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PH4674-LET.02

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Attention: Olu Austin Ayeni

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Subject: Hydrogeological Assessment - Proposed Institutional Development
912 David Manchester Road
Ottawa (Carp), Ontario

INTRODUCTION

Further to your request, Paterson has conducted a Hydrogeological Assessment in support of a Site Plan Control Application for the proposed institutional development, specifically a church, to be located at 912 David Manchester Road in Ottawa (Carp), Ontario.

The purpose of the Hydrogeological Assessment is to assess the underlying aquifer in terms of available groundwater quality and quantity to support the Site Plan Application for the proposed institutional development. The site was assessed using the methodology provided in City of Ottawa Hydrogeological and Terrain Analysis Guidelines (HTAG).

Proposed Development

The precise details for the proposed Institutional Development have not yet been identified. A Desktop Hydrogeological Review for a Private Water Well Supply and Preliminary Terrain Analysis was completed by Paterson as part of a due diligence review (Report Number PH4674-LET.01 dated November 30, 2022). The Preliminary Terrain Analysis completed as part of that assessment detailed potential site uses and the assumptions which would be required in order to meet the City of Ottawa's (City) HTAG requirements for a Terrain Analysis. Three scenarios were presented, and the maximum Total Daily Design Sanitary Sewage Flow (TDDSSF) volume that was identified was 3.95 m³/day. Until design details can be provided, and for the purpose of this Hydrogeological Assessment, the maximum daily sewage flow of 3.95 m³/day will be assumed.





Hydrogeological Pre-consultation

A Hydrogeological Pre-consultation was completed with a City of Ottawa Hydrogeologist on November 17, 2022. During the Hydrogeological Pre-consultation the City Hydrogeologist noted that the site is likely to contain thin soils and possible impacts from the adjacent highway. They suggested doubling the standard amount of casing (extending it to 12 m) in an effort to reduce the potential of salt impacts from the highway.

Discussions with the City Hydrogeologists have been ongoing intermittently since the initial Hydrogeological Pre-consultation.

Ontario Regulation 170/03

Ontario regulation 170/03 (O.Reg 170) is one of the Ontario regulation which regulates drinking water systems. Under O.Reg 170, a church is considered a “small non-municipal non-residential system”

According to O.Reg 170 “a *“small non-municipal non-residential system” means a non-municipal drinking water system that is not capable of supplying drinking water at a rate of more than 2.9 litres per second, serves a designated facility or public facility and...*”. According to O.Reg. 170 “a *public facility*” is defined as “... a church, mosque, synagogue, temple or other place of worship”.

As the proposed development will be regulated under O.Reg 170, regular groundwater testing and monitoring of the water treatment equipment must be completed. As such, provided that the development is for institutional use (church) only, the groundwater must be treated and maintained under O.Reg 170 in order to be provided to the public. As the treatment system is regulated for the proposed use, the raw water quality is of limited importance provided that it can be treated by modern water treatment technology.

As part of O.Reg 170, the owner may install desired treatment for aesthetic objectives, however, an Engineering Evaluation Report will be required in support of the O.Reg.170 application that will require specific groundwater treatment. This report falls outside of the purview of the current assessment.

Description of Subject Site

The subject site is an approximately 2.23 hectare (ha) lot and is currently vacant. The church will be serviced by a private water supply well and onsite septic system. Please refer to Figure-1 Key Plan for the proposed development location.

The subject site is currently vacant with approximately the northwestern two-thirds of the subject site being treed and the remainder consisting of light brush. The subject site is relatively flat and is slightly below the grade of the Trans-Canada Highway 417 and David Manchester Road. The general overburden groundwater flow direction is assumed to be



to the north to northwest to an unnamed tributary which then flows northeast towards the Carp River.

The subject site is bordered to the north by a residential property, to the east by Highway 417 followed by undeveloped land, to the south by residential properties, and to the west by David Manchester Road followed by residential properties and undeveloped land.

According to available overburden mapping (OGS MRD128), the overburden at the subject site is continuous and is mapped to consist of coarse-textured glaciomarine deposits consisting of sand, gravel, minor silt and clay. Available WWRs immediately adjacent to the subject site indicate an overburden of clay or clay and sand with gravel and boulders.

Based on available geological mapping (OGS MRD219), the bedrock in the area consists of limestone with minor shales of the Bobcaygeon Formation with an approximate drift thickness of 3 to 5 m, extending to 5 to 10 m in the northwest portion of the site.

Karst Mapping

According to available mapping (OGS GRS005), the subject site is within an area mapped as potential karst. According to the onsite test well (TW1) water well record (WWR), the overburden in the area of the well installation consists of sand and clay to a depth of 1.8 m below ground surface (bgs) followed by limestone to the depth of the well.

TW1 has well casing extending to a depth of 12.2 m bgs, and aquifer intercepts of 22.3 and 52.7 m bgs. Based on the depth of the aquifer intercepts and the geochemistry encountered within the aquifer, there are no indications of surficial impacts on the aquifer. Therefore, it is not anticipated that there is karst within the subject site.

Mississippi-Rideau Source Protection Mapping

The Mississippi-Rideau Source Protection Plan (MRSPP) 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 Highly Vulnerable Aquifer (HVA) within the MRSPP, 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 MRSPP 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 existing usage. Therefore, there are no related requirements for an HVA or SGRA at this location.



FIELDWORK PROGRAM

Well Testing

As a means to demonstrate the adequacy of the aquifer underlying the subject lands, with respect to water quality and quantity, the newly drilled well (TW1) on the subject site was tested. TW1 has a Water Well Record (WWR) Well ID of A395664. TW1 has a 152.4 mm diameter steel casing that extends to 12.2 m below ground surface (bgs) with a 0.44 m stick up. The well itself extends to a depth of 54.9 m bgs. Based on the WWR, bedrock was encountered at 1.8 m bgs.

As a means to evaluate the water supply aquifer intercepted by the well, the well was subjected to an 8-hour constant rate pumping test. The pumping test was conducted on January 18, 2024 under the full-time supervision of Paterson personnel, at a rate of 36 L/min. After 8 hours of constant rate pumping, the pumping rate was lowered to 12 L/min for an hour to determine if a lower flow would further reduce the field turbidity and colour concentrations. Water quality sampling occurred at 4 hours, 8 hours and at 9 hours into the pumping test with the samples collected at the 4 and 8-hour mark being submitted for comprehensive testing of bacteriological, chemical, and physical water quality parameters consistent with the standard "Subdivision Supply" suite of parameters plus trace metals and VOCs. As the pumping rate was lowered after the 8-hour constant rate pumping test to determine if the field colour and turbidity could be further reduced, only sampling for colour and turbidity testing was completed at the 9 hour mark.

Due to elevated colour and turbidity encountered in the field results, a supplemental 8-hour constant rate pumping test was completed on April 4, 2024 at a constant pumping rate of 12 L/min. Water quality sampling occurred at 4 hours and 8 hours into the pumping test and the samples were submitted for comprehensive testing of bacteriological, chemical, and physical water quality parameters consistent with the standard "Subdivision Supply" suite of parameters plus trace metals.

During the pumping tests, the pumping rate was periodically measured using the timed volume correlation method. The pumping rate was maintained within 5% of the selected pumping rate. The static water level was recorded manually and an electric datalogger (VanEssen TD-Diver) was installed in the test well prior to the start of the pumping tests. The data logger recorded water levels at 30 second intervals. In addition, manual water level readings were taken at periodic intervals during the test. Prior to both pumping tests, the well was disinfected as per the MECP Disinfection Instruction Sheet (attached), and a data-logger was installed to monitor the background groundwater levels.

The selected rate of 36 L/min provides approximately 4.4 times the maximum TDDSSF volume of 3,950 L/day during the 8-hour pumping test. The pumping rate was determined to be representative of a flow rate which would be in excess of what the development would require.



Recovery data was collected from the well following the completion of the pumping. The well was noted to have achieved 100% recovery approximately 27 minutes after the completion of the constant rate pumping test on January 18, 2024.

Prior to collection of all groundwater samples, the free chlorine residual was verified as non-detectable. All samples were collected unfiltered and unchlorinated and were placed directly into clean bottles supplied by the analytical laboratory. Samples were placed immediately into a cooler with ice and were transported directly to Environmental Testing Canada Inc.(Eurofins) laboratory in Ottawa. All samples were received by the laboratory within 24 hours of collection.

A series of field tests of the pumped water were carried out at the well head during the 8-hour pumping tests. The parameters tested at the well head included: pH, total dissolved solids, conductivity, turbidity, apparent colour, and temperature. Calibration / confirmation of calibration of all field-testing equipment was performed in Paterson's laboratory the day prior to the pumping test. Values are then confirmed again onsite prior to the start of the pumping test.

AQUIFER ANALYSIS

After completing the pumping test analysis, it has become evident that there are two definitive water bearing fractures accessed by TW1. The aquifer intercepts recorded on the WWR are located at 22.3 and 52.7 m bgs. The 8-hour pumping test completed on January 18, 2024 at a constant rate of 36 L/min lowered the static water level to 33.3 m bgs, which was below the 22.3 m aquifer intercept. The 8-hour pumping test completed on April 4, 2024 at a constant rate of 12 L/min lowered the static water level to 5.6 m bgs, which is above the 22.3 m aquifer intercept.

Available water well records (WWR) of the neighboring properties on the MECP Well Record mapping website indicated that the wells were screened in limestone. Surrounding WWRs are attached to this report.

Water Quantity

Pumping test data 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.



AQUIFER PARAMETER	RESULT OF ANALYSIS
Estimated Aquifer Transmissivity (m ² /day)	0.7
Pumping Rate (L/min)	36
Pre-test Static Water Level (m)	1.3
Post-test Static Water Level (m)	33.3
Available Drawdown (m)	53.5
% Drawdown During Pumping Test (%)	60
Specific Capacity (L/min/m drawdown)	1.1

The drawdown data was analyzed using the Cooper-Jacob and Theis recovery method of analysis. Aquifer transmissivity of the aquifer is estimated to be 0.7 m²/day. Refer to the Cooper-Jacob and Theis-Recovery methods of analysis data sheets attached to this report.

The pumping test results show that TW1 has a sufficient yield to support the water demands that may be required based on the theoretical water demands. Overall maximum drawdown at a constant pumping rate of 36 L/min for a period of 8 hours was approximately 32 m (60% of the available drawdown). 100 % recovery was achieved approximately 27 minutes after the end of pumping in the pumping test.

The total volume of water pumped during the 8-hour pumping event on January 18, 2024 was approximately 17,280 L. This is approximately 4.4 times the maximum theoretical total daily design volume of water (3,950 L/d) required to support the Site Plan Control Application.

The suitability of the aquifer to supply the proposed Site Plan Application for the proposed institutional development 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, and given the analyses presented and summarized above, it is our opinion that there is an adequate supply of water to support the theoretical volume requirement for the proposed Site Plan Control Application. A comparison of the finalized water requirements for the site should be completed once details of the plans/usage are finalized.

Water Quality

Field Data

Turbidity, electrical conductivity, total dissolved solids (TDS), pH, apparent color 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.

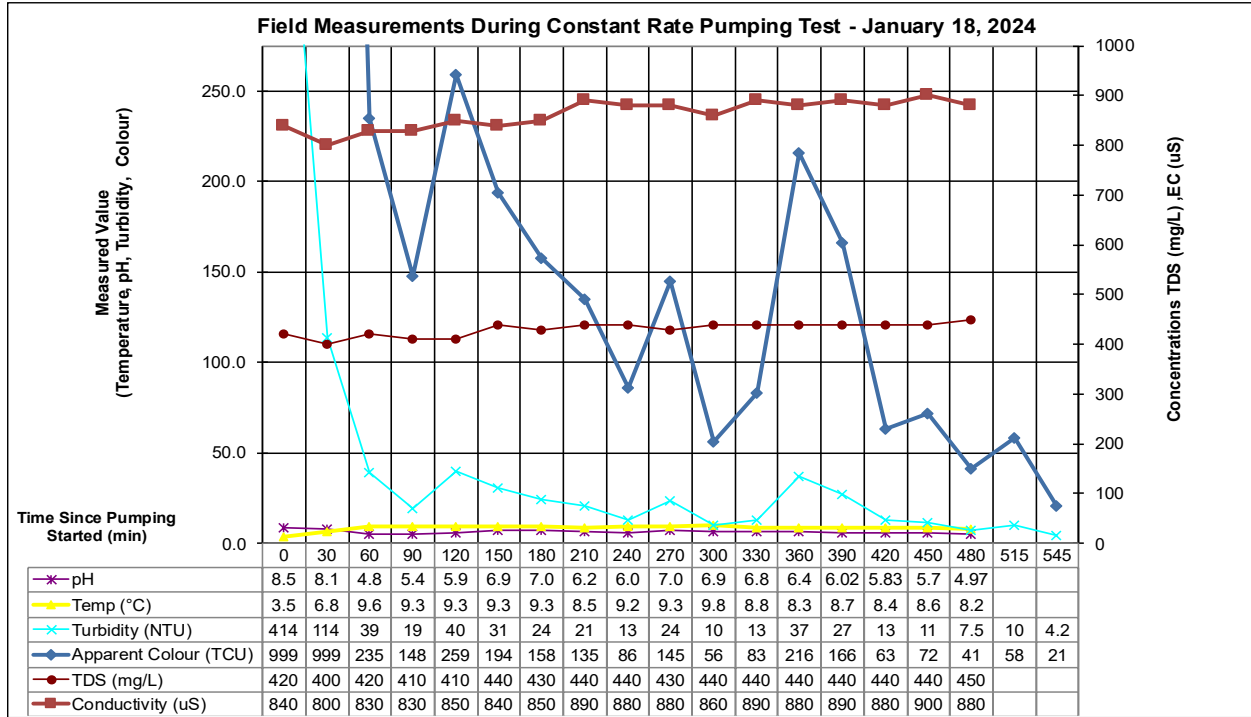


Figure 1: Field Measurements During Constant Rate Pumping Test – January 18, 2024

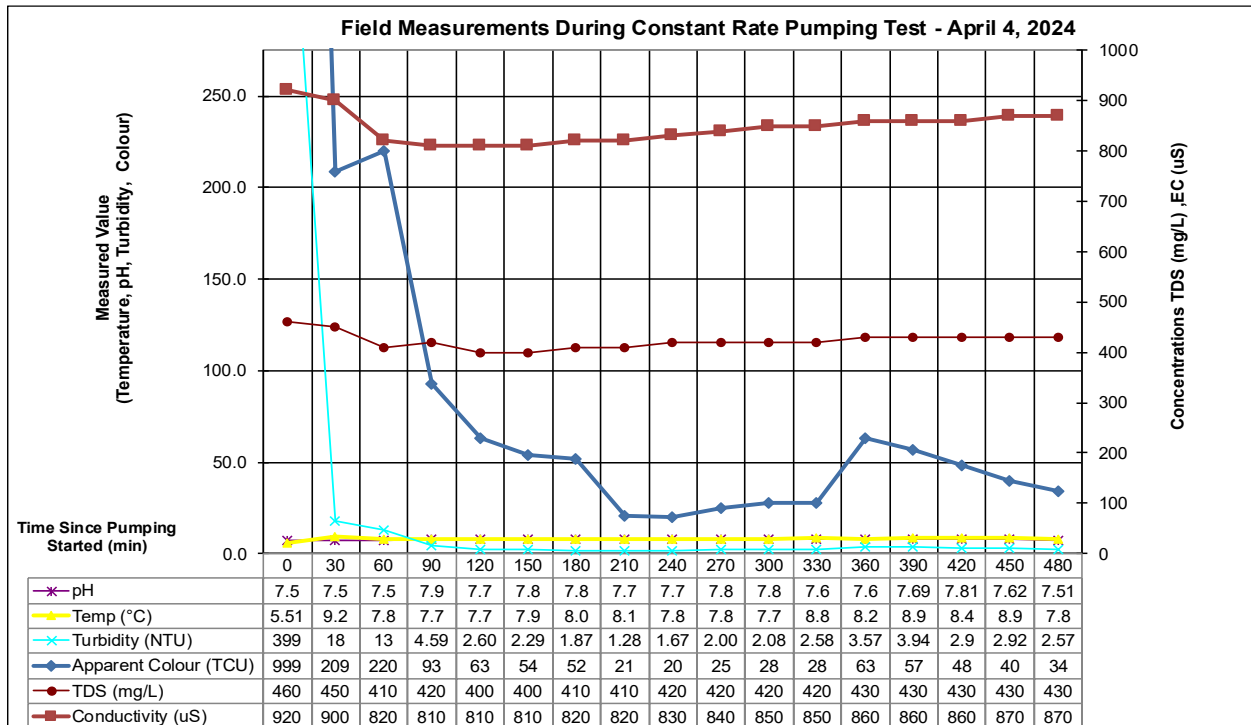


Figure 2: Field Measurements During Constant Rate Pumping Test – April 4, 2024



Laboratory Data

The Subdivision Package suite of parameters and trace metals laboratory water quality obtained from the pumping test of TW1 is provided in Table 2a and 2b below and the laboratory analyses reports can be found attached. VOC laboratory analytical testing was completed and results are provided in Table 2c. All laboratory test results can be found attached to this report.

TABLE 2a: GROUNDWATER MICROBIOLOGY & GENERAL GEOCHEMISTRY								
PARAMETER	UNITS	ODWS		TW1				
		LIMIT	TYPE	TW1 GW1 (4 hr)	TW1 GW2 (8 hr)	TW1 GW3 (9 hr)	TW1 GW1 (4 hr)	TW1 GW2 (8 hr)
				1/18/2024	1/18/2024	1/18/2024	4/4/2024	4/4/2024
MICROBIOLOGICAL								
Escherichia Coli (E.Coli)	ct/100mL	0	MAC	0	0	-	0	0
Total Coliforms	ct/100mL	0	MAC	0	0	-	0	0
GENERAL CHEMICAL - HEALTH RELATED								
Fluoride (F)	mg/L	1.5	MAC	1.86	1.74	-	2.07	1.85
Ammonia (N-NH ₃)	mg/L	-	-	0.456	0.482	-	0.286	0.306
Nitrite (N-NO ₂)	mg/L	1	MAC	<0.10	<0.10	-	<0.10	<0.10
Nitrate (N-NO ₃)	mg/L	10	MAC	<0.10	<0.10	-	<0.10	<0.10
Total Kjeldahl Nitrogen	mg/L	-	-	0.820	1.000	-	0.4	0.411
Turbidity (Field)	NTU	1.0 (5.0)	MAC/AO	13.00	7.52	4.21	1.67	2.57
Turbidity (Laboratory)	NTU	1.0 (5.0)	MAC/AO	49.0	41.7	38.3	23.7	25.5
GENERAL CHEMICAL - AESTHETIC RELATED								
Alkalinity (as CaCO ₃)	mg/L	30-500	OG	382	379	-	381	393
Chloride (Cl)	mg/L	250	AO	51	56	-	42.5	45.9
Apparent Colour (Lab)	TCU	5	AO	236	74	15	38	19
Apparent Colour (Field)	TCU	5	AO	86	41	21	20	34
Conductivity	uS/cm	-	-	836	835	-	802	842
Dissolved Organic Carbon	mg/L	5	AO	1.9	2.3	-	1.9	1.3
Hardness (as CaCO ₃)	mg/L	100	OG	239	260	-	209	250
Ion Balance	unitless	-	-	1.01	1.02	-	0.99	0.99
pH	unitless	6.5-8.5	AO	8	7.99	-	8.19	8.12
Phenols	mg/L	-	-	<0.001	<0.001	-	<0.001	<0.001
Sulphate (SO ₄)	mg/L	500	AO	19	22	-	17	27
Sulphide (S ₂ ⁻)	mg/L	0.05	AO	10.00	8.45	-	7.6	5.76
Tannin & Lignin	mg/L	-	-	0.50	0.25	-	0.2	0.2
Total Dissolved Solids	mg/L	500	AO	543	543	-	521	547

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



TABLE 2b: GROUNDWATER GEOCHEMISTRY - METALS

PARAMETER	UNITS	ODWS		TW1			
		LIMIT	TYPE	TW1 GW1 (4 hr)	TW1 GW2 (8 hr)	TW1 GW1 (4 hr)	TW1 GW2 (8 hr)
				1/18/2024	1/18/2024	4/4/2024	4/4/2024
METALS							
Aluminum (Al)	mg/L	0.1	OG	0.5	0.24	<0.02	<0.02
Antimony (Sb)	mg/L	0.006	IMAC	<0.001	<0.001	<0.001	<0.001
Arsenic (As)	mg/L	0.01	IMAC	<0.002	<0.002	<0.002	<0.002
Barium (Ba)	mg/L	1.0	MAC	0.64	0.62	0.56	0.605
Beryllium (Be)	mg/L	-	-	<0.001	<0.001	<0.001	<0.001
Boron (B)	mg/L	5.0	IMAC	0.40	0.37	0.39	0.38
Cadmium (Cd)	mg/L	0.005	MAC	<0.0002	<0.0002	<0.0002	<0.0002
Calcium (Ca)	mg/L	-	-	43	48	39	47
Chromium (Cr)	mg/L	0.05	MAC	<0.002	<0.002	<0.002	<0.002
Cobalt (Co)	mg/L	-	-	<0.0004	<0.0004	<0.0004	<0.0004
Copper (Cu)	mg/L	1.0	AO	<0.002	<0.002	<0.002	<0.002
Iron (Fe)	mg/L	0.3	AO	0.42	0.16	0.31	0.59
Lead (Pb)	mg/L	0.01	MAC	<0.002	<0.002	<0.002	<0.002
Magnesium (Mg)	mg/L	-	-	32	34	27	32
Manganese (Mn)	mg/L	0.05	AO	<0.02	<0.02	<0.02	<0.02
Mercury (Hg)	mg/L	0.001	MAC	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum (Mo)	mg/L	-	-	<0.01	<0.01	<0.01	<0.01
Nickel (Ni)	mg/L	-	-	<0.01	<0.01	<0.01	<0.01
Potassium (K)	mg/L	-	-	9	9	8	9
Selenium (Se)	mg/L	0.05	MAC	0.003	<0.002	0.004	0.004
Silver (Ag)	mg/L	-	-	<0.0002	<0.0002	<0.0002	<0.0002
Sodium (Na)	mg/L	200	AO	107	102	110	104
Strontium (Sr)	mg/L	-	-	3.07	3.17	2.62	3.01
Thallium (Tl)	mg/L	-	-	<0.0002	<0.0002	<0.0002	<0.0002
Uranium (U)	mg/L	0.02	MAC	<0.002	<0.002	<0.002	<0.002
Vanadium (V)	mg/L	-	-	<0.002	<0.002	<0.002	<0.002
Zinc (Zn)	mg/L	5.0	AO	<0.02	<0.02	<0.02	<0.02

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



TABLE 2c: GROUNDWATER GEOCHEMISTRY - VOLATILES

PARAMETER	UNITS	ODWS		TW1	
		LIMIT	TYPE	TW1 GW1 (4 hr)	TW1 GW2 (8 hr)
				1/18/2024	1/18/2024
VOCs Surrogates					
1,2-dichloroethane-d4	%	-	-	-	83
4-bromofluorobenzene	%	-	-	-	78
Toluene-d8	%	-	-	-	118
Volatiles					
1,1,1,2-tetrachloroethane	µg/L	-	-	-	<0.5
1,1,1-trichloroethane	µg/L	-	-	-	<0.4
1,1,2,2-tetrachloroethane	µg/L	-	-	-	<0.5
1,1,2-trichloroethane	µg/L	-	-	-	<0.4
1,1-dichloroethane	µg/L	-	-	-	<0.4
1,1-dichloroethylene	µg/L	14.0	MAC	-	<0.5
1,2-dichlorobenzene	µg/L	200.0	MAC	-	<0.4
1,2-dichloroethane	µg/L	5.0	IMAC	-	<0.5
1,2-dichloropropane	µg/L	-	-	-	<0.5
1,3,5-trimethylbenzene	µg/L	-	-	-	<0.3
1,3-dichlorobenzene	µg/L	-	-	-	<0.4
1,3-Dichloropropylene (cis+trans)	µg/L	-	-	-	<0.5
1,4-dichlorobenzene	µg/L	5.0	MAC	-	<0.4
Acetone	µg/L	-	-	-	<5
Benzene	µg/L	1.0	MAC	-	<0.5
Bromodichloromethane	µg/L	-	-	-	<0.3
Bromoform	µg/L	-	-	-	<0.4
Bromomethane	µg/L	-	-	-	<0.5
c-1,2-Dichloroethylene	µg/L	-	-	-	<0.4
c-1,3-Dichloropropylene	µg/L	-	-	-	<0.5
Carbon Tetrachloride	µg/L	2.0	MAC	-	<0.2
Chloroethane	µg/L	-	-	-	<0.5
Chloroform	µg/L	-	-	-	<0.5
Dibromochloromethane	µg/L	-	-	-	<0.3
Dichlorodifluoromethane	µg/L	-	-	-	<0.5
Dichloromethane	µg/L	50	MAC	-	<4.0
Ethylbenzene	µg/L	140	MAC	-	<0.5
Ethylene Dibromide	µg/L	-	-	-	<0.2
Hexane	µg/L	-	-	-	<5
m/p-xylene	µg/L	-	-	-	0.5
Methyl Ethyl Ketone (MEK)	µg/L	-	-	-	<2
Methyl Isobutyl Ketone (MIBK)	µg/L	-	-	-	<5
Methyl Tert Butyl Ether (MTBE)	µg/L	15	AO	-	<2
Monochlorobenzene	µg/L	80	MAC	-	<0.5
o-xylene	µg/L	-	-	-	<0.4
Styrene	µg/L	-	-	-	<0.5
t-1,2-Dichloroethylene	µg/L	-	-	-	<0.4
t-1,3-Dichloropropylene	µg/L	-	-	-	<0.5
Tetrachloroethylene	µg/L	10	MAC	-	<0.3
Toluene	µg/L	60	MAC	-	0.7
Trichloroethylene	µg/L	5	MAC	-	<0.3
Trichlorofluoromethane	µg/L	-	-	-	<0.5
Vinyl Chloride	µg/L	1	MAC	-	<0.2
Xylene; total	µg/L	90	MAC	-	0.5

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 - IMAC = Interim Maximum Acceptable Concentration
 - AO = Aesthetic Objective
 - OG = Operational Guideline
2. Shaded Concentration Indicates an Exceedance of the ODWS Objective



The bacteriological test results (Certificate of Analysis – Report No. 3004621, 3866744, and 3866747) 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.

The water quality of the subject water supply well meets all the Ontario Drinking Water Standards maximum acceptable concentrations (MAC). Furthermore, the water meets all of the Aesthetic Objectives (AO) and Operational Guidelines (OG) with the exception of the following.

- Fluoride (F⁻)
- Total Sulphides (S₂⁻)
- Hardness (as CaCO₃)
- Total Dissolved Solids (TDS)
- Iron (Fe)
- Turbidity
- Colour
- Aluminum (Al)

Exceedances of the above parameters are not uncommon of the water supply in the subject aquifer. Each of these groundwater parameters are discussed in detail below.

Should any water treatment be desired by the owner, it is recommended that a water treatment specialist be retained to ensure that water treatment occurs in a safe manner.

Fluoride

Fluoride can be naturally occurring in groundwater and has been added to drinking water in concentrations of 0.5 – 0.8 mg/L to control tooth decay. Fluoride was present in concentrations ranging from 2.07 to 1.74 mg/L and was noted to decrease in concentration with further development of the well. The MAC for fluoride is 1.5 mg/L, however, concentrations up to 2.4 mg/L are considered acceptable where the fluoride is naturally occurring.

According to the Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines (TSDODWSOG), when fluoride concentrations are above 1.5 mg/L but less than 2.4 mg/L the Ministry of Health and Long Term Care (MHLTC) recommends that an approach through local boards of health be used to raise public and professional awareness to control for excessive exposure to fluoride. Although no treatment is required for fluoride, it must be reported to the local Medical Officer of Health. As the water source is for a church, any public exposure to the groundwater will be governed by O.Reg 170.

Total Sulphides

Total sulphides were reported to be present within the water supply aquifer at concentrations of 5.76 to 10 mg/L, decreasing with time. Total Sulphides has an AO of



0.05 mg/L, but no OG, MAC or Maximum Concentration Considered Reasonably Treatable (MCCRT). As the objective is an aesthetic objective, no treatment is required.

Total Sulphides can present as compounds such as iron sulphide or hydrogen sulphide but is not limited to these forms. The value noted is for the **total sulphides** within the sample as there is no laboratory test for only hydrogen sulphide. Total sulphides should **not** be equated to a result for hydrogen sulphide.

Hydrogen sulphide is a gas that is heavier than air and has a very distinct “rotten egg” odour. Through the test, a faint odour was detected. The aesthetic objective for hydrogen sulphide, which is incidentally also the threshold of the average human olfactory detection, is 0.05 mg/L. MECP Procedure D-5-5 does not indicate an MCCRT for sulphide.

One method to remove hydrogen sulphide, if desired, is a chlorine feeder and filter through oxidation or equivalent method recommended by a water treatment professional.

Hardness as CaCO₃

Hardness, expressed as calcium carbonate, is an operational guideline and does not appear in the ODWS. Rather, it appears in the Technical Support Documents for Ontario Drinking Water Standards, Objectives and Guidelines as a parameter with an operational guideline at 100 mg/L. At the measured concentrations of 209 to 260 mg/L, the water is considered to be very hard, however, it is below the reasonable treatable limit of 500 mg/L specified in Table 3 of the MOECC guidance document Procedure D-5-5 (1996).

The Langelier calculation provided an LSI of 0.1. Based on the evaluation of the result, the water is super saturated and tends to precipitate a scale layer of calcium carbonate (slightly scale forming and non-corrosive). Based on the range of stability in the positive direction, there are no mitigative measures needed. See Langelier Saturation Index Calculation attached for calculation details.

It is recommended that water hardness be treated using conventional technologies such as water softening or reverse osmosis, if desired by the owner. Without treating hardness, scaling can occur which can result in discolouration and residue buildup on water fixtures, or reduction in boiler efficiency due to scale build-up. According to Health Canada's *Guidelines for Canadian Drinking Water Quality - Summary Tables* “Although hardness may have significant aesthetic effects, a guideline has not been established because public acceptance of hardness may vary considerably according to the local conditions; major contributors to hardness (calcium and magnesium) are not of direct public health concern”.

Total Dissolved Solids (TDS)

TDS refers to the concentration of inorganic substances dissolved in water. The main constituents are typically chloride, sulphates, calcium, magnesium, and bicarbonates. The TDS concentration of 521 to 547 mg/L exceeds the Aesthetic Objective of 500 mg/L.



At concentrations above 500 mg/L, some consumers may find the taste objectionable, however, as the objective is an aesthetic objective, no treatment is required. It is recommended that a point of use reverse osmosis unit be installed, if the owner desires, for drinking purposes. As such, no taste problems will occur when the system is used.

The Langelier calculation provided an LSI of 0.1. Based on the evaluation of the result, the water is super saturated and tends to precipitate a scale layer of calcium carbonate (slightly scale forming but non-corrosive). Based on the range of stability in the positive direction, there are no mitigative measures needed. See Langelier Saturation Index Calculation attached for calculation details.

Iron

Concentrations of iron above 0.3 mg/L can contribute to staining of fixtures and a metallic taste at higher concentrations. Precipitation of iron can promote the growth of iron bacteria in pipes. The concentration of iron in the groundwater in TW1 was measured to range from 0.16 to 0.59 mg/L.

The concentration of iron in the groundwater in the test well is considered to be reasonably treatable in accordance with Procedure D-5-5. It is recommended that a water softener or manganese greensand filter be used to reduce the levels of iron and reduce the potential for excessive precipitate occurring in the water supply system, if desired by the property owner. If treatment is not used, negative impacts such as discolouration of water fixtures, precipitation of iron and staining may occur.

Colour

Colour may occur in drinking water for several reasons. It may be due to organic substances from the decay of vegetation, or the presence of metals such as iron, manganese, and copper, which are abundant in nature. Apparent colour measurements obtained in the field measurements ranged from 20 to 86 TCU and in the laboratory results from 15 to 236 TCU, with colour decreasing with time.

The provincial aesthetic objective for colour in drinking water is 5 True Colour Units (TCU). The federal (Health Canada) guideline aesthetic objective limit for colour is 15 TCU (Guidelines for Canadian Drinking Water Quality, Health Canada June 2019). Procedure D-5-5 gives a maximum concentration considered reasonably treatable (MCCRT) for colour as 7 TCU.

Although the apparent colour concentration was above the MCCRT in the City's HTAG, it is based on water treatment recommendations from 1996. Paterson consulted with a water treatment specialist and confirmed that the apparent colour concentration could be reduced using available technologies. Since the proposed use as a church is regulated under O.Reg.170, the apparent color concentration in the treated groundwater will be required to be monitored and maintained to below the O.Reg 170 standards.



Turbidity

Turbidity, which is generally an aesthetic parameter, was detected in the laboratory test samples at values of 49 to 23.7 NTU in the 4 and 8 hours tests, with turbidity generally decreasing with time. Field testing detected the samples at values from 13 to 1.7 NTU. Continued pumping generally showed a decrease towards the end of the test. It is expected that continued use of the well would further reduce turbidity values. The elevated turbidity in the laboratory analyzed samples is attributed to the precipitation of iron. Therefore, it is anticipated that turbidity levels will also decrease due to treatment of other constituents, if treatment is desired by the owner.

During the pumping test, a Hanna Instruments HI98703 Fast Tracker Turbidity Meter was used to measure the turbidity in the groundwater at regular intervals. The ODWS maximum acceptable concentration for turbidity in drinking water entering the distribution system is 1 NTU. The ODWO for turbidity in drinking water and MCCRT is 5 NTU. The field test parameters are below the 5 NTU objective. As turbidity was detected above 1 NTU, particular care must be taken during testing to ensure that the bacteria requirements of Table 1 are met. The bacteriological test results indicated that the test samples were non-detect (0 ct/100 mL) for E.Coli and Total Coliforms during both the January 18 and April 4, 2024 pumping tests.

Since the proposed use as a church is regulated under O.Reg.170, the turbidity concentration in the treated groundwater will be required to be monitored and maintained below the O.Reg 170 standards.

Aluminum

Aluminum was reported to be present within the water supply aquifer at concentrations of 0.5 and 0.24 mg/L at the 4- and 8-hour marks, respectively, during the pumping test on January 18, 2024. Aluminum has an OG of 0.1 mg/L where an exceedance may cause coating of pipes in the distribution system and flocculation in the distribution system. Aluminum has a federal health related guideline MAC of 2.9 mg/L, which was not exceeded.

Aluminum concentrations were below the detection limit at both the 4-hour and 8-hour marks during the pumping test on April 4, 2024. As the aluminum concentration was shown to decrease with time, and was not present during the April 4, 2024 pumping test where a lower flow rate which is representative of the proposed usage was used, no treatment is required.

Sodium

Sodium (Na), an aesthetic parameter, was detected in the laboratory test sample at concentrations of 102 to 110 mg/L, which does not exceed the ODWS aesthetic objective of 200 mg/L. Although sodium is not toxic and no maximum acceptable concentration has been set, concentrations above 20 mg/L require that the Medical Officer of Health be notified of the water quality results, so that this information may be passed on to local



physicians for use in treatment of those requiring a sodium-restricted diet. It should be noted that some water treatment technologies, such as water softeners, can increase the sodium concentration so care should be given if such treatment technologies are used.





CONCLUSIONS

Based on the information contained within the body of this report the following conclusions can be drawn:

1. The water supply aquifer intercepted by the existing well is considered to be adequate to support the water quantity demands for the proposed institutional development.
2. Based on a visual inspection performed by Paterson personnel, the well casing, stickup, and well cap are in compliance with O.Reg 903. The final grading around the well will need to be sufficiently graded to direct surface water away from the wellhead and the well must be maintained in accordance with O.Reg 903.
3. The preferred water supply intercepted by TW1 contains a water supply that is potable as E.Coli and Total Coliforms were non-detect, and contains only elevated concentrations of fluorides, sulphides, hardness, TDS, iron, apparent colour, and turbidity. The noted parameters can be treated with current readily available water conditioning equipment.
4. Elevated concentrations of fluoride were encountered in the water supply intercepted by TW1. Fluoride has an MAC of 1.5 mg/L, however, when fluoride is naturally occurring and below 2.4 mg/L, the MHLTC recommends that an approach through local boards of health be used to raise public and professional awareness to control for excessive exposure to fluoride. The Medical Officer of Health should be informed.
5. If desired by the property owner, a residential grade water softener can be used to facilitate the reduction of the hardness concentration and reduce scaling. If a water softener is used for the proposed development, the owner should be made aware that additional sodium will be added to the water to reduce hardness. If desired, a point-of-use reverse osmosis system can be used to provide a drinking tap source without increasing sodium levels.
6. If desired by the property owner, the iron concentration in the water can be reduced using a residential grade water softener or iron greensand filter.
7. If desired by the property owner, a chlorine feeder and filter through oxidation or equivalent method recommended by a water treatment professional to reduce the total sulphides concentration, or remove potential odour due to hydrogen sulphide.



8. If desired by the property owner, total dissolved solids can be reduced by a point of use reverse osmosis filter.
9. Paterson consulted with a water treatment specialist and confirmed that the elevated colour can be reduced by available treatment technologies. Colour and turbidity can be reduced through the reduction of concentration of other parameters.
10. The sodium concentration was measured to be above the 20 mg/L reporting limit and, as such, the Medical Officer of Health for the City of Ottawa should be informed to assist area physicians in the treatment of local residents on sodium reduced diets. It should be noted that some water treatment equipment may further increase the sodium concentration.
11. As the proposed development will be regulated under O.Reg 170, regular groundwater testing and monitoring of the water treatment equipment must be completed. As such, provided that the development is for institutional use (church) only, the groundwater must be treated and maintained under O.Reg 170 in order to be provided to the public. As the treatment system is regulated for the proposed use, the raw water quality is of limited importance provided that it can be treated by modern water treatment technology.
12. The owner will need to ensure that protective measures are taken to protect the wellhead, such as the use of a barrier.

Given the analyses presented and summarized above, it is our opinion that there is an adequate supply of water to support the theoretical volume requirement for the proposed Site Plan Control Application. A comparison of the finalized water requirements for the site should be completed once details of the plans/usage are finalized.

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
- MECP Water Well Records
- Eurofins Certificate of Analysis
- Langelier Saturation Index (LSI) Calculation
- AQTESOLV - Pumping Test Analysis Reports



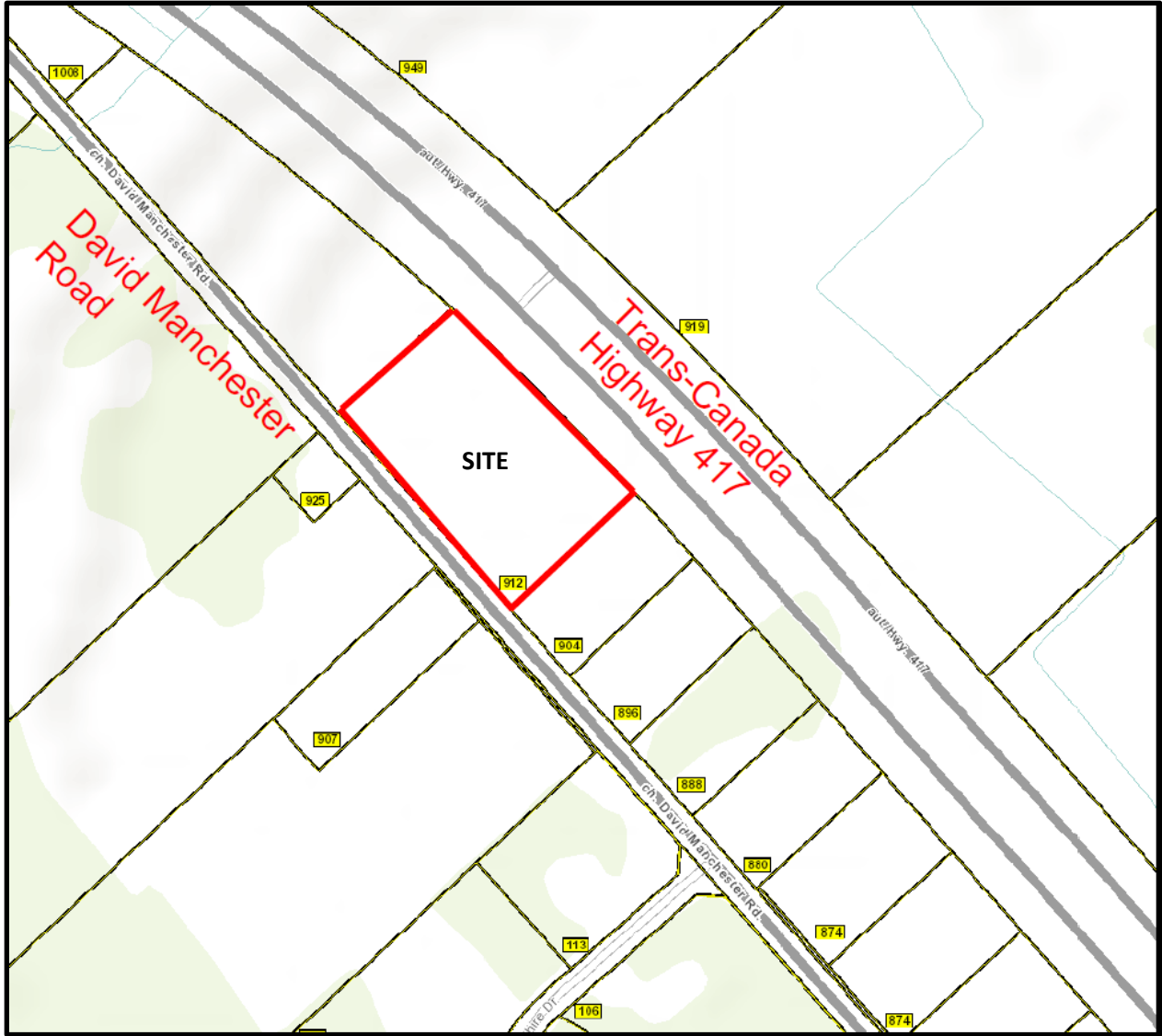


FIGURE 1

KEY PLAN



Tag#: A395664
A395664

Measurements recorded in: Metric Imperial

Page ___ of ___

Well Owner's Information

First Name: _____ Last Name/Organization: RCGG Chapel of Grace E-mail Address: _____
Mailing Address (Street Number/Name): ~~912 David Manchester Road~~ Municipality: Ottawa Province: ON Postal Code: K0A 1L0 Telephone No. (inc. area code): _____
Well Location: #1-74 Colonnade Road North Nepean ONT K0E 7L0
Address of Well Location (Street Number/Name): 912 David Manchester Road Township: West Carleton Lot: 9 Concession: 4
City/Town/Village: Carp Province: Ontario Postal Code: _____
UTM Coordinates: Zone: NAD 83 Easting: 18 Northing: 420431 Municipal Plan and Sublot Number: Plan 5R-13359 Other: Part 1

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
	Sand	Clay		0	8
Grey	Limestone			8	73
Grey	Limestone			73	140
Grey	Limestone	W/Grey	Sandstone	140	173
Grey	Limestone	W/Grey	Sandstone	173	180

Annular Space

Depth Set at (m/ft) From	Depth Set at (m/ft) To	Type of Sealant Used (Material and Type)	Volume Placed (m ³ /ft ³)
40	30	Neat cement	10.92
30	0	Bentonite slurry	4.20

Results of Well Yield Testing

Time (min)	Water Level (m/ft)	Time (min)	Water Level (m/ft)
After test of well yield, water was: <input type="checkbox"/> Clear and sand free <input type="checkbox"/> Other, specify: Not tested			
If pumping discontinued, give reason: Static Level 4'7"			
1	12.9	1	49.5
2	18.2	2	42.8
3	23.8	3	37.2
4	28	4	34.8
5	31.7	5	32.7
10	38.2	10	25.5
15	42.7	15	20.4
20	46.5	20	17.8
25	50	25	14.7
30	53.2	30	12.2
40	56.2	40	8.8
50	58.3	50	5.3
60	59.3	60	4.9

Method of Construction

<input type="checkbox"/> Cable Tool	<input type="checkbox"/> Diamond	<input type="checkbox"/> Public	<input type="checkbox"/> Commercial	<input type="checkbox"/> Not used
<input type="checkbox"/> Rotary (Conventional)	<input type="checkbox"/> Jetting	<input checked="" type="checkbox"/> Domestic	<input type="checkbox"/> Municipal	<input type="checkbox"/> Dewatering
<input type="checkbox"/> Rotary (Reverse)	<input type="checkbox"/> Driving	<input type="checkbox"/> Livestock	<input type="checkbox"/> Test Hole	<input type="checkbox"/> Monitoring
<input checked="" type="checkbox"/> Boring	<input type="checkbox"/> Digging	<input type="checkbox"/> Irrigation	<input type="checkbox"/> Cooling & Air Conditioning	
<input checked="" type="checkbox"/> Air percussion		<input type="checkbox"/> Industrial		
<input type="checkbox"/> Other, specify: SURSED		<input type="checkbox"/> 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
6.14	Steel	.188	+2	40
6	Open Hole		40	180

Status of Well

<input checked="" type="checkbox"/> Water Supply	<input type="checkbox"/> Replacement Well
<input type="checkbox"/> Test Hole	<input type="checkbox"/> Recharge Well
<input type="checkbox"/> Dewatering Well	<input type="checkbox"/> Observation and/or Monitoring Hole
<input type="checkbox"/> Alteration (Construction)	<input type="checkbox"/> Abandoned, Insufficient Supply
<input type="checkbox"/> Abandoned, Poor Water Quality	<input type="checkbox"/> Abandoned, other, specify:
<input type="checkbox"/> Other, specify:	

Construction Record - Screen

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

Water Details

Water found at Depth (m/ft)	Kind of Water:	Depth (m/ft) From	Diameter (cm/in) To
73	<input type="checkbox"/> Fresh <input checked="" type="checkbox"/> Untested		
173	<input type="checkbox"/> Gas <input type="checkbox"/> Other, specify:	0' 40'	93/4"
	<input type="checkbox"/> Fresh <input checked="" type="checkbox"/> Untested	40' 180'	6"

Well Contractor and Well Technician Information

Business Name of Well Contractor: Air Rock Drilling Co. Ltd. Well Contractor's Licence No.: C7681
Business Address (Street Number/Name): _____ Municipality: Richmond
Province: ON Postal Code: K0A 2Z0 Business E-mail Address: air-rock@sympatico.ca
Bus. Telephone No. (inc. area code): 8138832170 Name of Well Technician (Last Name, First Name): Hanna, Jeremy
Well Technician's Licence No.: 13632 Signature of Technician and/or Contractor: _____ Date Submitted: 12 31 2023

Map of Well Location

Please provide a map below following instructions on the back.

Comments: 1/2HP-10GPM set 140ft

Well owner's information package delivered: Yes No Date: 2023/206

Ministry Use Only
Date Package Delivered: 2023/12/05
Audit No: Z408322
Received: _____

Address of Well Location (Street Number/Name) **896 DAVID MANCHESTER** Township _____ Lot _____ Concession _____

County/District/Municipality **OTTAWA CARLTON** City/Town/Village **CARP** Province **Ontario** Postal Code **K0A1K0**

UTM Coordinates Zone Easting Northing **NAD 83 18 420594 5015613** 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	To
BROWN	SAND	CLAY	FILL	0	4
BROWN	CLAY	SANDY STONES	TILL	4	23
GREY	LIMESTONE	LAYERS OF BROWN LIMESTONE		23	219

Annular Space

Depth Set at (m/ft)	Type of Sealant Used (Material and Type)	Volume Placed (m ³)
0 17	BENTONITE GROUT	0.192
17 26 1/2	CEMENT GROUT	0.150

Results of Well Yield Testing

Time (min)	Water Level (m/ft)	Recovery	
		Time (min)	Water Level (m/ft)
Static Level	5.6		
1	10.8	1	22.85
2	14.05	2	17.75
3	16.31	3	14.93
4	17.95	4	13.19
5	19.25	5	11.90
10	23.32	10	9.38
15	25.3	15	8.41
20	26.55	20	7.82
25	27.10	25	7.49
30	28.09	30	7.10
40	29.15	40	6.93
50	29.85	50	6.85
60	30.49	60	6.81

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

If pumping discontinued, give reason: _____

Pump intake set at (m/ft) **200**

Pumping rate (l/min / GPM) **12**

Duration of pumping **1** hrs + **0** min

Final water level end of pumping (m/ft) **30.49**

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

Recommended pump depth (m/ft) **80**

Recommended pump rate (l/min / GPM) **12**

Well production (l/min / GPM) **12+**

Disinfected? Yes No

Method of Construction		Well Use		
<input type="checkbox"/> Cable Tool	<input type="checkbox"/> Diamond	<input type="checkbox"/> Public	<input type="checkbox"/> Commercial	<input type="checkbox"/> Not used
<input type="checkbox"/> Rotary (Conventional)	<input type="checkbox"/> Jetting	<input checked="" type="checkbox"/> Domestic	<input type="checkbox"/> Municipal	<input type="checkbox"/> Dewatering
<input type="checkbox"/> Rotary (Reverse)	<input type="checkbox"/> Driving	<input type="checkbox"/> Livestock	<input type="checkbox"/> Test Hole	<input type="checkbox"/> Monitoring
<input type="checkbox"/> Boring	<input type="checkbox"/> Digging	<input type="checkbox"/> Irrigation	<input type="checkbox"/> Cooling & Air Conditioning	
<input checked="" type="checkbox"/> Air percussion		<input type="checkbox"/> Industrial		
<input type="checkbox"/> Other, specify _____		<input type="checkbox"/> Other, specify _____		

Construction Record - Casing			Status of Well	
Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft)	<input checked="" type="checkbox"/> Water Supply <input type="checkbox"/> Replacement Well <input type="checkbox"/> Test Hole <input type="checkbox"/> Recharge Well <input type="checkbox"/> Dewatering Well <input type="checkbox"/> Observation and/or Monitoring Hole <input type="checkbox"/> Alteration (Construction) <input type="checkbox"/> Abandoned, Insufficient Supply <input type="checkbox"/> Abandoned, Poor Water Quality <input type="checkbox"/> Abandoned, other, specify _____ <input type="checkbox"/> Other, specify _____
			From To	
6 1/4	STEEL	.188	0+3 26 1/2	
6	OPEN HOLE		26 1/2 219	

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

Water Details		Hole Diameter	
Water found at Depth 93 (m/ft) <input type="checkbox"/> Gas <input type="checkbox"/> Other, specify _____	Kind of Water: <input type="checkbox"/> Fresh <input checked="" type="checkbox"/> Untested	Depth (m/ft)	Diameter (cm/in)
Water found at Depth 207 1/2 (m/ft) <input type="checkbox"/> Gas <input type="checkbox"/> Other, specify _____	Kind of Water: <input type="checkbox"/> Fresh <input checked="" type="checkbox"/> Untested	0 219	6"
Water found at Depth _____ (m/ft) <input type="checkbox"/> Gas <input type="checkbox"/> Other, specify _____	Kind of Water: <input type="checkbox"/> Fresh <input type="checkbox"/> Untested		

Well Contractor and Well Technician Information

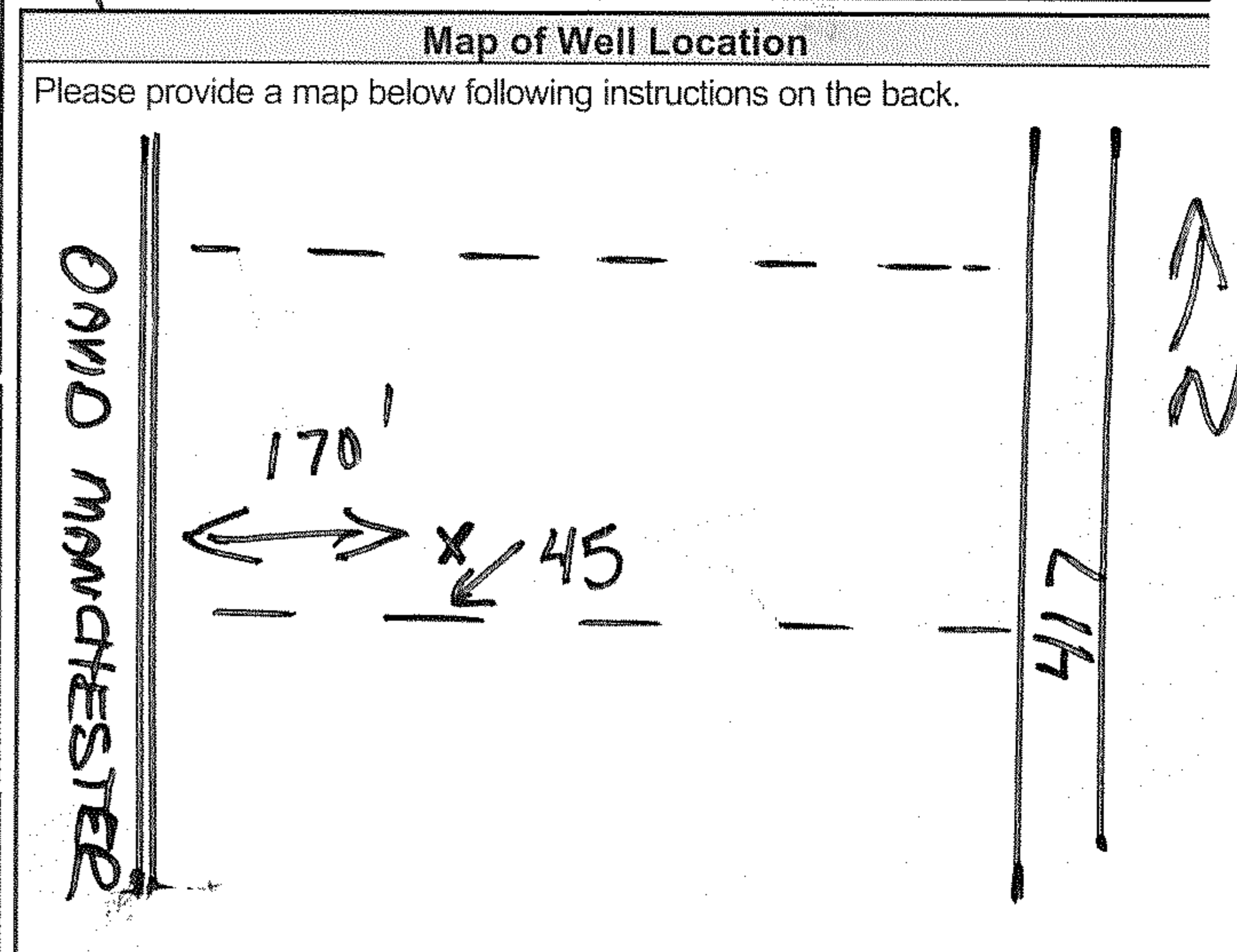
Business Name of Well Contractor **SAUNDERS WELL DRILLING** Well Contractor's Licence No. **4879**

Business Address (Street Number/Name) **RR #1** Municipality **BRAESIDE**

Province **ONT** Postal Code **K0A1G0** Business E-mail Address _____

Bus. Telephone No. (inc. area code) **6136235648** Name of Well Technician (Last Name, First Name) **SAUNDERS TROY**

Well Technician's Licence No. **T517** Signature of Technician and/or Contractor **Troy Saunders** Date Submitted **20140428**



Comments: _____

Well owner's information package delivered	Date Package Delivered	Ministry Use Only
<input checked="" type="checkbox"/> Yes	20140328	Audit No. Z175281
<input type="checkbox"/> No	20140328	APR 25 2014



Measurements recorded in: Metric Imperial

A095942

Page of

Well Owner's Information

First Name, Last Name / Organization (Lindon Slewidge / Slewidge Contracting), E-mail Address, Mailing Address (Box 72), Municipality (Carp), Province (ON), Postal Code (K0A 1L0), Telephone No.

Well Location

Address of Well Location (904 David Manchester Road), Township (West Carleton), Lot (S42L19), Concession (4), County/District/Municipality (Ottawa-Carleton), City/Town/Village (Carp), Province (Ontario), Postal Code, UTM Coordinates, Municipal Plan and Sublot Number (5R-13359), Other (Port # 2)

Overburden and Bedrock Materials/Abandonment Sealing Record

Table with columns: General Colour, Most Common Material, Other Materials, General Description, Depth (m/ft) From, To. Includes entries for Clay Sand, Gravel, and Limestone.

Annular Space table with columns: Depth Set at (m/ft) From, To; Type of Sealant Used; Volume Placed (m³). Entry: 0 to 21, Neat cement, 12.48.

Results of Well Yield Testing table with columns: Draw Down (Time, Water Level), Recovery (Time, Water Level). Includes 'NOT TESTED' and various pumping test results.

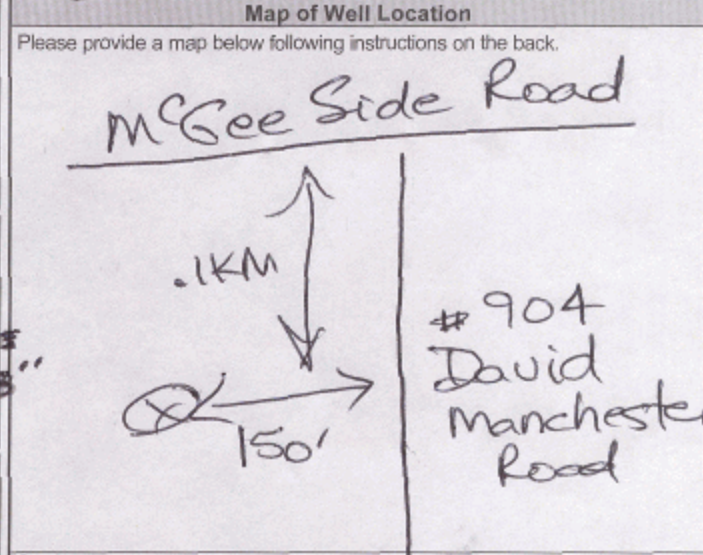
Method of Construction and Well Use checkboxes. Includes options like Cable Tool, Rotary, Boring, Air percussion, and various well uses like Domestic, Commercial, etc.

Construction Record - Casing and Status of Well. Includes columns for Inside Diameter, Material, Wall Thickness, Depth, and Status checkboxes.

Construction Record - Screen table with columns: Outside Diameter, Material, Slot No., Depth (m/ft).

Water Details and Hole Diameter tables. Includes water found at depth, kind of water, and hole diameter at different depths.

Well Contractor and Well Technician Information. Includes Business Name (Air Rock Drilling Co. Ltd), License No. (#1119), and Technician Name (Graham, Ryan).



Well owner's information package delivered (Yes/No), Date Package Delivered (20100623), Date Work Completed (20100622), Well Technician's License No. (T3484), Signature, Date Submitted (20100719).

Ministry Use Only section with Audit No. (2108401) and Received date (AUG 05 2010).

Address of Well Location (Street Number/Name) 907 DAVID MANCHESTER		Township HUNTLEY	Lot PT 9	Concession 5
County/District/Municipality OTTAWA		City/Town/Village CRP		Province Ontario
UTM Coordinates NAD 8 3	Zone 18Q	Easting 283815	Northing 5015604	Municipal Plan and Sublot Number

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 To
GREY	CLAY			0.00 2.14
GREY	SAND/GRIT	BOULDERS		2.14 3.96
GREY	WRESTONE	SAND		3.96 59.17
				(11')

Annular Space		
Depth Set at (m/ft) From To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0.00 6.10	BENTONITE MORTAR GROUT	0.18

Method of Construction	Well Use
<input checked="" type="checkbox"/> Cable Tool <input type="checkbox"/> Rotary (Conventional) <input type="checkbox"/> Rotary (Reverse) <input type="checkbox"/> Boring <input type="checkbox"/> Air percussion <input type="checkbox"/> Other, specify _____	<input type="checkbox"/> Diamond <input type="checkbox"/> Jetting <input type="checkbox"/> Driving <input type="checkbox"/> Digging <input type="checkbox"/> Public <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Livestock <input type="checkbox"/> Irrigation <input type="checkbox"/> Industrial <input type="checkbox"/> Other, specify _____

Construction Record - Casing				Status of Well	
Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft)		<input checked="" type="checkbox"/> Water Supply <input type="checkbox"/> Replacement Well <input type="checkbox"/> Test Hole <input type="checkbox"/> Recharge Well <input type="checkbox"/> Dewatering Well <input type="checkbox"/> Observation and/or Monitoring Hole <input type="checkbox"/> Alteration (Construction) <input type="checkbox"/> Abandoned, Insufficient Supply <input type="checkbox"/> Abandoned, Poor Water Quality <input type="checkbox"/> Abandoned, other, specify _____ <input type="checkbox"/> Other, specify _____
			From	To	
15.88	STEEL	0.48	0.00	6.10	

Construction Record - Screen				Status of Well	
Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft)		<input type="checkbox"/> Abandoned, Insufficient Supply <input type="checkbox"/> Abandoned, Poor Water Quality <input type="checkbox"/> Abandoned, other, specify _____ <input type="checkbox"/> Other, specify _____
			From	To	

Water Details		Hole Diameter	
Water found at Depth 2.30 (m/ft)	Kind of Water: <input type="checkbox"/> Fresh <input checked="" type="checkbox"/> Untested	Depth (m/ft) From To	Diameter (cm/in)
Water found at Depth 2.14 (m/ft)	Kind of Water: <input type="checkbox"/> Fresh <input checked="" type="checkbox"/> Untested	0.00 6.10	2.6
Water found at Depth 6.10 (m/ft)	Kind of Water: <input type="checkbox"/> Fresh <input type="checkbox"/> Untested	6.10 59.17	2.42

Well Contractor and Well Technician Information			
Business Name of Well Contractor STANTON DRILLING INC		Well Contractor's Licence No. 4875	
Business Address (Street Number/Name) BOX 29, 157 FIVE ARCHES DRIVE		Municipality PAKENHAM	
Province ON	Postal Code K0A2N0	Business E-mail Address stanton.drilling@bell.net	
Bus. Telephone No. (inc. area code) (416) 461-1111		Name of Well Technician (Last Name, First Name) STANTON, PETER	
Well Technician's Licence No. 0006	Signature of Technician and/or Contractor	Date Submitted 2018-03-23	

Results of Well Yield Testing				
After test of well yield, water was: <input type="checkbox"/> Clear and sand free <input checked="" type="checkbox"/> Other, specify Clearing	Draw Down		Recovery	
	Time (min)	Water Level (m/ft)	Time (min)	Water Level (m/ft)
If pumping discontinued, give reason: N/A	Static Level	1.36		
	1	2.95	1	20.15
	2	4.45	2	20.15
	3	5.40	3	20.15
	4	6.15	4	20.15
	5	6.92	5	20.15
Pump intake set at (m/ft) 27.5 m (90')				
Pumping rate (l/min / GPM) 23 l/min (5 gpm)				
Duration of pumping 1 hrs + 20 min				
Final water level end of pumping (m/ft) 20.16 m				
If flowing give rate (l/min / GPM) N/A				
Recommended pump depth (m/ft) 4.7 m (15')				
Recommended pump rate (l/min / GPM) 25 l/min (5 gpm)				
Well production (l/min / GPM) 27 l/min (5 gpm)				
Disinfected? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				

Map of Well Location	
Please provide a map below following instructions on the back.	
Comments:	
Well owner's information package delivered <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Date Package Delivered 2018-03-23
Date Work Completed 2018-03-23	
Ministry Use Only Audit No. 2252108 APR 10 2017 Received 2018	

Client: Paterson Group
9 AURIGA DRIVE
Ottawa, ON
K2E 7T9
Attention: Mr. Zavian Buchanan
PO#: 59259
Invoice to: Paterson Group

Report Number: 3004621
Date Submitted: 2024-01-19
Date Reported: 2024-01-25
Project: PH4674
COC #: 912676

Page 1 of 13

Dear Zavian Buchanan:**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:



Emma-Dawn
Ferguson
2024.01.25 14:40:14
-05'00'

APPROVAL:

Emma-Dawn Ferguson, 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/>.

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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

Client: Paterson Group
 9 AURIGA DRIVE
 Ottawa, ON
 K2E 7T9
 Attention: Mr. Zavian Buchanan
 PO#: 59259
 Invoice to: Paterson Group

Report Number: 3004621
 Date Submitted: 2024-01-19
 Date Reported: 2024-01-25
 Project: PH4674
 COC #: 912676

Group	Analyte	MRL	Units	Guideline	1716326 GW 2024-01-18 TW1-GW1	1716327 GW 2024-01-18 TW1-GW2
Anions	Cl	1	mg/L	AO 250	51	56
	F	0.10	mg/L	MAC 1.5	1.86*	1.74*
	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	19	22
General Chemistry	Alkalinity as CaCO3	5	mg/L	OG 30-500	382	379
	Colour (Apparent)	2	TCU	AO 5	236*	74*
	Conductivity	5	uS/cm		836	835
	DOC	0.5	mg/L	AO 5	1.9	2.3
	pH	1.00		6.5-8.5	8.00	7.99
	Phenols	0.001	mg/L		<0.001	<0.001
	S2-	0.01	mg/L	AO 0.05	10.0*	8.45*
	Tannin & Lignin	0.1	mg/L		0.5	0.2
	TDS (COND - CALC)	1	mg/L	AO 500	543*	543*
Turbidity	0.1	NTU	AO 5	49.0*	41.7*	
Hardness	Hardness as CaCO3	1	mg/L	OG 80-100	239*	260*
Indices/Calc	Ion Balance	0.01			1.01	1.02
Metals	Ag	0.0002	mg/L		<0.0002	<0.0002
	Al	0.02	mg/L	OG 0.1	0.50*	0.24*
	As	0.002	mg/L	IMAC 0.01	<0.002	<0.002
	B	0.02	mg/L	IMAC 5.0	0.40	0.37
	Ba	0.02	mg/L	MAC 1.0	0.64	0.62
	Be	0.001	mg/L		<0.001	<0.001
	Ca	1	mg/L		43	48
	Cd	0.0002	mg/L	MAC 0.005	<0.0002	<0.0002

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Group	Analyte	MRL	Units	Guideline	1716326 GW 2024-01-18 TW1-GW1	1716327 GW 2024-01-18 TW1-GW2
Metals	Co	0.0004	mg/L		<0.0004	<0.0004
	Cr	0.002	mg/L	MAC 0.05	<0.002	<0.002
	Cu	0.002	mg/L	AO 1	<0.002	<0.002
	Fe	0.06	mg/L	AO 0.3	0.42*	0.16
	Hg	0.0002	mg/L	MAC 0.001	<0.0002	<0.0002
	K	1	mg/L		9	9
	Mg	1	mg/L		32	34
	Mn	0.02	mg/L	AO 0.05	<0.02	<0.02
	Mo	0.01	mg/L		<0.01	<0.01
	Na	1	mg/L	AO 200	107	102
	Ni	0.01	mg/L		<0.01	<0.01
	Pb	0.002	mg/L	MAC 0.010	<0.002	<0.002
	Sb	0.001	mg/L	IMAC 0.006	<0.001	<0.001
	Se	0.002	mg/L	MAC 0.05	0.003	<0.002
	Sr	0.002	mg/L		3.07	3.17
	Tl	0.0002	mg/L		<0.0002	<0.0002
	U	0.002	mg/L	MAC 0.02	<0.002	<0.002
	V	0.002	mg/L		<0.002	<0.002
Zn	0.02	mg/L	AO 5	<0.02	<0.02	
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		0.456	0.482
	Total Kjeldahl Nitrogen	0.100	mg/L		0.820	1.00
VOCs Surrogates	1,2-dichloroethane-d4	0	%			83
	4-bromofluorobenzene	0	%			78

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Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1716326 GW 2024-01-18 TW1-GW1	1716327 GW 2024-01-18 TW1-GW2
VOCs Surrogates	Toluene-d8	0	%				118
Volatiles	1,1,1,2-tetrachloroethane	0.5	ug/L				<0.5
	1,1,1-trichloroethane	0.4	ug/L				<0.4
	1,1,2,2-tetrachloroethane	0.5	ug/L				<0.5
	1,1,2-trichloroethane	0.4	ug/L				<0.4
	1,1-dichloroethane	0.4	ug/L				<0.4
	1,1-dichloroethylene	0.5	ug/L	MAC 14			<0.5
	1,2-dichlorobenzene	0.4	ug/L	MAC 200			<0.4
	1,2-dichloroethane	0.5	ug/L	IMAC 5			<0.5
	1,2-dichloropropane	0.5	ug/L				<0.5
	1,3,5-trimethylbenzene	0.3	ug/L				<0.3
	1,3-dichlorobenzene	0.4	ug/L				<0.4
	1,3-Dichloropropylene (cis+trans)	0.5	ug/L				<0.5
	1,4-dichlorobenzene	0.4	ug/L	MAC 5			<0.4
	Acetone	5	ug/L				<5
	Benzene	0.5	ug/L	MAC 1			<0.5
	Bromodichloromethane	0.3	ug/L				<0.3
	Bromoform	0.4	ug/L				<0.4
	Bromomethane	0.5	ug/L				<0.5
	c-1,2-Dichloroethylene	0.4	ug/L				<0.4
	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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Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1716326 GW 2024-01-18 TW1-GW1	1716327 GW 2024-01-18 TW1-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			0.5	
	Methyl Ethyl Ketone (MEK)	2	ug/L			<2	
	Methyl Isobutyl Ketone (MIBK)	5	ug/L			<5	
	Methyl Tert Butyl Ether (MTBE)	2	ug/L	AO 15		<2	
	Monochlorobenzene	0.5	ug/L	MAC 80		<0.5	
	o-xylene	0.4	ug/L			<0.4	
	Styrene	0.5	ug/L			<0.5	
	t-1,2-Dichloroethylene	0.4	ug/L			<0.4	
	t-1,3-Dichloropropylene	0.5	ug/L			<0.5	
	Tetrachloroethylene	0.3	ug/L	MAC 10		<0.3	
	Toluene	0.4	ug/L	MAC 60		0.7	
	Trichloroethylene	0.3	ug/L	MAC 5		<0.3	
	Trichlorofluoromethane	0.5	ug/L			<0.5	
Vinyl Chloride	0.2	ug/L	MAC 1		<0.2		
Xylene; total	0.5	ug/L	MAC 90		0.5		

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QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 454963 Analysis/Extraction Date 2024-01-20 Analyst L V Method AMBCOLM1			
Escherichia Coli			
Total Coliforms			
Run No 454979 Analysis/Extraction Date 2024-01-19 Analyst AsA Method C SM2130B			
Turbidity	<0.1 NTU	97	70-130
Run No 455022 Analysis/Extraction Date 2024-01-22 Analyst SS Method EPA 8260			
Tetrachloroethane, 1,1,1,2-	<0.5 ug/L	122	60-130
Trichloroethane, 1,1,1-	<0.4 ug/L	115	60-130
Tetrachloroethane, 1,1,1,2,2-	<0.5 ug/L	119	60-130
Trichloroethane, 1,1,2-	<0.4 ug/L	121	60-130
Dichloroethane, 1,1-	<0.4 ug/L	117	60-130
Dichloroethylene, 1,1-	<0.5 ug/L	108	60-130
Dichlorobenzene, 1,2-	<0.4 ug/L	120	60-130
Dichloroethane, 1,2-	<0.5 ug/L	121	60-130
Dichloropropane, 1,2-	<0.5 ug/L	124	60-130

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QC Summary

Analyte	Blank	QC % Rec	QC Limits
1,3,5-trimethylbenzene	<0.3 ug/L	115	60-130
Dichlorobenzene, 1,3-	<0.4 ug/L	120	60-130
Dichlorobenzene, 1,4-	<0.4 ug/L	121	60-130
Acetone	<5 ug/L	120	60-130
Benzene	<0.5 ug/L	113	60-130
Bromodichloromethane	<0.3 ug/L	120	60-130
Bromoform	<0.4 ug/L	118	60-130
Bromomethane	<0.5 ug/L	105	60-130
Dichloroethylene, 1,2-cis-	<0.4 ug/L	121	60-130
Dichloropropene, 1,3-cis-	<0.5 ug/L	118	60-130
Carbon Tetrachloride	<0.2 ug/L	115	60-130
Chloroethane	<0.5 ug/L	99	60-130
Chloroform	<0.5 ug/L	121	60-130
Dibromochloromethane	<0.3 ug/L	120	60-130
Dichlorodifluoromethane	<0.5 ug/L	114	60-130
Methylene Chloride	<4.0 ug/L	102	60-130
Ethylbenzene	<0.5 ug/L	116	60-130
Ethylene dibromide	<0.2 ug/L	120	60-130

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QC Summary

Analyte	Blank	QC % Rec	QC Limits
Hexane (n)	<5 ug/L	110	60-130
m/p-xylene	<0.4 ug/L	119	60-130
Methyl Ethyl Ketone	<2 ug/L	120	60-130
Methyl Isobutyl Ketone	<5 ug/L	120	60-130
Methyl tert-Butyl Ether (MTBE)	<2 ug/L	120	60-130
Chlorobenzene	<0.5 ug/L	115	60-130
o-xylene	<0.4 ug/L	117	60-130
Styrene	<0.5 ug/L	117	60-130
Dichloroethylene, 1,2-trans-	<0.4 ug/L	120	60-130
Dichloropropene, 1,3-trans-	<0.5 ug/L	119	60-130
Tetrachloroethylene	<0.3 ug/L	119	60-130
Toluene	<0.4 ug/L	115	60-130
Trichloroethylene	<0.3 ug/L	115	60-130
Trichlorofluoromethane	<0.5 ug/L	116	60-130
Vinyl Chloride	<0.2 ug/L	106	60-130
Run No 455026 Analysis/Extraction Date 2024-01-22 Analyst SS Method EPA 8260			
Xylene Mixture			

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QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 455027 Analysis/Extraction Date 2024-01-22 Analyst SS Method EPA 8260			
Dichloropropene, 1,3-			
Run No 455033 Analysis/Extraction Date 2024-01-22 Analyst IP Method SM5530D/EPA420.2			
Phenols	<0.001 mg/L	112	50-120
Run No 455043 Analysis/Extraction Date 2024-01-22 Analyst AaN Method EPA 200.8			
Silver	<0.0002 mg/L	110	80-120
Aluminum	<0.02 mg/L	92	80-120
Arsenic	<0.002 mg/L	96	80-120
Boron (total)	<0.02 mg/L	99	80-120
Barium	<0.02 mg/L	94	80-120
Beryllium	<0.001 mg/L	104	80-120
Cadmium	<0.0002 mg/L	96	80-120
Cobalt	<0.0004 mg/L	98	80-120
Chromium Total	<0.002 mg/L	111	80-120
Copper	<0.002 mg/L	106	80-120
Iron	<0.06 mg/L	94	80-120

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QC Summary

Analyte	Blank	QC % Rec	QC Limits
Mercury	<0.0002 mg/L	104	80-120
Manganese	<0.02 mg/L	98	80-120
Molybdenum	<0.01 mg/L	86	80-120
Nickel	<0.01 mg/L	100	80-120
Lead	<0.002 mg/L	97	80-120
Antimony	<0.001 mg/L	87	80-120
Selenium	<0.002 mg/L	99	80-120
Strontium	<0.002 mg/L	90	80-120
Thallium	<0.0002 mg/L	96	80-120
Uranium	<0.002 mg/L	90	80-120
Vanadium	<0.002 mg/L	96	80-120
Zinc	<0.02 mg/L	102	80-120
Run No 455056 Analysis/Extraction Date 2024-01-23 Analyst IP Method SM 4110			
Chloride	<1 mg/L	100	90-110
N-NO2	<0.10 mg/L	101	90-110
N-NO3	<0.10 mg/L	102	90-110
SO4	<1 mg/L	95	90-110

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QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 455101 Analysis/Extraction Date 2024-01-23 Analyst AsA Method SM2320,2510,4500H/F			
Alkalinity (CaCO3)	<5 mg/L	100	90-110
Conductivity	<5 uS/cm	101	90-110
F	<0.10 mg/L	106	90-110
pH		99	90-110
Run No 455102 Analysis/Extraction Date 2024-01-23 Analyst AsA Method SM 5310B			
DOC	<0.5 mg/L	102	80-120
Run No 455103 Analysis/Extraction Date 2024-01-24 Analyst AsA Method C SM2120C			
Colour (Apparent)	<2 TCU	109	90-110
Run No 455135 Analysis/Extraction Date 2024-01-24 Analyst SKH Method EPA 350.1			
N-NH3	<0.020 mg/L	105	80-120
Run No 455136 Analysis/Extraction Date 2024-01-24 Analyst SKH Method EPA 351.2			
Total Kjeldahl Nitrogen	<0.100 mg/L	115	70-130

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QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 455144 Analysis/Extraction Date 2024-01-25 Analyst Z S Method M SM3120B-3500C			
Calcium	<1 mg/L	103	90-110
Potassium	<1 mg/L	107	87-113
Magnesium	<1 mg/L	100	76-124
Sodium	<1 mg/L	105	82-118
Run No 455145 Analysis/Extraction Date 2024-01-25 Analyst Z S Method C SM2340B			
Hardness as CaCO3			
Ion Balance			
TDS (COND - CALC)			
Run No 455152 Analysis/Extraction Date 2024-01-25 Analyst AsA Method C SM4500-S2-D			
S2-	<0.01 mg/L	112	80-120
Run No 455153 Analysis/Extraction Date 2024-01-25 Analyst AsA Method C SM5550B			
Tannin & Lignin	<0.1 mg/L	80	80-120

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Sample Comment Summary

Sample ID: 1716326	TW1-GW1	Metals MRL elevated for all samples in this workorder due to matrix interference (dilution was done). Elevated color results due to turbidity of the sample.
Sample ID: 1716327	TW1-GW2	Elevated color results due to turbidity of the sample.

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K2E 7T9
Attention: Mr. Zavian Buchanan
PO#: 59260
Invoice to: Paterson Group

Report Number: 3004622
Date Submitted: 2024-01-19
Date Reported: 2024-01-24
Project: PH4674
COC #: 912677

Dear Zavian Buchanan:

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:


Emma-
Dawn
Ferguson
2024.01.2
4 16:44:11
-05'00'

APPROVAL:

Emma-Dawn Ferguson, 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

Client: Paterson Group
 9 AURIGA DRIVE
 Ottawa, ON
 K2E 7T9
 Attention: Mr. Zavian Buchanan
 PO#: 59260
 Invoice to: Paterson Group

Report Number: 3004622
 Date Submitted: 2024-01-19
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Lab I.D. 1716328
 Sample Matrix GW
 Sample Type
 Sampling Date 2024-01-18
 Sample I.D. TW1-GW3

Group	Analyte	MRL	Units	Guideline	
General Chemistry	Colour (Apparent)	2	TCU	AO 5	15*
	Turbidity	0.1	NTU	AO 5	38.3*

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

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QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 454979 Analysis/Extraction Date 2024-01-19 Analyst AsA Method C SM2130B			
Turbidity	<0.1 NTU	97	70-130
Run No 455103 Analysis/Extraction Date 2024-01-24 Analyst AsA Method C SM2120C			
Colour (Apparent)	<2 TCU	109	90-110

Guideline = ODWSOG

*** = Guideline Exceedence**

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Sample Comment Summary

Sample ID: 1716328 TW1-GW3 Elevated color results due to turbidity of the sample.

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

OFFICIAL CERTIFICATE OF ANALYSIS : 3866744

WORK REQUEST : 100273660

Report Date : 2024-04-11

Paterson Group

9 Auriga Dr
Nepean, Ontario
K2E 7T9
Attention : Alex Schopf

Reception Date : 2024-04-05

Project : PH4674

Sampler : NA

PO Number : 59868

Temperature : 12 °C

Analysis	Quantity	External Method
Alkalinity (Water, Automated)	1	Modified from SM 2320 B
Ammonia, Total (Water, Colorimetry)	1	Modified from EPA 350.1
Chloride (Water, IC)	1	Modified from SM 4110 B and C
Colour, Apparent (Water, Spectrophotometry)	1	Modified from SM 2120 C
Conductivity (Water, Automated)	1	Modified from SM 2510 B
DOC (Water, IR)	1	Modified from SM 5310 B
Escherichia coli (DC Plate)	1	Modified from MECP E3407
Fluoride (Water, Auto/ISE)	1	Modified from SM 4500-F A and 4500-F C
Hardness (Water, Calculation Only)	1	SM 2340 B
Ion Balance (Water, Calculation)	1	Modified from SM1030 E
Metals Scan (Water, ICP/MS)	1	Modified from EPA 200.8
Metals Scan (Water, ICP/OES)	1	Modified from SM 3120 B
Nitrate (Water, IC)	1	Modified from SM 4110 B and C
Nitrite (Water, IC)	1	Modified from SM 4110 B and C
pH (25°C) (Water, Automated)	1	Modified from SM 4500-H+ B
Phenols (Water, Colorimetry)	1	Modified from EPA 420.2
Sulphate (Water, IC)	1	Modified from SM 4110 B and C
Sulphide (Water, Colorimetry)	1	Modified from SM 4500-S2 D
Tannin and Lignin (Water, Spec)	1	Modified from SM 5550 B
TDS (Estimated)	1	Modified from SM 2510 A
Total Coliforms (DC Plate)	1	Modified from MECP E3407
Total Kjeldahl Nitrogen (Water, Colorimetry)	1	Modified from EPA 351.2
Turbidity (Water, Turbidimeter)	1	Modified from SM 2130 B

Criteria :

A : Ontario Regulation 169/03 (Non-Regulated Drinking Water)

Sample status upon receipt :

7606709

Compliant

Certificate Comments :

7606709

Hg spike not available due to matrix interference in the mother sample. Metals MRL was raised due to matrix interference.

Notes :

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

Legend :

RL : Reporting limit

QC : Reference material (QC)

N/A : Not applicable

1 : Results in annex

* : Analysis conducted by external subcontracting

^ : Analysis not accredited

OFFICIAL CERTIFICATE OF ANALYSIS - EXCEEDENCE SUMMARY

Client : Paterson Group
 Project : PH4674

Reception Date : 2024-04-05

Eurofins Sample No	Client Sample Identification	Analyte	Result	Units	Exceeded Criteria		
					A	B	C
Colour, Apparent (Water, Spectrophotometry)							
7606709	TW1-GW1	Colour (Apparent)	38	TCU	5		
Fluoride (Water, Auto/ISE)							
7606709	TW1-GW1	Fluoride	2.07	mg/L	1.5		
Hardness (Water, Calculation Only)							
7606709	TW1-GW1	Hardness as CaCO3 (Calculation)	209	mg/L	80-100		
Metals Scan (Water, ICP/MS)							
7606709	TW1-GW1	Iron	0.31	mg/L	0.3		
Sulphide (Water, Colorimetry)							
7606709	TW1-GW1	Sulphide (S2-)	7.6	mg/L	0.05		
TDS (Estimated)							
7606709	TW1-GW1	TDS (Estimated) [^]	521	mg/L	500		
Turbidity (Water, Turbidimeter)							
7606709	TW1-GW1	Turbidity	23.7	NTU	5		

OFFICIAL CERTIFICATE OF ANALYSIS - RESULTS

Client : Paterson Group
Project : PH4674

Reception Date: 2024-04-05

Eurofins Sample No : 7606709									
Matrix : Drinking water									
Sampling Date : 2024-04-04									
Client Sample Identification : TW1-GW1									
Anions	RL	Unit	Criteria						
			A	B	C				
Chloride	0.5	mg/L	250			42.5			
Nitrate (as Nitrogen)	0.1	mg/L	10.0			<0.1			
Nitrite (as Nitrogen)	0.1	mg/L	1.0			<0.1			
Sulphate	1	mg/L	500			17			

Eurofins Sample No : 7606709									
Matrix : Drinking water									
Sampling Date : 2024-04-04									
Client Sample Identification : TW1-GW1									
Calculations	RL	Unit	Criteria						
			A	B	C				
Ion Balance (Calculation)^	0.1		0.99						

Eurofins Sample No : 7606709									
Matrix : Drinking water									
Sampling Date : 2024-04-04									
Client Sample Identification : TW1-GW1									
General Chemistry	RL	Unit	Criteria						
			A	B	C				
Alkalinity (as CaCO3)	5	mg/L	500			381			
Colour (Apparent)	2	TCU	5			38			
Conductivity @ 25°C	5	uS/cm				802			
Dissolved Organic Carbon	0.5	mg/L	5			1.9			
Fluoride	0.1	mg/L	1.5			2.07			
Hardness as CaCO3 (Calculation)	1	mg/L	80-100			209			
pH @ 25°C	1		6.5-8.5			8.19			
Phenols-4AAP	0.001	mg/L				<0.001			
Sulphide (S2-)	0.01	mg/L	0.05			7.6			
Tannin and Lignin	0.1	mg/L				0.2			
TDS (Estimated)^	5	mg/L	500			521			
Turbidity	0.1	NTU	5			23.7			

OFFICIAL CERTIFICATE OF ANALYSIS - RESULTS

Client : Paterson Group
Project : PH4674

Reception Date: 2024-04-05

		Eurofins Sample No :		7606709					
		Matrix :		Drinking water					
		Sampling Date :		2024-04-04					
		Client Sample Identification :		TW1-GW1					
Metals	RL	Unit	Criteria						
			A	B	C				
Metals Scan (Water, ICP/MS)									
Aluminum	0.01	mg/L	0.1			<0.02			
Antimony	0.0005	mg/L	0.006			<0.001			
Arsenic	0.001	mg/L	0.01			<0.002			
Barium	0.001	mg/L	1			0.556			
Beryllium	0.0005	mg/L				<0.001			
Boron	0.01	mg/L	5			0.39			
Cadmium	0.0001	mg/L	0.005			<0.0002			
Chromium	0.001	mg/L	0.05			<0.002			
Cobalt	0.0002	mg/L				<0.0004			
Copper	0.001	mg/L	1			<0.002			
Iron	0.03	mg/L	0.3			0.31			
Lead	0.001	mg/L	0.01			<0.002			
Manganese	0.01	mg/L	0.05			<0.02			
Mercury	0.0001	mg/L	0.001			<0.0002			
Molybdenum	0.005	mg/L				<0.01			
Nickel	0.005	mg/L				<0.01			
Selenium	0.001	mg/L	0.05			0.004			
Silver	0.0001	mg/L				<0.0002			
Strontium	0.001	mg/L				2.62			
Thallium	0.0001	mg/L				<0.0002			
Uranium	0.001	mg/L	0.02			<0.002			
Vanadium	0.001	mg/L				<0.002			
Zinc	0.01	mg/L	5			<0.02			
Metals Scan (Water, ICP/OES)									
Calcium	1	mg/L				39			
Magnesium	1	mg/L				27			
Potassium	1	mg/L				8			
Sodium	1	mg/L	200			110			

		Eurofins Sample No :		7606709					
		Matrix :		Drinking water					
		Sampling Date :		2024-04-04					
		Client Sample Identification :		TW1-GW1					
Microbiology	RL	Unit	Criteria						
			A	B	C				
Escherichia coli (DC)	0	CFU/100mL	0			0			
Total Coliforms (DC)	0	CFU/100mL	0			0			

OFFICIAL CERTIFICATE OF ANALYSIS - RESULTS

Client : Paterson Group
 Project : PH4674

Reception Date: 2024-04-05

Eurofins Sample No :		7606709							
Matrix :		Drinking water							
Sampling Date :		2024-04-04							
Client Sample Identification :		TW1-GW1							
Nutrients	RL	Unit							
Ammonia (Total, as Nitrogen)	0.02	mg/L	0.286						
Total Kjeldahl Nitrogen	0.1	mg/L	0.400						

Approved by : 
 Emma-Dawn Ferguson,
 Environmental Chemist

Approved by : 
 Jason Kennedy,
 Project Manager

OFFICIAL CERTIFICATE OF ANALYSIS - QUALITY CONTROL

Client : Paterson Group
Project : PH4674

Reception Date: 2024-04-05

Parameter	Unit	RL	Blank	QC		Matrix Spike		Duplicate	
				Recovery %	Range %	Recovery %	Range %	RPD %	Range %
Alkalinity (Water, Automated)									
<i>Method : Alkalinity (water, titration to pH 4.5, automated). Internal method: OTT-I-AT-WI45398.</i>									
Alkalinity (as CaCO ₃)	mg/L	5	<5	96	95-105				
Associated Samples : 7606709								Prep Date: 2024-04-09 Analysis Date: 2024-04-10	
Ammonia, Total (Water, Colorimetry)									
<i>Method : Ammonia (Water, Colorimetry). Internal method: OTT-I-NUT-WI46201.</i>									
Ammonia (Total, as Nitrogen)	mg/L	0.02	<0.020	117	80-120	96	80-120	2	0-20
Associated Samples : 7606709								Prep Date: 2024-04-08 Analysis Date: 2024-04-08	
Chloride (Water, IC)									
<i>Method : Anions (Water, Ion Chromatography). Internal method: OTT-I-IC-WI45985.</i>									
Chloride	mg/L	0.5	<0.5	110	80-120	102	80-120	-	0-20
Associated Samples : 7606709								Prep Date: 2024-04-10 Analysis Date: 2024-04-11	
Colour, Apparent (Water, Spectrophotometry)									
<i>Method : Colour (Water, Spectrophotometric). Internal method: OTT-I-SPEC-WI45980.</i>									
Colour (Apparent)	TCU	2	<2	87	39-159			17	0-40
Associated Samples : 7606709								Prep Date: 2024-04-10 Analysis Date: 2024-04-10	
Conductivity (Water, Automated)									
<i>Method : Conductivity (Water, Autotitrator). Internal Method: OTT-I-AT-WI45398.</i>									
Conductivity @ 25°C	uS/cm	5	<5	100	98-102				
Associated Samples : 7606709								Prep Date: 2024-04-09 Analysis Date: 2024-04-10	
DOC (Water, IR)									
<i>Method : Organic carbon (water, IR, combustion). Internal method: OTT-I-DEM-WI46148.</i>									
Dissolved Organic Carbon	mg/L	0.5	<0.5	110	84-116	103	80-120	-	0-15
Associated Samples : 7606709								Prep Date: 2024-04-10 Analysis Date: 2024-04-11	
Escherichia coli (DC Plate)									
<i>Method : Total Coliforms and E.Coli by MF (Water, DC plate). Internal method: OTT-M-BAC-WI45296.</i>									
Escherichia coli (DC)	CFU/100mL	0	0					-	0-30
Associated Samples : 7606709								Prep Date: 2024-04-05 Analysis Date: 2024-04-06	
Fluoride (Water, Auto/ISE)									
<i>Method : Fluoride by autotitrator, ion selective electrode. Internal method: OTT-I-AT-WI45398.</i>									
Fluoride	mg/L	0.1	<0.1	103	90-110			1	0-20
Associated Samples : 7606709								Prep Date: 2024-04-09 Analysis Date: 2024-04-10	

OFFICIAL CERTIFICATE OF ANALYSIS - QUALITY CONTROL

Client : Paterson Group
Project : PH4674

Reception Date: 2024-04-05

Parameter	Unit	RL	Blank	QC		Matrix Spike		Duplicate	
				Recovery %	Range %	Recovery %	Range %	RPD %	Range %
Metals Scan (Water, ICP/MS)									
<i>Method : Metals (Water, ICP/MS). Internal method: AMMTFQE1.</i>									
Aluminum	mg/L	0.01	<0.01	100	80-120	101	70-130	5	0-20
Antimony	mg/L	0.0005	<0.0005	87	80-120	92	70-130	-	0-20
Arsenic	mg/L	0.001	<0.001	97	80-120	96	70-130	-	0-20
Barium	mg/L	0.001	<0.001	90	80-120	95	70-130	0	0-20
Beryllium	mg/L	0.0005	<0.0005	103	80-120	-	70-130	-	0-20
Boron	mg/L	0.01	<0.01	100	80-120	96	70-130	-	0-20
Cadmium	mg/L	0.0001	<0.0001	99	80-120	97	70-130	-	0-20
Chromium	mg/L	0.001	<0.001	110	80-120	97	70-130	-	0-20
Cobalt	mg/L	0.0002	<0.0002	103	80-120	94	70-130	-	0-20
Copper	mg/L	0.001	<0.001	110	80-120	86	70-130	0	0-20
Iron	mg/L	0.03	<0.03	100	80-120	95	70-130	-	0-20
Lead	mg/L	0.001	<0.001	110	80-120	95	70-130	-	0-20
Manganese	mg/L	0.01	<0.01	100	80-120	94	70-130	-	0-20
Mercury	mg/L	0.0001	<0.0001	102	80-120	-	-	-	0-20
Molybdenum	mg/L	0.005	<0.005	100	80-120	96	70-130	-	0-20
Nickel	mg/L	0.005	<0.005	110	80-120	96	70-130	-	0-20
Selenium	mg/L	0.001	<0.001	95	80-120	96	70-130	-	0-20
Silver	mg/L	0.0001	<0.0001	104	80-120	-	70-130	-	0-20
Strontium	mg/L	0.001	<0.001	90	80-120	92	70-130	1	0-20
Thallium	mg/L	0.0001	<0.0001	105	80-120	93	70-130	-	0-20
Uranium	mg/L	0.001	<0.001	100	80-120	97	70-130	-	0-20
Vanadium	mg/L	0.001	<0.001	100	80-120	95	70-130	-	0-20
Zinc	mg/L	0.01	<0.01	90	80-120	-	70-130	-	0-20
Associated Samples : 7606709								Prep Date: 2024-04-09 Analysis Date: 2024-04-10	
Metals Scan (Water, ICP/OES)									
<i>Method : Metals (Water, ICP/OES). Internal method: OTT-I-MET-WI48491.</i>									
Calcium	mg/L	1	<1	102	86-115	98	70-130	1	0-20
Magnesium	mg/L	1	<1	100	91-109	100	70-130	0	0-20
Potassium	mg/L	1	<1	102	87-113	97	70-130	-	0-20
Sodium	mg/L	1	<1	99	85-115	96	70-130	1	0-20
Associated Samples : 7606709								Prep Date: 2024-04-09 Analysis Date: 2024-04-05	
Nitrate (Water, IC)									
<i>Method : Anions (Water, Ion Chromatography). Internal method: OTT-I-IC-WI45985.</i>									
Nitrate (as Nitrogen)	mg/L	0.1	<0.1	106	80-120	107	80-120	-	0-20
Associated Samples : 7606709								Prep Date: 2024-04-10 Analysis Date: 2024-04-11	
Nitrite (Water, IC)									
<i>Method : Anions (Water, Ion Chromatography). Internal method: OTT-I-IC-WI45985.</i>									
Nitrite (as Nitrogen)	mg/L	0.1	<0.1	106	80-120	98	80-120	-	0-20
Associated Samples : 7606709								Prep Date: 2024-04-10 Analysis Date: 2024-04-11	
pH (25°C) (Water, Automated)									
<i>Method : pH (Water, Automated Meter). Internal method: OTT-I-AT-WI45398.</i>									
pH @ 25°C		1	6.03	100	97-103				
Associated Samples : 7606709								Prep Date: 2024-04-09 Analysis Date: 2024-04-10	

OFFICIAL CERTIFICATE OF ANALYSIS - QUALITY CONTROL

Client : Paterson Group
Project : PH4674

Reception Date: 2024-04-05

Parameter	Unit	RL	Blank	QC		Matrix Spike		Duplicate	
				Recovery %	Range %	Recovery %	Range %	RPD %	Range %
Phenols (Water, Colorimetry)									
<i>Method : Phenols (Water, Colorimetry). Internal method: OTT-I-4AAP-WI46150.</i>									
Phenols-4AAP	mg/L	0.001	<0.001	91	75-125	105	70-130	-	0-20
Associated Samples : 7606709								Prep Date: 2024-04-09 Analysis Date: 2024-04-09	
Sulphate (Water, IC)									
<i>Method : Anions (Water, Ion Chromatography). Internal method: OTT-I-IC-WI45985.</i>									
Sulphate	mg/L	1	<1	105	90-110	99	80-120	-	0-20
Associated Samples : 7606709								Prep Date: 2024-04-10 Analysis Date: 2024-04-11	
Sulphide (Water, Colorimetry)									
<i>Method : Sulphide, S2- (Water, Colorimetry). Internal method: OTT-I-SPEC-WI45931.</i>									
Sulphide (S2-)	mg/L	0.01	<0.01	108	80-120			-	0-20
Associated Samples : 7606709								Prep Date: 2024-04-08 Analysis Date: 2024-04-09	
Tannin and Lignin (Water, Spec)									
<i>Method : Tannin and Lignin (Water, Spec), Internal method: OTT-I-SPEC-WI57693.</i>									
Tannin and Lignin	mg/L	0.1	<0.1	98	80-120			-	0-20
Associated Samples : 7606709								Prep Date: 2024-04-11 Analysis Date: 2024-04-11	
Total Coliforms (DC Plate)									
<i>Method : Total Coliforms and E.Coli by MF (Water, DC plate). Internal method: OTT-M-BAC-WI45296.</i>									
Total Coliforms (DC)	CFU/100mL	0	0					-	0-30
Associated Samples : 7606709								Prep Date: 2024-04-05 Analysis Date: 2024-04-06	
Total Kjeldahl Nitrogen (Water, Colorimetry)									
<i>Method : TKN (Water, colorimetry). Internal method: OTT-I-NUT-WI46201.</i>									
Total Kjeldahl Nitrogen	mg/L	0.1	<0.100	103	70-130	106	70-130	-	0-20
Associated Samples : 7606709								Prep Date: 2024-04-09 Analysis Date: 2024-04-10	
Turbidity (Water, Turbidimeter)									
<i>Method : Turbidity (Water, Turbidimeter). Internal method: OTT-I-TUR-WI46288.</i>									
Turbidity	NTU	0.1	<0.1	99	80-120			3	0-30
Associated Samples : 7606709								Prep Date: 2024-04-06 Analysis Date: 2024-04-06	

Where RPD % is reported as "-" the calculation is not available because one or both of the duplicates is within 5 times the RL.

OFFICIAL CERTIFICATE OF ANALYSIS : 3866747

WORK REQUEST : 100273659

Report Date : 2024-04-11

Paterson Group

9 Auriga Dr
Nepean, Ontario
K2E 7T9
Attention : Alex Schopf

Reception Date : 2024-04-05

Project : PH4674

Sampler : NA

PO Number : 59869

Temperature : 12 °C

Analysis	Quantity	External Method
Alkalinity (Water, Automated)	1	Modified from SM 2320 B
Ammonia, Total (Water, Colorimetry)	1	Modified from EPA 350.1
Chloride (Water, IC)	1	Modified from SM 4110 B and C
Colour, Apparent (Water, Spectrophotometry)	1	Modified from SM 2120 C
Conductivity (Water, Automated)	1	Modified from SM 2510 B
DOC (Water, IR)	1	Modified from SM 5310 B
Escherichia coli (DC Plate)	1	Modified from MECP E3407
Fluoride (Water, Auto/ISE)	1	Modified from SM 4500-F A and 4500-F C
Hardness (Water, Calculation Only)	1	SM 2340 B
Ion Balance (Water, Calculation)	1	Modified from SM1030 E
Metals Scan (Water, ICP/MS)	1	Modified from EPA 200.8
Metals Scan (Water, ICP/OES)	1	Modified from SM 3120 B
Nitrate (Water, IC)	1	Modified from SM 4110 B and C
Nitrite (Water, IC)	1	Modified from SM 4110 B and C
pH (25°C) (Water, Automated)	1	Modified from SM 4500-H+ B
Phenols (Water, Colorimetry)	1	Modified from EPA 420.2
Sulphate (Water, IC)	1	Modified from SM 4110 B and C
Sulphide (Water, Colorimetry)	1	Modified from SM 4500-S2 D
Tannin and Lignin (Water, Spec)	1	Modified from SM 5550 B
TDS (Estimated)	1	Modified from SM 2510 A
Total Coliforms (DC Plate)	1	Modified from MECP E3407
Total Kjeldahl Nitrogen (Water, Colorimetry)	1	Modified from EPA 351.2
Turbidity (Water, Turbidimeter)	1	Modified from SM 2130 B

Criteria :

A : Ontario Regulation 169/03 (Non-Regulated Drinking Water)

Sample status upon receipt :

7606707

Compliant

Certificate Comments :

7606707

Hg spike not available due to matrix interference in the mother sample. Metals MRL was raised due to matrix interference.

Notes :

- All analysis is completed at Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) unless otherwise stated.
- Eurofins Environment Testing Canada Inc. 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/>
- Please note: Field data, where presented on the report, has been provided by the client and is presented for informational purposes only. Guideline or regulatory limits listed on this report are provided for ease of use (informational purposes) only. Eurofins recommends consulting the official guideline or regulation as required. Unless otherwise stated, measurement uncertainty is not taken into account when determining guideline or regulatory exceedances.

Legend :

RL : Reporting limit

QC : Reference material (QC)

N/A : Not applicable

1 : Results in annex

* : Analysis conducted by external subcontracting

^ : Analysis not accredited

OFFICIAL CERTIFICATE OF ANALYSIS - EXCEEDENCE SUMMARY

Client : Paterson Group
 Project : PH4674

Reception Date : 2024-04-05

Eurofins Sample No	Client Sample Identification	Analyte	Result	Units	Exceeded Criteria		
					A	B	C
Colour, Apparent (Water, Spectrophotometry)							
7606707	TW1-GW2	Colour (Apparent)	19	TCU	5		
Fluoride (Water, Auto/ISE)							
7606707	TW1-GW2	Fluoride	1.85	mg/L	1.5		
Hardness (Water, Calculation Only)							
7606707	TW1-GW2	Hardness as CaCO3 (Calculation)	250	mg/L	80-100		
Metals Scan (Water, ICP/MS)							
7606707	TW1-GW2	Iron	0.59	mg/L	0.3		
Sulphide (Water, Colorimetry)							
7606707	TW1-GW2	Sulphide (S2-)	5.76	mg/L	0.05		
TDS (Estimated)							
7606707	TW1-GW2	TDS (Estimated)^	547	mg/L	500		
Turbidity (Water, Turbidimeter)							
7606707	TW1-GW2	Turbidity	25.5	NTU	5		

OFFICIAL CERTIFICATE OF ANALYSIS - RESULTS

Client : Paterson Group
Project : PH4674

Reception Date: 2024-04-05

Eurofins Sample No : 7606707									
Matrix : Drinking water									
Sampling Date : 2024-04-04									
Client Sample Identification : TW1-GW2									
Anions	RL	Unit	Criteria						
			A	B	C				
Chloride	0.5	mg/L	250			45.9			
Nitrate (as Nitrogen)	0.1	mg/L	10.0			<0.1			
Nitrite (as Nitrogen)	0.1	mg/L	1.0			<0.1			
Sulphate	1	mg/L	500			27			

Eurofins Sample No : 7606707									
Matrix : Drinking water									
Sampling Date : 2024-04-04									
Client Sample Identification : TW1-GW2									
Calculations	RL	Unit	Criteria						
			A	B	C				
Ion Balance (Calculation)^	0.1		0.99						

Eurofins Sample No : 7606707									
Matrix : Drinking water									
Sampling Date : 2024-04-04									
Client Sample Identification : TW1-GW2									
General Chemistry	RL	Unit	Criteria						
			A	B	C				
Alkalinity (as CaCO3)	5	mg/L	500			393			
Colour (Apparent)	2	TCU	5			19			
Conductivity @ 25°C	5	uS/cm				842			
Dissolved Organic Carbon	0.5	mg/L	5			1.3			
Fluoride	0.1	mg/L	1.5			1.85			
Hardness as CaCO3 (Calculation)	1	mg/L	80-100			250			
pH @ 25°C	1		6.5-8.5			8.12			
Phenols-4AAP	0.001	mg/L				<0.001			
Sulphide (S2-)	0.01	mg/L	0.05			5.76			
Tannin and Lignin	0.1	mg/L				0.2			
TDS (Estimated)^	5	mg/L	500			547			
Turbidity	0.1	NTU	5			25.5			

OFFICIAL CERTIFICATE OF ANALYSIS - RESULTS

Client : Paterson Group
Project : PH4674

Reception Date: 2024-04-05

		Eurofins Sample No :		7606707					
		Matrix :		Drinking water					
		Sampling Date :		2024-04-04					
		Client Sample Identification :		TW1-GW2					
Metals	RL	Unit	Criteria						
			A	B	C				
Metals Scan (Water, ICP/MS)									
Aluminum	0.01	mg/L	0.1			<0.02			
Antimony	0.0005	mg/L	0.006			<0.001			
Arsenic	0.001	mg/L	0.01			<0.002			
Barium	0.001	mg/L	1			0.605			
Beryllium	0.0005	mg/L				<0.001			
Boron	0.01	mg/L	5			0.38			
Cadmium	0.0001	mg/L	0.005			<0.0002			
Chromium	0.001	mg/L	0.05			<0.002			
Cobalt	0.0002	mg/L				<0.0004			
Copper	0.001	mg/L	1			<0.002			
Iron	0.03	mg/L	0.3			0.59			
Lead	0.001	mg/L	0.01			<0.002			
Manganese	0.01	mg/L	0.05			<0.02			
Mercury	0.0001	mg/L	0.001			<0.0002			
Molybdenum	0.005	mg/L				<0.01			
Nickel	0.005	mg/L				<0.01			
Selenium	0.001	mg/L	0.05			0.004			
Silver	0.0001	mg/L				<0.0002			
Strontium	0.001	mg/L				3.01			
Thallium	0.0001	mg/L				<0.0002			
Uranium	0.001	mg/L	0.02			<0.002			
Vanadium	0.001	mg/L				<0.002			
Zinc	0.01	mg/L	5			<0.02			
Metals Scan (Water, ICP/OES)									
Calcium	1	mg/L				47			
Magnesium	1	mg/L				32			
Potassium	1	mg/L				9			
Sodium	1	mg/L	200			104			

		Eurofins Sample No :		7606707					
		Matrix :		Drinking water					
		Sampling Date :		2024-04-04					
		Client Sample Identification :		TW1-GW2					
Microbiology	RL	Unit	Criteria						
			A	B	C				
Escherichia coli (DC)	0	CFU/100mL	0			0			
Total Coliforms (DC)	0	CFU/100mL	0			0			

OFFICIAL CERTIFICATE OF ANALYSIS - RESULTS

Client : Paterson Group
 Project : PH4674

Reception Date: 2024-04-05

Eurofins Sample No :			7606707						
Matrix :			Drinking water						
Sampling Date :			2024-04-04						
Client Sample Identification :			TW1-GW2						
Nutrients	RL	Unit							
Ammonia (Total, as Nitrogen)	0.02	mg/L	0.306						
Total Kjeldahl Nitrogen	0.1	mg/L	0.411						

Approved by : 
 Emma-Dawn Ferguson,
 Environmental Chemist

Approved by : 
 Jason Kennedy,
 Project Manager

OFFICIAL CERTIFICATE OF ANALYSIS - QUALITY CONTROL

Client : Paterson Group
Project : PH4674

Reception Date: 2024-04-05

Parameter	Unit	RL	Blank	QC		Matrix Spike		Duplicate	
				Recovery %	Range %	Recovery %	Range %	RPD %	Range %
Alkalinity (Water, Automated)									
<i>Method : Alkalinity (water, titration to pH 4.5, automated). Internal method: OTT-I-AT-WI45398.</i>									
Alkalinity (as CaCO ₃)	mg/L	5	<5	96	95-105				
Associated Samples : 7606707								Prep Date: 2024-04-09 Analysis Date: 2024-04-10	
Ammonia, Total (Water, Colorimetry)									
<i>Method : Ammonia (Water, Colorimetry). Internal method: OTT-I-NUT-WI46201.</i>									
Ammonia (Total, as Nitrogen)	mg/L	0.02	<0.020	117	80-120	96	80-120	2	0-20
Associated Samples : 7606707								Prep Date: 2024-04-08 Analysis Date: 2024-04-08	
Chloride (Water, IC)									
<i>Method : Anions (Water, Ion Chromatography). Internal method: OTT-I-IC-WI45985.</i>									
Chloride	mg/L	0.5	<0.5	110	80-120	102	80-120	-	0-20
Associated Samples : 7606707								Prep Date: 2024-04-10 Analysis Date: 2024-04-11	
Colour, Apparent (Water, Spectrophotometry)									
<i>Method : Colour (Water, Spectrophotometric). Internal method: OTT-I-SPEC-WI45980.</i>									
Colour (Apparent)	TCU	2	<2	87	39-159			17	0-40
Associated Samples : 7606707								Prep Date: 2024-04-10 Analysis Date: 2024-04-10	
Conductivity (Water, Automated)									
<i>Method : Conductivity (Water, Autotitrator). Internal Method: OTT-I-AT-WI45398.</i>									
Conductivity @ 25°C	uS/cm	5	<5	100	98-102				
Associated Samples : 7606707								Prep Date: 2024-04-09 Analysis Date: 2024-04-10	
DOC (Water, IR)									
<i>Method : Organic carbon (water, IR, combustion). Internal method: OTT-I-DEM-WI46148.</i>									
Dissolved Organic Carbon	mg/L	0.5	<0.5	110	84-116	103	80-120	-	0-15
Associated Samples : 7606707								Prep Date: 2024-04-10 Analysis Date: 2024-04-11	
Escherichia coli (DC Plate)									
<i>Method : Total Coliforms and E.Coli by MF (Water, DC plate). Internal method: OTT-M-BAC-WI45296.</i>									
Escherichia coli (DC)	CFU/100mL	0	0					-	0-30
Associated Samples : 7606707								Prep Date: 2024-04-05 Analysis Date: 2024-04-06	
Fluoride (Water, Auto/ISE)									
<i>Method : Fluoride by autotitrator, ion selective electrode. Internal method: OTT-I-AT-WI45398.</i>									
Fluoride	mg/L	0.1	<0.1	103	90-110			1	0-20
Associated Samples : 7606707								Prep Date: 2024-04-09 Analysis Date: 2024-04-10	

OFFICIAL CERTIFICATE OF ANALYSIS - QUALITY CONTROL

Client : Paterson Group
Project : PH4674

Reception Date: 2024-04-05

Parameter	Unit	RL	Blank	QC		Matrix Spike		Duplicate	
				Recovery %	Range %	Recovery %	Range %	RPD %	Range %
Metals Scan (Water, ICP/MS)									
<i>Method : Metals (Water, ICP/MS). Internal method: AMMTFQE1.</i>									
Aluminum	mg/L	0.01	<0.01	100	80-120	101	70-130	5	0-20
Antimony	mg/L	0.0005	<0.0005	87	80-120	92	70-130	-	0-20
Arsenic	mg/L	0.001	<0.001	97	80-120	96	70-130	-	0-20
Barium	mg/L	0.001	<0.001	90	80-120	95	70-130	0	0-20
Beryllium	mg/L	0.0005	<0.0005	103	80-120	-	70-130	-	0-20
Boron	mg/L	0.01	<0.01	100	80-120	96	70-130	-	0-20
Cadmium	mg/L	0.0001	<0.0001	99	80-120	97	70-130	-	0-20
Chromium	mg/L	0.001	<0.001	110	80-120	97	70-130	-	0-20
Cobalt	mg/L	0.0002	<0.0002	103	80-120	94	70-130	-	0-20
Copper	mg/L	0.001	<0.001	110	80-120	86	70-130	0	0-20
Iron	mg/L	0.03	<0.03	100	80-120	95	70-130	-	0-20
Lead	mg/L	0.001	<0.001	110	80-120	95	70-130	-	0-20
Manganese	mg/L	0.01	<0.01	100	80-120	94	70-130	-	0-20
Mercury	mg/L	0.0001	<0.0001	102	80-120	-	-	-	0-20
Molybdenum	mg/L	0.005	<0.005	100	80-120	96	70-130	-	0-20
Nickel	mg/L	0.005	<0.005	110	80-120	96	70-130	-	0-20
Selenium	mg/L	0.001	<0.001	95	80-120	96	70-130	-	0-20
Silver	mg/L	0.0001	<0.0001	104	80-120	-	70-130	-	0-20
Strontium	mg/L	0.001	<0.001	90	80-120	92	70-130	1	0-20
Thallium	mg/L	0.0001	<0.0001	105	80-120	93	70-130	-	0-20
Uranium	mg/L	0.001	<0.001	100	80-120	97	70-130	-	0-20
Vanadium	mg/L	0.001	<0.001	100	80-120	95	70-130	-	0-20
Zinc	mg/L	0.01	<0.01	90	80-120	-	70-130	-	0-20
Associated Samples : 7606707								Prep Date: 2024-04-09 Analysis Date: 2024-04-10	
Metals Scan (Water, ICP/OES)									
<i>Method : Metals (Water, ICP/OES). Internal method: OTT-I-MET-WI48491.</i>									
Calcium	mg/L	1	<1	102	86-115	98	70-130	1	0-20
Magnesium	mg/L	1	<1	100	91-109	100	70-130	0	0-20
Potassium	mg/L	1	<1	102	87-113	97	70-130	-	0-20
Sodium	mg/L	1	<1	99	85-115	96	70-130	1	0-20
Associated Samples : 7606707								Prep Date: 2024-04-09 Analysis Date: 2024-04-05	
Nitrate (Water, IC)									
<i>Method : Anions (Water, Ion Chromatography). Internal method: OTT-I-IC-WI45985.</i>									
Nitrate (as Nitrogen)	mg/L	0.1	<0.1	106	80-120	107	80-120	-	0-20
Associated Samples : 7606707								Prep Date: 2024-04-10 Analysis Date: 2024-04-11	
Nitrite (Water, IC)									
<i>Method : Anions (Water, Ion Chromatography). Internal method: OTT-I-IC-WI45985.</i>									
Nitrite (as Nitrogen)	mg/L	0.1	<0.1	106	80-120	98	80-120	-	0-20
Associated Samples : 7606707								Prep Date: 2024-04-10 Analysis Date: 2024-04-11	
pH (25°C) (Water, Automated)									
<i>Method : pH (Water, Automated Meter). Internal method: OTT-I-AT-WI45398.</i>									
pH @ 25°C		1	6.03	100	97-103				
Associated Samples : 7606707								Prep Date: 2024-04-09 Analysis Date: 2024-04-10	

OFFICIAL CERTIFICATE OF ANALYSIS - QUALITY CONTROL

Client : Paterson Group
Project : PH4674

Reception Date: 2024-04-05

Parameter	Unit	RL	Blank	QC		Matrix Spike		Duplicate	
				Recovery %	Range %	Recovery %	Range %	RPD %	Range %
Phenols (Water, Colorimetry)									
<i>Method : Phenols (Water, Colorimetry). Internal method: OTT-I-4AAP-WI46150.</i>									
Phenols-4AAP	mg/L	0.001	<0.001	91	75-125	105	70-130	-	0-20
Associated Samples : 7606707								Prep Date: 2024-04-09 Analysis Date: 2024-04-09	
Sulphate (Water, IC)									
<i>Method : Anions (Water, Ion Chromatography). Internal method: OTT-I-IC-WI45985.</i>									
Sulphate	mg/L	1	<1	105	90-110	99	80-120	-	0-20
Associated Samples : 7606707								Prep Date: 2024-04-10 Analysis Date: 2024-04-11	
Sulphide (Water, Colorimetry)									
<i>Method : Sulphide, S2- (Water, Colorimetry). Internal method: OTT-I-SPEC-WI45931.</i>									
Sulphide (S2-)	mg/L	0.01	<0.01	108	80-120			-	0-20
Associated Samples : 7606707								Prep Date: 2024-04-08 Analysis Date: 2024-04-09	
Tannin and Lignin (Water, Spec)									
<i>Method : Tannin and Lignin (Water, Spec), Internal method: OTT-I-SPEC-WI57693.</i>									
Tannin and Lignin	mg/L	0.1	<0.1	98	80-120			-	0-20
Associated Samples : 7606707								Prep Date: 2024-04-11 Analysis Date: 2024-04-11	
Total Coliforms (DC Plate)									
<i>Method : Total Coliforms and E.Coli by MF (Water, DC plate). Internal method: OTT-M-BAC-WI45296.</i>									
Total Coliforms (DC)	CFU/100mL	0	0					-	0-30
Associated Samples : 7606707								Prep Date: 2024-04-05 Analysis Date: 2024-04-06	
Total Kjeldahl Nitrogen (Water, Colorimetry)									
<i>Method : TKN (Water, colorimetry). Internal method: OTT-I-NUT-WI46201.</i>									
Total Kjeldahl Nitrogen	mg/L	0.1	<0.100	103	70-130	106	70-130	-	0-20
Associated Samples : 7606707								Prep Date: 2024-04-09 Analysis Date: 2024-04-10	
Turbidity (Water, Turbidimeter)									
<i>Method : Turbidity (Water, Turbidimeter). Internal method: OTT-I-TUR-WI46288.</i>									
Turbidity	NTU	0.1	<0.1	99	80-120			3	0-30
Associated Samples : 7606707								Prep Date: 2024-04-06 Analysis Date: 2024-04-06	

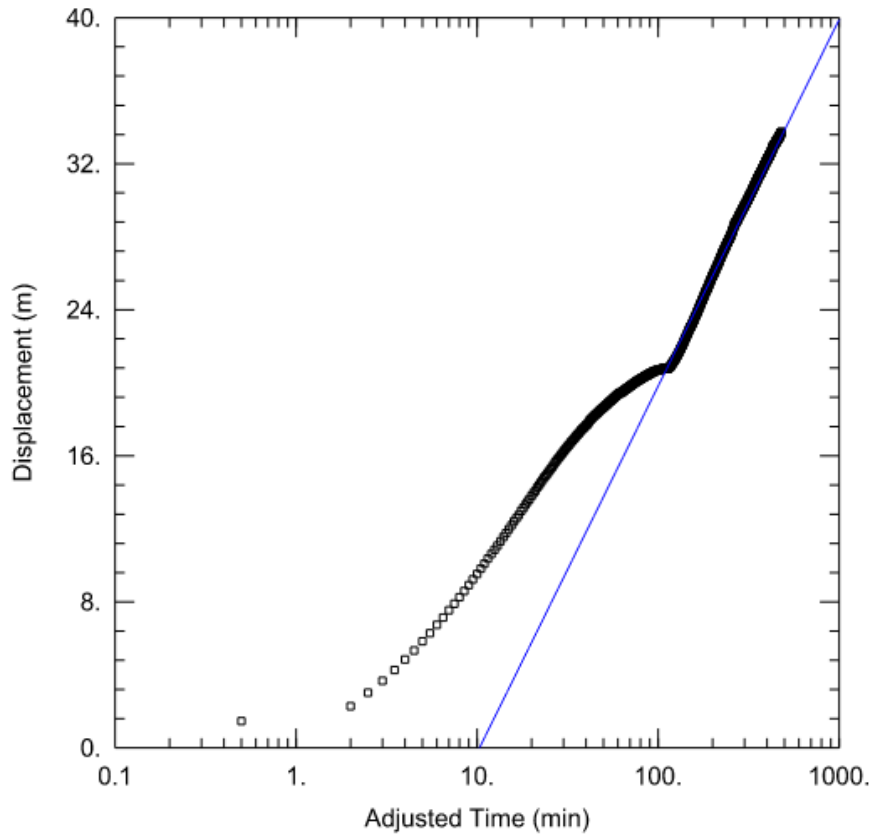
Where RPD % is reported as "-" the calculation is not available because one or both of the duplicates is within 5 times the RL.

MW1 inputs			
pH	8.1	A	0.17
TDS	547	B	2.43
Calcium	47	C	1.27
Alkalinity	393	D	2.59
Temp.	7.8		
		pHs =	8.034338327

Langelier Saturation Index (LSI) Calculation		(Langelier, 1936)
LSI = pH - pHs	A = (Log10 [TDS] - 1) / 10	
pHs = (9.3 + A + B) - (C + D)	B = -13.12 x Log10 (oC + 273) + 34.55	
Where:	C = Log10 [Ca2+ as CaCO3] - 0.4	
	D = Log10 [alkalinity as CaCO3]	
		LSI = 0.1
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 non-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).	

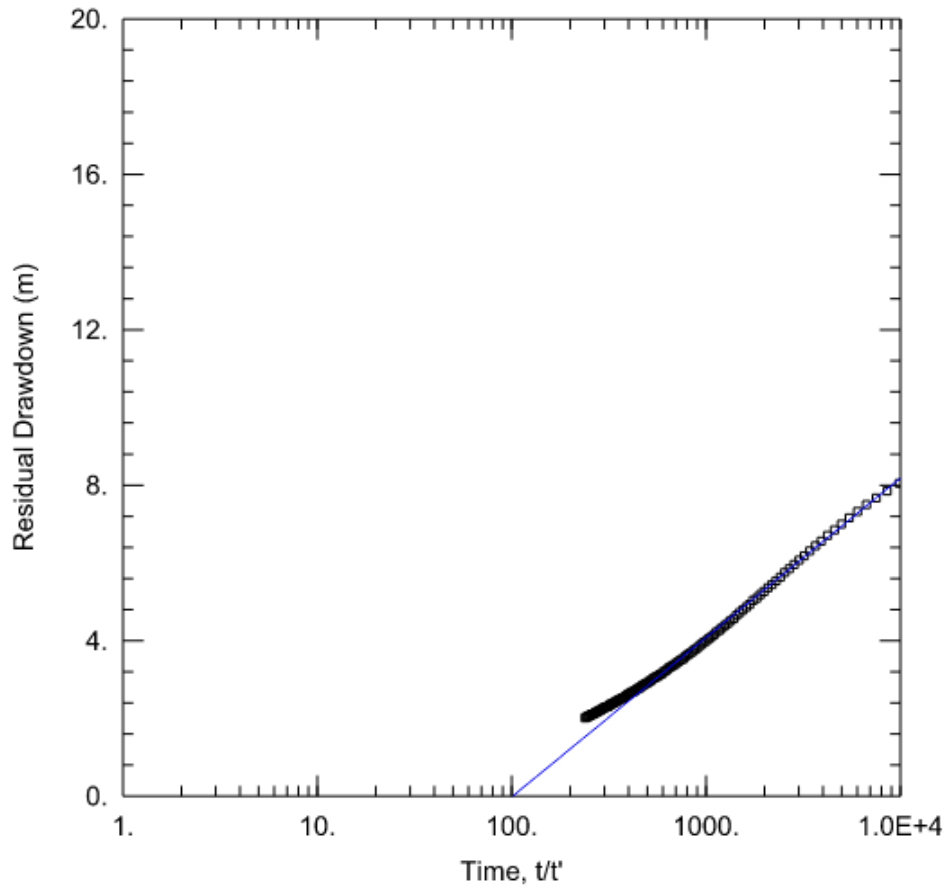
Pumping Test Analysis Report

File No.	PH4674	Well ID:	TW1
Date:	January 18, 2024	Solution Method:	Cooper-Jacob
Client:	Olu Austin Ayeni	Transmissivity (m ² /day):	0.5
Site Address:	912 David Manchester, Carp	Discharge Rate (L/min)	36
Project:	Proposed Institutional Development	Analysis performed by:	EA



Pumping Test Analysis Report

File No.	PH4674	Well ID:	TW1
Date:	January 18, 2024	Solution Method:	Theis Recovery
Client:	Olu Austin Ayeni	Transmissivity (m ² /day):	0.8
Site Address:	912 David Manchester, Carp	Discharge Rate (L/min)	0
Project:	Proposed Institutional Development	Analysis performed by:	EA



Pumping Test Analysis Report

File No. PH4674
Date: January 18, 2024
Client: Olu Austin Ayeni
Site Address: 912 David Manchester, Carp
Project: Proposed Institutional Development

Summary Table:		
Solution Method:	Well ID:	Transmissivity (m ² /day):
Cooper-Jacob	TW1	0.5
Theis Recovery	TW1	0.8
Average:	TW1	0.65