (Wells) as amended made under the Ontario Water Resources Act, R.S.O. 1990, c. O. 40, E-laws - https://www.ontario.ca/laws/regulation/900903

Paterson Group produced a report titled Mineralized Well Water Report, Proposed Commercial Development 6165 Thunder Road, Ottawa, Ontario; with File number PH4650-LET.01; and dated May 2, 2023 (the “Paterson Group Report”). A copy of the Paterson Group Report has been provided to me and is attached as part of Schedule B to this letter.

Based on the results provided in the Paterson Group Report, I understand that a water quality sample collected from the well on May 2, 2023 during an 8-hour pumping test at the midpoint (GW1) and end (GW2) showed chloride concentrations of 502 milligrams per litre and 519 milligrams per litre, respectively. The water in the well is therefore “mineralized water” as defined in subsection 1(1) of the Wells Regulation. The samples were submitted to an accredited laboratory and analyzed for dissolved gasses. Water quality analysis results from well A342424 showed sulphide concentrations of 36 milligrams per litre and 43 milligrams per litre, respectively, suggesting the presence of H2S gas.

The Paterson Group Report proposed that the well be used as a non-potable water supply at the Subject Site and recommended that the well be maintained until such time as the water supply is no longer required, after which it be abandoned in accordance with Reg.903.

In coming to a decision on your request for consent not to abandon this well, I have reviewed the following reports and documents (attached as part of Schedule B):

- May 2, 2023, File: PH4650-LET.01, Mineralized Well Water Report, Proposed Commercial Development 6165 Thunder Road, Ottawa, Ontario by Paterson Group Inc**.**

Based on a review of the materials, the Ministry has determined that the well is unlikely to act as a pathway to allow mineralized water to intermingle with fresh groundwater resources and thus is unlikely to impair the quality of local groundwater resources.

In respect of the well, you have agreed to the following requirements (attached as part of Schedule C – Letter to Wells Director Accepting Conditions for Director Consent) as conditions of the Director granting consent permitting you not to abandon this well:

1. The well shall be properly vented to the outside atmosphere in a manner that will safely disperse all gases, as per section 15.1 of Regulation 903;

2. The services of a water treatment specialist shall be retained and you shall install, operate and maintain a water treatment system in the distribution system, in accordance with recommendations of the water treatment specialist, to remove any hydrogen sulphide prior to the water being used in the building;

3. The treatment system shall be properly maintained and operational at all times in accordance with the recommendations of the water treatment specialist;

4. All faucets within the building shall be labelled to indicate that the water is not intended for human consumption;

5. The well water shall not be used as a drinking water source under any circumstances by any person and botted water shall be supplied for consumption by employees; and

6. Due to elevated chloride, steps shall be taken to mitigate the impact of corrosion of plumbing including: use of approved PEX pipe and fittings, installation of stainless steel fixtures, and not installing water treatment systems that may increase corrosivity of the water.

7. Once the water treatment system for reducing hydrogen sulphide in water from well A342424 becomes operational, you shall immediately notify the Director appointed for the purposes of subsection 21 (10) of the Wells Regulation by email to wellshelpdesk@ontario.ca of the date when the water treatment system became operational.

Failure to comply with the conditions specified above shall result in the automatic revocation of this consent without notice.

This consent is not assignable to a successor or assign without the express written authorization of the Director.

The issuance of and compliance with the conditions of this consent does not relieve any person of any obligation to comply with any provision of any other applicable statute, regulation or other legal requirement, including, but not limited to, any requirement to obtain and comply with any other approvals required by the City of Ottawa.

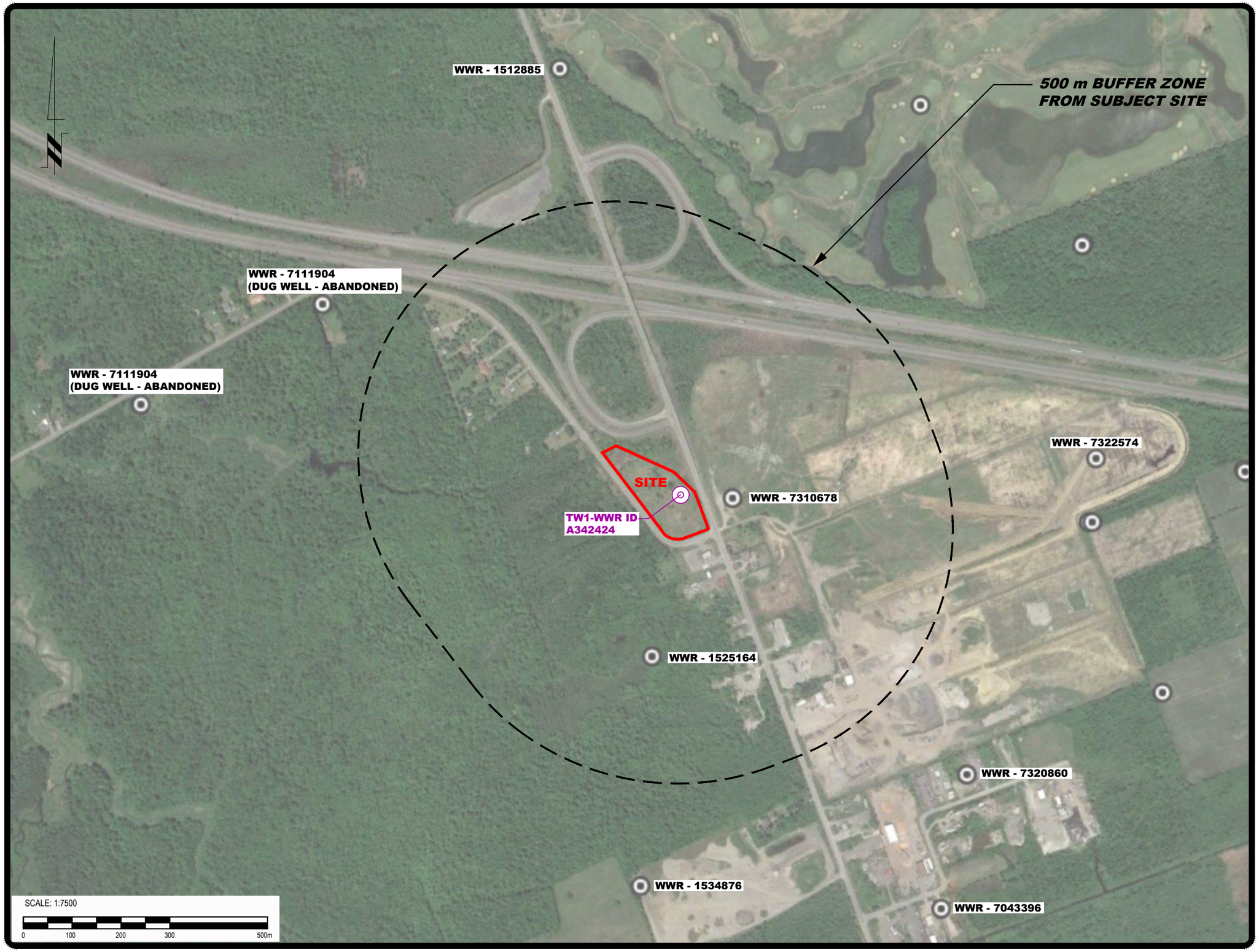
Shelley Kilby, M.Sc., P.Geo
Director
Appointed for the purposes of subsection 21(10) of the Wells Regulation

c: Tracy Hart, District Manager, Ottawa District Office
Alija Bos, Hydrogeologist, Eastern Region

Ellen Klupfel, Supervisor, Environmental Monitoring and Reporting Branch
Erik Ardley, P.Geo., Paterson Group
Tessa Di Iorio, City of Ottawa

SCHEDULE A

WELL LOCATION MAP



LEGEND:

- WATER WELL LOCATION
- TW 1 LOCATION

Date	Description	Rev.

Client:

BROFORT INVESTMENTS INC.

Consultant:

PATERSON GROUP
9 AURIGA DRIVE
OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

Address:

6165 THUNDER ROAD
CARLSBAD SPRINGS, ONTARIO

Drawing:

MECP WATER WELL LOCATION PLAN PLAN

Scale:	Date:
1:7500	04/2023
Drawn by: NK	Checked by: AS
Report No.: PG4650-LET.02	Approved by: EA

Drawing No.:

PH4650-1

p:\autocad drawings\hydrogeology\ph46xx\ph4650 - brofort investments - 6165 thunder road - prelim rial\ph4650-1 site plan.dwg

SCHEDULE B

DOCUMENTS REVIEWED BY WELLS REGULATION DIRECTOR

May 2, 2023

PH4650-LET.01

Brofort Investments Inc.
2161 Thurston Drive
Ottawa, Ontario
K1G 6C9

Attention: **Phil Klugman**

Subject: **Mineralized Well Water Report**
Proposed Commercial Development
6165 Thunder Road, Ottawa, Ontario

PATERSON GROUP
Consulting Engineers
9 Auriga Drive
Ottawa, Ontario
K2E 7T9
Tel: (613) 226-7381

Geotechnical Engineering
Environmental Engineering
Hydrogeology
Materials Testing
Building Science
Rural Development Design
Retaining Wall Design
Noise and Vibration Studies

patersongroup.ca

Further to your request, Paterson Group (Paterson) has conducted a Mineralized Water Well Report (MWWR) in support of Site Plan application for a proposed commercial development to be located at 6165 Thunder Road, Ottawa, Ontario (Subject Site). The purpose of this report is to act as an application to the Ministry of the Environment, Conservation and Parks (MECP) Wells Director to retain the use of a mineralized well. It should be noted that the area in question is known for mineralized water in the bedrock aquifers. The mineralized well will be used as a treated non-potable water source, and potable water will be provided by the Carlsbad Trickle Feed System.

Introduction

Paterson was retained by Brofort Investments Inc. to conduct a MWWR in support of a proposed commercial development to be located at 6165 Thunder Road in Ottawa. Please refer to Figure 1 - Key Plan for the approximate site location. The underlying bedrock aquifer accessed by the onsite drilled test well has been determined to be mineralized (chloride concentration greater than 500 mg/L) and as such, has been determined to be non-potable. The subject site will be serviced by the municipal water supply (Carlsbad Trickle Feed System) for potable water, the onsite drilled well for non-potable water (ie. hand washing / toilets), and a private septic system.

Available geological mapping indicates that the bedrock underlying the subject site consists of shale and limestone of the Carlsbad Formation. The bedrock aquifers accessed through the Carlsbad Formation are known to be of poor quality. As the intention of the mineralized well clause is to prevent contamination of a good quality aquifer, Paterson has determined that due to the absence of an available surficial aquifer and a poor quality bedrock aquifer, a good quality aquifer will not be further impacted by the mineralized well water from the onsite well. As per previous discussions with the City

and the MECP, the bedrock groundwater aquifer in the area is known for its poor quality, which is why the Carlsbad Trickle System was installed. There are no known aquifers available, based on our review and anecdotal evidence, that provide quality water that meets the required guidelines.

The subject property is located at 6165 Thunder Road, situated between Thunder Road and Boundary Road, with the 417 on/off ramp to the north, in Carlsbad Springs (Ottawa), Ontario. The property is approximately 1.65 ha in size and is currently undeveloped.

The proposed development consists of commercial buildings with associated infrastructure. A test well was drilled on-site and will be retained for non-potable use. The well will not be used as a drinking water supply and on-site treatment will be used to allow the groundwater to be usable for non-potable supply (i.e. hand washing / toilet flushing) only. Potable water will be supplied by the Carlsbad Trickle System. There will be no consumption of the non-potable water supply and signs will be posted to indicate that there should be no consumption from the bathroom faucets. Public washrooms will not be provided as part of the proposed development.

Figure 1: Key Plan

Background

As there were no existing drilled wells on site, a licensed well contractor (Air Rock Drilling) was retained to install a new drilled well on March 2, 2023. The new drilled well, hereafter referred to as Test Well 1 (TW1) has a Water Well Record (WWR) ID of A342424. TW1 was submitted to an 8-hour pumping test as part of a Hydrogeological Assessment for a Site Plan Application. It was determined that TW1 was able to provide a sufficient quantity of groundwater for the proposed development. Groundwater samples were collected from TW1 during the 8-hour pumping test at the midpoint (GW1) and end (GW2) of the pumping test. The samples were submitted to an accredited laboratory for comprehensive testing of bacteriological, chemical and physical water quality parameters consistent with the standard "Subdivision Supply" suite of parameters, trace metals and Volatile Organic Compounds (VOC's). The geochemical results from the samples collected at the midpoint and end of the constant rate pumping test indicated that there was a chloride concentration of 502 and 519 mg/L respectively in the underlying bedrock aquifer. As the chloride concentration was found to be greater than 500 mg/L, the well is considered mineralized, as per O.reg 903.

Field Program

A new drilled well was constructed by Air Rock Drilling on March 2, 2023. Please refer to Paterson Drawing PH4650-1 MECP Water Well Location plan, attached for its location. The MECP Water Well Record (WWR) for TW1 (WWR ID A342424) indicates that the well extends to approximately 55 m below ground surface (bgs). The 159 mm wide steel casing is recorded to extend to 23.2 m bgs, with a 0.61 m stick up. Shale bedrock was encountered at 23.2 m bgs. The overburden material was recorded to consist of clay down to a depth of approximately 23 m, with some gravel encountered in the clay layer at 19.5 m bgs. A copy of the WWR can be found attached.

As a means to evaluate the water supply aquifer intercepted by TW1, TW1 was subjected to an 8-hour constant rate pumping test. The pumping test was conducted on March 14, 2023 under the full-time supervision of Paterson personnel. The pumping test was carried out at a pumping rate of 38 L/min for a duration of 8 hours. Approximately 18,240 L was removed from the well throughout the constant rate pumping test.

Groundwater samples were collected at the midpoint (GW1) and end (GW2) of the 8-hour constant rate pumping test. Prior to the collection of the groundwater samples, the free chlorine residual was tested and found to be non-detectable. The water samples were submitted for comprehensive testing of bacteriological, chemical, and physical water quality parameters consistent with the standard "Subdivision Supply" suite of parameters, VOCs and trace metals, as per the City of Ottawa's Hydrogeological and Terrain Analysis Guidelines (HTAG).

Surficial and Bedrock Geology

Paterson reviewed the available geological mapping provided by the Ontario Geological Survey (OGS MRD128) and found it to be generally consistent with the available historical surrounding Water Well Records (WWR). The mapping indicates that a coarse-textured glaciomarine deposit consisting of a sand, gravel, minor silt and clay occupies the entirety of the subject site. The surrounding WWR's indicate a deep clay deposit underlies the shallow coarse-grained layer.

Paterson drilled four (4) boreholes at 6165 Thunder Road on October 25, 2022, spaced in such a way as to provide general coverage, as part of a Geotechnical field program. The boreholes were extended to depths between 5.9 and 7.6 m below ground surface (bgs). The subsurface profile was consistent across all of the boreholes and consisted of a fill layer, underlain by a silty sand layer, and further underlain by a thick clay layer. The fill layer was observed in all boreholes and extended to depths between 0.8 and 1.2 m bgs. The underlying sand layer was observed to extend to a depth of 1.2 to 1.5 m bgs. The clay layer onsite extended from 1.2 m bgs to more than 7.6 m bgs. The results from the boreholes are consistent with the information available from surrounding WWR's. Please refer to the attached Paterson borehole logs and Paterson's Drawing PG6430-1-Test Hole Location Plan attached to this report for additional details.

Hydrogeology

Based on the topographic relief of the area and available groundwater flow direction mapping, the onsite overburden groundwater flow direction is expected to trend towards the northwest of the property. The general overburden flow direction is anticipated to be westerly towards the various unnamed tributaries of the Bear Brook Municipal Drain. As the overburden is mapped to consist of a thin layer of sand underlain by a thick layer of clay, the surficial overburden aquifer is anticipated to be shallow. The underlying thick clay layer is anticipated to isolate the shallow receiving layer from the aquifers accessed by local wells.

The shallow overburden aquifer (<1.5 m thickness) has been identified as the receiving layer for subsurface discharge. According to O.Reg 9.03 dug wells require a minimum of 2.5 m of suitable sealant from ground surface. Furthermore, drilled wells would be cased significantly deeper into the bedrock aquifer. Due to the relative separation of the thick clay aquitard, impacts to the overlying surficial receiving aquifer are not anticipated to impact the underlying clay or bedrock aquifers. Furthermore, based on the general overburden flow direction, there are no downgradient dug or drilled wells from the subject site. It is assumed that the bedrock is the primary supply aquifer for drilled wells and the clay layer is the primary supply aquifer for dug wells, where possible. The overburden, consisting of sand, gravel, and silt acts as the receiving aquifer, and is hydrologically isolated from the clay and bedrock aquifers due to the low permeability of the clay layer.

A dug well was considered for the site once it was determined that TW1 was mineralized. The thick clay stratigraphy identified onsite would not allow for the development of a

suitable groundwater source. As such, a dug well would not be able to provide sufficient groundwater quantity for the proposed development. Additionally, the City of Ottawa does not allow for dug wells completed in clay to be used in support of Site Plan applications (City of Ottawa HTAG section 5.2.3).

Carlsbad Trickle System

The Carlsbad Trickle system is a network of small diameter pipes which supplies drinking water from the City of Ottawa's central distribution system. It was needed to address widespread well-water quality and quantity problems in east rural Ottawa. As the Carlsbad Trickle System supplies water to this area, it is a strong indicator that there is poor well water quality and/or quantity. As such, there is a reduced potential that dwellings are supplied by a private water supply.

Groundwater Quality

Laboratory Data

The laboratory water quality results from the subdivision package are provided in Table 1a and the trace metal results are provided in Table 1b below. The VOC analytical results were measured to be below the Guideline limits. All analytical laboratory results can be found attached.

TABLE 1A: GROUNDWATER GEOCHEMISTRY (TW1)					
PARAMETER	UNITS	ODWS		TW1	
		LIMIT	TYPE	GW1 2023-03-14	GW2 2023-03-14
MICROBIOLOGICAL					
Escherichia Coli (E.Coli)	ct/100mL	0	MAC	0	0
Total Coliforms	ct/100mL	0	MAC	0	0
GENERAL CHEMICAL - HEALTH RELATED					
Fluoride	mg/L	1.5(2.4)	MAC	1.44	1.44
N-NO2 (Nitrite)	mg/L	1	MAC	<0.10	<0.10
N-NO3 (Nitrate)	mg/L	10	MAC	<0.10	<0.10
Turbidity (Laboratory)	NTU	1.0 (5.0)	MAC/AO	49.8	22.30
N-NH3 (Ammonia)	mg/L	-	-	0.4	0.50
Total Kjeldahl Nitrogen	mg/L	-	-	1.47	1.43
GENERAL CHEMICAL - AESTHETIC RELATED					
Hardness (as $CaCO_3$)	mg/L	100	OG	45	40
Ion Balance	unitless	-	-	0.92	0.96
Total Dissolved Solids	mg/L	500	AO	1850	1,870
Alkalinity (as $CaCO_3$)	mg/L	500	OG	696	688
Chloride	mg/L	250	AO	502	519
Colour	TCU	5	AO	209	90
Conductivity	uS/cm	-	-	2850	2870
pH	unitless	6.5-8.5	AO	8.49	8.37
Sulphide	mg/L	0.05	AO	36	43
Sulphate	mg/L	500	AO	51	56
Phenols	mg/L	-	-	0.001	<0.001
Tannin & Lignin	mg/L	-	-	2.7	1.7
Dissolved Organic Carbon	mg/L	5	AO	18.7	12.1

1. ODWS identifies the following types of parameters:
   MAC=Maximum Allowable Concentration
   AO = Aesthetic Objective
   OG= Operational Guideline
2. Shaded Concentration Indicates an Exceedance of the ODWS Objective

TABLE 1B: GROUNDWATER GEOCHEMISTRY (TW1)					
PARAMETER	UNITS	ODWS		TW1	
		LIMIT	TYPE	GW1 2023-03-14	GW2 2023-03-14
METALS					
Aluminum (Al)	mg/L	0.1	OG	0.84	0.72
Antimony (Sb)	mg/L	0.006	IMAC	<0.0005	<0.0005
Arsenic (As)	mg/L	0.01	IMAC	<0.001	<0.001
Barium (Ba)	mg/L	1	MAC	0.24	0.24
Beryllium (Be)	mg/L	-	-	<0.0005	<0.0005
Boron (B)	mg/L	5	IMAC	1.07	1.08
Cadmium (Cd)	mg/L	0.005	MAC	<0.0001	<0.0001
Calcium (Ca)	mg/L	-	-	3	3
Chromium (Cr)	mg/L	0.05	MAC	0.002	0.001
Cobalt (Co)	mg/L	-	-	0.0005	0.0004
Copper (Cu)	mg/L	1	AO	<0.001	<0.001
Iron (Fe)	mg/L	0.3	AO	1.77	1.21
Lead (Pb)	mg/L	0.01	MAC	<0.001	<0.001
Magnesium (Mg)	mg/L	-	-	9	8
Manganese (Mn)	mg/L	0.05	AO	0.14	0.09
Mercury (Hg)	mg/L	0.01	MAC	0.0001	<0.0001
Molybdenum (Mo)	mg/L	-	-	<0.005	<0.005
Nickle (Ni)	mg/L	-	-	<0.005	<0.005
Potassium (K)	mg/L	-	-	13	13
Selenium (Se)	mg/L	0.05	MAC	0.003	0.002
Silver (Ag)	mg/L	-	-	<0.0001	<0.0001
Sodium (Na)	mg/L	200	AO	653	652
Strontium (Sr)	mg/L	-	-	0.787	0.818
Thallium (Tl)	mg/L	-	-	<0.0001	<0.0001
Uranium (U)	mg/L	0.02	MAC	<0.001	<0.001
Vanadium (V)	mg/L	-	-	0.001	0.001
Zinc (Z)	mg/L	5	AO	<0.01	<0.01

AO = Aesthetic Objective

OG= Operational Guideline

2. Shaded Concentration Indicates an Exceedance of the ODWS Objective

The water quality of the new drilled well meets all the Ontario Drinking Water Standards (ODWS) maximum acceptable concentrations (MAC) with the exception of turbidity. Furthermore, the water meets all of the aesthetic objectives (AO) and operational guidelines (OG) with the exception of the following:

- ❑ TDS (Total Dissolved Solids)
- ❑ DOC
- ❑ Chloride
- ❑ Colour
- ❑ Iron
- ❑ Sodium
- ❑ Sulfide
- ❑ Alkalinity
- ❑ Aluminium
- ❑ Manganese

Exceedances of the above parameters are typical of the water supply in the subject aquifer.

Mineralized Water Well

Mineralized water, as defined by Ontario Regulation 903 (O.Reg 903), is a water containing excess of any one of 6,000 mg/L TDS, 500 mg/L chlorides or 500 mg/L sulphates. As the groundwater encountered by TW1 during the constant rate pumping test was determined to have chloride concentrations greater than 500 mg/L (502 and 519 mg/L), the water supply accessed by TW1 is considered mineralized.

It is known that many of the surrounding properties have been serviced by municipal water connections, and those that are not municipally serviced, should have access to a municipal water connection, if desired. The Carlsbad Trickle Feed System was needed to address the widespread well-water quality problems in the area, which corroborates that it is well known to residents in the area that poor quality groundwater exists.

The onsite overburden flow direction is expected in a northwesterly direction towards the mapped watercourse, and the general overburden flow direction is anticipated be west towards the various unnamed tributaries of the Bear Brook Municipal Drain. The only potential downgradient receptor from the subject site is 6150 Thunder Road, which is anticipated to be municipally serviced.

As the City of Ottawa does not allow the use of dug wells for Site Plan applications, and the impervious nature of a clay deposit makes a dug well groundwater supply not feasible, a dug well is not a viable option for the development.

While potable drinking water will be provided by the Carlsbad Trickle System, there is not a suitable non-potable water supply available onsite. As there is not a cost effective alternative to the onsite mineralized well, we are requesting an exemption to O.Reg 903 decommissioning requirements to retain a mineralised well to be used as a non-potable water supply to service the proposed development. Please note that a vented cap will be required for the mineralized well.

As the groundwater accessed by TW1 has shown quality issues, a Water Treatment Specialist (Culligan) was consulted in order to provide a potential water treatment system to treat the groundwater encountered by TW1. The purpose of the consultation was to demonstrate that the groundwater accessed by TW1 could be treated to non-potable standards. Culligan recommended the following treatment system:

- Chemical feed peristaltic pumping system interjecting hydrogen peroxide.
- Automatic multi-media filtration.
- Automatic catalytic carbon filtration.
- Water softening for hardness reduction regenerating with salt.
- Organic trap using macro porous anion resin and regenerating with salt for colour reduction.
- Reverse Osmosis demineralization for TDS reduction.

The above noted system is in no way designed to limit the treatment system used onsite. It is noted solely to provide the MECP with evidence that the groundwater encountered by TW1 can be treated to non-potable standards. A new treatment specialist may be consulted at the time of installation who may provide a different system. The groundwater used to support the proposed development must be treated to the point that it will not have adverse effects on its users, and as such must be considered acceptable by the Ministry of Labour, Immigration, Training and Skills Development (MOL) under the Occupational Health and Safety Act guidelines.

Conclusions

The following statements and conclusions are based upon a review of the available information and analysis contained within this letter report:

- The water supply aquifer intercepted by the onsite well is considered to be mineralized.
- The onsite drilled well water supply (TW1) is to be used as a non-potable water supply only. Signs indicating that the water is to be used for hand washing and toilet use only must be posted.
- Potable water will be supplied by the Carlsbad Trickle System, and signs indicating which sources are potable must be posted.
- A Water Treatment Specialist will need to be retained to provide a treatment system for the groundwater accessed by TW1 prior to its use.
- The use of the groundwater accessed by TW1 must be in compliance with the MOL OHSA standards.
- Public access to onsite washroom facilities is not provided.
- A vented cap will be required on the mineralized well.
- The results of the water supply assessment have provided satisfactory evidence that the water supply aquifer accessed by TW1 can support the proposed development with respect to water quantity for the proposed usage of handwashing and toilet flushing.
- The groundwater accessed by TW1 can be feasibly treated onsite to be of sufficient quality to be used for non-potable reasons.
- The drilled well is to be maintained as per O.Reg 903 until such time as the water supply is no longer required. At that point, the water supply well should be decommissioned in accordance with O.Reg 903.
- Paterson has concluded that the available water supply is considered mineralized and that any wells accessing the overburden aquifer would be isolated from any potential impacts by the underlying thick clay layer.
- We recommend that the Director of the MECP grant approval for retention of the new onsite drilled well as a mineralized well.

We trust that the current submission satisfies your immediate requirements.

Best Regards,

Paterson Group Inc.

Alexander Schopf, PhD, EIT

Erik Ardley, P.Geo

Attachments:

- ❑ MECP Water Well Records (Surrounding 500 m radius)
- ❑ Paterson borehole logs
- ❑ PG6430-1-Test Hole Location Plan
- ❑ PH4650-1- MECP Water Well Location Plan
- ❑ Eurofins Certificate of Analysis

Ontario — Ministry of the Environment, Conservation and Parks

Tag#:A342424 (Print Below)

A342424

TW1

Well Record

Regulation 903 Ontario Water Resources Act

Measurements recorded in: ☐ Metric ☒ Imperial

Page ____ of ____

Well Owner's Information

First Name	Last Name/Organization	E-mail Address	☐ Well Constructed by Well Owner
	Brofort Investments Inc		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
2161 Thurston Drive	Ottawa	ON	K1G 6C9	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
6165 Thunder Road	Cumberland	P/L 1	9

County/District/Municipality	City/Town/Village	Province	Postal Code
Ottawa Carleton	Carlsbad Springs	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	465182	5021482	5R-11663	

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

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To
	Clay			0'	64'
	Clay	& Gravel		64'	76'
Grey & Black	Shale			76'	148'
Grey & Black	Shale			148'	174'
Grey & Black	Shale			174'	180'

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
20'	0'	Neat cement	12.48

Method of Construction

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

Well Use

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

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth From	Depth To
6 1/4"	Steel	.188"	+2	76
6"	Open Hole		76	180

Construction Record - Screen

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

Status of Well

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

Water Details

Water found at Depth	Kind of Water	Hole Diameter Depth From	Depth To	Diameter (cm/in)
148 (m/ft) ☐ Gas	☐ Fresh ☒ Untested ☐ Other, specify	0'	20'	9 3/4"
174 (m/ft) ☐ Gas	☐ Fresh ☒ Untested ☐ Other, specify	20'	76'	6 1/4"
(m/ft) ☐ Gas	☐ Fresh ☐ Untested ☐ Other, specify	76'	180'	6"

Results of Well Yield Testing

After test of well yield, water was: ☐ Clear and sand free ☐ Other, specify **Not tested**

If pumping discontinued, give reason: X

Pump intake set at (m/ft): 170

Pumping rate (l/min / GPM): 184.5

Duration of pumping: 1 hrs + 0 min

Final water level end of pumping (m/ft): 50.6'

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

Recommended pump depth (m/ft): 140' / 100'

Recommended pump rate (l/min/GPM): 10 / 15

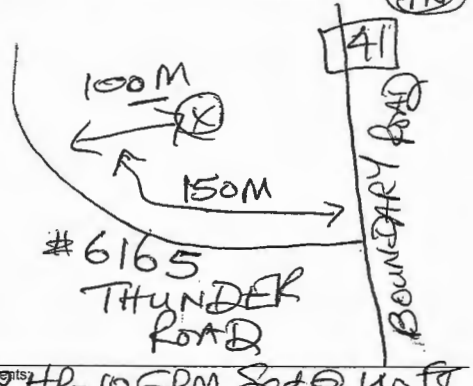
Well production (l/min/GPM): 15

Disinfected? ☒ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	10'4"		50.6'
1	20.5	1	38.6
2	26.4	2	33.2
3	30.9	3	29.2
4	34.4	4	25.8
5	37.7	5	23.1
10	46.9	10	15.4
15	50.3	15	12.2
20	50.4	20	11.7
25	50.4	25	11.3
30	50.5	30	10.9
40	50.6	40	10.6
50	50.6	50	10.4
60	50.6'	60	10.4"

Map of Well Location

Please provide a map below following instructions on the back. AN



Comments: 1 1/2 HP-10GPM Set @ 140 FT
3/4 HP--15GPM Set @ 100 FT

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Air Rock Drilling Co. Ltd.	7681

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
6659 Franktown Road	Richmond	ON	K0A 2Z0	air-rock@sympatico.ca

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
6138382170	

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted (Y Y Y Y M M D D)
		2023 03 31

Well owner's information package delivered: ☒ Yes ☐ No

Date Package Delivered (Y Y Y Y M M D D): 2023 03 31

Ministry Use Only

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Ministry's Copy

Ministry of the Environment
Ontario
OTTAWA - CARLETON

The Ontario Water Resources Act

WATER WELL RECORD

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

11 1525164 MUNICIP 15002 CON. CON 09

COUNTY OR DISTRICT [redacted] | TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE Gloucester | CON, BLOCK, TRACT, SURVEY, ETC 9 | LOT 1

[redacted] Carlsbad Springs | DATE COMPLETED DAY 3 MO 5 YR 90

RC ELEVATION RC BASIN CODE

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
Yellow	Sand	Loam	Loose	0	2
Blue	Clay		Dense	2	70
Grey	Till		Packed	70	77
Grey	Limestone		Layered	77	100

31

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
95	1 ☐ FRESH 2 ☐ SALTY 3 ☒ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
6¼	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	188	0	77
6	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE 5 ☐ PLASTIC		77	100
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER INCHES	LENGTH FEET

MATERIAL AND TYPE | DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	DEPTH SET AT - FEET TO	MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER, ETC.)
2	77	Clay

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☒ PUMP 2 ☐ BAILER

PUMPING RATE: 25 GPM

DURATION OF PUMPING: 1 HOURS 0 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 1 ☒ PUMPING 2 ☐ RECOVERY			
		15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
6 FEET	40 FEET	16 FEET	26 FEET	36 FEET	40 FEET

IF FLOWING, GIVE RATE: GPM

PUMP INTAKE SET AT: 40 FEET

WATER AT END OF TEST: 1 ☐ CLEAR 2 ☒ CLOUDY

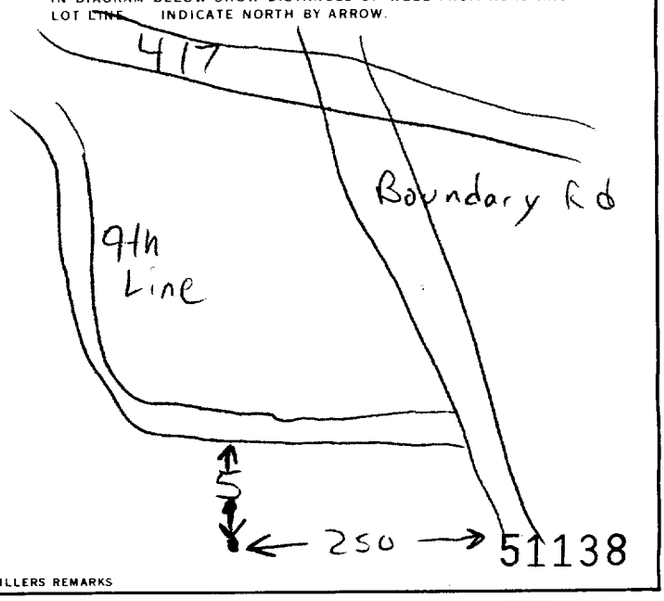
RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP

RECOMMENDED PUMP SETTING: 40 FEET

RECOMMENDED PUMPING RATE: 25 GPM

LOCATION OF WELL

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



DRILLERS REMARKS

FINAL STATUS OF WELL

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

WATER USE

1 ☐ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL ☐ OTHER 5 ☒ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED

METHOD OF CONSTRUCTION

1 ☐ CABLE TOOL 2 ☐ ROTARY (CONVENTIONAL) 3 ☐ ROTARY (REVERSE) 4 ☒ ROTARY (AIR) 5 ☐ AIR PERCUSSION 6 ☐ BORING 7 ☐ DIAMOND 8 ☐ JETTING 9 ☐ DRIVING ☐ DIGGING ☐ OTHER

CONTRACTOR

NAME OF WELL CONTRACTOR: Roy's LBR Ltd | WELL CONTRACTOR'S LICENCE NUMBER: 4609

ADDRESS: Cornwall

NAME OF WELL TECHNICIAN: Roger Rox | WELL TECHNICIAN'S LICENCE NUMBER: T-0330

SIGNATURE OF TECHNICIAN/CONTRACTOR | SUBMISSION DATE DAY ____ MO. ____ YR. ____

OFFICE USE ONLY

DATA SOURCE | CONTRACTOR 4609 | DATE RECEIVED DEC 04 1990

DATE OF INSPECTION | INSPECTOR

REMARKS

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

Ontario — Ministry of the Environment

Measurements recorded in: ☐ Metric ☒ Imperial

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

Well Record

Regulation 903 Ontario Water Resources Act

Page ____ of ____

[redacted]

Address of Well Location (Street Number/Name): 6000 Nineth Line Rd

Township: Cumberland

Lot: 2

Concession: 9

County/District/Municipality: Ottawa Region

City/Town/Village: Carlsbad Springs

Province: Ontario

Postal Code: K0A 1K0

UTM Coordinates: NAD 83 Zone 18 Easting 464462 Northing 5021884

Municipal Plan and Sublot Number:

Other:

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
		Clean Stone		0	12
		Betonite Hole Plug		12	14

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m^3/ft^3)

Method of Construction

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

Well Use

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

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To

Construction Record - Screen

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

Status of Well

☐ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☐ Abandoned, other, *specify*: Not in use
☐ Other, *specify*

Water Details

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

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)

Results of Well Yield Testing

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

If pumping discontinued, give reason:

Pump intake set at *(m/ft)*

Pumping rate *(l/min / GPM)*

Duration of pumping ____ hrs + ____ min

Final water level end of pumping *(m/ft)*

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

Recommended pump depth *(m/ft)*

Recommended pump rate *(l/min / GPM)*

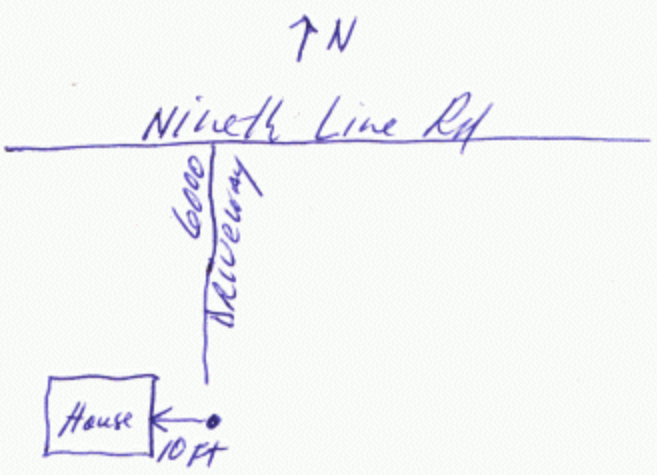
Well production *(l/min / GPM)*

Disinfected? ☒ Yes ☐ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level				
1			1	
2			2	
3			3	
4			4	
5			5	
10			10	
15			15	
20			20	
25			25	
30			30	
40			40	
50			50	
60			60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments: Cement Casing Dug well Abandone.

Well Contractor and Well Technician Information

Business Name of Well Contractor: Raymond Pump + Well

Well Contractor's Licence No.: 7260

Business Address (Street Number/Name): 47 Main St, St-Albert Ont

Municipality: Nation

Province: Ont.

Postal Code: K0A3C0

Business E-mail Address:

Bus. Telephone No. *(inc. area code)*: 6139872399

Name of Well Technician (Last Name, First Name): Raymond Jacques

Well Technician's Licence No.: 0264

Signature of Technician and/or Contractor:

Date Submitted: 2008 09 15

Well owner's information package delivered: ☐ Yes ☒ No

Date Package Delivered: Y Y Y Y M M D D

Date Work Completed: 2008 09 15

Ministry Use Only

Audit No. Z 87900

SEP 24 2009

Received

0506E (12/2007)

Ministry's Copy

Ontario — Ministry of the Environment and Climate Change

Well Tag No. (A 236242) Tag#: A 236242

Well Record

Regulation 903 Ontario Water Resources Act

Measurements recorded in: ☒ Metric ☐ Imperial

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
	Boundry Road Development Inc.	N/A	

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
16766 Transcanadienne Suite 500	Kirland	Qc.	H9H4M7	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
5371 Boundry Road	Cumberland	21	11

County/District/Municipality	City/Town/Village	Province	Postal Code
Ottawa	Cumberland Spring	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	465300	5021483		

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Brown	Fill	clay, Stone	Hard	0	1.8
Brown	clay	Silt	Hard	1.8	3.9
Grey	clay		Soft	3.9	21.0
Grey	gravel	Silt, Sand	packed	21.0	60.96
					22.25
Grey	shale		layered	22.25	60.96

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	24.99	cinent grout	1.5 m³

Method of Construction

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

Well Use

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

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To
15.55	Steel	.48	4.6	24.99
15.32	Open Hole		24.99	60.96

Construction Record - Screen

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

Status of Well

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

Water Details

Water found at Depth (m/ft)	Kind of Water	
27 (m/ft)	☐ Gas	☐ Fresh ☒ Untested ☐ Other, specify ____
52 (m/ft)	☐ Gas	☐ Fresh ☒ Untested ☐ Other, specify ____
(m/ft)	☐ Gas	☐ Fresh ☐ Untested ☐ Other, specify ____

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	24.99	24.9
24.99	60.9	

Results of Well Yield Testing

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

If pumping discontinued, give reason:

Pump intake set at (m/ft): 60

Pumping rate (l/min / GPM): 42

Duration of pumping: 1 hrs + ____ min

Final water level end of pumping (m/ft): 5.75

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft): 58

Recommended pump rate (l/min / GPM): 66

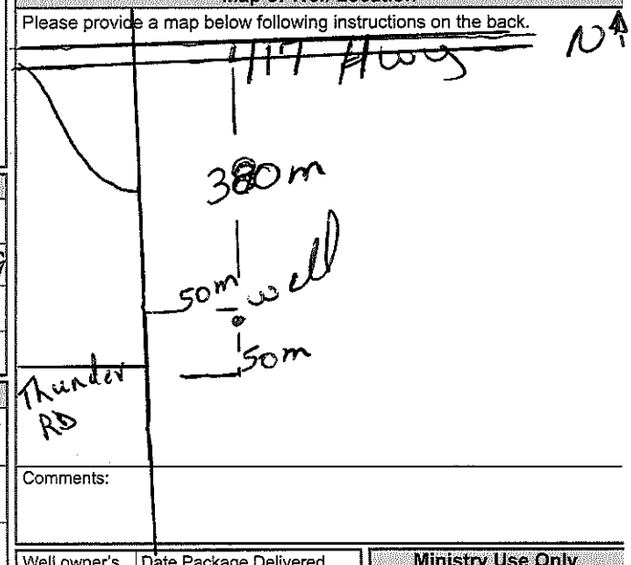
Well production (l/min / GPM): 75

Disinfected? ☒ Yes ☐ No

Draw Down Time (min)	Water Level (m/ft)	Recovery Time (min)	Water Level (m/ft)
Static Level	3.83		5.75
1	4.42	1	4.64
2	4.61	2	4.36
3	4.75	3	4.26
4	4.78	4	4.23
5	4.79	5	4.18
10	4.96	10	4.10
15	5.16	15	4.03
20	5.24	20	3.95
25	5.31	25	3.89
30	5.32	30	3.85
40	5.62	40	3.83
50	5.70	50	3.83
60	5.75	60	3.83

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Bourgeois Well Drilling Ltd.	7417

Business Address (Street Number/Name)	Municipality
14245 Conc. 10-11	Crysler

Province	Postal Code	Business E-mail Address
On	K0A1R0	N/A

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
6139875291	GENIER, MICHAEL

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
3493		2018 03 26

Well owner's information package delivered	Date Package Delivered	Ministry Use Only
☒ Yes ☐ No	2018 03 27	Audit No. Z276189
	Date Work Completed: 2018 03 23	MAY 07 2018 Received

0506E (2014/11) Ministry's Copy

patersongroup Consulting Engineers

9 Auriga Drive, Ottawa, Ontario K2E 7T9

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Warehouse Complex - 6165 Thunder Road
Ottawa, Ontario

DATUM Geodetic

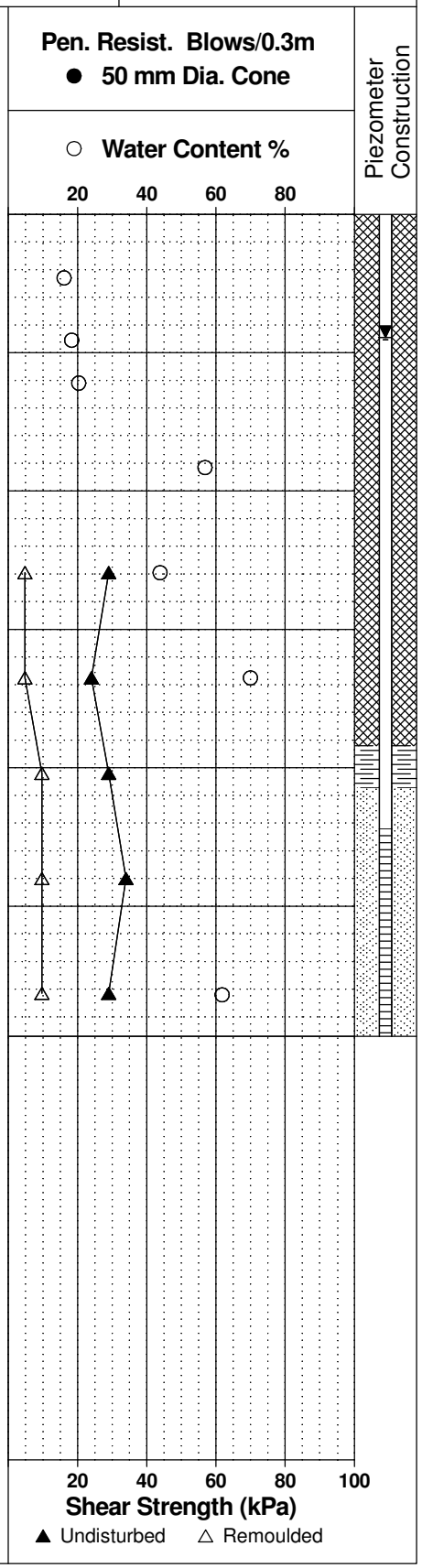
REMARKS

BORINGS BY Track-Mount Power Auger **DATE** October 25, 2022

FILE NO. PG6430

HOLE NO. BH 1-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	77.05
FILL: Brown silty sand with gravel, cobbles, trace clay and organics		AU	1				
		SS	2	67	6	1	76.05
1.17							
Loose, dark brown **SILTY SAND,** trace clay and gravel							
1.45		SS	3	83	3	2	75.05
Firm, reddish brown **SILTY CLAY**		SS	4	83	P		
						3	74.05
- grey by 3.0m depth		SS	5	75	P		
						4	73.05
						5	72.05
		SS	6	100	P		
5.94							
End of Borehole							
(GWL @ 0.89m - Nov. 2, 2022)							



patersongroup Consulting Engineers

9 Auriga Drive, Ottawa, Ontario K2E 7T9

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Warehouse Complex - 6165 Thunder Road
Ottawa, Ontario

DATUM Geodetic

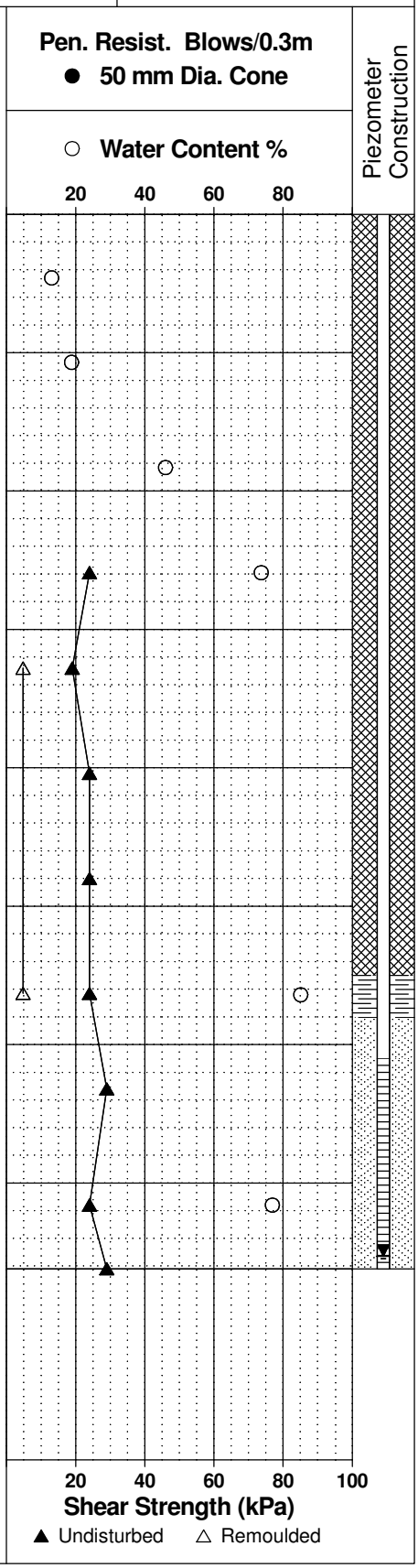
REMARKS

BORINGS BY Track-Mount Power Auger **DATE** October 25, 2022

FILE NO. PG6430

HOLE NO. BH 2-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	77.01
FILL: Brown silty sand with gravel, trace clay and organics		AU	1				
0.69							
Compact, brown **SILTY SAND,** trace clay, gravel, organics		SS	2	50	12	1	76.01
1.45							
		SS	3	100	2	2	75.01
Soft to firm, brown **SILTY CLAY**		SS	4	100	P	3	74.01
- grey by 3.0m depth						4	73.01
						5	72.01
		SS	5	100	P	6	71.01
		SS	6	100	P	7	70.01
7.62							
End of Borehole							
(GWL @ 7.53m - Nov. 2, 2022)							



patersongroup Consulting Engineers

9 Auriga Drive, Ottawa, Ontario K2E 7T9

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Warehouse Complex - 6165 Thunder Road
Ottawa, Ontario

DATUM Geodetic

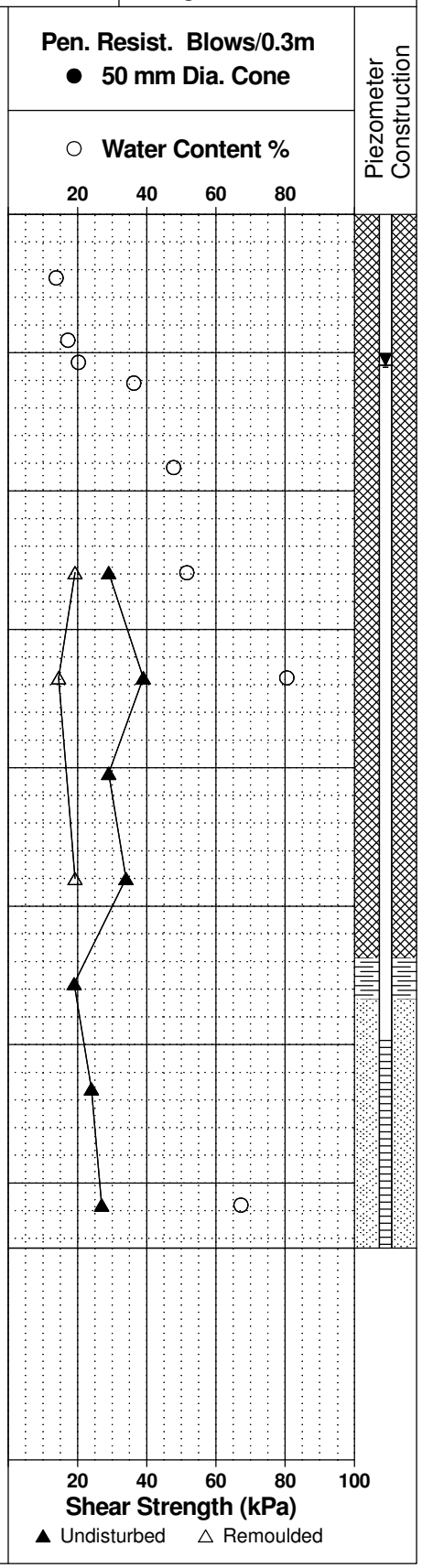
REMARKS

BORINGS BY Track-Mount Power Auger **DATE** October 25, 2022

FILE NO. PG6430

HOLE NO. BH 3-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	76.89
FILL: Brown silty sand with gravel, some clay, organics and concrete		AU	1				
1.07		SS	2	75	14	1	75.89
Compact, brown **SILTY SAND** 1.27							
		SS	3	100	4	2	74.89
		SS	4	100	P		
Firm, brown **SILTY CLAY**						3	73.89
		SS	5	100	P		
- grey by 3.7m depth						4	72.89
						5	71.89
- soft to firm by 5.3m depth							
						6	70.89
		SS	6	8	P	7	69.89
7.47							
End of Borehole							
(GWL @ 1.09m - Nov. 2, 2022)							



patersongroup Consulting Engineers

9 Auriga Drive, Ottawa, Ontario K2E 7T9

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Warehouse Complex - 6165 Thunder Road
Ottawa, Ontario

DATUM Geodetic

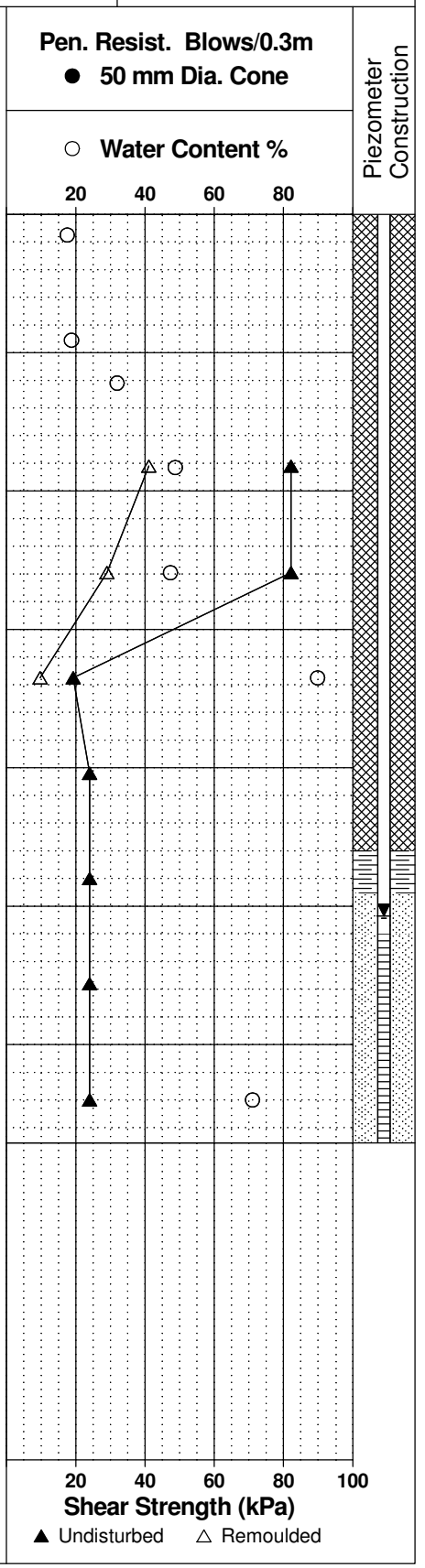
REMARKS

BORINGS BY Track-Mount Power Auger **DATE** October 25, 2022

FILE NO. PG6430

HOLE NO. BH 4-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	76.71
FILL: Brown silty sand with gravel, some clay, organics, cobbles, trace concrete		AU	1				
0.69							
Loose, brown **SILTY SAND to SANDY SILT**		SS	2	75	5	1	75.71
1.17							
		SS	3	17	P	2	74.71
Stiff to firm, brown **SILTY CLAY**		SS	4	17	P	3	73.71
- soft and grey by 3.0m depth		SS	5	100	P	4	72.71
						5	71.71
						6	70.71
		SS	6	100	P		
6.71							
End of Borehole							
(GWL @ 5.07m - Nov. 2, 2022)							



SYMBOLS AND TERMS

SOIL DESCRIPTION

Behavioural properties, such as structure and strength, take precedence over particle gradation in describing soils. Terminology describing soil structure are as follows:

Desiccated	-	having visible signs of weathering by oxidation of clay minerals, shrinkage cracks, etc.
Fissured	-	having cracks, and hence a blocky structure.
Varved	-	composed of regular alternating layers of silt and clay.
Stratified	-	composed of alternating layers of different soil types, e.g. silt and sand or silt and clay.
Well-Graded	-	Having wide range in grain sizes and substantial amounts of all intermediate particle sizes (see Grain Size Distribution).
Uniformly-Graded	-	Predominantly of one grain size (see Grain Size Distribution).

The standard terminology to describe the strength of cohesionless soils is the relative density, usually inferred from the results of the Standard Penetration Test (SPT) 'N' value. The SPT N value is the number of blows of a 63.5 kg hammer, falling 760 mm, required to drive a 51 mm O.D. split spoon sampler 300 mm into the soil after an initial penetration of 150 mm.

Relative Density	'N' Value	Relative Density %
Very Loose	<4	<15
Loose	4-10	15-35
Compact	10-30	35-65
Dense	30-50	65-85
Very Dense	>50	>85

The standard terminology to describe the strength of cohesive soils is the consistency, which is based on the undisturbed undrained shear strength as measured by the in situ or laboratory vane tests, penetrometer tests, unconfined compression tests, or occasionally by Standard Penetration Tests.

Consistency	Undrained Shear Strength (kPa)	'N' Value
Very Soft	<12	<2
Soft	12-25	2-4
Firm	25-50	4-8
Stiff	50-100	8-15
Very Stiff	100-200	15-30
Hard	>200	>30

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

Cohesive soils can also be classified according to their “sensitivity”. The sensitivity is the ratio between the undisturbed undrained shear strength and the remoulded undrained shear strength of the soil.

Terminology used for describing soil strata based upon texture, or the proportion of individual particle sizes present is provided on the Textural Soil Classification Chart at the end of this information package.

ROCK DESCRIPTION

The structural description of the bedrock mass is based on the Rock Quality Designation (RQD).

The RQD classification is based on a modified core recovery percentage in which all pieces of sound core over 100 mm long are counted as recovery. The smaller pieces are considered to be a result of closely-spaced discontinuities (resulting from shearing, jointing, faulting, or weathering) in the rock mass and are not counted. RQD is ideally determined from NXL size core. However, it can be used on smaller core sizes, such as BX, if the bulk of the fractures caused by drilling stresses (called “mechanical breaks”) are easily distinguishable from the normal in situ fractures.

RQD %	ROCK QUALITY
90-100	Excellent, intact, very sound
75-90	Good, massive, moderately jointed or sound
50-75	Fair, blocky and seamy, fractured
25-50	Poor, shattered and very seamy or blocky, severely fractured
0-25	Very poor, crushed, very severely fractured

SAMPLE TYPES

SS	-	Split spoon sample (obtained in conjunction with the performing of the Standard Penetration Test (SPT))
TW	-	Thin wall tube or Shelby tube
PS	-	Piston sample
AU	-	Auger sample or bulk sample
WS	-	Wash sample
RC	-	Rock core sample (Core bit size AXT, BXL, etc.). Rock core samples are obtained with the use of standard diamond drilling bits.

SYMBOLS AND TERMS (continued)

GRAIN SIZE DISTRIBUTION

MC%	-	Natural moisture content or water content of sample, %
LL	-	Liquid Limit, % (water content above which soil behaves as a liquid)
PL	-	Plastic limit, % (water content above which soil behaves plastically)
PI	-	Plasticity index, % (difference between LL and PL)
Dxx	-	Grain size which xx% of the soil, by weight, is of finer grain sizes These grain size descriptions are not used below 0.075 mm grain size
D10	-	Grain size at which 10% of the soil is finer (effective grain size)
D60	-	Grain size at which 60% of the soil is finer
Cc	-	Concavity coefficient = $(D30)^2$ / (D10 x D60)
Cu	-	Uniformity coefficient = D60 / D10

Cc and Cu are used to assess the grading of sands and gravels:
Well-graded gravels have: $1 < Cc < 3$ and $Cu > 4$
Well-graded sands have: $1 < Cc < 3$ and $Cu > 6$
Sands and gravels not meeting the above requirements are poorly-graded or uniformly-graded.
Cc and Cu are not applicable for the description of soils with more than 10% silt and clay
(more than 10% finer than 0.075 mm or the #200 sieve)

CONSOLIDATION TEST

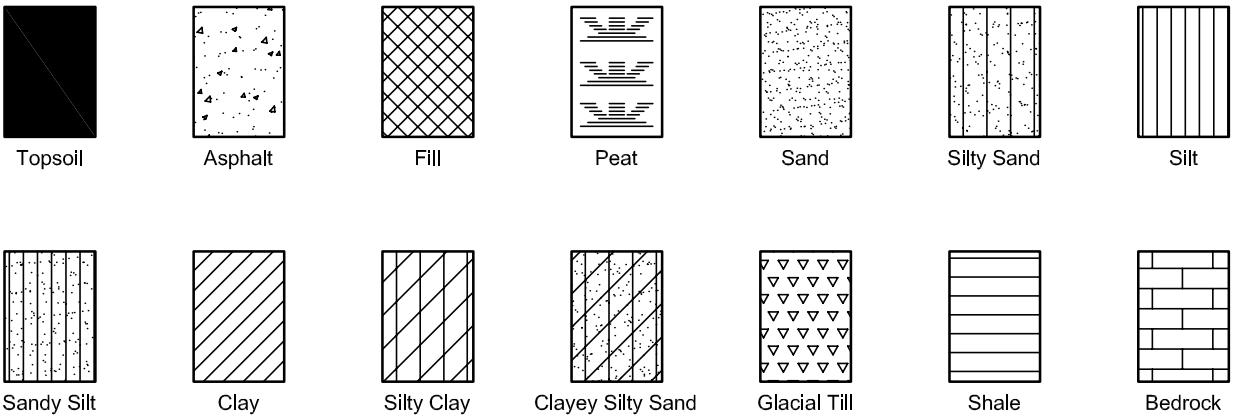
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void Ratio		Initial sample void ratio = volume of voids / volume of solids
Wo	-	Initial water content (at start of consolidation test)

PERMEABILITY TEST

k	-	Coefficient of permeability or hydraulic conductivity is a measure of the ability of water to flow through the sample. The value of k is measured at a specified unit weight for (remoulded) cohesionless soil samples, because its value will vary with the unit weight or density of the sample during the test.

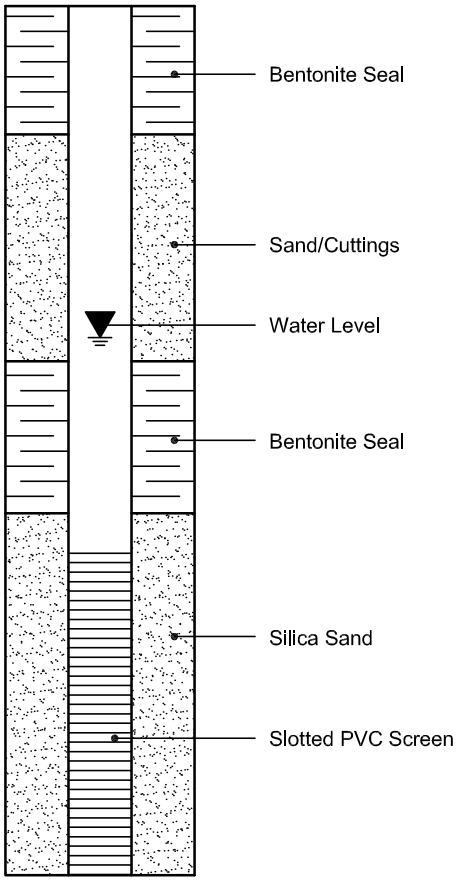
SYMBOLS AND TERMS (continued)

STRATA PLOT

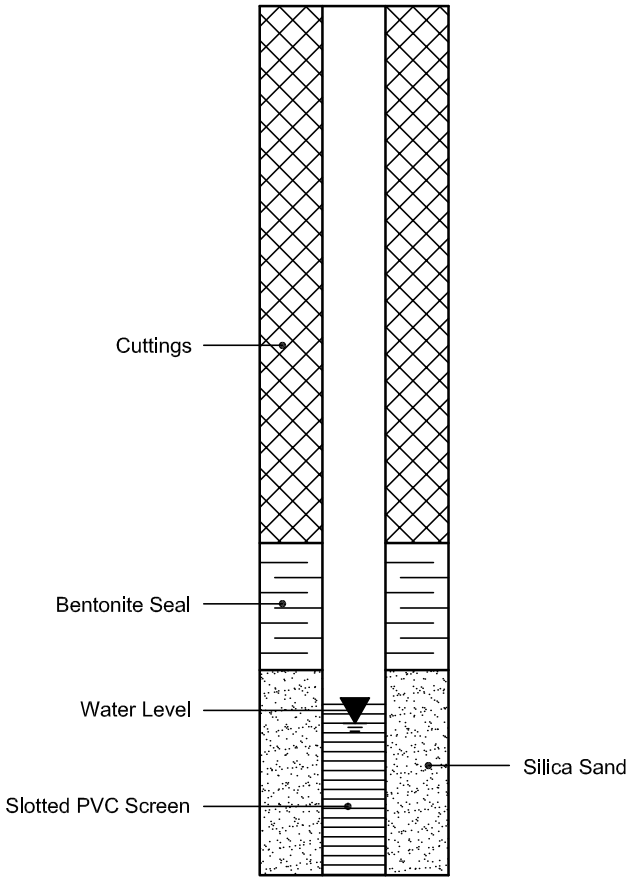


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



Certificate of Analysis

Client: Paterson Group
9 Auriga Dr
Nepean, ON
K2E 7T9
Attention: Mr. Alex Schopf
PO#: 57017
Invoice to: Paterson Group

Report Number: 1994690
Date Submitted: 2023-03-15
Date Reported: 2023-03-22
Project: PH4650
COC #: 906100

Dear Alex Schopf:

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: R Zafari Raheleh Zafari 2023.03.22 17:35:19 -04'00'

Raheleh Zafari, Environmental Chemist

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.

Certificate of Analysis

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Report Number: 1994690
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Project: PH4650
COC #: 906100

Group	Analyte	MRL	Units	Guideline	Lab I.D. / Sample Matrix / Sample Type / Sampling Date / Sample I.D.	1677714 GW 2023-03-14 GW1	1677715 GW 2023-03-14 GW2
Anions	Cl	1	mg/L	AO 250		502*	519*
	F	0.10	mg/L	MAC 1.5		1.44	1.44
	N-NO2	0.10	mg/L	MAC 1.0		<0.10	<0.10
	N-NO3	0.10	mg/L	MAC 10.0		<0.10	<0.10
	SO4	1	mg/L	AO 500		51	56
General Chemistry	Alkalinity as CaCO3	5	mg/L	OG 30-500		696*	688*
	Colour (Apparent)	2	TCU	AO 5		209*	90*
	Conductivity	5	uS/cm			2850	2870
	DOC	0.5	mg/L	AO 5		18.7*	12.1*
	pH	1.00		6.5-8.5		8.49	8.37
	Phenols	0.001	mg/L			0.001	<0.001
	S2-	2	mg/L	AO 0.05		36*	43*
	TDS (COND - CALC)	1	mg/L	AO 500		1850*	1870*
	Turbidity	0.1	NTU	AO 5		49.8*	22.3*
Hardness	Hardness as CaCO3	1	mg/L	OG 80-100		45*	40*
Indices/Calc	Ion Balance	0.01				1.01	1.00
Metals	Ag	0.0001	mg/L			<0.0001	<0.0001
	Al	0.01	mg/L	OG 0.1		0.84*	0.72*
	As	0.001	mg/L	IMAC 0.01		<0.001	<0.001
	B	0.01	mg/L	IMAC 5.0		1.07	1.08
	Ba	0.01	mg/L	MAC 1.0		0.24	0.24
	Be	0.0005	mg/L			<0.0005	<0.0005
	Ca	1	mg/L			3	3
	Cd	0.0001	mg/L	MAC 0.005		<0.0001	<0.0001
	Co	0.0002	mg/L			0.0005	0.0004

Guideline = ODWSOG *** = Guideline Exceedence**

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Report Number: 1994690
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Project: PH4650
COC #: 906100

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1677714 GW 2023-03-14 GW1	1677715 GW 2023-03-14 GW2
Metals	Cr	0.001	mg/L	MAC 0.05		0.002	0.001
	Cu	0.001	mg/L	AO 1		<0.001	<0.001
	Fe	0.03	mg/L	AO 0.3		1.77*	1.21*
	Hg	0.0001	mg/L	MAC 0.001		0.0001	<0.0001
	K	1	mg/L			13	13
	Mg	1	mg/L			9	8
	Mn	0.01	mg/L	AO 0.05		0.14*	0.09*
	Mo	0.005	mg/L			<0.005	<0.005
	Na	1	mg/L	AO 200		653*	652*
	Ni	0.005	mg/L			<0.005	<0.005
	Pb	0.001	mg/L	MAC 0.010		<0.001	<0.001
	Sb	0.0005	mg/L	IMAC 0.006		<0.0005	<0.0005
	Se	0.001	mg/L	MAC 0.05		0.003	0.002
	Sr	0.001	mg/L			0.787	0.818
	Tl	0.0001	mg/L			<0.0001	<0.0001
	U	0.001	mg/L	MAC 0.02		<0.001	<0.001
	V	0.001	mg/L			0.001	0.001
	Zn	0.01	mg/L	AO 5		<0.01	<0.01
Microbiology	Escherichia Coli	0	ct/100mL	MAC 0		0	0
	Total Coliforms	0	ct/100mL	MAC 0		0	0
Nutrients	N-NH3	0.020	mg/L			0.400	0.496
	Total Kjeldahl Nitrogen	0.100	mg/L			1.47	1.43
Subcontract-Inorg	Tannin & Lignin	0.5	mg/L			2.7	1.7
VOCs Surrogates	1,2-dichloroethane-d4	0	%			125	
	4-bromofluorobenzene	0	%			88	

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COC #: 906100

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1677714 GW 2023-03-14 GW1	1677715 GW 2023-03-14 GW2
VOCs Surrogates	Toluene-d8	0	%			80	
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	30	ug/L			<30	
	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	
	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	

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Project: PH4650
COC #: 906100

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1677714 GW 2023-03-14 GW1	1677715 GW 2023-03-14 GW2
Volatiles	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			0.7	
	Methyl Ethyl Ketone (MEK)	2	ug/L			<2	
	Methyl Isobutyl Ketone (MIBK)	10	ug/L			<10	
	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		1.2	
	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		0.7	

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COC #: 906100

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 438707 **Analysis/Extraction Date** 2023-03-15 **Analyst** AaN **Method** C SM2130B			
Turbidity	<0.1 NTU	100	70-130
Run No 438712 **Analysis/Extraction Date** 2023-03-16 **Analyst** L V **Method** AMBCOLM1			
Escherichia Coli			
Total Coliforms			
Run No 438745 **Analysis/Extraction Date** 2023-03-16 **Analyst** SKH **Method** EPA 350.1			
N-NH3	<0.020 mg/L	113	80-120
Run No 438764 **Analysis/Extraction Date** 2023-03-16 **Analyst** SKH **Method** EPA 351.2			
Total Kjeldahl Nitrogen	<0.100 mg/L	118	70-130
Run No 438765 **Analysis/Extraction Date** 2023-03-16 **Analyst** Z S **Method** M SM3120B-3500C			
Calcium	<1 mg/L	100	90-110
Potassium	<1 mg/L	104	87-113
Magnesium	<1 mg/L	98	76-124
Sodium	<1 mg/L	104	82-118

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QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 438786 **Analysis/Extraction Date** 2023-03-16 **Analyst** SD **Method** EPA 200.8			
Aluminum	<0.01 mg/L	114	80-120
Arsenic	<0.001 mg/L	92	80-120
Boron (total)	<0.01 mg/L	107	80-120
Barium	<0.01 mg/L	97	80-120
Beryllium	<0.0005 mg/L	105	80-120
Cadmium	<0.0001 mg/L	101	80-120
Cobalt	<0.0002 mg/L	101	80-120
Chromium Total	<0.001 mg/L	98	80-120
Copper	<0.001 mg/L	102	80-120
Iron	<0.03 mg/L	106	80-120
Manganese	<0.01 mg/L	112	80-120
Molybdenum	<0.005 mg/L	87	80-120
Nickel	<0.005 mg/L	103	80-120
Lead	<0.001 mg/L	103	80-120
Antimony	<0.0005 mg/L	112	80-120
Selenium	<0.001 mg/L	102	80-120

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QC Summary

Analyte	Blank	QC % Rec	QC Limits
Strontium	<0.001 mg/L	95	80-120
Thallium	<0.0001 mg/L	99	80-120
Uranium	<0.001 mg/L	99	80-120
Vanadium	<0.001 mg/L	94	80-120
Zinc	<0.01 mg/L	108	80-120
Run No 438806 **Analysis/Extraction Date** 2023-03-16 **Analyst** AaN **Method** SM 4110			
N-NO2	<0.10 mg/L	107	90-110
N-NO3	<0.10 mg/L	107	90-110
SO4	<1 mg/L	110	90-110
Run No 438833 **Analysis/Extraction Date** 2023-03-17 **Analyst** SD **Method** EPA 200.8			
Silver	<0.0001 mg/L	99	80-120
Mercury	<0.0001 mg/L	114	80-120
Run No 438837 **Analysis/Extraction Date** 2023-03-20 **Analyst** AaN **Method** C SM2120C			
Colour (Apparent)	<2 TCU	98	90-110
Run No 438853 **Analysis/Extraction Date** 2023-03-17 **Analyst** AaN **Method** SM 4110			

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QC Summary

Analyte	Blank	QC % Rec	QC Limits
Chloride	<1 mg/L	100	90-110
Run No 438881 **Analysis/Extraction Date** 2023-03-17 **Analyst** PJ **Method** EPA 8260			
Tetrachloroethane, 1,1,1,2-	<0.5 ug/L	98	60-130
Trichloroethane, 1,1,1-	<0.4 ug/L	91	60-130
Tetrachloroethane, 1,1,2,2-	<0.5 ug/L	99	60-130
Trichloroethane, 1,1,2-	<0.4 ug/L	97	60-130
Dichloroethane, 1,1-	<0.4 ug/L	92	60-130
Dichloroethylene, 1,1-	<0.5 ug/L	81	60-130
Dichlorobenzene, 1,2-	<0.4 ug/L	94	60-130
Dichloroethane, 1,2-	<0.5 ug/L	92	60-130
Dichloropropane, 1,2-	<0.5 ug/L	92	60-130
1,3,5-trimethylbenzene	<0.3 ug/L	99	60-130
Dichlorobenzene, 1,3-	<0.4 ug/L	90	60-130
Dichloropropene,1,3-			
Dichlorobenzene, 1,4-	<0.4 ug/L	90	60-130
Acetone	<30 ug/L		60-130
Benzene	<0.5 ug/L	94	60-130

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QC Summary

Analyte	Blank	QC % Rec	QC Limits
Bromodichloromethane	<0.3 ug/L	92	60-130
Bromoform	<0.4 ug/L	94	60-130
Bromomethane	<0.5 ug/L	81	60-130
Dichloroethylene, 1,2-cis-	<0.4 ug/L	90	60-130
Dichloropropene,1,3-cis-	<0.5 ug/L	82	60-130
Carbon Tetrachloride	<0.2 ug/L	93	60-130
Chloroethane	<0.5 ug/L	83	60-130
Chloroform	<0.5 ug/L	93	60-130
Dibromochloromethane	<0.3 ug/L	93	60-130
Dichlorodifluoromethane	<0.5 ug/L	72	60-130
Methylene Chloride	<4.0 ug/L	97	60-130
Ethylbenzene	<0.5 ug/L	90	60-130
Ethylene dibromide	<0.2 ug/L	99	60-130
Hexane (n)	<5 ug/L	100	60-130
m/p-xylene	<0.4 ug/L	97	60-130
Methyl Ethyl Ketone	<2 ug/L	110	60-130
Methyl Isobutyl Ketone	<10 ug/L		60-130
Methyl tert-Butyl Ether (MTBE)	<2 ug/L	90	60-130

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QC Summary

Analyte	Blank	QC % Rec	QC Limits
Chlorobenzene	<0.5 ug/L	93	60-130
o-xylene	<0.4 ug/L	92	60-130
Styrene	<0.5 ug/L	89	60-130
Dichloroethylene, 1,2-trans-	<0.4 ug/L	93	60-130
Dichloropropene,1,3-trans-	<0.5 ug/L	86	60-130
Tetrachloroethylene	<0.3 ug/L	90	60-130
Toluene	<0.4 ug/L	88	60-130
Trichloroethylene	<0.3 ug/L	89	60-130
Trichlorofluoromethane	<0.5 ug/L	80	60-130
Vinyl Chloride	<0.2 ug/L	79	60-130
Run No 438884 **Analysis/Extraction Date** 2023-03-20 **Analyst** PJ **Method** EPA 8260			
Xylene Mixture			
Run No 438916 **Analysis/Extraction Date** 2023-03-20 **Analyst** AET **Method** SM2320,2510,4500H/F			
Alkalinity (CaCO3)	<5 mg/L	97	90-110
Conductivity	<5 uS/cm	100	90-110
F	<0.10 mg/L	100	90-110

Guideline = ODWSOG *** = Guideline Exceedence**

Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Certificate of Analysis

Client: Paterson Group
9 Auriga Dr
Nepean, ON
K2E 7T9
Attention: Mr. Alex Schopf
PO#: 57017
Invoice to: Paterson Group

Report Number: 1994690
Date Submitted: 2023-03-15
Date Reported: 2023-03-22
Project: PH4650
COC #: 906100

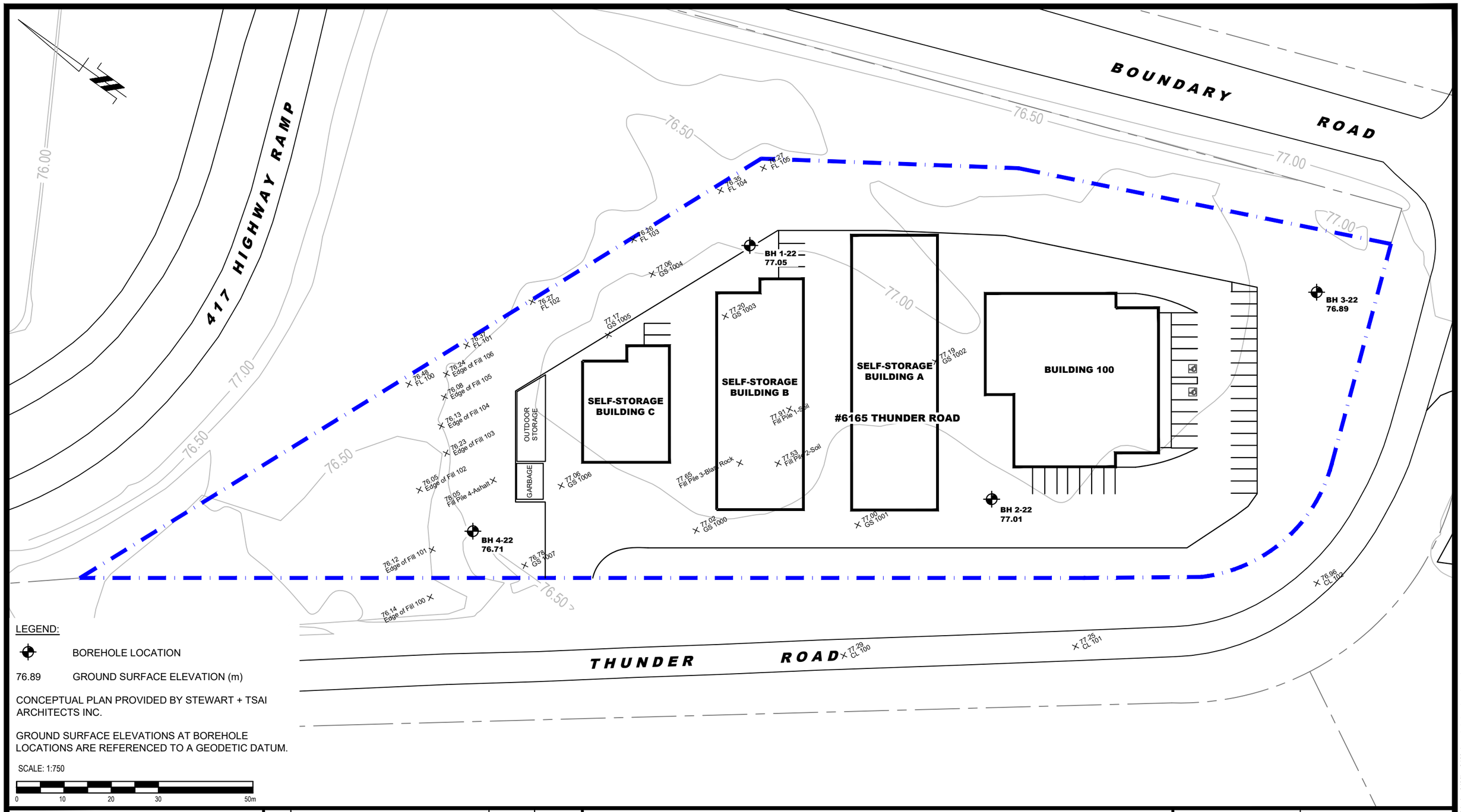
QC Summary

Analyte	Blank	QC % Rec	QC Limits
pH		100	90-110
Run No 438926 **Analysis/Extraction Date** 2023-03-21 **Analyst** AaN **Method** C SM4500-S2-D			
S2-	<0.01 mg/L	85	80-120
Run No 438927 **Analysis/Extraction Date** 2023-03-20 **Analyst** AET **Method** SM 5310B			
DOC	<0.5 mg/L	87	80-120
Run No 438932 **Analysis/Extraction Date** 2023-03-21 **Analyst** AET **Method** C SM2340B			
Hardness as CaCO3			
Ion Balance			
TDS (COND - CALC)			
Run No 438936 **Analysis/Extraction Date** 2023-03-21 **Analyst** IP **Method** SM5530D/EPA420.2			
Phenols	<0.001 mg/L	102	50-120
Run No 439017 **Analysis/Extraction Date** 2023-03-22 **Analyst** AET **Method** SUBCONTRACT-CA-INORG			
Tannin & Lignin			

Guideline = ODWSOG *** = Guideline Exceedence**

Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range



LEGEND:

BOREHOLE LOCATION

76.89 GROUND SURFACE ELEVATION (m)

CONCEPTUAL PLAN PROVIDED BY STEWART + TSAI ARCHITECTS INC.

GROUND SURFACE ELEVATIONS AT BOREHOLE LOCATIONS ARE REFERENCED TO A GEODETIC DATUM.

SCALE: 1:750

0 10 20 30 50m

PATERSON GROUP
9 AURIGA DRIVE
OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

HP URBAN INC.

GEOTECHNICAL INVESTIGATION
PROPOSED WAREHOUSE COMPLEX
6165 THUNDER ROAD

OTTAWA, ONTARIO

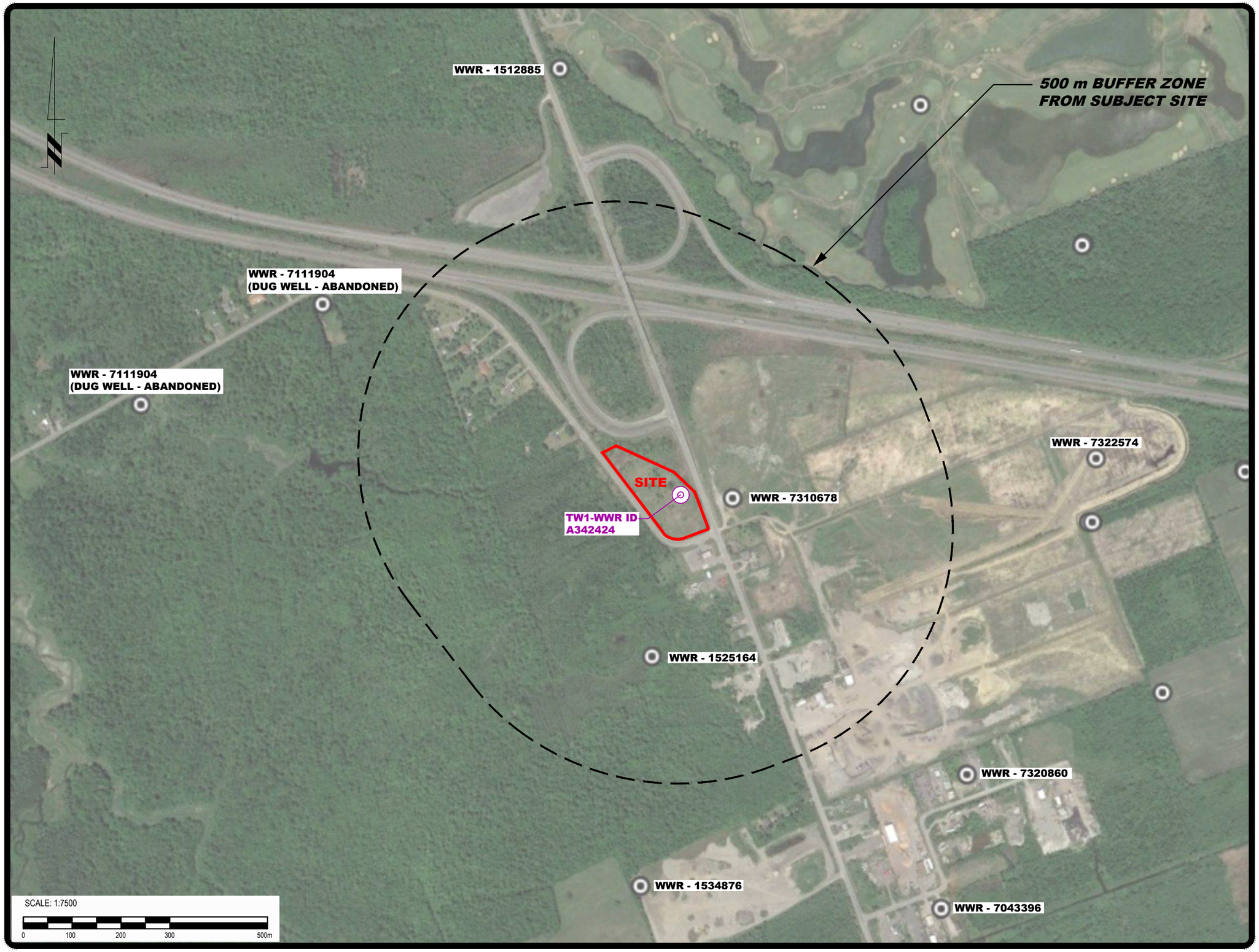
Title:

TEST HOLE LOCATION PLAN

Scale: 1:750	Date: 12/2022
Drawn by: JM	Report No.: PG6430-1
Checked by: NP	Dwg. No.: PG6430-1
Approved by: DJG	Revision No.:

p:\autocad drawings\geotechnical\pg64xx\pg6430\pg6430-1 test hole location plan r.dwg

11x17



LEGEND:

- WATER WELL LOCATION
- TW 1 LOCATION

Date	Description	Rev.

Client:

BROFORT INVESTMENTS INC.

Consultant:

PATERSON GROUP
9 AURIGA DRIVE
OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

Address:

6165 THUNDER ROAD
CARLSBAD SPRINGS, ONTARIO

Drawing:

MECP WATER WELL LOCATION PLAN PLAN

Scale:	Date:
1:7500	04/2023
Drawn by: NK	Checked by: AS
Report No.: PG4650-LET.02	Approved by: EA

Drawing No.:

PH4650-1

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SCHEDULE C

LETTER TO WELLS DIRECTOR ACCEPTING CONDITIONS FOR DIRECTOR CONSENT

November 16, 2023

Shelley Kilby, M.SC., P.Geo.
Coordinator, Water Well Management Program
Environmental Monitoring and Reporting Branch
Ministry of the Environment, Conservation and Parks
125 Resources Rd
Toronto, ON M9P 3V6

ATTENTION: Ms. Shelley Kilby, M.SC., P.Geo., Coordinator, Water Well Management Program, Environmental Monitoring and Reporting Branch

---

RE: 6165 THUNDER ROAD, OTTAWA, ON, REQUEST FOR DIRECTOR APPROVAL

Ms. Kilby

Further to a discussion with my Project Manager, Erik Ardley, I have been advised that the operation of the well located at 6165 Thunder Road ("Subject Site") will require Director Approval for them to be used at the subject site. Additionally, for Director Approval to be considered, the following requirements are to be followed, they are:

Pertaining to well A342424,

1. The well shall be properly vented to the outside atmosphere in a manner that will safely disperse all gases, as per section 15.1 of Regulation 903;

2. The services of a water treatment specialist shall be retained and you shall install, operate and maintain a water treatment system in the distribution system, in accordance with recommendations of the water treatment specialist, to remove any hydrogen sulphide prior to the water being used in the building;

3. The treatment system shall be properly maintained and operational at all times in accordance with the recommendations of the water treatment specialist;

4. All faucets within the building shall be labelled to indicate that the water is not intended for human consumption;

5. The well water shall not be used as a drinking water source under any circumstances by any person and botted water shall be supplied for consumption by employees; and

6. Due to elevated chloride, steps shall be taken to mitigate the impact of corrosion of plumbing including: use of approved PEX pipe and fittings, installation of stainless

steel fixtures, and not installing water treatment systems that may increase corrosivity of the water.

7. Once the water treatment system for reducing hydrogen sulphide in water from well A342424 becomes operational, you shall immediately notify the Director appointed for the purposes of subsection 21 (10) of the Wells Regulation by email to wellshelpdesk@ontario.ca of the date when the water treatment system became operational.

We find these requirements acceptable and would politely request that the Ministry of the Environment, Conservation and Parks consider our application for Director Approval for this site.

Thank you,

Philip Klugman
November 24th,2023

PRELIMINARY

NOTE:

TOTAL DESIGN DAILY SANITARY SEWAGE FLOW (Q) HAS BEEN CALCULATED TO BE 5,415 L/DAY. THE PROPOSED SEWAGE SYSTEM HAS BEEN DESIGNED TO SUPPORT UP TO 5,415 L/DAY.

(KNOWN AS) BOUNDARY ROAD

EDGE OF ASPHALT

SIB(1173)

N33°36'25"W 54.59m

N24°24'10"W 79.81m

UNDERGROUND BELL

UP

BH 1-22 77.05

BH 3-22 76.89

BH 2-22 77.01

BH 4-22 76.71

ELEC

MAIL BOX

N67°20'15"W 168.87m

100mmØ PVC SEWER PIPE @ 2% MIN. SLOPE
- TO BE SLEEVED THROUGH A 150mm PVC SDR 28 TRAFFIC RATED SEWER PIPE

NEW 16,245L (min.) SEPTIC TANK c/w
- POLYLOK PL 525 EFFLUENT FILTER
- POLY RISER & COVER ASSEMBLY (2)
- OUTLET INV. = 77.35m± (TBC)

NEW 5,415L (min.) BALANCING TANK c/w
- TIME OPERATED DUPLEX EFFLUENT PUMPS
- HIGH WATER ALARM
- POLY RISER & COVER ASSEMBLY (2)

2 x 32mØ PVC SCH40 FORCEMAINS
- INSTALL TO GRAVITY DRAIN AND OVERLAY WITH 50mm T x 600mm W INSULATION BOARDS

ELJEN SPECIFIED SAND AREA (8.0m x 44.60m)

4 RUNS OF 15 ELJEN GSF A-42 MODULES MODULAR BASE ELEV. = 77.40m

TYP. 100mmØ PERFORATED PVC SEPTIC PIPE INSTALLED LEVEL ON ELJEN MODULES INV. = 77.58m

ELJEN SAMPLING PAN
- INSTALL COLLECTION PLATES AS PER MANUFACTURER SPECIFICATIONS

6165 THUNDER ROAD
PROPOSED 1-STOREY
WAREHOUSE BUILDING
2796 m²
FFE = 78.27

GRAVEL AREA

DEPRESSED LOADING AREA

ASPHALT AREA

PROPOSED STORMWATER MANAGEMENT & WATER STORAGE AREA.
BOTTOM ELEV. ±75.00
PERMANENT POOL ELEV ±76.35
SWM STORAGE ELEV ±76.45
MINIMUM TOP ELEV ±77.45
FIRE FLOW STORAGE VOLUME ± 1044 m³
STORMWATER STORAGE VOLUME ± 128 m³

10.08m - 300mmØ STM @ 0.34%. BLDG INV 76.82. C/W BACKFLOW PREVENTER PER CITY STANDARD S14.

24.17m - 375mmØ STM @ 0.25%

49.32m - 375mmØ STM @ 0.25%

4.90m - 375mmØ STM @ 0.25%

MH1 T/G 77.95

MH2 T/G 78.14

CB3 T/G 77.82

N35°47'00"W (REFERENCE BEARING) 233.51m

WHERE 5.0m FROM PARKING AREA TO EDGE OF EXCAVATION IS NOT POSSIBLE, 75mm T x 600 mm W RIGID INSULATION BOARDS TO BE INSTALLED VERTICALLY FROM BASE OF EXCAVATION TO THE TOPSOIL LAYER

TYP. 100mmØ VENT PIPE INSTALLED IN 150mmØ LANDSCAPE VALVE COVER

25mØ PVC SCH40 PRESSURE PIPE SLEEVED THROUGH 100mm PERFORATED PVC SEPTIC PIPE INSTALLED LEVEL.
- INV. = 77.58m
- 3mmØ ORIFICES @ MID OF EACH MODULE @ 12 O'CLOCK POSITION IN PRESSURE PIPE
- HOLES AT FIRST AND LAST MODULES (I.E. DRAIN HOLES) SHALL BE DRILLED AT 5 O'CLOCK POSITION.

N69°24'00"E 48.16m

R=3.705
R=41.66
C=38.90
N73°59'00"W
5.0m(min.)
5.0m(act.)

BOTTOM OF BANK

TOP OF BANK

EDGE OF ASPHALT

JOB BENCHMARK
MAGNETIC NAIL IN ASPHALT
ELEV. = 77.30m

SIB(MTC)

SIB(MTC)

(KNOWN AS) SERVICE ROAD (TRAVELLED ROAD)

LEGEND:

- Bore Hole Location
- x 70.81 — Existing Ground Surface Elev. (m)
- **x 72.70** — Proposed Ground Surface Elev. (m)
- Surficial Flow Direction
- Proposed Structure

BENCHMARK INFORMATION:

TBM: Top of Magnetic Nail In Asphalt of Thunder Road near south west corner of subject Property
Approximate Geodetic Elevation = 77.30m

REFERENCE:

Base Plan and Topographic Information obtained from Lot Grading Drainage and Servicing Plan No. C101, provided on April 22, 2024, by McINTOSH PERRY

SCALE: 1:750

0 10 20 30 50m

Consultant

PATERSON GROUP

9 AURIGA DRIVE
OTTAWA, ON
K2E 7Z9
TEL: (613) 226-7381

DD/MM/YY	Description	Rev.
29/04/24	Issued for Site Plan Application	1
26/02/23	Issued for Preliminary Discussion Purposes	0

Client: **BROFORT INVESTMENTS**

Project: **PROPOSED COMMERCIAL DEVELOPMENT**
6165 THUNDER ROAD
OTTAWA (CARLSBAD SPRINGS), ONTARIO

Drawing: **SEWAGE SYSTEM LAYOUT PLAN**

Scale:	Drawn by:
1:750	HV
Date:	Checked by:
04/2024	MK

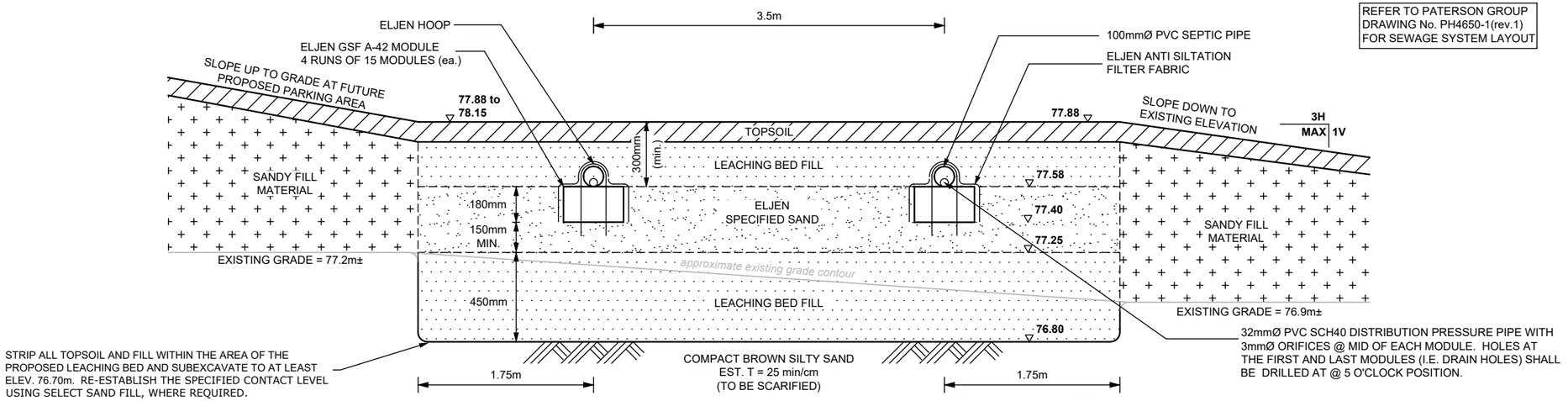
Drawing no.: **PH4650-1(rev.1)**

p:\autocad drawings\hydrogeology\ph4650x\ph4650 - brofort investments - 6165 thunder road - prelim mia\ph4650-1(rev.1).dwg

COVER MATERIAL TO CONSIST OF LEACHING BED FILL FOLLOWED BY APPROX. 100mm OF SANDY TOPSOIL. LEACHING BED TO BE VEGETATED AS SOON AS POSSIBLE.

FINAL GRADING SHALL BE SUITABLY SHAPED TO DIRECT SURFACE WATER AWAY FROM THE PROPOSED SEWAGE SYSTEM.

REFER TO PATERSON GROUP DRAWING No. PH4650-1(rev.1) FOR SEWAGE SYSTEM LAYOUT



PROFILE

N.T.S.

NOTES:

THE PROPOSED SEWAGE SYSTEM HAS BEEN DESIGNED TO SUPPORT A COMMERCIAL TYPE USAGE CONSISTING OF OFFICE, STORE AND WAREHOUSE SPACE. THE DAILY DESIGN SEWAGE FLOW RATE IS CALCULATED IN ACCORDANCE WITH O.B.C. TABLE 8.2.1.3.B.

UNITS:

- 2

OFFICE SPACE:

- [(100m² / 9.3) x 75 L/DAY] x 2 UNITS = 806 L/DAY x 2 UNITS
- ESTIMATE SEWAGE FLOW = 1615 L/DAY

STORE SPACE:

- (100m² x 5 L/DAY) x 2 UNITS = 5000 L/DAY x 2 UNITS
- ESTIMATE SEWAGE FLOW = 1,000 L/DAY

WAREHOUSE SPACE:

- 3 LOADING BAY x 150 L/DAY x 2 UNITS = 450 L/DAY x 2 UNITS
- 1 WATERCLOSET x 950 L/DAY x 2 UNITS = 950 L/DAY x 2 UNITS
- ESTIMATE SEWAGE FLOW = 2,800 L/DAY

ESTIMATED SEWAGE FLOW = 5,415 L/DAY
DESIGN SEWAGE FLOW = 5,415 L/DAY

2) SOIL CONDITIONS

SOILS INFORMATION GATHERED BY PATERSON GROUP INC. ON OCT. 25, 2022. REFER TO PATERSON GROUP REPORT PG6308-1 FOR FULL SOILS BREAKDOWN.

BH 2-22, ELEV. 77.01m		BH 3-22, ELEV. 76.89m	
0-0.69	FILL: SISA, TRACE CLAY & ORGANICS	0-1.07	FILL: BR. SILTY SAND, WITH GRAVEL, SOME CLAY
0.69-1.45	COMPACT BR. SILTY SAND, TRACE CLAY & GRAVEL	1.07-1.27	COMPACT BROWN SILTY SAND
1.45-7.62	SOFT TO FIRM BROWN SILTY CLAY GREYING @ 3.0m DEPTH	1.27-7.47	FIRM BROWN SILTY CLAY GREYING @ 3.7m DEPTH

- G.W.L. @ 1.09m DEPTH (75.80m)

3) PRETREATMENT TANK

- TANK SHALL BE CONNECTED TO BUILDING BY A 100mm Ø PVC PIPE SLEEVED THROUGH A 150mmØ PVC SDR 28 PIPE AND OVERLAIN WITH 50mm T x 600mm W RIGID INSULATION BOARDS (UNDER ROADWAY) AND SHALL BE INSTALLED AT 2.0% (min.) SLOPE TO THE PRETREATMENT TANK.
- MINIMUM WORKING CAPACITY OF PRETREATMENT TANK = (3 x Q) = 3 x 5,415 L/DAY = 16,245 L (min.)
- IT IS RECOMMENDED THAT A NEW 16,245L MIN. TWO-COMPARTMENT SEPTIC TANK BE INSTALLED.
- AN OBC APPROVED EFFLUENT FILTER (I.E. POLYLOK PL-525 EFFLUENT FILTER, OR EQUIVALENT) SHALL BE INSTALLED ON THE OUTLET PIPE IN THE PRETREATMENT TANK.
- THE ACCESS LIDS TO THE TANK OPENINGS SHALL BE EXTENDED TO THE GROUND SURFACE. INSTALL RISERS AND COVERS TO SUIT.
- ACCESS LIDS SHALL INCLUDE SAFETY DEVICES AS PER CSA B66-21.

4) LEACHING BED SIZING CRITERIA

- NO. OF MODULES REQUIRED = Q/95 = 5,415/95 = 57 MODULES
- USE 4 RUNS OF 15 (60) ELJEN GSF A-42 MODULES EACH
- SAND AREA REQUIRED = QT/400 = 5,415(25)/400 = 338.4m²
- SAND AREA PROVIDED = 8.0m x 44.6m = 365.8m² (min.)

5) BALANCING TANK

- INSTALL A 5,415L MIN. BALANCING TANK IN SERIES AND DOWNSTREAM FROM THE NEW SEPTIC TANK.
- A TIME OPERATED ALTERNATING DUPLEX PUMPING SYSTEM (I.E. MYERS ME3F, OR SIMILAR) AND A HIGH WATER ALARM SHALL BE INSTALLED IN THE BALANCING TANK.
- THE TIME OPERATIONAL PUMPING SYSTEM SHALL OPERATE EVERY HOUR (I.E. 230 L/DOSE) AND SHALL ALTERNATE BETWEEN EACH CELL.
- A 3mmØ DRAIN HOLE SHALL BE INSTALLED IN THE UNDERSIDE OF THE FORCEMAIN IN THE BALANCING TANK NEAR THE WALL CONNECTION.
- RISERS WITH A COVER SHALL BE INSTALLED OVER THE BALANCING TANK TO PROVIDE ACCESS FROM THE GROUND SURFACE.
- DISCHARGE PIPING FOR PUMP SHALL BE CONFIGURED SUCH THAT THE PUMP IS EASILY SERVICED FROM THE GROUND SURFACE.

5) FORCEMAINS

- A 32mmØ (NOMINAL) PVC SCH40 FORCEMAIN SHALL BE USED TO CARRY THE EFFLUENT FROM THE BALANCING TANK TO EACH CELL OF THE ELJEN MODULES.
- THE FORCEMAIN SHALL BE INSTALLED TO GRAVITY DRAIN TO THE PUMP CHAMBER AND OVERLAIN WITH 50mm THICK BY 600mm WIDE RIGID INSULATION BOARDS.

7) LEACHING BED CONSTRUCTION GUIDELINES

- REMOVE ALL EXISTING TOPSOIL, AND FILL WITHIN THE LIMITS OF THE SAND AREA AND SUBEXCAVATE TO AT LEAST ELEVATION 76.80m, WHICHEVER IS GREATER. RE-ESTABLISH THE SPECIFIED CONTACT LEVEL USING SELECT SAND FILL, WHERE REQUIRED.
- THE SUBGRADE SURFACE SHALL BE SCARIFIED, UNDER DRY CONDITIONS.
- PLACE A 150mm MIN. THICK LAYER OF LEACHING BED FILL OVER THE SUITABLY PREPARED SUBGRADE.
- 100mm T RIGID INSULATION BOARDS SHALL BE INSTALLED VERTICALL ALONG THE THE EDGE OF EXCAVATION FROM THE BASE OF THE SYSTEM TO THE FINISHED GRADE, WHERE ADEQUATE HORIZONTAL SEPARATION IS NOT ACHIEVED TO HARDSCAPED PATIO / DRIVEWAY.
- LEACHING BED SAND FILL SHALL BE UNIFORM SAND WITH GRADING LIMITS SIMILAR TO 100% PASSING 13.2mm SIEVE, LESS THAN 5% PASSING 0.075mm SIEVE, AND HAVING A PERCOLATION TIME OF 6 TO 8 min/cm. LEACHING BED FILL SHALL BE PRE- APPROVED BY THE CONSULTANT.
- PLACE A 150mm MIN. THICK LAYER OF ELJEN SPECIFIED SAND FILL OVER THE LEACHING BED FILL.
- THE ELJEN SPECIFIED SAND FILL SHALL CONSIST OF WASHED SAND MEETING THE REQUIREMENTS OF ASTM C33 "STANDARD SPECIFICATION FOR CONCRETE AGGREGATES" WITH LESS THAN THAN 5% PASSING 0.075mm SIEVE. ELJEN SPECIFIED SAND FILL SHALL BE PRE-APPROVED BY THE CONSULTANT.
- THE MODULES SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
- THE MODULES SHALL BE INSTALLED LEVEL, END TO END AND WITH THE WHITE DEMARCATION LINE FACING UP.
- THE MODULAR BASE LEVEL (ELEV. 77.40m) SHALL BE ESTABLISHED WITH ELJEN SPECIFIED SAND FILL, HAVING A MINIMUM THICKNESS OF 150mm.
- THE ELJEN MODULES SHALL BE FED BY A 38mmØ PVC SCH40 PRESSURE PIPE. INSTALLED TO GRAVITY DRAIN TO THE BALANCING TANK, AND SHALL BE OVERLAIN WITH 50mm T x 600mm W RIGID INSULATION BOARDS.
- THE DISTRIBUTION PIPE SHALL CONSIST OF A 25mmØ SCH 40 PVC PRESSURE PIPE SLEEVED THROUGH A 100mmØ PERFORATED PVC PIPE CENTRED OVER THE MODULES. THE PIPE SHALL BE SECURED TO THE TOP OF THE MODULES USING AN ELJEN HOOP (MINIMUM 1 HOOP PER MODULE).
- PREPARE THE 25mmØ PVC SCH 40 PRESSURE PIPE BY DRILLING A 3mmØ HOLES AT CENTRE OF EACH MODULE AT THE 12 O'CLOCK POSITION. THE HOLES AT THE FIRST AND LAST MODULES (I.E. DRAIN HOLES) SHALL BE DRILLED AT THE 5'OCLOCK POSITION.
- THE INVERT LEVEL OF THE DISTRIBUTION PIPE SHALL BE SET ON THE MODULES AT ELEVATION 77.58m.
- INSTALL ELJEN SYSTEM SAMPLING DEVICE AS PER MANUFACTURER'S RECOMMENDATIONS.
- TO ALLOW FOR SERVICING AND VENTING, IT IS RECOMMENDED THAT THE END OF EACH 100mmØ PIPE RUN BE EXTENDED TO THE GROUND SURFACE AND THE PRESSURE PIPE BE SLEEVED THROUGH THE PVC PIPE. THE PRESSURE PIPE SHALL BE FITTED WITH A TREADED END CAP FOR SERVICING. THE END OF THE 100mmØ PVC PIPE SHALL BE FITTED WITH AN END CAP WITH 6mmØ VENT HOLES. THE VENT AND CLEAN-OUT ASSEMBLY SHALL BE COVERED WITH A 150mmØ IRRIGATION VALVE COVER INSTALLED FLUSH WITH THE GROUND SURFACE.
- THE ELJEN ANTI-SILTATION FILTER FABRIC SHALL BE SPREAD LENGTHWISE OVER THE PERFORATED SEPTIC PIPE AND DOWN THE SIDES OF THE MODULES. ENSURE ENDS OF MODULES ARE ALSO COVERED WITH FABRIC.
- THE MODULES SHALL BE BACKFILLED, WITH ELJEN SPECIFIED SAND FILL TO AT LEAST THE TOP OF THE ELJEN MODULES, FOLLOWED BY 200mm (min.) TO 500mm (max.) OF LEACHING BED FILL, FOLLOWED BY 100mm OF SANDY TOPSOIL, WITHIN THE LIMITS OF THE SAND AREA. THE BED AREA SHOULD BE VEGETATED AS SOON AS POSSIBLE.
- THE SIDES OF THE BED SHOULD BE SLOPED AT 3H:1V OR SHALLOWER.

8) MINIMUM CLEARANCE DISTANCE FROM DISTRIBUTION PIPE

- 4.1m FROM ANY PROPERTY LINE
- 6.1m FROM ANY STRUCTURE: 5.0m FROM ANY BASEMENTLESS STRUCTURE
- 5.0m FROM ANY POOL
- 16.1m FROM ANY DRILLED WELL

9) MINIMUM CLEARANCE DISTANCE FROM TANK(S)

- 1.5m FROM ANY STRUCTURE
- 15.0m FROM ANY DRILLED OR DUG WELL
- 3.0m FROM ANY PROPERTY LINE

10) GENERAL

- SNOW STORAGE SHALL NOT BE LOCATED OVER OR UPGRADIENT OF THE PROPOSED SEWAGE SYSTEM.
- THE SEWAGE SYSTEM HAS NOT BEEN DESIGNED TO SUPPORT TRAFFIC LOADING.
- THE BACKFILLING OF THE SEWAGE SYSTEM SHOULD MINIMIZE THE RISK OF OVER COMPACTION WITH THE USE RUBBER TRACKED EQUIPMENT AND BY AVOIDING THE CREATION OF ANY CONSTRUCTION ROUTES OR PATHWAYS OVER THE SYSTEM.
- ANY IRRIGATION / SPRINKLER SYSTEM SHALL NOT BE LOCATED WITHIN THE VICINITY OF THE PROPOSED SEWAGE SYSTEM.
- CONTRACTOR SHALL BE QUALIFIED AND REGISTERED UNDER PART 8 OF THE ONTARIO BUILDING CODE.
- ALL WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH THE LATEST BY-LAWS, CODES AND REGULATIONS.
- CONTRACTOR SHALL REVIEW DRAWINGS IN DETAIL AND SHALL INFORM THE CONSULTANT OF ANY ERRORS AND/OR OMISSIONS ON DESIGN DRAWINGS IMMEDIATELY.
- CONTRACTOR SHALL BE RESPONSIBLE TO LOCATE AND PROTECT ALL EXISTING UNDERGROUND SERVICES.
- CONTRACTOR SHALL VISIT THE SITE AND REVIEW ALL DOCUMENTATION TO BECOME FAMILIAR WITH THE SITE AND SUBSURFACE SOIL CONDITIONS TO DETERMINE SUITABLE METHODS OF CONSTRUCTION.
- THE MANUFACTURER PROVIDES A LIMITED WARRANTY OF THE SYSTEM COMPONENTS. THE OWNER OF THE SYSTEM MUST SIGN A MAINTENANCE AGREEMENT WITH THE MANUFACTURER'S REPRESENTATIVE. THE HOMEOWNER IS RESPONSIBLE FOR THE ANNUAL FEES ASSOCIATED WITH THE MAINTENANCE.
- THE FIRM OF PATERSON GROUP INC. HAS PROVIDED DESIGN SERVICES ONLY FOR THE SUBJECT SEWAGE SYSTEM. THE DESIGN HAS BEEN CARRIED OUT IN ACCORDANCE WITH THE MANUFACTURER'S GUIDELINES AND OUR INTERPRETATION OF PART 8 OF THE ONTARIO BUILDING CODE.
- THE PROPERTY LINE / SEPARATION DISTANCES SHOULD BE CONFIRMED PRIOR TO CONSTRUCTION.
- CONSTRUCTION INSPECTIONS DURING THE INSTALLATION OF THE SEWAGE SYSTEM MAY BE REQUIRED BY THE REGULATING AUTHORITY AND ARE STRONGLY RECOMMENDED BY THIS FIRM DUE TO THE POTENTIAL VARIABILITY IN GROUND WATER ELEVATION AT THE SUBJECT SITE. IF THIS FIRM IS TO COMPLETE ANY CONSTRUCTION INSPECTION(S), ADDITIONAL FEES MAY BE APPLIED. CONFIRMATION OF PAYMENT WILL BE REQUIRED PRIOR TO THE INSPECTION.
- THE TEST HOLE INFORMATION PROVIDED, IS INTENDED TO BE USED FOR DESIGN PURPOSES ONLY, AND SHOULD NOT BE RELIED UPON FOR CONSTRUCTION PURPOSES. IF DISCREPANCIES ARE FOUND DURING THE CONSTRUCTION PROCESS, IT IS THE CLIENT'S RESPONSIBILITY TO CONTACT THIS FIRM TO MAKE ANY NECESSARY COMMENTS OR REVISIONS. ADDITIONAL REVISIONS ARE NOT CONSIDERED PART OF THE DESIGN WORKS AND WILL BE CONSIDERED AS AN ADDITIONAL COST.

29/03/24	Issued for Septic Permit	1
06/03/24	Issued for Client Review	0
DD/MM/YY	DESCRIPTION	REV.

Consultant:

PATERSON GROUP

9 AURIGA DRIVE
OTTAWA, ON
K2E 7Z9
TEL: (613) 226-7381

Client:

BROFORT INVESTMENTS

Project:

PROPOSED COMMERCIAL DEVELOPMENTS

6165 THUNDER ROAD
OTTAWA (CARLSBAD SPRINGS)
ONTARIO

Drawing:

SEWAGE SYSTEM DETAILS AND NOTES

Scale:	Drawn by:
N.T.S.	HV
Date: 04/2024	Checked by: MK

Drawing No.:

PH4650-2(rev.1)

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