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Hydrogeological Study for a Private Water Well Supply Proposed Commercial / Industrial Development

3713 Borrisokane Road
Ottawa, Ontario

Prepared For

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Report PH3959-REP.03

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1.0 INTRODUCTION

Paterson has conducted a Hydrogeological Study for a Private Water Well Supply in support of a proposed lot severance of an existing industrial property located at 3713 Borrisokane Road. The purpose of these works has been to determine the suitability of the water supply aquifer underlying the subject site to service a proposed lot severance. The severance will consist of the creation of one lot that is identified as 3713 Borrisokane Road (Part 1) and 3717 Borrisokane Road (Part 2), as shown on J.D Barnes Plan 4R-32754 dated March 19, 2020 in Appendix 3. Specifically, these works are being carried out to satisfy Condition 3 of the Committee of Adjustment Decision, File No. D08-01-20/B-00004 and D08-01-20/B-00007. This report supercedes Paterson Report PH3959-REP.02 - Desktop Hydrogeological Review for a Private Water Supply Well dated December 12, 2019.

This report is to be read in conjunction with Paterson Report PH3959-REP.01- Groundwater Impact Assessment: Proposed Commercial Development dated December 12, 2019. The report provides an overview of the impacts related to the proposed sewage system and the reasonable use assessment.

1.1 Terms of Reference

Paterson Group Inc. (Paterson) was retained by Caivan (Greenbank North) Inc. (Caivan) to carry out a Hydrogeological Study for a Private Water Supply in support of a lot severance application at 3713 Borrisokane Road, Ottawa, Ontario. The proposed development is intended to be serviced by municipal services in the future and the process to complete the future municipal servicing has been commenced. At this time, the current report is intended to meet the lot severance requirements for Condition 3 within the Committee of Adjustment Decision.

The proposed development within Part 1 is expected to consist of a two storey, slab-on-grade warehouse and office building with a combined footprint of approximately 11,794 m². The subject site (Part 1) and Part 2 to the east were previously used as an aggregate extraction operation that is now considered to be depleted of resources and is undergoing rehabilitation. Reference should be made to Paterson Drawing PH3959 - 1 - Rev.1 - Proposed Site Layout in Appendix 3 for the site location and general proposed site layout.

The subject site is located immediately west of the approved Community Design Plan (CDP) boundary within a rural zone requiring private services. A potable water supply well has been constructed onsite in support of the lot severance application.

The purpose of this study has been to carry out a hydrogeological review to determine the suitability of the water supply aquifer system underlying the site to adequately supply the proposed development for potable usage. Specifically, the intent of this report is not to design the water distribution system, but to determine the availability of a safe, reliable water supply having sufficient quality and quantity to provide interim potable water for the proposed development.

This study was conducted in general accordance with Ontario Ministry of Environment guidance document Procedure D-5-5 - Technical Guideline for Private Wells; Water Supply Assessment.

The following report has been prepared specifically and solely for the aforementioned project described herein. It contains our findings and recommendations pertaining to the private services for the subject site as it is understood at the time of writing this report.

2.0 BACKGROUND

2.1 Subject Site

The subject site is approximately 7.9 ha (Part 1) and is located at 3713 Borrisokane Road in the City of Ottawa, Ontario (refer to Paterson Drawing PH3959 - 1 - Rev.1 - Proposed Site Layout Plan and J.D Barnes Ltd. Plan 4R-32754 in Appendix 3). The subject site is bounded to the west of the site by Borrisokane Road followed by Highway 416 and the Trail Road Landfill Facility. An undeveloped partially treed lot borders the site to the north and a proposed residential development to the north and east. East of the site lies undeveloped land with future plans to construct a residential development on municipal services. The property is currently zoned Mineral Extraction Operation - Pit with an ME2 zoning designation. However, the Ontario Ministry of Natural Resources and Forestry has confirmed that the Drummond Costello Pit license has been surrendered in accordance with appropriate Ministry requirements.

The subject site was formerly used as part of an aggregate extraction operation. Various fill piles, excavated areas, gravel roads, as well as scattered construction debris are located across the site.

2.2 Neighbouring Properties

The subject property is bordered by Borrisokane Road to the west followed by Highway 416 and then by the Trail Road Landfill Facility, an undeveloped partially treed lot to the north, undeveloped lands being rehabilitated to the east for a proposed residential development in the future and a currently proposed residential development (The Ridge). See Paterson Drawing PH3959 - 1 - Rev.1 - Proposed Site Layout Plan in Appendix 3.

2.3 Neighbouring Wells

A search of the Ministry of the Environment, Conservation and Parks (MECP) online water well mapping database found nine (9) well records within 500 m of the subject site. Six (6) of the WWRs were recorded as either monitoring/test wells, and the other three (3) WWRs are abandonment records. There are no recorded potable water wells within 500 m of the subject site. All nearby rural properties currently consist of commercial and industrial usages. Municipal services will exist in the proposed developments to the east and northeast within the CDP boundary. See Paterson Drawing PH3959 - 2 - MECP Water Well Location Plan in Appendix 3.

2.4 Regional Geology

Published surficial geology mapping for the area in the vicinity of the subject site indicate that the site is underlain by a glaciofluvial deposit with a portion of the site located within the Ottawa Valley Kars Esker. Refer to Paterson Drawing PH3959 - 4 - Surficial Geology in Appendix 3 for the Ontario Geological Survey (OGS) mapping.

Based on site specific investigative works carried out by this firm (Paterson Report No. PG5155-1 Revision 1, dated Feb 10, 2020), the general subsoil profile encountered within the subject area consisted of a fill layer overlying a silty sand and/or sand deposit with varying amount of gravel, cobbles and boulders. A discontinuous brown to grey silty clay was encountered below the sand deposit and/or fill layer at select test hole locations. The clay layer extends from west to east and pinches out within the subject site. Reference should be made to Paterson Drawing PG5155-1 Revision 1 - Test Hole Location Plan and the associated Soil Profile and Test Data sheets in Appendix 3 for specific details of the soil profiles encountered at each test hole location.

According to the available mapping from Natural Resources Canada for Drift Thickness, the overburden across the site ranges in thickness from approximately 15 to 25 m. Paterson borehole BH14-19 extended to a depth of 31.72 m and did not encounter bedrock.

During the construction of TW1, grey and black limestone bedrock was recorded at 33.8 m depth below ground surface (bgs), and white sandstone was recorded to be encountered at 87.2 m bgs.

The OGS mapping indicates that the subject lands are underlain by dolostone and limestone bedrock of the Oxford Formation. Refer to Paterson Drawing PH3959-6 - Bedrock Geology in Appendix 3 for the OGS mapping. Underlying the Oxford Formation is the March and Nepean Formations consisting of sandstone. The Oxford Formation is widely used as an aquifer to provide good quality and quantity water supplies. The underlying sandstone formations are well known to provide groundwater considered to be very high in quantity and quality. Some of the municipal water supplies for the Villages surrounding the City use the Nepean aquifer to provide adequate quantity and quality without adversely affecting other water users or the aquifer.

2.5 Proposed Development

The proposed development is anticipated to be serviced through municipal services in the future and Caivan is following the process to obtain these services. However, private servicing options are being reviewed to comply with the Committee of Adjustment Decision as previously referenced. If private services are needed on an interim basis, the buildings are proposed to be constructed in a phased approach as noted below.

Phase 1

The proposed Phase 1 building is expected to consist of a two storey, slab-on-grade assembly building with a footprint of approximately 9,341 m². It is anticipated that associated paved access lanes, vehicle parking areas and landscaped areas will surround the proposed buildings. The estimated peak season employee count is 40 employees working two shifts a day, with an estimated maximum daily sewage flow volume of 6,650 L/day (based on Ontario Building Code - 2012 - Part 8).

Phase 2

The proposed Phase 2 building is an office/showroom building. This phase is proposed to be completed subsequent to Phase 1. The office building has an approximate footprint of 2,453 m². The estimated maximum daily flow volume is 22,253 L/day, which will require an environmental compliance application (ECA) and supporting documents/processes for the private on-site sewage treatment system. Refer to Paterson Drawing PH3959 - 1 - Rev.1 - Proposed Site Layout Plan in Appendix 3 for further details.

Existing Water Supply Well Location

The proposed development is anticipated to be municipally serviced. However, a private water supply well has been constructed (March 6, 2020) onsite after consultation with the City of Ottawa and has been constructed to meet Condition 3 of the Committee of Adjustment Decision. The location of the potable water supply well is outside the minimum required setbacks as per O.Reg. 903 and is located upgradient of the proposed sewage system area. Refer to Paterson Drawing PH3959 - 1 - Rev.1 - Proposed Site Layout Plan in Appendix 3 for the existing location of the water supply well.

Peak Season Maximum Daily Water Demand

Although the development will be constructed in a phased approach, the potable water supply well is proposed to be used to supply both phases of the development dependent upon the timing of municipal services.

Paterson Group completed theoretical daily water demand calculations for the proposed development. In order to determine the peak seasonal maximum daily water demand, the follow parameters have been used.

For Phase 1, the factory is assumed to have 40 employees at 2 shifts per day, and the factory office space is approximately 80 m². This equates to (40 employees x 2 shifts x 75 L/day) + ((80 m² / 9.3 m²) x 75 L/day) for a total of 6,650 L/Day.

For Phase 2, a daycare with 15 children and two adults, a design/visitor center with 30 visitors per hour for 8 hours of the day, and an office space of 2,006 m² were used for the calculations. This equates to ((15 children x 75 L/day) + (2 adults x 75 L/day)) + (30 visitors per hour x 8 hours a day = 240 visitors x 20 L/day) + ((2,006 m² / 9.3 m²) x 75 L/day) for a total of 22,253 L/day.

Maximum peak season daily flows result in a total of (6,650 L/day + 22,253 L/day) for a total of 28,903 L/day.

3.0 METHOD OF STUDY

A new drilled well (TW1) was constructed for use as a test well for this hydrogeological assessment and as a potential production well. The design of TW1 was based on pre-consultation with the City of Ottawa.

3.1 Test Well Construction

Test Well 1 (TW1)

As a means to demonstrate the adequacy of the aquifer underlying the subject lands, with respect to water quality and quantity, a new drilled well was constructed and tested. TW1 has a 260 mm diameter steel casing extending to a depth of 34.7 m below ground surface. The 260 mm steel casing extends 0.92 m into bedrock. A 158 mm diameter steel casing was installed inside the 260 mm diameter steel casing extending to a depth of 60.4 m below ground surface. The total depth of the well was indicated to be 97.5 m. According to the well record, gray and black limestone bedrock was recorded at a depth of approximately 33.8 m below ground surface (bgs), and white sandstone was recorded to be encountered at 87.2 m bgs.

The new drilled well is located in the southern portion of the property. Refer to attached Paterson Drawing PH3959 - 1 - Rev.1 - Proposed Site Layout Plan in Appendix 3 for the approximate well location. It is proposed that this well will service the proposed commercial / industrial development. The new drilled well is fully accessible with the 150 mm diameter steel casing extending 0.43 m above the 260 mm diameter steel stickup. The well stick-up meets the minimum height requirement as per Ontario Regulation 903.

3.2 Grouting Inspection

Test Well 1 (TW1)

Qualified Paterson personnel completed the grouting inspection on TW1 on March 5 and 6, 2020. Qualified Paterson personnel witnessed the welding and setting of the 260 mm diameter steel casing on March 5, 2020. Paterson witnessed the welding and setting of the 158 mm diameter steel casing and subsequent placement of grouting on March 6, 2020. TW1 conforms to O.Reg 903 standards.

Observation Wells (OBS1 and OBS2)

As per the pre-consultation with the City of Ottawa, the two deepest existing monitoring wells along Borrisokane Road, completed by Dillon Consulting Ltd. (Dillon) were outfitted with electronic dataloggers. The Dillon borehole logs were provided to Paterson by the City of Ottawa representatives, and can be found attached to this report in Appendix 2.

MW 186-1 and MW 187-1 were chosen as they were the two deeper wells between TW1 and the Trail Road Waste Facility. Both wells were outfitted with a datalogger which monitored water levels for 24 hours prior to the pumping test and 24 hours after the completion of the pumping test. Both borehole logs can be found attached in Appendix 1, and can be seen located on the attached plan: Dillon Consulting Project: 18-7333 - Plan Trail Road Landfill Site dated Feb 11, 2020 in Appendix 3.

MW 186-1 (OBS1) has a total depth of 10.11 m below ground surface, and contains a 50 mm diameter PVC well. According to the borehole log, the subsurface profile consists of a brown coarse grained sand with a grey clayey silt and grey clay layer occurring between 5.5 to 6.1 m depth below ground surface. Water levels were not recorded on the borehole log. The water level prior to the pumping test was measured to be at 6.20 m below the top of the casing. The water level at the end of the pumping test was 6.17 m below the top of the casing. The horizontal separation from OBS1 to TW1 is 253 m, indicated by Paterson Drawing PH3959 - 1 - Rev.1 - Proposed Site Layout Plan in Appendix 3.

MW 187-1 (OBS2) has a total depth of 10.67 m below ground surface, and contains a 50 mm diameter PVC well. According to the borehole log, the subsurface profile consists of a brown coarse grained sand with a grey clay to silty clay with some sand layer occurring between 5.8 to 7.3 m depth below ground surface. Water levels were not recorded on the borehole log. The water level prior to the pumping test was measured to be at 7.06 m below the top of the casing. The water level at the end of the pumping test was 7.04 m below the top of the casing. The horizontal separation from OBS2 to TW1 is 376 m, indicated by Paterson Drawing PH3959 - 1 - Rev.1 - Proposed Site Layout Plan in Appendix 3.

3.3 Pumping Test

Test Well 1 (TW1)

As a means to evaluate the water supply aquifer intercepted by the well, the well was subjected to a 12 hour constant rate pumping test. The duration was based on the preliminary Hydrogeology and Terrain Analysis Guidelines and the City of Ottawa pre-consultation. The pumping test was conducted on March 10, 2020 under the full-time supervision of Paterson personnel.

A submersible pump was provided by Air Rock Drilling for the 12 hour pumping test. A licensed water well technician (Air Rock Drilling) 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 being 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 68 L/min for a duration of 12 hours. During the pumping test, the pumping rate was periodically measured using the timed volume correlation method. The pump rate was maintained within 5% of the selected pump rate. The static water level was recorded and an electronic datalogger (VanEssen TD-Diver) was installed in the test well prior to the start of the pumping test. The data logger recorded water levels at 30 second intervals. In addition, manual water level readings were taken at periodic intervals during the test.

A electronic barometer (VanEssen TD-Barometer) was installed in the test well prior to the start of the pumping test and was used for barometric correction on the dataloggers in TW1, OBS1, and OBS2.

Recovery data was collected from the well following the completion of the pumping. The well was noted to have achieved 95% recovery approximately 4.5 minutes after the completion of the pumping.

Groundwater samples were collected at 6 hours and 12 hours after the start of pumping. Prior to collection of the groundwater samples, the free chlorine residual was verified to be non-detectable. The water samples were submitted for comprehensive testing of bacteriological, chemical and physical water quality parameters consistent with the standard 'Subdivision Supply' suite of parameters, with additional testing for Volatile Organic Compounds (VOC's) and metals as per the City of Ottawa pre-

consultation.

All samples were collected unfiltered and unchlorinated and were placed directly into clean bottles supplied by the analytical laboratory. Samples were placed immediately into a cooler with ice and were transported directly to the 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 12 hour pumping test. The parameters tested at the well head included: pH, total dissolved solids, conductivity, turbidity and temperature.

Observation Wells (OBS1 and OBS2)

The static water levels were recorded and electronic dataloggers (VanEssen TD-Diver) were installed in the test wells prior to the start of the pumping test. The data loggers recorded water levels at 1 minute intervals. In addition, manual water level readings were taken at periodic intervals during the pumping test.

OBS1 had water levels which fluctuated between 6.15 to 6.34 m below the top of the casing during the overall monitoring period. As a 0.19 m water level fluctuation was measured for this observation well during the monitoring period, the fluctuation of 0.03 m during the pumping test on TW1 is considered to be related to ambient conditions.

OBS2 had water levels which fluctuated between 7.02 to 7.18 m below the top of casing during the overall monitoring period. As a 0.16 m water level fluctuation was measured for this observation well during the monitoring period, the fluctuation of 0.02 m during the pumping test on TW1 is considered to be related to ambient conditions.

4.0 AQUIFER ANALYSIS

4.1 Water Quantity

Pumping test data was analyzed using AquiferTest Pro (v. 2016.1) aquifer analysis software package by Schlumberger Water Services. 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)	1940
Pumping Rate (L/min)	68
Pre-test Static Water Level (m)	9.5
End of Test Water level (m)	15.06
Available Drawdown (m)	88.04
% Drawdown During Pumping Test	10.8
Specific Capacity (L/min/m drawdown)	12.2

The drawdown data was analyzed using the Theis (Theis, 1935), Theis Recovery, and the Cooper & Jacob methods of analysis (Cooper & Jacob, 1946). Aquifer transmissivity is estimated to be approximately 1940 m²/day.

The pumping test results show that TW1 has a high yield to support the water demands for the proposed commercial / industrial development. Maximum drawdown at a constant pumping rate for a period of 12 hrs was approximately 5.56 m (10.8 % of the available drawdown). 95 % recovery was achieved approximately 4.5 minutes after the end of pumping.

The total volume of water pumped during the 12 hour pumping event was approximately 48,960 L. This is in excess of the average daily sewage flow volume required to support the proposed commercial / industrial development, according to Paterson calculations.

The suitability of the aquifer to supply the proposed commercial / industrial development was assessed using the methodology provided in MECP Procedure D-5-5 (MOEE, 1996).

Based on the information summarized in Table 1, it is readily apparent that the new water supply well has intercepted a significant water supply aquifer which has sufficient quantity to service the proposed commercial / industrial development at peak seasonal use. The transmissivity aquifer parameter suggests an aquifer which is able to transmit adequate quantities of water relatively quickly with fast recharge capabilities.

Given the analyses presented and summarized above, it is our opinion that there is an adequate supply of water to service the proposed commercial / industrial development on the property.

The observation wells, OBS1 and OBS2, experienced negligible drawdown (0.03 and 0.02 m increase in water level) during the pumping test of TW1. The drawdown is attributed to a surficial connection to the shallow aquifer as the water level was increasing in both observation wells while precipitation was occurring and started to decrease after the precipitation stopped. Minor variability (0.16 to 0.18 m water level fluctuations) in the static water level of the observation wells in the days subsequent to the pumping test of TW1 were recorded.

4.2 Water Quality

Field Data

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

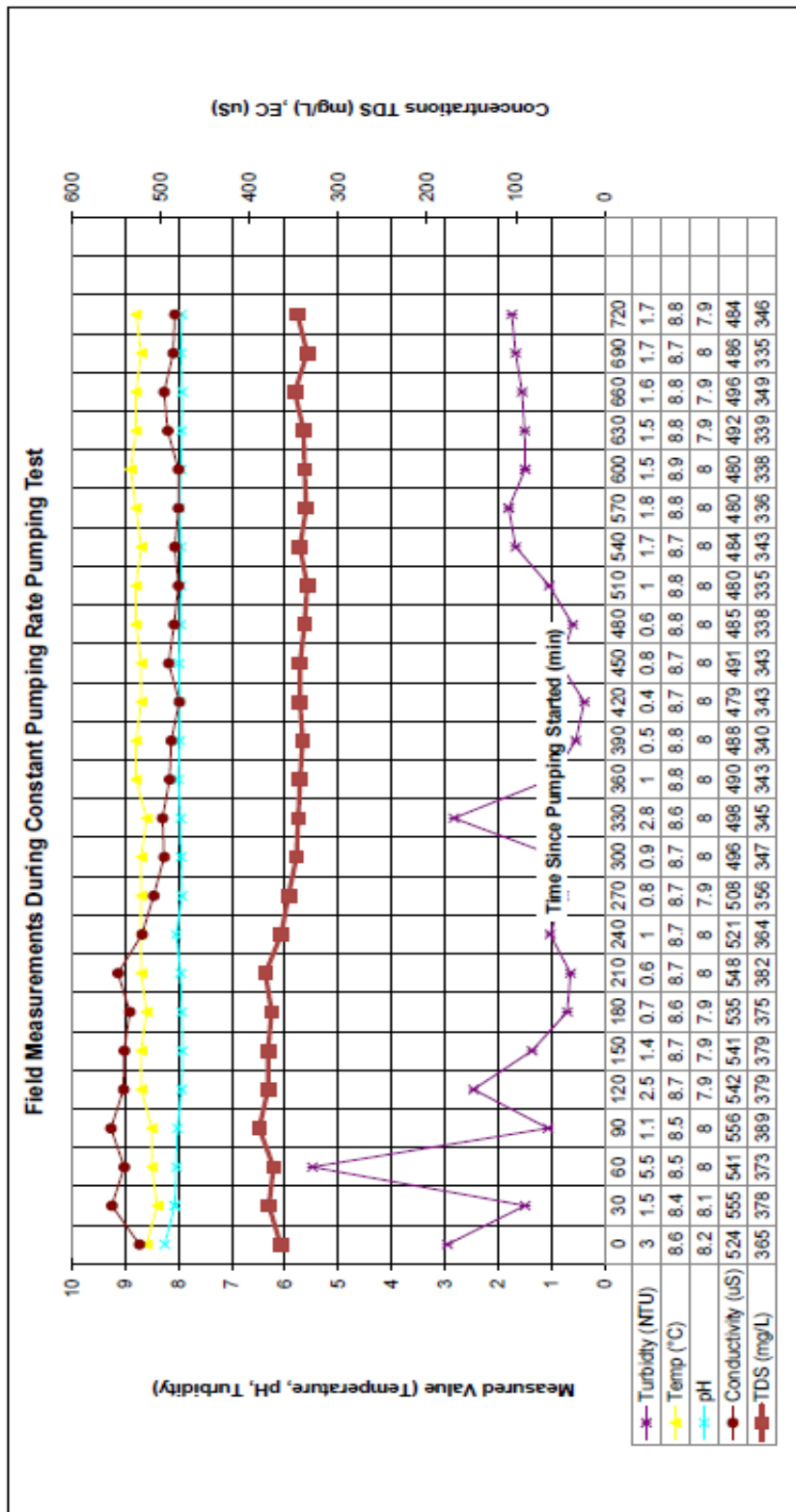


TABLE 2: GROUNDWATER GEOCHEMISTRY (TW1)					
PARAMETER	UNITS	ODWS		TW1	
		LIMIT	TYPE	GW1 (6 hr) 10/03/2020	GW2 (12 hr) 10/03/2020
MICROBIOLOGICAL					
Escherichia Coli (E.Coli)	ct/100mL	0	MAC	0	0
Total Coliforms	ct/100mL	0	MAC	0	0
GENERAL CHEMICAL - HEALTH RELATED					
Fluoride	mg/L	1.5 (2.4)	MAC	0.7	0.66
N-NO2 (Nitrite)	mg/L	1	MAC	< 0.10	< 0.10
N-NO3 (Nitrate)	mg/L	10	MAC	< 0.10	< 0.10
Turbidity (Laboratory)	NTU	1.0 (5.0)	MAC/AO	0.8	1.9
Turbidity (Field)	NTU	1.0 (5.0)	MAC/AO	1.0	1.7
N-NH3 (Ammonia)	mg/L	-	-	0.09	0.10
Total Kjeldahl Nitrogen	mg/L	-	-	0.263	0.296
GENERAL CHEMICAL - AESTHETIC RELATED					
Hardness (as CaCO3)	mg/L	100	OG	119	126
Ion Balance	unitless	-	-	0.89	0.91
Total Dissolved Solids	mg/L	500	AO	280	280
Alkalinity (as CaCO3)	mg/L	500	OG	164	166
Chloride	mg/L	250	AO	44	41
Aluminum	mg/L	0.1	OG	< 0.01	< 0.01
Antimony	mg/L	0.006	IMAC	< 0.0005	< 0.0005
Arsenic	mg/L	0.01	IMAC	< 0.001	< 0.001
Barium	mg/L	1	MAC	0.04	0.05
Bismuth	mg/L	-	-	< 0.002	< 0.002
Boron	mg/L	5	IMAC	0.23	0.21
Cadmium	mg/L	0.005	MAC	< 0.0001	< 0.0001
Calcium	mg/L	-	-	23	24
Chromium	mg/L	0.05	MAC	< 0.001	< 0.001
Cobalt	mg/L	-	-	< 0.0002	< 0.0002
Colour	TCU	5	AO	< 2	< 2
Conductivity	uS/cm	-	-	511	500
Copper	mg/L	1	AO	< 0.001	< 0.001
Dissolved Organic Carbon	mg/L	5	AO	0.7	0.7
Iron	mg/L	0.3	AO	0.08	0.12
Lead	mg/L	0.01	MAC	< 0.001	< 0.001
Magnesium	mg/L	-	-	15	16
Manganese	mg/L	0.05	AO	< 0.01	< 0.01
Mercury	mg/L	0.001	MAC	< 0.0001	< 0.0001
Molybdenum	mg/L	-	-	< 0.005	< 0.005
Nickel	mg/L	-	-	< 0.005	< 0.005
pH	unitless	6.5-8.5	AO	8.37	8.39
Phenols	mg/L	-	-	< 0.001	< 0.001
Potassium	mg/L	-	-	7	7
Selenium	mg/L	0.05	MAC	< 0.001	< 0.001
Silver	mg/L	-	-	< 0.0001	< 0.0001
Sodium	mg/L	200	AO	56	51
Sulphate	mg/L	500	AO	33	33
Sulphide	mg/L	0.05	AO	< 0.01	< 0.01
Tannin & Lignin	mg/L	-	-	< 0.1	< 0.1
Tin	mg/L	-	-	< 0.01	< 0.01
Titanium	mg/L	-	-	< 0.01	< 0.01
Uranium	mg/L	0.02	MAC	< 0.001	< 0.001
Vanadium	mg/L	-	-	< 0.001	< 0.001
Zinc	mg/L	5	AO	< 0.01	< 0.01

1. ODWS identifies the following types of parameters:

MAC=Maximum Allowable Concentration

AO = Aesthetic Objective

OG= Operational Guideline

IMAC= Interim Maximum Acceptable Concentration

2. Shaded Concentration Indicates an Exceedance of the ODWS Objective

TABLE 2: GROUNDWATER GEOCHEMISTRY (TW1)					
PARAMETER	UNITS	ODWS		TW1	
		LIMIT	TYPE	GW1 (6 hr) 10/03/2020	GW2 (12 hr) 10/03/2020
General Chemical - Volatile Organic Compounds (VOC's)					
1,1,1,2-tetrachloroethane	ug/L			<0.5	<0.5
1,1,1-trichloroethane	ug/L			<0.4	<0.4
1,1,2,2-tetrachloroethane	ug/L			<0.5	<0.5
1,1,2-trichloroethane	ug/L			<0.4	<0.4
1,1-dichloroethane	ug/L			<0.4	<0.4
1,1-dichloroethylene	ug/L	14	MAC	<0.5	<0.5
1,2-dichlorobenzene	ug/L	200	MAC	<0.4	<0.4
1,2-dichloroethane	ug/L	5	IMAC	<0.2	<0.2
1,2-dichloropropane	ug/L			<0.5	<0.5
1,3,5-trimethylbenzene	ug/L			<0.3	<0.3
1,3-dichlorobenzene	ug/L			<0.4	<0.4
1,3-Dichloropropylene (cis+trans)	ug/L			<0.3	<0.3
1,4-dichlorobenzene	ug/L	5	MAC	<0.4	<0.4
Acetone	ug/L			<30	<30
Benzene	ug/L	1	MAC	<0.5	<0.5
Bromodichloromethane	ug/L			<0.3	<0.3
Bromoform	ug/L			<0.4	<0.4
Bromomethane	ug/L			<0.5	<0.5
c-1,2-Dichloroethylene	ug/L			<0.4	<0.4
c-1,3-Dichloropropylene	ug/L			<0.2	<0.2
Carbon Tetrachloride	ug/L	2	MAC	<0.2	<0.2
Chloroethane	ug/L			<0.2	<0.2
Chloroform	ug/L			<0.5	<0.5
Dibromochloromethane	ug/L			<0.3	<0.3
Dichlorodifluoromethane	ug/L			<0.5	<0.5
Dichloromethane	ug/L	50	MAC	<4.0	<4.0
Ethylbenzene	ug/L	140	MAC	<0.5	<0.5
Ethylene Dibromide	ug/L			<0.2	<0.2
Hexane	ug/L			<5	<5
m/p-xylene	ug/L			<0.4	<0.4
Methyl Ethyl Ketone (MEK)	ug/L			<10	<10
Methyl Isobutyl Ketone (MIBK)	ug/L			<10	<10
Methyl Tert Butyl Ether (MTBE)	ug/L	15	AO	<2	<2
Monochlorobenzene	ug/L	80	MAC	<0.5	<0.5
o-xylene	ug/L			<0.4	<0.4
Styrene	ug/L			<0.5	<0.5
t-1,2-Dichloroethylene	ug/L			<0.4	<0.4
t-1,3-Dichloropropylene	ug/L			<0.2	<0.2
Tetrachloroethylene	ug/L	10	MAC	<0.3	<0.3
Toluene	ug/L	60	MAC	<0.5	<0.5
Trichloroethylene	ug/L	5	MAC	<0.3	<0.3
Trichlorofluoromethane	ug/L			<0.5	<0.5
Vinyl Chloride	ug/L	1	MAC	<0.2	<0.2
Xylene; total	ug/L	90	MAC	<0.5	<0.5

1. ODWS identifies the following types of parameters:

MAC=Maximum Allowable Concentration

AO = Aesthetic Objective

OG= Operational Guideline

IMAC= Interim Maximum Acceptable Concentration

2. Shaded Concentration Indicates an Exceedance of the ODWS Objective

Laboratory Data

The laboratory water quality obtained from the pumping test of TW1 is provided in Table 2 above and the laboratory analyses reports can be found attached.

The bacteriological test results (Certificate of Analysis - Report No. 1926944) indicated that the test sample at the 6 and 12 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

Exceedance of the above parameter are not uncommon of the water supply in the subject aquifer. The groundwater parameters are discussed in detail below.

Hardness as CaCO₃

Hardness, expressed as calcium carbonate, an operational guideline, 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 of 100 mg/L. At the measured concentration of 119 and 126 mg/L, the water is considered to be hard. The Technical Support Document for ODWS publication states that water with hardness in excess of 500 mg/L may be unacceptable for most domestic purposes, however, there is no maximum treatable value available. It is expected the hardness concentration can be treated using standard commercial water softener technologies, if desired. Discharging of wastes from water treatment should be directed away from the septic system.

Sodium

Sodium is an aesthetic parameter, and was detected in the test samples at a concentration of 56 and 51 mg/L, which is less than the ODWS aesthetic objective of 200 mg/L. Sodium is a unique water quality parameter in that it has a cautionary limit of 20 mg/L for health related purposes, but can be present in raw water up to 200 mg/L and still be within the aesthetic objective. It is a requirement of the ODWS that the Medical Officer of Health be notified of the water quality results where sodium is

present in concentrations exceeding 20 mg/L and it is intended for consumption. The purpose of this is such that the information can be disseminated to local physicians for their use in the treatment of individuals requiring reduced sodium dietary needs.

5.0 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 TW1 is considered to be more than adequate to support the seasonal peak water quantity demands for the proposed commercial / industrial development.
2. The preferred water supply aquifer intercepted by TW1 contains a water supply that is potable, and contains only elevated concentrations of hardness. The concentrations are within the aesthetic objective values for the ODWS. The hardness can be treated with current readily available commercial water conditioning equipment, if desired.
3. The sodium concentrations were 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.
4. The results of the water supply assessment suggests that the water supply aquifer underlying the subject site can support the proposed commercial / industrial development from both a quality and quantity perspective.

The present report applies only to the project described in this document. Use of this report for purposes other than those described herein or by person(s) other than Caivan (Greenbank North) Inc., or their agents, is not authorized without review by Paterson for the applicability of our recommendations to the alternative use of the report.

We trust that this report satisfies your present requirements. Should you have any questions regarding this report, do not hesitate to contact us.

Yours truly,

PATERSON GROUP INC.

Erik Ardley, Bsc. Geology

Junior Hydrogeologist



Michael S. Killam, P.Eng.

Hydrogeologist



APPENDIX 1

MECP WATER WELL RECORD - TW1

PUBLISHED MECP WATER WELL RECORDS

DILLON CONSULTING MONITORING WELL RECORDS - OBS1, AND OBS2

Measurements recorded in: ☐ Metric ☒ Imperial

Well

Below)

A 274388

Page of

Well Owner's Information

First Name Caivan	Last Name / Organization Barrhaven Kentel Ltd. Tolerson Group	E-mail Address 	<input type="checkbox"/> Well Constructed by Well Owner
Mailing Address (Street Number/Name) 54 Colonnade Road South	Municipality Ottawa	Province Ont	Postal Code K2E 7J5
Telephone No. (inc. area code) 			

Well Location

Address of Well Location (Street Number/Name) # 3713 DORRISOKANE ROAD				Township Nepean		Lot 9		Concession 3 R.F.	
County/District/Municipality Ottawa-Carleton				City/Town/Village Nepean		Province Ontario		Postal Code	
UTM Coordinates Zone Easting Northing NAD 83 18441097015009710				Municipal Plan and Sublot Number Plan SR-6254 Part 2		Other Plan SR-13403 Part 1			

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

[illegible]

Annular Space

Depth From	Set at (m/ft) To	Type of Sealant Used (Material and Type)	Volume Placed (m ³ /ft ³)
198'	188'	Neat Cement Slurry	10.92
188'	0'	Bentonite Slurry	50.40
201 1/4"	20' 0"	Bentonite Slurry	4.20

Method of Construction

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

Construction Record - Casino

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft)		<input checked="" type="checkbox"/> Water Supply <input checked="" type="checkbox"/> Replacement Well <input type="checkbox"/> Test Hole <input type="checkbox"/> Recharge Well <input type="checkbox"/> Dewatering Well <input type="checkbox"/> Observation and/or Monitoring Hole <input type="checkbox"/> Alteration (Construction) <input type="checkbox"/> Abandoned,
			From	To	
10 1/4"	Steel	.250"	+1'	114'	
6 1/4"	Steel	.188"	+2'	198'	
6 1/8"	Open Hole		198'	320'	

Construction Record - Screen

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

☐ Abandoned, Poor Water Quality
☐ Abandoned, other, specify _____
☐ Other, specify _____

Water Details


Water found at Depth 314' (m/f) <input checked="" type="checkbox"/> Gas <input checked="" type="checkbox"/> Other, specify _____	Kind of Water: <input type="checkbox"/> Fresh <input checked="" type="checkbox"/> Unstested	Depth (m/f) From _____ To _____	Diameter (cm/in)
Water found at Depth (m/f) <input type="checkbox"/> Gas <input type="checkbox"/> Other, specify _____	Kind of Water: <input type="checkbox"/> Fresh <input type="checkbox"/> Unstested	0' 20'	12 3/4"
Water found at Depth (m/f) <input type="checkbox"/> Gas <input type="checkbox"/> Other, specify _____	Kind of Water: <input type="checkbox"/> Fresh <input type="checkbox"/> Unstested	20' 198'	9 3/4"
Water found at Depth (m/f) <input type="checkbox"/> Gas <input type="checkbox"/> Other, specify _____	Kind of Water: <input type="checkbox"/> Fresh <input type="checkbox"/> Unstested	198' 32'	6 1/2"

Hole Diameter

Hole Diameter		
Depth (m/ft)		Diameter (cm/in)
From	To	
0'	20'	12 3/4"
20'	198'	9 3/4"
198'	332'	6 1/8"

Well Contractor and Well Technician Information

Business Name of Well Contractor		Well Contractor's Licence No.
Air Rock Drilling Co Ltd		C7681
Business Address (Street Number/Name)		Municipality
6659 Franktown Road		Richmond
Province	Postal Code	Business E-mail Address

Buss. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)	
61388382170	HANNA JEREMY	
Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
TJ3633		2012-11-23

Results of Well Yield Testing

After test of well yield, water was:		Draw Down		Recovery	
<input type="checkbox"/> Clear and sand free <input checked="" type="checkbox"/> Other, specify _____		Time (min)	Water Level (m/ft)	Time	Water Level (m/ft)
If pumping discontinued, give reason: X		Static Level	31' 0"		80' 6"
Pump intake set at (m/ft) 300'		1	39.7	1	64.2
Pumping rate (l/min / GPM) 20		2	48.7	2	56.2
Duration of pumping 1 hrs + 0 min		3	52.8	3	48.9
Final water level end of pumping (m/ft) 80' 6"		4	57.5	4	43.3
If flowing give rate (l/min / GPM) X		5	60.3	5	39.
Recommended pump depth (m/ft) 150 FT		10	70.	10	31.7
Recommended pump rate (l/min / GPM) 20		15	75.1	15	31' 0"
Well production (l/min / GPM) 20		20	76.8	20	31' 0"
Disinfected? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		25	77.9	25	
		30	78.7	30	
		40	79.5	40	
		50	80.3	50	
		60	80' 6"	60	

Map of Well Location

Please provide a map below following instructions on the back.

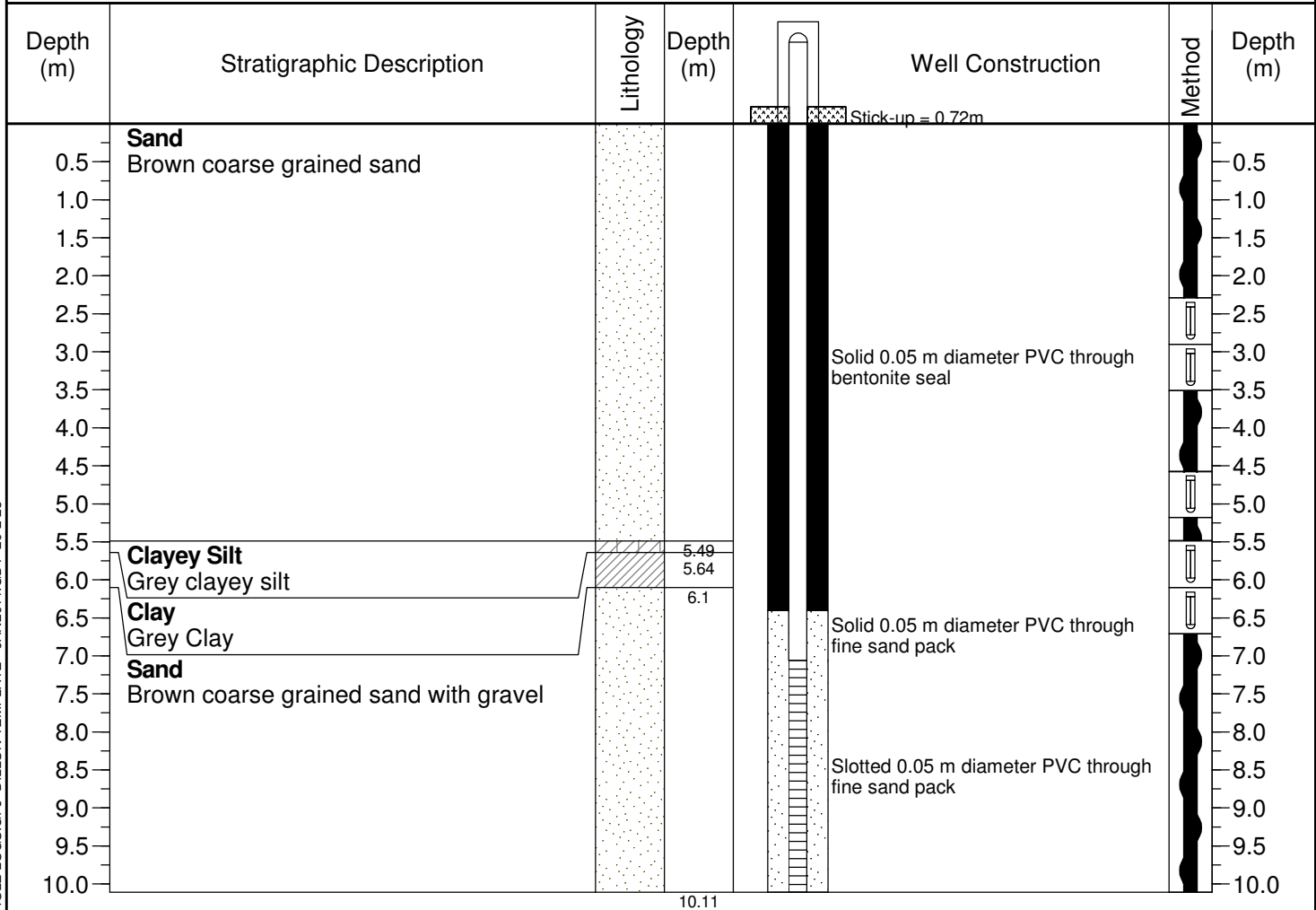
Hand-drawn map showing the location of a site relative to Burnside Road and Burnisokane Road. The site is marked with an 'X' in a circle. The distance from Burnside Road is 1.3 KM, and the distance from Burnisokane Road is 0.2 KM. A north arrow is shown in the top right corner.

Comments: 1 1/2 H-20 PM @ 150 FR	
Well owner's Information package delivered <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Date Package Delivered 2000 03 06 Date Work Completed 2000 03 04 Ministry Use Only Audit No. 2302528 Received



Dillon Consulting Ltd.
177 Collonade Road, Suite 101
Ottawa, Ontario K2E 7J4
Telephone: (613) 745-2213
Fax: (613) 745-3491

Client: Dillon Consulting Ltd. Project: Trail Road Landfill Drilling Program
Project No.: 18-7333 Location: Trail Road Landfill
Drilling Co.: Aardvark Drilling Inc. Drilling Method: Hollow Stem Augers
Supervised by: TTN Date Started: 19-12-11 Date Completed: 19-12-11



DILLON MW DEPTH 2019 M183-M187 + TEST WELL TRAIL LANDFILL BOREHOLE LOGS.GPJ DILLON TEMPLATE - JAN2011.GDT 20-2-28

LITHOLOGY SYMBOLS
 Sand
 Clay

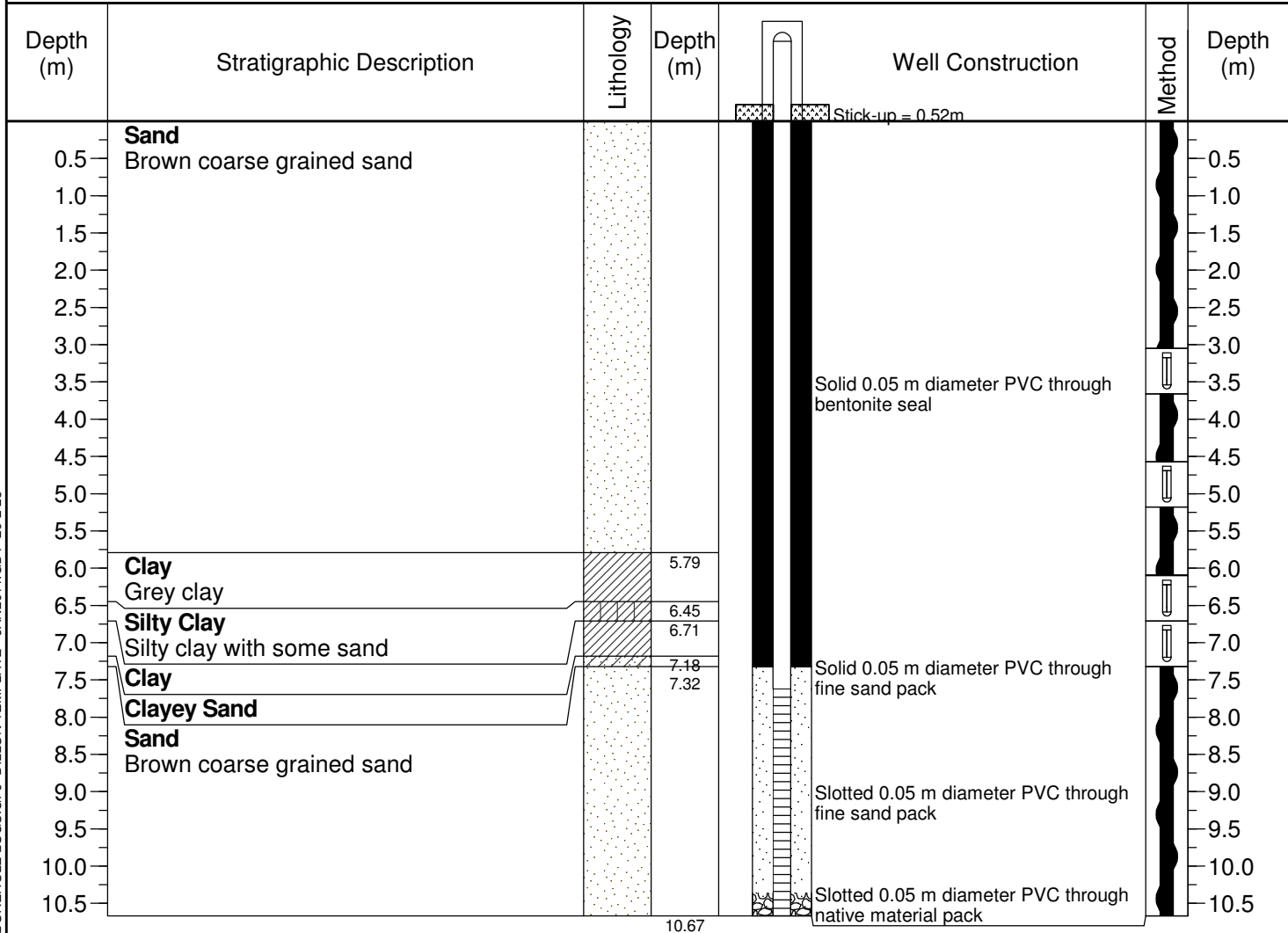
Clayey Silt

SAMPLE TYPE
 Auger
 Split Spoon



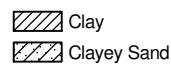
Dillon Consulting Ltd.
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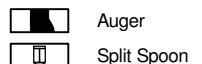


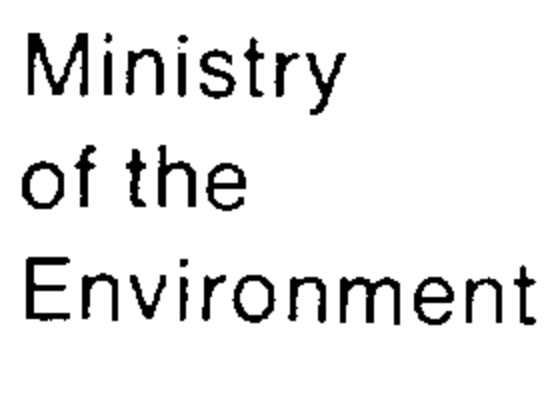
DILLON MW DEPTH 2019 M183-M187 + TEST WELL TRAIL LANDFILL BOREHOLE LOGS.GPJ DILLON TEMPLATE - JAN2011.GDT 20-2-28

**LITHOLOGY
SYMBOLS**



**SAMPLE
TYPE**





WATER WELL RECORD

104

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

OFFICE USE ONLY	DATA SOURCE	58	CONTRACTOR	58-62	DATE RECEIVED	63-68	80
	5222		APR 05 1994				
	DATE OF INSPECTION		INSPECTOR				
REMARKS							

Ministry of
the Environment

Well Tag Number (Place sticker and print number below)

Well Record

Regulation 903 Ontario Water Resources Act

page of

Instructions for Completing Form

- For use in the **Province of Ontario** only. This document is a permanent **legal** document. Please retain for future reference.
 • All Sections **must** be completed in full to avoid delays in processing. Further instructions and explanations are available on the back of this form.
 • Questions regarding completing this application can be directed to the Water Well Management Coordinator at 416-235-6203.
 • **All metre measurements shall be reported to 1/10th of a metre.**
 • Please print clearly in blue or black ink only.
- Ministry Use Only**

Well Owner's Information and Location of Well Information

First Name City of Ottawa		Last Name [REDACTED]		Mailing Address (Street Number/Name, RR Lot, Concession) RR2 4475 Trail Road			
County/District/Municipality Ottawa Carleton		Township/City/Town/Village Ottawa		Province Ontario	Postal Code K0A 2Z0	Telephone Number (include area code) 613-580-2424 x22843	
Address of Well Location (County/District/Municipality) Ottawa Carleton				Township Nepean		Lot 4	Concession
RR#/Street Number/Name RR2 4475 Trail Road				City/Town/Village Ottawa		Site/Compartment/Block/Tract etc.	
GPS Reading	NAD 83	Zone 18	Easting 440488	Northing 5009573	Unit Make/Model Magellan	Mode of Operation: <input checked="" type="checkbox"/> Undifferentiated <input type="checkbox"/> Differentiated, specify _____	

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth	Metres
				From	To
grey	sand	silt	Medium to coarse sand, some silt	0	6.1
grey	sand		Coarse sand	6.1	6.55
grey	silt		silt	6.55	6.71
grey	clay	silt	clay, some silt	6.71	9.75
grey	sand		Medium to coarse sand	9.75	12.8

Hole Diameter		
Depth	Metres	Diameter
From	To	Centimetres
0	12.8	20.3

Water Record	
Water found at _____ Metres	Kind of Water
<input type="checkbox"/> _____ m <input type="checkbox"/> Gas <input type="checkbox"/> Other: _____	<input type="checkbox"/> Fresh <input type="checkbox"/> Salty <input type="checkbox"/> Sulphur <input type="checkbox"/> Minerals
<input type="checkbox"/> _____ m <input type="checkbox"/> Gas <input type="checkbox"/> Other: _____	<input type="checkbox"/> Fresh <input type="checkbox"/> Salty <input type="checkbox"/> Sulphur <input type="checkbox"/> Minerals
<input type="checkbox"/> _____ m <input type="checkbox"/> Gas <input type="checkbox"/> Other: _____	<input type="checkbox"/> Fresh <input type="checkbox"/> Salty <input type="checkbox"/> Sulphur <input type="checkbox"/> Minerals

After test of well yield, water was

☐ Clear and sediment free

☐ Other, specify _____

Chlorinated ☐ Yes ☐ No

Construction Record				
Inside diam centimetres	Material	Wall thickness centimetres	Depth	Metres
			From	To
Casing				
	<input type="checkbox"/> Steel <input type="checkbox"/> Fibreglass <input type="checkbox"/> Plastic <input type="checkbox"/> Concrete <input type="checkbox"/> Galvanized			
	<input type="checkbox"/> Steel <input type="checkbox"/> Fibreglass <input type="checkbox"/> Plastic <input type="checkbox"/> Concrete <input type="checkbox"/> Galvanized			
	<input type="checkbox"/> Steel <input type="checkbox"/> Fibreglass <input type="checkbox"/> Plastic <input type="checkbox"/> Concrete <input type="checkbox"/> Galvanized			
Screen				
Outside diam	<input type="checkbox"/> Steel <input type="checkbox"/> Fibreglass <input type="checkbox"/> Plastic <input type="checkbox"/> Concrete <input type="checkbox"/> Galvanized	Slot No.		
No Casing or Screen				
<input type="checkbox"/> Open hole				

Test of Well Yield				
Pumping test method	Draw Down		Recovery	
	Time min	Water Level Metres	Time min	Water Level Metres
Pump intake set at - (metres)	Static Level			
Pumping rate - (litres/min)	1		1	
Duration of pumping _____ hrs + _____ min	2		2	
Final water level end of pumping _____ metres	3		3	
Recommended pump type. <input type="checkbox"/> Shallow <input type="checkbox"/> Deep	4		4	
Recommended pump depth. _____ metres	5		5	
Recommended pump rate. (litres/min)	10		10	
If flowing give rate - (litres/min)	15		15	
	20		20	
	25		25	
If pumping discontinued, give reason.	30		30	
	40		40	
	50		50	
	60		60	

Plugging and Sealing Record				<input type="checkbox"/> Annular space	<input checked="" type="checkbox"/> Abandonment
Depth set at - Metres		Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)		
From	To				
0	1.0	hole plug	2 bags		
1.0	12.8	cement bentonite grout	1 1/2		
<p align="center">Method of Construction</p> <div> <input type="checkbox"/> Cable Tool <input type="checkbox"/> Rotary (air) <input type="checkbox"/> Diamond <input type="checkbox"/> Digging </div> <div> <input type="checkbox"/> Rotary (conventional) <input type="checkbox"/> Air percussion <input type="checkbox"/> Jetting <input type="checkbox"/> Other </div> <div> <input type="checkbox"/> Rotary (reverse) <input type="checkbox"/> Boring <input type="checkbox"/> Driving _____ </div>					
<p align="center">Water Use</p> <div> <input type="checkbox"/> Domestic <input type="checkbox"/> Industrial <input type="checkbox"/> Public Supply <input type="checkbox"/> Other </div> <div> <input type="checkbox"/> Stock <input type="checkbox"/> Commercial <input type="checkbox"/> Not used _____ </div> <div> <input type="checkbox"/> Irrigation <input type="checkbox"/> Municipal <input type="checkbox"/> Cooling & air conditioning _____ </div>					
<p align="center">Final Status of Well</p> <div> <input type="checkbox"/> Water Supply <input type="checkbox"/> Recharge well <input type="checkbox"/> Unfinished <input checked="" type="checkbox"/> Abandoned, (Other) </div> <div> <input type="checkbox"/> Observation well <input type="checkbox"/> Abandoned, insufficient supply <input type="checkbox"/> Dewatering _____ </div> <div> <input type="checkbox"/> Test Hole <input type="checkbox"/> Abandoned, poor quality <input type="checkbox"/> Replacement well _____ </div>					

Well Contractor/Technician Information			
Name of Well Contractor OAS		Well Contractor's Licence No. 6964	
Business Address (street name, number, city etc.) 5518 Appleton Side Road, Almonte Ont K0A 1A0			
Name of Well Technician (last name, first name) Oehlman Brian		Well Technician's Licence No. T 2593	
Signature of Technician/Contractor [Signature]		Date Submitted <div> <div>YY</div> <div>MM</div> <div>DD</div> </div>	

Location of Well

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

GPS reading taken on M4-2
this well is located 2m
from M4-1

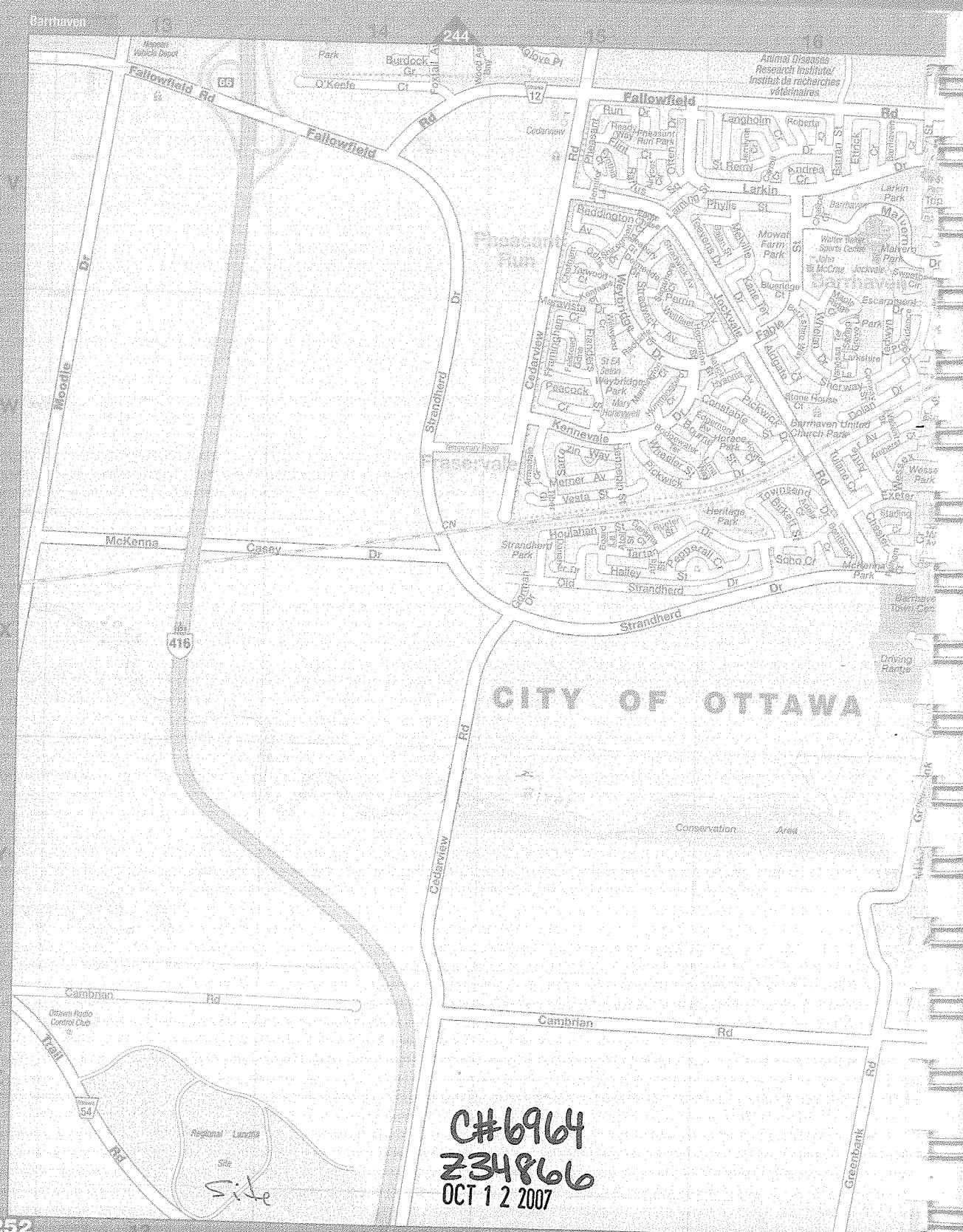
Site plan enclosed

Area map enclosed

Audit No. Z 34866	Date Well Completed YYYY MM DD 2007 9 10
Was the well owner's information package delivered? <input type="checkbox"/> Yes <input type="checkbox"/> No	Date Delivered YYYY MM DD 2007 10 10

Ministry Use Only

Data Source	Contractor
Date Received YYYY MM DD OCT 12 2007	Date of Inspection YYYY MM DD
Remarks	Well Record Number



C#6964
234866
OCT 1 2 2007



Instructions for Completing Form

- For use in the **Province of Ontario** only. This document is a permanent **legal** document. Please retain for future reference.
- All Sections **must** be completed in full to avoid delays in processing. Further instructions and explanations are available on the back of this form.
- Questions regarding completing this application can be directed to the Water Well Management Coordinator at 416-235-6203.
- All metre measurements shall be reported to 1/10th of a metre.**
- Please print clearly in blue or black ink only.

Well Owner's Information and Location of Well Information

First Name <i>City of Ottawa</i>		Last Name <i>[Redacted]</i>		Mailing Address (Street Number/Name, RR, Lot, Concession) <i>RR 2 4475 trail Road</i>											
County/District/Municipality <i>Ottawa Carleton</i>				Township/City/Town/Village <i>Ottawa</i>				Province <i>Ontario</i>		Postal Code <i>K0A 2Z0</i>		Telephone Number (include area code) <i>613-580-2424 x22843</i>			
Address of Well Location (County/District/Municipality) <i>Ottawa Carleton</i>						Township <i>Nepew</i>				Lot <i>1</i>		Concession <i>1</i>			
RR#/Street Number/Name <i>RR 2 4475 trail Road</i>						City/Town/Village <i>Ottawa</i>				Site/Compartment/Block/Tract etc.					
GPS Reading <i>8.3</i>		NAD <i>18</i>		Zone <i>18</i>		Easting <i>440488</i>		Northing <i>5999575</i>		Unit Make/Model <i>Jayellan</i>		Mode of Operation: <input checked="" type="checkbox"/> Undifferentiated <input type="checkbox"/> Averaged <input type="checkbox"/> Differentiated, specify _____			

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth Metres	
				From	To
<i>grey</i>	<i>sand</i>	<i>silt</i>	<i>medium to coarse sand, some silt</i>	<i>0</i>	<i>6.1</i>
<i>grey</i>	<i>sand</i>		<i>Coarse sand</i>	<i>6.1</i>	<i>6.55</i>
<i>grey</i>	<i>silt</i>		<i>Silt</i>	<i>6.55</i>	<i>6.71</i>
<i>grey</i>	<i>clay</i>	<i>silt</i>	<i>clay, some silt</i>	<i>6.71</i>	<i>9.75</i>
<i>grey</i>	<i>sand</i>		<i>medium to coarse sand</i>	<i>9.75</i>	<i>12.8</i>

Hole Diameter				
Depth From	Metres To	Diameter Centimetres		
<i>0</i>	<i>12.8</i>	<i>20.3</i>		
Water Record				
Water found at _____ Metres / Kind of Water				
<input type="checkbox"/> m. <input type="checkbox"/> Fresh <input type="checkbox"/> Sulphur				
<input type="checkbox"/> Gas <input type="checkbox"/> Salty <input type="checkbox"/> Minerals				
<input type="checkbox"/> Other: _____				
<input type="checkbox"/> m. <input type="checkbox"/> Fresh <input type="checkbox"/> Sulphur				
<input type="checkbox"/> Gas <input type="checkbox"/> Salty <input type="checkbox"/> Minerals				
<input type="checkbox"/> Other: _____				
<input type="checkbox"/> m. <input type="checkbox"/> Fresh <input type="checkbox"/> Sulphur				
<input type="checkbox"/> Gas <input type="checkbox"/> Salty <input type="checkbox"/> Minerals				
<input type="checkbox"/> Other: _____				
After test of well yield, water was				
<input type="checkbox"/> Clear and sediment free				
<input type="checkbox"/> Other, specify _____				
Chlorinated <input type="checkbox"/> Yes <input type="checkbox"/> No				

Construction Record				
Inside diam centimetres	Material	Wall thickness centimetres	Depth Metres	
			From	To
Casing				
<i>5.2</i>	<input type="checkbox"/> Steel <input type="checkbox"/> Fibreglass <input checked="" type="checkbox"/> Plastic <input type="checkbox"/> Concrete <input type="checkbox"/> Galvanized	<i>0.4</i>	<i>0</i>	<i>10.75</i>
	<input type="checkbox"/> Steel <input type="checkbox"/> Fibreglass <input type="checkbox"/> Plastic <input type="checkbox"/> Concrete <input type="checkbox"/> Galvanized			
	<input type="checkbox"/> Steel <input type="checkbox"/> Fibreglass <input type="checkbox"/> Plastic <input type="checkbox"/> Concrete <input type="checkbox"/> Galvanized			
Screen				
Outside diam	<input type="checkbox"/> Steel <input type="checkbox"/> Fibreglass <input checked="" type="checkbox"/> Plastic <input type="checkbox"/> Concrete <input type="checkbox"/> Galvanized	Slot No.		
<i>6.0</i>		<i>10</i>	<i>10.75</i>	<i>12.25</i>
No Casing or Screen				
<input type="checkbox"/> Open hole				

Test of Well Yield				
Pumping test method	Draw Down		Recovery	
	Time min	Water Level Metres	Time min	Water Level Metres
Pump intake set at - (metres)	Static Level			
Pumping rate - (litres/min)	<i>1</i>		<i>1</i>	
Duration of pumping _____ hrs + _____ min	<i>2</i>		<i>2</i>	
Final water level end of pumping _____ metres	<i>3</i>		<i>3</i>	
Recommended pump type. <input type="checkbox"/> Shallow <input type="checkbox"/> Deep	<i>4</i>		<i>4</i>	
Recommended pump depth. _____ metres	<i>5</i>		<i>5</i>	
Recommended pump rate. (litres/min)	<i>10</i>		<i>10</i>	
If flowing give rate - (litres/min)	<i>15</i>		<i>15</i>	
	<i>20</i>		<i>20</i>	
	<i>25</i>		<i>25</i>	
If pumping discontinued, give reason.	<i>30</i>		<i>30</i>	
	<i>40</i>		<i>40</i>	
	<i>50</i>		<i>50</i>	
	<i>60</i>		<i>60</i>	

Plugging and Sealing Record			
Depth set at - Metres		Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
From	To		
<i>0</i>	<i>0.3</i>	<i>hole plug</i>	<i>1/2 bag</i>
<i>0.3</i>	<i>6.4</i>	<i>sand back fill</i>	
<i>6.4</i>	<i>10.15</i>	<i>hole plug</i>	<i>7 1/2 bags</i>
<i>10.15</i>	<i>12.25</i>	<i>filter sand</i>	<i>6 bags</i>
Method of Construction			
<input type="checkbox"/> Cable Tool	<input type="checkbox"/> Rotary (air)	<input type="checkbox"/> Diamond	<input type="checkbox"/> Digging
<input type="checkbox"/> Rotary (conventional)	<input type="checkbox"/> Air percussion	<input type="checkbox"/> Jetting	<input type="checkbox"/> Other
<input type="checkbox"/> Rotary (reverse)	<input type="checkbox"/> Boring	<input type="checkbox"/> Driving	<i>hollow stem augers</i>
Water Use			
<input type="checkbox"/> Domestic	<input type="checkbox"/> Industrial	<input type="checkbox"/> Public Supply	<input type="checkbox"/> Other
<input type="checkbox"/> Stock	<input type="checkbox"/> Commercial	<input type="checkbox"/> Not used	<i>Sampling</i>
<input type="checkbox"/> Irrigation	<input type="checkbox"/> Municipal	<input type="checkbox"/> Cooling & air conditioning	
Final Status of Well			
<input type="checkbox"/> Water Supply	<input type="checkbox"/> Recharge well	<input type="checkbox"/> Unfinished	<input type="checkbox"/> Abandoned, (Other)
<input type="checkbox"/> Observation well	<input type="checkbox"/> Abandoned, insufficient supply	<input type="checkbox"/> Dewatering	
<input checked="" type="checkbox"/> Test Hole	<input type="checkbox"/> Abandoned, poor quality	<input type="checkbox"/> Replacement well	
Well Contractor/Technician Information			
Name of Well Contractor <i>OCS Inc</i>		Well Contractor's Licence No. <i>6964</i>	
Business Address (street name, number, city etc.) <i>5518 Appleton Side Road Almonte Ont K0A 1A0</i>			
Name of Well Technician (last name, first name) <i>Ohlmann Brian</i>		Well Technician's Licence No. <i>T2593</i>	
Signature of Technician/Contractor <i>X [Signature]</i>		Date Submitted YYYY MM DD <i>2007 10 10</i>	


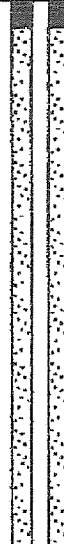




Location of Well			
In diagram below show distances of well from road, lot line, and building. Indicate north by arrow.			
<i>GPS reading taken on M4-1</i>			
<i>Site plan enclosed</i>			
<i>Area map enclosed</i>			
Audit No. <i>2 34860</i>		Date Well Completed YYYY MM DD <i>2007 9 10</i>	
Was the well owner's information package delivered? <input type="checkbox"/> Yes <input type="checkbox"/> No		Date Delivered YYYY MM DD <i>2007 10 10</i>	
Ministry Use Only			
Data Source		Contractor	
Date Received YYYY MM DD <i>OCT 12 2007</i>		Date of Inspection YYYY MM DD	
Remarks		Well Record Number	



Dillon Consulting Ltd.
Suite 200, 5310 Canotek Road
Ottawa, ON
K1J 9N5
(613) 745-2213

Page 1 of 1
M4-1

Client: <u>City of Ottawa</u>				Project: <u>Trail Road Landfill Site</u>			
Project No.: <u>07-7490-0800</u>				Location: <u>Trail Road Landfill</u>			
Drilling Co.: <u>OGS Inc.</u>				Drilling Method: <u>Hollow-stem auger</u>			
Supervised by: <u>EG</u>				Date Started: <u>9/10/07</u>		Date Completed: <u>9/10/07</u>	

Depth Scale (m)	Stratigraphic Description	Lithology	Depth (m)	Well Construction	Sample				Depth Scale (m)	
					Method	Number	N Value	Rec %		
1.0	Medium to coarse sand, some silt, grey, wet.								1.0	
2.0									2.0	
3.0									3.0	
4.0									4.0	
5.0									5.0	
6.0	Coarse sand, grey, wet.		6.1						6.0	
	Silt, grey, wet.		6.55						6.5	
7.0	Clay, grey, moist, very plastic, some silt.		6.71						7.0	
8.0	Medium to coarse sand, grey, wet.								8.0	
9.0										9.0
10.0										10.0
11.0										11.0
12.0									12.0	
			12.8							

DILLON MAY - NO VOC SEPT. OF TRAIL GPJ DILLON MAY13 05:00T 92047

LITHOLOGY
SYMBOLS

Sand
 Silt / Clay

Well Construction

SAMPLE
TYPE

Split Spoon

C 6964

OCT 12 2007

Z 34860

Ministry of
the Environment

A087279

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

A 087279

Master Well Record for Cluster Well Construction


Regulation 903, Ontario Water Resources Act

Page 1 of 3

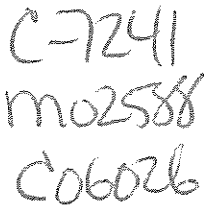
Address of Well Location (Street Number/Name, RR) 4375 Trail Rd				Township		Lot		Concession									
County/District/Municipality				City/Town/Village Hana				Province Ontario		Postal Code							
UTM Coordinates NAD 83		Zone 18		Easting 440833		Northing 5009011		GPS Unit Make Garmin		Model Etrex							
Mode of Operation: <input type="checkbox"/> Undifferentiated <input checked="" type="checkbox"/> Averaged <input type="checkbox"/> Differentiated, specify																	
Overburden and Bedrock Materials (see instructions on the back of this form)										Hole Details							
General Colour		Most Common Material		Other Materials		General Description		Depth (Metres) From To		Diameter (Centimetres)							
Brn		Sand		silt		soft, dry		0 4.27		0 4.27 8.25							
										Water Use							
										<input type="checkbox"/> Public		<input type="checkbox"/> Industrial		<input type="checkbox"/> Not used		<input checked="" type="checkbox"/> Other, specify	
										<input type="checkbox"/> Domestic		<input type="checkbox"/> Commercial		<input type="checkbox"/> Dewatering			
										<input type="checkbox"/> Livestock		<input type="checkbox"/> Municipal		<input checked="" type="checkbox"/> Monitoring			
										<input type="checkbox"/> Irrigation		<input checked="" type="checkbox"/> Test Hole		<input type="checkbox"/> Cooling & Air Conditioning			
										Method of Construction							
										<input type="checkbox"/> Cable Tool		<input type="checkbox"/> Air Percussion		<input type="checkbox"/> Digging			
										<input type="checkbox"/> Rotary (Conventional)		<input type="checkbox"/> Diamond		<input type="checkbox"/> Boring			
										<input type="checkbox"/> Rotary (Reverse)		<input type="checkbox"/> Jetting		<input checked="" type="checkbox"/> Other, specify			
										<input type="checkbox"/> Rotary (Air)		<input type="checkbox"/> Driving		Direct Push			
Status of Well																	
<input checked="" type="checkbox"/> Test Hole		<input type="checkbox"/> Abandoned, Insufficient Supply															
<input type="checkbox"/> Replacement Well		<input type="checkbox"/> Abandoned, Poor Water Quality															
<input type="checkbox"/> Dewatering Well		<input checked="" type="checkbox"/> Other, specify monitoring															
<input type="checkbox"/> Alteration (Construction)		<input type="checkbox"/> Abandoned, other, specify															
No Casing and Screen Used										Static Water Level Test							
Open Hole <input type="checkbox"/> Yes <input type="checkbox"/> No										Metres							
Screen																	
<input type="checkbox"/> Galvanized <input type="checkbox"/> Steel <input type="checkbox"/> Fibreglass <input type="checkbox"/> Concrete <input checked="" type="checkbox"/> Plastic																	
Outside Diameter (Centimetres)										Slot No.							
3.34										10							
Water Details																	
Water found at Depth				Kind of Water													
Metres <input type="checkbox"/> Gas				<input type="checkbox"/> Fresh <input type="checkbox"/> Salty <input type="checkbox"/> Sulphur <input type="checkbox"/> Minerals													
Water found at Depth				Kind of Water													
Metres <input type="checkbox"/> Gas				<input type="checkbox"/> Fresh <input type="checkbox"/> Salty <input type="checkbox"/> Sulphur <input type="checkbox"/> Minerals													
Water found at Depth				Kind of Water													
Metres <input type="checkbox"/> Gas				<input type="checkbox"/> Fresh <input type="checkbox"/> Salty <input type="checkbox"/> Sulphur <input type="checkbox"/> Minerals													
Disinfected <input type="checkbox"/> Yes <input type="checkbox"/> No if no, provide reason: Date Master Well Completed (yyyy/mm/dd)																	
2009/08/27																	
Cluster Information (Please also fill out the additional Cluster Well Information for Well Construction for each parcel of land and cluster)																	
Total Wells in Cluster				Please indicate Number of Cluster Well Information Log Sheets Submitted													
4				1													
Total Wells on this Property																	
4																	
Location of Well Cluster																	
Detailed Map must be provided as an attachment no larger than legal size (8.5" x 14"). Sketches are not allowed.																	
<input type="checkbox"/> Check box to confirm detailed map is provided as per Section 11.1 (3)																	
Consent to release additional information concerning the cluster to the Ministry of the Environment																	
Municipality																	
St. Catharines																	
Well Contractor and Well Technician Information																	
Business Name of Well Contractor				Well Contractor's Licence No.													
Strata Soil Sampling				72411													
Business Address (Street No./Name, number, RR)				Municipality													
12-147 West Beaver Creek				Richmond Hill													
Province		Postal Code		Business E-mail Address													
ON		L4B1C6															
Business Telephone No. (inc. area code) Name of Well Technician (Last Name, First Name)																	
905-74-9304 Robinson Travis																	
Well Technician's Licence No.		Signature of Technician		Date Submitted (yyyy/mm/dd)													
31159				2009/09/04													
Ministry Use Only																	
Audit No.				Well Contractor No.													
M 02588																	
Date Received (yyyy/mm/dd)				Date of Inspection (yyyy/mm/dd)													
SEP 22 2009																	
Remarks																	

Address of Well Location (Street Number/Name, RR) 4375 Trail Rd			Lot	Concession	Township		County/District/Municipality		upon request	
City/Town/Village Ottawa		Province Ontario	Postal Code		GPS Unit Make Garmin	Model Etrex	Unit Mode of Operation <input type="checkbox"/> Undifferentiated <input checked="" type="checkbox"/> Averaged <input type="checkbox"/> Differentiated, specify:		Signature of Technician/Contractor	
									Date (yyyy/mm/dd)	

[illegible]

Well Contractor and Well Technician Information											
Business Name of Well Contractor				Business Address (Street Number/Name, RR)				Municipality		Province	
Strata Soil Sampling				#2-147 West Beaver Creek				Richmond Hill		ON	
Postal Code		Business Telephone No. (inc. area code)		Well Contractor's Licence No.		Business E-mail Address					
L4B1C6											
Name of Well Technician (First Name, Last Name)				Well Technician's Licence No.		Date Submitted (yyyy/mm/dd)		Signature of Technician			
Trevor Robinson				3159		08/08/04					

Date 1st Well in Cluster Constructed (yyyy/mm/dd) 2009/08/27	Date Last Well in Cluster Constructed (yyyy/mm/dd) 2009/08/27
Ministry Use Only	
Date Received (yyyy/mm/dd) 2009/08/22	Date Inspected (yyyy/mm/dd)
Audit No: C 06026	Remarks m02548



SEP 22 2009



Measurements recorded in: ☒ Metric ☐ Imperial

A190843

5-19480 Page ____ of ____

Well Owner's Information

First Name City of Ottawa	Last Name / Organization Ottawa	E-mail Address kip@cityofottawa.ca	<input type="checkbox"/> Well Constructed by Well Owner
Mailing Address (Street Number/Name) 110 Laurier Avenue West, 5th Floor	Municipality Ottawa	Province ON	Postal Code K1P1J1

Well Location

Address of Well Location (Street Number/Name) Trail Road Landfill	Township Ottawa	Lot 1	Concession 1
County/District/Municipality Ottawa	City/Town/Village Ottawa	Province Ontario	Postal Code K1P1J1
UTM Coordinates NAD 83 184407449009359	Zone 18	Easting 449009	Northings 359
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)
Brn	Topsoil	Scal	Soft	0 31
Brn	Sand	Silt, gravel	Soft	131 3.35

Annular Space			
Depth Set at (m/ft)	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)	
0 131	monument, concrete		
131 1.52	Benchtyle		
1.52 3.35	Band		

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

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)	
5.20	PVC	3.90	0 1.83	<input type="checkbox"/> Water Supply <input type="checkbox"/> Replacement Well <input checked="" type="checkbox"/> Test Hole <input type="checkbox"/> Recharge Well <input type="checkbox"/> Dewatering Well <input checked="" type="checkbox"/> Observation and/or Monitoring Hole <input type="checkbox"/> Alteration (Construction) <input type="checkbox"/> Abandoned, Insufficient Supply <input type="checkbox"/> Abandoned, Poor Water Quality <input type="checkbox"/> Abandoned, other, specify _____ <input type="checkbox"/> Other, specify _____

Construction Record - Screen				Status of Well
Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft)	
6.03	PVC	10	1.83 3.35	<input type="checkbox"/> Water Supply <input type="checkbox"/> Replacement Well <input checked="" type="checkbox"/> Test Hole <input type="checkbox"/> Recharge Well <input type="checkbox"/> Dewatering Well <input checked="" type="checkbox"/> Observation and/or Monitoring Hole <input type="checkbox"/> Alteration (Construction) <input type="checkbox"/> Abandoned, Insufficient Supply <input type="checkbox"/> Abandoned, Poor Water Quality <input type="checkbox"/> Abandoned, other, specify _____ <input type="checkbox"/> Other, specify _____

Water Details		Hole Diameter	
Water found at Depth (m/ft) <input type="checkbox"/> Gas <input type="checkbox"/> Other, specify _____	Kind of Water: <input type="checkbox"/> Fresh <input type="checkbox"/> Untested	Depth (m/ft)	Diameter (cm/in)
Water found at Depth (m/ft) <input type="checkbox"/> Gas <input type="checkbox"/> Other, specify _____	Kind of Water: <input type="checkbox"/> Fresh <input type="checkbox"/> Untested	0 3.35	15.24
Water found at Depth (m/ft) <input type="checkbox"/> Gas <input type="checkbox"/> Other, specify _____	Kind of Water: <input type="checkbox"/> Fresh <input type="checkbox"/> Untested		

Well Contractor and Well Technician Information			
Business Name of Well Contractor Strata Drilling Group	Well Contractor's Licence No. 72411	Business Address (Street Number/Name) 165 Shields Court	Municipality Markham
Province Ont	Postal Code L3R6V8	Business E-mail Address wrecords@stratasoil.com	
Bus. Telephone No. (inc. area code) 905 940 7919	Name of Well Technician (Last Name, First Name) Kaufelt, Kaye	Well Technician's Licence No. 3935	Signature of Technician and/or Contractor Kaye Kaufelt
Date Submitted 2016 11 28			

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

Map of Well Location

Please provide a map below following instructions on the back.

Well owner's information package delivered <input type="checkbox"/> Yes <input type="checkbox"/> No	Date Package Delivered 2016 11 25	Date Work Completed 2016 11 25
Ministry Use Only		Audit No. 2238155
Received		DEC 23 2016

Well ID

Well ID Number: 7249988
Well Audit Number: Z199790
Well Tag Number:

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

Well Location

Address of Well Location	4475 TRAIL ROAD
Township	NEPEAN TOWNSHIP
Lot	
Concession	
County/District/Municipality	OTTAWA-CARLETON
City/Town/Village	Ottawa
Province	ON
Postal Code	n/a
UTM Coordinates	NAD83 — Zone 18
	Easting: 440490.00
	Northing: 5009568.00
Municipal Plan and Sublot Number	
Other	

Overburden and Bedrock Materials Interval

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To
----------------	----------------------	-----------------	---------------------	------------	----------

Annular Space/Abandonment Sealing Record

Depth From	Depth To	Type of Sealant Used (Material and Type)	Volume Placed
0 ft	40 ft	BENTONITE GROUT	
0 ft	40 ft	BENTONITE GRAVEL	

Method of Construction & Well Use

Method of Construction	Well Use
H.S.A.	Monitoring

Status of Well

Abandoned-Other

Construction Record - Casing

Inside Diameter	Open Hole or material	Depth From	Depth To
-----------------	-----------------------	------------	----------

Construction Record - Screen

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

Well Contractor and Well Technician Information

Well Contractor's Licence Number: 7238

Results of Well Yield Testing

After test of well yield, water was
If pumping discontinued, give reason
Pump intake set at
Pumping Rate
Duration of Pumping
Final water level
If flowing give rate
Recommended pump depth
Recommended pump rate
Well Production
Disinfected?

Draw Down & Recovery

Draw Down Time(min)	Draw Down Water level	Recovery Time(min)	Recovery Water level
SWL			
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	

15	15
20	20
25	25
30	30
40	40
45	45
50	50
60	60

Water Details

Water Found at Depth	Kind
----------------------	------

Hole Diameter

Depth From	Depth To	Diameter
0 ft	40 ft	8 inch

Audit Number: Z199790

Date Well Completed: August 28, 2015

Date Well Record Received by MOE: October 14, 2015

Well ID

Well ID Number: 7249990
Well Audit Number: Z199792
Well Tag Number: A175298

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

Well Location

Address of Well Location	4475 TRAIL ROAD
Township	NEPEAN TOWNSHIP
Lot	
Concession	
County/District/Municipality	OTTAWA-CARLETON
City/Town/Village	Ottawa
Province	ON
Postal Code	n/a
UTM Coordinates	NAD83 — Zone 18
	Easting: 440483.00
	Northing: 5009564.00
Municipal Plan and Sublot Number	
Other	

Overburden and Bedrock Materials Interval

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To
BRWN	SAND	SILT	LOOS	0 ft	2 ft
GREY	SAND	SILT	LOOS	2 ft	17 ft
GREY	GRVL	SAND	LOOS	17 ft	20 ft
GREY	CLAY	SILT	SOFT	20 ft	37 ft
GREY	SAND	GRVL	LOOS	37 ft	50 ft

Annular Space/Abandonment Sealing Record

Depth From	Depth To	Type of Sealant Used (Material and Type)	Volume Placed
0 ft	39 ft	BENTONITE GROUT	

Method of Construction & Well Use

Method of Construction	Well Use
Rotary (Convent.)	Monitoring

Status of Well

Observation Wells

Construction Record - Casing

Inside Diameter	Open Hole or material	Depth From	Depth To
2 inch	PLASTIC	3 ft	40 ft

Construction Record - Screen

Outside Diameter	Material	Depth From	Depth To
2 inch	PLASTIC	40 ft	50 ft

Well Contractor and Well Technician Information

Well Contractor's Licence Number: 7238

Results of Well Yield Testing

After test of well yield, water was
If pumping discontinued, give reason
Pump intake set at
Pumping Rate
Duration of Pumping
Final water level
If flowing give rate
Recommended pump depth
Recommended pump rate
Well Production
Disinfected?

Draw Down & Recovery

Draw Down Time(min)	Draw Down Water level	Recovery Time(min)	Recovery Water level
SWL			
1		1	
2		2	

3	3
4	4
5	5
10	10
15	15
20	20
25	25
30	30
40	40
45	45
50	50
60	60

Water Details

Water Found at Depth	Kind
----------------------	------

Hole Diameter

Depth From	Depth To	Diameter
0 ft	29 ft	6 inch
29 ft	50 ft	4 inch

Audit Number: Z199792

Date Well Completed: August 27, 2015

Date Well Record Received by MOE: October 14, 2015

Well ID

Well ID Number: 7277726
Well Audit Number: Z238154
Well Tag Number: A190844

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

Well Location

Address of Well Location	TRAIL ROAD LANDFILL
Township	NEPEAN TOWNSHIP
Lot	
Concession	
County/District/Municipality	OTTAWA-CARLETON
City/Town/Village	Ottawa
Province	ON
Postal Code	n/a
UTM Coordinates	NAD83 — Zone 18
	Easting: 440681.00
	Northing: 5009540.00
Municipal Plan and Sublot Number	
Other	

Overburden and Bedrock Materials Interval

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To
BRWN	LOAM		SOFT	0 m	.31 m
BRWN	SAND	GRVL	LOOS	.31 m	3.35 m

Annular Space/Abandonment Sealing Record

Depth From	Depth To	Type of Sealant Used (Material and Type)	Volume Placed
0 m	.31 m	CONCRETE	
.31 m	1.52 m	BENTONITE	
1.52 m	3.35 m	FILTER SAND	

Method of Construction & Well Use

Method of Construction	Well Use
Boring	Test Hole

Status of Well

Monitoring and Test Hole

Construction Record - Casing

Inside Diameter	Open Hole or material	Depth From	Depth To
5.2 cm	PLASTIC	0 m	1.83 m

Construction Record - Screen

Outside Diameter	Material	Depth From	Depth To
6.03 cm	PLASTIC	1.83 m	3.35 m

Well Contractor and Well Technician Information

Well Contractor's Licence Number: 7241

Results of Well Yield Testing

After test of well yield, water was
If pumping discontinued, give reason
Pump intake set at
Pumping Rate
Duration of Pumping
Final water level
If flowing give rate
Recommended pump depth
Recommended pump rate
Well Production
Disinfected?

Draw Down & Recovery

Draw Down Time(min)	Draw Down Water level	Recovery Time(min)	Recovery Water level
SWL			
1		1	
2		2	
3		3	
4		4	

5	5
10	10
15	15
20	20
25	25
30	30
40	40
45	45
50	50
60	60

Water Details

Water Found at Depth	Kind
----------------------	------

Hole Diameter

Depth From	Depth To	Diameter
0 m	3.35 m	15.24 cm

Audit Number: Z238154

Date Well Completed: November 23, 2016

Date Well Record Received by MOE: December 23, 2016

APPENDIX 2

EUROFINS CERTIFICATE OF ANALYSIS

AQUIFERTEST PRO - PUMPING TEST ANALYSIS REPORTS

PG5155: SOIL PROFILES AND TEST DATA LOGS

DILLON PROJECT NO:18-7333 SOIL PROFILES AND TEST DATA LOGS

Certificate of Analysis

Client: Paterson Group
154 Colonnade Rd. South
Nepean, ON
K2E 7T7
Attention: Mr. Erik Ardley
PO#: 29626
Invoice to: Paterson Group

Report Number: 1926944
Date Submitted: 2020-03-11
Date Reported: 2020-03-17
Project: PH3959
COC #: 208266

					Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1484408 GW 2020-03-10 TW1-GW1	1484409 GW 2020-03-10 TW1-GW2
Group	Analyte	MRL	Units	Guideline			
Anions	Cl	1	mg/L	AO 250		44	41
	F	0.10	mg/L	MAC 1.5		0.70	0.66
	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		33	33
General Chemistry	Alkalinity as CaCO3	5	mg/L	OG 500		164	166
	Colour	2	TCU	AO 5		<2	<2
	Conductivity	5	uS/cm			511	500
	DOC	0.5	mg/L	AO 5		0.7	0.7
	pH	1.00		6.5-8.5		8.37	8.39
	S2-	0.01	mg/L	AO 0.05		<0.01	<0.01
	TDS	10	mg/L	AO 500		280	280
	Turbidity	0.1	NTU	AO 5.0		0.8	1.9
Hardness	Hardness as CaCO3	1	mg/L	OG 100		119*	126*
Indices/Calc	Ion Balance	0.01				0.89	0.91
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		0.23	0.21
	Ba	0.01	mg/L	MAC 1.0		0.04	0.05
	Bi	0.002	mg/L			<0.002	<0.002
	Ca	1	mg/L			23	24
	Cd	0.0001	mg/L	MAC 0.005		<0.0001	<0.0001
	Co	0.0002	mg/L			<0.0002	<0.0002
	Cr	0.001	mg/L	MAC 0.05		<0.001	<0.001

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
154 Colonnade Rd. South
Nepean, ON
K2E 7T7
Attention: Mr. Erik Ardley
PO#: 29626
Invoice to: Paterson Group

Report Number: 1926944
Date Submitted: 2020-03-11
Date Reported: 2020-03-17
Project: PH3959
COC #: 208266

					Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1484408 GW 2020-03-10 TW1-GW1	1484409 GW 2020-03-10 TW1-GW2
Group	Analyte	MRL	Units	Guideline			
Metals	Cu	0.001	mg/L	AO 1.0		<0.001	<0.001
	Fe	0.03	mg/L	AO 0.3		0.08	0.12
	Hg	0.0001	mg/L	MAC 0.001		<0.0001	<0.0001
	K	1	mg/L			7	7
	Mg	1	mg/L			15	16
	Mn	0.01	mg/L	AO 0.05		<0.01	<0.01
	Mo	0.005	mg/L			<0.005	<0.005
	Na	2	mg/L	AO 200		56	51
	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
	Sn	0.01	mg/L			<0.01	<0.01
	Ti	0.01	mg/L			<0.01	<0.01
	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		<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	0.010	mg/L			0.093	0.097
	Total Kjeldahl Nitrogen	0.100	mg/L				0.296
		0.200	mg/L			0.263	
Subcontract-Inorg	Phenols	0.001	mg/L			<0.001	<0.001
	Tannin & Lignin	0.1	mg/L			<0.1	<0.1
VOCs Surrogates	1,2-dichloroethane-d4	0	%			93	90

Guideline = ODWSOG

*** = Guideline Exceedence**

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Client: Paterson Group
154 Colonnade Rd. South
Nepean, ON
K2E 7T7
Attention: Mr. Erik Ardley
PO#: 29626
Invoice to: Paterson Group

Report Number: 1926944
Date Submitted: 2020-03-11
Date Reported: 2020-03-17
Project: PH3959
COC #: 208266

					Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1484408 GW 2020-03-10 TW1-GW1	1484409 GW 2020-03-10 TW1-GW2
Group	Analyte	MRL	Units	Guideline			
VOCs Surrogates	4-bromofluorobenzene	0	%			109	109
	Toluene-d8	0	%			101	102
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	0.2	ug/L	IMAC 5		<0.2	<0.2
	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)	0.3	ug/L			<0.3	<0.3
	1,4-dichlorobenzene	0.4	ug/L	MAC 5		<0.4	<0.4
	Acetone	30	ug/L			<30	<30
	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	0.2	ug/L			<0.2	<0.2
	Carbon Tetrachloride	0.2	ug/L	MAC 2		<0.2	<0.2
	Chloroethane	0.2	ug/L			<0.2	<0.2
	Chloroform	0.5	ug/L			<0.5	<0.5

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

Client: Paterson Group
154 Colonnade Rd. South
Nepean, ON
K2E 7T7
Attention: Mr. Erik Ardley
PO#: 29626
Invoice to: Paterson Group

Report Number: 1926944
Date Submitted: 2020-03-11
Date Reported: 2020-03-17
Project: PH3959
COC #: 208266

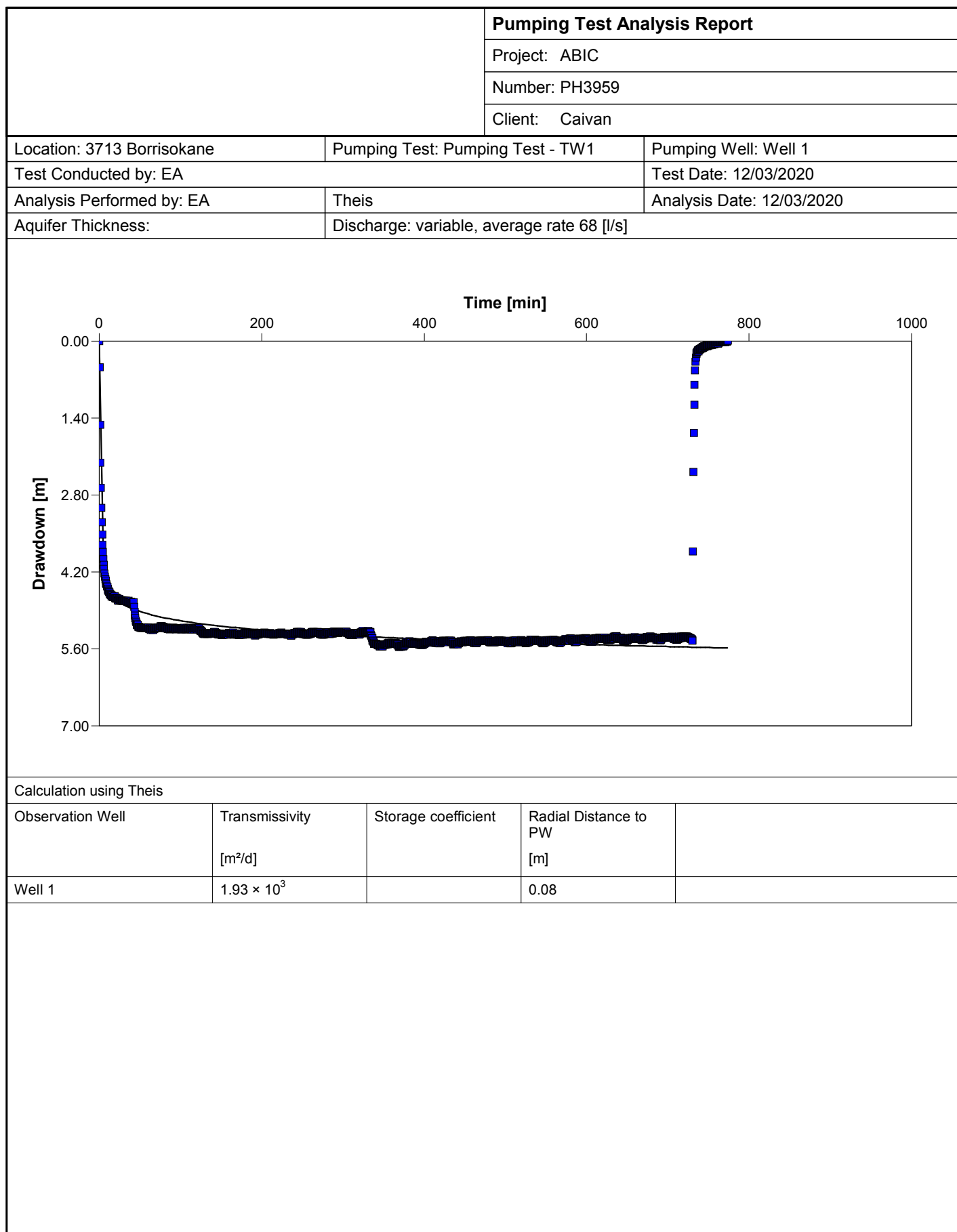
					Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1484408 GW 2020-03-10 TW1-GW1	1484409 GW 2020-03-10 TW1-GW2
Group	Analyte	MRL	Units	Guideline			
Volatiles	Dibromochloromethane	0.3	ug/L			<0.3	<0.3
	Dichlorodifluoromethane	0.5	ug/L			<0.5	<0.5
	Dichloromethane	4.0	ug/L	MAC 50		<4.0	<4.0
	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)	10	ug/L			<10	<10
	Methyl Isobutyl Ketone (MIBK)	10	ug/L			<10	<10
	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	0.2	ug/L			<0.2	<0.2
	Tetrachloroethylene	0.3	ug/L	MAC 10		<0.3	<0.3
	Toluene	0.5	ug/L	MAC 60		<0.5	<0.5
	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

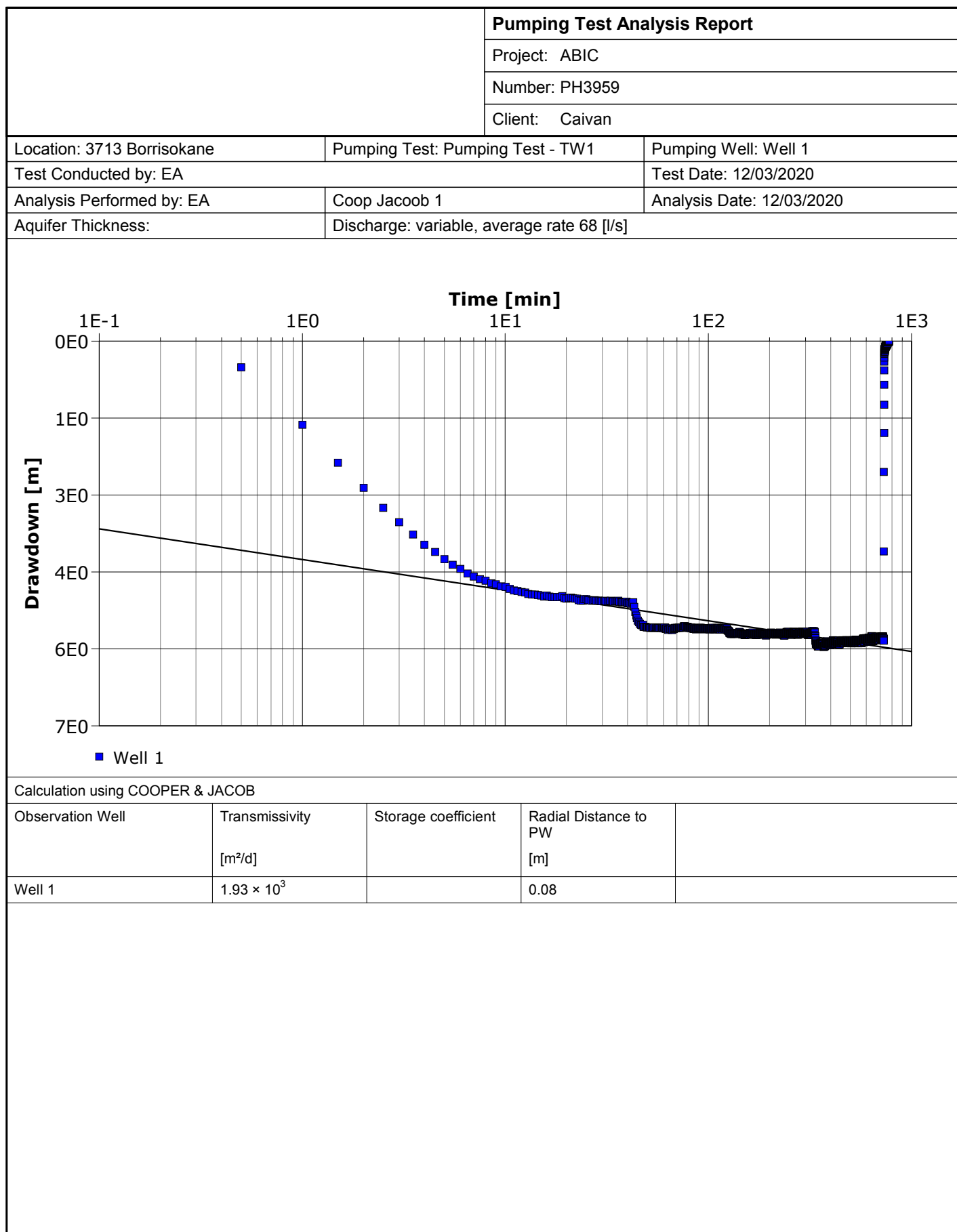
Guideline = ODWSOG

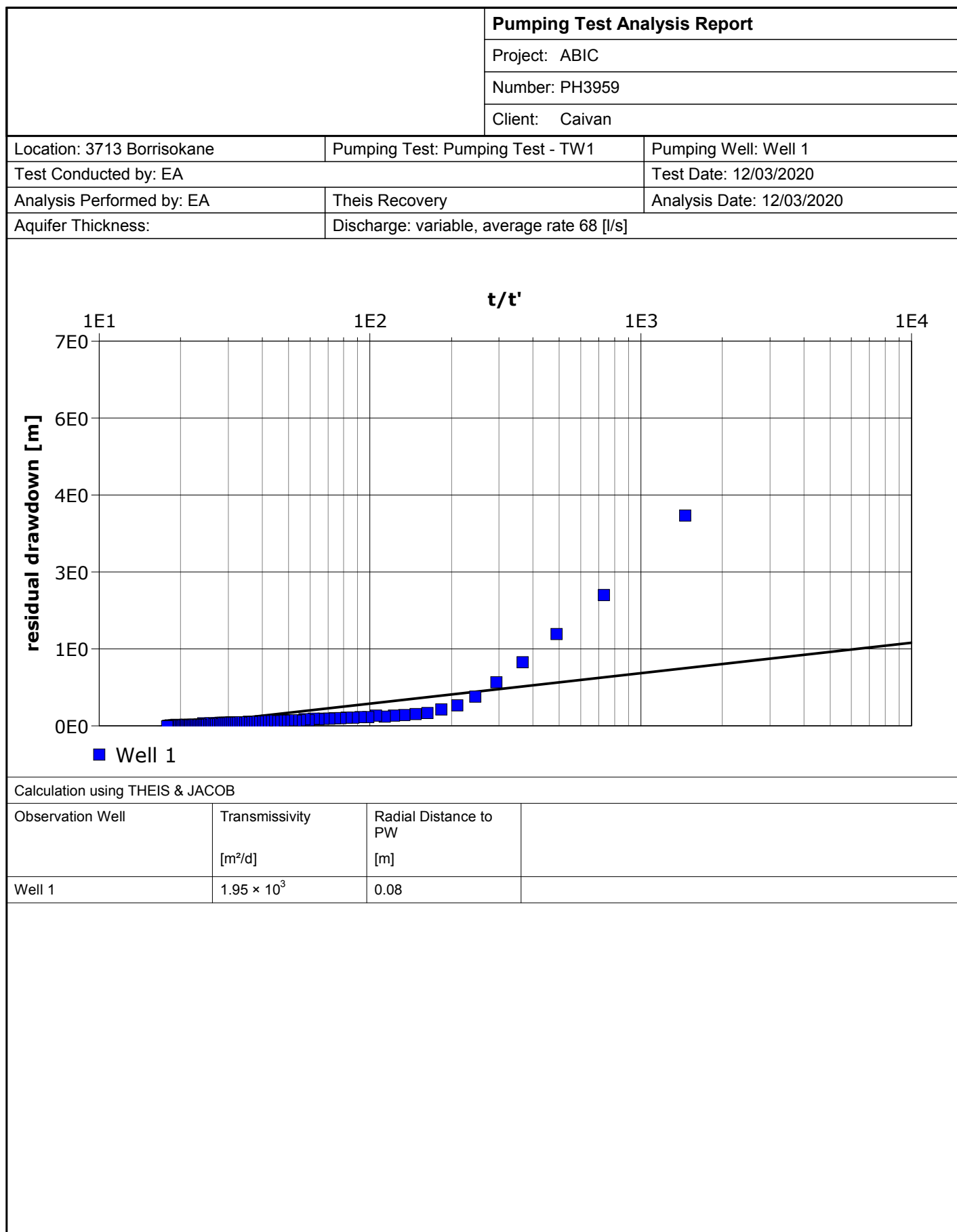
*** = Guideline Exceedence**

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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







				Pumping Test Analysis Report		
				Project: ABIC		
				Number: PH3959		
				Client: Caivan		
Location: 3713 Borrisokane		Pumping Test: Pumping Test - TW1		Pumping Well: Well 1		
Test Conducted by: EA				Test Date: 12/03/2020		
Aquifer Thickness: NAN m		Discharge: variable, average rate 68 [l/s]				
	Analysis Name	Analysis Performed by	Method name	Well	T [m²/d]	S
1	Theis	EA	Theis	Well 1	1.93×10^3	
2	Coop Jacob 1	EA	Cooper & Jacob I	Well 1	1.93×10^3	
3	Theis Recovery	EA	Theis Recovery	Well 1	1.95×10^3	

DATUM Geodetic





REMARKS

BORINGS BY CME 55 Power Auger

DATE 2019 November 14

FILE NO. PG5155

HOLE NO. BH 9-19

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction	
		TYPE	NUMBER	% RECOVERY	N VALUE or RQD			○ Water Content %					
								20	40	60	80		
GROUND SURFACE													
FILL: Brown silty clay with sand and gravel, trace asphalt and organics		AU	1			0	104.25						
		SS	2	79	29	1	103.25						
		SS	3	50	65	2	102.25						
		SS	4	46	7	3	101.25						
FILL: Brown sand with gravel, trace clay		SS	5	17	5	4	100.25						
SS		6	25	5	5	99.25							
FILL: Brown silty clay, some sand, gravel, trace organics		SS	7	38	3	6	98.25						
		SS	8	75	5								
		SS	9	58	9								
End of Borehole													
(GWL @ 4.01m - Nov. 29, 219)													
								Shear Strength (kPa)					
								20	40	60	80	100	
								▲ Undisturbed △ Remoulded					

DATUM Geodetic

REMARKS

BORINGS BY CME 55 Power Auger

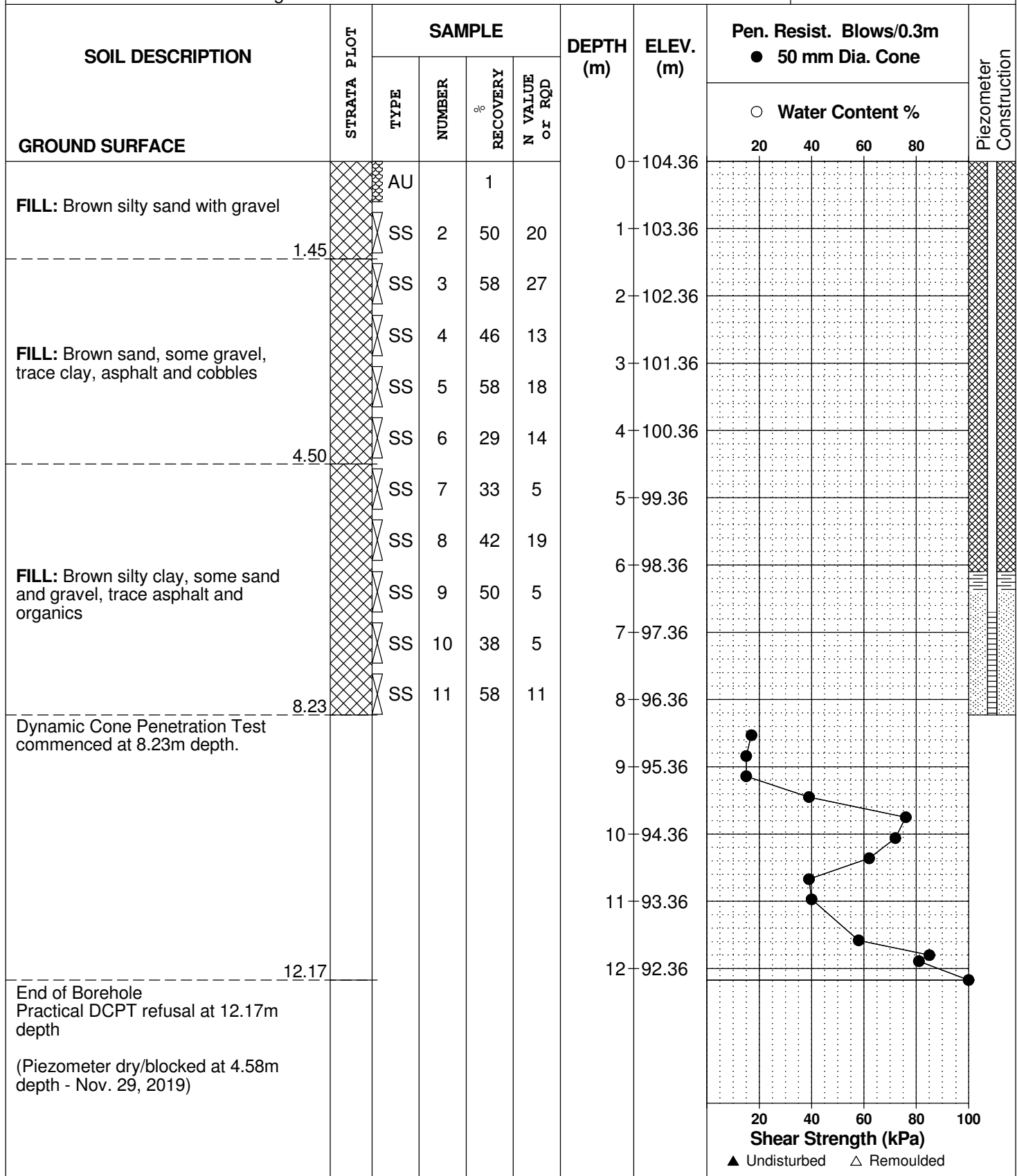
DATE 2019 November 13

FILE NO.

PG5155

HOLE NO.

BH10-19



DATUM Geodetic

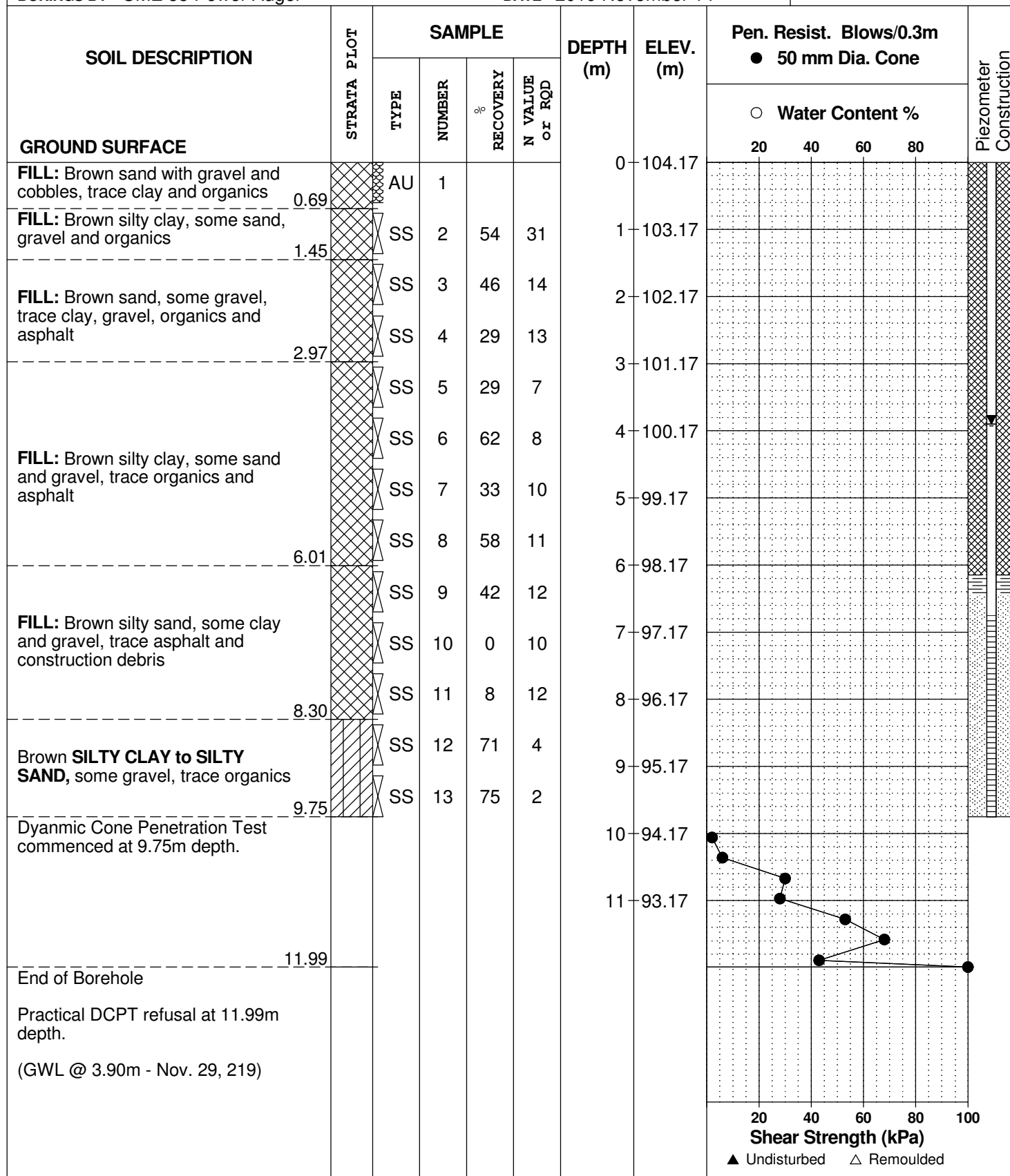
REMARKS

BORINGS BY CME 55 Power Auger

DATE 2019 November 14

FILE NO.
PG5155

HOLE NO.
BH11-19



DATUM Geodetic

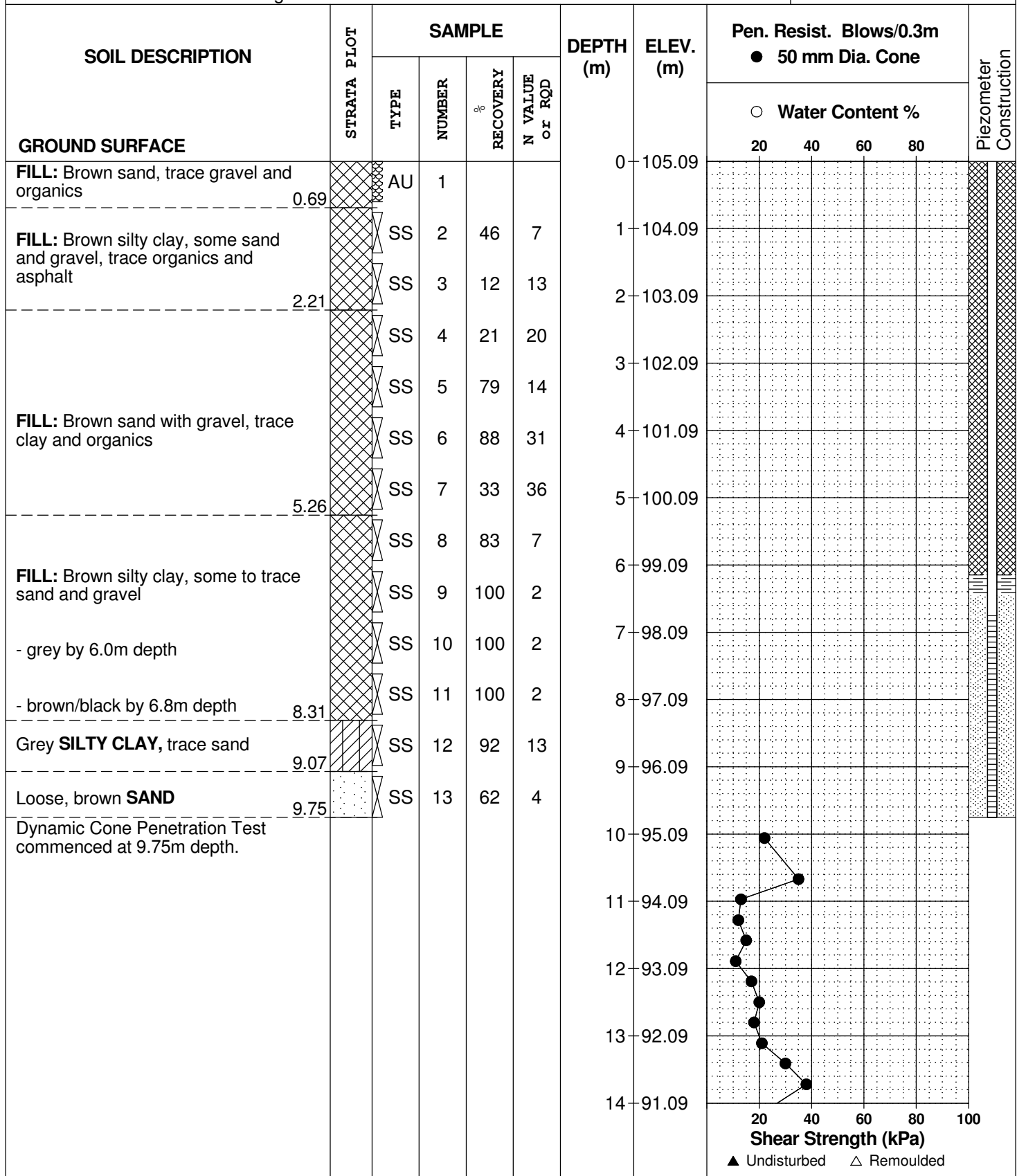
REMARKS

BORINGS BY CME 55 Power Auger

DATE 2019 November 14

FILE NO. PG5155

HOLE NO. BH12-19



SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Residential Development - Borrisokane Rd.
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME 55 Power Auger

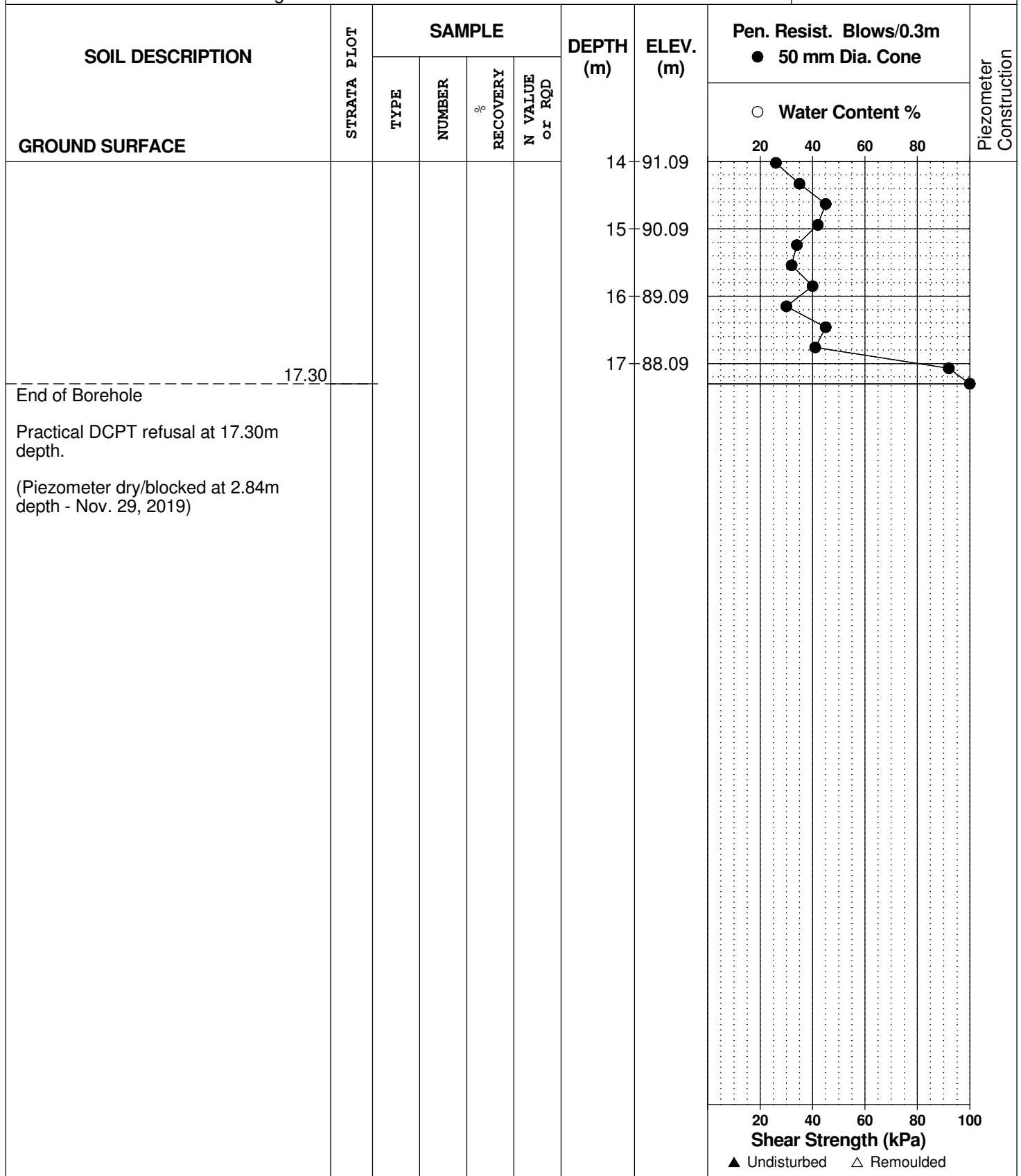
DATE 2019 November 14

FILE NO.

PG5155

HOLE NO.

BH12-19



DATUM Geodetic

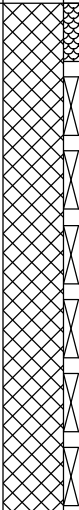
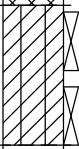
REMARKS

BORINGS BY CME 55 Power Auger

DATE 2019 November 15

FILE NO. **PG5155**

HOLE NO. **BH13-19**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction	
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %					
								20	40	60	80		
GROUND SURFACE						0	105.43						
FILL: Brown and, some gravel, trace clay, organics and asphalt		AU	1										
		SS	2	42	24	1	104.43						
		SS	3	54	15	2	103.43						
		SS	4	75	22	3	102.43						
		SS	5	75	48	4	101.43						
		SS	6	54	33	5	100.43						
		SS	7	29	16	6	99.43						
	5.26												
Brown/black SILTY CLAY, trace sand		SS	8	100	2								
SS		9	100	2									
	6.70												
End of Borehole													
(Piezometer dry/blocked at 5.04m depth - Nov. 29, 2019)													
								Shear Strength (kPa)					
								20	40	60	80	100	
								▲ Undisturbed △ Remoulded					

DATUM Geodetic

REMARKS

BORINGS BY CME 55 Power Auger

DATE 2019 January 15

FILE NO. PG5155

HOLE NO. BH14-19

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %				
								20	40	60	80	
GROUND SURFACE												
14.40 Grey SILTY CLAY , trace sand and gravel		SS	19	83	30	14	90.42					
		SS	20	75	9	15	89.42					
		SS	21	88	3	16	88.42					
		SS	22	96	5	17	87.42					
		SS	23	100	7	18	86.42					
		SS	24	100	6	19	85.42					
		SS	25	100	7	20	84.42					
21.54 Dense to very dense, grey SANDY SILT		SS	26	100	6	21	83.42					
		SS	27	0	50+	22	82.42					
23.93 Very dense, brown SAND , some silt, trace clay and gravel		SS	28	54	48	23	81.42					
		SS	29	75	54	24	80.42					
25.45 Very dense, grey SILT , some sand		SS	30	42	51	25	79.42					
		SS	31	50	61	26	78.42					
26.97 GLACIAL TILL: Very dense, grey sand, some clay, gravel, cobbles and boulders		SS	32	50	61	27	77.42					
		SS	33	50	61	28	76.42					
								20	40	60	80	100
								Shear Strength (kPa)				
								▲ Undisturbed △ Remoulded				

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Prop. Residential Development - Borrisokane Rd.
Ottawa, Ontario**

DATUM	Geodetic
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FILE NO. PG5155

REMARKS

HOLE NO. **BH14-19**

BORINGS BY CME 55 Power Auger

DATE 2019 January 15

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[illegible]

DATUM Geodetic

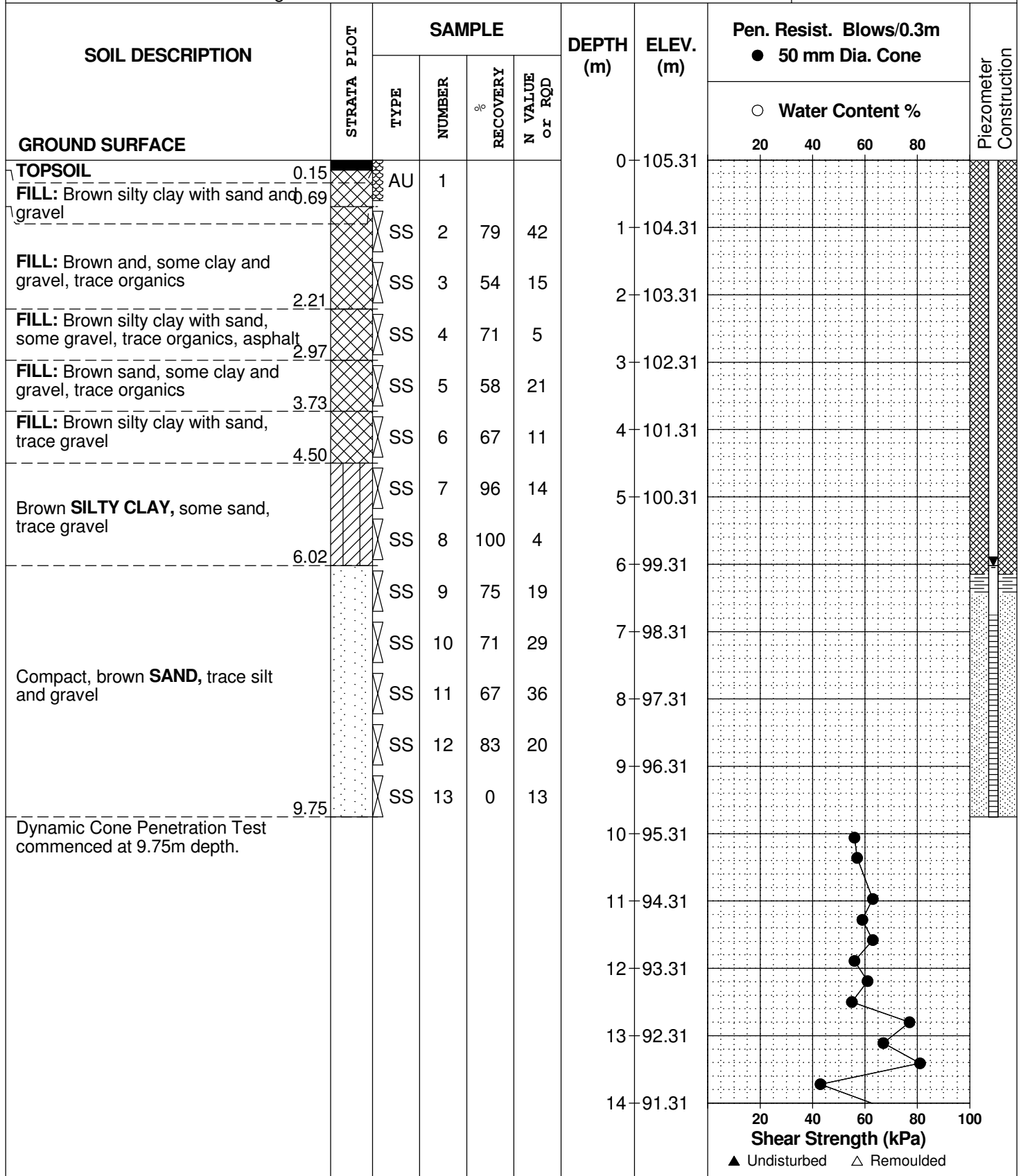
REMARKS

BORINGS BY CME 55 Power Auger

DATE 2019 November 18

FILE NO. PG5155

HOLE NO. BH16-19



DATUM Geodetic

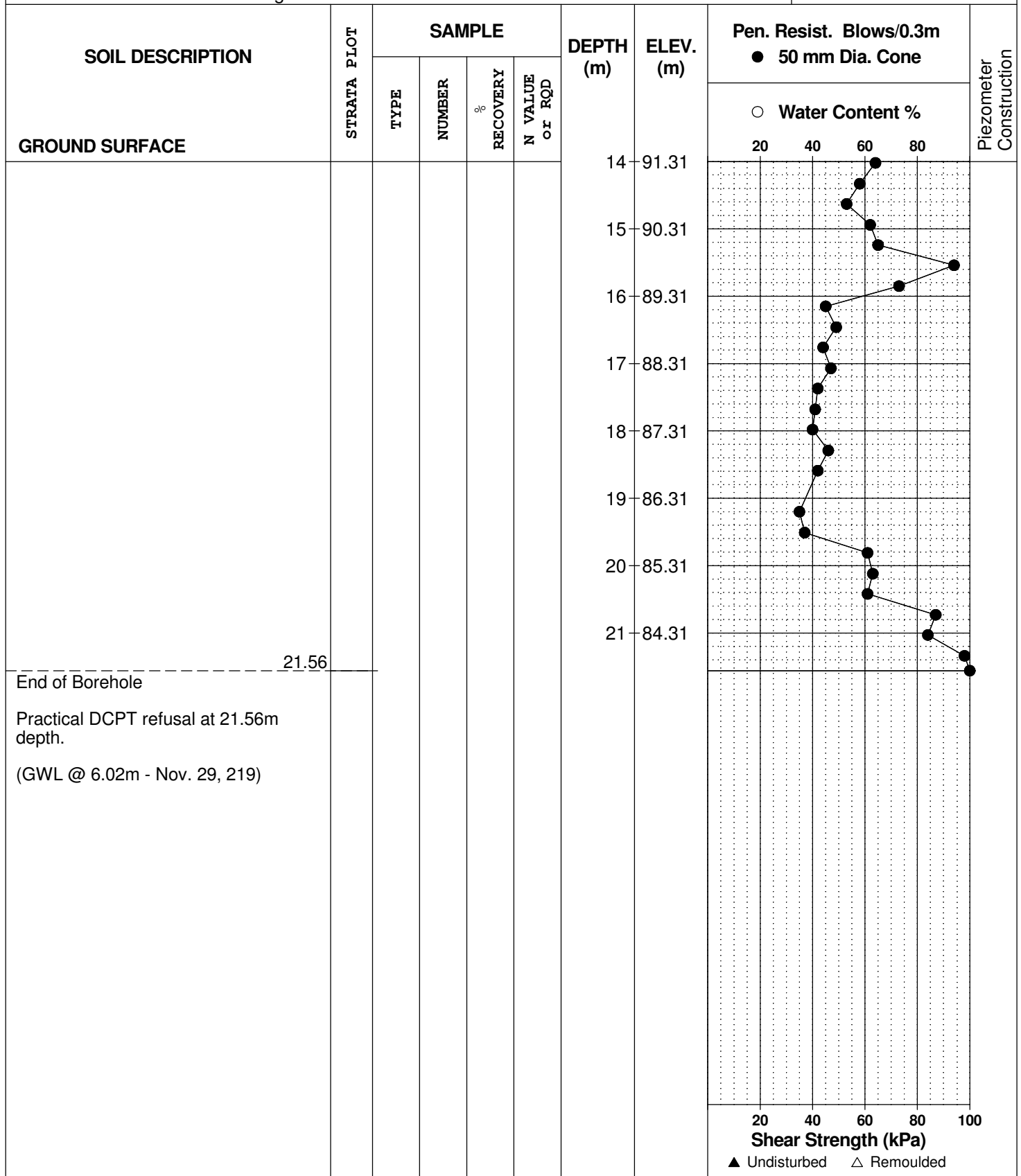
REMARKS

BORINGS BY CME 55 Power Auger

DATE 2019 November 18

FILE NO.
PG5155

HOLE NO.
BH16-19



DATUM Geodetic

FILE NO.

PG5155

REMARKS

HOLE NO.

BH17-19

BORINGS BY CME 55 Power Auger

DATE 2019 November 19

[illegible]

DATUM	Geodetic
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FILE NO.

PG5155

REMARKS

HOLE NO.

BH18-19

BORINGS BY CME 55 Power Auger

DATE 2019 November 19

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DATUM Geodetic

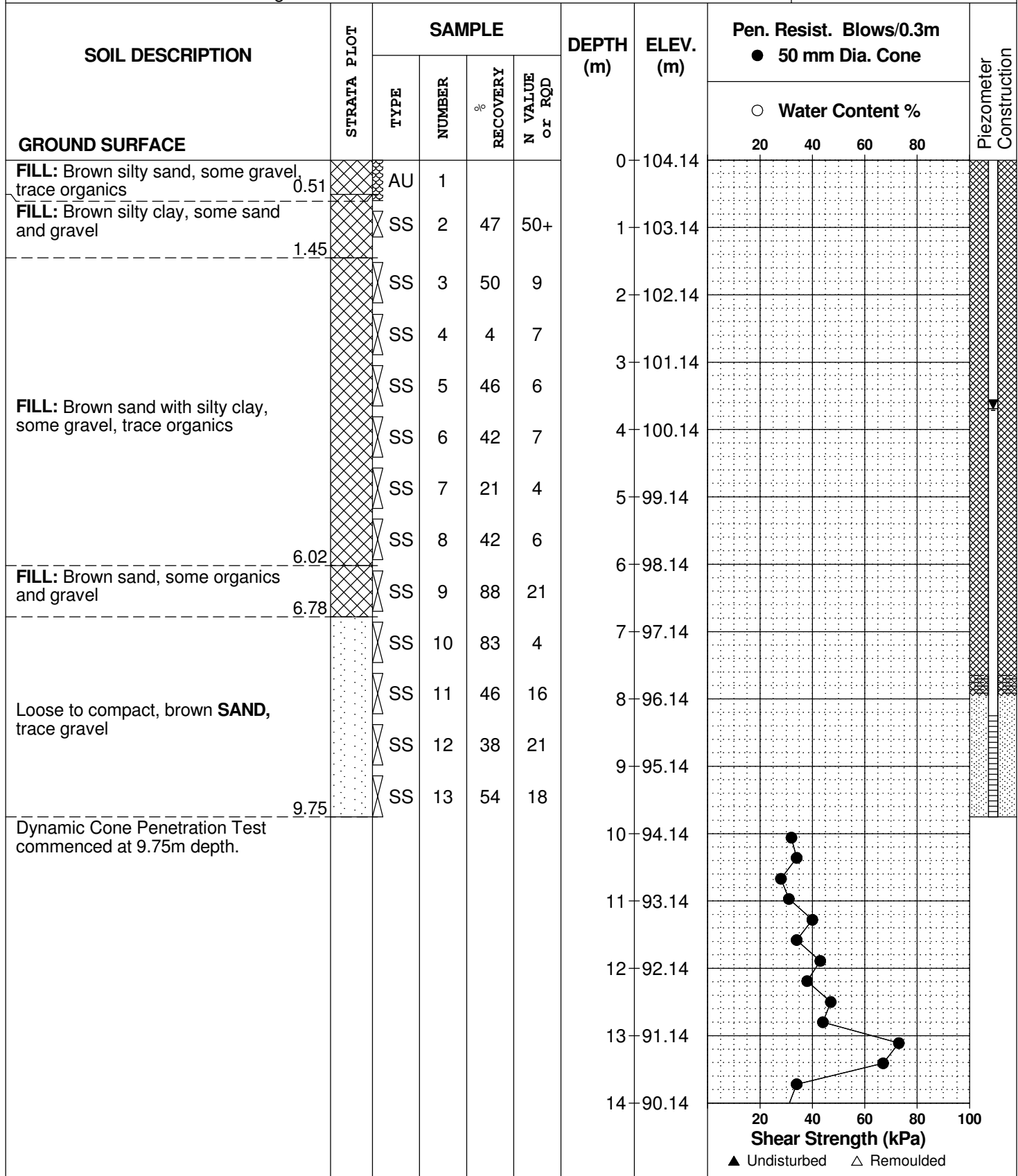
REMARKS

BORINGS BY CME 55 Power Auger

DATE 2019 November 19

FILE NO.
PG5155

HOLE NO.
BH19-19



DATUM Geodetic

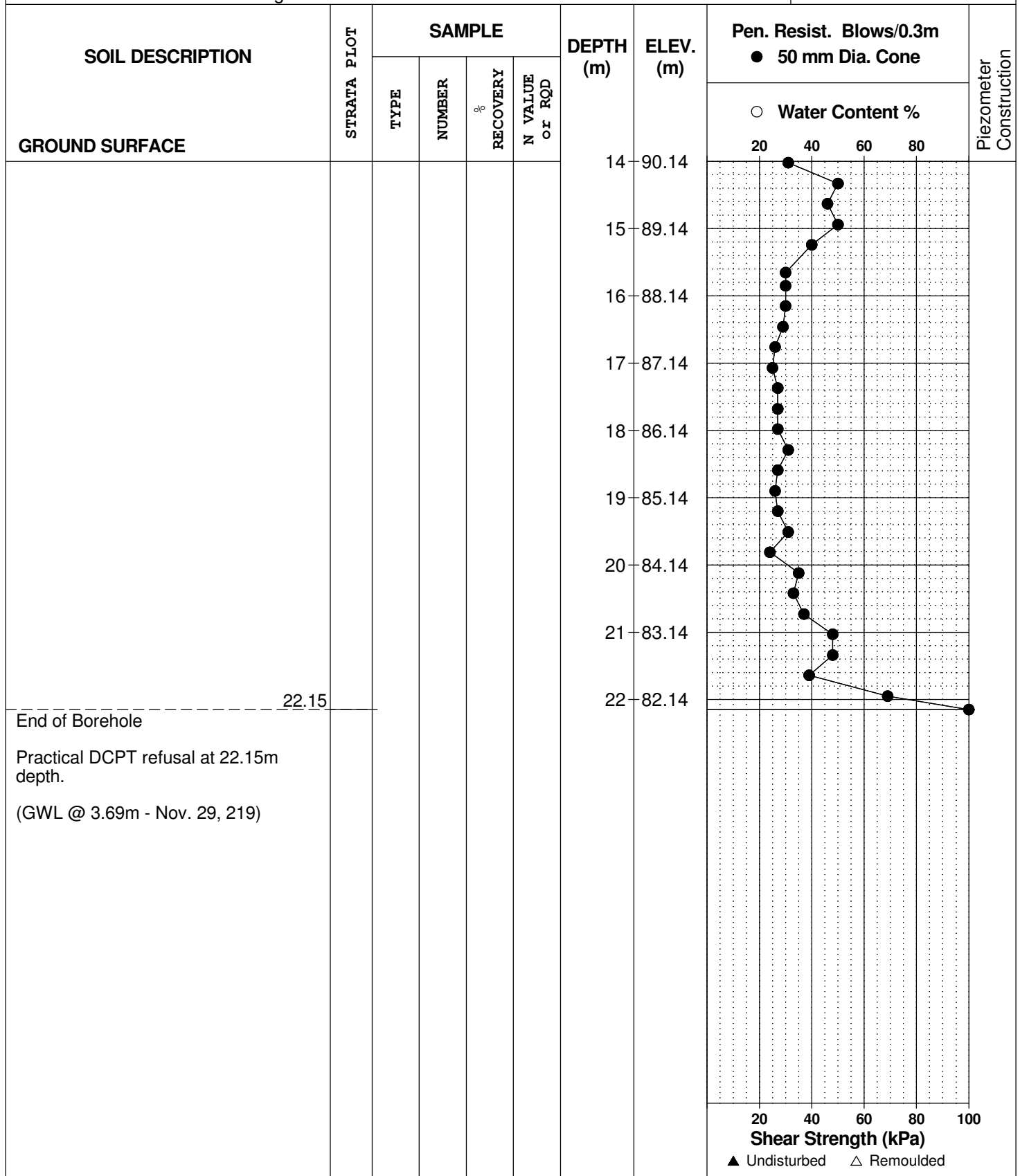
REMARKS

BORINGS BY CME 55 Power Auger

DATE 2019 November 19

FILE NO. PG5155

HOLE NO. BH19-19



DATUM Geodetic

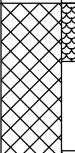

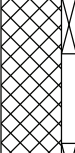


REMARKS

BORINGS BY CME 55 Power Auger

DATE 2019 November 19

FILE NO. PG5155

HOLE NO. BH20-19

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Monitoring Well Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %				
								20	40	60	80	
GROUND SURFACE						0	103.72					
FILL: Brown silty sand, trace gravel and organics		AU	1			1	102.72					
		SS	2	42	12	2	101.72					
2.59						3	100.72					
FILL: Brown sand, trace gravel		SS	3	58	5	4	99.72					
		SS	4	79	7	5	98.72					
		SS	5	54	15	6	97.72					
6.02						7	96.72					
Compact, brown SAND, trace gravel and clay seams		SS	6	58	19	8	95.72					
		SS	7	54	12	9	94.72					
		SS	6	50	8	10	93.72					
7.54												
Compact, grey SILTY SAND with gravel and clay		SS	9	71	2							
8.30												
Grey-brown SILTY CLAY, trace sand		SS	10	92	2							
		SS	11	100	1							
10.67												
End of Borehole												
(GWL @ 3.83m - Nov. 29, 219)												
								20 40 60 80 100				
								Shear Strength (kPa)				
								▲ Undisturbed △ Remoulded				

DATUM Ground surface elevations provided by J.D. Barnes Limited.

FILE NO. PG5016

REMARKS

HOLE NO. BH 7

BORINGS BY CME 55 Power Auger

DATE 2019 July 23

[illegible]

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Residential Development - Borrisokane Rd.
Ottawa, Ontario

FILE NO. PG5155

HOLE NO. **TP32**

DATE 2019 November 11

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	% RECOVERY	N VALUE or RQD			○ Water Content %				
								20	40	60	80	
GROUND SURFACE												
FILL: Brown sand, some gravel, cobbles, trace clay and organics	0.30	G	1			0	102.23					
Brown SAND , some gravel, trace cobbles		G	1			1	101.23					
						2	100.23					
						3	99.23					
						4	98.23					
	4.70	G	2			5	97.23					
Brown SAND , some clay, gravel, cobbles and boulders	5.40	G	3									
End of Test Pit												
(GWL at 4.8m depth based on field observations)												

20406080100

Shear Strength (kPa)

▲ Undisturbed △ Remoulded

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Prop. Residential Development - Borrisokane Rd.
Ottawa, Ontario**

FILE NO. PG5155

HOLE NO. **TP33**

DATE 2019 November 11

[illegible]

DATUM	Geodetic
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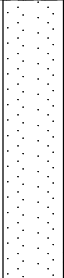

FILE NO. PG5155

REMARKS

HOLE NO. TP34

BORINGS BY Excavator

DATE 2019 November 11

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone					Piezometer Construction	
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %						
								20	40	60	80			
GROUND SURFACE						0	103.24							
FILL: Brown sand, trace gravel and organics		G	1											
0.60														
FILL: Brown silty clay, some sand, gravel, organics and topsoil		G	2											
1.05														
FILL: Brown sand, trace gravel						2	101.24							
		G	3			3	100.24							
3.60														
Loose to compact, brown SAND						4	99.24							
		G	4			5	98.24							
5.20														
End of Test Pit														
(Groundwater infiltration at 3.15m depth)														

20406080100

Shear Strength (kPa)

▲ Undisturbed △ Remoulded

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Residential Development - Borrisokane Rd.
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY Excavator

DATE 2019 November 11

FILE NO.
PG5155

HOLE NO.
TP35

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %				
								20	40	60	80	
GROUND SURFACE												
FILL: Topsoil, trace organics, gravel and sand	0.15	G	1			0	10530.00					
						1	10529.00					
FILL: Brown sand, some gravel and cobbles						2	10528.00					
		G	2			3	10527.00					
	3.10					4	10526.00					
						5	10525.00					
Loose, brown SAND		G	3			6	10524.00					
End of Test Pit	6.10											
(TP dry upon completion)												
								20	40	60	80	100
								Shear Strength (kPa)				
								▲ Undisturbed △ Remoulded				

DATUM Geodetic

REMARKS

BORINGS BY Excavator

DATE 2019 November 11

FILE NO. PG5155

HOLE NO. TP36

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %				
								20	40	60	80	
GROUND SURFACE												
TOPSOIL	0.15		G	1		0	105.10					
FILL: Brown sand, some topsoil, gravel, cobbles - some asphalt between 2.4 and 2.7m depth			G			1	104.10					
			G	2		2	103.10					
			G			3	102.10					
			G			4	101.10					
	4.50					5	100.10					
GLACIAL TILL: Loose, brown sand, some gravel, cobbles and clay												
	6.05		G	3		6	99.10					
End of Test Pit												
(GWL @ 5.95m depth based on field observations)												
								20	40	60	80	100
								Shear Strength (kPa)				
								▲ Undisturbed △ Remoulded				

DATUM	Geodetic
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FILE NO. PG5155

REMARKS

HOLE NO. TP37

BORINGS BY Excavator

DATE 2019 November 11

[illegible]

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Prop. Residential Development - Borrisokane Rd.
Ottawa, Ontario**

DATUM	Geodetic
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FILE NO. PG5155

REMARKS

HOLE NO. **TP38**

BORINGS BY Excavator

DATE 2019 November 11

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %				
								20	40	60	80	
GROUND SURFACE												
FILL: Brown silty clay, some sand, 0.15% gravel, organics		G	1			0	106.11					
Fir, brown SILTY CLAY, trace sand and gravel						1	105.11					
		G	2			2	104.11					
						3	103.11					
						4	102.11					
						5	101.11					
End of Test Pit	5.50											
(TP dry upon completion)												
								20	40	60	80	100
								Shear Strength (kPa)				
								▲ Undisturbed △ Remoulded				

DATUM	Geodetic
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FILE NO. PG5155

REMARKS

HOLE NO. **TP39**

BORINGS BY Excavator

DATE 2019 November 12

[illegible]

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	% RECOVERY	N VALUE or RQD			○ Water Content %				
								20	40	60	80	
GROUND SURFACE												
FILL: Brown sand, some gravel, cobbles	0.15	G	1			0	106.46					
FILL: Brown sand, some gravel, cobbles, trace brick						1	105.46					
						2	104.46					
		G	2			3	103.46					
- trace clay by 3.2m depth						4	102.46					
		G	3			5	101.46					
End of Test Pit	5.20											
(Groundwater infiltration at 5.1m depth)												

20406080100

Shear Strength (kPa)

▲ Undisturbed △ Remoulded

DATUM	Geodetic
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FILE NO. PG5155

REMARKS

HOLE NO. TP41

BORINGS BY Excavator

DATE 2019 November 12

[illegible]

DATUM	Geodetic
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FILE NO. PG5155

REMARKS

HOLE NO. **TP42**

BORINGS BY Excavator

DATE 2019 November 12

[illegible]

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Prop. Residential Development - Borrisokane Rd.
Ottawa, Ontario**

FILE NO. PG5155

HOLE NO. **TP43**

DATE 2019 November 12

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %				
								20	40	60	80	
GROUND SURFACE												
FILL: Brown silty clay, some topsoil, trace gravel	0.20	G	1			0	104.67					
FILL: Brown silty clay, some sand, gravel, cobbles, trace construction debris						1	103.67					
		G	2			2	102.67					
	2.90					3	101.67					
FILL: Gry silty clay, some sand, gravel, cobbles						4	100.67					
		G	3			5	99.67					
	5.20											
End of Test Pit												
(Groundwater infiltration at 4.9m depth)												

20406080100

Shear Strength (kPa)

▲ Undisturbed △ Remoulded

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Prop. Residential Development - Borrisokane Rd.
Ottawa, Ontario**

FILE NO. PG5155

HOLE NO. TP44

DATE 2019 November 12

[illegible]

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Residential Development - Borrisokane Rd.
Ottawa, Ontario

DATUM Geodetic

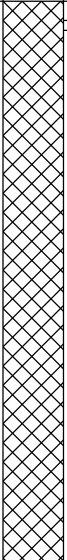

REMARKS

BORINGS BY Excavator

DATE 2019 November 12

FILE NO.
PG5155

HOLE NO.
TP45

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %				
								20	40	60	80	
GROUND SURFACE												
FILL: Brown sand, some gravel, cobbles, clay, trace organics		G	1			0	104.14					
						1	103.14					
						2	102.14					
		G	2			3	101.14					
3.50												
FILL: Brown silty clay, some sand, gravel, trace cobbles						4	100.14					
						5	99.14					
5.70												
End of Test Pit (TP dry upon completion)												
								20	40	60	80	100
								Shear Strength (kPa)				
								▲ Undisturbed △ Remoulded				

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Prop. Residential Development - Borrisokane Rd.
Ottawa, Ontario**

FILE NO. PG5155

HOLE NO. **TP46**

DATE 2019 November 11

[illegible]

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Prop. Residential Development - Borrisokane Rd.
Ottawa, Ontario**

DATUM	Geodetic
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FILE NO. PG5155

REMARKS

HOLE NO. TP47

BORINGS BY Excavator

DATE 2019 November 11

[illegible]

DATUM	Geodetic
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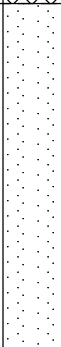
FILE NO. PG5155

REMARKS

HOLE NO. TP48

BORINGS BY Excavator

DATE 2019 November 12

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %				
								20	40	60	80	
GROUND SURFACE												
FILL: Brown sand with some to trace gravel		G	1			0	102.61					
						1	101.61					
						2	100.61					
						3	99.61					
3.50		G	2									
Loose to dense, brown SAND						4	98.61					
5.30		G	3			5	97.61					
End of Test Pit												
(Groundwater infiltration at 4.9m depth)												
								20	40	60	80	100
								Shear Strength (kPa)				
								▲ Undisturbed △ Remoulded				

DATUM	Geodetic
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FILE NO. PG5155

REMARKS

HOLE NO. **TP49**

BORINGS BY Excavator

DATE 2019 November 11

[illegible]

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Residential Development - Borrisokane Rd.
Ottawa, Ontario

DATUM	Geodetic
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FILE NO. PG5155

REMARKS

HOLE NO. **TP50**

BORINGS BY Excavator

DATE 2019 November 11

[illegible]

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

**Prop. Residential Development - Borrisokane Rd.
Ottawa, Ontario**

DATUM	Geodetic
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FILE NO.

PG5155

REMARKS

HOLE NO.

TP51

BORINGS BY Excavator

DATE 2019 November 12

SOIL DESCRIPTION		STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction	
			TYPE	NUMBER	% RECOVERY	N VALUE or RQD			○ Water Content %					
									20	40	60	80		
GROUND SURFACE														
FILL: Brown sand, some gravel, cobbles, trace clay	0.20		G	1			0	103.92						
							1	102.92						
							2	101.92						
FILL: Brown sand, trace gravel							3	100.92						
			G	2			4	99.92						
							5	98.92						
End of Test Pit	5.10		G	3										
(Groundwater infiltration at 5.0m depth														

20406080100

Shear Strength (kPa)

▲ Undisturbed △ Remoulded

DATUM Geodetic

FILE NO. PG5155

REMARKS

HOLE NO. **TP52**

BORINGS BY Excavator

DATE 2019 November 12

[illegible]

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Prop. Residential Development - Borrisokane Rd.
Ottawa, Ontario**

FILE NO. PG5155

HOLE NO. **TP53**

DATE 2019 November 11

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %				
								20	40	60	80	
GROUND SURFACE												
FILL: Brown sand and gravel, trace organics	0.25	G	1			0	102.16					
FILL: Brown sand, trace gravel		G	2			1	101.16					
		G	2			2	100.16					
		G	3			3	99.16					
		G	3			4	98.16					
End of Test Pit	5.05					5	97.16					
(GWL @ 4.6m depth based on field observations)												

20406080100

Shear Strength (kPa)

▲ Undisturbed △ Remoulded

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

**Prop. Residential Development - Borrisokane Rd.
Ottawa, Ontario**

DATUM	Geodetic
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FILE NO.

PG5155

REMARKS

HOLE NO.

TP54

BORINGS BY Excavator

DATE 2020 January 6

[illegible]

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Residential Development - Borrisokane Rd.
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY Excavator

DATE 2020 January 6

FILE NO.
PG5155

HOLE NO.
TP55

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction	
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %					
								20	40	60	80		
GROUND SURFACE						0	103.31						
FILL: Sand and gravel with topsoil													
	0.60												
										</			

DATUM	Geodetic
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FILE NO. PG5155

REMARKS

HOLE NO. **TP56**

BORINGS BY Excavator

DATE 2020 January 6

[illegible]

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Prop. Residential Development - Borrisokane Rd.
Ottawa, Ontario**

DATUM	Geodetic
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FILE NO. PG5155

REMARKS

HOLE NO. TP57

BORINGS BY Excavator

DATE 2020 January 6

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	% RECOVERY	N VALUE or RQD			○ Water Content %				
GROUND SURFACE								20	40	60	80	
FILL: Gravel with topsoil						0	101.89					
	0.60											
Loose, light brown SAND						1	100.89					
						2	99.89					
						3	98.89					
						4	97.89					
End of Test Pit	4.80											
(Groundwater infiltration at 4.2m depth)												
								20	40	60	80	100
								Shear Strength (kPa)				
								▲ Undisturbed △ Remoulded				

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Prop. Residential Development - Borrisokane Rd.
Ottawa, Ontario**

DATUM	Geodetic
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FILE NO. PG5155

REMARKS

HOLE NO. **TP58**

BORINGS BY Excavator

DATE 2020 January 6

[illegible]

DATUM	Geodetic
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FILE NO. PG5155

REMARKS

HOLE NO. **TP59**

BORINGS BY Excavator

DATE 2020 January 6

[illegible]

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Prop. Residential Development - Borrisokane Rd.
Ottawa, Ontario**

DATUM	Geodetic
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FILE NO. PG5155

REMARKS

HOLE NO. **TP59**

BORINGS BY Excavator

DATE 2020 January 6

[illegible]

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Prop. Residential Development - Borrisokane Rd.
Ottawa, Ontario**

DATUM	Geodetic
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FILE NO. PG5155

REMARKS

HOLE NO. **TP60**

BORINGS BY Excavator

DATE 2020 January 6

[illegible]

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Prop. Residential Development - Borrisokane Rd.
Ottawa, Ontario**

DATUM	Geodetic
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FILE NO. PG5155

REMARKS

HOLE NO. TP61

BORINGS BY Excavator

DATE 2020 January 6

[illegible]

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Residential Development - Borrisokane Rd.
Ottawa, Ontario

DATUM Geodetic

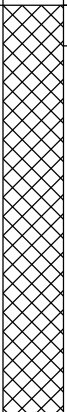
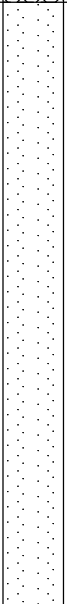
REMARKS

BORINGS BY Excavator

DATE 2020 January 6

FILE NO.
PG5155

HOLE NO.
TP62

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction	
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %					
								20	40	60	80		
GROUND SURFACE						0	101.34						
FILL: Dark grey to black silty sand with organics		G	1			1	100.34						
						2	99.34						
						3	98.34						
Loose, light brown SAND						4	97.34						
						5	96.34						
End of Test Pit													
(Groundwater infiltration at 2.5m depth)													
								20	40	60	80	100	
								Shear Strength (kPa)					
								▲ Undisturbed △ Remoulded					

DATUM	Geodetic
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FILE NO. PG5155

REMARKS

HOLE NO. **TP63**

BORINGS BY Excavator

DATE 2020 January 6

[illegible]

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Prop. Residential Development - Borrisokane Rd.
Ottawa, Ontario**

FILE NO. PG5155

HOLE NO. TP64

DATE 2020 January 6

[illegible]

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Residential Development - Borrisokane Rd.
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY Excavator

DATE 2020 January 6

FILE NO.
PG5155

HOLE NO.
TP65

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction				
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %								
								20	40	60	80					
GROUND SURFACE						0	102.82									
FILL: Gravel with topsoil	0.20															
Compact, dark brown SILTY SAND with gravel and cobbles		G	1			1	101.82									
						2	100.82									
						3	99.82									
						4	98.82									
						5	97.82									
End of Test Pit	5.40															
(Groundwater infiltration at 3.2m depth)																
								20	40	60	80	100				
								Shear Strength (kPa)								
								▲ Undisturbed △ Remoulded								

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Residential Development - Borrisokane Rd.
Ottawa, Ontario

DATUM	Geodetic
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FILE NO. PG5155

REMARKS

HOLE NO. **TP66**

BORINGS BY Excavator

DATE 2020 January 6

[illegible]

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Prop. Residential Development - Borrisokane Rd.
Ottawa, Ontario**

FILE NO. PG5155

HOLE NO. TP67

DATE 2020 January 8

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %				
								20	40	60	80	
GROUND SURFACE						0	103.88					
FILL: Gravel and cobbles, trace boulders and crushed stone 1.00 FILL: Dark brown silty sand with gravel, some cobbles and organics, trace boulders, wood and concrete 5.40 End of Test Pit (TP dry upon completion)		G	1			1	102.88					
						2	101.88					
						3	100.88					
						4	99.88					
						5	98.88					
								20	40	60	80	100

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Prop. Residential Development - Borrisokane Rd.
Ottawa, Ontario**

DATUM Geodetic

FILE NO. PG5155

REMARKS

HOLE NO. **TP68**

BORINGS BY Excavator

DATE 2020 January 8

[illegible]

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Residential Development - Borrisokane Rd.
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY Excavator

DATE 2020 January 8

FILE NO.
PG5155

HOLE NO.
TP69

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction	
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %					
								20	40	60	80		
GROUND SURFACE						0	102.88						
FILL: Gravel with topsoil													
	0.60												
						1	101.88						
						2	100.88						
						3	99.88						
						4	98.88						
						5	97.88						
End of Test Pit	5.02												
(Groundwater infiltration at 4.2m depth)													

Loose, light brown **SAND**

▽

DATUM	Geodetic
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FILE NO. PG5155

REMARKS

HOLE NO. **TP70**

BORINGS BY Excavator

DATE 2020 January 8

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %				
								20	40	60	80	
GROUND SURFACE												
FILL: Gravel with crushed stone and topsoil	0.50					0	102.02					
FILL: Dark brown silt with gravel, cobbles and construction debris	1.60					1	101.02					
Loose, light brown SAND	3.20					2	100.02					
End of Test Pit (Groundwater infiltration at 3.2m depth)						3	99.02					
Shear Strength (kPa)												
▲ Undisturbed △ Remoulded												

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

**Prop. Residential Development - Borrisokane Rd.
Ottawa, Ontario**

DATUM	Geodetic
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FILE NO.

PG5155

REMARKS

HOLE NO.

TP71

BORINGS BY Excavator

DATE 2020 January 8

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction	
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %					
								20	40	60	80		
GROUND SURFACE						0	101.32						
FILL: Dark brown silt with organics, gravel, cobbles and construction debris													
0.75													
Loose, light brown SAND						1	100.32						
1.02													
Stiff, grey SILTY CLAY , trace organics		G	1			2	99.32						
2.90													
Loose, light brown SAND						3	98.32						
4.60						4	97.32						
End of Test Pit													
(Groundwater infiltration at 3.4m depth)													

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Residential Development - Borrisokane Rd.
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY Excavator

DATE 2020 January 8

FILE NO.
PG5155

HOLE NO.
TP72

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction		
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %						
								20	40	60	80			
GROUND SURFACE						0	101.92							
FILL: Dark brown organic silt with gravel, cobbles, trace boulders and constrcution debris						1	100.92							
						1.30								
Loose, light brown SAND						2	99.92							
						2.30								
Stiff, grey SILTY CLAY, trace organics						3	98.92							
						4	97.92							
						5	96.92							
End of Test Pit (TP dry upon completion)						5.90								
								20	40	60	80	100		
								Shear Strength (kPa)						
								▲ Undisturbed △ Remoulded						

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Residential Development - Borrisokane Rd.
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY Excavator

DATE 2020 January 8

FILE NO.

PG5155

HOLE NO.

TP73

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction	
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %					
								20	40	60	80		
GROUND SURFACE						0	102.39						
FILL: Brown silty sand with gravel, cobbles, boulders, trace organics						1	101.39						
2.00						2	100.39						
Loose, light brown SAND						3	99.39						
3.90													
End of Test Pit													
(Groundwater infiltration at 2.9m depth)													

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

DATUM Ground surface elevations provided by J.D. Barnes Limited.

FILE NO. PG5016

REMARKS

HOLE NO. **TP10**

BORINGS BY Excavator

DATE 2019 July 26

[illegible]

DATUM Ground surface elevations provided by J.D. Barnes Limited.






FILE NO. PG5016

REMARKS

HOLE NO. TP11

BORINGS BY Excavator

DATE 2019 July 26

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	% RECOVERY	N VALUE or RQD			○ Water Content %				
								20	40	60	80	
GROUND SURFACE												
FILL: Brown sand with gravel, trace cobbles and boulders		G	1			0	105.18					
FILL: Brown sand with gravel		G	2			1	104.18					
FILL: Brown sand with gravel		G	3			2	103.18					
Brown SAND, some gravel		G	4			3	102.18					
End of Test Pit (TP dry upon completion)		G				4	101.18					
						5	100.18					
						6	99.18					

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
3713 Borrisokane Road
Ottawa, Ontario**

FILE NO. PG5016

HOLE NO. **TP12**

DATE 2019 July 26

[illegible]

DATUM Ground surface elevations provided by J.D. Barnes Limited.

FILE NO. PG5016

REMARKS

HOLE NO. TP13

BORINGS BY Excavator

DATE 2019 July 26

[illegible]

SOIL PROFILE AND TEST DATA

FILE NO. PG5016

HOLE NO. TP14

REMARKS

BORINGS BY Excavator

DATE 2019 July 26

[illegible]



SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
3713 Borrisokane Road
Ottawa, Ontario**

FILE NO. PG5016

HOLE NO. **TP26**

DATE 2019 September 18

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %				
								20	40	60	80	
GROUND SURFACE												
FILL: Brown silty sand with clay, trace organics and cobbles		G	1			0	105.54					
						1	104.54					
						2	103.54					
						3	102.54					
4.09						4	101.54					
FILL: Brown silty clay with concrete and boulders		G	2			5	100.54					
						6	99.54					
						7	98.54					
						7.67						
End of Test Pit (TP dry upon completion)												

20 40 60 80 100
Shear Strength (kPa)
 ▲ Undisturbed △ Remoulded

SYMBOLS AND TERMS

SOIL DESCRIPTION

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

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

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

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

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

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

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

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

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

ROCK DESCRIPTION

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

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

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

SAMPLE TYPES

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

SYMBOLS AND TERMS (continued)

GRAIN SIZE DISTRIBUTION

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

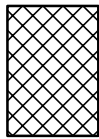
STRATA PLOT



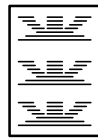
Topsoil



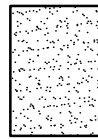
Asphalt



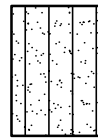
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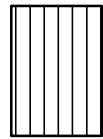
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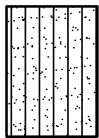
Sand



Silty Sand



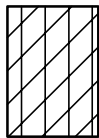
Silt



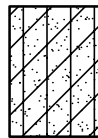
Sandy Silt



Clay



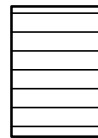
Silty Clay



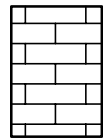
Clayey Silty Sand



Glacial Till



Shale



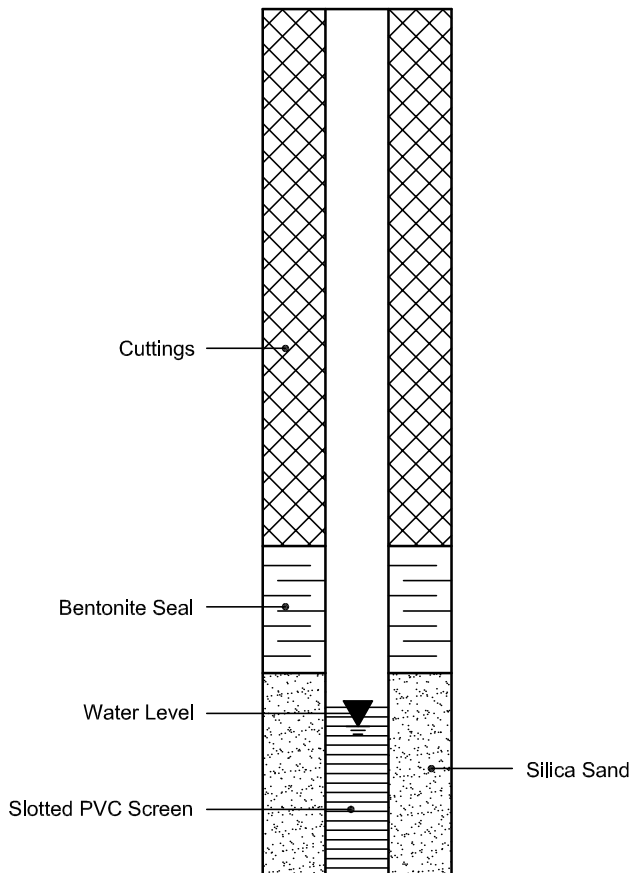
Bedrock

MONITORING WELL AND PIEZOMETER CONSTRUCTION

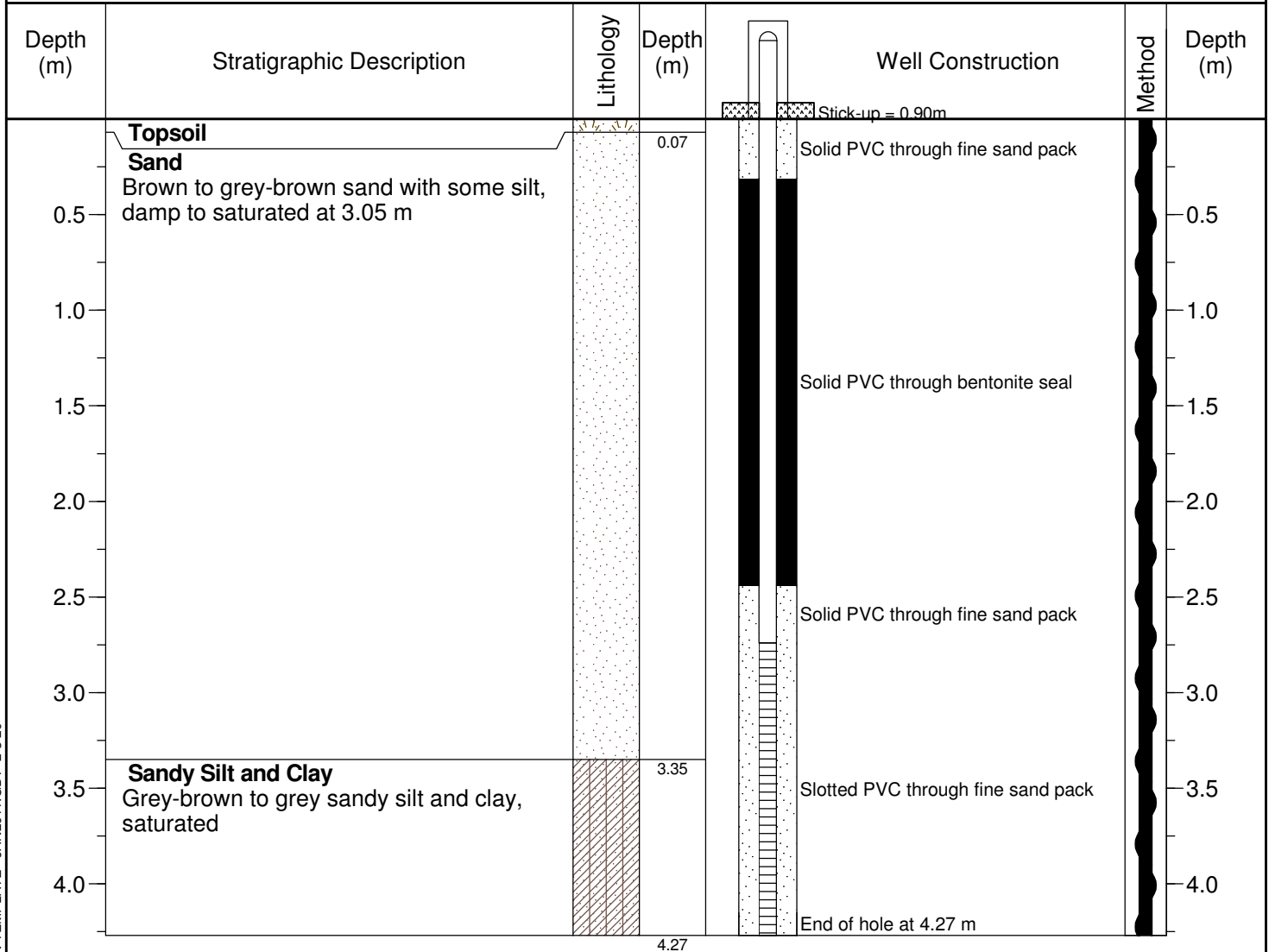
MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION






Client: <u>City of Ottawa</u>	Project: <u>Trail Road Landfill</u>
Project No.: <u>18-7333</u>	Location: <u>Ottawa, ON</u>
Drilling Co.: <u>Aardvark Drilling</u>	Drilling Method: <u>Auger</u>
Supervised by: <u>Kristine Cavanagh</u>	Date Started: <u>30-11-18</u> Date Completed: <u>30-11-18</u>




DILLON MW DEPTH 2018 TRAIL + NEPEAN WELLS.GPJ DILLON TEMPLATE - JAN2011.GDT 2-3-20

**LITHOLOGY
SYMBOLS**

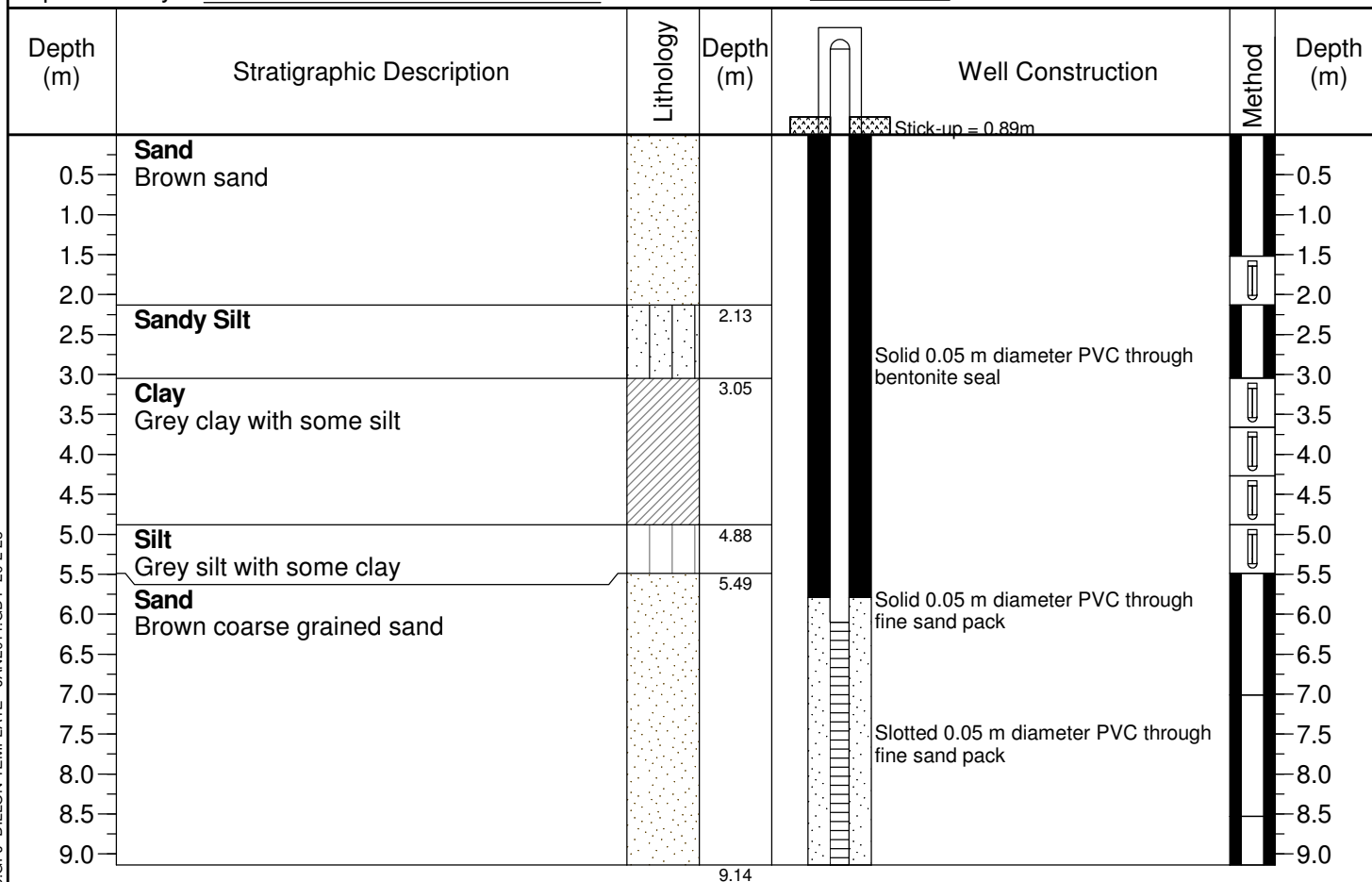
 Organics
 Sand, Silt, and Clay

 Sand

**SAMPLE
TYPE**

 Auger

Client: <u>Dillon Consulting Ltd.</u>	Project: <u>Trail Road Landfill Drilling Program</u>
Project No.: <u>18-7333</u>	Location: <u>Trail Road Landfill</u>
Drilling Co.: <u>Aardvark Drilling Inc.</u>	Drilling Method: <u>Mud Rotary</u>
Supervised by: <u>BCT</u>	Date Started: <u>19-12-2</u> Date Completed: <u>19-12-2</u>



DILLON MW DEPTH 2019 M183-M187 + TEST WELL TRAIL LANDFILL BOREHOLE LOGS.GPJ DILLON TEMPLATE - JAN2011.GDT 20-2-28



LITHOLOGY SYMBOLS



SAMPLE TYPE

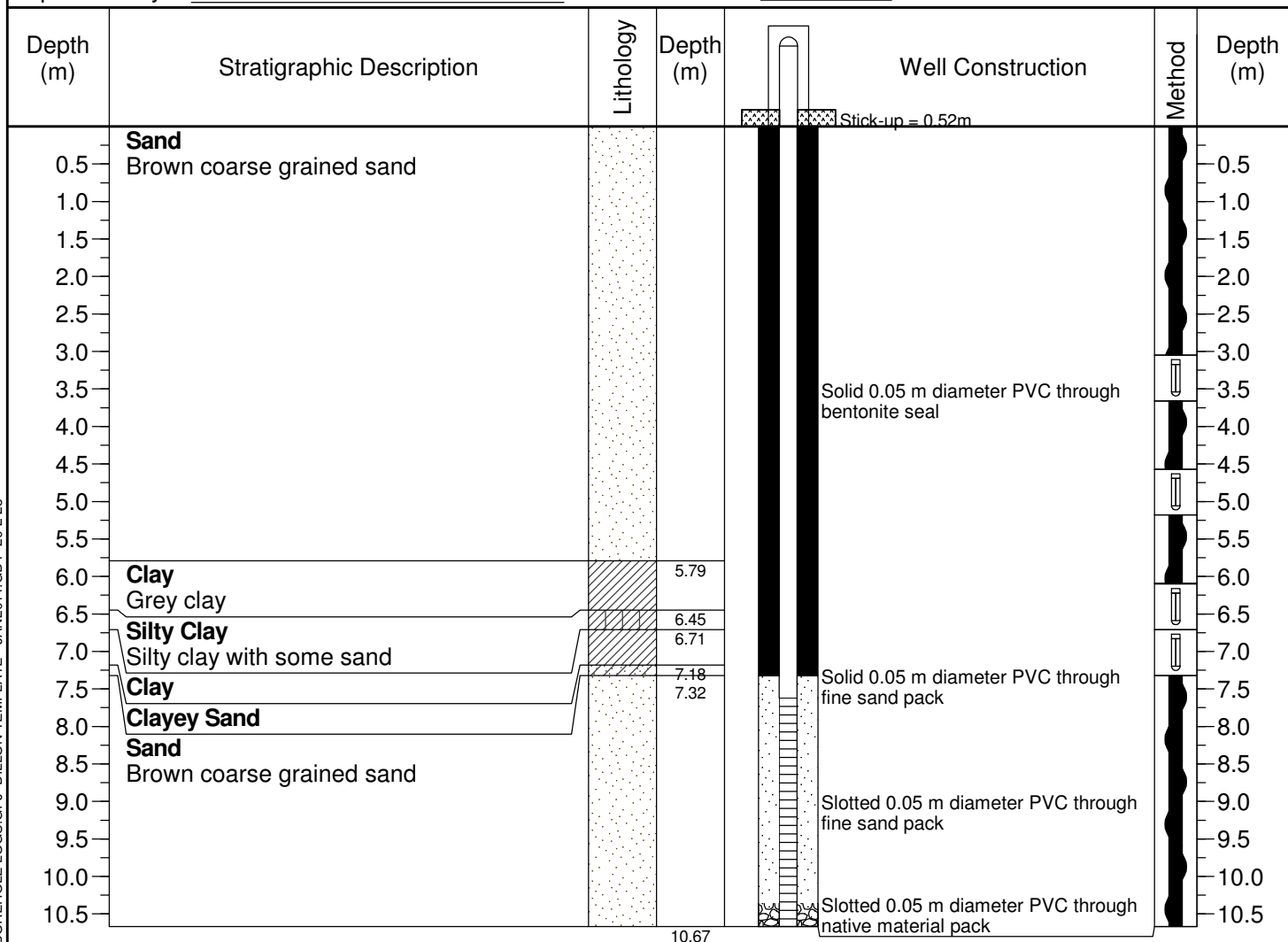


BOREHOLE LOG	PROJECT: 92-287	BOREHOLE: M79 1 of 1
Trail Road Landfill 1992 Drilling and Geophysics Program FOR: Regional Municipality of Ottawa-Carleton		DATE: 23 November 1992 GEOLOGIST LD ELEVATION 101.5 m ASL

DEPTH (m)	STRATIGRAPHY	STRATIGRAPHIC DESCRIPTION	MONITOR DETAILS & NUMBER	SAMPLE						N VALUE				WATER CONTENT (%)				
				NUMBER	INTERVAL	TYPE	N VALUE	X WATER	X REC	X RQD	N VALUE				WATER CONTENT (%)			
											15	30	45	60	10	20	30	40
1		SAND AND SILT FILL Grey brown sand and silt fill, moist to wet, very soft. Placed as embankment material for Highway 416		1	SS	8												
1.6		SAND Grey brown coarse sand, some medium sand, moist to wet. becoming saturated below about 3 m. seam of fine sand and silt at about 4.6m	2	SS	15													
2			3	SS	31													
3			4	SS	21													
4			5	SS	40													
4.9			6	SS	26													
		Borehole terminated in saturated sand at about 4.9 m																

 Gartner Lee Limited


Client: <u>Dillon Consulting Ltd.</u>	Project: <u>Trail Road Landfill Drilling Program</u>
Project No.: <u>18-7333</u>	Location: <u>Trail Road Landfill</u>
Drilling Co.: <u>Aardvark Drilling Inc.</u>	Drilling Method: <u>Hollow Stem Augers</u>
Supervised by: <u>TTN</u>	Date Started: <u>19-12-12</u> Date Completed: <u>19-12-12</u>





DILLON MW DEPTH 2019 M183-M187 + TEST WELL TRAIL LANDFILL BOREHOLE LOGS.GPJ DILLON TEMPLATE - JAN2011.GDT 20-2-28

LITHOLOGY SYMBOLS

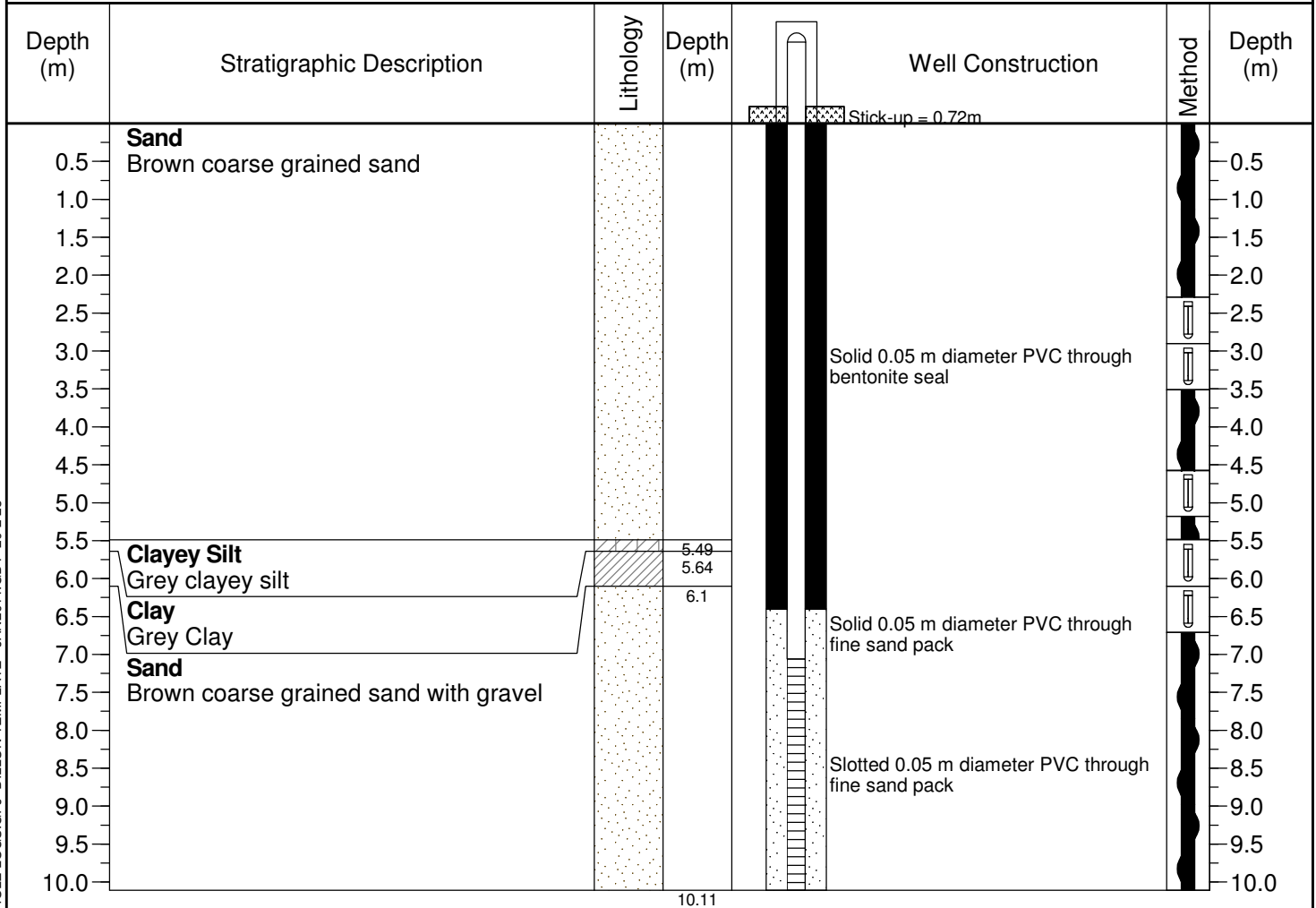
 Sand
 Silty Clay

 Clay
 Clayey Sand

SAMPLE TYPE

 Auger
 Split Spoon

Client: <u>Dillon Consulting Ltd.</u>	Project: <u>Trail Road Landfill Drilling Program</u>
Project No.: <u>18-7333</u>	Location: <u>Trail Road Landfill</u>
Drilling Co.: <u>Aardvark Drilling Inc.</u>	Drilling Method: <u>Hollow Stem Augers</u>
Supervised by: <u>TTN</u>	Date Started: <u>19-12-11</u> Date Completed: <u>19-12-11</u>



DILLON MW DEPTH 2019 M183-M187 + TEST WELL TRAIL LANDFILL BOREHOLE LOGS.GPJ DILLON TEMPLATE - JAN2011.GDT 20-2-28

LITHOLOGY SYMBOLS







	Sand
	Clay

 Clayey Silt

SAMPLE TYPE

	Auger
	Split Spoon

BOREHOLE LOG	PROJECT: 91-134	BOREHOLE: M8B-I, II 1 of 1
MONITOR REPLACEMENT TRAIL ROAD LANDFILL - HIGHWAY 416 FOR: Ministry of Transport of Ontario		DATE: 12 March 1991 GEOLOGIST LD ELEVATION 101.8 m ASL

DEPTH (m)	STRATIGRAPHY	STRATIGRAPHIC DESCRIPTION	MONITOR DETAILS & NUMBER	SAMPLE						N VALUE				WATER CONTENT (%)				
				NUMBER	INTERVAL	TYPE	N VALUE	% WATER	% REC	% RQD								
											15	30	45	60	10	20	30	40
1		SAND Light to medium brown fine to medium sand, moist, loose to compact.		1	SS	4												
2		-Becoming saturated with some coarse sand below about 2 m.		2	SS	15												
3				3	SS	14												
4		-Occasional sea shell fragments below about 3.8 m.		4	SS	17												
5				5	SS	16												
6				6	SS	12												
6.4																		
7		-Assumed clay seam between about 6.4 to 7.3 m.																
7.3																		
8		-Becoming a sand and gravel below about 7.3 m with cobbles below about 8.3 m.																
8.5																		
		Borehole terminated at 8.53 m in assumed sand and gravel. NOTE: Stratigraphy below about 5.2 m inferred from drill cuttings. Monitors installed in separate boreholes.																

APPENDIX 3

PH3959 - 1 - REV.1 - PROPOSED SITE LAYOUT PLAN

PG5155 - 1 - REVISION 1 - TEST HOLE LOCATION PLAN

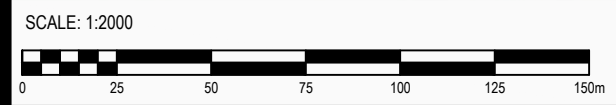
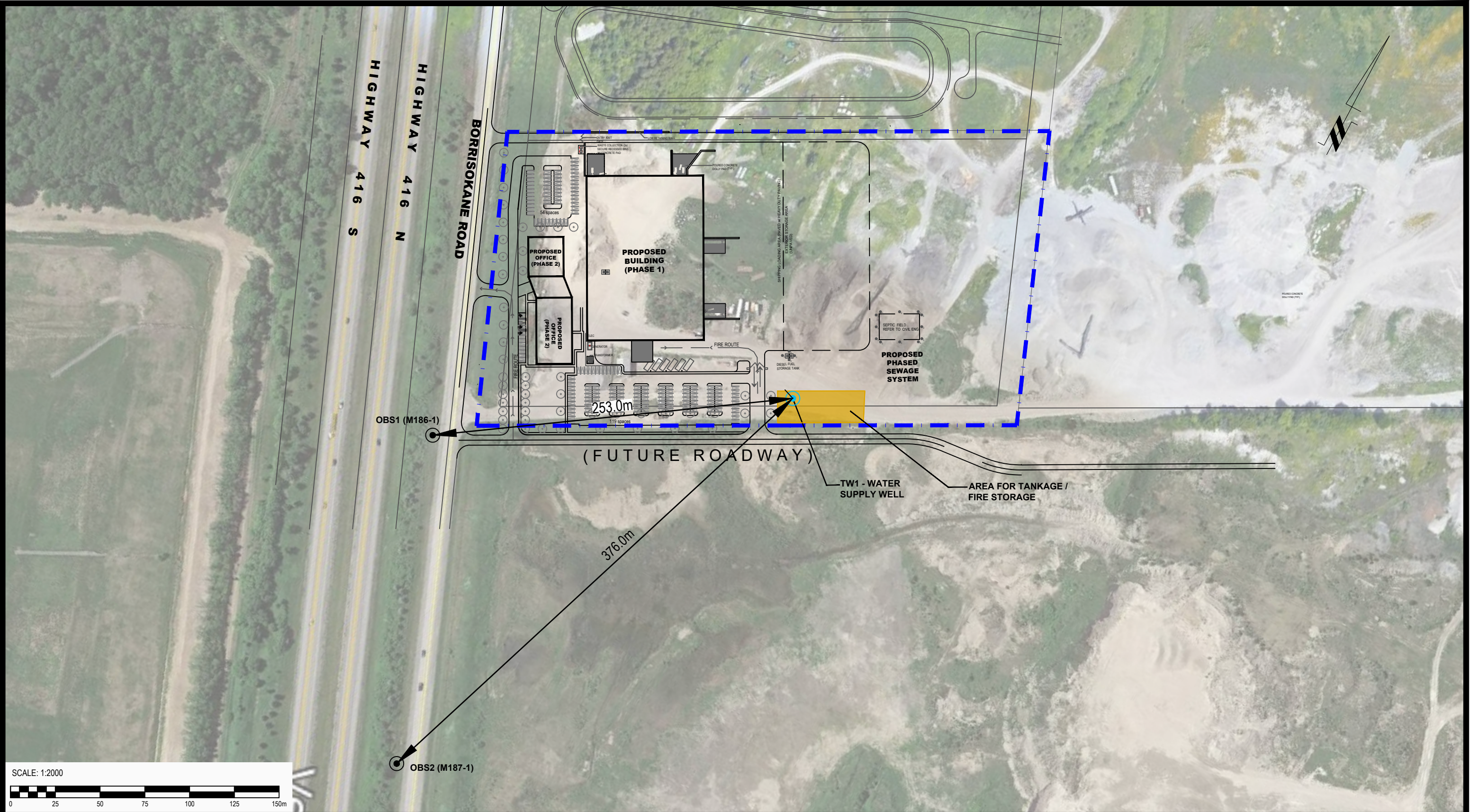
**DILLON CONSULTING PROJECT NO:18-7333 - 2019 GROUNDWATER MONITORING
LOCATIONS**

PH3959 - 2 - MECP WATER WELL LOCATION PLAN

PH3959 - 4 - SURFICIAL GEOLOGY

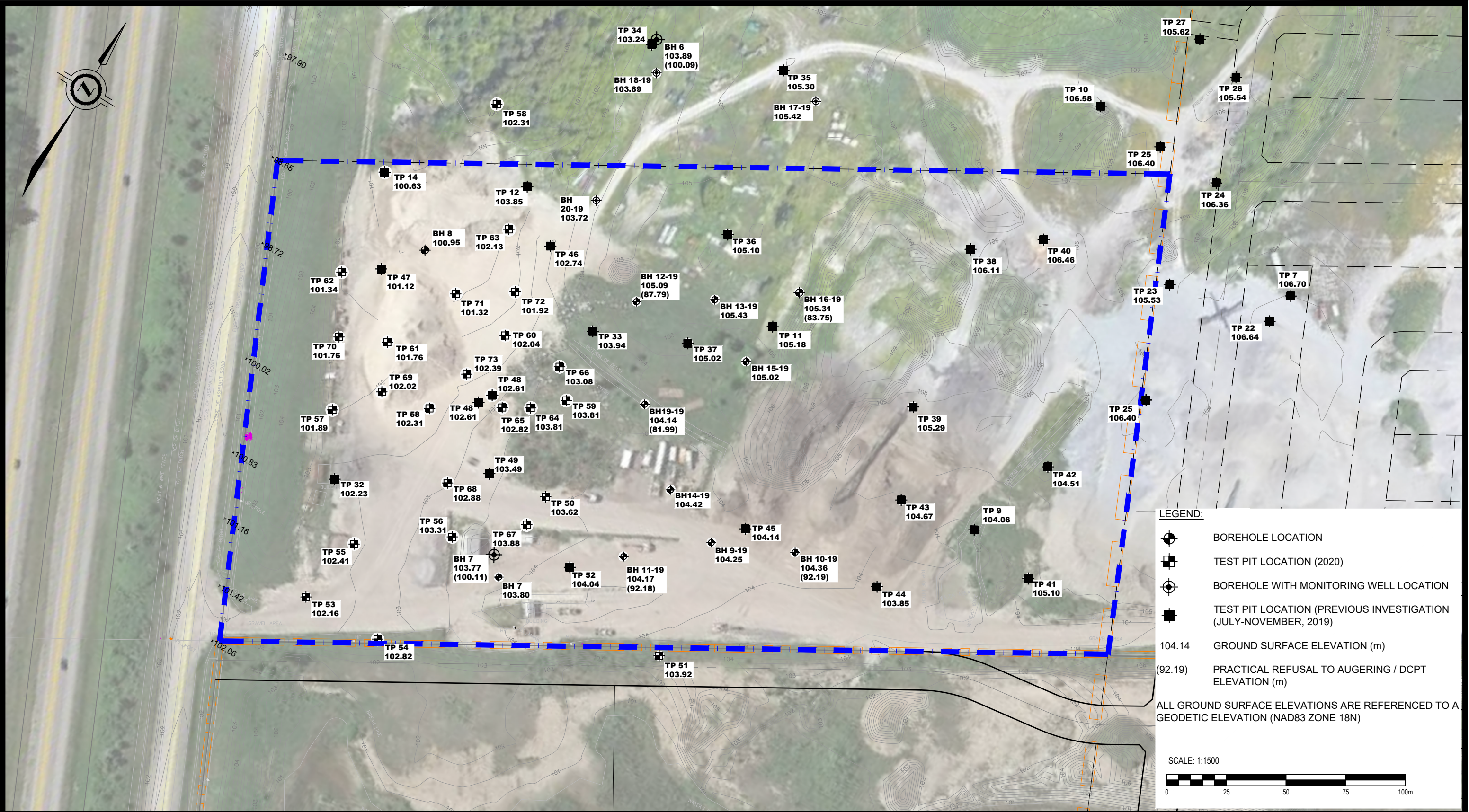
PH3959 - 6 - BEDROCK GEOLOGY

J.D BARNES LTD. PLAN 4R-32754



<div><div><div>patersongroup</div><div>consulting engineers</div></div><div><div>154 Colonnade Road South</div><div>Ottawa, Ontario K2E 7J5</div><div>Tel: (613) 226-7381 Fax: (613) 226-6344</div></div></div>					CAIVAN GREENBANK NORTH INC. HYDROGEOLOGICAL STUDY FOR A PRIVATE WATER WELL SUPPLY 3713 BORRISOKANE - PROPOSED COMMERCIAL / INDUSTRIAL DEVELOPMENT OTTAWA, ONTARIO	Scale:	1:2500	Date:	03/2020	
						Drawn by:	RCG	Report No.:	PH3959-3	
						Checked by:	EA	PH3959-1	Revision No.:	1
						Approved by:	MK			
	1	REVISED BASED ON NEW PROPOSED SITE LAYOUT	17/03/2020	EA	Title: PROPOSED SITE LAYOUT PLAN					
	NO.	REVISIONS	DATE	INITIAL						

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patersongroup
consulting engineers

154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

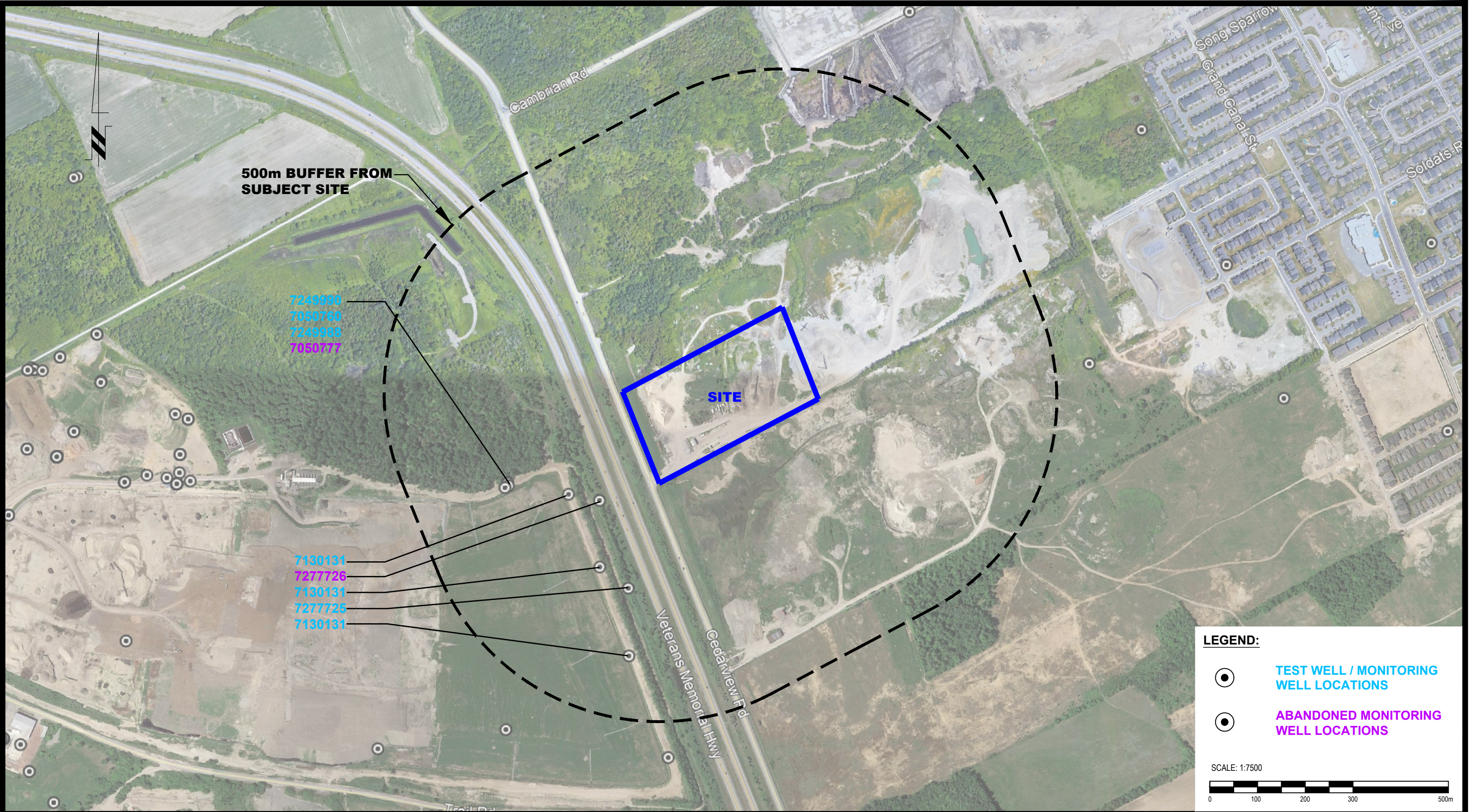
NO.	REVISIONS	DATE	INITIAL

CAIVAN GREENBANK NORTH INC.
GEOTECHNICAL INVESTIGATION
3713-BORRISOKANE-PROPOSED COMMERCIAL DEVELOPMENT
OTTAWA, ONTARIO


Title:
TEST HOLE LOCATION PLAN


Scale:	1:1500	Date:	02/2020
Drawn by:	RCG	Report No.:	PG5155-1
Checked by:	DJG	PG5155-1	Revision No.:
Approved by:	DJG		

p:\autocad\drawings\geotechnical\pg5155\pg5155-1 corrected holes.dwg




LEGEND:

 **TEST WELL / MONITORING WELL LOCATIONS**

 **ABANDONED MONITORING WELL LOCATIONS**

SCALE: 1:7500



patersongroup
consulting engineers

154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

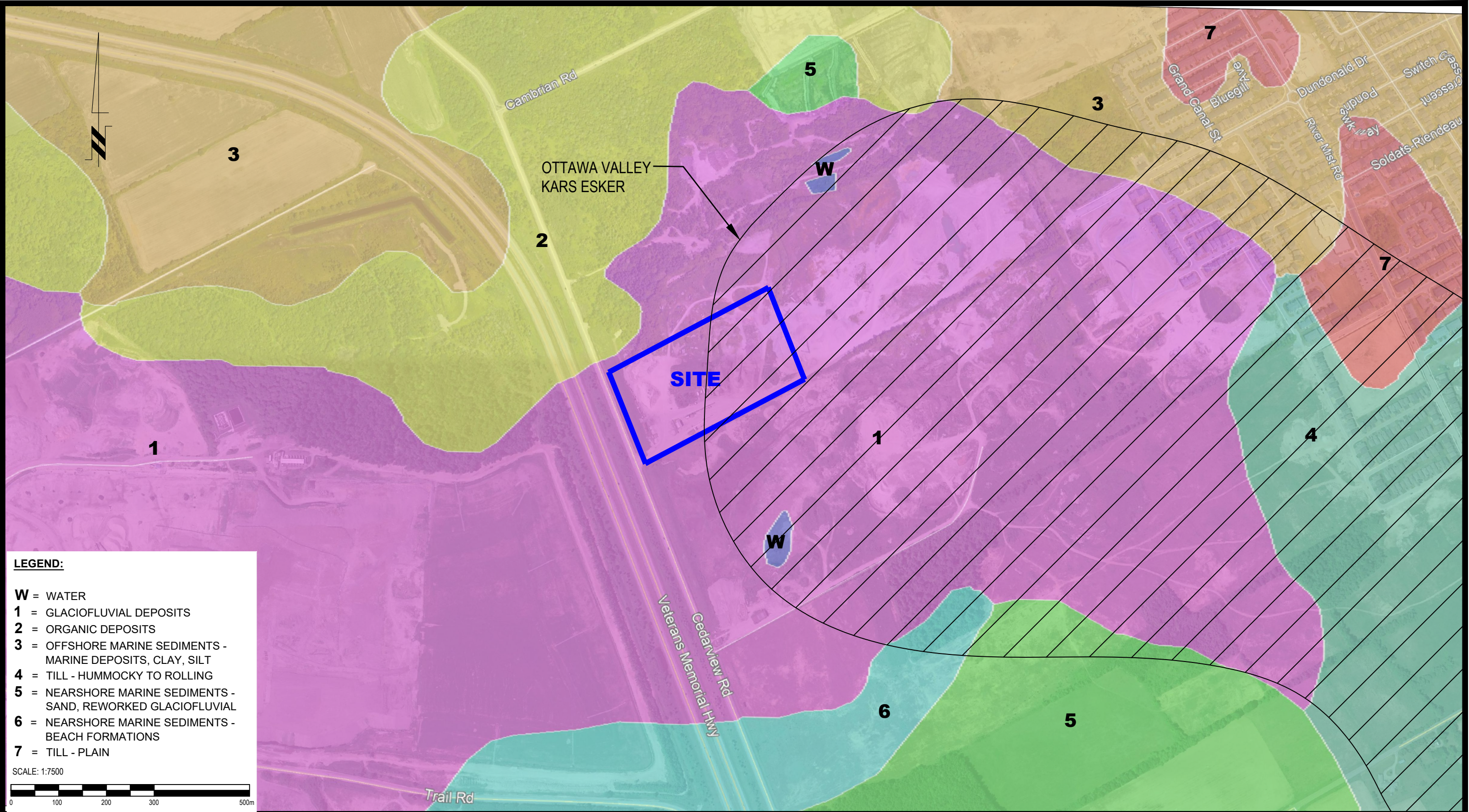
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NO.	REVISIONS	DATE	INITIAL

CAIVAN GREENBANK NORTH INC.
GROUNDWATER IMPACT ASSESSMENT
3713 BORRISOKANE - PROPOSED COMMERCIAL / INDUSTRIAL DEVELOPMENT
OTTAWA, ONTARIO

Title:
MECP WATER WELL LOCATION PLAN

Scale:	1:7500	Date:	11/2019
Drawn by:	RCG	Report No.:	PH3959-1
Checked by:	EA	PH3959-2	Revision No.:
Approved by:	MK		

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patersongroup
consulting engineers

154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

0			
NO.	REVISIONS	DATE	INITIAL

CAIVAN GREENBANK NORTH INC.	
GROUNDWATER IMPACT ASSESSMENT	
3713 BORRISOKANE - PROPOSED COMMERCIAL / INDUSTRIAL DEVELOPMENT	
OTTAWA,	ONTARIO
Title:	
SURFICIAL GEOLOGY	

Scale:	1:7500	Date:	11/2019
Drawn by:	RCG	Report No.:	PH3959-1
Checked by:	EA	PH3959-4	Revision No.:
Approved by:	MK		

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LEGEND:

DOLOMITE [OXFORD FORMATION]

SCALE: 1:7500

0

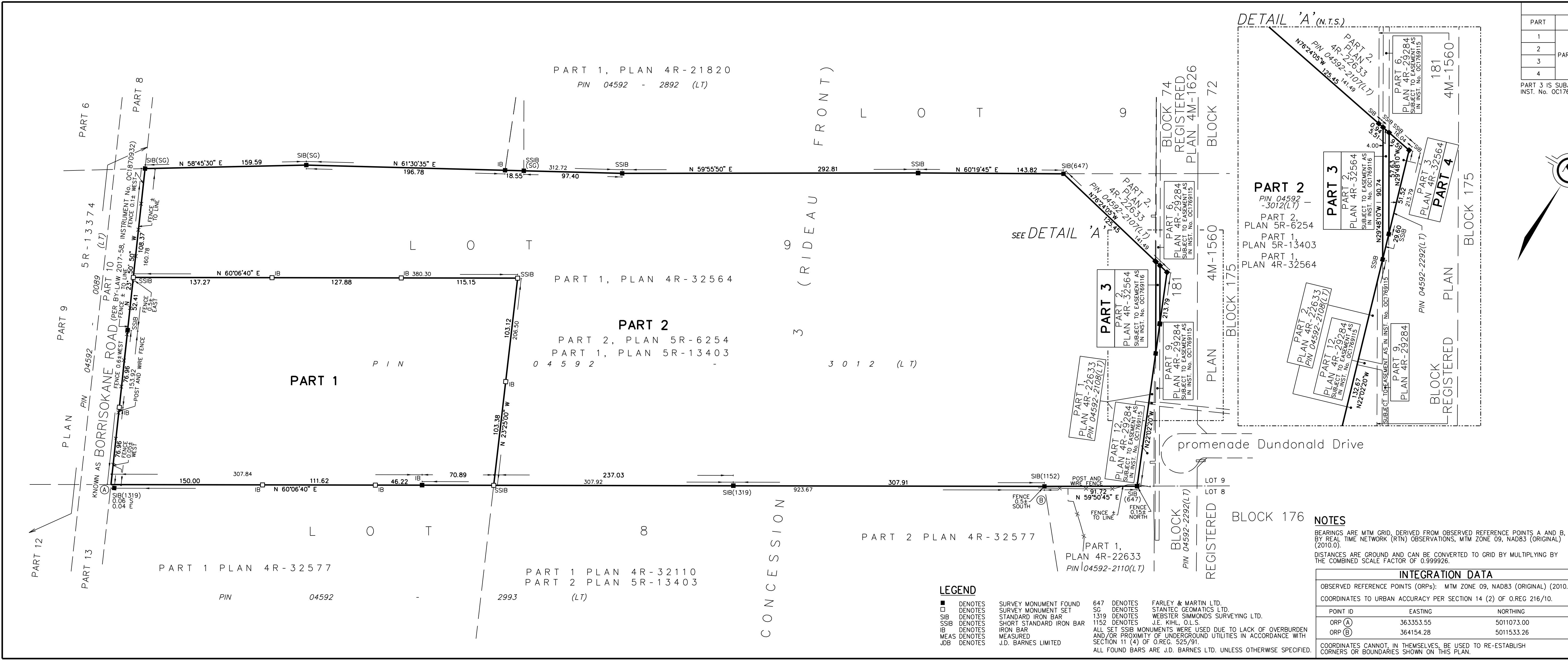
100

200

300

500m

<div><div><div>patersongroup</div><div>consulting engineers</div></div><div><div>154 Colonnade Road South</div><div>Ottawa, Ontario K2E 7J5</div><div>Tel: (613) 226-7381 Fax: (613) 226-6344</div></div></div>					CAIVAN GREENBANK NORTH INC. GROUNDWATER IMPACT ASSESSMENT 3713 BORRISOKANE - PROPOSED COMMERCIAL / INDUSTRIAL DEVELOPMENT OTTAWA, ONTARIO	Scale:	1:7500	Date:	11/2019
						Drawn by:	RCG	Report No.:	PH3959-1
						Checked by:	EA	PH3959-6	Revision No.:
						Approved by:	MK		
	0				Title:	BEDROCK GEOLOGY			
	NO.	REVISIONS	DATE	INITIAL					



SCHEDULE			
PART	LOT	CON	PIN
1	PART OF 9	3 (RF)	ALL OF 04592-3012(LT)
2			
3			
4			

PART 3 IS SUBJECT TO EASEMENT AS IN INST. No. OC1769116

PLAN 4R-32754

Received and deposited

March 19th, 2020

Cheryl Langkamer

Representative for the
Land Registrar for the
Land Titles Division of
Ottawa-carleton (No.4)

THE INTENDED PLOT SIZE OF THIS PLAN IS 940mm IN WIDTH BY 355mm IN HEIGHT WHEN PLOTTED AT A SCALE OF 1:2000

PLAN OF SURVEY OF
**PART OF LOT 9
CONCESSION 3 (RIDEAU FRONT)
CITY OF OTTAWA**

SCALE 1:2000

J.D. BARNES LIMITED

METRIC DISTANCES AND/OR COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

- THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.
- THE SURVEY WAS COMPLETED ON MARCH 3, 2020.

MARCH 10, 2020
DATE

C.M. FOX
ONTARIO LAND SURVEYOR

THIS PLAN OF SURVEY RELATES TO AOLS PLAN SUBMISSION FORM NUMBER 2109810

INTEGRATION DATA		
OBSERVED REFERENCE POINTS (ORPs): MTM ZONE 09, NAD83 (ORIGINAL) (2010.0).		
COORDINATES TO URBAN ACCURACY PER SECTION 14 (2) OF O.REG 216/10.		
POINT ID	EASTING	NORTHING
ORP (A)	363353.55	5011073.00
ORP (B)	364154.28	5011533.26
COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.		

LEGEND

■	DENOTES SURVEY MONUMENT FOUND	647	DENOTES FARLEY & MARTIN LTD.
□	DENOTES SURVEY MONUMENT SET	SG	DENOTES STANTEC GEOMATICS LTD.
SIB	DENOTES STANDARD IRON BAR	1319	DENOTES WEBSTER SIMMONDS SURVEYING LTD.
SSIB	DENOTES SHORT STANDARD IRON BAR	1152	DENOTES J.E. KIHIL, O.L.S.
IB	DENOTES IRON BAR	ALL SET SSB MONUMENTS WERE USED DUE TO LACK OF OVERBURDEN AND/OR PROXIMITY OF UNDERGROUND UTILITIES IN ACCORDANCE WITH SECTION 11 (4) OF O.REG. 525/91.	
MEAS	DENOTES MEASURED	ALL FOUND BARS ARE J.D. BARNES LTD. UNLESS OTHERWISE SPECIFIED.	
JDB	DENOTES J.D. BARNES LIMITED		