

March 7, 2025

PH4720-LET.02

Brunstad Christian Church Ottawa
1981 Century Road
North Gower (Ottawa), Ontario
K1G 6C9

Attention: **Peter Twilley**

Subject: **Hydrogeological Assessment and Terrain Analysis**
Proposed Church Building Addition
1981 Century Road, North Gower (Ottawa), Ontario

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Introduction

Further to your request, Paterson Group (Paterson) has conducted a Hydrogeological Assessment and Terrain Analysis in support of a Site Plan Control Application for the proposed building addition to the existing church located at 1981 Century Road in Ottawa (North Gower), Ontario. Please refer to the Key Plan (attached) for the approximate site location. The subject site refers to the parcel at 1981 Century Road in Ottawa.

The purpose of this work has been to determine the suitability of the water supply aquifer underlying the site and to carry out a septic system impact assessment (Terrain Analysis) to determine the site's suitability for private on-site sewage systems. Specifically, the intent of the report is to determine the quality and quantity of water underlying the subject site, as well as to assess the subject sites ability to support the proposed sewage volumes from a nitrate attenuation standpoint.

The proposed Site Plan application is for a building addition. Details of the proposed building addition can be found in the attached drawing S.J Lawrence Architect Incorporated Drawing A1.0 "Proposed Site Plan" last revised on December 5, 2024.

The Subject Site consists of a 3.64 hectares (ha) lot and is currently occupied by the existing church with associated private infrastructure. The ground surface is generally flat. The general groundwater flow is anticipated to be in a northwestern direction towards a mapped watercourse which runs parallel with the northern and eastern property boundaries.



The Subject Site is bordered to the north, east and west by either agricultural or undeveloped land. Century road is located along the southern property boundary followed by agricultural lands.

HYDROGEOLOGICAL ASSESSMENT

The purpose of this work has been to determine the suitability of the water supply aquifer underlying the site to support the Site Plan Application for a proposed building addition. The purpose of this study has been to determine the suitability of the water supply aquifer system underlying the site to adequately supply the proposed development for potable supply usage. Specifically, the intent of this report is to review the availability of a safe and reliable water supply having sufficient quantity and quality to provide potable water for the proposed development.

Hydrogeological Pre-consultation

A Hydrogeological Pre-consultation was completed with a City of Ottawa Hydrogeologist on June 14, 2023. The City Hydrogeologist noted that the use of a NSF or BNQ verified sewage system with nitrate reduction for septic treatment was acceptable to support the Site Plan application.

DESCRIPTION OF SUBJECT SITE

The subject site is an approximately 3.64 ha lot and is currently occupied by a one-storey commercial building; Brunstad Christian Church Ottawa. The Site Plan application is for a proposed building addition. Please refer to Figure-1 Key Plan and the attached drawing S.J Lawrence Architect Incorporated Drawing A1.0 "Proposed Site Plan" last revised on December 5, 2024, for the proposed site location and site layout.

The subject site is currently serviced by an onsite sewage system and a private drilled well. A new sewage system is proposed to be located in the same location as the old sewage system. A new sewage system has been proposed due to the increase in sewage system flows associated with the proposed building addition. An approved Ottawa Septic System Office (OSSO) Sewage System Installation Permit was obtained for a total daily design sanitary sewage flow (TDDSSF) of 6,040 L/day. The approved OSSO Sewage System Installation Permit will be submitted along with the Site Plan application package.

The existing well, hereafter referred to as Test Well 1 (TW1) is the well which is currently servicing the existing building and will continue to service the building following the completion of the proposed addition.

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



MISSISSIPPI-RIDEAU SOURCE PROTECTION PLAN

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 is not mapped to be within any of the four groundwater related vulnerable areas identified within the Clean Water Act (2006). The four vulnerable areas consist of Significant Groundwater Recharge Area (SGRA), Highly Vulnerable Aquifer (HVA), Intake Protection Zone (IPZ) and Wellhead Protection Area (WHPA). Therefore, there are no related requirements for an HVA, IPZ, SGRA or WPA at this location.

FIELDWORK PROGRAM

Well Inspection

A visual inspection of TW1 was performed by Paterson personnel. The well casing and cap were observed to be in good condition. The grading around the well was noted to be sufficiently graded to direct surface water away from the wellhead, as required by O.Reg 903. The stickup was measured to be 0.67 m above ground surface. Based on a visual inspection by Paterson personnel, the well was deemed to be in good condition.

Well Testing

As a means to demonstrate the adequacy of the aquifer underlying the subject lands, with respect to water quality and quantity, the existing drilled well (TW1) on the subject site was tested. TW1 has a Water Well Record (WWR) Well ID of A207617. TW1 has a 152.4 mm diameter steel casing that extends to 24.4 m below ground surface (bgs) with a 0.67 m stick up. The well itself extends to a depth of 57 m bgs. According to available geological mapping, the drift thickness at TW1 varies from 5 to 10 m.

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 June 20, 2023 under the full-time supervision of Paterson personnel. Prior to the pumping test the well was disinfected as per the MECP Disinfection Instruction Sheet (attached), and a data-logger was installed to monitor the background groundwater levels.

A submersible pump was provided by Air Rock Drilling for the 8-hour pumping test. A licensed water well technician was retained to complete the necessary plumbing related activities. A discharge hose assembly with a gate valve was connected to the rented pump. The discharge line was placed at a sufficient distance to ensure that the discharge water was directed away from the well. Upon completion of the test, the pump was removed and the well was disinfected by Air Rock Drilling.

The pumping test was carried out at a pumping rate of 80 L/min for a duration of 8 hours. During the pumping test, the pumping rate was periodically measured using the timed volume correlation method. The pumping rate was maintained within 5% of the selected



pump 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 test. The selected rate of 80 L/min provides approximately 6.3 times the maximum total daily design volume for the septic system during the 8-hour pumping test. The rate was determined to be representative of a flow rate which would be in excess of what the proposed development would require.

The data logger recorded water levels at 30 second intervals. In addition, manual water level readings were taken at periodic intervals during the test.

Recovery data was collected from the well following the completion of the pumping. The well was measured to have achieved 71% recovery within 60 minutes after the end of pumping. After 60 minutes of recovery had passed, the pump was reconfigured back to its original condition by Air Rock personnel. The water level was measured to have achieved 95% recovery approximately 1 hour and 50 min after the end of the pumping test.

Groundwater samples were collected at 4 hours and 8 hours after the start of pumping. Prior to collection of the groundwater samples, the free chlorine residual was verified as non-detectable. The water samples were submitted for comprehensive testing of bacteriological, chemical, and physical water quality parameters consistent with the standard "Subdivision Supply" suite of parameters plus trace metals, and Volatile Organic Compounds (VOC's).

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 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 test. The parameters tested at the well head included: pH, total dissolved solids, conductivity, turbidity, apparent colour, and temperature.

Aquifer Analysis

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.



Table 1: SUMMARY OF WATER SUPPLY AQUIFER CHARACTERISTICS OF TW1	
AQUIFER PARAMETER	RESULT OF ANALYSIS
Transmissivity (m ² /day)	367.1
Pumping Rate (L/min)	80
Pre-test Static Water Level (m)	2.5
Post-test Static Water Level (m)	2.8
Available Drawdown (m)	54.5
% Drawdown During Pump Test (%)	0.55
Specific Capacity (L/min/m drawdown)	145

The drawdown data was analyzed using the Theis and Cooper Jacob methods of analysis. Aquifer transmissivity is estimated to be 367.1 m²/day. Refer to the Theis and Cooper Jacob methods of analysis data sheets attached to this report.

The pumping test results show that TW1 has a high yield to support the water demands that may be required. Overall maximum drawdown at a constant pumping rate for a period of 8 hours was approximately 0.3 m (0.55% of the available drawdown). It should be noted that 95% recovery was measured at approximately 1 hour and 50 min after the end of the pumping test.

The total volume of water pumped during the 8-hour pumping event was approximately 38,400 L. This is approximately 6.3 times the maximum total daily design volume of water required (6,040 L/day) to support the Site Plan Control Application.

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

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

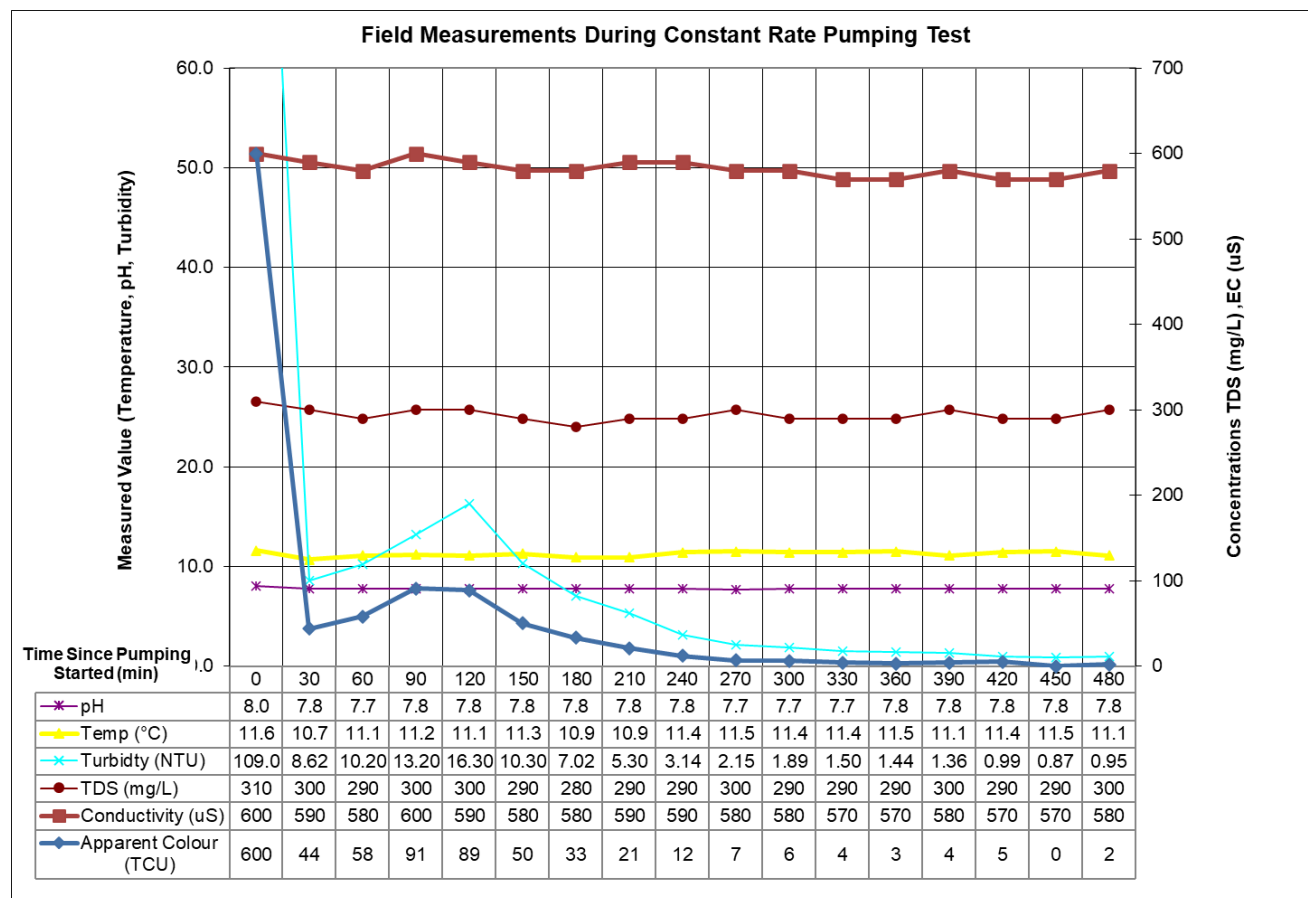
Given the analyses presented and summarized above, it is our opinion that there is an adequate supply of water to support the proposed Site Plan Control application. Available water well records (WWR) of the neighboring properties on the MECP Well Record mapping website indicated that the wells were screened in limestone and sandstone. Surrounding WWR's are attached to this report.



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.



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, 2b, and 2c below and the laboratory analyses reports can be found attached to this report. VOC laboratory analytical testing were completed and measured to be non-detect in the sample results. All laboratory test results can be found attached to this report.



TABLE 2a: GROUNDWATER MICROBIOLOGY & GENERAL GEOCHEMISTRY

PARAMETER	UNITS	ODWS		TW1	
		LIMIT	TYPE	GW1 (4 hr)	GW2 (8 hr)
				6/20/2023	6/20/2023
MICROBIOLOGICAL					
Escherichia Coli (E.Coli)	ct/100mL	0	MAC	0	0
Total Coliforms	ct/100mL	0	MAC	0	0
GENERAL CHEMICAL - HEALTH RELATED					
Fluoride (F)	mg/L	1.5	MAC	0.36	0.35
Ammonia (N-NH ₃)	mg/L	-	-	0.06	0.06
Nitrite (N-NO ₂)	mg/L	1	MAC	<0.10	<0.10
Nitrate (N-NO ₃)	mg/L	10	MAC	<0.10	<0.10
Total Kjeldahl Nitrogen	mg/L	-	-	0.15	0.12
Turbidity (Field)	NTU	1.0 (5.0)	MAC/AO	3.14	0.95
Turbidity (Laboratory)	NTU	1.0 (5.0)	MAC/AO	2.1	1.3
GENERAL CHEMICAL - AESTHETIC RELATED					
Alkalinity (as CaCO3)	mg/L	30-500	OG	179	179
Chloride (Cl)	mg/L	250	AO	65	65
Colour (Apparent)	TCU	5	AO	17	15
Colour (Field - Apparent)	TCU	5	AO	12	2
Conductivity	uS/cm	-	-	563	558
Dissolved Organic Carbon	mg/L	5	AO	2.30	2.10
Hardness (as CaCO3)	mg/L	100	OG	243	243
Ion Balance	unitless	-	-	0.96	0.96
pH	unitless	6.5-8.5	AO	7.82	7.85
Phenols	mg/L	-	-	<0.001	<0.001
Sulphate (SO ₄)	mg/L	500	AO	34	33
Sulphide (S ₂ ⁻)	mg/L	0.05	AO	<0.02	<0.02
Tannin & Lignin	mg/L	-	-	<0.5	<0.5
Total Dissolved Solids	mg/L	500	AO	366	363

1. ODWS identifies the following types of parameters:

MAC = Maximum Allowable Concentration

AO = Aesthetic Objective

OG = Operational Guideline

2. Shaded Concentration Indicates an Exceedance of the ODWS Objective



TABLE 2b: GROUNDWATER GEOCHEMISTRY - METALS

PARAMETER	UNITS	ODWS		TW1	
		LIMIT	TYPE	GW1 (4 hr)	GW2 (8 hr)
				6/20/2023	6/20/2023
Volatiles					
Aluminum (Al)	mg/L	0.1	OG	<0.01	<0.01
Antimony (Sb)	mg/L	0.006	IMAC	<0.0005	<0.0005
Arsenic (As)	mg/L	0.01	IMAC	<0.001	<0.001
Barium (Ba)	mg/L	1.0	MAC	0.18	0.18
Beryllium (Be)	mg/L	-	-	<0.0005	<0.0005
Boron (B)	mg/L	5.0	IMAC	0.05	0.05
Cadmium (Cd)	mg/L	0.005	MAC	<0.0001	<0.0001
Calcium (Ca)	mg/L	-	-	61	61
Chromium (Cr)	mg/L	0.05	MAC	<0.001	<0.001
Cobalt (Co)	mg/L	-	-	<0.0002	<0.0002
Copper (Cu)	mg/L	1.0	AO	0.004	0.003
Iron (Fe)	mg/L	0.3	AO	0.38	0.29
Lead (Pb)	mg/L	0.01	MAC	<0.001	<0.001
Magnesium (Mg)	mg/L	-	-	22	22
Manganese (Mn)	mg/L	0.05	AO	<0.01	<0.01
Mercury (Hg)	mg/L	0.001	MAC	<0.0001	<0.0001
Molybdenum (Mo)	mg/L	-	-	<0.005	<0.005
Nickle (Ni)	mg/L	-	-	<0.005	<0.005
Potassium (K)	mg/L	-	-	3	3
Selenium (Se)	mg/L	0.05	MAC	<0.001	<0.001
Silver (Ag)	mg/L	-	-	<0.0001	<0.0001
Sodium (Na)	mg/L	200	AO	22	21
Strontium (Sr)	mg/L	-	-	0.695	0.695
Thallium (Tl)	mg/L	-	-	<0.0001	<0.0001
Uranium (U)	mg/L	0.02	MAC	<0.001	<0.001
Vanadium (V)	mg/L	-	-	<0.001	<0.001
Zinc (Zn)	mg/L	5.0	AO	<0.01	<0.01

1. 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	GW1 (4 hr)	GW2 (8 hr)
				6/20/2023	6/20/2023
VOCs Surrogates					
1,2-dichloroethane-d4	%	-	-	119	121
4-bromofluorobenzene	%	-	-	94	93
Toluene-d8	%	-	-	99	99
Volatiles					
1,1,1,2-tetrachloroethane	µg/L	-	-	<0.5	<0.5
1,1,1-trichloroethane	µg/L	-	-	<0.4	<0.4
1,1,2,2-tetrachloroethane	µg/L	-	-	<0.5	<0.5
1,1,2-trichloroethane	µg/L	-	-	<0.4	<0.4
1,1-dichloroethane	µg/L	-	-	<0.4	<0.4
1,1-dichloroethylene	µg/L	14.0	MAC	<0.5	<0.5
1,2-dichlorobenzene	µg/L	200.0	MAC	<0.4	<0.4
1,2-dichloroethane	µg/L	5.0	IMAC	<0.2	<0.2
1,2-dichloropropane	µg/L	-	-	<0.5	<0.5
1,3,5-trimethylbenzene	µg/L	-	-	<0.3	<0.3
1,3-dichlorobenzene	µg/L	-	-	<0.4	<0.4
1,3-Dichloropropylene (cis+trans)	µg/L	-	-	<0.3	<0.3
1,4-dichlorobenzene	µg/L	5.0	MAC	<0.4	<0.4
Acetone	µg/L	-	-	<5	<5
Benzene	µg/L	1.0	MAC	<0.5	<0.5
Bromodichloromethane	µg/L	-	-	<0.3	<0.3
Bromoform	µg/L	-	-	<0.4	<0.4
Bromomethane	µg/L	-	-	<0.5	<0.5
c-1,2-Dichloroethylene	µg/L	-	-	<0.4	<0.4
c-1,3-Dichloropropylene	µg/L	-	-	<0.2	<0.2
Carbon Tetrachloride	µg/L	2.0	MAC	<0.2	<0.2
Chloroethane	µg/L	-	-	<0.2	<0.2
Chloroform	µg/L	-	-	<0.5	<0.5
Dibromochloromethane	µg/L	-	-	<0.3	<0.3
Dichlorodifluoromethane	µg/L	-	-	<0.5	<0.5
Dichloromethane	µg/L	50	MAC	<4.0	<4.0
Ethylbenzene	µg/L	140	MAC	<0.5	<0.5
Ethylene Dibromide	µg/L	-	-	<0.2	<0.2
Hexane	µg/L	-	-	<5	<5
m/p-xylene	µg/L	-	-	<0.4	<0.4
Methyl Ethyl Ketone (MEK)	µg/L	-	-	<2	<2
Methyl Isobutyl Ketone (MIBK)	µg/L	-	-	<5	<5
Methyl Tert Butyl Ether (MTBE)	µg/L	15	AO	<2	<2
Monochlorobenzene	µg/L	80	MAC	<0.5	<0.5
o-xylene	µg/L	-	-	<0.4	<0.4
Styrene	µg/L	-	-	<0.5	<0.5
t-1,2-Dichloroethylene	µg/L	-	-	<0.4	<0.4
t-1,3-Dichloropropylene	µg/L	-	-	<0.2	<0.2
Tetrachloroethylene	µg/L	10	MAC	<0.3	<0.3
Toluene	µg/L	60	MAC	<0.4	<0.4
Trichloroethylene	µg/L	5	MAC	<0.3	<0.3
Trichlorofluoromethane	µg/L	-	-	<0.5	<0.5
Vinyl Chloride	µg/L	1	MAC	<0.2	<0.2
Xylene; total	µg/L	90	MAC	<0.5	<0.5

- ODWS identifies the following types of parameters:
 - MAC = Maximum Acceptable Concentration
 - IMAC = Interim Maximum Acceptable Concentration
 - AO = Aesthetic Objective
 - OG = Operational Guideline



The bacteriological test results (Certificate of Analysis – Report No. 1998379) 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.

❑ Hardness (as CaCO_3)

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.

Hardness as CaCO_3

Hardness, expressed as calcium carbonate, is an operation 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 concentration of 243 mg/L, the water is considered to be 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 0.3. 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 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".

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 be 0.38 and 0.29 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 an iron 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 owner, however, continued pumping demonstrated a decrease in the iron concentration to below the aesthetic objective during the pumping test.

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. 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 for colour as 7 TCU. As colour is a strictly aesthetic parameter, a manganese greensand filter or a carbon filter can be used to reduced manganese from the water supply, if desired by the owner.

During the field pumping test, a DR900 colorimeter was used to measure apparent colour in the groundwater at regular intervals. Apparent colour in the groundwater was measured as 2 TCU at the end of the pumping test, which is below the aesthetic guidelines of 15 TCU. The elevated apparent colour levels detected in the lab samples is attributed to the precipitation of iron out of the groundwater.

Turbidity

Turbidity, which is generally an aesthetic parameter, was detected in the laboratory test samples at values of 2.1 and 1.3 NTU in the 4 and 8 hours tests, respectively. Field testing detected the samples at values of 3.14 and 0.95 NTU in the 4 and 8 hour field tests, respectively. Continued pumping 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.

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 Aesthetic Objective for turbidity in drinking water reaching the consumer is 5 NTU. The field test parameters are below the 1 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 at the 4 and 8 hour interval were non-detect (0 ct/100 mL) for E.Coli and Total Coliforms.



Sodium

Sodium (Na), an aesthetic parameter, was detected in the laboratory test sample at concentrations of 22 and 21 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.

TERRAIN ANALYSIS

The purpose of this study has been to carry out a Septic System Impact Analysis (Terrain Analysis) to determine the site's suitability for private on-site wastewater systems. Specifically, the intent of this report is to provide design details for private septic servicing and lot development potential.

Surficial Geology

Paterson carried out a Geotechnical Investigation on July 17, 2023 as part the Geotechnical Assessment with report number PG6727-1 dated September 5, 2023. Four (4) boreholes were installed in a manner to provide general coverage of the subject site, with specific consideration to the redevelopment. The general overburden was observed to be a thin layer of topsoil followed by fill and/or clayey silt or silty clay. Fill, consisting of brown silty sand, was encountered in BH1-23, to a maximum depth of 0.69 m bgs. Clayey Silt and silty clay with trace to some sand were both encountered underlying the fill layer. Various combinations of silt, clay and sand were encountered in all boreholes overlying a glacial till layer of a silty sand to sandy silt with gravel, cobbles and boulders which extended to the maximum depth of the boreholes. Practical refusal to augering was not encountered in any boreholes and DCPT refusal was observed in BH4-23 at a depth of 10.7 m bgs. The results of the geotechnical program are generally consistent with available geological mapping provided by the Ontario Geological Survey (OGS MRD128) and with the available historical surrounding Water Well Records (WWR). Further details can be found in Geotechnical Investigation report PG6727-1 dated September 5, 2023.

Available surficial geological mapping provided by the Ontario Geological Survey (OGS MRD128) is generally consistent with the available historical surrounding Water Well Records (WWR). The mapping indicates that a fine-textured glaciomarine deposit consisting of a silt and clay deposit with minor sand and gravel exists over the majority of the subject site. The eastern portion of the site is mapped to consist of a till with stone-poor, sandy-silt to silty sand with sand textured till. The surrounding WWR's indicate clay, sand and gravel with some boulders in the overburden layer.

Available bedrock geological mapping provided by the Ontario Geological Survey (MRD 219) indicates that the bedrock underlying the subject site consists of dolostone,



minor shale and sandstone of the Oxford Formation in the Beekmantown Group. Available overburden thickness mapping shows a drift thickness of 5 to 10 m across the subject site.

Karst Mapping

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

Hydrogeological Sensitivity of the Site

The subject site currently consists of an existing church building with associated infrastructure and private servicing (potable well and septic system). The subject site is currently occupied by a one-story commercial building, specifically the Brunstad Christian Church. The subject site is bordered to the north, east and west by either agricultural or undeveloped land and to the south by Century Road followed by agricultural land and a residential dwelling. All surrounding properties are on private services.

According to the geotechnical field investigation, the overburden thickness was observed to be greater than 2 m. As the proposed site does not have bedrock within 2 m of the ground surface, the site is not considered hydrogeologically sensitive. Separation distances are not required to be increased between the septic components and the onsite well.

To corroborate our position in this matter, the water quality of the bedrock aquifer targeted by the onsite drilled potable supply well shows no indication of surface water or surface impacts from sewage system effluent.

Total Daily Design Sanitary Sewage Flow (TDDSSF)

An approved Ottawa Septic System Office (OSSO) Sewage System Installation Permit (SSIP) will be submitted as part of the Site Plan control application submission. The approved OSSO SSIP is for a Total Daily Design Sanitary Sewage Flow (TDDSSF) of 6,040 L/day. Please refer to the approved OSSO SSIP for additional details.

Predictive Nitrate Impact Assessment

In order to demonstrate that private services would adequately support the proposed Site Plan application, a Predictive Nitrate Impact Assessment (NIA) for the subject site was completed. The values shown in the Predictive NIA attached to this report are summarized below.

☐ Site area	3.64 ha
☐ Impervious area (%)	30 %



☐ Daily sewage flow	6.04 m ³ /d
☐ Concentration of nitrate in effluent (Value based on typical effluent concentration)	40 mg/L
☐ Concentration of nitrate in effluent with treatment (Value based on NSF245/BNQ certified nitrate reduction system with 50% nitrate reduction)	20 mg/L
☐ Surplus Water (The surplus water value was estimated based on Environment Canada Climate Office values with a soil type comprised of a silt loam (Urban lawns / Shallow Rooted Crops) and anthropogenic sources.)	341 mm/yr
☐ Combined infiltration factor based on:	0.50
• Topography infiltration factor	0.20
• Soil texture infiltration factor	0.20
• Cover infiltration factor	0.10

The topography infiltration factor of 0.20 is based upon a rolling land with an average slope of 2.8 to 3.8 m/km. The soil texture infiltration factor was based upon an “medium combinations of loam and clay” with a value of 0.2 which is a reasonable generalization based upon the site investigations and available geological mapping. The “cover infiltration factor” was calculated at 0.10 based upon a cultivated land type cover.

The calculation for a conventional septic system results in a predicted nitrate concentration of 13.48 mg/L nitrate for the subject site, using a value of 40 mg/L nitrate concentration within the effluent. This value was based upon a daily sewage flow of 6,040 L/day. It is expected that the actual usage should be lower. The inclusion of nitrate reduction technology (50 % nitrogen reduction in the of the effluent nitrate, BNQ or NSF 245 certified technology) would result in a nitrate concentration of **6.74 mg/L** at the property boundary using a value of 20 mg/L nitrate within the effluent, which is below the maximum property value of 10 mg/L nitrate.

Based on the results of the predictive NIA, it is our opinion that the property can adequately support the proposed Site Plan application without having an adverse impact on the underlying bedrock aquifer, provided that a BNQ/NSF 245 certified nitrate reduction system or similar technology is used in the sewage system.

Ottawa Septic System Office Sewage System Installation Permit

An approved Ottawa Septic System Office (OSSO) Sewage System Installation Permit (SSIP) will be submitted as part of the Site Plan control application submission. The approved OSSO permit needs to include a BNQ 3680-600 or NSF 245 certified technology. Any system that has a BNQ 3680-600 or NSF/ANSI 245 standard certification is capable of a minimum of 50 % nitrogen reduction in the effluent.



The approved OSSO SSIP that has been submitted with the Site Plan control application submission package contains a sewage system which is designed for a TDDSSF of 6,040 L/day. It includes an Eljen GSF denitrification system which is NSF 245 approved.



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 building addition.
2. Based on a visual inspection performed by Paterson personnel, the well casing, stickup, well cap, and surrounding grading are of sufficient standard to meet O.Reg 903.
3. As TW1 currently provides potable water to the existing building, the client is familiar with the quality of the groundwater.
4. The preferred water supply intercepted by TW1 contains a water supply that is potable and contains only elevated concentrations of hardness.
5. A residential grade water softener is recommended to facilitate the reduction of the hardness concentration, if desired by the owner. 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.
6. 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.
7. The site is not considered hydrogeologically sensitive.
8. The predicted nitrate concentrations at the property boundary is calculated to be below the required 10 mg/L threshold when a BNQ/NSF 245 certified technology with 50% nitrate reduction is used.
9. A Sewage System Permit and Building Permit need to be issued prior to the commencement of construction on the proposed warehouse addition or the proposed septic system.
10. The results of the Hydrogeological Assessment and Terrain Analysis have provided satisfactory evidence that the subject site can support the proposed building addition with respect to water quality, quantity and sewage system placement.



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 Calculation
- ☐ AQTESOLV - Pumping Test Analysis Reports
- ☐ Nitrate Impact Assessment Calculations
- ☐ MECP Disinfection Instruction Sheet
- ☐ S.J. Lawrence Architect Incorporated - Proposed Site Plan, dated December 5, 2024



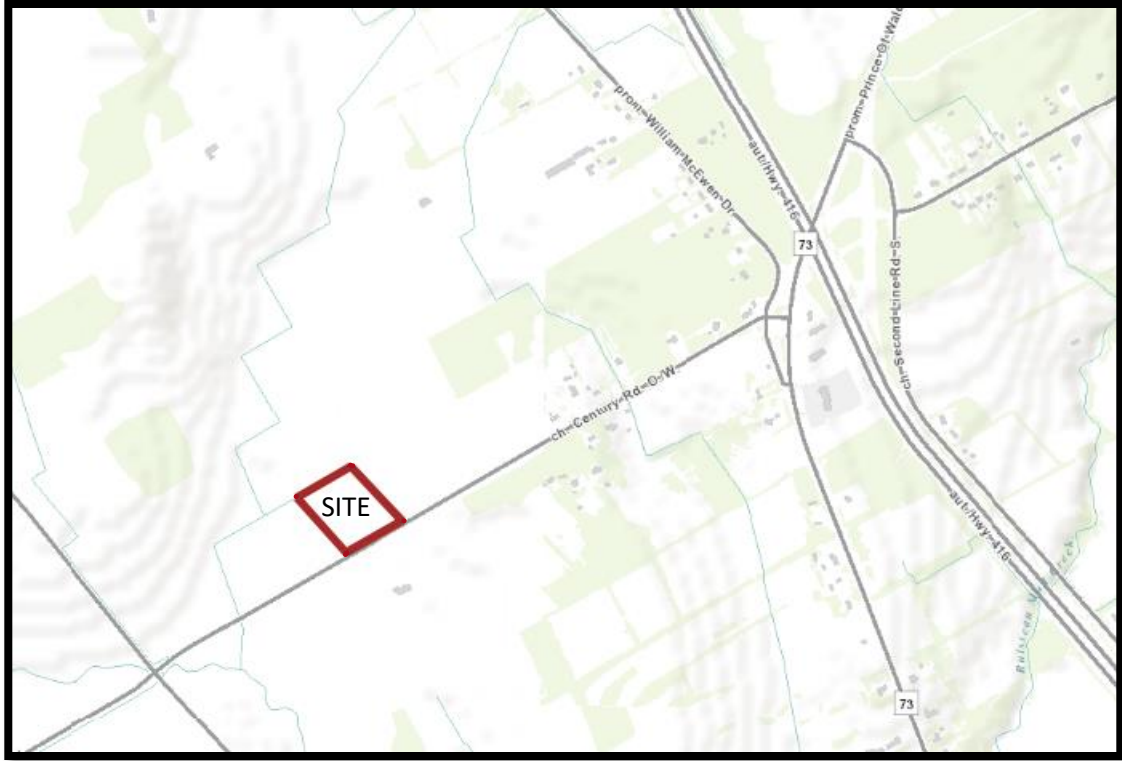


FIGURE 1

KEY PLAN



Measurements recorded in: ☐ Metric ☒ Imperial

A207617

Page _____ of _____

Well Owner's Information

First Name	Last Name / Organization Rideau Christian Fellowship Centre	E-mail Address	☐ Well Constructed by Well Owner
Mailing Address (Street Number/Name) 1981 Century Road West	Municipality North Gower	Province ON	Postal Code K0A 2T0
Telephone No. (inc. area code)			

Well Location

Address of Well Location (Street Number/Name) 1981 Century Road West	Township Rideau	Lot P/L 5	Concession 2
County/District/Municipality Ottawa-Carleton	City/Town/Village North Gower	Province Ontario	Postal Code
UTM Coordinates NAD 83 Zone 18 Easting 441817 Northing 5003968	Municipal Plan and Sublot Number 5R-13075	Other Part 2	

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)
	Sand & Gravel	Boulders		0' 38'
Grey	Limestone			38' 97'
White	Sandstone			97' 179'
White	Sandstone			179' 181'
White	Sandstone			181' 187'

Annular Space			
Depth Set at (m)	Type of Sealant Used (Material and Type)	Volume Placed (m³)	
80' 70'	Neat cement	10.9	
70' 0'	Bentonite slurry	50.4	

Method of Construction		Well Use	
☐ Cable Tool	☐ Diamond	☐ Public	☐ Commercial
☐ Rotary (Conventional)	☐ Jetting	☒ Domestic	☐ Municipal
☐ Rotary (Reverse)	☐ Driving	☐ Livestock	☐ Test Hole
☐ Boring	☐ Digging	☐ Irrigation	☐ Cooling & Air Conditioning
☒ Air percussion		☐ Industrial	
☐ Other, specify		☐ Other, specify	

Construction Record - Casing				Status of Well	
Inside Diameter (cm)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm)	Depth (m)		
6 1/4"	Steel	1.88"	+2' 80'	☒ Water Supply	
6 1/8"	Open Hole		80' 187'	☐ Replacement Well	
				☐ Test Hole	
				☐ Recharge Well	
				☐ Dewatering Well	
				☐ Observation and/or Monitoring Hole	
				☐ Alteration (Construction)	
				☐ Abandoned, Insufficient Supply	
				☐ Abandoned, Poor Water Quality	
				☐ Abandoned, other, specify	
				☐ Other, specify	

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

Water Details		Hole Diameter	
Water found at Depth	Kind of Water: ☐ Fresh ☒ Untested	Depth (m)	Diameter (cm)
179 (m)	☐ Gas ☒ Other, specify	From To	
181 (m)	☐ Gas ☒ Other, specify	0' 80' 9 3/4"	
	☐ Gas ☐ Other, specify	80' 187' 6 1/8"	
	☐ Gas ☐ Other, specify		

Business Name of Well Contractor Air Rock Drilling Co. Ltd.		Well Contractor's Licence No. 1119
Business Address (Street Number/Name) 6658 Franktown Road, RR#1		Municipality Richmond
Province ON	Postal Code K0A 2Z0	Business E-mail Address air-rock@sympatico.ca
Bus. Telephone No. (inc. area code) 613-382170	Name of Well Technician (Last Name, First Name) Hanna, Jeremy	
Well Technician's Licence No. 13632	Signature of Technician and/or Contractor 	Date Submitted 2017 04 28

Results of Well Yield Testing				
After test of well yield, water was: ☐ Clear and sand free ☐ Other, specify Not tested	Draw Down		Recovery	
	Time (min)	Water Level (m/ft)	Time (min)	Water Level (m/ft)
If pumping discontinued, give reason: X	Static Level	5.7"		6.4"
Pump intake set at (m/ft) 180	1	6.2	1	5.7
	2	6.2	2	5.7
Pumping rate (l/min GPM) 20	3	6.2	3	5.7
	4	6.2	4	5.7
Duration of pumping hrs + min	5	6.3	5	5.7
	10	6.3	10	5.7
Final water level end of pumping (m/ft) 6.4"	15	6.3	15	5.7
	20	6.4	20	5.7
If flowing give rate (l/min / GPM) X	25	6.4	25	5.7
	30	6.4	30	5.7
Recommended pump depth (m/ft) 100'	40	6.4	40	5.7
	50	6.4	50	5.7
Recommended pump rate (l/min / GPM) 20	60	6.4	60	5.7
Well production (l/min / GPM) 20				
Disinfected? ☒ Yes ☐ No				

Map of Well Location

Please provide a map below following instructions on the back.

Comments: 3/4 HP - 15 GPM SET @ 100 FT	Well owner's information package delivered ☒ Yes ☐ No	Date Package Delivered 2017 04 24	Ministry Use Only Audit No. 2237336 JUN 07 2017
	Date Work Completed 2017 04 19		Received



Ministry
of the
Environment
Ontario

WATER WELL RECORD

1520433

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

11

MUNICIP

CON.

COUNTY OR DISTRICT

TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE

CON., BLOCK, TRACT, SURVEY, ETC.

LOT 25-27

DATE COMPLETED

DAY 28 MO 8 YR 85

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET	
				FROM	TO
	clay			0	15
	gravel			15	24
grey	Limestone			24	97
	Sandstone			97	140

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER			
10-13	1 ☒ FRESH	3 ☐ SULPHUR	14	
13-18	2 ☐ SALTY	4 ☐ MINERAL	19	
20-23	1 ☐ FRESH	3 ☐ SULPHUR	24	
	2 ☐ SALTY	4 ☐ MINERAL	29	
25-28	1 ☐ FRESH	3 ☐ SULPHUR	29	
	2 ☐ SALTY	4 ☐ MINERAL	34	
30-33	1 ☐ FRESH	3 ☐ SULPHUR	34	
	2 ☐ SALTY	4 ☐ MINERAL	40	

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET	
			FROM	TO
10-11	1 ☒ STEEL	12		13-16
	2 ☐ GALVANIZED			
	3 ☐ CONCRETE			
	4 ☐ OPEN HOLE			
17-18	1 ☐ STEEL	19		20-23
	2 ☐ GALVANIZED			
	3 ☐ CONCRETE			
	4 ☐ OPEN HOLE			
24-25	1 ☐ STEEL	26		27-30
	2 ☐ GALVANIZED			
	3 ☐ CONCRETE			
	4 ☐ OPEN HOLE			

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

61 PLUGGING & SEALING RECORD

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

PUMPING TEST METHOD	PUMPING RATE	DURATION OF PUMPING
1 ☒ PUMP	20 GPM	15-16 HOURS 30 MINS
2 ☐ BAILER		
STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING
12 FEET	50 FEET	15 MINUTES 50 FEET
		30 MINUTES 50 FEET
		45 MINUTES
		60 MINUTES
IF FLOWING, GIVE RATE	PUMP INTAKE SET AT	WATER AT END OF TEST
RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
☐ SHALLOW ☒ DEEP	60 FEET	20 GPM

FINAL STATUS OF WELL	WATER USE	METHOD OF DRILLING
1 ☒ WATER SUPPLY	1 ☒ DOMESTIC	1 ☐ CABLE TOOL
2 ☐ OBSERVATION WELL	2 ☐ STOCK	2 ☒ ROTARY (CONVENTIONAL)
3 ☐ TEST HOLE	3 ☐ IRRIGATION	3 ☐ ROTARY (REVERSE)
4 ☐ RECHARGE WELL	4 ☐ INDUSTRIAL	4 ☐ ROTARY (AIR)
	☐ OTHER	5 ☐ AIR PERCUSSION
		6 ☐ BORING
		7 ☐ DIAMOND
		8 ☐ JETTING
		9 ☐ DRIVING

8668 LOCATION OF WELL

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

Monotich Estates

F. 14

55' 600'

Eastman Avenue

May 13

cap 10 cm from ground level.

CONTRACTOR	NAME OF WELL CONTRACTOR	LICENCE NUMBER
	Git Rock Drilling Ltd	1119
	RR# 2 Jasper, Ont	
	Wallace Desautels	1119
	SIGNATURE OF CONTRACTOR	SUBMISSION DATE
		DAY 10 MO 2 YR 85

OFFICE USE ONLY	DATA SOURCE	CONTRACTOR	DATE RECEIVED
			200286
	DATE OF INSPECTION	INSPECTOR	
	REMARKS		



Ontario

Ministry
of the
Environment

The Ontario Water Resources Act
WATER WELL RECORD

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

11

1526027

MUNICIPALITY 15004

CON. 102

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON. BLOCK, TRACT, SURVEY ETC	LOT
North Gower Ont	Rideau	2	6
DATE COMPLETED		48-53	
DAY 25 MO 10 YR 91			

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)					
GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET	
				FROM	TO
	sand, gravel	boulders		0	27
	limestone			27	100

41 WATER RECORD	51 CASING & OPEN HOLE RECORD	61 PLUGGING & SEALING RECORD																																									
<table><tr><td>WATER FOUND AT - FEET</td><td>KIND OF WATER</td></tr><tr><td>33</td><td>1 ☒ FRESH 3 ☐ SULPHUR</td></tr><tr><td>94</td><td>2 ☐ SALTY 4 ☐ MINERALS</td></tr><tr><td></td><td>6 ☐ GAS</td></tr></table>	WATER FOUND AT - FEET	KIND OF WATER	33	1 ☒ FRESH 3 ☐ SULPHUR	94	2 ☐ SALTY 4 ☐ MINERALS		6 ☐ GAS	<table><tr><td>INSIDE DIA. INCHES</td><td>MATERIAL</td><td>WALL THICKNESS INCHES</td><td>DEPTH - FEET</td></tr><tr><td>6 1/4</td><td>1 ☒ STEEL</td><td>1.88</td><td>0 32</td></tr><tr><td></td><td>2 ☐ GALVANIZED</td><td></td><td></td></tr><tr><td></td><td>3 ☐ CONCRETE</td><td></td><td></td></tr><tr><td></td><td>4 ☐ OPEN HOLE</td><td></td><td></td></tr><tr><td></td><td>5 ☐ PLASTIC</td><td></td><td></td></tr></table>	INSIDE DIA. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET	6 1/4	1 ☒ STEEL	1.88	0 32		2 ☐ GALVANIZED				3 ☐ CONCRETE				4 ☐ OPEN HOLE				5 ☐ PLASTIC			<table><tr><td>SIZE OF OPENING (SLOT NO.)</td><td>DIAMETER</td><td>LENGTH</td></tr><tr><td></td><td>INCHES</td><td>FEET</td></tr><tr><td></td><td></td><td></td></tr></table>	SIZE OF OPENING (SLOT NO.)	DIAMETER	LENGTH		INCHES	FEET			
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	INCHES	FEET																																									

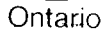
71 PUMPING TEST	PUMPING TEST METHOD	PUMPING RATE	DURATION OF PUMPING
	1 ☒ PUMP 2 ☐ BAILER	40 GPM	1 15-16 HOURS
	STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING
	10 FEET	50 FEET	15 MINUTES 50 FEET 30 MINUTES 50 FEET 45 MINUTES 50 FEET 60 MINUTES 50 FEET
	IF FLOWING GIVE RATE	PUMP INTAKE SET AT	WATER AT END OF TEST
		60 FEET	1 ☒ CLEAR 2 ☐ CLOUDY
	RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
	☐ SHALLOW ☒ DEEP	60 FEET	40 GPM

LOCATION OF WELL
IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE INDICATE NORTH BY ARROW.
102059

FINAL STATUS OF WELL	1 ☒ WATER SUPPLY 2 ☐ OBSERVATION WELL 3 ☐ TEST HOLE 4 ☐ RECHARGE WELL	5 ☐ ABANDONED, INSUFFICIENT SUPPLY 6 ☐ ABANDONED, POOR QUALITY 7 ☐ UNFINISHED 8 ☐ DEWATERING
WATER USE	1 ☒ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL 5 ☐ OTHER	6 ☐ COMMERCIAL 7 ☐ MUNICIPAL 8 ☐ PUBLIC SUPPLY 9 ☐ COOLING OR AIR CONDITIONING 10 ☐ NOT USED
METHOD OF CONSTRUCTION	1 ☐ CABLE TOOL 2 ☒ ROTARY (CONVENTIONAL) 3 ☐ ROTARY (REVERSE) 4 ☐ ROTARY (AIR) 5 ☐ AIR PERCUSSION	6 ☐ BORING 7 ☐ DIAMOND 8 ☐ JETTING 9 ☐ DRIVING 10 ☐ DIGGING 11 ☐ OTHER

CONTRACTOR	NAME OF WELL CONTRACTOR	WELL CONTRACTOR'S LICENCE NUMBER
	Air-Rock Drilling Co Ltd	1119
	ADDRESS	
	RR # 2 Jasper Ont	
	NAME OF WELL TECHNICIAN	WELL TECHNICIAN'S LICENCE NUMBER
	Kenny Desautels	70004
	SIGNATURE OF TECHNICIAN/CONTRACTOR	SUBMISSION DATE
	Kenny Desautels	DAY MO YR

OFFICE USE ONLY	DATE RECEIVED	DATE OF INSPECTION	INSPECTOR
	1119	JAN 30 1992	
	REMARKS		





Print only in spaces provided.
Mark correct box with a checkmark, where applicable.

11

1530048

Municipality 15004 Con. CON 02

County or District	Township/Borough/City/Town/Village	Con block tract survey, etc.	Lot
Ottawa Carleton	Rideau	2	6
Address		Date completed	2 day 7 month 98 year
1890 Century Road North Gower Ontario			
			
			

[illegible]

31

32

41		WATER RECORD				
Water found at – feet		Kind of water				
183	10-13	1	☐ Fresh	3	☐ Sulphur	14
		2	☐ Salty	4	☐ Minerals	
				6	☐ Gas	
	15-18	1	☐ Fresh	3	☐ Sulphur	19
		2	☐ Salty	4	☐ Minerals	
				6	☐ Gas	
	20-23	1	☐ Fresh	3	☐ Sulphur	24
		2	☐ Salty	4	☐ Minerals	
				6	☐ Gas	
	25-28	1	☐ Fresh	3	☐ Sulphur	29
		2	☐ Salty	4	☐ Minerals	
				6	☐ Gas	
	30-33	1	☐ Fresh	3	☐ Sulphur	34
		2	☐ Salty	4	☐ Minerals	
				6	☐ Gas	

51 CASING & OPEN HOLE RECORD					
Inside diam inches	Material	Wall thickness inches	Depth - feet		
			From	To	
6 10-11 1/4	☐ Steel ☒ Galvanized ☐ Concrete ☐ Open hole ☐ Plastic	.188	0	44.5 13-16	
6 17-18	☐ Steel ☐ Galvanized ☐ Concrete ☒ Open hole ☐ Plastic		44.5	190 20-23	
6 24-25	☐ Steel ☐ Galvanized ☐ Concrete ☐ Open hole ☐ Plastic			27-30	

SCREEN	Sizes of opening (Slot No.)	31-33	Diameter	34-38	Length	39-46
			inches		feet	
	Material and type			Depth at top of screen 41-44		
				feet		

61 PLUGGING & SEALING RECORD			
☒ Annular space		☐ Abandonment	
Depth set at - feet		Material and type (Cement grout, bentonite, etc.)	
From	To		
10-13	14-17	Grouted Cement (16)	
43'6"	22-25		
26-29	30-33		
	80		

71	Pumping test method ¹⁰		Pumping rate ¹¹⁻¹⁴		Duration of pumping ¹⁵	
	1 ☒ Pump 2 ☐ Bailer		15 GPM		...1... Hours Mins	
	Static level		Water level end of pumping		25 Water levels during 1 ☐ Pumping 2 ☐ Recovery	
	19-21	22-24	15 minutes ₂₆₋₂₈	30 minutes ₂₉₋₃₁	45 minutes ₃₂₋₃₄	60 minutes ₃₅₋₃₇
	11'1" ₃₈₋₄₁	30 feet	12'1" ₄₂	12'3" ₄₃₋₄₅	12'2" ₄₆₋₄₉	11'11" ₅₀₋₅₃
If flowing give rate		Pump intake set at		Water at end of test		
GPM		feet		☐ Clear ☒ Cloudy		
Recommended pump type		Recommended pump setting		Recommended pump rate		
☐ Shallow ☒ Deep		60 feet		5 GPM		

FINAL STATUS OF WELL 54

1 ☒ Water supply	5 ☐ Abandoned, insufficient supply	9 ☐ Unfinished
2 ☒ Observation well	6 ☐ Abandoned, poor quality	10 ☐ Replacement well
3 ☐ Test hole	7 ☐ Abandoned (Other)	
4 ☐ Recharge well	8 ☐ Dewatering	

WATER USE 55-56

1 ☒ Domestic	5 ☐ Commercial	9 ☐ Not used
2 ☒ Stock	6 ☐ Municipal	10 ☐ Other
3 ☐ Irrigation	7 ☐ Public supply	
4 ☐ Industrial	8 ☐ Cooling & air conditioning	

METHOD OF CONSTRUCTION

1 ☐ Cable tool	5 ☐ Air percussion	9 ☐ Driving
2 ☐ Rotary (conventional)	6 ☒ Boring	10 ☐ Digging
3 ☐ Rotary (reverse)	7 ☐ Diamond	11 ☐ Other
4 ☐ Rotary (air)	8 ☐ Jetting	

LOCATION OF WELL

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

Century Road

31'7"

43'7"

G

#1890

183899

Name of Well Contractor	Well Contractor's Licence No.
Capital Water Supply Ltd.	1558
Address	
P.O. Box 490 Stittsville, Ontario K2S 1A6	
Name of Well Technician	Well Technician's Licence No.
S. Miller	T0097
Signature of Technician/Contractor	Submission date
	day 3 mo 7 yr 98

MINISTRY USE ONLY	Data source	58	Contractor	59-62	Date received	63-68
			1558		JUL 22 1998	
	Date of inspection		Inspector			
	Remarks					
	CSS. S9					



Measurements recorded in: ☒ Metric ☐ Imperial

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

A165087

Tag #: A165087

Well Record

Regulation 903 Ontario Water Resources Act

Page _____ of _____

Address of Well Location (Street Number/Name) 1934 Century Road, West		Township Rideau	Lot	Concession
County/District/Municipality Ottawa Carleton		City/Town/Village North Gower	Province Ontario	Postal Code
UTM Coordinates NAD 83	Zone 18	Easting 442228	Northings 5004016	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	Sandy Soil	Stones	Loose	0	2.74
Grey	Sandy Soil		Packed	2.74	5.48
Grey	Gravel	Broken Rock	Very Wet	5.48	6.40
Grey	Limestone		Hard	6.40	36.57
Grey & White	Sandstone		Hard	36.57	45.10

Annular Space			Results of Well Yield Testing			
Depth Set at (m/ft)	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)	Draw Down		Recovery	
From	To		Time (min)	Water Level (m/ft)	Time (min)	Water Level (m/ft)
7.31	0	Grouted Cement & Bentonite				

Method of Construction	Well Use		
☐ Cable Tool ☒ Rotary (Conventional) ☐ Rotary (Reverse) ☐ Boring ☒ Air percussion ☐ Other, specify _____	☐ Diamond ☐ Jetting ☐ Driving ☐ Digging	☐ Public ☒ Domestic ☐ Livestock ☐ Irrigation ☐ Industrial ☐ Other, specify _____	☐ Commercial ☐ Municipal ☐ Test Hole ☐ Cooling & Air Conditioning ☐ Not used ☐ Dewatering ☐ Monitoring

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)		
			From	To	
27.13			0	7.31	☒ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☐ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☐ Abandoned, other, specify _____ ☐ Other, specify _____
15.86	Steel	.48	+2.43	7.31	

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

Water Details		Hole Diameter	
Water found at Depth 11.58(m/ft) ☐ Gas ☐ Other, specify _____	Kind of Water: ☐ Fresh ☒ Untested	Depth (m/ft)	Diameter (cm/in)
		From	To
Water found at Depth 43.27(m/ft) ☐ Gas ☐ Other, specify _____	Kind of Water: ☐ Fresh ☒ Untested	0	7.31
		7.31	45.10
Water found at Depth (m/ft) ☐ Gas ☐ Other, specify _____	Kind of Water: ☐ Fresh ☐ Untested		15.86
			15.23

Well Contractor and Well Technician Information			
Business Name of Well Contractor Capital Water Supply Ltd.	Well Contractor's Licence No. 1 5 5 8		
Business Address (Street Number/Name) Box 490	Municipality Stittsville		
Province Ontario	Postal Code K 2 S 1 A 6	Business E-mail Address office capitalwater.ca	
Bus. Telephone No. (inc. area code) 6 1 3 8 3 6 1 7 6 6	Name of Well Technician (Last Name, First Name) Miller, Stephen		
Well Technician's Licence No. 0 0 9 7	Signature of Technician and/or Contractor	Date Submitted 2 0 1 6 0 9 2 0	

Map of Well Location			
Please provide a map below following instructions on the back.			
Comments:			

Well owner's information package delivered ☒ Yes ☐ No	Date Package Delivered 2 0 1 6 0 9 1 9 Date Work Completed 2 0 1 6 0 8 0 8	Ministry Use Only Audit No. 2226817 MAY 25 2017 Received	
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Measurements recorded in: ☒ Metric ☐ Imperial

Tag#: A250952

Address of Well Location (Street Number/Name)		Township	Lot	Concession
1978 Century rd west		Rideau		
County/District/Municipality		City/Town/Village	Province	Postal Code
Ottawa - Carleton		North Gower	Ontario	K0A2T0
UTM Coordinates	Zone	Easting	Northings	Municipal Plan and Sublot Number
NAD	83	18441940	5003841	
				Other

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

Annular Space			
Depth Set at (m/ft)		Type of Sealant Used	Volume Placed
From	To	(Material and Type)	(m³/ft³)
1m	1.75m	bentonite	0.35m³

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

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)		☐ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☐ Observation and/or Monitoring Hole ☒ Alteration (Construction) ☐ Abandoned, Inefficient, or Damaged
			From	To	
15.86	steel	.48	+45m	1.75m	
10	steel	.48	1.75m	unknown	

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

Insufficient Supply

☐ Abandoned, Poor Water Quality

☐ Abandoned, other, *specify*

☐ Other, *specify*

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

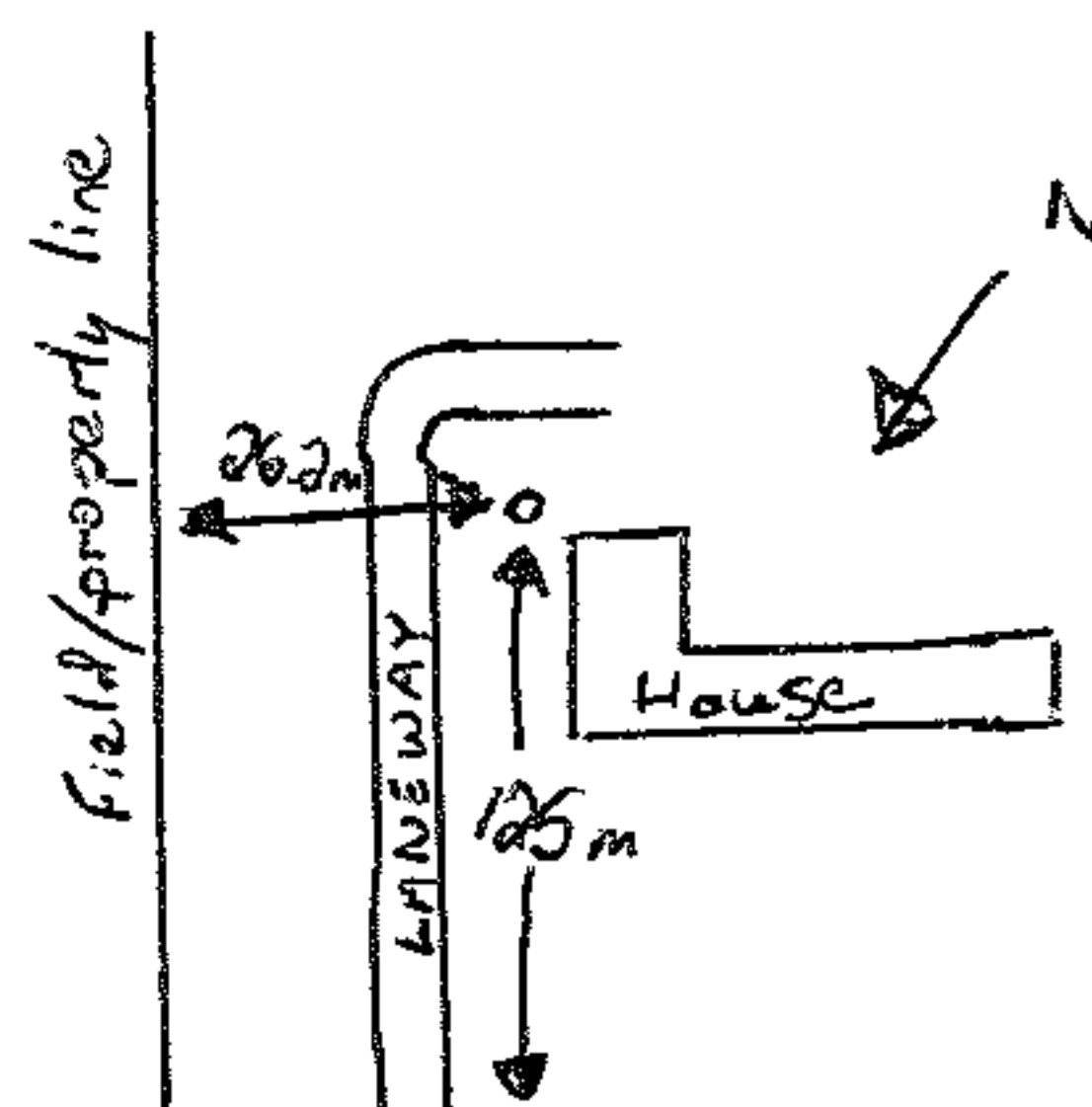
Well Contractor and Well Technician Information				
Business Name of Well Contractor			Well Contractor's Licence No.	
H.O. Wright + Sons Limited			6 3 5 7	
Business Address (Street Number/Name)			Municipality	
2383 Church St. North Gower				
Province	Postal Code	Business E-mail Address		
ON	K0A2T0			
Bus. Telephone No. (inc. area code)		Name of Well Technician (Last Name, First Name)		
6 1 3 4 8 9 3 3 7 2		Wilson, Wendel		
Well Technician's Licence No.		Signature of Technician and/or Contractor		Date Submitted
4 0 8 4		Wendel Wilson		20190601

Results of Well Yield Testing

After test of well yield, water was:	Draw Down		Recovery	
☐ Clear and sand free	Time (min)	Water Level (m/ft)	Time (min)	Water Level (m/ft)
☐ Other, specify _____	Static Level			
If pumping discontinued, give reason:	1		1	
Pump intake set at (m/ft)	2		2	
Pumping rate (l/min / GPM)	3		3	
Duration of pumping _____ hrs + _____ min	4		4	
Final water level end of pumping (m/ft)	5		5	
If flowing give rate (l/min / GPM)	10		10	
Recommended pump depth (m/ft)	15		15	
Recommended pump rate (l/min / GPM)	20		20	
Well production (l/min / GPM)	25		25	
Disinfected?	30		30	
☐ Yes ☐ No	40		40	
	50		50	
	60		60	

Map of Well Location

Please provide a map below following instructions on the back.



Century Rd west.

Comments: extend well casing above grade

Well owner's information package delivered ☐ Yes ☐ No	Date Package Delivered Y Y Y Y M M D D	Ministry Use Only Audit No. 229135 AUG 15 2019 Received
	Date Work Completed 20190612	



Address of Well Location (Street Number/Name) 1942 Century Road West		Township Rideau	Lot P/L 6	Concession 2
County/District/Municipality Ottawa Carleton		City/Town/Village Noth Gower	Province Ontario	Postal Code
UTM Coordinates Zone NAD 83	Easting 18 442123	Northing 5004062	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
	Sand	& Gravel & Boulders		0' 41'
Grey	Limestone			41' 105'
Grey	Limestone			105' 155'
Grey	Limestone			155' 163'

Annular Space			Results of Well Yield Testing			
Depth Set at (m/ft) From To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)	After test of well yield, water was: ☐ Clear and sand free ☐ Other, specify Not tested		Draw Down Time (min) Water Level (m/ft)	
80' 70'	Neat cement	9.36	If pumping discontinued, give reason: X		Static Level	57.2'
70' 0'	Bentonite slurry	18.8			1 20.3	48.6
			Pump intake set at (m/ft) 140		2 25.5	45.5
			Pumping rate (l/min / GPM) 10		3 29.3	42.9
			Duration of pumping 1 hrs + 0 min		4 33.2	40.8
			Final water level end of pumping (m/ft) 57.2'		5 38.8	38.1
			If flowing give rate (l/min / GPM) X		10 42.8	28.3
			Recommended pump depth (m/ft) 140'		15 47.2	20.3
			Recommended pump rate (l/min / GPM) 10 10 GPM		20 51.5	14.8
			Well production (l/min / GPM) 10		25 53.8	14.8
			Disinfected? ☒ Yes ☐ No		30 55.2	14.8
					40 56.8	14.8
					50 57.2	14.8
					60 57.2	14.8

Method of Construction		Well Use	
☐ Cable Tool ☐ Rotary (Conventional) ☐ Rotary (Reverse) ☒ Boring ☒ Air percussion ☐ Other, specify SURGED	☐ Diamond ☐ Jetting ☐ Driving ☐ Digging	☐ Public ☒ Domestic ☐ Livestock ☐ Irrigation ☐ Industrial ☐ Other, specify	☐ Commercial ☐ Municipal ☐ Test Hole ☐ Cooling & Air Conditioning ☐ Not used ☐ Dewatering ☐ Monitoring

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) From To	☒ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☐ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☐ Abandoned, other, specify ☐ Other, specify	
6 1/4"	Steel	.188"	+2' 80'		
6"	Open Hole		80' 163'		

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

Water Details		Hole Diameter	
Water found at Depth 05 105 (m/ft) ☐ Gas ☒ Other, specify X	Kind of Water: ☐ Fresh ☒ Untested	Depth (m/ft) From To	Diameter (cm/in)
Water found at Depth 55 155 (m/ft) ☐ Gas ☒ Other, specify X	Kind of Water: ☐ Fresh ☒ Untested	0' 80'	9 3/4"
Water found at Depth (m/ft) ☐ Gas ☐ Other, specify	Kind of Water: ☐ Fresh ☐ Untested	80' 163'	6"

Well Contractor and Well Technician Information	
Business Name of Well Contractor Air Rock Drilling Co. Ltd.	Well Contractor's Licence No. 7681
Business Address (Street Number/Name) 6666 Franktown Road	Municipality Richmond
Province ON	Postal Code K0A 2Z0
Business E-mail Address air-rock@sympatico.ca	

Bus. Telephone No. (inc. area code) 613 382 170	Name of Well Technician (Last Name, First Name) Hogan, Dan
Well Technician's Licence No. 13058	Signature of Technician and/or Contractor
Date 2019 08 30	Date 2019 08 30

Map of Well Location

Please provide a map below following instructions on the back.

1942 CENTURY ROAD WEST

55' 1.1 km

Prince of Wales

Comments:
1/2 HP - 10 GPM Set @ 140 FT

Well owner's information package delivered ☒ Yes ☐ No	Date Package Delivered 2019 08 01	Date Work Completed 2019 07 24	Ministry Use Only Audit No. 2302357 OCT 1 1 2019
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Client: Paterson Group
9 Auriga Dr
Nepean, ON
K2E 7T9
Attention: Mr. Alex Schopf
PO#: 57758
Invoice to: Paterson Group

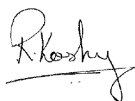
Report Number: 1998379
Date Submitted: 2023-06-21
Date Reported: 2023-07-05
Project: PH4720
COC #: 908628

Page 1 of 13

Dear Alex Schopf:

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

Report Comments:



Rebecca Koshy
2023.07.05
18:39:22 -04'00'

APPROVAL:

Rebecca Koshy, Project Manager

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 Dr
Nepean, ON
K2E 7T9
Attention: Mr. Alex Schopf
PO#: 57758
Invoice to: Paterson Group

Report Number: 1998379
Date Submitted: 2023-06-21
Date Reported: 2023-07-05
Project: PH4720
COC #: 908628

					Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1692147 GW 2023-06-20 GW1	1692148 GW 2023-06-20 GW2
Group	Analyte	MRL	Units	Guideline			
Anions	Cl	1	mg/L	AO 250		65	65
	F	0.10	mg/L	MAC 1.5		0.36	0.35
	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		34	33
General Chemistry	Alkalinity as CaCO3	5	mg/L	OG 30-500		179	179
	Colour (Apparent)	2	TCU	AO 5		17*	15*
	Conductivity	5	uS/cm			563	558
	DOC	0.5	mg/L	AO 5		2.3	2.1
	pH	1.00		6.5-8.5		7.82	7.85
	Phenols	0.001	mg/L			<0.001	<0.001
	S2-	0.02	mg/L	AO 0.05		<0.02	<0.02
	TDS (COND - CALC)	1	mg/L	AO 500		366	363
	Turbidity	0.1	NTU	AO 5		2.1	1.3
Hardness	Hardness as CaCO3	1	mg/L	OG 80-100		243*	243*
Indices/Calc	Ion Balance	0.01				0.96	0.96
Metals	Ag	0.0001	mg/L			<0.0001	<0.0001
	Al	0.01	mg/L	OG 0.1		<0.01	<0.01
	As	0.001	mg/L	IMAC 0.01		<0.001	<0.001
	B	0.01	mg/L	IMAC 5.0		0.05	0.05
	Ba	0.01	mg/L	MAC 1.0		0.18	0.18
	Be	0.0005	mg/L			<0.0005	<0.0005
	Ca	1	mg/L			61	61
	Cd	0.0001	mg/L	MAC 0.005		<0.0001	<0.0001
	Co	0.0002	mg/L			<0.0002	<0.0002

Guideline = ODWSOG

* = Guideline Exceedence

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

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

Certificate of Analysis

Client: Paterson Group
9 Auriga Dr
Nepean, ON
K2E 7T9
Attention: Mr. Alex Schopf
PO#: 57758
Invoice to: Paterson Group

Report Number: 1998379
Date Submitted: 2023-06-21
Date Reported: 2023-07-05
Project: PH4720
COC #: 908628

					Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1692147 GW 2023-06-20 GW1	1692148 GW 2023-06-20 GW2
Group	Analyte	MRL	Units	Guideline			
Metals	Cr	0.001	mg/L	MAC 0.05		<0.001	<0.001
	Cu	0.001	mg/L	AO 1		0.004	0.003
	Fe	0.03	mg/L	AO 0.3		0.38*	0.29
	Hg	0.0001	mg/L	MAC 0.001		<0.0001	<0.0001
	K	1	mg/L			3	3
	Mg	1	mg/L			22	22
	Mn	0.01	mg/L	AO 0.05		<0.01	<0.01
	Mo	0.005	mg/L			<0.005	<0.005
	Na	1	mg/L	AO 200		22	21
	Ni	0.005	mg/L			<0.005	<0.005
	Pb	0.001	mg/L	MAC 0.010		<0.001	<0.001
	Sb	0.0005	mg/L	IMAC 0.006		<0.0005	<0.0005
	Se	0.001	mg/L	MAC 0.05		<0.001	<0.001
	Sr	0.001	mg/L			0.695	0.685
	Tl	0.0001	mg/L			<0.0001	<0.0001
	U	0.001	mg/L	MAC 0.02		<0.001	<0.001
	V	0.001	mg/L			<0.001	<0.001
	Zn	0.01	mg/L	AO 5		<0.01	<0.01
Microbiology	Escherichia Coli	0	ct/100mL	MAC 0		0	0
	Total Coliforms	0	ct/100mL	MAC 0		0	0
Nutrients	N-NH3	0.020	mg/L			0.058	0.057
	Total Kjeldahl Nitrogen	0.100	mg/L			0.146	0.117
Subcontract-Inorg	Tannin & Lignin	0.5	mg/L			<0.5	<0.5
VOCs Surrogates	1,2-dichloroethane-d4	0	%			119	121
	4-bromofluorobenzene	0	%			94	93

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Certificate of Analysis

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9 Auriga Dr
Nepean, ON
K2E 7T9
Attention: Mr. Alex Schopf
PO#: 57758
Invoice to: Paterson Group

Report Number: 1998379
Date Submitted: 2023-06-21
Date Reported: 2023-07-05
Project: PH4720
COC #: 908628

					Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1692147 GW 2023-06-20 GW1	1692148 GW 2023-06-20 GW2
Group	Analyte	MRL	Units	Guideline			
VOCs Surrogates	Toluene-d8	0	%			99	99
Volatiles	1,1,1,2-tetrachloroethane	0.5	ug/L			<0.5	<0.5
	1,1,1-trichloroethane	0.4	ug/L			<0.4	<0.4
	1,1,2,2-tetrachloroethane	0.5	ug/L			<0.5	<0.5
	1,1,2-trichloroethane	0.4	ug/L			<0.4	<0.4
	1,1-dichloroethane	0.4	ug/L			<0.4	<0.4
	1,1-dichloroethylene	0.5	ug/L	MAC 14		<0.5	<0.5
	1,2-dichlorobenzene	0.4	ug/L	MAC 200		<0.4	<0.4
	1,2-dichloroethane	0.5	ug/L	IMAC 5		<0.5	<0.5
	1,2-dichloropropane	0.5	ug/L			<0.5	<0.5
	1,3,5-trimethylbenzene	0.3	ug/L			<0.3	<0.3
	1,3-dichlorobenzene	0.4	ug/L			<0.4	<0.4
	1,3-Dichloropropylene (cis+trans)	0.5	ug/L			<0.5	<0.5
	1,4-dichlorobenzene	0.4	ug/L	MAC 5		<0.4	<0.4
	Acetone	5	ug/L			<5	<5
	Benzene	0.5	ug/L	MAC 1		<0.5	<0.5
	Bromodichloromethane	0.3	ug/L			<0.3	<0.3
	Bromoform	0.4	ug/L			<0.4	<0.4
	Bromomethane	0.5	ug/L			<0.5	<0.5
	c-1,2-Dichloroethylene	0.4	ug/L			<0.4	<0.4
	c-1,3-Dichloropropylene	0.5	ug/L			<0.5	<0.5
	Carbon Tetrachloride	0.2	ug/L	MAC 2		<0.2	<0.2
	Chloroethane	0.5	ug/L			<0.5	<0.5
	Chloroform	0.5	ug/L			<0.5	<0.5
	Dibromochloromethane	0.3	ug/L			<0.3	<0.3

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Certificate of Analysis

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9 Auriga Dr
Nepean, ON
K2E 7T9
Attention: Mr. Alex Schopf
PO#: 57758
Invoice to: Paterson Group

Report Number: 1998379
Date Submitted: 2023-06-21
Date Reported: 2023-07-05
Project: PH4720
COC #: 908628

					Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1692147 GW 2023-06-20 GW1	1692148 GW 2023-06-20 GW2
Group	Analyte	MRL	Units	Guideline			
Volatiles	Dichlorodifluoromethane	0.5	ug/L			<0.5	<0.5
	Dichloromethane	4.0	ug/L	MAC 50		<4.0	<4.0
	Ethylbenzene	0.5	ug/L	MAC 140		<0.5	<0.5
	Ethylene Dibromide	0.2	ug/L			<0.2	<0.2
	Hexane	5	ug/L			<5	<5
	m/p-xylene	0.4	ug/L			<0.4	<0.4
	Methyl Ethyl Ketone (MEK)	2	ug/L			<2	<2
	Methyl Isobutyl Ketone (MIBK)	5	ug/L			<5	<5
	Methyl Tert Butyl Ether (MTBE)	2	ug/L	AO 15		<2	<2
	Monochlorobenzene	0.5	ug/L	MAC 80		<0.5	<0.5
	o-xylene	0.4	ug/L			<0.4	<0.4
	Styrene	0.5	ug/L			<0.5	<0.5
	t-1,2-Dichloroethylene	0.4	ug/L			<0.4	<0.4
	t-1,3-Dichloropropylene	0.5	ug/L			<0.5	<0.5
	Tetrachloroethylene	0.3	ug/L	MAC 10		<0.3	<0.3
	Toluene	0.4	ug/L	MAC 60		<0.4	<0.4
	Trichloroethylene	0.3	ug/L	MAC 5		<0.3	<0.3
	Trichlorofluoromethane	0.5	ug/L			<0.5	<0.5
	Vinyl Chloride	0.2	ug/L	MAC 1		<0.2	<0.2
	Xylene; total	0.5	ug/L	MAC 90		<0.5	<0.5

Guideline = ODWSOG

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K2E 7T9
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Report Number: 1998379
Date Submitted: 2023-06-21
Date Reported: 2023-07-05
Project: PH4720
COC #: 908628

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 443724 Analysis/Extraction Date 2023-06-22 Analyst L V Method AMBCOLM1			
Escherichia Coli			
Total Coliforms			
Run No 443744 Analysis/Extraction Date 2023-06-21 Analyst M E Method C SM2130B			
Turbidity	<0.1 NTU	102	70-130
Run No 443771 Analysis/Extraction Date 2023-06-22 Analyst AaN Method C SM2120C			
Colour (Apparent)	<2 TCU	103	90-110
Run No 443789 Analysis/Extraction Date 2023-06-22 Analyst AaN Method SM 4110			
Chloride	<1 mg/L	100	90-110
N-NO2	<0.10 mg/L	106	90-110
N-NO3	<0.10 mg/L	108	90-110
SO4	<1 mg/L	105	90-110
Run No 443800 Analysis/Extraction Date 2023-06-22 Analyst SKH Method EPA 351.2			
Total Kjeldahl Nitrogen	<0.100 mg/L	107	70-130

Guideline = ODWSOG

* = Guideline Exceedence

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

Certificate of Analysis

Client: Paterson Group
9 Auriga Dr
Nepean, ON
K2E 7T9
Attention: Mr. Alex Schopf
PO#: 57758
Invoice to: Paterson Group

Report Number: 1998379
Date Submitted: 2023-06-21
Date Reported: 2023-07-05
Project: PH4720
COC #: 908628

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 443810 Analysis/Extraction Date 2023-06-22 Analyst SD Method EPA 200.8			
Silver	<0.0001 mg/L	95	80-120
Aluminum	<0.01 mg/L	104	80-120
Arsenic	<0.001 mg/L	86	80-120
Boron (total)	<0.01 mg/L	94	80-120
Barium	<0.01 mg/L	86	80-120
Beryllium	<0.0005 mg/L	97	80-120
Cadmium	<0.0001 mg/L	94	80-120
Cobalt	<0.0002 mg/L	91	80-120
Chromium Total	<0.001 mg/L	98	80-120
Copper	<0.001 mg/L	93	80-120
Iron	<0.03 mg/L	88	80-120
Mercury	<0.0001 mg/L	110	80-120
Manganese	<0.01 mg/L	93	80-120
Molybdenum	<0.005 mg/L	83	80-120
Nickel	<0.005 mg/L	93	80-120
Lead	<0.001 mg/L	95	80-120

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Project: PH4720
COC #: 908628

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Antimony	<0.0005 mg/L	113	80-120
Selenium	<0.001 mg/L	94	80-120
Strontium	<0.001 mg/L	93	80-120
Thallium	<0.0001 mg/L	96	80-120
Uranium	<0.001 mg/L	90	80-120
Vanadium	<0.001 mg/L	89	80-120
Zinc	<0.01 mg/L	94	80-120
Run No 443842 Analysis/Extraction Date 2023-06-22 Analyst AsA Method SM 5310B			
DOC	<0.5 mg/L	104	80-120
Run No 443845 Analysis/Extraction Date 2023-06-22 Analyst AET Method SM2320,2510,4500H/F			
Alkalinity (CaCO ₃)	<5 mg/L	99	90-110
Conductivity	<5 uS/cm	101	90-110
F	<0.10 mg/L	102	90-110
pH		100	90-110
Run No 443947 Analysis/Extraction Date 2023-06-23 Analyst PJ Method EPA 8260			
Tetrachloroethane, 1,1,1,2-	<0.5 ug/L	88	60-130

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Date Submitted: 2023-06-21
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COC #: 908628

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Trichloroethane, 1,1,1-	<0.4 ug/L	81	60-130
Tetrachloroethane, 1,1,2,2-	<0.5 ug/L	109	60-130
Trichloroethane, 1,1,2-	<0.4 ug/L	87	60-130
Dichloroethane, 1,1-	<0.4 ug/L	102	60-130
Dichloroethylene, 1,1-	<0.5 ug/L	91	60-130
Dichlorobenzene, 1,2-	<0.4 ug/L	104	60-130
Dichloroethane, 1,2-	<0.5 ug/L	82	60-130
Dichloropropane, 1,2-	<0.5 ug/L	82	60-130
1,3,5-trimethylbenzene	<0.3 ug/L	109	60-130
Dichlorobenzene, 1,3-	<0.4 ug/L	100	60-130
Dichloropropene, 1,3-			
Dichlorobenzene, 1,4-	<0.4 ug/L	100	60-130
Acetone	<5 ug/L	80	60-130
Benzene	<0.5 ug/L	84	60-130
Bromodichloromethane	<0.3 ug/L	102	60-130
Bromoform	<0.4 ug/L	84	60-130
Bromomethane	<0.5 ug/L	101	60-130
Dichloroethylene, 1,2-cis-	<0.4 ug/L	110	60-130

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Report Number: 1998379
Date Submitted: 2023-06-21
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Project: PH4720
COC #: 908628

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Dichloropropene, 1,3-cis-	<0.5 ug/L	102	60-130
Carbon Tetrachloride	<0.2 ug/L	83	60-130
Chloroethane	<0.5 ug/L	103	60-130
Chloroform	<0.5 ug/L	103	60-130
Dibromochloromethane	<0.3 ug/L	83	60-130
Dichlorodifluoromethane	<0.5 ug/L	92	60-130
Methylene Chloride	<4.0 ug/L	107	60-130
Ethylbenzene	<0.5 ug/L	80	60-130
Ethylene dibromide	<0.2 ug/L	89	60-130
Hexane (n)	<5 ug/L	100	60-130
m/p-xylene	<0.4 ug/L	102	60-130
Methyl Ethyl Ketone	<2 ug/L	120	60-130
Methyl Isobutyl Ketone	<5 ug/L	110	60-130
Methyl tert-Butyl Ether (MTBE)	<2 ug/L	100	60-130
Chlorobenzene	<0.5 ug/L	83	60-130
o-xylene	<0.4 ug/L	102	60-130
Styrene	<0.5 ug/L	99	60-130
Dichloroethylene, 1,2-trans-	<0.4 ug/L	103	60-130

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Date Reported: 2023-07-05
Project: PH4720
COC #: 908628

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Dichloropropene, 1,3-trans-	<0.5 ug/L	96	60-130
Tetrachloroethylene	<0.3 ug/L	110	60-130
Toluene	<0.4 ug/L	108	60-130
Trichloroethylene	<0.3 ug/L	99	60-130
Trichlorofluoromethane	<0.5 ug/L	110	60-130
Vinyl Chloride	<0.2 ug/L	99	60-130
Run No 443965 Analysis/Extraction Date 2023-06-26 Analyst PJ Method EPA 8260			
Xylene Mixture			
Run No 444352 Analysis/Extraction Date 2023-06-27 Analyst IP Method SM5530D/EPA420.2			
Phenols	<0.001 mg/L	104	50-120
Run No 444385 Analysis/Extraction Date 2023-06-27 Analyst Z S Method M SM3120B-3500C			
Calcium	<1 mg/L	101	90-110
Potassium	<1 mg/L	110	87-113
Magnesium	<1 mg/L	100	76-124
Sodium	<1 mg/L	109	82-118

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Project: PH4720
COC #: 908628

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 444466 Analysis/Extraction Date 2023-06-27 Analyst AET Method C SM2340B			
Hardness as CaCO ₃			
Ion Balance			
TDS (COND - CALC)			
Run No 444495 Analysis/Extraction Date 2023-06-27 Analyst AsA Method C SM4500-S2-D			
S2-	<0.01 mg/L	87	80-120
Run No 444500 Analysis/Extraction Date 2023-06-27 Analyst SKH Method EPA 350.1			
N-NH ₃	<0.020 mg/L	96	80-120
Run No 444943 Analysis/Extraction Date 2023-07-05 Analyst R K Method SUBCONTRACT-CA-INORG			
Tannin & Lignin	<0.5 mg/L		

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 COC #: 908628

Sample Comment Summary

Sample ID: 1692147	GW1	S2- MRL elevated due to matrix interference (dilution was done).
Sample ID: 1692148	GW2	S2- MRL elevated due to matrix interference (dilution was done).

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.

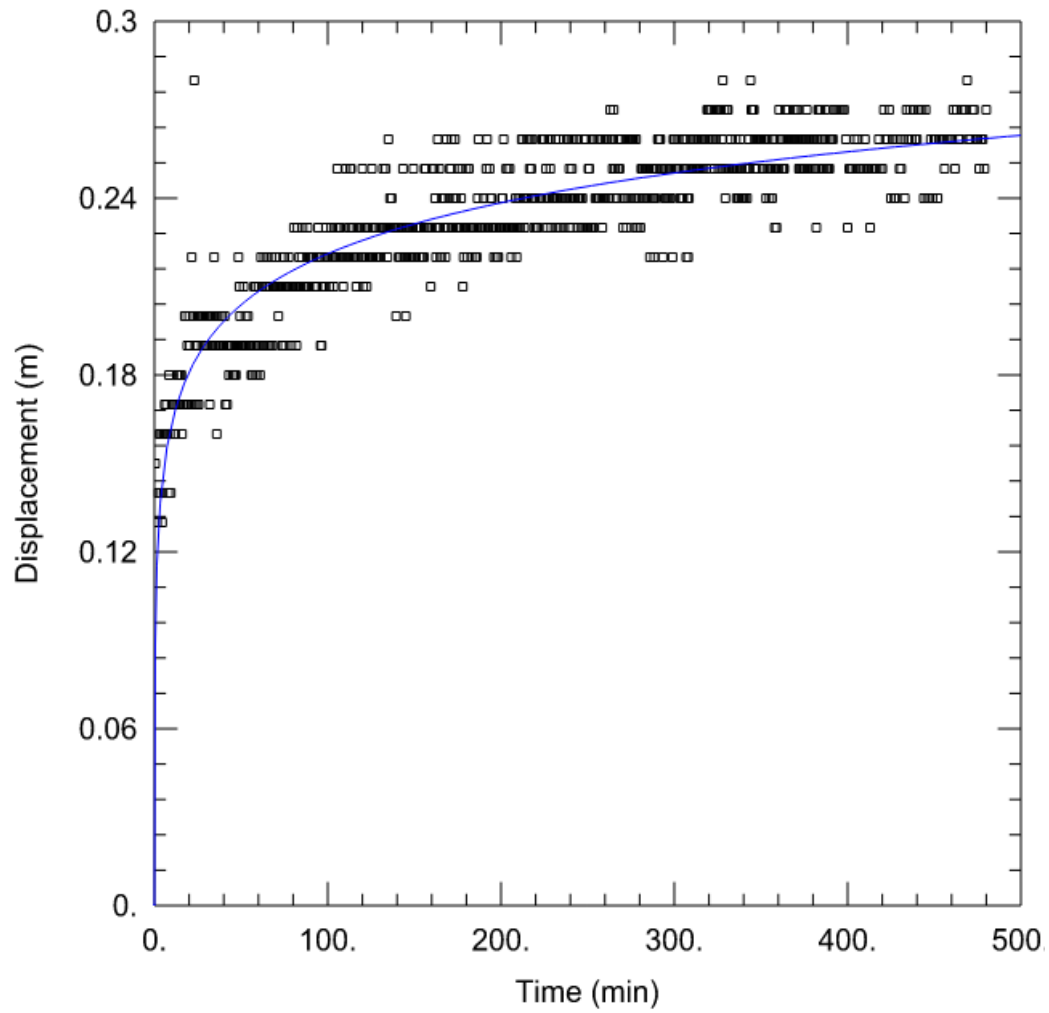
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TW1 inputs			
pH	7.85	A	0.16
TDS	363	B	2.36
Hardness	243	C	1.99
Alkalinity	179	D	2.25
Temp.	11.1		
		pHs =	7.577988771

Langelier Saturation Index (LSI) Calculation		(Langelier, 1936)
$LSI = pH - pHs$ $pHs = (9.3 + A + B) - (C + D)$ Where:		$A = (\text{Log}_{10} [\text{TDS}] - 1) / 10$ $B = -13.12 \times \text{Log}_{10} (oC + 273) + 34.55$ $C = \text{Log}_{10} [\text{Ca}^{2+} \text{ as CaCO}_3] - 0.4$ $D = \text{Log}_{10} [\text{alkalinity as CaCO}_3]$
		LSI = 0.3
LSI	Effect	
0.5 to 2	Water is super saturated and tends to precipitate a scale layer of calcium carbonate (scale forming but non-corrosive)	
0 to 0.5	Water is super saturated and tends to precipitate a scale layer of calcium carbonate (slightly scale forming and corrosive).	
0	Water is saturated (in equilibrium) with calcium carbonate. A scale layer of calcium carbonate is neither precipitated nor dissolved.	
0 to -0.5	Water is under saturated and tends to dissolve solid calcium carbonate (slightly corrosivebut non-scale forming).	
-0.5 to -2	Water is under saturated and tends to dissolve solid calcium carbonate (seriously corrosive).	

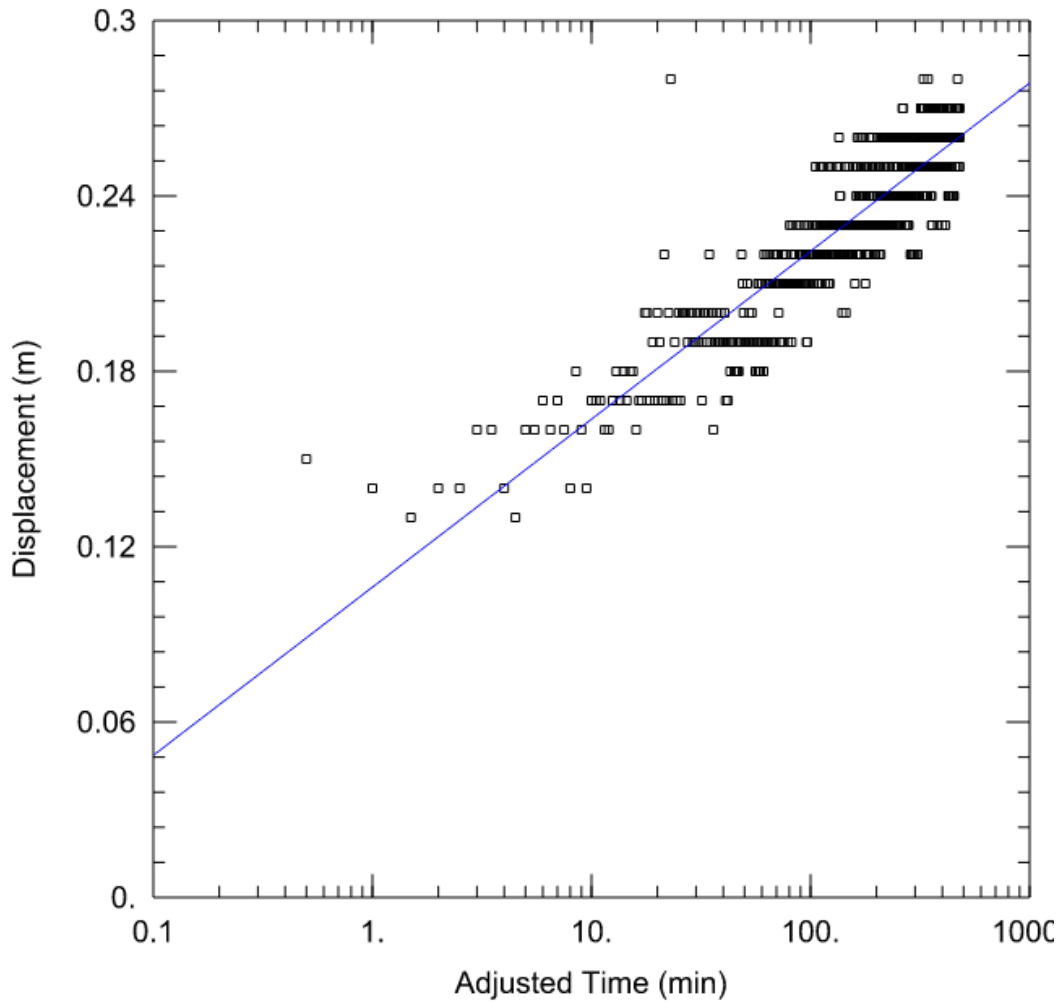
Pumping Test Analysis Report

File No.	PH4720	Well ID:	TW1
Date:	Thursday, June 1, 2023	Solution Method:	Theis
Client:	Brunstad Christian Church	Transmissivity (m ² /day):	367.1
Site Address:	1981 Century Road	Discharge Rate (L/min)	80
Project:	Proposed Commercial Development	Analysis performed by:	AS



Pumping Test Analysis Report

File No.	PH4720	Well ID:	TW1
Date:	Thursday, June 1, 2023	Solution Method:	Cooper-Jacob
Client:	Brunstad Christian Church	Transmissivity (m ² /day):	367.1
Site Address:	1981 Century Road	Discharge Rate (L/min)	80
Project:	Proposed Commercial Development	Analysis performed by:	AS



Pumping Test Analysis Report

File No. PH4720
Date: Thursday, June 1, 2023
Client: Brunstad Christian Church
Site Address: 1981 Century Road
Project: Proposed Commercial
Development

Summary Table:		
Solution Method:	Well ID:	Transmissivity (m2/day):
Theis	TW1	367.1
Cooper-Jacob	TW1	367.1
Average:		367.10

1981 Century Road

PH4720



PREDICTIVE NITRATE IMPACT ASSESSEMENT		
Infiltration Factors		
Topography	0.20	
Soil	0.20	
Cover	0.10	
Total	0.50	
Site Characteristics		
Area of Site :	36420	m ²
Total of roof areas:	3586	m ²
Total area of paved driveway areas:	7384	m ²
Roof + paved driveway areas	10970	m ²
Impervious Area	10970	m ²
Percent Impervious Area =	30	%
Infiltration Area =	25450	m ²
Septic Effluent		
Concentration of Effluent (Cs) =	40	mg/L
Daily Sewage Flow (Qs)=	6.04	m ³
See Notes below.		
Infiltration Calculation		
Nitrate concentration in precipitation (C _i) =	0	mg/L
Surplus Water (Environment Canada)	341	mm/yr
Factored Water Surplus =	171	mm/yr
Infiltration % due to stormwater management measures	-	%
Infiltration rate from stormwater management measures =	0	mm/yr
Infiltration Flow Entering the System (Q _i) =	12	m ³ /day
Mass Balance Model (MOEE, 1995)		
$C_T = (Q_b C_b + Q_e C_e + Q_i C_i) / (Q_b + Q_e + Q_i) = \text{Cumulative Nitrate Concentration}$		
Q _b = flow entering the system across the upgradient area	0	m ³ /day
C _b = background nitrate concentration	0	mg/L
Q _e = flow entering the system from the septic drainfield	6.04	m ³ /day
C _e = concentration of nitrates in the septic effluent	40	mg/L
Q _i = flow entering the system from infiltration	12	m ³ /day
C _i = Concentration of nitrates in the infiltrate	0	mg/L
C_T =	13.48	mg/L
Notes: Site characteristic values were measured as approximate values from the available site plan. Daily Sewage Flow volume was calculated by Paterson Group as a preliminary design flow.		

1981 Century Road

PH4720



PREDICTIVE NITRATE IMPACT ASSESSEMENT

Infiltration Factors

Topography	0.20
Soil	0.20
Cover	0.10
Total	0.50

Site Characteristics

Area of Site :	36420	m ²
Total of roof areas:	3586	m ²
Total area of paved driveway areas:	7384	m ²
Roof + paved driveway areas	10970	m ²
Impervious Area	10970	m ²
Percent Impervious Area =	30	%
Infiltration Area =	25450	m ²

Septic Effluent

Concentration of Effluent (Cs) =	20	mg/L
Daily Sewage Flow (Qs)=	6.04	m ³
See Notes below.		

Infiltration Calculation

Nitrate concentration in precipitation (C _i) =	0	mg/L
Surplus Water (Environment Canada)	341	mm/yr
Factored Water Surplus =	171	mm/yr
Infiltration % due to stormwater management measures	-	%
Infiltration rate from stormwater management measures =	0	mm/yr
Infiltration Flow Entering the System (Q _i) =	12	m ³ /day

Mass Balance Model (MOEE, 1995)

$$C_T = (Q_b C_b + Q_e C_e + Q_i C_i) / (Q_b + Q_e + Q_i) = \text{Cumulative Nitrate Concentration}$$

Q _b = flow entering the system across the upgradient area	0	m ³ /day
C _b = background nitrate concentration	0	mg/L
Q _e = flow entering the system from the septic drainfield	6.04	m ³ /day
C _e = concentration of nitrates in the septic effluent	20	mg/L
Q _i = flow entering the system from infiltration	12	m ³ /day
C _i = Concentration of nitrates in the infiltrate	0	mg/L
C_T =	6.74	mg/L

Notes: Site characteristic values were measured as approximate values from the available site plan. Daily Sewage Flow volume was calculated by Paterson Group as a preliminary design flow.

SOIL PROFILE AND TEST DATA

GEOTECHNICAL INVESTIGATION

1981 Century Road, Ottawa, Ontario

DATUM: Geodetic **EASTING:** 364500.506 **NORTHING:** 5005505.065 **ELEVATION:** 92.70

PROJECT: Geotechnical Investigation - Proposed Church Addition

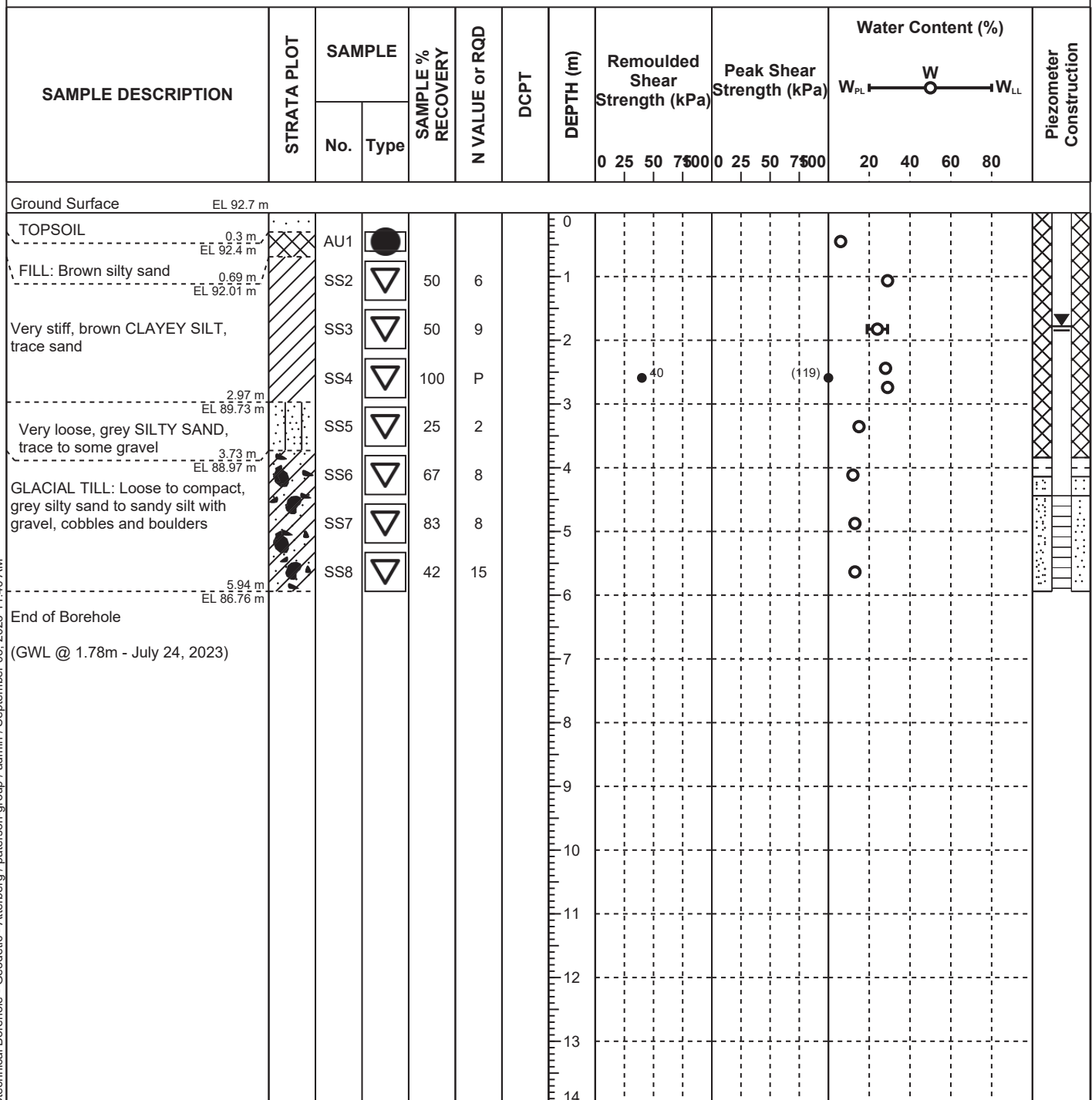
FILE NO. **PG6727**

BORINGS BY: CME Low Clearance Drill

REMARKS:

DATE: July 17, 2023

HOLE NO. BH 1-23



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SOIL PROFILE AND TEST DATA

GEOTECHNICAL INVESTIGATION

1981 Century Road, Ottawa, Ontario

DATUM: Geodetic **EASTING:** 364543.428 **NORTHING:** 5005517.55 **ELEVATION:** 92.10

PROJECT: Geotechnical Investigation - Proposed Church Addition

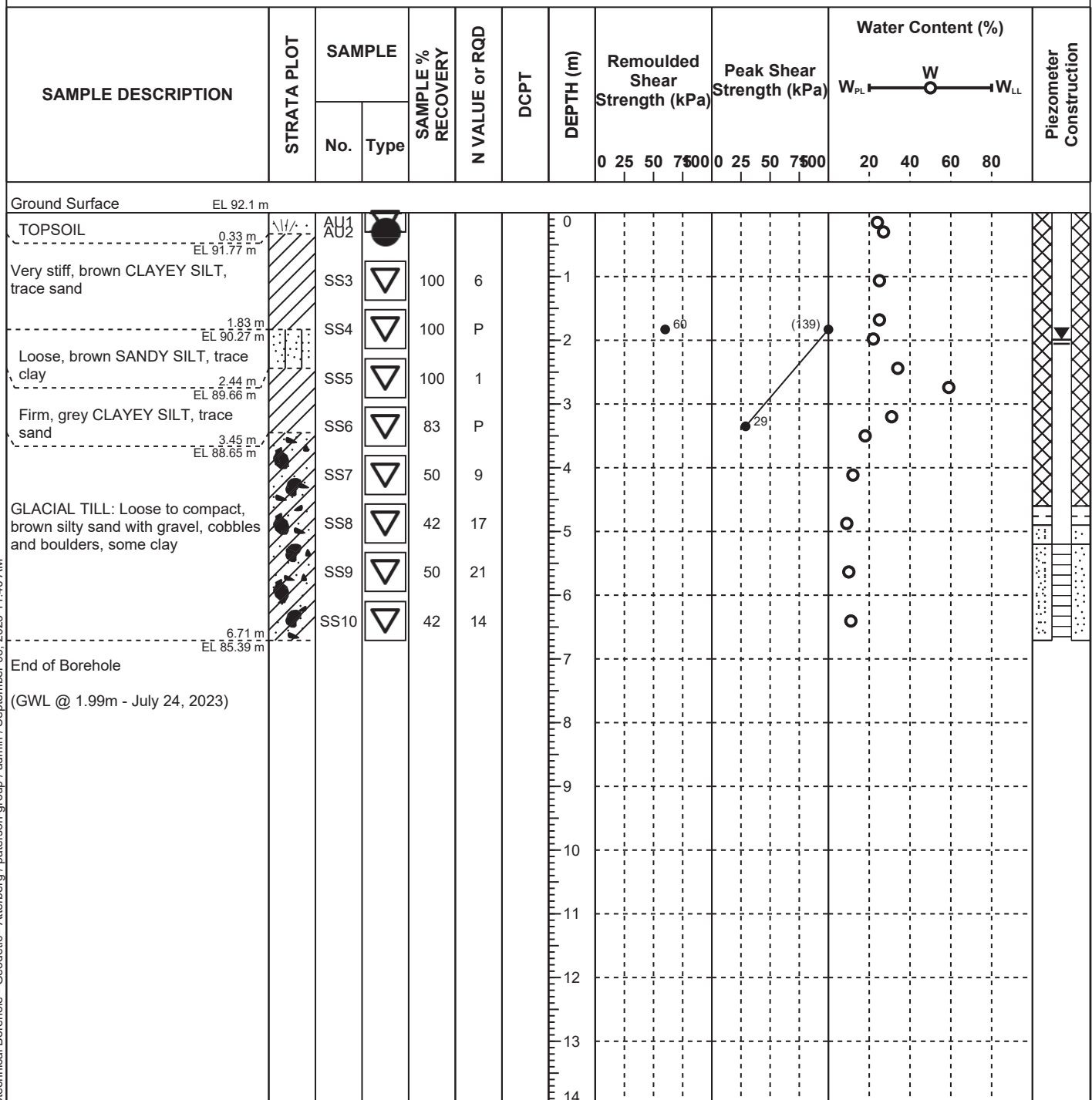
FILE NO. PG6727

BORINGS BY: CME Low Clearance Drill

REMARKS:

DATE: July 17, 2023

HOLE NO. BH 2-23



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SOIL PROFILE AND TEST DATA

GEOTECHNICAL INVESTIGATION

1981 Century Road, Ottawa, Ontario

DATUM: Geodetic **EASTING:** 364517.298 **NORTHING:** 5005546.179 **ELEVATION:** 91.87

PROJECT: Geotechnical Investigation - Proposed Church Addition

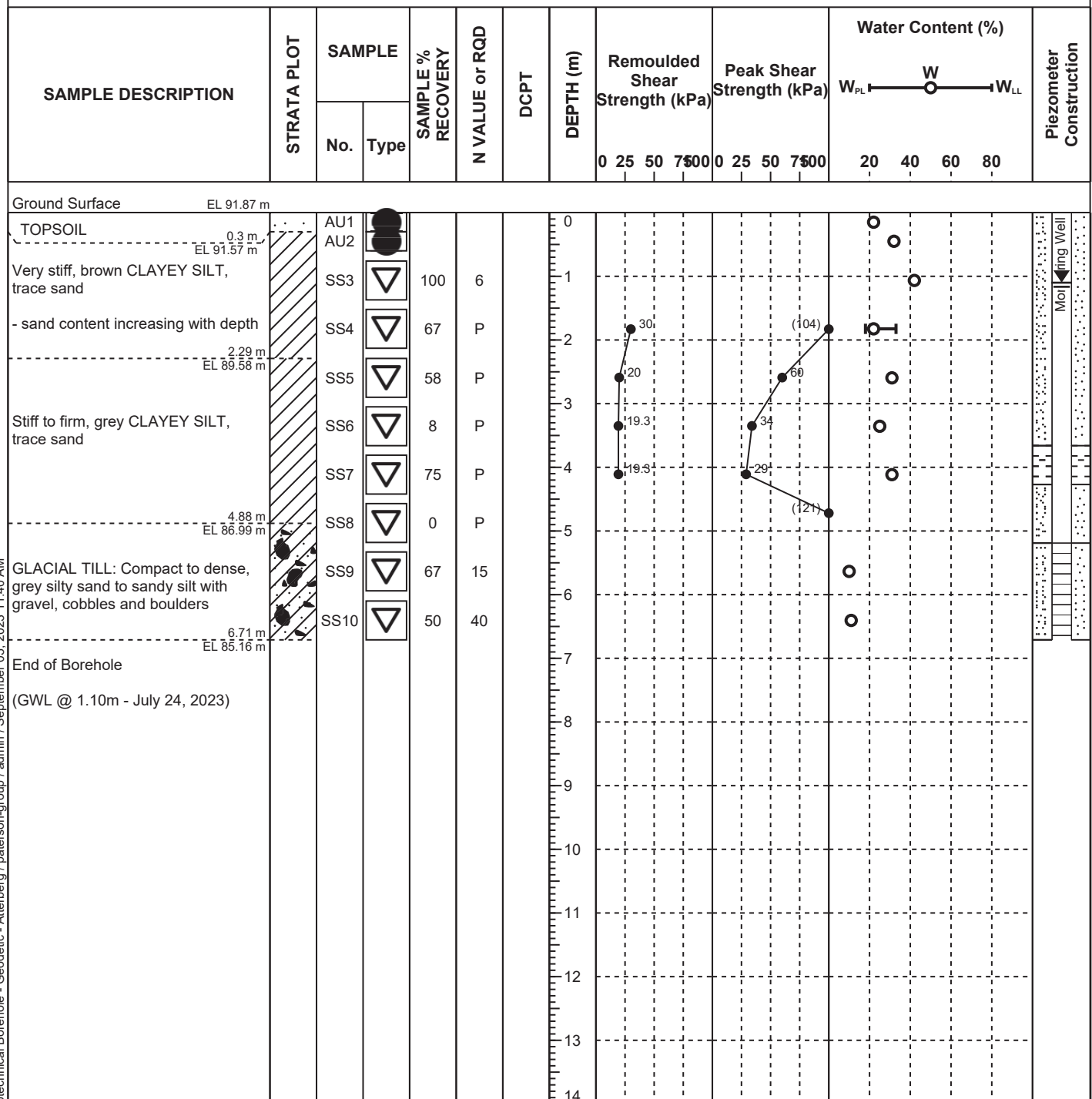
FILE NO. **PG6727**

BORINGS BY: CME Low Clearance Drill

REMARKS:

DATE: July 17, 2023

HOLE NO. BH 3-23



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GROUP**

SOIL PROFILE AND TEST DATA

GEOTECHNICAL INVESTIGATION

1981 Century Road, Ottawa, Ontario

DATUM: Geodetic **EASTING:** 364447.399 **NORTHING:** 5005517.13 **ELEVATION:** 92.03

PROJECT: Geotechnical Investigation - Proposed Church Addition

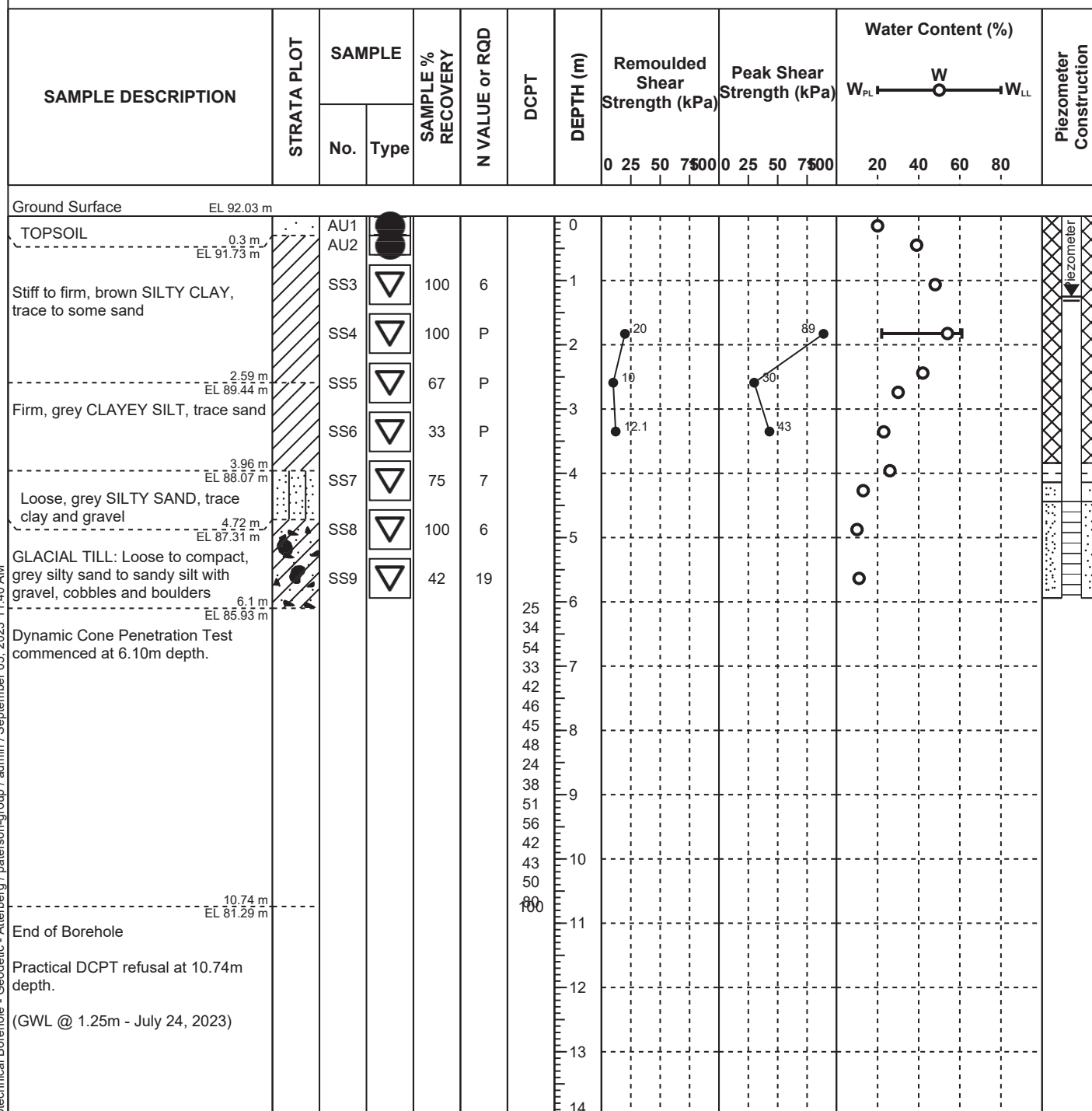
FILE NO. PG6727

BORINGS BY: CME Low Clearance Drill

REMARKS:

DATE: July 17, 2023

HOLE NO. BH 4-23



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SYMBOLS AND TERMS

SOIL DESCRIPTION

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

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

The standard terminology to describe the relative strength of cohesionless soils is the compactness condition, usually inferred from the results of the Standard Penetration Test (SPT) 'N' value. The SPT N value is the number of blows of a 63.5 kg hammer, falling 760 mm, required to drive a 51 mm O.D. split spoon sampler 300 mm into the soil after an initial penetration of 150 mm. An SPT N value of "P" denotes that the split-spoon sampler was pushed 300 mm into the soil without the use of a falling hammer.

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

The standard terminology to describe the strength of cohesive soils is the consistency, which is based on the undisturbed undrained shear strength as measured by the in situ or laboratory shear vane tests, unconfined compression tests, or occasionally by the Standard Penetration Test (SPT). Note that the typical correlations of undrained shear strength to SPT N value (tabulated below) tend to underestimate the consistency for sensitive silty clays, so Paterson reviews the applicable split spoon samples in the laboratory to provide a more representative consistency value based on tactile examination.

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

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

Cohesive soils can also be classified according to their “sensitivity”. The sensitivity, S_t , is the ratio between the undisturbed undrained shear strength and the remoulded undrained shear strength of the soil. The classes of sensitivity may be defined as follows:

Low Sensitivity:	$S_t < 2$
Medium Sensitivity:	$2 < S_t < 4$
Sensitive:	$4 < S_t < 8$
Extra Sensitive:	$8 < S_t < 16$
Quick Clay:	$S_t > 16$

ROCK DESCRIPTION

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

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

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

SAMPLE TYPES

SS	-	Split spoon sample (obtained in conjunction with the performing of the Standard Penetration Test (SPT))
TW	-	Thin wall tube or Shelby tube, generally recovered using a piston sampler
G	-	"Grab" sample from test pit or surface materials
AU	-	Auger sample or bulk sample
WS	-	Wash sample
RC	-	Rock core sample (Core bit size BQ, NQ, HQ, etc.). Rock core samples are obtained with the use of standard diamond drilling bits.

SYMBOLS AND TERMS (continued)

PLASTICITY LIMITS AND GRAIN SIZE DISTRIBUTION

WC%	-	Natural water content or water content of sample, %
LL	-	Liquid Limit, % (water content above which soil behaves as a liquid)
PL	-	Plastic Limit, % (water content above which soil behaves plastically)
PI	-	Plasticity Index, % (difference between LL and PL)
Dxx	-	Grain size at which xx% of the soil, by weight, is of finer grain sizes These grain size descriptions are not used below 0.075 mm grain size
D10	-	Grain size at which 10% of the soil is finer (effective grain size)
D60	-	Grain size at which 60% of the soil is finer
Cc	-	Concavity coefficient = $(D_{30})^2 / (D_{10} \times D_{60})$
Cu	-	Uniformity coefficient = D_{60} / D_{10}

Cc and Cu are used to assess the grading of sands and gravels:

Well-graded gravels have: $1 < Cc < 3$ and $Cu > 4$

Well-graded sands have: $1 < Cc < 3$ and $Cu > 6$

Sands and gravels not meeting the above requirements are poorly-graded or uniformly-graded.

Cc and Cu are not applicable for the description of soils with more than 10% silt and clay
(more than 10% finer than 0.075 mm or the #200 sieve)

CONSOLIDATION TEST

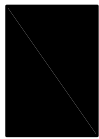
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidation ratio = p'_c / p'_o
Void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

PERMEABILITY TEST

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

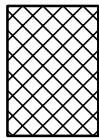
STRATA PLOT



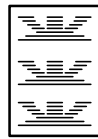
Topsoil



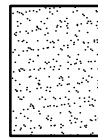
Asphalt



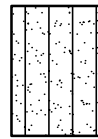
Fill



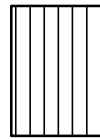
Peat



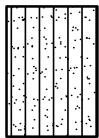
Sand



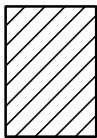
Silty Sand



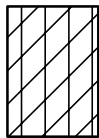
Silt



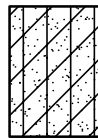
Sandy Silt



Clay



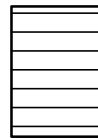
Silty Clay



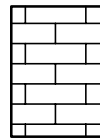
Clayey Silty Sand



Glacial Till



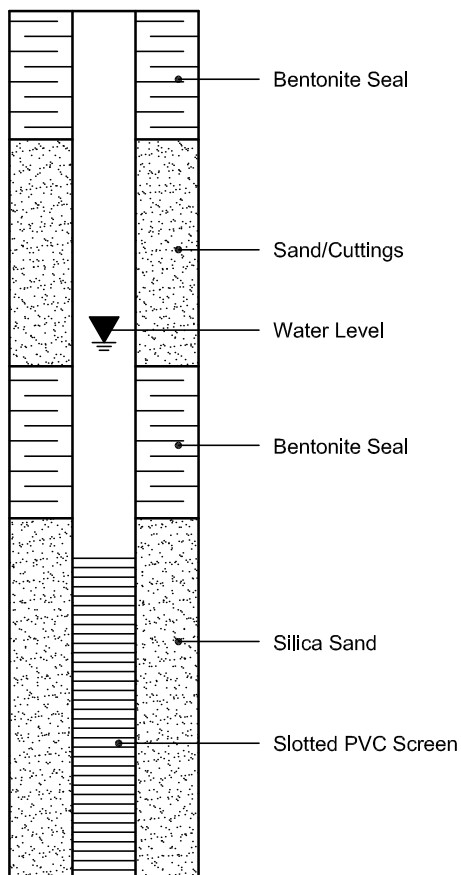
Shale



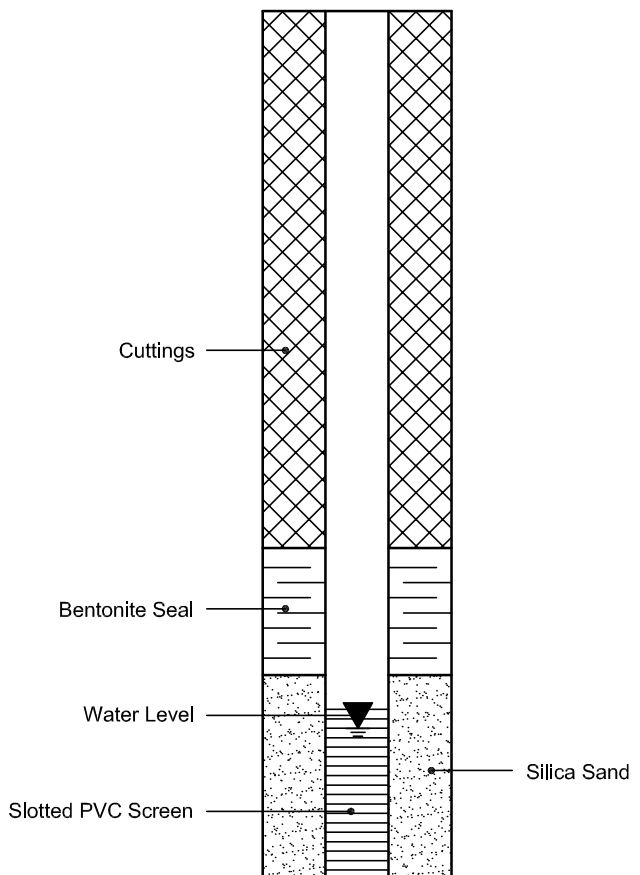
Bedrock

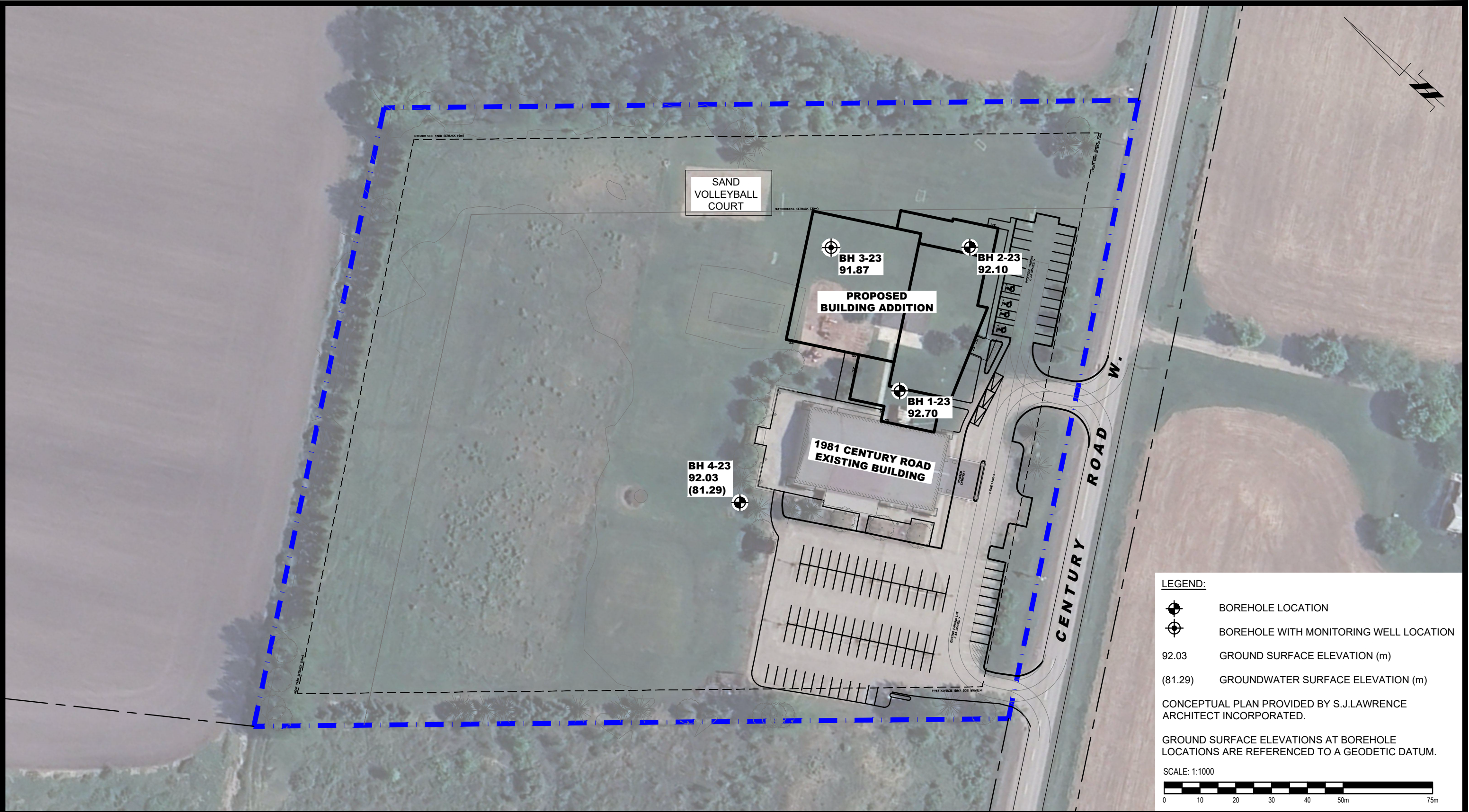
MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION





LEGEND:

BOREHOLE LOCATION

BOREHOLE WITH MONITORING WELL LOCATION

92.03 GROUND SURFACE ELEVATION (m)

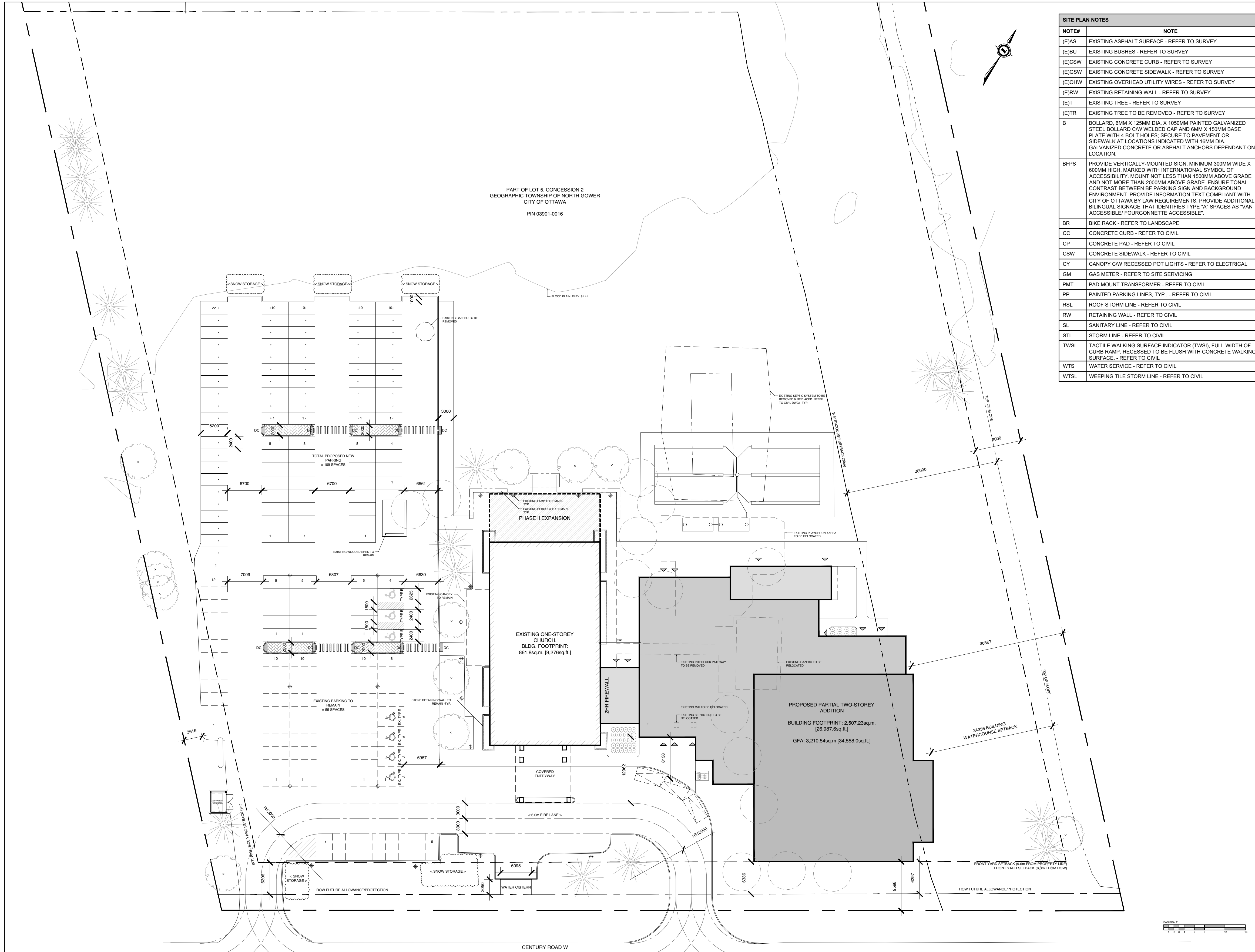
(81.29) GROUNDWATER SURFACE ELEVATION (m)

CONCEPTUAL PLAN PROVIDED BY S.J.LAWRENCE ARCHITECT INCORPORATED.

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

SCALE: 1:1000

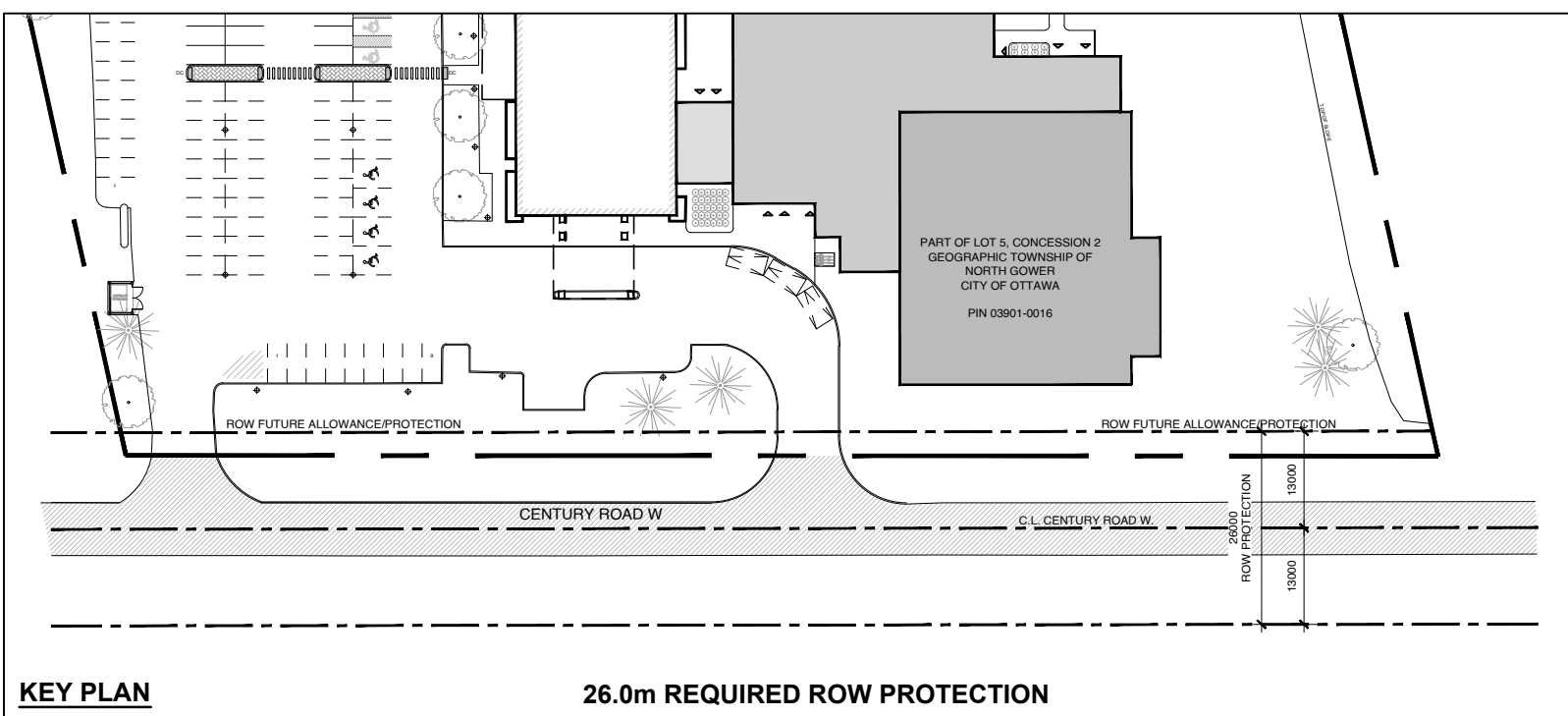
 9 AURIGA DRIVE OTTAWA, ON K2E 7T9 TEL: (613) 226-7381					BRUNSTAD CHRISTIAN CHURCH OTTAWA GEOTECHNICAL INVESTIGATION PROPOSED BUILDING ADDITION 1981 CENTURY ROAD ONTARIO	Scale:	1:1000	Date:	09/2023	
						Drawn by:	GK	Report No.:	PG6727-1	
						Checked by:	KP	Dwg. No.: PG6727-1		
						Approved by:	SD		Revision No.:	
NO.	REVISIONS	DATE	INITIAL	OTTAWA, Title: TEST HOLE LOCATION PLAN						



01 CONCEPT SITE PLAN
A1.0 SCALE: 1:400

LEGEND

	NEW OVERHEAD DOOR		NEW SIGN, REFER TO SIGN LEGEND		TWO WAY TRAFFIC		MINIMUM SETBACKS (ZONING)
	NEW DOOR / ENTRANCE		FIRE ROUTE SIGN		DEPRESSED CURB (DC)		NEW CONSTRUCTION
	BICYCLE PARKING SPACE (1.8Mx0.6M)		STREET LIGHT		TACTILE WALKING SURFACE INDICATORS (TWSi)		EXISTING BUILDINGS
	NO PARKING LINES		DESIGNATED ACCESSIBLE PARKING SPACE AS PER AODA STANDARDS		PROPERTY LINE		SOFT LANDSCAPING
	PARKING STALL COUNT PER ROW		VISITOR PARKING		PROPOSED FENCE		CONCRETE SIDEWALK
					COMPACT PARKING SPACES		BUILDING MOUNTED LIGHTS REFER TO ELECTRICAL DWGS



KEY PLAN 26.0m REQUIRED ROW PROTECTION

SITE PLAN NOTES	
NOTES	NOTE
(E)AS	EXISTING ASPHALT SURFACE - REFER TO SURVEY
(E)BU	EXISTING BUSHES - REFER TO SURVEY
(E)CSW	EXISTING CONCRETE CURB - REFER TO SURVEY
(E)GSW	EXISTING CONCRETE SIDEWALK - REFER TO SURVEY
(E)OHW	EXISTING OVERHEAD UTILITY WIRES - REFER TO SURVEY
(E)RW	EXISTING RETAINING WALL - REFER TO SURVEY
(E)T	EXISTING TREE - REFER TO SURVEY
(E)TR	EXISTING TREE TO BE REMOVED - REFER TO SURVEY
B	BOLLARD, 6MM X 125MM DIA. X 1050MM PAINTED GALVANIZED STEEL BOLLARD C/W WELDED CAP AND 6MM X 150MM BASE PLATE WITH 4 BOLT HOLES. SECURE TO PAVEMENT OR SIDEWALK AT LOCATIONS INDICATED WITH 16MM DIA. GALVANIZED CONCRETE OR ASPHALT ANCHORS DEPENDANT ON LOCATION.
BFPS	PROVIDE VERTICALLY MOUNTED SIGN, MINIMUM 300MM WIDE X 600MM HIGH, MARKED WITH INTERNATIONAL SYMBOL OF ACCESSIBILITY. MOUNT NOT LESS THAN 1500MM ABOVE GRADE AND NOT MORE THAN 2000MM ABOVE GRADE. ENSURE TONAL CONTRAST BETWEEN BF PARKING SIGN AND BACKGROUND ENVIRONMENT. PROVIDE INFORMATION TEXT COMPLIANT WITH CITY OF OTTAWA BY-LAW REQUIREMENTS. PROVIDE ADDITIONAL BILINGUAL SIGNAGE THAT IDENTIFIES TYPE "A" SPACES AS "VAN ACCESSIBLE/ FOURGONNETTE ACCESSIBLE".
BR	BIKE RACK - REFER TO LANDSCAPE
CC	CONCRETE CURB - REFER TO CIVIL
CP	CONCRETE PAD - REFER TO CIVIL
CSW	CONCRETE SIDEWALK - REFER TO CIVIL
CY	CANOPY C/W RECESSED POT LIGHTS - REFER TO ELECTRICAL
GM	GAS METER - REFER TO SITE SERVICING
PMT	PAD MOUNT TRANSFORMER - REFER TO CIVIL
PP	PAINTED PARKING LINES, TYP. - REFER TO CIVIL
RSL	ROOF STORM LINE - REFER TO CIVIL
RW	RETAINING WALL - REFER TO CIVIL
SL	SANITARY LINE - REFER TO CIVIL
STL	STORM LINE - REFER TO CIVIL
TWSi	TACTILE WALKING SURFACE INDICATOR (TWSi), FULL WIDTH OF CURB RAMP, RECESSED TO BE FLUSH WITH CONCRETE WALKING SURFACE - REFER TO CIVIL
WTS	WATER SERVICE - REFER TO CIVIL
WTSL	WEEPING TILE STORM LINE - REFER TO CIVIL

CITY OF OTTAWA ZONING BY-LAW

ZONING MECHANISM (RIS)	REQUIRED	PROVIDED
MINIMUM LOT WIDTH	75m	176.79m
MINIMUM LOT AREA	10,000m ²	36,422.13m ²
MAXIMUM BUILDING HEIGHT	12m	7.5m
MINIMUM FRONT YARD SETBACK	9.0m	9.6m FROM PROPERTY LINE 6.3m FROM ROW
MINIMUM REAR YARD SETBACK	10m	130m
MINIMUM INTERIOR YARD SETBACK	9.0m	30.4m/80m
MAXIMUM LOT COVERAGE	30%	6.9%
MINIMUM LANDSCAPED AREA	20%	70.5%
PROVIDED TOTAL LANDSCAPE AREA		25,670m ²
WATERCOURSE SETBACK	30m	24.34m
PARKING PROVISIONS		
MINIMUM REQUIRED VEHICLE PARKING SPACES (AREA D ON SCHEDULE 1A) (COMMUNITY CENTRE / PLACE OF WORSHIP)	EXISTING CHURCH - PLACE OF WORSHIP: 861.8 m² 10 SPACES PER 100m² GFA = 861.8/100 = 8.618 x 10 = 87 SPACES PROPOSED ADDITION - COMMUNITY CENTRE (ANCILLARY AREA): 1387.5 m² 4 SPACES PER 100m² GFA = 1387.5/100 = 13.875 x 4 = 56 SPACES - PLACE OF WORSHIP: 587.7 m² 10 SPACES PER 100m² GFA = 587.7/100 = 5.877 x 10 = 59 SPACES - TOTAL: 115 SPACES NEW BUILD + EXISTING: 87 + 115 = 202 SPACES REQUIRED	168 SPACES PROVIDED
PROVIDED PARKING	REGULAR SPACES (EXISTING)	55
	REGULAR SPACES (NEW)	45
	ACCESSIBLE SPACE (TYPE A)	4 (EXISTING)
	ACCESSIBLE SPACE (TYPE B)	3
	COMPACT SPACES (50% OF PARKING SPACES: BY-LAW 2021-218, PART 4 - SECTION 106)	61
	TOTAL	168
BICYCLE PARKING REQUIRED	1 PER 1500 m ² OF GFA = 3 SPACES	3
MINIMUM DRIVEWAY WIDTH	PARKING LOT: 6.0m	6.0m
MINIMUM AISLE WIDTH	PARKING LOT: 6.0m	6.0m
MINIMUM PARKING SPACE DIMENSIONS	LENGTH: 5.2m WIDTH: 2.6m	LENGTH: 5.2m WIDTH: 2.6m
	UP TO 50% OF REQUIRED PARKING SPACES MAY BE 4.6m x 2.4m	50% (81 SPACES PERMITTED) = 61 SPACES

AREA SCHEDULE

ROOM NAME	ROOM AREA	LOCATION
PRIMARY USE (WORSHIP)		
EXISTING ONE-STOREY CHURCH	861.8 SQ.M	GROUND FLOOR
NURSERY ROOM	134.7 SQ.M	GROUND FLOOR
NURSERY WIC	4.9 SQ.M	GROUND FLOOR
FEEDING ROOM	21.2 SQ.M	GROUND FLOOR
STROLLER STORAGE	5.9 SQ.M	GROUND FLOOR
SUNDAY SCHOOL ROOM 01	59.4 SQ.M	SECOND FLOOR
YOUTH LOUNGE	192.7 SQ.M	SECOND FLOOR
MEZZANINE	27.9 SQ.M	SECOND FLOOR
SENIORS LOUNGE	70.8 SQ.M	SECOND FLOOR
SUNDAY SCHOOL ROOM 02	47.8 SQ.M	SECOND FLOOR
OFFICE	11.2 SQ.M	SECOND FLOOR
OFFICE	11.2 SQ.M	SECOND FLOOR
SECONDARY USE (ANCILLARY)		
MULTI PURPOSE SPACE	1102.4 SQ.M	GROUND FLOOR
FEAST HALL/CAFE	245.6 SQ.M	GROUND FLOOR
COFFEE BAR	10.6 SQ.M	GROUND FLOOR
MEETING ROOM	26.9 SQ.M	SECOND FLOOR
SERVICE SPACE		
COAT CHECK	16.3 SQ.M	GROUND FLOOR
RECEPTION	7.7 SQ.M	GROUND FLOOR
MALE CHANGE ROOM	85.9 SQ.M	GROUND FLOOR
FEMALE CHANGE ROOM	86.8 SQ.M	GROUND FLOOR
UNIVERSAL WIC	9.3 SQ.M	GROUND FLOOR
STORAGE/JAN. CL.	15.0 SQ.M	GROUND FLOOR
COMMERCIAL KITCHEN	134.5 SQ.M	GROUND FLOOR
STAFF WIC	4.8 SQ.M	GROUND FLOOR
STAFF WIC	3.8 SQ.M	GROUND FLOOR
STORAGE/MECH	44.5 SQ.M	GROUND FLOOR
STORAGE	56.5 SQ.M	GROUND FLOOR
JAN. CL.	6.3 SQ.M	SECOND FLOOR
WIC	3.8 SQ.M	SECOND FLOOR
B.F WIC	6.5 SQ.M	SECOND FLOOR
CIRCULATION		
BUILDING LINK	55.5 SQ.M	GROUND FLOOR
LOBBY	117.6 SQ.M	GROUND FLOOR
VESTIBULE	15.4 SQ.M	GROUND FLOOR
EXIT CORRIDOR	3.8 SQ.M	GROUND FLOOR
STAIR A	22.7 SQ.M	GROUND FLOOR
CORRIDOR 01	48.3 SQ.M	GROUND FLOOR
STAIR B	24.2 SQ.M	GROUND FLOOR
CORRIDOR 02	62.4 SQ.M	GROUND FLOOR
CORRIDOR 03	120.2 SQ.M	SECOND FLOOR
STAIR A	22.7 SQ.M	SECOND FLOOR
STAIR B	20.5 SQ.M	SECOND FLOOR
AREA TOTALS		
PRIMARY USE (WORSHIP):	1449.5 SQ.M	(87.7 SQ.M NEW BUILD ONLY)
SECONDARY USE (ANCILLARY):	1387.5 SQ.M	
SERVICE SPACE:	481.5 SQ.M	
CIRCULATION:	513.3 SQ.M	

BUILDING AREAS	SQ.M.	SQ.FT.
BUILDING FOOTPRINT	2,507.23m ²	26,987.68m ²
GROUND FLR. GROSS AREA	2,507.23m ²	26,987.68m ²
SECOND FLR. GROSS AREA	703.31m ²	7,570.48m ²
TOTAL GROSS FLR. AREA	3,210.54m ²	34,558.08m ²

CLIENT NAME:
BCCO BRUNSTAD CHRISTIAN CHURCH

NOTES:
1) ALL WORK TO BE IN COMPLIANCE WITH LOCAL BUILDING CODES, REGULATIONS AND BY-LAWS.
2) ADDITIONAL DRAWINGS MAY BE ISSUED FOR CLARIFICATION TO ASSIST PROPER EXECUTION OF WORK. SUCH DRAWINGS WILL HAVE THE SAME MEANING AND INTENT AS IF THEY WERE INCLUDED WITH PLANS IN CONTRACT DOCUMENTS.
3) DO NOT SCALE DRAWINGS.
4) ALL SUB-CONTRACTORS TO TAKE THEIR OWN ON-SITE MEASUREMENTS AND BE RESPONSIBLE FOR THEIR ACCURACY.
5) NOTIFY SHAWN J. LAWRENCE ARCHITECT FOR ANY ERRORS AND/OR OMISSIONS PRIOR TO START OF WORK.

CONSULTANTS:
ARCHITECTURAL DRAWINGS
S.J. LAWRENCE ARCHITECT INC.
205-10 DEAKIN STREET, NEPEAN, ON K2E 8B7
613.784.1110
STRUCTURAL DRAWINGS
CLELAND JARDINE (BPA)
850 TERRY FOX DR. KANATA, ON K2L 4B1
613.941.1933
MECHANICAL & ELECTRICAL DRAWINGS
GOODFREY NEEDHAM & ASSOCIATES LTD. (SNAUL)
1805 KENNEDY RD. OTTAWA, ON K2G 3G5
613.121.5111
CIVIL DRAWINGS
TATHAM ENGINEERING
100-8035 GANDET RD, SLOUCESTER, ON K1J 5L4
613.741.9656
SEPTIC DRAWINGS
PATERSON GROUP
1 AURIGA DRIVE, OTTAWA, ON K2S 1T5
613.226.7351
LANDSCAPE DRAWINGS
V5 LANDSCAPE GROUP
4055 BANK ST., OTTAWA, ON K1X 1S1
613.714.5296
URBAN PLANNER
OR PLANNING + DESIGN
45 EGGLESE ST UNIT C, OTTAWA, ON K1R 6G5
613.550.5245

SEAL:
NORTH ARROW

14	2024.12.05	ISSUED FOR COORDINATION
15	2024.08.29	ISSUED FOR COORDINATION
16	2024.06.10	ISSUED FOR REVIEW
17	2024.02.12	ISSUED FOR REVIEW
18	2024.02.09	ISSUED FOR COORDINATION
19	2024.01.23	ISSUED FOR REVIEW
20	2023.12.04	ISSUED FOR PRE-CONSULT
21	2023.11.30	ISSUED FOR REVIEW
22	2023.10.24	ISSUED FOR REVIEW
23	2023.10.20	ISSUED FOR REVIEW
24	2023.10.17	ISSUED FOR REVIEW
25	2023.10.02	ISSUED FOR REVIEW
26	2023.04.13	ISSUED FOR REVIEW
27	2023.08.22	ISSUED FOR REVIEW
28	2023.07.27	ISSUED FOR REVIEW
29	2023.07.12	ISSUED FOR REVIEW
30	2023.05.25	ISSUED FOR REVIEW
31	2023.04.28	ISSUED FOR REVIEW

S.J. LAWRENCE
ARCHITECT
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SUITE 205
OTTAWA, ONTARIO
K2E 8B7
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s.j.law@sjlarchitect.com



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S.J. LAWRENCE ARCHITECT INCORPORATED
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PROJECT:
BCCO CHURCH ADDITION

SHEET TITLE:
PROPOSED SITE PLAN

DRAWN BY:
D.T. B.L.
CHECKED BY:
S.J.L.
PLOT DATE:
2024.12.05
PROJECT DATE:
2023.03.15
JOB NUMBER:
SL-1040-23
SCALE:
1:400
SHEET NUMBER:

A1.0

APPLICATION #