Geotechnical Engineering

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Existing Conditions Report: Hydrogeology:

Cardinal Creek Village Ottawa (Cumberland), Ontario

Prepared For:

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Report: PH1890-REP.01



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EXECUTIVE SUMMARY

The Hydrogeology Existing Conditions report provides a detailed description of the geology and groundwater conditions present at the proposed Cardinal Creek Village lands. The descriptions provided are based on published mapping and regional reports and augmented with detailed field investigations as part of a comprehensive geotechnical investigation carried out, to date, on the subject lands.

The Cardinal Creek Village consists of a 225 hectare tract of land proposed to undergo urban development east of Cardinal Creek and spanning north and south of Old Montreal Road. Physiographically, the subject property is dominated by low permeable silty clay and marine glacial till surficial soils. Surficial drainage is generally towards the Ottawa River, but drainage is bisected by two (2) tributaries of Cardinal Creek directing surface water and shallow overburden groundwater into the Creek system.

The overburden found on the subject property consists of stiff silty clay and glacial till of marine origins overlying Paleozoic limestone bedrock. Overall estimated saturated hydraulic conductivities of the overburden soils are considered to be low and generally unsuitable for the infiltration of surface water as part of an overall stormwater management plan for the subject property.

The bedrock which underlies the subject property consists of generally flat-lying carbonate sedimentary rock composed of layers of Paleozoic bedrock from the Middle and Upper Ordovician and Oxford Formations. Bedrock contours reveal that surficial topography is dominated by the presence of the bedrock beneath the site.

Karst features were identified on lands in excess of 400m to the west of the subject property and situated along Cardinal Creek. These features are contained within the Bobcaygeon Formation limestone and consist of a tunnel valley system with a unique set of geologic features which comprise an Area of Natural and Scientific Interest (ANSI). Karst features were not identified on the subject property and proposed development activities on the subject property are not anticipated to impact the Karst within the ANSI area. Potential areas for Karst features on the subject lands will be investigated as part of the detailed site investigation program.

Infiltration rates of between 13 mm/year and 126 mm/year can be expected from the existing surficial soils, based on estimated hydraulic conductivities for silty clay and marine glacial till, respectively. The subject property is not considered to be a groundwater recharge area and no continuous overburden groundwater aquifer is defined on the site.

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The surficial drainage patterns, identified on the subject property, are such that shallow overburden groundwater can discharge into the bisecting drainage tributaries of Cardinal Creek and may contribute to base flow within these watercourses. However, no evidence of lateral seepage was noted along the upgradient or downgradient faces of the drainage courses at the time of preparation of this report.

The groundwater flow systems present beneath the site consist of an upper and lower bedrock aquifer system. This aquifer system is contained, for the most part, within the Middle and Upper Ordovician Formation bedrock and both aquifer systems are utilized by privately serviced properties abutting the subject property. The upper aquifer system is utilized by water wells constructed to the west of the subject lands and the lower aquifer system is utilized by water wells constructed to the east of the subject lands.

The preferential pathway for groundwater flow is limited to shallow overburden groundwater movement, where present, towards the drainage tributaries and ultimately the Ottawa River.

The upper and lower aquifer systems are not considered to be vulnerable based on DRASTIC analysis. Construction related activities involving blasting of bedrock have been identified as possibly resulting in temporary impact to neighbouring water wells intercepting the upper aquifer system, on a isolated and localized basis. Limits on ground vibrations of 12.5 mm/s have been set on measurements made at offsite neighbouring wells for blasting operations. A comprehensive water well baseline study of neighbouring wells has been recommended to establish baseline water quality and quantity data prior to the construction phase of the development.

Existing water wells have been identified within the limits of the subject lands and have been identified as requiring decommissioning in accordance with existing legislative requirements.

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1.0 INTRODUCTION

1.1 Terms of Reference

Paterson Group (Paterson) was commissioned by Tamarack Homes Ltd. (Tamarack) to complete an existing conditions assessment from a hydrogeological perspective for a large tract of land (225 ha) proposed to undergo urban development located east of the City of Ottawa's existing urban boundary and spanning to the north and south of Old Montreal Road.

The purpose of this study has been to combine available background information from numerous literature sources with site specific fieldwork data to prepare a report which summarizes the existing hydrogeological conditions at the site which can be utilized to address potential groundwater impacts on existing adjacent rural development and provide recommendations on proposed development activities.

1.2 Background

The study area, hereafter referred to as the subject property, is identified in Drawing No. PH1890-FIG.1 - Site Location Plan, contained in Appendix 4. Regional Road 174 and the Ottawa River border the northern limits of the site, with Ted Kelly Drive and Frank Kenny Road to the east, and the Cardinal Creek corridor to the west.

Agricultural lands extend to the south beyond the subject property. Rural estate lot development is located beyond the proposed eastern limits of the subject property beyond Frank Kenny Road/Ted Kelly Drive. Moreover, a medium density residential development, also on private services, is located to the west of the subject property beyond Cardinal Creek. A series of low density residential, institutional and commercial land uses are present along Old Montreal Road both adjacent to, and inside the proposed subject property development area.

It is understood that the subject property will be developed as a combination of residential and commercial uses and will be serviced by municipally supplied water and sanitary sewer services. It is further understood that stormwater management will consist of a series of stormwater management facilities ultimately outletting to the Ottawa River and it's tributary, Cardinal Creek.

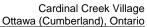
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Paterson has previously completed a Phase I Environmental Site Assessment on the subject property under separate cover. Reference should be made to Paterson Report No. PE2392-1. In addition, Paterson has completed a geotechnical investigation concurrent with this study report. The findings and recommendations of the geotechnical investigation are contained within Paterson Report No. PG1796-1R, dated November 7, 2012. This report draws on the findings of the geotechnical investigation as it relates to the site specific delineation of the thickness and areal extent of the surficial soils within the site boundaries and utilizes the test hole and borehole information obtained from that study.





2.0 PHYSIOGRAPHY

The subject property is primarily dominated by agricultural lands with some remnant forest parcels present along the edges of the property to the south, west and east. The physiography of the site is largely controlled by the underlying rock structures and overlying unconsolidated materials (overburden). The subject property exists as a series of plateau areas separated by defined vertical elevation displacements consistent with escarpment formations.

Drainage on the subject property is considered to be discontinuous to poor within the flat-lying areas within the plateau areas. Most surficial drainage moves towards two (2) drainage tributaries which bisect the direction of surficial flow. Generally the surficial drainage and shallow overburden groundwater flows towards the Ottawa River following the sloping topography, or to the Cardinal Creek network which ultimately outlets into the Ottawa River. Cardinal Creek and its' two (2) related tributaries present on the subject property, are delineated on the Site Location Plan, Paterson Drawing No. PH1890-FIG.1 located in Appendix 4.



3.0 GEOLOGY

The geology of the site is separated into the surficial geology and the bedrock geology. The surficial geology pertains to the unconsolidated material (overburden) present at the ground surface and extending to the face of the underlying bedrock. The bedrock geology pertains to the solid rock forming part of the earth's crust.

3.1 Surficial Geology

The surficial soils in the vicinity of the subject area generally consist of series of silty clay and marine till, generally consistent with marine deposits associated the Champlain Sea.

Based on the borehole program, overburden thickness across the site varies between 1.2 m and greater than 10 m across the site. Using well recognized techniques for the field identification of soils, three (3) unique stratigraphic units were identified in the areas investigated. The soils were classified using the Unified Soil Classification System (USCS) and percolation rates were estimated based on published data correlating soil types to permeability while accounting for variability in the consistency of the soil as identified by the soil morphology. The stratigraphic units are summarized in Table 1, and a detailed description of our findings at each of the test locations is provided on the Soil Profile and Test Data Sheets which appear in Appendix 1.

Based on the findings of the geotechnical investigation, the subject property is generally overlain by two (2) dominant stratigraphic units of marine origin: silty clay and a marine glacial till. A third stratigraphic unit, a silty sand with trace clay was noted in several test holes, but is discontinuous throughout the site and is present in isolated pockets only. The silty sand, where encountered, was present in a thin veneer near the ground surface and was underlain by a stiff to very stiff silty clay. Reference should be made to Paterson Drawing No. PH1890-1 - Test Hole Location Plan in Appendix 4, which has been reproduced from the geotechnical investigation.

A review of the available surficial soils mapping for the area, obtained from the Ontario Geologic Survey reveals that the actual site specific soil conditions compare well with the published mapping. Reference can be made to Paterson Drawing No. PH1890-FIG.2 in Appendix 4 in which the relevant portion of the published mapping as been reproduced.



TABLE 1:	SUMMARY OF UN SUBJECT PROPE GEOTECHNICAL I	RTY BASED ON	FINDINGS OF	
TERRAIN UNIT	USCS CLASSIFICATION	GENERAL THICKNESS (m)	ESTIMATED PERC. RATE ² (min/cm)	IN SITU SATURATED HYDRAULIC CONDUCTIVITY (cm/sec)
1	SW-SC- silty sand trace clay	0.2 to 0.6	25 to 35	4 x 10 ⁻⁵
2	CH- Silt clay with high plasticity (i.e."fat clay")	0.8 to more than 9.0	40 to 100	4 x 10 ⁻⁸
3	GC- Glacial Till	1.0 to more than 5.0	30 to 40	4 x 10 ⁻⁷

- 1. Maximum depth of test hole excavation of 10 m below ground surface.
- 2. Estimated percolation rate based on a cross-referencing of the measured insitu hydraulic conductivity of the soil in each terrain unit against a corresponding percolation rate as summarized in SG6 of the Ontario Building Code (1997).

3.2 Bedrock Geology

A review of the available borehole information reveals that bedrock is present at variable depths across the subject lands. In the southern quadrant of the subject lands, the overburden thins and bedrock outcrops along a southern ridge line where a significant elevation transition occurs. Similarly, the overburden thins again in the northern quadrant along a second ridge line defining another abrupt elevation transition downwards towards the Ottawa River.

A cursory review of the reported bedrock elevations, as depicted in the Preliminary Bedrock Contour Plan- Drawing No. PH1890-2, reveals that the bedrock surface topography strongly influences the surficial topography throughout the site. Moreover, the depth to bedrock varies significantly from the south to the north, with the shallowest areas of overburden cover being limited to the vertical escarpments where bedrock outcrops slightly.

A description of the bedrock geology of the subject property is advanced in the following sections:



3.2.1 Paleozoic Bedrock

The subject property is underlain by generally flat-lying carbonate bedrock of sedimentary origin. Most of the bedrock present beneath the site consists of layers of limestone and similar sedimentary rock of varying thicknesses. These layers of bedrock form part of the sequence of Middle and Upper Ordovician limestone with interbeds of dolostone, shale and quartz sandstone, generally referred to as Ottawa Group.

A thin sliver of the northern most portion of the subject property is underlain by limestone of the Oxford Formation, a Lower Ordovician limestone of the Beekmantown Group. The Oxford transitions from the Middle Ordovician layers by way of a vertical fault. Relevant sections of the bedrock mapping for the immediate vicinity of the subject property have been reproduced from available Ontario Geologic Survey Graphical Information Service data and is presented in Paterson Drawing No. PH1890-FIG.3 in Appendix 4. A brief description of each of the three (3) dominant limestone formations is provided below.

Oxford Formation - Lower Ordovician - Beekmantown Group

The Oxford Formation is the youngest of the Lower Ordovician bedrock strata and consists mainly of brownish grey to green-grey, very fine to medium crystalline dolostone, present in thin to very thick layers. Localized interbedding of shale, quartz sandstone and shaley dolostone is common towards the base of the formation.

Gull River and Bobcaygeon Formations - Middle Ordovician - Ottawa Group

The Gull River Formation is characterized by fine grained light grey to brown limestones with variable and sparse fossil content. Greenish grey to tan-weathered silty dolostone beds become more prevalent towards the base of the formation. Minor shales and thin sandstone beds are also present in localized areas.

The Bobcaygeon Formation is characterized by brown to grey-brown fossiliferous limestone. Thin shale interbeds or partings are prevalent in the upper parts and calarenites and nodal textures are common in the lower part. The Formation was laid down in a shallow, marine, inland sea environment. The Bobcaygeon Formation limestone can be observed at the ground surface as a weathered bedrock outcrop feature along the top of the southern ridge line.



3.2.2 Karst Features

The term karst is generally used to describe a geologic formation shaped by the dissolution of a layer, or layers of soluble bedrock, typically carbonate rock such as limestone or dolostone.

The area to the southwest of the subject property situated at the crossing of Cardinal Creek under Watters Road which is in excess of 400 m beyond the nearest edges of the subject lands, has been identified as an Area of Natural and Scientific Interest (ANSI) due to the presence of Karst Features observed at that location. The primary reference for the detailed description of this ANSI is the Earth Science Inventory Report prepared by the Ontario Ministry of Natural Resources (MNR) in 1991. This document has been appended to this report in Appendix 3. Other references in the summary, below, are summarized in Section 7.0.

The Cardinal Creek Karst represents a karst tunnel valley system by which surface water disappears beneath the surface into an entrance cave, and re-appears at several waterfalls along Cardinal Creek as springs. The main karst features which occur in this system include surface etching and pooling of waters (karren), sink holes, dry stream beds, artesian springs and sinks. A "breakdown collapse" feature was identified in 2008 which is believed to be unique to the Province. This particular feature is described as a large sinkhole (doline) present above the central portion of the cave structure which has been largely sealed by clay.

At the Cardinal Creek Karst, the exposed bedrock was confirmed to be that of Bobcaygeon Formation of the Ottawa Group. Documentation reference in the preparation of the Earth Science Inventory Report suggests that the east-west trending joint sets of the Bobcaygeon Formation were one of the primary factors in the development of the karst system as groundwater was able to flow through these joint sets. It is further opined in these references that the localized nature of the Cardinal Creek valley drainage system is also a critical component in it's development.

The approximate area of the Karst formation was accurately delineated by Golder Associates Ltd. (Golder) and presented in a hydrogeological study report for an urban development located to the west-southwest of the subject property (September 2009). The limits of the Karst formation which were presented in the Golder report are reproduced on Paterson Drawing No. PH1890-FIG.3 for reference purposes. It is noted that these delineated limits are located a considerable distance away from the western limits of the subject property and development within site limits is not expected to impact the Karst features contained within that area.





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While a segment of the southern quadrant of the subject property is underlain directly by Bobcaygeon Formation limestone, for the most part, the thickness and composition of surficial soils are not conducive to vertical infiltration to any significant extent both directly under or upgradient of the site. Where bedorck outcrops on the site, a cursory assessment by Paterson indicates that the rock is weathered, blocky, with soil filled fractures which do not penetrate vertically to any significant depth below the surface of the ground. As such, based on the understanding of karst development and geohydrology, and based on the extensive visual site investigations carried out by Paterson, the subject property is not considered to be karstic or contain karst features.



4.0 HYDROGEOLOGICAL SETTING

The hydrogeologic conditions for the subject property cover the following critical areas:

- infiltration potentials of surficial soils;
- groundwater recharge and discharge potentials; and
- groundwater flow systems within site boundaries.

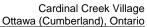
The sections provided below reflect the site specific data obtained from the site during the field investigations and from the available information obtained from groundwater impact studies completed by Paterson and others on neighbouring sites.

4.1 Infiltration Potential and Groundwater Recharge

Within the context of hydrogeology, infiltration can be defined as the entry of surface water into the soil together with the associated flow of groundwater away from the ground surface within the unsaturated zone. In a similar context, groundwater recharge is the entry into the saturated zone of water made available at the phreatic surface (i.e. water table surface) together with the associated flow of groundwater away from the phreatic surface within the saturated zone. Moreover, infiltration is only one part of the overall water budget and, as such, surface water which infiltrates into the subsurface does not necessarily become a net addition to the groundwater reservoir which would result in groundwater recharge.

The infiltration potential on the subject property is considered to be low given the nature of the surficial soils described, in detail, in Section 3.1. Surface water infiltrating into the ground surface generally encounters the low permeable silty clay directly beneath the topsoil layer (and silty sand veneer in some locations) which, in turn is underlain by a glacial till of marine origins. Generally speaking, this watershed, like most of those within the Ottawa area, obtain the bulk of groundwater recharge to bedrock aguifers from areas with exposed bedrock with favorable fracturing (ie. interconnected downward strikes) and where overburden deposits consist of thin/thick layers of permeable sands, gravels and thin layers of non-cohesive glacial till. Exposed bedrock in which the surface is massive and unfractured is considered to be relatively impermeable, from a bedrock aquifer recharge perspective. Although the exposed bedrock area, present along the top of the south ridgeline (reference should be made to the Test Hole Location Plan-Drawing No. PH1809-1 for the bedrock location), consists of a weathered, fractured zone at the near surface, the fractures were visually noted to be soil filled and probe results suggest the fractures are limited to the upper few metres of the bedrock. As such, the bedrock, at a depth below the weathering zone, is considered to be competent and of low permeability.

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Based on the estimated hydraulic conductivities presented in Table 1 of Section 3.1, the silty clay and glacial till have corresponding infiltration rates of approximately 13 mm/year and 126 mm /year respectively. Where exposed bedrock consists of vertical faces, infiltration potential into the fractured bedrock is considered negligible. Bedrock outcrops which contain compact, cohesive soil filled fractures are typically underlain by competent bedrock of low permeability. As a result, the site is not conducive to the best management practices for stormwater infiltration and recharge on this site should be avoided where possible.

4.2 Groundwater Discharge and Baseflow

Groundwater discharge areas are considered to be the end points of groundwater discharge flow systems. Groundwater discharge areas generally provide baseflow to the surface water courses, which then requires protection and maintenance of groundwater recharge and discharge areas.

Based on the detailed surficial soils information for the subject property, and building on Section 4.1, above, the subject property is not considered to contribute any significant volumes of overburden groundwater recharge and no bedrock aquifer recharge. The direction of topographic relief is northwards towards the Ottawa River, as detailed in Section 2.0, and two (2) tributaries bisect this direction of flow in an east-west direction.

The most northerly tributary, based on the visual observations by Paterson, and from the information obtained from Muncaster Environmental Planning Inc. (Muncaster), has a wetted width of approximately 1.6 m on average with a corresponding average depth of 8 cm. As such, the tributary generally lacks sufficient width to intercept significant overburden groundwater flow throughout most of it's alignment. In situ probing within the centre-line of the northern tributary along it's alignment suggests that the eastern portion of the tributary has a minimum of 300 to 600 mm of silty clay overlying bedrock. Moving west along the central portion of the alignment, the tributary shallows significantly while the thickness of the underlying silty clay/glacial till overburden increases to more than 2 m. No evidence of upward discharge of groundwater was noted at any portion of the northern tributary along the eastern and central portions of the northern tributary alignment.

It is noteworthy to point out that the outlet of the north tributary cascades downward along boulders and some exposed bedrock at Cardinal Creek. Careful observation of the bedrock layers and temperature measurements taken at the cascade area did not indicate the presence of groundwater discharge through the upper bedrock layers.

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The south tributary, based on similar visual observations and ancillary information provided by Muncaster, flows over the silty clay and glacial till surficial layers only. As it was detailed in the previous paragraph, Paterson completed probing of the insitu soil beneath the centre-line of the southern tributary. Based on the findings of the insitu works, the southern tributary is underlain by glacial till along the eastern portion of the alignment. Several hundred metres downstream of the start of the southern tributary, the underlying insitu soil transitions to a soft silty clay having a thickness in excess of 2 m. No evidence of upward discharge of groundwater was noted within the tributary during these works.

The surficial topography within the southern tributary identifies it residing within a modest ravine having a differential elevation of approximately 4 m to 5 m to the base of the tributary along the steeper portion of the alignment nearest to Cardinal Creek. As such, the southern tributary acts to intercept most of the overburden groundwater flow originating from the southern lands and may act as a localized discharge area for shallow overburden groundwater. There was no evidence of lateral seepage along the upgradient or downgradient faces of the ravine sidewalls at the time of the field investigation by Paterson. It was noted that the tributary is receiving runoff from both sides of the tributary through channelized drainage corridors. Several of these corridors were noted to have experienced extensive erosion and were included in the limit of hazard lands detailed in the geotechnical investigation (Paterson Report PG1796-1).

4.3 Flow Systems

Based on Paterson's experience in neighbouring sites, combined with the existing information contained within the AECOM (2009) Subwatershed Study, there are two (2) main groundwater flow systems: one flow system in the overburden and another in the bedrock.

Groundwater flows from areas of higher hydraulic pressure to areas of lower hydraulic pressure. The local flow system within the overburden groundwater follows the topographic relief of the site, as does the bedrock groundwater located within the upper portions at, and just below the face of the bedrock.

However, based on the information obtained from numerous hydrogeolgical studies prepared by Paterson in conjunction with the regional groundwater flow information contained within the J.E. Charon report (Charon, 1974), the direction of flow within the lower bedrock aquifer system is towards the southeast beneath and beyond the subject property.





With respect to hydraulic connection between the overburden groundwater and the lower bedrock aquifer system, the lower bedrock aquifer system is present at considerable depth below the bedrock surface at the southern and eastern quadrants of the subject property. Similarly, based on the published Ontario Ministry of Environment (MOE) Water Well Records (WWR's) for the bedrock wells located along the west of the property, the preferred water supply aquifer intercepted by this group of wells is at a depth of approximately 18 m to 20 m below ground surface.

East of the subject property, the water supply wells intercept the deeper water supply aquifer located within the Middle Ordovician limestone. The depth of aquifer interception in the lower aquifer varies from 25.9 m to more than 99.1 m with the bulk of the water wells intercepting the lower aquifer between 35 m and 75 m below ground surface. A detailed summary of the regional hydrogeology and water well assessment appears in Section 5.3.

Based on the water well record information, previous studies, and on the low permeable surficial soils on the site, it is opined that the overburden groundwater is not capable of infiltrating deep enough into the bedrock to recharge or be hydraulically connected to the lower bedrock aquifer systems due to the existence of such a strong localized direction of groundwater flow to the Ottawa River.

4.4 Preferential Pathways for Groundwater Flow

Given the information provided in the earlier sections of this report, the preferential pathway for groundwater flow is northwards within the overburden groundwater flow system. This flow system is interrupted within the reach of the two (2) bisecting tributaries where the overburden groundwater flow is altered and directed to the tributaries as surface water.



5.0 AQUIFER AND GROUNDWATER USE

5.1 Aquifer Delineation

An aquifer is defined as a geologic formation which are able to hold, transmit and yield enough water to supply production wells completed into them. Based on the published MOE WWR's for the wells located in the immediate vicinity of the subject property (Refer to Paterson Drawing No. PH1890-FIG.3 for water well locations and to the individual water well records located in Appendix 3), there are two (2) usable aquifer systems located within the bedrock in which the water wells intercept. These are the Middle Ordovician bedrock aquifer and the Lower Ordovician bedrock aquifer.

Middle Ordovician Bedrock Aquifer

Based on the reported depth of aquifer intercepts of these wells, an upper bedrock aquifer is present at depths of between 19 m and 30 m below ground surface within the Middle Ordovician Group of both the Gull River and Bobcaygeon Formations. The wells located to the west of the site, along Old Montreal Road, appear to utilize this upper aquifer system. The upper aquifer system has an interpreted direction of groundwater flow towards the Ottawa River, based on works completed by Paterson and Golder Associates Ltd. (Golder) in this area.

To the immediate east and southeast of the subject property, the neighbouring water wells appear to intercept the Middle Ordovician bedrock aquifer at a significantly lower elevation. In this area, the lower aquifer system appears to be present at depths ranging from 35 m below ground surface (bgs) to more than 130 m bgs surface. The upper aquifer appears to be discontinuous throughout the south and east of the subject property.

Lower Ordovician Bedrock Aquifer

Several wells are present, based on the available MOE WWR's, within the Oxford Formation limestone present beyond the fault running along the northern portion of the site and adjacent to the Ottawa River. Several water wells report intercepting a water supply aquifer within the Oxford Formation limestone after first passing through upwards of 30 m of silty clay overburden.

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5.2 Aquifer Vulnerability

Given the depth of low permeable surficial soils present within the subject area, combined with the thickness of competent bedrock overlying the confined aquifer systems of both the Middle Ordovician and Lower Ordovician aquifer, these bedrock aquifer systems are considered to be of low intrinsic vulnerability.

It is prudent to note that the works carried out by Paterson on the adjacent estate lot subdivision known as Camelot Estates, where the water wells intercept the lower water supply aquifer system, that the hydraulic pressure exerted on the lower aquifer is such that the aquifer is considered to be confined and hydraulically isolated from the overburden groundwater, where present.

Using the well established DRASTIC methodology to scope the intrinsic vulnerability of the aquifer systems present below the site, one can assess the vulnerability score for each of the aquifer systems. The DRASTIC methodology employs multipliers for each of the categories within the DRASTIC model and gauges the vulnerability of an aquifer system based on the following scores:

- High (>160)
- Moderate (101 to 160)
- Low (<101)

The DRASTIC score for the upper and lower Middle Ordovician bedrock aquifers are of the order of 58 and 73, respectively. Similarly, the Lower Ordovician bedrock aquifer scores of the order of 60. As these scores are well below the score of 101, the bedrock aquifer systems are considered to be of low intrinsic vulnerability.

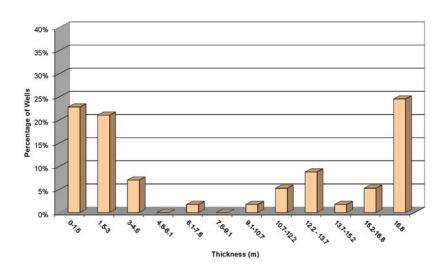
5.3 Water Supply Wells

Water supply wells constitute the primary source of drinking water for the neighbouring properties located immediately adjacent to the subject property. The available published water wells for the immediate area are plotted on Paterson Drawing No. PH1890-FIG.3 in Appendix 4.

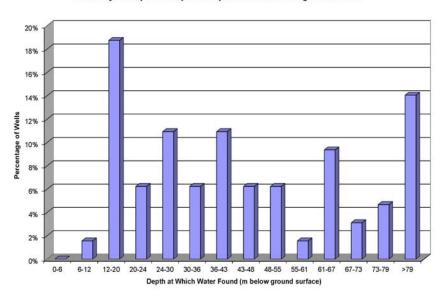
A review of the regional hydrogeology defined by the neighbouring water well records clearly reveals that approximately 18 of the 64 available published MOE WWR's are in the upper bedrock aquifer and these wells are located either beyond the subject property to the west, or along the western edges of the site boundaries. The remainder of the water well records report intercepting the lower aquifer as the primary water supply aquifer. A summary of the regional hydrogeology is provided in the charts provided below:



Summary of Overburden Thickness Reported in Surrounding Water Wells

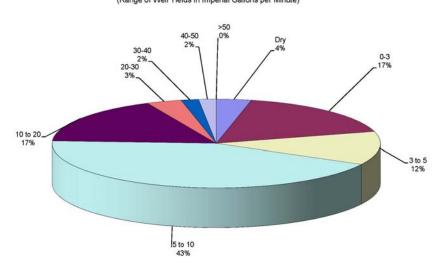


Summary of Reported Aquifer Depths In Surrounding Water Wells

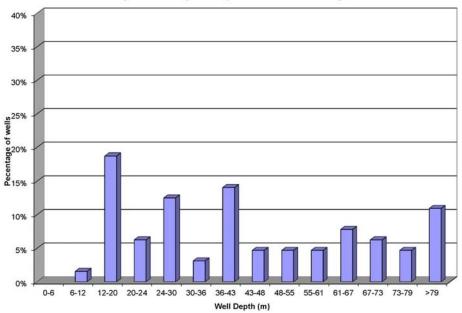


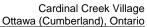


Summary of Well Yields Reported for Surrounding Water Wells (Range of Well Yields in Imperial Gallons per Minute)



Summary of Well Depths Reported in Surrounding Water Wells







It is noted that there are a handful of recorded water wells present within the subject property limits. These wells appear to presently/formerly service the existing residences and commercial operations located along Old Montreal Road. It is of critical importance that all existing drilled wells be located and decommissioned in strict accordance with Ontario Regulation 903 (Wells) made under the Ontario Water Resource Act. This will ensure that the water wells do not allow for the potential of short circuiting of contaminants into the upper and lower bedrock aquifer systems.

5.4 Construction Precautions for Protecting Existing Offsite Wells

It was noted in the geotechnical investigation that rock removal is anticipated during the construction phase of the development. Blasting within the shallow bedrock could potentially have a localized impact on the neighbouring water wells utilizing the upper aquifer. Notwithstanding the above, the discontinuous nature of the upper bedrock aquifer, combined with the topographic relief towards the Ottawa River within the site boundaries, will result in only temporary and localized disturbance where encountered. No long term adverse impacts to the upper bedrock aquifer is expected as a result of the proposed development.

A baseline water quality program implemented prior to the start of construction activities is a prudent measure to employ for the neighbouring residences. The baseline water quality and potentiometric head elevations collected from representative wells located in the upper water supply aquifer system will allow for a clear comparative analysis in the event that offsite well users report adverse water quality or quantity issues during the construction phase.

In addition, peak particle velocity limits can be implemented for blasting operations to minimize the potential to adversely affect offsite wells. In most instances, a peak particle velocity of 12.5 mm/s for ground vibrations is specified in accordance with the Noise Pollution Control publication 119 of the Model Municipal Noise Control By-law published by the MOE. Data collected from various sources indicates that a ground vibration limit of 50 mm/s peak particle velocity is adequate to protect wells from any significant damage. There is a possibility, at this limit, that temporary turbidity may be caused, however.



6.0 NEXT STEPS

It is understood that this hydrogeologic assessment will be used in conjunction with other existing conditions reports to develop a constraints and opportunities plan for the proposed development. The following steps are recommended to assist in the long term protection of groundwater quality and groundwater discharge functions:

- 1. The potential groundwater discharge to the tributaries outletting to Cardinal Creek should be further studied to determine the contribution to base flow conditions. Maintaining natural streambed conditions along the two (2) tributaries on the site may assist in the preservation of baseflow through these features, or augmentation through stormwater management structures, may be prudent.
- 2. The extent of the vertical limits of fracturing within the exposed bedrock present along both the south and north ridgelines should be subjected to further study. The study methodology should include the coring of the bedrock at depth to further assess the competency of the underlying bedrock and insitu hydraulic conductivity analysis.
- 3. Existing water wells located on the subject property should be decommissioned in accordance with the governing legislation in order to prevent unconfined and rapid contamination of the upper and lower Middle Ordovician bedrock aquifer systems. The decommissioning should be undertaken prior to the start of the construction phase of the development and under the direct supervision of a qualified Professional Engineer of Ontario or Professional Geoscientist.
- 4. A comprehensive water well baseline study should be undertaken for all wells located within the immediate vicinity of the subject property. The study should establish representative baseline conditions for water quality and quantity and should accurately identify the well construction methodology of each well and aquifer system it intercepts.

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5. A blasting program should be set up where bedrock is to be drilled and blasted as part of the construction phase. The blasting program should act to compliment the water well baseline study and should set monitoring limits on ground vibrations to offsite wells.

Prepared by:

PATERSON GROUP INC.

Robert A. Passmore, P.Eng. Senior Environmental Engineer

Report: PH1890-REP.01 November 7, 2012



7.0 REFERENCES

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APPENDIX 1

□ SOIL PROFILE & TEST DATA SHEETS

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SOIL PROFILE AND TEST DATA

Shear Strength (kPa)

△ Remoulded

▲ Undisturbed

Proposed Residential Development - Queen Street

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

Geotechnical Investigation Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. **DATUM** FILE NO. **PG1796 REMARKS** HOLE NO. **BH 1-12 BORINGS BY** CME 55 Power Auger **DATE** March 27, 2012 **SAMPLE** Pen. Resist. Blows/0.3m Piezometer Construction STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPEWater Content % **GROUND SURFACE** 0+67.86Brown SILTY CLAY, trace sand 1 0.51 1 + 66.862 SS 83 19 3 SS 100 15 2+65.86SS 4 100 8 3 + 64.86Very stiff to stiff, brown SILTY CLAY 4 + 63.86- grey by 4.3m depth 5 + 62.866 + 61.867 + 60.868+59.86 9+58.86End of Borehole (GWL @ 6.75m-April 13, 2012) 40 60 100

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation **Proposed Residential Development - Queen Street** Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. FILE NO. DATUM **PG1796 REMARKS** HOLE NO.

BORINGS BY CME 55 Power Auger					ATE	March 28,	2012	_	HOLE NO.	BH 2-12	2
SOIL DESCRIPTION	PLOT		SAN	/IPLE	1	DEPTH	ELEV.		esist. Blow 0 mm Dia. (ter
	STRATA 1	TYPE	NUMBER	RECOVERY	N VALUE or RQD	(m)	(m)	○ v	Vater Conte	 nt %	Piezometer
GROUND SURFACE				<u> </u>	Z -	0-	64.29	20	40 60	80	L
TOPSOIL 0.28		S AU	1 2				01.20				ļ ,
Brown SILTY CLAY , trace sand 0.76		- 7.0	-								
		ss	3	100	24	1-	63.29				
		∇			- :						
		\sqrt{s}	4	100	18						
			-	100	'	2-	62.29				
		ss	5	100	11						
ery stiff, brown SILTY CLAY		\ 33) 5	100	14						
						3-	61.29			19	94
						1-	60.29			19	99
						4	00.29			<u> </u>	
		7									-
<u>4.95</u>		∦ ss	6	62	16	5-	59.29				
	\^^^^	⊔ ≊ SS	7	0	50+		00120				
	\^^^^		-								
ACIAL TILL. Cray ailty alov with	1,^^,^1	_				6-	58.29				-
GLACIAL TILL: Grey silty clay with and, gravel, cobbles and boulders		∦ ss	8	29	16						
		\triangle									
	\^^^^					7-	57.29				
7 67	\^^^^										
ind of Borehole		_									
ractical refusal to augering @ 7.67m											
epth											
GWL @ 0.40m-April 13, 2012)											
3442 @ 0.401117 pill 10, 2012)											
								20	40 60	80 10	∤ 00
								Shea	ar Strength	(kPa)	
								▲ Undist	urbed △ Re	emoulded	

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation **Proposed Residential Development - Queen Street** Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. FILE NO. DATUM **PG1796 REMARKS** HOLE NO.

BORINGS BY CME 55 Power Auger				0	ATE	March 27,	2012		HOLE	E NO.	BH 3-	12
SOIL DESCRIPTION	PLOT		SAN	IPLE	1	DEPTH	ELEV.		esist. 0 mm		/s/0.3m Cone	eter
	STRATA	TYPE	NUMBER	RECOVERY	N VALUE or RQD	(m)	(m)	0 V	/ater	Conte	ent %	Piezometer Construction
GROUND SURFACE		**		22	Z	0-	65.38	20	40	60	80 	
TOPSOIL 0.30	3	ÃAU	1 2									···· y
		ss	3	100	21	1-	64.38					
		ss	4	100	19	2-	-63.38					
		ss	5	100	14	3-	62.38					
Hard to very stiff, brown SILTY CLAY							02.00		<u> </u>			230
						4-	61.38					120
- stiff and grey by 4.3m depth						5-	-60.38	<u></u>				
6.63	3					6-	-59.38	Δ.				
GLACIAL TILL: Grey silty clay with sand, gravel, cobbles and boulders	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	∑ ss	6	67	50+	7-	-58.38					
•	2 ^^^^	× SS	7	100	50+	8-	-57.38					
Practical refusal to augering @ 8.02m depth												
GWL @ 0.43m-April 13, 2012)												
								20 Shea			80 (kPa) emoulded	100

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation **Proposed Residential Development - Queen Street** Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd. FILE NO. **PG1796 REMARKS** HOLE NO.

BORINGS BY CME 55 Power Auger					DATE	March 27,	2012		HOLEIN	BH 4-1	12
SOIL DESCRIPTION	PLOT		SAN	IPLE		DEPTH			esist. Bl 0 mm Di	ows/0.3m a. Cone	ter
	STRATA F	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	○ v	Vater Co	ntent %	Piezometer
GROUND SURFACE TOPSOIL				щ	-	0-	65.15	20	40	60 80	- ×
11.35		⊠ AU	1								
<u> </u>		7					04.15				
		ss	2	100	25	1-	-64.15				
lard, brown SILTY CLAY 1.90				00	00						
	, (XXX,	ss	3	83	22	2-	63.15				
GLACIAL TILL: Brown silty sand with gravel, cobbles, boulders, trace	^^^^	ss	4	62	41						
lay	7 \ ^ ^ ^ ^ ^ /	<u>[</u>			41		62.15				
EDDOOK - Disabala		≍ SS	5	25	50+		02.13				
EDROCK: Black shale 3.86	3										
nd of Borehole											
GWL @ 1.07m-April 13, 2012)											
										<u> </u>	
								20 Shea	40 or Streng	60 80 jth (kPa)	100
								▲ Undist		Remoulded	

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation **Proposed Residential Development - Queen Street** Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. DATUM

FILE NO.

PG1796

REMARKS

HOLF NO

BORINGS BY CME 55 Power Auger				D	ATE	March 27,	2012		HOL	E NO.	BH	ł 5-12	2
SOIL DESCRIPTION	PLOT		SAN	IPLE		DEPTH	ELEV.	Pen. R	esist. 0 mm				eter
	STRATA 1	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	O Water Content %			%	Piezometer	
GROUND SURFACE	03		2	M. M.	z °		-62.34	20	40	60) 8	0	
TOPSOIL 0.28		∑ AU	1			0-	-02.34						
Jard to your stiff brown SILTV		ss	2	58	25	1-	-61.34						
lard to very stiff, brown SILTY CLAY		ss	3	100	19	2-	-60.34						
		ss	4	100	24	3-	-59.34						
3.73		ss	5	100	17	3	JJ.J4						
SLACIAL TILL: Grey silty clay with		ss	6	75	49	4-	-58.34						
, gravel, cobbles and boulders		ss	7	50	34	5-	-57.34						
iLACIAL TILL: Grey silty sand with ravel, cobbles and boulders 6.40	^^^^	- SS	8	100	50+	6-	-56.34						
nd of Borehole													
ractical refusal to augering @ 6.40m epth													
GWL @ 0.40m-April 13, 2012)													
								20 Shea	40 ar Stro		::::: h (kPa Remou	a)	00

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation **Proposed Residential Development - Queen Street** Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. FILE NO. DATUM **PG1796 REMARKS** HOLE NO. **RH 6-12**

BORINGS BY CME 55 Power Auger				0	DATE	March 28,	2012			BH 6-	12
SOIL DESCRIPTION	PLOT		SAN	IPLE		DEPTH	ELEV.			lows/0.3m ia. Cone	Ţēr.
	STRATA P	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)			entent %	Piezometer
GROUND SURFACE	ß		z	E.	z °		04.07	20	40	60 80	
TOPSOIL 0.30] 0-	61.27				
Brown SILTY CLAY 0.69		1									
GLACIAL TILL: Brown silty clay with sand, gravel and rock fragments	\^^^^ \^^^^	ss	1	67	20	1-	60.27				
<u>1.68</u>	\^^^^	⊠ SS	2	100	50+						
NACIAL TILL CON ATTO AND A TELE	^^^^					2-	59.27				\exists
GLACIAL TILL: Grey silty sand with pravel and rock fragments	\^^^^	≍ SS	3	67	50+						
3.10 end of Borehole	[^^^^	× SS	4	50	50+	3-	-58.27				
Practical refusal to augering @ 3.10m lepth											
GWL @ 2.31m-April 13, 2012)											
								20 Shea	40 ar Strend	60 80 gth (kPa)	100
								▲ Undist		∆ Remoulded	
	1	I		1	1		1				

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation **Proposed Residential Development - Queen Street** Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. FILE NO. DATUM **PG1796 REMARKS** HOLE NO.

	SS SS	NUMBER	#PLE \$50 75 100	14 66 or RQD	1-	ELEV. (m) -70.88 -69.88 -68.88	F		50 n Wate	st. E	ia. C	one	e	
**************************************	æ̃AU ∑ss ∑ss	2 3	50	14	1 - 2 -	-70.88 -69.88 -68.88								
	∑ss ∑ss	3	50	14	1-	-69.88 -68.88		20	4		60	8		
	∑ss ∑ss	3	75	66	1-	-69.88 -68.88								
	ss	3	75	66	2-	-68.88								
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Δ													
^^^^ ^^^^ ^^^ ^^ ^^ ^^ ^^ ^^ ^^ ^^ ^^ ^	≅ SS	4	100	50+	3-	-67.88								
^^^^	≅ SS	4	100	50+	3-	-67.88								
										: :				
							1 ' '					: :	: :	
								20			60			100
									She	Shear S	Shear Stren	Shear Strength	Shear Strength (kPa	Shear Strength (kPa)

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development - Queen Street Ottawa, Ontario

20

▲ Undisturbed

40

Shear Strength (kPa)

60

△ Remoulded

100

DATUM Ground surface elevations provided by Stantec Geomatics Ltd. FILE NO. **PG1796 REMARKS** HOLE NO. **BH 8-12 BORINGS BY** CME 55 Power Auger **DATE** April 4, 2012 **SAMPLE** Pen. Resist. Blows/0.3m Piezometer Construction STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPEWater Content % 80 **GROUND SURFACE** 20 0+90.00**TOPSOIL** 0.23 1 Hard, brown SILTY CLAY 1 + 89.00SS 2 100 34 SS 3 82 50+ 2 + 88.00GLACIAL TILL: Very dense, brown silty sand with gravel, cobbles, boulders, trace clay 3 + 87.004 50+ ⊠ SS 100 End of Borehole Practical refusal to augering @ 3.43m depth (GWL @ 0.62m-April 13, 2012)

SOIL PROFILE AND TEST DATA

Geotechnical Investigation **Proposed Residential Development - Queen Street**

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

Ottawa, Ontario Ground surface elevations provided by Stantec Geomatics Ltd.

REMARKS

DATUM

FILE NO. **PG1796**

BORINGS BY CME 55 Power Auger				D	ATE	April 5, 20	12	HOLE NO. BH 9-12
SOIL DESCRIPTION	PLOT		SAN	IPLE		DEPTH	ELEV.	Pen. Resist. Blows/0.3m ■ 50 mm Dia. Cone
	STRATA 1	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	Pen. Resist. Blows/0.3m ■ 50 mm Dia. Cone ○ Water Content %
GROUND SURFACE	07			RE	z °		53.33	20 40 60 80
		ss	4	100	14		-52.33	
		ss	2	100	16		-51.33	
Very stiff to stiff, brown SILTY CLAY							-50.33	1
grey by 3.6m depth						4-	-49.33	A A A
						5-	-48.33	
						6-	47.33	
						7-	-46.33	
						8-	-45.33	
						9-	44.33	<u> </u>
1 <u>0.2</u> 1 End of Borehole						10-	-43.33	
(GWL @ 7.01m-April 13, 2012)								
								20 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

SOIL PROFILE AND TEST DATA

Geotechnical Investigation **Proposed Residential Development - Queen Street**

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

Ground surface elevations provided by Stantec Geomatics Ltd.

Ottawa, Ontario

REMARKS

DATUM

FILE NO.

PG1796

HOLF NO

BORINGS BY CME 55 Power Auger				D	ATE /	April 5, 20)12	_	HOLE	E NO.	BH1	0-12	2
SOIL DESCRIPTION	PLOT		SAN	IPLE	ı	DEPTH		Pen. R	esist. 60 mm			n	ter tion
	STRATA F	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	O Water Content %				Piezometer Construction	
GROUND SURFACE	0,		-	22	z o	0-	-55.60	20	40	60	80		***
FILL: Brown silty sand with gravel, roots, trees, plants		⊗ AU	1 2				33.00						
1.14	1	ss	3	62	8	1-	54.60						<u>.</u>
		ss	4	100	18	2-	-53.60						
		ss	5	100	12	3-	52.60						
Very stiff to stiff, brown SILTY CLAY						4	E1 60					1	
- grey by 4.3m depth						4-	-51.60	A			A		
						5-	50.60	A			*		
						6-	49.60	A					
						7-	48.60	4			/		
						8-	-47.60						
						9-	46.60	A				10	
1 <u>0</u> .2						10-	45.60	<u> </u>					<u> </u>
End of Borehole (GWL @ 1.25m-April 13, 2012)													
								20 Shea • Undist			80 (kPa) temoulde		0

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development - Queen Street Ottawa, Ontario

20

▲ Undisturbed

40

Shear Strength (kPa)

60

△ Remoulded

100

Ground surface elevations provided by Stantec Geomatics Ltd. **DATUM** FILE NO. **PG1796 REMARKS** HOLE NO. **BH11-12 BORINGS BY** CME 55 Power Auger **DATE** March 28, 2012 **SAMPLE** Pen. Resist. Blows/0.3m Piezometer Construction STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPEWater Content % 20 80 **GROUND SURFACE** 0 + 67.84FILL: Brown silty sand 0.13 1 0.36 TOPSOIL -66.84 SS 2 100 18 Very stiff, brown SILTY CLAY 3 SS 100 25 2 + 65.84SS 4 100 50+ GLACIAL TILL: Brown silty clay with sand, gravel, cobbles and boulders 3 + 64.84SS 5 55 48 3.96 End of Borehole Practical refusal to augering @ 3.96m depth (GWL @ 0.40m-April 13, 2012)

Consulting Engineers

SOIL PROFILE AND TEST DATA

▲ Undisturbed

△ Remoulded

Geotechnical Investigation Proposed Residential Development - Queen Street

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. **DATUM**

FILE NO. **PG1796**

REMARKS

HOLE NO.

BORINGS BY CME 55 Power Auger **DATE** March 28, 2012

BH12-12 SAMPLE Pen. Resist. Blows/0.3m Piezometer Construction STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPE Water Content % 20 80 **GROUND SURFACE** 0+71.00**TOPSOIL** <u>0</u>.<u>3</u>0 1 + 70.00SS 1 100 22 2 SS 100 16 2 + 69.00Very stiff to stiff, brown SILTY CLAY SS 3 58 6 - grey by 3.0m depth 3 + 68.004 + 67.005.11 5 + 66.00SS 4 100 13 6 + 65.00SS 5 100 5 GLACIAL TILL: Grey silty clay with 7 + 64.00sand, gravel, cobbles and boulders SS 6 100 15 7 SS 100 15 8 + 63.009 + 62.008 50 50+ End of Borehole Practical refusal to augering @ 9.27m depth (GWL @ 0.47m-April 13, 2012) 20 40 60 100 Shear Strength (kPa)

Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development - Queen Street Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. **DATUM** FILE NO. **PG1796 REMARKS** HOLE NO. BH13-12 **BORINGS BY** CME 55 Power Auger **DATE** March 29, 2012 **SAMPLE** Pen. Resist. Blows/0.3m Piezometer Construction STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPEWater Content % 20 80 **GROUND SURFACE** 0+73.24**TOPSOIL** 0.25 1 1 + 72.24SS 2 62 12 SS 3 50+ 73 2 + 71.24GLACIAL TILL: Brown silty sand SS 4 83 50+ with clay, gravel, cobbles and boulders 3+70.24⊠ SS 5 80 50+ 4 + 69.24<u>4</u>.<u>85</u>\^^^^\ SS 6 75 50 +End of Borehole Practical refusal to augering @ 4.85m depth (GWL @ 0.59m-April 13, 2012) 20 40 60 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

Consulting Engineers

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development - Queen Street

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. **DATUM** FILE NO. **PG1796 REMARKS** HOLE NO. BH14-12 **BORINGS BY** CME 55 Power Auger **DATE** March 28, 2012 **SAMPLE** Pen. Resist. Blows/0.3m Piezometer Construction STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPEWater Content % 20 80 **GROUND SURFACE** 0 + 70.34**TOPSOIL** 0.41 -69.34 SS 1 100 15 Very stiff, brown SILTY CLAY 2 SS 100 27 2 + 68.34SS 3 89 50+ GLACIAL TILL: Brown silty sand 3+67.34with gravel, cobbles and boulders SS 4 62 3 3.73 BEDROCK: Black shale 5 3.96 SS 33 50+ End of Borehole Practical refusal to augering @ 3.96m depth (GWL @ 1.24m-April 13, 2012) 20 40 60 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation **Proposed Residential Development - Queen Street** Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. FILE NO. DATUM **PG1796 REMARKS** HOLE NO.

DRINGS BY CME 55 Power Auger				D	ATE	March 28,	2012		HOLE NO.	3H15-12	2
SOIL DESCRIPTION	PLOT		SAN	IPLE		DEPTH (m)	ELEV. (m)		esist. Blows 0 mm Dia. Co	/0.3m one	eter
	STRATA	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(111)	(111)		/ater Conten	t %	Piezometer
ROUND SURFACE				μ.	-	0-	-71.07	20	40 60	80	XXX
OPSOIL 0.28 ery stiff, brown SILTY CLAY	3	⊗ AU	1								፠
1.45		ss	2	100	27	1-	-70.07				
LACIAL TILL: Brown silty sand th gravel, cobbles and boulders		ss	3	83	27	2-	-69.07				
EDROCK: Black shale		≍ SS ≈ SS	4 5	100	50+ 50+						
nd of Borehole				"	30+						
actical refusal to augering @ 2.77m epth											
WL @ 1.03m-April 13, 2012)											
								20	40 60	80 100	00
	1	1	ı	1	1				ır Strength (k		-

SOIL PROFILE AND TEST DATA

Geotechnical Investigation **Proposed Residential Development - Queen Street** Ottawa, Ontario

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

Ground surface elevations provided by Stantec Geomatics Ltd.

FILE NO.

PG1796

REMARKS

DATUM

HOLE NO.

BORINGS BY CME 55 Power Auger					ATE	March 30,	2012	HOLE NO. BH	116-12
SOIL DESCRIPTION	PLOT		SAN	IPLE	1	DEPTH	ELEV.	Pen. Resist. Blows/0. • 50 mm Dia. Cond	3m ster
	STRATA P	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	○ Water Content 9	zome struc
GROUND SURFACE TOPSOIL 0.30	\					0-	56.07	20 40 00 0	
0.50		æ AU ∜SS	1 2	100	24	1-	- 55.07		
		1 33	-	100	24				
		ss	3	100	10	2-	-54.07		
		ss	4	100	6	0.	-53.07		
Very stiff to stiff, brown SILTY CLAY						3-	-53.07	<u>^</u>	133
grey by 4.3m depth						4-	52.07	A	
						5-	-51.07		
						6-	-50.07	 	
						7-	-49.07	4	
						8-	-48.07		
						9-	47.07	A	
Dynamic Cone Penetration Test commenced at 10.21m depth. Cone bushed to 24.4m depth. Practical cone refusal at 24.41m depth. BH dry - April 13, 2012)						10-	-46.07		
								20 40 60 8 Shear Strength (kPa ▲ Undisturbed △ Remou	

Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development - Queen Street Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. **DATUM** FILE NO. **PG1796 REMARKS** HOLE NO. **BH17-12 BORINGS BY** CME 55 Power Auger **DATE** March 28, 2012 **SAMPLE** Pen. Resist. Blows/0.3m Piezometer Construction STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPEWater Content % 20 80 **GROUND SURFACE** 0 + 73.111 **TOPSOIL** 0.28 Very stiff, brown SILTY CLAY 1 + 72.11SS 2 100 31 SS 3 100 17 2+71.11 GLACIAL TILL: Brown silty clay with SS 4 50+ 44 sand, gravel, cobbles and boulders 3+70.11imes SS 5 83 50+ 3.86 4 + 69.11**BEDROCK:** Black shale SS SS 6 7 100 50+ 100 50+ End of Borehole Practical refusal to augering @ 4.82m depth (GWL @ 0.61m-April 13, 2012) 20 40 60 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development - Queen Street Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. **DATUM** FILE NO. **PG1796 REMARKS** HOLE NO. **BH18-12 BORINGS BY** CME 55 Power Auger **DATE** March 30, 2012 **SAMPLE** Pen. Resist. Blows/0.3m Piezometer Construction STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPEWater Content % 20 **GROUND SURFACE** 0+76.69**TOPSOIL** 0.30 1 1 + 75.69SS 2 62 12 GLACIAL TILL: Brown silty sand with gravel, cobbles and boulders SS 3 71 33 2 + 74.69SS 4 100 50+ 2.97 End of Borehole Practical refusal to augering @ 2.97m depth (GWL @ 2.50m-April 13, 2012) 20 40 60 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

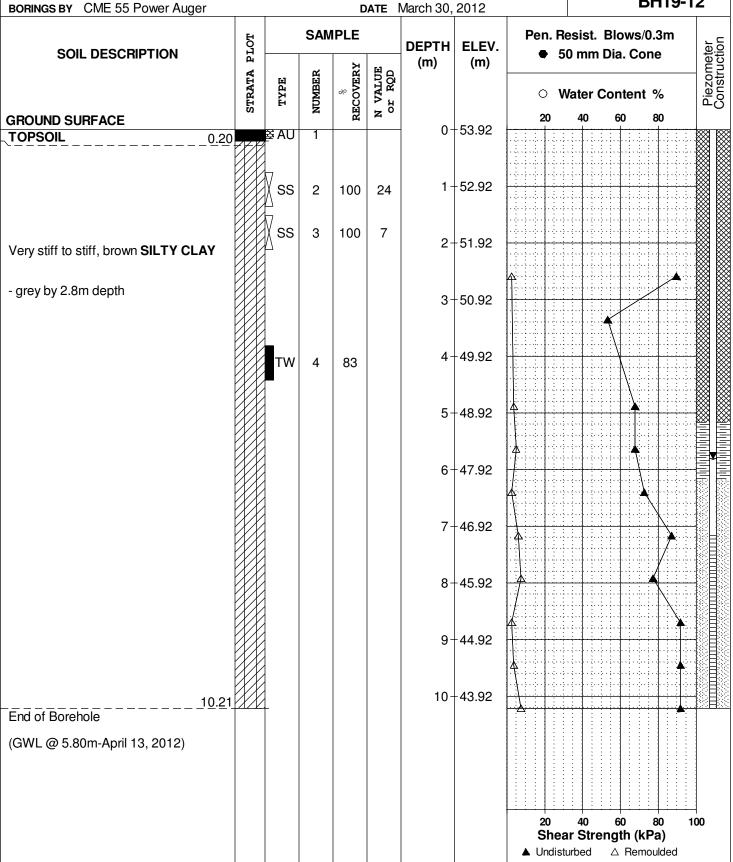
SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development - Queen Street

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. **DATUM** FILE NO. **PG1796 REMARKS** HOLE NO. BH19-12 **BORINGS BY** CME 55 Power Auger **DATE** March 30, 2012



154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation **Proposed Residential Development - Queen Street** Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. FILE NO. DATUM **PG1796 REMARKS** HOLE NO.

Shear Strength (kPa)	BORINGS BY CME 55 Power Auger					DATE	March 28,	2012		HOLI	BI	H20-12
GROUND SURFACE TOPSOIL Very stiff, brown SILTY CLAY, trace, 69 80 SS 3 62 44 53 78 2-74.36 GLACIAL TILL: Very dense, brown silty sand with gravel, cobbles and boulders SS 6 50 50+ End of Borehole Practical refusal to augering @ 5.16m depth (GWL @ 0.72m-April 13, 2012)	SOIL DESCRIPTION	LOT		SAN	/IPLE		-					.3m
SS 4 53 78 2 74.36 3 78 2 74.36 3 73.36			TYPE	TOMBER	% ICOVERY	VALUE or RQD	(m)	(m)				
Very stiff, brown SILTY CLAY, trace 6.99 2 AU 2 SS 3 62 44 1 75.36 SS 3 62 44 1 75.36 SS 4 53 78 2 74.36 SS 5 67 50+ 3 73.36 SS 5 67 50+ 5 71.36 SS 5 67 50+ 5 71.36 SS 6 50 50+ 5 71.36 SS 6 50+ 5 71.36 SS 6 50+ 5 71.36 SS 6 50+ 5 71.36 SS 71.		02			Z	Z		76 36	20	40	60	
SS 3 62 44 1 75.36 SS 4 53 78 2 74.36 2 74.36 SS 5 67 50+ 3 73.36 SS 5 67 50+ 5 16 SS 5 67 50+ 5 71.36 2 20 40 60 80 1 Shear Strength (kPa)	TOPSOIL 0.28	// V	ğAU					70.30				
SS 3 62 44 1 1 75.36 SS 4 53 78 2 -74.36 QSS 5 67 50+ SS 5 67 50+ SS 6 50 50+ End of Borehole Practical refusal to augering @ 5.16m depth (GWL @ 0.72m-April 13, 2012)	Very stiff, brown SILTY CLAY ,trace sand		⊗ AU	2								
GLACIAL TILL: Very dense, brown silty sand with gravel, cobbles and boulders SS 5 67 50+ 3-73.36 4-72.36 End of Borehole Practical refusal to augering @ 5.16m depth (GWL @ 0.72m-April 13, 2012)		^ ^ ^^^	∜ss	3	62	44	1-	75.36				
GLACIAL TILL: Very dense, brown silty sand with gravel, cobbles and boulders SS 5 67 50+ 3 - 73.36 4 - 72.36 End of Borehole Practical refusal to augering @ 5.16m depth (GWL @ 0.72m-April 13, 2012)		^^^^ ^^^^	<u> </u>									*************************************
GLACIAL TILL: Very dense, brown silty sand with gravel, cobbles and boulders SS 5 67 50+ 4-72.36 End of Borehole Practical refusal to augering @ 5.16m depth (GWL @ 0.72m-April 13, 2012)		`^^^^	∬ss	4	53	78						*************************************
boulders		`^^^^ `^^^^					2-	74.36				***************************************
boulders	GLACIAL TILL: Von donce brown	^^^^ ^^^,										
boulders SS 5 67 50+ 3 73.30 4 72.36	silty sand with gravel, cobbles and	^^^^,					2.	72.26				
S S 6 50 50+	boulders	^^^^ ^^^^	∏ ss	5	67	50+	3	73.36				
End of Borehole Practical refusal to augering @ 5.16m depth (GWL @ 0.72m-April 13, 2012) 20 40 60 80 11 Shear Strength (kPa)		^^^^										
End of Borehole Practical refusal to augering @ 5.16m depth (GWL @ 0.72m-April 13, 2012) 20 40 60 80 11 Shear Strength (kPa)		^^^^					4-	72.36				
End of Borehole Practical refusal to augering @ 5.16m depth (GWL @ 0.72m-April 13, 2012) 20 40 60 80 11 Shear Strength (kPa)		^^^^ ^^^^										
End of Borehole Practical refusal to augering @ 5.16m depth (GWL @ 0.72m-April 13, 2012) 20 40 60 80 1 Shear Strength (kPa)		^^^^	⊠ SS	6	50	50+						
End of Borehole Practical refusal to augering @ 5.16m depth (GWL @ 0.72m-April 13, 2012) 20 40 60 80 1s Shear Strength (kPa)	<u>5</u> .16	^,^ <u>^</u> ,^					5-	71.36				
depth (GWL @ 0.72m-April 13, 2012)	End of Borehole											
(GWL @ 0.72m-April 13, 2012)	Practical refusal to augering @ 5.16m											
20 40 60 80 11 Shear Strength (kPa)	depth											
Shear Strength (kPa)	(GWL @ 0.72m-April 13, 2012)											
Shear Strength (kPa)												
Shear Strength (kPa)												
Shear Strength (kPa)												
Shear Strength (kPa)												
Shear Strength (kPa)												
Shear Strength (kPa)												
Shear Strength (kPa)												
Shear Strength (kPa)												
Shear Strength (kPa)												
Shear Strength (kPa)												
Shear Strength (kPa)												
Shear Strength (kPa)												
Shear Strength (kPa)												
Shear Strength (kPa)												
Shear Strength (kPa)												
									20 Shea	40 ar Stre	60 enath (kP	80 100 Pa)
■ Undisturbed △ Remoulded											△ Remo	

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation **Proposed Residential Development - Queen Street** Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. **DATUM**

FILE NO.

PG1796

REMARKS

BORINGS BY CME 55 Power Auger				D	ATE /	April 2, 20	12		HOLE NO. BH21-1	12
SOIL DESCRIPTION	PLOT		SAN	IPLE		DEPTH	ELEV.		sist. Blows/0.3m mm Dia. Cone	eter
	STRATA E	TYPE	NUMBER	% RECOVERY	VALUE r RQD	(m)	(m)		iter Content %	Piezometer
GROUND SURFACE	S	F	R	REC	N O N	_		20	40 60 80	1 4
TOPSOIL 0.25		≋ AU	1			0-	-53.89			
		ss	2	100	16	1-	-52.89			
		ss	3	100	8	2-	-51.89			
Very stiff to stiff, brown SILTY CLAY						3-	-50.89			
- grey by 3.6m depth						4-	-49.89	A		
						5-	-48.89	A		
						6-	-47.89	A		
						7-	-46.89	<u> </u>		
						8-	- 45.89	A		
						9-	-44.89			-
10.21 Dynamic Cone Penetration Test		-				10-	-43.89	<u>.</u>		96
commenced at 10.21m depth. Cone pushed to 26.4m depth. Practical cone refusal at 26.39m depth.										
(GWL @ 8.55m-April 13, 2012)										
									Strength (kPa)	100

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development - Queen Street Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd. FILE NO. **PG1796 REMARKS** HOLF NO.

BORINGS BY CME 55 Power Auger				г	ΔΤΕ	April 2, 20	112		HOLE N	o. BH22-1	2
SOIL DESCRIPTION	PLOT		SAN	IPLE	I	DEPTH (m)	ELEV. (m)		esist. B	lows/0.3m ia. Cone	neter ction
	STRATA	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	()	(,			ntent %	Piezometer Construction
GROUND SURFACE				~	Z	<u></u>	78.53	20	40	60 80	
TOPSOIL 0.3	0	⊠ AU	1				70.55				-
GLACIAL TILL: Brown silty sand with gravel, cobbles and boulders		∑ × ss	2	60	50+	1-	77.53				
<u>1.5</u>	<u> </u>	∑ SS	3	100	50+						
BEDROCK: Black shale	23	<u>۸</u> 33	3	100	30+	2-	-76.53				4
End of Borehole											
Practical refusal to augering @ 2.23m depth											
(BH dry upon completion)											
								20 Shor	40 ar Strong	60 80 1	00
								■ Undist		gth (kPa) ∆ Remoulded	
								_ Ondisi			

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development - Queen Street Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd. FILE NO. **PG1796 REMARKS**

BORINGS BY CME 55 Power Auger				D	ATE A	April 4, 20	12		HOLE NO. BH23-12	
SOIL DESCRIPTION	PLOT		SAN	IPLE		DEPTH	ELEV.		esist. Blows/0.3m	tion
	STRATA E	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)		Vater Content %	Piezometer Construction
GROUND SURFACE	מֿ		5	REG	zö		FF F0	20	40 60 80	
TOPSOIL0.20		17				0-	-55.50			
		SS 7	1	83	15	1 -	-54.50			
		SS 7	2	100	20	2-	-53.50			-
		SS V SS	3	100	20	3-	-52.50			
Very stiff to stiff, brown SILTY CLAY - grey by 4.3m depth		∬ SS	4	100	8	4-	-51.50	A	1	
						5-	-50.50	A		
						6-	-49.50	*	102	
						7-	-48.50	A		
						8-	-47.50	A	1	
GLACIAL TILL: Grey silty sand with 20 gravel, cobbles and boulders End of Borehole		SS	5		50+	9-	-46.50			
Practical refusal to augering @ 9.20m depth										
(GWL @ 2.12m-April 13, 2012)										
								20 Shea ▲ Undist	40 60 80 100 ar Strength (kPa)	

Consulting Engineers

Enginee

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

▲ Undisturbed

△ Remoulded

Geotechnical Investigation Proposed Residential Development - Queen Street Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. **DATUM** FILE NO. **PG1796 REMARKS** HOLE NO. **BH24-12 BORINGS BY** CME 55 Power Auger **DATE** April 2, 2012 **SAMPLE** Pen. Resist. Blows/0.3m Piezometer Construction STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPEWater Content % 20 80 **GROUND SURFACE** 0 + 87.44Brown SILTY SAND, trace clay 0.20 2 86.44 SS 3 100 21 4 SS 100 16 2 + 85.44SS 5 100 9 Very stiff to stiff, brown SILTY CLAY 3 + 84.44- firm and grey by 3.6m depth 4 + 83.446 100 5 + 82.44 6 + 81.447 + 80.44GLACIAL TILL: Grey silty clay with sand, gravel, cobbles and boulders SS 7 62 15 8 + 79.44 8.81 End of Borehole Practical refusal to augering @ 8.81m depth (BH dry - April 13, 2012) 20 40 60 100 Shear Strength (kPa)

Consulting Engineers

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development - Queen Street Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

FILE NO.
PG1796

HOLE NO.
PLUSE 10

BH25-12 **BORINGS BY** CME 55 Power Auger **DATE** April 2, 2012 **SAMPLE** Pen. Resist. Blows/0.3m Piezometer Construction STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPEWater Content % 20 80 **GROUND SURFACE** 0 + 81.91TOPSOIL 0.20 1 1 + 80.91SS 2 50 25 GLACIAL TILL: Brown silty sand SS 3 20 50+ with gravel, cobbles and boulders 2 + 79.91imes SS 4 50+ 67 3+78.915 ∖⊠ SS 50+ 3.35 71 End of Borehole Practical refusal to augering @ 3.35m depth (GWL @ 0.66m-April 13, 2012) 20 40 60 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development - Queen Street Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. DATUM FILE NO. **PG1796 REMARKS** HOLE NO. **BH26-12 BORINGS BY** CME 55 Power Auger **DATE** April 3, 2012 **SAMPLE** Pen. Resist. Blows/0.3m Piezometer Construction STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPE Water Content % 20 80 **GROUND SURFACE** 0 + 89.45**TOPSOIL** 0.30 Very stiff, brown SILTY CLAY, trace sand 1 + 88.45SS 1 100 18 SS 2 50+ 100 GLACIAL TILL: Brown silty clay with sand, gravel, cobbles and boulders 2 + 87.45End of Borehole Practical refusal to augering @ 2.16m depth (GWL @ 0.97m-April 13, 2012) 20 40 60 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

Consulting Engineers

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development - Queen Street Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. DATUM FILE NO. **PG1796 REMARKS** HOLE NO. **BH27-12 BORINGS BY** CME 55 Power Auger **DATE** April 9, 2012 **SAMPLE** Pen. Resist. Blows/0.3m Piezometer Construction STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPEWater Content % 20 80 **GROUND SURFACE** 0 + 96.23TOPSOIL 0.20 1 GLACIAL TILL: Brown silty sand SS 2 50+ 60 with gravel, cobbles and boulders 1 + 95.231.45\^^^ End of Borehole Practical refusal to augering @ 1.45m depth (BH dry upon completion) 20 60 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation **Proposed Residential Development - Queen Street** Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. DATUM

FILE NO.

PG1796

REMARKS

HOLE NO.

BORINGS BY CME 55 Power Auger				D	ATE A	April 3, 20	12		HOLE	NO. BH28-1	2
SOIL DESCRIPTION	PLOT		SAN	IPLE		DEPTH (m)	ELEV. (m)			Blows/0.3m Dia. Cone	eter ction
	STRATA	TYPE	NUMBER	» RECOVERY	N VALUE or RQD	(111)	(111)	○ v	Vater Co	ontent %	Piezometer Construction
GROUND SURFACE				22	Z	<u></u>	89.10	20	40	60 80	
TOPSOIL 0.30		Ž AU Ž AU	1 2				09.10				¥
Very stiff, brown SILTY CLAY		ss	3	100	23	1-	-88.10				
2.21		ss	4	100	15	2-	-87.10				
GLACIAL TILL: Brown silty sand with gravel, cobbles and boulders 2.82 End of Borehole		ss	5	79	49						
Practical refusal to augering @ 2.82m depth											
(GWL @ 0.40m-April 13, 2012)											
								20	40	60 80 10	00
								Shea ▲ Undist	ar Stren	gth (kPa) △ Remoulded	

Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development - Queen Street Ottawa, Ontario

20

▲ Undisturbed

40

Shear Strength (kPa)

60

△ Remoulded

100

DATUM Ground surface elevations provided by Stantec Geomatics Ltd. FILE NO. **PG1796 REMARKS** HOLE NO. **BH29-12 BORINGS BY** CME 55 Power Auger **DATE** April 3, 2012 **SAMPLE** Pen. Resist. Blows/0.3m Piezometer Construction STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPEWater Content % 20 80 **GROUND SURFACE** 0 + 87.20**TOPSOIL** 0.25 1 -86.20 SS 2 100 21 Very stiff to stiff, brown SILTY CLAY 3 SS 100 20 2 + 85.20SS 4 17 100 3 + 84.205 SS 100 12 ¥ 4 + 83.20SS 6 50 34 GLACIAL TILL: Brown silty sand with gravel, cobbles and boulders SS 7 4 9 5+82.20 5.26 SS 8 100 50 +GLACIAL TILL: Grey silty clay with 5.54 [^^^ sand, gravel, cobbles and boulders End of Borehole Practical refusal to augering @ 5.54m depth (Piezometer damaged - April 13, 2012)

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development - Queen Street Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. **DATUM** FILE NO. **PG1796 REMARKS** HOLE NO. BH30-12 **BORINGS BY** CME 55 Power Auger **DATE** April 3, 2012 **SAMPLE** Pen. Resist. Blows/0.3m Piezometer Construction STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPEWater Content % 20 **GROUND SURFACE** 0 + 88.74**TOPSOIL** 0.25 1 SS 2 83 18 1 + 87.743 SS 75 12 2 + 86.74Hard to very stiff, brown SILTY **CLAY** 3 + 85.744 + 84.74GLACIAL TILL: Brown silty sand SS 4 100 50 +with gravel, cobbles and boulders 5 + 83.74 5.16\\() End of Borehole Practical refusal to augering @ 5.16m depth (Piezometer damaged-April 13,2012) 60 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation **Proposed Residential Development - Queen Street** Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. FILE NO. **DATUM PG1796 REMARKS** HOLE NO. **BH31-13**

BORINGS BY CME 55 Power Auger				DATE	April 3, 20	12	BH31-12
SOIL DESCRIPTION	PLOT	SA	MPLE		DEPTH	ELEV.	Pen. Resist. Blows/0.3m ■ 50 mm Dia. Cone
	STRATA P	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	O Water Content %
ROUND SURFACE			μ.	ļ -	0-	-86.70	20 40 60 80
TOPSOIL <u>0.28</u>	⊗ A	U 1					
ery stiff to stiff, brown SILTY CLAY	s	S 2	100	12	1-	-85.70	
	s	S 3	100	19	2-	-84.70	
2.97	s	S 4	100	19			
LACIAL TILL: Brown silty clay with and, gravel, cobbles and boulders	.^^^ ^^^ S	S 5	82	50+	3-	-83.70	
nd of Borehole	^^						
ractical refusal to augering @ 3.76m epth							
GWL @ 1.12m-April 13, 2012)							
							20 40 60 80 10 Shear Strength (kPa)
							▲ Undisturbed △ Remoulded
I .				1	1		<u> </u>

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation **Proposed Residential Development - Queen Street** Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. **DATUM**

FILE NO.

PG1796

REMARKS

HOLE NO.

BORINGS BY CME 55 Power Auger	_			D	ATE .	June 26, 2	2012	BH32-12
SOIL DESCRIPTION	PLOT		SAN	IPLE	ı	DEPTH	ELEV.	Pen. Resist. Blows/0.3m ■ 50 mm Dia. Cone
GROUND SURFACE	STRATA I	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	Pen. Resist. Blows/0.3m
SHOUND SUNFACE						0-	-87.94	
		ss	1	100	22	1 -	-86.94	
/ery stiff to stiff, brown SILTY CLAY		ss	2	100	18	2-	-85.94	
very suit to suit, blowit sier i cear		SS	3	100	13	3-	-84.94	100 A
firm by 4.3m depth						4-	-83.94	1
3, aopa.						5-	-82.94	
<u>6.6</u>	0	ss	4	100	2	6-	-81.94	
		ss	5	42	38	7-	-80.94	
GLACIAL TILL: Grey silty clay with and, gravel, cobbles and boulders		× SS	6	67	50+	8-	-79.94	
	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	× ss	7	100	50+	9-	-78.94	
10.0	6 ^^^^	<u></u>				10-	-77.94	
GWL @ 4.6m depth based on field bservations)								
								20 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development - Queen Street Ottawa, Ontario

20

▲ Undisturbed

40

Shear Strength (kPa)

60

△ Remoulded

100

Ground surface elevations provided by Stantec Geomatics Ltd. **DATUM** FILE NO. **PG1796 REMARKS** HOLE NO. **BH33-12 BORINGS BY** CME 55 Power Auger **DATE** June 27, 2012 **SAMPLE** Pen. Resist. Blows/0.3m STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPEWater Content % 20 80 **GROUND SURFACE** 0+91.15GLACIAL TILL: Brown silty sand 1 with gravel, cobbles, boulders 0.86 2 .≅ SS 33 50+ End of Borehole Practical refusal to augering at 0.86m depth (BH dry upon completion)

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation **Proposed Residential Development - Queen Street** Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. FILE NO. **DATUM PG1796 REMARKS** HOLE NO. RH34-12

BORINGS BY CME 55 Power Auger				D	ATE .	June 26, 2	2012			BH	134-12
SOIL DESCRIPTION	PLOT		SAN	IPLE		DEPTH	ELEV.			Blows/0.0 Dia. Cone	3m
	STRATA E	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)			Content %	Zome
GROUND SURFACE	01		4	RE	z °		89.99	20	40	60 8	0
Hard to very stiff, brown SILTY CLAY		Š SS	1 2	100	17		-88.99				249
2.82						2-	87.99				249 249
GLACIAL TILL: Brown silty clay with sand, gravel, cobbles, boulders 3.28 End of Borehole	^^^^^ ^^^^	∑ ss	3	33	50+	3-	86.99				
Practical refusal to augering at 3.28m depth											
(GWL @ 2.8m depth based on field observations)											
								20 Shea • Undist		60 8 ngth (kPa △ Remou	

Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development - Queen Street Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. **DATUM** FILE NO. **PG1796 REMARKS** HOLE NO. BH35-12 **BORINGS BY** CME 55 Power Auger **DATE** June 27, 2012 **SAMPLE** Pen. Resist. Blows/0.3m Piezometer Construction STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPEWater Content % 20 **GROUND SURFACE** 0 + 90.07Hard, brown SILTY CLAY 1 + 89.07SS 1 100 23 2 76 50+ GLACIAL TILL: Brown silty clay with 00 2 + 88.07sand, gravel, cobbles, boulders End of Borehole Practical refusal to augering at 2.00m depth (GWL @ 1.9m depth based on field observations) 20 40 60 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation

20

▲ Undisturbed

40

Shear Strength (kPa)

60

△ Remoulded

100

Proposed Residential Development - Queen Street 154 Colonnade Road South, Ottawa, Ontario K2E 7J5 Ottawa, Ontario Ground surface elevations provided by Stantec Geomatics Ltd. **DATUM** FILE NO. **PG1796 REMARKS** HOLE NO. BH36-12 **BORINGS BY** CME 55 Power Auger **DATE** June 26, 2012 **SAMPLE** Pen. Resist. Blows/0.3m Piezometer Construction STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPEWater Content % 20 **GROUND SURFACE** 0+91.15Brown SILTY SAND with clay 1 0.60 1 + 90.15SS 2 100 6 3 SS 67 16 GLACIAL TILL: Brown silty clay with 2 + 89.15sand, gravel, cobbles, boulders SS 4 54 39 3 + 88.15SS 5 56 50+

End of Borehole Practical refusal to augering at 3.81m depth

3.81

(BH dry upon completion)

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation

20

▲ Undisturbed

60

△ Remoulded

Shear Strength (kPa)

100

Proposed Residential Development - Queen Street 154 Colonnade Road South, Ottawa, Ontario K2E 7J5 Ottawa, Ontario Ground surface elevations provided by Stantec Geomatics Ltd. **DATUM** FILE NO. **PG1796 REMARKS** HOLE NO. **BH37-12 BORINGS BY** CME 55 Power Auger **DATE** June 26, 2012 **SAMPLE** Pen. Resist. Blows/0.3m Piezometer Construction STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPEWater Content % 20 **GROUND SURFACE** 0 + 89.42-88.42 Hard, brown SILTY CLAY SS 1 100 22 2 SS 100 16 2 + 87.42GLACIAL TILL: Brown silty clay with SS 3 75 50+ sand, gravel, cobbles, boulders End of Borehole

Practical refusal to augering at 2.87m depth

(GWL @ 2.6m depth based on field observations)

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation **Proposed Residential Development - Queen Street** Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. FILE NO. **DATUM PG1796 REMARKS** HOLE NO. RH38-12

BORINGS BY CME 55 Power Auger				D	ATE .	June 26, 2	2012		BH38-1	12
SOIL DESCRIPTION	PLOT		SAN	IPLE	1	DEPTH	ELEV.		st. Blows/0.3m nm Dia. Cone	ter
	STRATA E	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)		er Content %	Piezometer
GROUND SURFACE				R	z °	0-	88.92	20 40	0 60 80	
		7					-87.92			
Very stiff to stiff, brown SILTY CLAY		ss	1	100	19		07.92			
,		ss	2	100	16	2-	-86.92			
<u>2</u> . <u>9</u> 7	, , , ,	ss	3	100	20	3-	85.92			
GLACIAL TILL: Brown silty clay with sand, gravel, cobbles, boulders	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	⊠ss ∏ss	5	100	50+		04.00			
	2 \^^^^	<u>√</u> 33	3	30	30+	4-	84.92			
Practical refusal to augering at 4.22m depth										
(GWL @ 3.5m depth based on field observations)										
								20 40 Shear S	trength (kPa)	100

SOIL PROFILE AND TEST DATA

Proposed Residential Development - Queen Street

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

Geotechnical Investigation Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. FILE NO. **DATUM PG1796 REMARKS** HOLE NO. **RH 1**

BORINGS BY CME 55 Power Auger				C	ATE .	January 20), 2009	BH 1
SOIL DESCRIPTION	PLOT		SAN	IPLE	1	DEPTH	ELEV.	Pen. Resist. Blows/0.3m ■ 50 mm Dia. Cone
	STRATA E	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	Pen. Resist. Blows/0.3m
GROUND SURFACE		<u></u> ₩				0-	67.45	
FILL: Grey-brown silty clay with topsoil		& AU & ∏	1				00.45	
1.45		ss	2	83	10	1-	-66.45	
		ss	3	100	11	2-	-65.45	
Very stiff to stiff, brown SILTY CLAY		ss	4	100	4	3-	-64.45	
- grey-brown by 3.6m depth						4-	-63.45	A
- stiff to very stiff and grey by 5.2m						5-	-62.45	
depth						6-	-61.45	
						7-	-60.45	
						8-	-59.45	
9.45						9-	-58.45	110
End of Borehole	VVX	1						
(GWL @ 0.61m-Feb. 3/09)								
								20 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

Geotechnical Investigation

Proposed Residential Development - Queen Street Ottawa, Ontario

SOIL PROFILE AND TEST DATA

Ground surface elevations provided by Stantec Geomatics Ltd. **DATUM**

FILE NO.

PG1796

REMARKS

BORINGS BY CME 55 Power Auger					ATE .	January 20	0, 2009	HOLE NO. BH 2
SOIL DESCRIPTION	PLOT	SAMPLE				DEPTH	ELEV.	Pen. Resist. Blows/0.3m ◆ 50 mm Dia. Cone
	STRATA E	TYPE	NUMBER	% RECOVERY	VALUE r RQD	(m)	(m)	Pen. Resist. Blows/0.3m
GROUND SURFACE	SI	NUI RECC				20 40 60 80		
TOPSOIL 0.04		& AU	1			0-	-60.07	
		ss	2	75	10	1-	-59.07	
Very stiff, brown SILTY CLAY		ss	3	100	13	2-	-58.07	
- grey-brown by 2.2m depth		ss	4	100	6	3-	-57.07	189
						4-	-56.07	169
						5-	-55.07	120 4
6.71						6-	-54.07	129
	**************************************	ss	5	38	33	7-	-53.07	
GLACIAL TILL: Grey-brown silty clay with sand, gravel, cobbles and boulders	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	SS SS	6 7	67	41 50+	8-	-52.07	
9.17 End of Borehole	7 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		8	0	50+	9-	-51.07	
(GWL @ 0.69m-Feb. 3/09)								
								20

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development - Queen Street Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. **DATUM** FILE NO. **PG1796 REMARKS** HOLE NO. **BH 3** DATE January 20, 2009 **BORINGS BY** CME 55 Power Auger **SAMPLE** Pen. Resist. Blows/0.3m STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPE Water Content % 20 80 **GROUND SURFACE** 0 + 63.94**TOPSOIL** 0.20 1 Very stiff, brown SILTY CLAY 1 + 62.94SS 2 12 58 SS 3 50 50+ **BEDROCK:** Weathered black shale 2+61.94 2.29 荽 AU 4 End of Borehole Practical refusal to augering @ 2.29m depth (BH dry upon completion) 40 60 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

DATUM

Ground surface elevations provided by Stantec Geomatics Ltd.

SOIL PROFILE AND TEST DATA

FILE NO.

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

Geotechnical Investigation Proposed Residential Development - Queen Street Ottawa, Ontario

PG1796 REMARKS HOLE NO. **BH 4 BORINGS BY** CME 55 Power Auger DATE January 21, 2009 **SAMPLE** Pen. Resist. Blows/0.3m Piezometer Construction STRATA PLOT DEPTH ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPE Water Content % 80 20 **GROUND SURFACE** 0+53.72TOPSOIL 0.20 1 1 + 52.72SS 2 75 9 SS 3 92 4 2+51.72 Stiff, brown SILTY CLAY 3 + 50.72- grey-brown by 3.0m depth SS 4 Ρ - grey by 3.7m depth 4 + 49.72 5 + 48.726 + 47.72 7+46.72 1 8 + 45.72 9 + 44.72 End of Borehole (GWL @ 0.87m-Feb. 3/09) 60 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

60

△ Remoulded

Shear Strength (kPa)

▲ Undisturbed

100

Geotechnical Investigation Proposed Residential Development - Queen Street Ottawa, Ontario

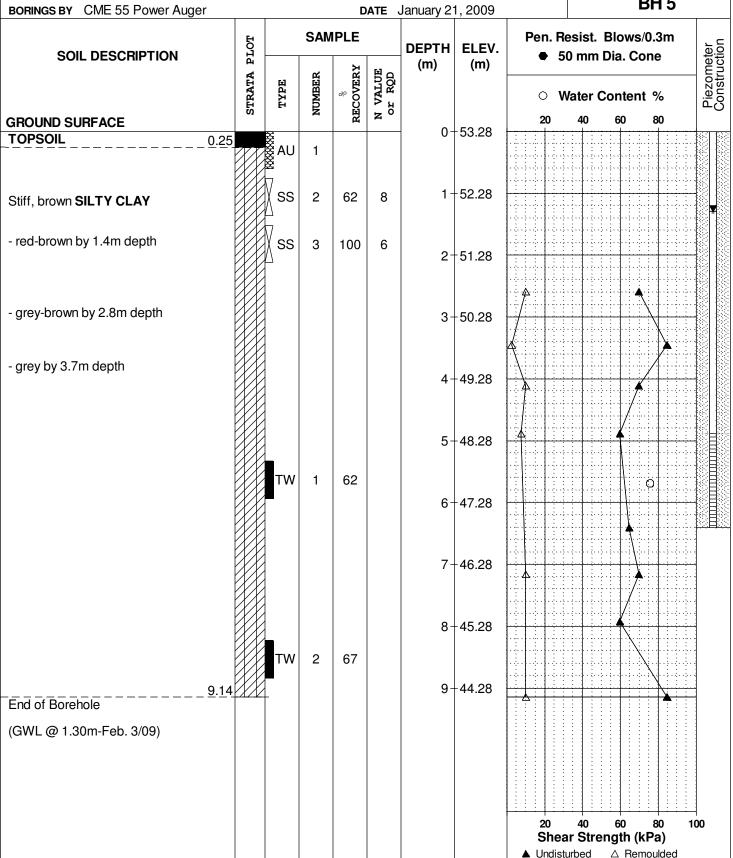
Ground surface elevations provided by Stantec Geomatics Ltd. **DATUM** FILE NO. **PG1796 REMARKS** HOLE NO. **BH 4B BORINGS BY** CME 55 Power Auger DATE January 21, 2009 **SAMPLE** Pen. Resist. Blows/0.3m STRATA PLOT DEPTH ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPE Water Content % 20 80 **GROUND SURFACE** 0 + 53.721 + 52.72**OVERBURDEN** 2 + 51.723 + 50.724 + 49.72**Grey SILTY CLAY** Ö End of Borehole (BH 4B located 1.5m south of BH 4 location)

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development - Queen Street Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. **DATUM** FILE NO. **PG1796 REMARKS** HOLE NO. **BH 5**



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development - Queen Street Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. **DATUM** FILE NO. **PG1796 REMARKS** HOLE NO. BH₆ DATE January 20, 2009 **BORINGS BY** CME 55 Power Auger **SAMPLE** Pen. Resist. Blows/0.3m STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPEWater Content % 20 80 **GROUND SURFACE** 0 + 77.71**TOPSOIL** 0.30 GLACIAL TILL: Grey silty sand with clay, gravel, cobbles and boulders 1 + 76.71SS 10 1 92 BEDROCK: Weathered, black shale 2 50+ 67 End of Borehole Practical refusal to augering @ 1.75m depth (BH dry upon completion) 20 40 60 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Queen Street
Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. **DATUM** FILE NO. **PG1796 REMARKS** HOLE NO. **BH7** DATE January 20, 2009 **BORINGS BY** CME 55 Power Auger **SAMPLE** Pen. Resist. Blows/0.3m STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPEWater Content % 80 **GROUND SURFACE** 20 0+72.32**TOPSOIL** 0.30 1 25mm Topsoil Very stiff, grey-brown SILTY CLAY 1 + 71.32SS 2 100 11 3 83 9 2 + 70.32GLACIAL TILL: Very dense, brown sandy silt with gravel, cobbles and 2.36 SS 4 0 50+ boulders End of Borehole Practical refusal to augering @ 2.36m depth (GWL @ 0.50m-Feb. 3/09) 20 40 60 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

SOIL PROFILE AND TEST DATA

Proposed Residential Development - Queen Street

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Geotechnical Investigation Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. **DATUM** FILE NO. **PG1796 REMARKS** HOLE NO. **BH8 BORINGS BY** CME 55 Power Auger DATE January 23, 2009 **SAMPLE** Pen. Resist. Blows/0.3m Piezometer Construction STRATA PLOT DEPTH ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPEWater Content % 80 **GROUND SURFACE** 0 + 87.11**TIOPSOIL** 0.30 1

9

5

42

67

SS

SS

2

3

Hard to very stiff, brown SILTY **CLAY**

- stiff and grey-brown by 4.3m depth

- grey by 7.9m depth

(GWL @ 0.82m-Feb. 3/09)

End of Borehole

1 + 86.11 2+85.11 3 + 84.11 4 + 83.11 5 + 82.116+81.11 7 ± 80.11 8 + 79.11 9 ± 78.11 60 100 Shear Strength (kPa)

▲ Undisturbed

△ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development - Queen Street Ottawa, Ontario

DATUM Ground surface elevations p	rovide	ed by S	Stante	c Geo	matics	s Ltd.			FILE NO.	PG1796	
REMARKS									HOLE NO.		
BORINGS BY CME 55 Power Auger				D	ATE .	January 22	2, 2009 			D 110	
SOIL DESCRIPTION	A PLOT		SAM		H 0	DEPTH (m)	ELEV. (m)		esist. Blo 0 mm Dia		Piezometer Construction
	STRATA	TYPE	NUMBER	% RECOVERY	N VALUE or RQD				ater Con		Piezo Constr
GROUND SURFACE		A		24	4	0-	-57.53	20	40 60	0 80	
TOPSOIL0.20 FILL: Brown silty clay with sand and gravel		AU SS	1	50	20		-56.53				
End of Borehole		_									
Practical refusal to augering @ 1.45m depth								20 Shea ▲ Undisti	40 60 ir Strengt	0 80 10 h (kPa) Remoulded	00

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development - Queen Street Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. **DATUM** FILE NO. **PG1796 REMARKS** HOLE NO. **BH 9B** DATE January 22, 2009 **BORINGS BY** CME 55 Power Auger **SAMPLE** Pen. Resist. Blows/0.3m STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPE Water Content % 20 80 **GROUND SURFACE** 0+57.00**TOPSOIL** 0.20 1+56.00Very stiff, brown SILTY CLAY SS 1 71 17 2+55.00 SS 2 35 54 GLACIAL TILL: Dense, brown silty sand with gravel, cobbles and 3 + 54.00SS 3 75 50+ boulders 3.73 End of Borehole Practical refusal to augering @ 3.73m depth (GWL @ 0.53m-Feb. 3/09) 20 40 60 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

DATUM

Ground surface elevations provided by Stantec Geomatics Ltd.

SOIL PROFILE AND TEST DATA

FILE NO.

Proposed Residential Development - Queen Street

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Geotechnical Investigation Ottawa, Ontario

PG1796 REMARKS HOLE NO. **BH10 BORINGS BY** CME 55 Power Auger DATE January 22, 2009 **SAMPLE** Pen. Resist. Blows/0.3m Piezometer Construction STRATA PLOT DEPTH ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPEWater Content % 20 80 **GROUND SURFACE** 0 + 86.36**TOPSOIL** 0.20 1 1 + 85.36SS 2 10 58 SS 3 75 11 2+84.36 SS 4 83 8 3+83.36 Hard to very stiff, brown SILTY 239 **CLAY** 4 + 82.36 - stiff and grey by 4.3m depth 5 + 81.366 + 80.36 7 + 79.368 + 78.369 + 77.36End of Borehole (GWL @ 1.52m-Feb. 3/09) 60 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA
Geotechnical Investigation

Shear Strength (kPa)

△ Remoulded

▲ Undisturbed

Proposed Residential Development - Queen Street Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. DATUM FILE NO. **PG1796 REMARKS** HOLE NO. **BH11** DATE January 23, 2009 **BORINGS BY** CME 55 Power Auger **SAMPLE** Pen. Resist. Blows/0.3m STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPEWater Content % 20 80 **GROUND SURFACE** 0 + 89.75**TOPSOIL** 0.30 Very stiff, brown **SILTY CLAY** with 0.69 1 organic matter 1 + 88.75SS 2 8 75 GLACIAL TILL: Compact to dense, brown silty sand with clay, gravel, SS 3 50 20 2+87.75 cobbles and boulders SS 4 50+ 80 2.95 End of Borehole Practical refusal to augering @ 2.95m depth 20 40 60 100

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development - Queen Street Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. **DATUM** FILE NO. **PG1796 REMARKS** HOLE NO. **BH12 BORINGS BY** CME 55 Power Auger DATE January 22, 2009 **SAMPLE** Pen. Resist. Blows/0.3m STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPEWater Content % 80 **GROUND SURFACE** 20 0 + 80.38**TOPSOIL** 0.20 1 GLACIAL TILL: Very dense, brown silty sand with clay, gravel, cobbles and boulders SS 2 50+ 1 + 79.38End of Borehole Practical refusal to augering @ 1.22m depth (GWL @ 0.61m-Feb. 3/09) 20 40 60 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development - Queen Street Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. **DATUM** FILE NO. **PG1796 REMARKS** HOLE NO. **BH13 BORINGS BY** CME 55 Power Auger DATE January 26, 2009 **SAMPLE** Pen. Resist. Blows/0.3m STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPE Water Content % 20 80 **GROUND SURFACE** +92.03 **TOPSOIL** 0.30 Very stiff, brown **SILTY CLAY**, some 0.71 1 sand End of Borehole Practical refusal to augering @ 0.71m depth 40 60 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation **Proposed Residential Development - Queen Street** Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. FILE NO. **DATUM PG1796 REMARKS** HOLENO

BORINGS BY CME 55 Power Auger					ATE .	January 26	6, 2009		HOLE NO.	BH14	
SOIL DESCRIPTION	PLOT		SAN	IPLE		DEPTH (m)	ELEV. (m)	1	esist. Blov) mm Dia.		neter
	STRATA	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	,	()	0 W	ater Cont	ent %	Piezometer
GROUND SURFACE	0,			RE	Z 0		-88.88	20	40 60	80	
Very stiff, brown SILTY CLAY		₩ AU	1			0	-00.00				<u>,</u>
		ss	2	67	54	1-	-87.88				
GLACIAL TILL: Very dense, brown silty sand with clay, gravel, cobbles and boulders	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	ss	3	33	54	2-	-86.88				
	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	ss	4	50	24	3-	-85.88				
	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	ss	5	50	13						
GLACIAL TILL: Very stiff, grey silty	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	ss	6	33	16	4-	-84.88				
GLACIAL TILL: Very stiff, grey silty clay with sand, gravel, cobbles and coulders		ss	7	38	30	5-	-83.88				
		ss	8	25	31	6-	-82.88				
	\^^^^^	ss	9	38	44						
7.62	\^^^^\ \^^^^\	ss	10	42	42	7-	-81.88				
End of Borehole											
(GWL @ 0.61m-Feb. 3/09)											
								20	40 60	80	— 100
									r Strength	1	80 (kPa) emoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation **Proposed Residential Development - Queen Street** Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. FILE NO. **DATUM PG1796 REMARKS** HOLE NO.

BORINGS BY CME 55 Power Auger					ATE .	January 20	6, 2009		HOLI	E NO.	8H15	
SOIL DESCRIPTION	PLOT		SAN	IPLE		DEPTH	ELEV.			Blows/ Dia. Co		eter
	STRATA I	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	○ V	Vater (Content	%	Piezometer Construction
GROUND SURFACE	ิ้ง	_	Z	RE	Z O		00.40	20	40	60	80	
TOPSOIL 0.25		Ş Ş AU	1			0-	88.13					
		\$										
Stiff, brown SILTY CLAY, some		SS	2	8	9	1-	87.13					
organic matter to 1.4m depth		ss	3	42	4	2-	86.13					. ▼
2.82								Δ			A	
		ss	4	100	2	3-	85.13				2	9
GLACIAL TILL: Grey silty clay with sand, gravel, cobbles						4-	-84.13					
		ss	6	42	14							
GLACIAL TILL: Compact grey sittle 20	\^^^^,	٧/١				5-	-83.13			: 		
GLACIAL TILL: Compact, grey silts.39 sand with gravel, cobbles and boulders End of Borehole Practical refusal to augering @ 5.39m depth (GWL @ 1.86m-Feb. 3/09)		F 55	7	0	50+							
								20 Shea ▲ Undist		60 ength (k △ Rem	Pa)	1 00

SOIL PROFILE AND TEST DATA

▲ Undisturbed

△ Remoulded

Proposed Residential Development - Queen Street

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Geotechnical Investigation Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. **DATUM** FILE NO. **PG1796 REMARKS** HOLE NO. **BH16** DATE January 26, 2009 **BORINGS BY** CME 55 Power Auger Pen. Resist. Blows/0.3m **SAMPLE** Piezometer Construction STRATA PLOT DEPTH ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPEWater Content % 80 **GROUND SURFACE** 20 0+67.96**TOPSOIL** 0.30 1 1 + 66.96SS 2 79 10 SS 3 100 10 2+65.96 Hard to very stiff, brown SILTY SS 4 100 8 **CLAY** 3 + 64.96SS 5 5 100 -63.96 - grey by 4.0m depth 5 + 62.966 + 61.96 7 ± 60.96 8 + 59.96 GLACIAL TILL: Grey silty clay with SS 6 42 4 sand, gravel, cobbles and boulders 9+58.969.75 \^^ End of Borehole (GWL @ 0.50m-Feb. 3/09) 60 100 Shear Strength (kPa)

SOIL PROFILE AND TEST DATA

Proposed Residential Development - Queen Street

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Geotechnical Investigation Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. **DATUM** FILE NO. **PG1796 REMARKS** HOLE NO. **BH17 BORINGS BY** CME 55 Power Auger DATE January 23, 2009 **SAMPLE** Pen. Resist. Blows/0.3m Piezometer Construction STRATA PLOT DEPTH ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPEWater Content % 20 80 **GROUND SURFACE** 0 + 86.28TOPSOIL 0.20 1 1 + 85.28SS 2 14 54 SS 3 50 12 2+84.28 SS 4 71 9 3+83.28 SS 5 5 75 4 + 82.28 Very stiff, brown SILTY CLAY 159 5 + 81.28- stiff and grey-brown by 5.9m depth 6 + 80.28- grey by 6.6m depth 7+79.28 8 + 78.28 9 + 77.28 End of Borehole (GWL @ 0.88m-Feb. 3/09) 60 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation **Proposed Residential Development - Queen Street** Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. FILE NO. **DATUM PG1796 REMARKS** HOLE NO.

SOIL DESCRIPTION 1		Ĕ		SAN	IPLE				Pen. Resist. Blows/0.3m
AU 1 0 54.83 1 53.83	SOIL DESCRIPTION				놙	FI -			● 50 mm Dia. Cone
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Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development - Queen Street Ottawa, Ontario

Ground surface elevations provided by Stantec Geomatics Ltd. **DATUM** FILE NO. **PG1796 REMARKS** HOLE NO. **BH19** DATE January 22, 2009 **BORINGS BY** CME 55 Power Auger **SAMPLE** Pen. Resist. Blows/0.3m STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPEWater Content % 80 **GROUND SURFACE** 20 0 + 71.73**TOPSOIL** 0.30 1 1 + 70.73GLACIAL TILL: Brown silty sand SS 2 33 16 with clay, gravel, cobbles SS 3 50+ 76 1.91 2 + 69.73SS 4 50 50+ BEDROCK: Weathered, black 3 + 68.735 6 0 50+ shale 4 + 67.73End of Borehole Practical refusal to augering @ 4.09m depth (BH dry - Feb. 3/09) (GWL @ 1.5m depth upon completion) 20 40 60 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

APPENDIX 2

□ PUBLISHED MOE WELL DATA

COUNTY OR DISTRICT	Ontario 1. PRINT ONLY IN SPACE 2. CHECK CORRECT I		E 11	566	1486	MUNICIP. /ISTOI/ 10 CON., BLOCK TRACT, S	don. 14 15 URVEY PC	· 9	1 22 O 3
€au	total Currely	<u>Gken</u>	Cumberland	,		1 (-1 0,52	DATE COMP		De 32 1
			# 1, Cumbe	•	_ 6		DAY	L_мо. <u>05</u>	YR
		ng 01.3	18/0/0	RC. ELEVATION	50	RC. BASIN CODE			
	LOG	OF OVERBURE	EN AND BED	ROCK MA	TERIALS	(SEE INSTRUCTIONS)			
GENERAL COLOUR	MOST COMMON MATERIAL	OTHER	MATERIALS			GENERAL DESCRIPTION		DEPTH FROM	- FEET
blue	z clay							0	10
grey	rock				_			10_	_65
							-		
						· · · · · · · · · · · · · · · · · · ·	•		
						4.			
31 00/1	<u> 131051 10065</u>					11 54	65		75
	ER RECORD	51 CASING	& OPEN HO	DEPTH - FEI		SIZE(5) OF OPENING	31-33 DIAME		LENGTH
AT - FEET	KIND OF WATER FRESH 3 D SULPHUR 14	DIAM MA RIV	AL THICKNESS INCHES	FROM	то	MATERIAL AND TYPE		DEPTH TO TOP OF SCREEN	41
2[SALTY 4 MINERAL \	GALVAN	250 ZED	0 3	5°''	<u>ν</u>]			FEE
ין ו	FRESH 3 SULPHUR SALTY 4 MINERAL	4 □ OPEN H	A E 19	a	20-23	61 PLUGGIN DEPTH SET AT - FEET	MATERIAL AND	(C	ECOP EMENT GRO PACKER,
2 [FRESH 3 SULPHUR SALTY 4 MINERAL	23 ☐ CONCRE	TÉ		065	FROM TO 10-13 14-17		CEA	J FACKER,
2 [☐ FRESH 3 ☐ SULPHUR 29 ☐ SALTY 4 ☐ MINERAL	1 STEEL 2 GALVAN	26		27-30	18-21 22-25			
	□ FRESH 3 □ SULPHUR ^{34 BO} □ SALTY 4 □ MINERAL	3 CONCRE	TE			26-29 30-33	80		
71 PUMPING TEST MI		11-14 DURATIO		7-18		LOCATIO	OF WE	LL	
STATIC	WATER 25	LEVELS DURING	HOURS OF N	tins.	IN DIA LOT L	AGRAM BELOW SHOW DISTA	ANCES OF WELL F	ROM ROAD ANI	•
LEVEL 19-5	PUMPING		2 RECOVERY	ES 5-37		()			18
/D FEE	705 FEET 005 FEET	005 FEET 05	FEET 5	FEET 42		1			6
Z IF FLOWING.	GPM. 32 0	FEET X	CLEAR 2 CLOU	ру			1 .26	1	29
RECOMMENDED P	PUMP	43-45 RECOMM PUMPIN 725 FEET RATE		6-49 GPM.			1.8		3
50-53	GPM./FT. SPECIFI					15	(1) EE		
FINAL	1 AWATER SUPPLY 2 OBSERVATION WELL	. 6 ABANDONED		PLY ~		—			
OF WELL		7 UNFINISHED	·		01	LD17	\.		
,	DOMESTIC STOCK	5 COMMERCIAL 6 MUNICIPAL				\	LOK CPK		Marin and
WATER USE		7 PUBLIC SUPPLY 8 COOLING OR A	R CONDITIONING				11 04	1 0	
	57 DE CARRE TOOL	6 [] BOI	NOT USED	[]			11 Px		
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DRILLING		9 DRI		DRILLER	IS REMARK			· · ·	
NAME OF WELL	L CONTRACTOR		LICENCE NUMBER	I loat	A IRCE	58 CONTRACTOR	59-62 DATE RECEN	179	6
G. Charb	onneau, Diamond		ling 1504	ヹ∟_	E OF INSPEC	1504 TION INSPE		X 1 1 12	·
R. R.	2, Boite 194, Or	leans, Ont.	LICENCE NUMBER	B L	IARKS:		K.		_ /-
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	ourgeois /	SUBMISSION		2 OFF			(188,831		· · · · ·

arleton -	Reesol	TOWNSHIP, BOROUGH, C		-	CON., BLOCK, TRACT, SUI	/ // // //	1 02	
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		NG	1, Cumber	ELEVATION	RC. BASIN CODE	1 1 1 1 1	<u> </u>	iV
·/		G OF OVERBURDE	24 2:	26	30 31			
ENERAL COLOUR	MOST COMMON MATERIAL	OTHER MA			GENERAL DESCRIPTION		DEPTH -	FEET TO
blue	clay		 				0	60
grey	limestone						60	68
31) 10060	0131a5111 b06	18/2/15/11/11				ــــا لــــــ	لبلبل	لد
32	14 15	1 1 1 1 1 1 1 1 32	<u> </u>		54	65 31-33 DIAMETER	34-38 LE	75 NGTH
WATE	R RECORD	51 CASING &	OPEN HO	E RECORD	SIZE(S) OF OPENING (SLOT NO.)	31-33 DIAMETER	INCHES	
AT - FEET	KIND OF WATER	DIAM. MATERIAL	THICKNESS			DE	PTH TO TOP	41
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Basin 25 WATE O.F. Con I hot 29 County or District Massel	CR W	ELL J 31 & Township,	pleted16	PES DI YES	0 WATER COMMISSION 3144 and 3
Casing and Screen Record			Pui	mping Test	
		0 7		7!	
Inside diameter of casing 2"		ł		_	
Total length of casingX68! 72!			mping rate	401	
Type of screen		. Pumpin	g level	401	
Length of screen	.,			g 3Hrs	
Depth to top of screen		Water o	clear or cloudy at	end of testCle	ear
Diameter of finished hole2"			mended pumping	rate9	G.P.M.
			XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	K. Pump Set.	45.'
Well Log		1		ater Record	
Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, sulphur)
Plus Alex	0'	60'	10444		
Blue Clay	60'	651			
Bolders Sand	651	701			
Grey Limestone	70'	75'	751	541	Fresh
					_
				-	<u> </u>
					_
			 		-
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					Λ.
For what purpose(s) is the water to be used	?		Loc	ation of Well	ph/
Domestic			In diagram below	w show distances	of well from
- w 1 1 : ll on on killeride	מוז		road and lot lin	ne. Indicate nort	h by arrow.
Is well on upland, in valley, or on hillside					x
			,	TRANS CANAR	م الم
Drilling Firm G. CHARBONNEA	J	-			10
MAMOND DRILLER ARTESIAN W	aua" (1	DANIS TOH		, y
OFLEANS, ONT.	." \	""			4
RR 1 Nayan 9R	-25				
Licence Number454					
Name of Driller			0	1017	
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Address Orleans			1		35 3
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Ginal Chanton	enem		32	31	39
Ginal Chanton	enem		32	3 J CSS-SB	39

Elev. 5 10 13 17 15 1 4 10 N Elev. The Ontar	io Water Resou	irces Comm	nission Act, 1957	JAN 19 1 Ontario wa Resources com	ATER
10127 WAT	ER WE	ELL	RECORI	11513	1431
County or District		るしら ,Township,	위 6은 Village, Town or	CityCumberla	nd
TAE .	12 12 10	Com	pleted 0ct 11	month	year)
		ress	Orleans On	t	
Casing and Screen Record	đ		Pur	nping Test	
Incide diameter of reging 2"		Static le	evel 21'		
Total length of casing	601	Test-pu		9	
Type of screen		Pumpin	ng level		
Length of screen		i i	on of test pumpin	2 Hrs	Clear
Depth to top of screen	 I	Water	clear or cloudy at	end of test	G.P.M
Diameter of finished hole21		Kecom	mended pumping	CK Set 40'	
W. H. L.				ater Record	
Well Log			Depth(s)	No. of feet	Kind of water
Overburden and Bedrock Record	From ft.	To ft.	at which water(s) found	water rises	(fresh, salty, sulphur)
Blue Clay	٥'	48'			_
Bolders	4 8' 58'	58 ' 70 '	701	49'	Fresh
Grey Limestone					
		1			1
For what purpose(s) is the water to be use	ed?			ation of Well	(0)
Domestic			In diagram belo	w show distances	of well from
Is well on upland, in valley, or on hillsic	le?Up		road and lot li	ne. Indicate nort	th by arrow.
			TRANSCA	NADA	
Drilling Firm		h	NISTON.		
•	***	1	773 7772		
Address					
		·"·			
Licence Number 454			OLD 17	1 11	
Licence Number 454 Name of Driller 454	u				
Licence Number 454	u				6
Licence Number 454 Name of Driller 454	<u>u</u>			K -	.4>
Licence Number 454 Name of Driller 2 Charbonness Address 0nleans	<u>.</u>			£ -	-4>

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O.F. Con 5+Rold 28 Department of M		e of Ontar 314/6	ord Con	513131	u d
Date Completed. A. ar. 19	p, Villa Town o	ge , Town o r City)	city flo	ulstr	
Pipe and Casing Record		Λ	umping Test		
Casing diameter(s). Length(s) of casing(s). Type of screen. Length of screen. Distance from top of screen to ground level. Is well a gravel-wall type?	Static level Pumping level Pumping rate Duration of te	4 3 f	bowls to ground	50 g.p.k	á:
W	ater Record			<u></u>	
Quality (hard, soft, contains iron, sulphur, etc.) Appearance (clear, cloudy, coloured)	e inly			Kind of Water	No, of Feet Water Rises
Well Log					
Overburden and Bedrock Record	From	То		tion of Well	201
Blue Red Clay miked	0 ft.	ft.	_	elow show dist ad and lot lin by arrow.	W 44"
B.f. roch-gray house	4.7	83	TOUR TOUR	1 15° 16°	ad Side
			Coc o	r i	
Situation: Is well on upland in valley, or on hillside? Drilling Firm	_ #7//	Address	umberb.	3 7 Rettl	<u> </u>

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Ontario	1. PRINT ONLY IN	SPACES PROVIDED	711	15183	331	MUNICIP	1 CON 2	-	المصا
COUNTY OR DISTRICT		TOWNSHIP, BORGUGH C	TTY TOWN VILLAGE		•	J SO J	16 15		1 D /
Car	rleton	Cumberl	and	····		105.	O.F	-	8
		. P	ierre St.	Cumber	land,	Ont.	i -	13 × 0 _ 04	44.53 6 va _83
	12	17 18 NGS	7.4.9 g	్లోషేక్టిం	<u>.</u> 4	RASIN CODE			IV
ļ		G OF OVERBURDE	N AND BEDRO	CK MATEŔĨA	ALS (SEE	INSTRUCTIONS			
GENERAL COLOUR	MCST COMMON MATERIAL	OTHER M	ATERIALS			RAL DESCRIPTION		DEPT FROM	H · FEET
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(31) as 23	1505								ı
32			SZVS					444	
	ER RECORD	(51) CASING &	OPEN HOLE R	ECORD	Z 5:7E-	54 SI OF DPENING	31-33 DIAME.	ĒR 34-38	75 80 LENGIH 39-40
WATER FOUND AT - FEET	KIND OF WATER	INSIDE DIAM MATERIAL INCHES		EPTH - FEFT	L BE	ERIAL AND TYPE		INCHES	FEET 41-44 ID
20	PRESH 3 SULPHUR 14 SALTY 4 MINERAL	640-11 CATEEL	12 100 AA	<i>∞6</i> 6	sc		ļ	OF SCREEN	1511
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20-23 1 🗀	FRESH 3 SULPHUR 24	17-18 C STEEL 3 [] GALVANIZED	,	\$0.53	FROM	SET AT FEET	MATERIAL AND		ENT GROUT ACKER, ETC)
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71 HUMPING TEST METH	100 2 10 PUMPING RATE	11-14 DURATION OF	PUNP:NG			OCATION	25 14/51 /		
1 PUMP STATIC	BAILER 0024	GPM HO	5-16 00 17-18 OURS 41%5			OCATION O			
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IF FLOWING GIVE RATE	38-41 PUMP INTAKE SI		R 2 CLOUDY			\ \	ě.		7
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50-53		7,111	GPM		3	4/			_~
FINAL	1 WATER SUPPLY 2 DESERVATION WELL	S ABANDONED, INSE			_ =	Tomiker !	7 1		·
STATUS OF WELL	3 [] TEST HOLE 4 [] RECHARGE WELL	7 UNFINISHED		(3))	70		X.	
55-	DOMESTIC STOCK	5 COMMERCIAL 6 MUNICIPAL			•	1 1	1 12	e Sir	
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DRILLING	A BOTARY (AIR)	E DRIVING	·	DRILLERS REMARK	.s	•			
NAME OF WELL CO			ICENCE NUMBER	DATA		ONTRACTOR 59-62	DATE RECEIVED		63-66 10
G. Char	rbonneau †Son	Drilling Lt	d 1504	SOURCE OF INSPEC	TION .	150 H	05	18 E	3
R.R. 2	Box 194,0r	Leans, Ont	KIC 1T1	N SERVER					
ADDRESS R. R. 2 MAME OF DRILLER RAYBOI SIGNATUR OF CO	nd Charbonne	SUBMISSION DATE	**.	OFFICE (-
191	abon -	I	06 va 83	<u>a</u>		**			c. Gr
MINISTRY	OF THE ENVIR					· .	, F0	ORM NO 0506	-4-77 FORM 7



The Ontario Water Resources Act. WATER WELL RECORD

1517346 . PRINT ONLY IN SPACES PROVIDED 2. CHECK 🗵 CORRECT BOX WHERE APPLICABLE TOWNSHIP, BOROUGH, CITY, TOWN CON # (n Burland CHWBEBLAND 26 LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS) DEPTH - FEET MOST COMMON NATERIAL GENERAL COLOUR OTHER MATERIALS GENERAL DESCRIPTION FROM 7 046 0 GLAY 7 40 CHEY 38 CLAY HD BLUE HARDDAN 63 58 BROWN 63 66 GRAVEL BLACK 70 LIMESTONE CRET 6097 123 1 1 10040 1205 1 1 100583105 1 1 100636 14 1 1 1 100668 11 1 1 1 10070 12 15 1 31_ المنابات الم 32 SCREEN 41 WATER RECORD 51) **CASING & OPEN HOLE RECORD** DEPTH . FEET WATER FOUND AT - FEET KIND OF WATER MATERIAL AND TYPE DEPTH TO TO 41-44 FRUM FRESH 3 SULPHUR SALTY 4 MINERAL 06,0 GALVANIZED 066 1 | FRESH 3 | SULPHUR 2 | SALTY 4 | MINERAL CONCRETE 0 61 **PLUGGING & SEALING RECORD** 4 🗌 OPEN HOLE DEPTH SET AT - FEET MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER, ETC.) STEEL FROM ONCRETE DPEN HOLE 1 FRESH 3 SULPHUR
2 SALTY 4 MINERAL 27-3 21-25 I 🗆 STEEL A C GALVANIZED 1 | FRESH 3 | SULPHUR 2 | SALTY 4 | MINERAL CONCRETE 30-33 DOEN HOLE LOCATION OF WELL 2 BAILER 0/ 15-16 30 17-18 00/0 1 | PUMP IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE INDICATE NORTH BY ARROW. PUMPING RECOVERY WATER LEVELS DURING 45 MINUTES 50 MINUT 840 PUMPI 1 CLEAR RECOMMENDED PUMP SETTINO 56 FEET RATE BOOK SHALLOW DEEP WATER SUPPLY S ABANDONED, INBUFFICIENT SUPPLY 2 OBSERVATION WELL . ABANDONED, POOR QUALITY STATUS 3 TEST HOLE , UNFINISHED OF WELL 1 DOMESTIC 5 COMMERCIAL 2 STOCK 6 MUNICIPAL
7 PUBLIC SUPPLY WATER() RAPA USE INDUSTRIAL . COOLING OR AIR CONDITIONING 9 🔲 NOT USED OTHER 6 | BORING 7 | DIAMOND 8 | JETTING 1 CABLE TOOL METHOD POTARY (CONVENTIONAL)
ROTARY (REVERSE)
ROTARY (AIR) DRILLING # AIR PERCUSSION DRILLERS REMARKS DATA ONLY 1517 OFFICE USE FORM NO. 0506-4-77 FORM 7 MINISTRY OF THE ENVIRONMENT COPY

8	Ministry of the Environment
Ontario	1. P!
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COUNTY OR D	ISTRICT ACART

The Unitario Water Resources Act
WATER WELL RECORD

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		G OF OVERBU	RDEN AND BE	DROC	K MATERIALS	S I SEE IN	STRUCTIONS)			
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	ATER RECORD	51 CASII	NG & OPEN HO		ECORD	SIZE IS	OF OPENING	SI-33 DIAMET	INCHES	LENGTH 39-1
	KIND OF WATER	DIAM MATE	RIAL THICKNESS INCHES	FRO	y TO	SCREEN WATER	RIAL AND TYPE		DEPTH TO TOP OF SCREEN	41-44
15-10 1	SALTY 4 MINERAL FRESH 3 SULPHUR 19	GALV	CRETE 188	0	050	61	PLUGGING	& SEAL	ING RECO	ORD
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25-24 1	SALTY 4 MINERAL FRESH 3 SULPHUR 29	3 CON-	N HOLE	ļ	27-30)-13 14-17 1-21 22-25		-	
10-17	SALTY 4 MINERAL FRESH 1 SULPHUR 34	2 GAL	VANIZEO CRETE			26			*******	
PUMPING TEST A	SALTY 4 MINERAL METHOD 10 PUMPING RAT	10-14 DURA	N HOLE	<u>" </u>		L	OCATION O	F WEL	L	
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OS OF FLOWING. GIVE RATE RECOMMENDED	28-41 PUMP INTAKE		ER AT END OF TEST	D _{FEET}	, ,		ald. It	0	5 km Cumb	to
RECONMENDED	PUMP TYPE RECONMEND	ED 43-45 RECO	CLEAR 2 CCL	46-49			alo. 1/4-k	1		
SO-53	OW LOSEP SETTING	065 FEET RATE	00/2	GPM				Ja.	*	
FINAL	1 WATER SUPPLY		NED, INSUFFICIENT SU	PPLY			$\left(\right)$	+		
STATUS OF WELL	, } J 🗀 L31 OLE	7 🔲 UNFINISI					1	Hou	12	
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WATER USE	I IRRIGATION INDUSTRIAL OTHER	7 PUBLIC SUPP COOLING OR								
ARETU OF	57 1 DECABLE TOOL	• 🗆	BORING	-			<i>y</i>			
METHOI OF DRILLING	S ROTARY (REVERS	SE) • []	DIAMOND JETTING DRIVING				<			
	AIR PERCUSSION		LICENCE NUMBE		DRILLERS REMARKS		CONTRACTOR 59-62	DATE BECEIVE		43-41
1 1		HU.	1517		SOURCE /		1517	29	118	32
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Z	OF CONTRACTOR	SUBMISSI			OFFICE 1					
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R.R.2, Box 194, Orleans, Ont. KIC 1T1

RAME OF DELLER OR BORE

I. Bourgesis

SIGNATOR OF CONTRACTOR

LICENCE NUMBER

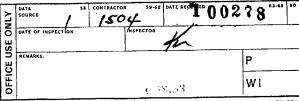
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SIGNATOR OF CONTRACTOR

DAY 194, Orleans, Ont. KIC 1T1

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UNTY OR DISTRICT	**	TOWNSHIP, BOROUGH	LE 🛫		3104		10 14 BLOCK, TRACT, SURVEY	ETC.	<u> </u>	toro &
Carlo	of One	Cumber	land				105	DATE COMPL	ETED	25
		nb	erland,	0nta	rio		·	DAY 29	_ ~	yr. 7
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	LC	OG OF OVERBURE	DEN AND BEI	DROCH	MATERIAL	S (SEE	INSTRUCTIONS)			
ENERAL COLOUR	MOST COMMON MATERIAL	OTHER	MATERIALS			GENER	RAL DESCRIPTION		DEPTH FROM	70
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The Ontario Water Resources Act WATER WELL RECORD

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Ontario		ACES PROVIDED T BOX WHERE APPLICABLE TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	151690		MUNICIP.) / 	<u>-</u>	. O & &
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		berland. Ont				DAY 19	MO ()	48-53 5 YR:78
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olue	clay						49	59
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32				للل	ىلىللىپا	يا لىل	الللا	ليل
41 WATE	R RECORD	CASING & OPEN HOLE	RECORD	Z SIZI	E'S OF OPENING DT NO ;	31-33 0:43	METER 34-38	LENGTH 3
NATER FOUND AT - FEET	KIND OF WATER	INSIDE WALL DIAM MATERIAL HICKNESS INCHES	DEPTH - FEET	CREE ™	TERIAL AND TYPE		DEPTH TO TO	41-44
363 'Z	FRESH 3 SULPHUR 14	10-11 1 XSTEF. 12	13-16	S		· · · · · · · · · · · · · · · · · · ·	07 354524	FEET
15-18 1	FRESH 3 SULPHUR 19	61 CONCRETE 188	0(9060	61	PLUGGIN	G & SEA	ALING REC	ORD
	FRESH 3 SULPHUR 24	17-18 1 🖸 STECL 19	20-23	DEPT	H SET AT - FEET	MATERIAL A		MENT GROUT PACKER ETC)
2 🗇	SALTY 4 MINERAL	3 CONCRETE			10-12 14-17			٠.,
2 🗆	FRESH 3 SULPHUR 29 SALTY 4 MINERAL	24-25 1 3 STEEL 26	27-30		18-21 22-25			
30-33 1 🗆	FRESH 3 SULPHUR 34 80 SALTY 4 MINERAL	3 CONCRETE			26-29 30-33 80			
UMPING TEST METH	OD TO PUMPING RATE	<u>.</u>			LOCATION	OF WE	LL	
1 SPUNP		20 GPM 01 45-16 17-18 1 □ PDMP3NG	IN DIA	AGRAM BI	ELOW SHOW DISTANC	ES OF WEL	L FROM ROAL	AND
STATIC LEVEL	END OF WATER L PUMPING 22-24 IS MINUTES	EVELS DURING 2 MECOVERY 30 MINUTES 45 MINUTES 60 MINUTES	L01 L	INE I	NDICATE NORTH BY	ARROW.		اَمَا
F 050	26-2				•			1
IF FLOWING.	38-41 PUMP INTAKE	SET AT WATER AT END OF TEST 42			ζ		_	,u ¹ /
OF FLOWING. GIVE RATE RECOMMENDED PUM		58 FEET 13 CLEAR 2 □ CLOUDY 43-45 RECOMMENDED 46-49	1		· ·		`	7
SHALLOW	PUMP SETTING	658 FEET PHYPING 0020 GPM		1		•		
			130/					
FINAL STATUS	OBSERVATION WEI	5 ABANDONED, INSUFFICIENT SUPPLY 6 ABANDONED POOR QUALITY 7 UNFINISHED	11 +				<u> </u>	
OF WELL	·	7 UNIVERSED		بمتعممه	/			
	DOMESTIC	5 COMMERCIAL © MUNICIPAL			,			
WAŢER UŞE 0	S IRRIGATION INDUSTRIAL	7 D PUBLIC SUPPLY 6 COOLING OR AIR CONDITIONING				, 	_	
	OTHER	9 □ NOT USED			•	C/V P/	1201	
метнор	CABLE TOOL CONVEN							
OF L	ROTARY (REVERSE	E) # [] JETTING • [] DRIVING					700	M
	S AIR PERCUSSION		DRILLERS REMAR		8 CONTRACTOR 59-	62 DATE 0 GOS	IVEDO ~	63-1
AG. Charb		n Drilling Ltd. 1504	DATA SOURCE		1504	120	<u>"02</u>	7:1
C ADDRESS			O DATE OF INSP	PECTION	INSPECTOR		1	
R.2 B	Box 194, Orle	éans, Ont. K1C 1T1	E REMARKS			···		Р
S Fee Boy	rgesis	SUBMISSION DATE	OFFICE					
	and we	DAY 19 NO. 05 YR78	b		£.	٠. ›		WI

MINISTRY OF THE ENVIRONMENT COPY

FORM 7 NOE 07-091

UTM 1/18 2 41613101810 E 19 R 5101317151610 N



1513139

GROUND WATER BRANCH

The Water-well Drillers Act, 1954 Department of Mines

SEP 10 1957 ONTARIO WATER RESOURCES COMMISSION

County or Territorial District		Iownsmp,	3/4/6e Village, Town or Ci	v)	
		dd	illage, Town or Ciress	moulans	RANI
rate completed					
(day)	(month)	(year)			
Pipe and Casin	g Record		·	Pumping Test	
Casing diameter(s)		, G4.	tic level	o Seel	
Casing diameter(s)	***************************************	D.,	nping rate	1400 90	hour
Length(s)	YANE	Fui	nping level		7
Type of screen Length of screen		Du	ration of test	of hour	
Length of screen		Du		•	
Well Log	3			Water Record	
Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	No. of feet water rises	Kind of wate (fresh, salty or sulphur)
Alux elas	0	60	Touna		
mar day	60	70	70	60	fresh
Try limestone				_	/
			<u> </u>		
					_

For what purpose(s) is the water to be used?
Is water clear or cloudy?
Drilling firm Challenneum Address Ont
Name of Driller Jerus Charles Address Always Ont
Licence Number 76.5
I certify that the foregoing statements of fact are true

Signature of Licensee

road and lot line. Indicate north by arrow.

UTM 1 8 2 4 6 3 2 6 0 E Ottatil 5 0 3 7 6 2 9 P Ontario Water Reso Elev 1 1 1 5 0 2 1 1 5 WATER WEL	ources Commission A	ORD	WATER RES 56 N.S JAN 15 ONTARIO RESOURCES CO	ON 76
Basin, of Basin of F. Cont Rot 28 T	Cownship, Village, To			
Con let, from Ottawa B. Lot 28	Date completed2	O Septembel (day	2 1904. month	year)
	lress Cumbe	rland, Ont.		.,,
Casing and Screen Record		Pumping	Test	
Inside diameter of casing 2 ⁿ	Static level	25		
Total length of casing50!	Test-pumping ra	te8		G.P.M.
Type of screen	Pumping level	40	. 	
Length of screen	Duration of test p	oumping	2 hrs.	
Depth to top of screen	Water clear or clo	oudy at end of	_{test} clear	
Diameter of finished hole 2"	Recommended p	umping rate.	8	G.P.M
	with pump setting	g of40	feet belo	w ground surface
Well Log			Water	Record
Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
blue clay grey limestone	0 45	555 4 59	59	fresh
For what purpose(s) is the water to be used? domestic	In diagram	Location m below show	of Well distances of we	ll from
Is well on upland, in valley, or on hillside? hillside Drilling or Boring Firm	road and	lot line. Inc	licate north by	arrow.
G.Charbonneau, Diamond & Cable Drilling,		1		<i>y</i>
Address R.R. # 1, Box 194, Orleans, Ont.		J P I	1	
Licence Number. 1418		0		2751
Name of Driller or Borer		1	07	. 1
Address Orleans, Ont. R.R. # 1. Date 20 September, 1964. (Signature of Licensed Drilling or Boring Contractor)	1 .		CR	A SON
Form 7 15M-60-4138		į		

				GROUND W	TER BRAND
UTM 8 2 4 6 3 4 2 0 E			9	56 No	331 7 15
				Option:	MATED.
Russell O.F. ConT Ret 28		REC		Cumberla	nd.
Conlest from Ottawa R. Lot Part of lot 28 I	Date co	ompleted	August 13,	1963	
				Ont.	
Casing and Screen Record Inside diameter of casing 2"	C4-	tia laval	Pumpin		
			-		
Total length of casing 56!				,	
Type of screen	1				
Length of screen	1			hrs.	
Depth to top of screen				testclear	
Diameter of finished hole 2"	1	_		8.	
	wi	th pump settin	g of	45 feet belo	
Well Log			T	Depth(s) at	Kind of wate
Overburden and Bedrock Record		From ft.	To ft.	which water(s) found	(fresh, salty sulphur)
blue clay		0	53		
grey limestone		53	66	66≨	fresh
		•			
			1		,
	1			!!	
For what purpose(s) is the water to be used? domestic		т 1*	Location	of Well distances of we	JI from
				dicate north by	
Is well on upland, in valley, or on hillside? hillside					Not
Drilling or Boring Firm				(39)	(29)
G.Charbonneau, Cable & Diamond Drilling		0101	7		No.
Address R.R.# 1, Box 194, Orleans, Ont.		06.00			والمراود والمعالية والمعال
		•••	1/2	LIMITE	Supplementary of the supplement of the supplementary of the supplementar
Licence Number 1025			0	15	
Name of Driller or Borer G. Charbonneau		/	(') 0		
Address R.R.# 1, Orleans, Ont.		. ა	113	1	4
Date August 13 1967		i	Z V		~
(Signature of Licensed Drilling or Boring Contractor)			VK	, —	C
, <u>-</u>			2	1	
Form 7 10M-62-1152			AN PRA		- Constant
OWRC COPY			0	(15/6,)	3

1 3 2 4 6 3 2 4 0 E	ources	L15131 Commission REC	Act	GROUND NO. 56 STEB 21 ONTARIO MARCES CILLE	10. X
County or District Russell O. F. Con I Rot 28 Con 1 Rot 28 Con 2 Rot 28	Γownsh Date co	ip, Village, Tompleted 28	31 G / 6e own or City 3 November	Cumbe. an	ISSIUM J
			Cumberl	and, Ont.	
Casing and Screen Record	1		Pumpir		
Total length of casing. Type of screen Length of screen.	Tes Pur Du	t-pumping range ra	te	0' 2 hrs.	G.P.N
Depth to top of screen Diameter of finished hole 2"	i			f test clear	
	wit	h pump settin	g of	20' feet belo	w ground surfa
Well Log				Water	Record
Overburden and Bedrock Record		From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
blue clay grey limestone		0 	28 38	381	fresh
	,				
For what purpose(s) is the water to be used? Is well on upland, in valley, or on hillside hillside upland Drilling or Boring Firm G. Charbonneau, Diamond & Cable Drilling, Address R. R. # 1, Box 194, Orleans, Ont.			m below show	of Well w distances of we adicate north by	
Licence Number 1025 Name of Driller or Borer G. Charbonneau Address R. R. # 1, Orleans, Ont. Date 28 November 196%. (Signature of Licensed Drilling or Boring Contractor) Form 7 15M-60-4138 OWRC COPY	12	1 6 2 30	MILE.	Ton your services of the servi	old 17

UTM 1/18 2 4161414110 E		151310	i	56 Nº	329
Elev. 5 R 012 717 WATER WEI	L	REC	ORĎ		1
County or District Russell Cont Rot 2	3	うる「子/! hip, Village, T	ا اس 'own or City	Cumberland	
Con. 1st from Ottawa B. Lot 1)ate c	ompleted1	4. September.	1967.	year)
			rland, Ont.		
Casing and Screen Record			Pumping		
Inside diameter of casing			•	·····	
Total length of casing 62'	1				
Type of screen				0'	
Length of screen	l	-		2 hrs.	
Depth to top of screen			•	testclear	
Diameter of finished hole5"		_		feet belo	
Well Log	WI	tn pump settii	ıg oı20	т	Record
Overburden and Bedrock Record		From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
blue clay & bolders			40		
hard pan		40	62	62	fresh
			-		
For what purpose(s) is the water to be used? domestic			Location	of Well	
				distances of we	
Is well on upland, in valley, or on hillside?valley		road and		icate north by	arrow.
Drilling or Boring Firm			F0+57	1 60724	Ag.
G. Charbonneau, Diamond & Cable Drilling,			1	1 1	/
Address R.R. 1, Box 194, Orleans, Ont.			y į	75	•
			5		
Licence Number 2593			1	007	
Name of Driller or Borer G. Charbonneau			0/14	275m1-> 1	
Address R.R. 1, Orleans, Ont.			*	& MILLS	OLD 11
Date 14 September 1967.			12		
Signature of Licensed Drilling or Boring Contractor)			MAR		
Form 7 15M-60-4138		• .			\$ \$
O W R C COPY					S.K
_ 				Ample out	9

THE OHIGHO Water Resources Ac ER WELL RECORD ONTARIO 1512408 2. CHECK X CORRECT BOX WHERE APPLICABLE COUNTY OR DISTRICT TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE OF Carleton Cumberland DAY CONDIETED 18 NO7 YR. 72 mberland. Ontario 9280 25 21317181/10 LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS) DEPTH - FEET MOST COMMON MATERIAL GENERAL DESCRIPTION GENERAL COLOUR OTHER MATERIALS FROM 0 20 red clay 60 olav 60 70 black gravel 70 85 grey limestone 10020705 | 1 10060305 | 1 10070811 | 10085215 | 1 1 1 1 1 1 1 31 32 CASING & OPEN HOLE RECORD WATER RECORD 51 41 SCREEN DEPTH - FEET WATER OUND DEPTH TO TO OF SCREEN FRESH 3 | SULPHUR SALTY 4 | MINERAL STEEL GALVANIZED *90*85 250 0 >70 1 FRESH 3 SULPHUR 2 SALTY 4 MINERAL 3 CONCRETE 4 CONCRETE PLUGGING & SEALING RECORD 61 0070 DEPTH SET AT - FEET MATERIAL AND TYPE (CEMENT GROUT 1 D STEEL 2 D GALVANIZED 1 G FRESH 3 G SULPHUR FROM TO 2 SALTY 4 MINERAL 3 Th contracts OPEN HOLE STEEL GALVANIZED 0085 1 | FRESH 3 | SULPHUR 2 | SALTY 4 | MINESAL 1 TRESH 3 SULPHUR 2 SALTY 4 NINERAL CONCRETE 4 CPEN HOLE 11-14 DEFACION OF PUNPING FUMPISH PAT LOCATION OF WELL 1 🗆 PUMP BAILER IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW. WATER LEVEL END OF PUMPING PUMPING 2 J RECOVERY WATER LEVELS DURING 22-24 S 050 065 32-34 065 065°9-31 060-20 065 FEET IF FLOWING PUMP 1 🗀 CLEAR 43-45 RECOMMENDED PUMPING DOOM 46.45 FUMP SETTING 080 I DEFE GPM ☐ SHALLOW 000.5 GPM./FT. SPECIFIC CAPACITY WATER SUPPLY OBSERVATION WELL S ABANDONED, INSUFFICIENT SUPPLY G ABANDONED POOR QUALITY STATUS 3 /7 TEST HOLE 7 🔲 UNFINISHED OF WELL 4 🗖 DOMESTIC 5 COMMERCIAL 6 MUNICIPAL WATER 3 | IRRIGATION PUBLIC SUPPLY USE O/ . COULING OR AIR CONDITIONING 4 🔲 INDUSTRIAL O OTHER 9 🗆 NOT USED CABLE TOOL ROTARY (CONVENTIONAL) 6 D BORING 7 DIAMOND **METHOD** 3 | ROTARY (REVERSE) 4 | ROTARY (AIR) 8 🔲 JETTING 9 🔲 DRIVING DRILLING 5 AIR PERCUSSION DRILLERS REMARKS 240473 ONLY G. Charbonneau, Diamond & Cable Drilling 055 CONTRACTOR ADDRESS R. R. 2, Box 194, Orleans, Ontario NAME OF DRILLER OR BORER PK

OFFICE

WΙ

FORM 7 07-091

SUBMISSION DATE

18 NO. 7

L. Bourgegis

MINISTRY OF THE ENVIRONMENT COPY

9 R 5 0 3 8 6 2 5 N Or	Drillers A	ct ee of Ontar	RE(API GEOLO	6 Nº CEIVE R = 3 1952 GICAL BRANI TMENT OF MIN	. 1
Date Completed	own o	316/110 or City)	Con Cu		
Length(s) of casing(s). 20' St Type of screen. Pr	atic level imping leve	9.15.Z. 12. feet	umping Test		
Distance from top of screen to ground level	uration of to	est /	bowls to ground		
Kind (fresh or mineral)			Depth(s) to Water	Kind of Water	No. of Feet Water Rises
Quality (hard, soft, contains iron, sulphur, etc.)			Horizon(s)	heal	69 feet
For what purpose(s) is the water to be used?D. omes	tia			7	
For what purpose(s) is the water to be used? D. omes How far is well from possible source of contamination? What is the source of contamination? Enclose a copy of any mineral analysis that has been made			•		
For what purpose(s) is the water to be used?			Loc In diagram well from r	eation of We	stances of
For what purpose(s) is the water to be used?	of water	То	Loc In diagram well from r	below show di	stances of
For what purpose(s) is the water to be used?	From 0 ft.	Toft.	Loc In diagram well from r	below show di	stances of
For what purpose(s) is the water to be used?	From 0 ft.	Toft.	Loc In diagram well from r	below show di	stances of

WATER WELL RECORD

NTY OR DISTRICT	0	T BOX WHERE APPLICABLE 12 TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	3	g CON., BLOCK, TRACT, S		34 / 1	OT 25-21
Carleton	Cussic	Cumberland		rst. Iron (DATE COME		() 27 IB-53
		umberland, Ont.		RC. BASIN CODE	DAY 24	мо05_	yr. _7 0
		038899	25 ZIST	ST 25 1	_لــــــــــــــــــــــــــــــــــــ	ــــــــــــــــــــــــــــــــــــــ	
	LO	G OF OVERBURDEN AND BEDROC	K MATERIAI				
ENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS		GENERAL DESCRIPTION	1	DEPTH FROM	- FEET
grey	clay					0	8
black	muck					8	12
	clay & bolder					12	70
blue				11513128		70	85
grey	limestone			3 9		10	
				···			
							
							-
						-	
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						+	+
	ا با ململلم	المديادة المحادية	100+4	• 1 1 1	1.1.11		. .
	<u>812951 1097</u>	<u>dead boraddastad l</u>	0085215	<u>. . .</u>	┸┸┸┹╸┖┷╸ ┼╷╏╷┊╏╷	<u></u> 	اباب
32	14 15 21	32	3	SIZE(S) OF OPENING (SLOT NO.)	31-33 DIAM	ETER 34-38	75 LENGTH
WATER FOUND	R RECORD		TH - FEET	w w		INCHE	5
	FRESH 3 SULPHUR	INCHES FROM	1 TO	MATERIAL AND TYPE		OF SCREEN	
	SALTY 4 MINERAL	06 2 GALVANIZED 12 188 0	.72	<u>s</u>			FEET
2 2]FRESH 3 ☐ SULPHUR "]SALTY 4 ☐ MINERAL	3 CONCRETE 4 OPEN HOLE	0072	61 PLUGGIN	G & SEA		ECOR
	FRESH 3 SULPHUR SALTY 4 MINERAL	17-18 1 ☐ STEEL 19 2 ☐ GALVANIZED 3 ☐ CONCRETE		FROM TO 10-13 14-1	MATERIAL AN	D TYPE LE	D PACKER, ET
25-28	JFRESH 3 □ SULPHUR 29	42 OPEN HOLE 24-25 1 ☐ STEEL 26	0085	18-21 22-25	5		
30.33	SALTY 4 ☐ MINERAL] FRESH 3 ☐ SULPHUR 34	1 105		26-29 30-3	3 80 .		
2[SALTY 4 MINERAL	4 OPEN HOLE		<u> </u>	<u> </u>		
71 PUMPING TEST ME	THOO 10 PUMPING RATE 0006	15-16 17-18		LOCATIO			
STATIC	WATER LEVEL 25	1 CHEIR PURING	IN I LOT	DIAGRAM BELOW SHOW DIST LINE. INDICATE NORTH BY	ANCES OF WELL F		
LEVEL 19-2	PUMPING	27 RECOVERY					14
	050 EET 025	EET 035 FEET 045 FEET 045 FEET		· 4)	ω^0	15
Z IF FLOWING, GIVE RATE	38-41 PUMP INTAKE	\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \		,	1957	W	
RECOMMENDED PL	PUMP	D 43-45 RECOMMENDED 46-49		8 < 20 X	170		
SHALLON	DEEP SETTING	70 FEET RATE 0006 GPM.		300	\mathcal{M}		
	54 WATER SUPPLY	5 ABANDONED, INSUFFICIENT SUPPLY	wT.	7.5	×1 -	1/	
FINAL STATUS	OBSERVATION W	ELL 6 ABANDONED, POOR QUALITY 7 UNFINISHED	v (,]]	11/ 201	CT	
OF WELL	4 ☐ RECHARGE WELL			<u> </u>			
WATER	2 STOCK	5 COMMERCIAL 6 MUNICIPAL			61	D 1	7
USE (7 DUBLIC SUPPLY 8 COOLING OR AIR CONDITIONING				. ,	•
,	OTHER	9 () NOT USED					
METHOD	CABLE TOOL ROTARY (CONVE			1 1			
OF DRILLING	3 ☐ ROTARY (REVER 4 ☐ ROTARY (AIR) 5 ☐ AIR PERCUSSION	9 DRIVING		1 1			
NAME OF WELL		LICENCE NUMBER	DRILLERS REMAR	SB CONTRACTOR	59-62 DATE RECE	VED	63
O G. Char		d & Cable Drilling, 1504	DATA SOURCE DATE OF INSP	1 1504	i	3027	11
O D D	-		ш	ECTION INSP	ECTOR		
MAME OF DRIL	2, 194, Orleans	LICENCE HUMBER	S REMARKS:				
2	Piché CONTRASTOR	SUBMISSION DATE	OFFICE				
O SIGNATORE OF							

ال رس	ILdI IU	thé Environ	ment	Jan. (1)	700	1.4	Regulation 903	VVCII IN Ontario Water Rese
netructions	for Complet	ting Form		A04=	49	8		page_
For use in	n the Provinc	e of Ontario	only. This docum	ent is a perma	rent legal	I document. P	∟l lease retain for futur	e reference
 All Sections Questions 	ons must be co s regarding co	ompleted in f ompleting this	ull to avoid delays application can h	in processing to directed to t	r l Further ir	nstructions and	d explanations are ava	ailable on the back of
 All metre 	measureme	nts shall be	reported to 1/10	of a metre.	- Valor	vvoii ivianagei	Ministry Use	· · · · · · · · · · · · · · · · · · ·
,			nk only. tion of Well Info	rmation	MUN	C	ON NO	LOT
irst Name	_ 1.	[ast Name	9 (Mai	ling Address	s (Street Number	er/Name, RR,Lot,Cond	es(S)on)
County/District/	Municipality	J DE	Je O MC		Pro	Svince Posta	al Code Tele	phone Number (include
144 et)\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	II a anii a a (Oasse	4. (D) - 1.1.4/1.4	Utta	we	0	ntario K	11813	
Address of Well	Logation (Cour		icipality)		nship Wwb	arla	nd 2	Concession
RR#/Street/Nu	nber/Name X	na A	(thur s	24 6	ity/Town/Vil		Ste/Compa	artment/Block/Tract of
GPS Reading	NAD 2	one Pastin	AGAS North	3889	t Make/M		of Operation: 🔲 und	ifferentiated X Aver
og of Over	8:3 burden and	Bedrock Ma	iterials (see inst		11100	gellon	Diffe	erentiated, specify
General Colour	Most commo	on material	Other Ma	aterials		Genera	al Description	Depth From
	C/k	ay		****				0
	<u> </u>	rendi	neston	2				5,79
		1			<u>.</u>		·	
					-			
					-			
	Diameter etres Diamete	21	Cons	struction Reco			<u> </u>	t of Well Yield Draw Down
	To Centimetr	es diam	Material	Wall thickness	Depth	Metres	Pumping test method	Time Water Level Tim
0 73	,15 149	centimetres	· .	centimetres	From	То	Pump intake setal (metres	min Metres mir
		_	Steel Fibreglass	Casing	-	1	(metres)	Static 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
		ା . ୧୪		.48		1250	(litres/min) 5, 10	<u> </u>
Water found at Metros	r Record / Kind of Water		Galvanized	,	<u> </u>	101	Duration of pumping hrs + mir	
154m	Fresh Sulph	ur	Steel Fibreglass Plastic Concrete			·	Final water level end of puppling Commerce	3 36,00 3
Gas D	Sal Miner	als	Galvanized				Recommended pump	437,00 4
	Fresi Sulph	ur	Steel Fibreglass Plastic Concrete				type. Shallow Recommended symp	5 27.75 5
☐ Gás ☐ ☐ Other: ——	Salty Miner	als	Galvanized				depthmetres	;
	Fresh Sulph			Screen		Ţ	Recommended rump rate (litres/min)	10 57.40 10
Other:		diam	Steel Fibreglass	Slot No.			If flowing give rate -	20 40 80 20
After test of we	ed water was	s.	Galvanized		ļ		(litres/min) If pumping discontinued, give reason.	25 4 4 25 30 4 4 5 30
Other, spec	WESTED	님	No	Casing or Scre			ded, give reason.	40 40 40 50 50 40 40 50
Chiorinated 🖵	ŻYes ∐ No		pen hole		11,89	73.15		50 43 40 50 60 43 80 60
		Sealing Rec			andonment		Location	of Well
11000	Material an	d type (bentonite	slurry, neat cement slurr	\	e Placed metres)	In diagram belo	ow show distances of well by arrow.	from road lot line, and l
1139) Nec	et Cem	et Sluce	17 .00	2//	1 W	ow show distances of well by arrow.	T
 						Oliv	1	1
							1 KM	# 101
							\ -	_\
			Construction Diamond		Diagram	· ·	X.	-> KING ARTH STA
Cable Tool Rotary (conv	ventional) 🛣 🗛 ir	tary (air) percussion	Jetting		Digging Other		240	/ AKOT
Rotary (reve	erse) Bor		☐ Driving er Use		-			1 577
1		ustrial	Public Sup	oply	Other			/
Domestic		mmercial Inicipal	☐ Not used ☐ Cooling &	air conditioning		Audit No.	48599 P	ate Well Completed
Stock	L.IVIL	Final Sta	atus of Well		ned; (Other)	<u>Z</u>		ate Delivered yay
Stock Irrigation		no wol	Untinished		areu, (Orner)	package delive	Division o mapped	2006
Stock Irrigation Water Supp Observation	oly Recharg	ned, insufficient		3				se Only
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	r s information		tion of Well In				N Ø F	1 1 1	OV TOIL	Q
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Instruction	ons for	Compl	etin	g Form	A	२०५	811		17	page_	of
• For us	se in the	Provin	ce o	of Ontario only. Thi	is docume	nt is a peri	nanent lega	I document. Pl	ease retain for future refer	ence.	
									d explanations are available on nent Coordinator at 416-23		this form.
• All m	etre me	asuren	ents	s shall be reported							
				e or black ink only.			MUN /		Ministry Use Only	6 LOT	100
Well Own		format	on a	and Location of V	Nell Infor	mation	ailing Addres	S (Street Number	er/Name, RR,Lot,Concession)		C/3
	daa	or t	Z	nvestme	nts	Ltd "	225	nec	were or, su		80
County/Dis				Township	o/Citv/Town	/Village I	P	Posta	il Code Telephone N	Number (includ	e area code)
Address of	Well Loc	ation (Co	untv/	(District/Municipality)	taw		yynship	Ontario 1 6	Loh	Cbncession	
	SPA	wa	C	a leton	L		Cun	1 ber la	~ 0 ≈ 5	/	
RR#/Street		Name	\sim	ontrea	120	[City/Town/V	n ber 10	Site/Compartment/	Block/Tract et	c.
GPS Readi		NAD	Zone	\$ 146491S		38871	Unit Make/N	Andel Mode	of Operation: Undifferentiat		aged
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H	ole Dian	eter	1	T	Const	ruction Red	ord		Test of We	il Yield Do	takec
Depth	Metres	Diam		Inside		Wall	Depth	Metres	Pumping test method Drav	v Down F	Recovery 💐
From	То	Centim		diam Mate centimetres	erial	thickness centimetres	From	То		Vater Level Time Metres min	
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·	<u> </u>		ot	Stool F	Fibreglass	Casing	<u> </u>	<u> </u>	Pumping rate - 1	32.6 1	39.33
			17	[F] P	Concrete	.48		,	(litres/min) 45		
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65 × 8	Fres	. ☐ Min		Plastic Galvaniz	Concrete		1		of pumpings T metres		
Other:		D.F	+		Fibreglass		 	-	Recommended pump 4.	34.90 4	38.5
69 ps	Fres	h ∏ Sul	phur erais		Concrete					35,02 5	38.3
Other:	1103	*A	1. 1	☐ Galvaniz	zed		<u> </u>		depth. 10 metres		
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Chlorinate	Yes	□No	$\downarrow \downarrow$	Den uc			1001	73.1		71.87 60	37.0
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	(conventio	nal) 🗹 🛣 J	lotary	(air)] Diamond				J	100'	Kd.
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COUNTY OR DISTRICT	\ 2	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	5601297 156003 CON. 100 12 12 12 12 12 12 12 12 12 12 12 12 12
Carl	eton Kussoll	Cumberland	lat from Ottawa 1 025
		Cumberland, On	
		7HING 13,7,9,8,9	RC. ELEVATION RC. BASIN CODE II III IY
	LO	24	25 26 30 31 ROCK MATERIALS (SEE INSTRUCTIONS)
GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	CENERAL DESCRIPTION DEPTH - FEET
grey	lèsse rock &	bolders	O 10
grey	limestone		10 15
			11513129
			3 9
		V	
	# 		
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31 QQ/Q	12/2/3 1 0/5	12/2/15	
1 2 10	14 15 21	1512 5110 0 0 0050 U.O.	3 3 5 5 75 5 1-3
WATER FOUND	R RECORD	51 CASING & OPEN HO	DEPTH - FEET INCHES
10-13 1	RESH 3 D SULPHUR 14	INCHES INCHES INCHES	FROM TO WATERIAL AND TYPE DEPTH TO TOP 41 OF SCREEN
15-18	SALTY 4 MINERAL FRESH 3 SULPHUR 19	06 2 GALVANIZED 188	0 28-
20-23	SALTY 4 MINERAL FRESH 3 SULPHUR 24	4 ☐ OPEN HOLE 17-18 1 ☐ STEEL 19	20-23 DEPTH SET AT - FEET MATERIAL AND TYPE (CEMENT GRO
25-28	SALTY 4 MINERAL	2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	FROM TO LEAD PACKER, I
	FRESH 3 SULPHUR 23 SALTY 4 MINERAL	24-25 1 STEEL 26	27-30 18-21 22-25
םין ו	FRESH 3 SULPHUR 34 8 SALTY 4 MINERAL	3 CONCRETE 4 OPEN HOLE	26-29 30-33 80
71 PUMPING TEST MET			LOCATION OF WELL
□ PUMP STATIC		10 GPM 02 15-16 00 17-1	IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND
LEVEL 19-21	WATER LEVEL 25 END OF PUMPING WATER 0402-24 15 MINUTES 26-	R LEVELS DURING 2 RECOVERY	
0 0 FEET	0-30 FEET 040,FEE	ET 040 FEET 040 FEET 040 FEE	0/0/7
Z IF FLOWING, GIVE RATE	38-41 PUMP INTAKE	SET AT WATER AT END OF TEST 4	2
RECOMMENDED PUN	P TYPE RECOMMENDED		
SHALLOW	DEEP SETTING C		10/25
FINAL	54 WATER SUPPLY	5 ABANDONED, INSUFFICIENT SUPPLY	¬
STATUS OF WELL	2 ☐ OBSERVATION WE	LL 6 ABANDONED, POOR QUALITY 7 UNFINISHED	
	4 ☐ RECHARGE WELL -56 DOMESTIC	5 COMMERCIAL	-
WATER	2 ☐ STOCK 3 ☐ IRRIGATION	6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY	
USE (4 INDUSTRIAL OTHER	B COOLING OR AIR CONDITIONING 9 NOT USED	
METHOD	57 CABLE TOOL	6 ☐ BORING	
OF	POTARY (CONVENT D ROTARY (REVERSE D ROTARY (AIR)	E) 8 □ JETTING	11 15m
	5 AIR PERCUSSION	9 DRIVING	DRILLERS REMARKS:
DRILLING		LICENCE NUMBER	DATA 58 CONTRACTOR 59-62 DATE RECEIVED 59 D63
NAME OF WELL O		& Cable Dwilliam 1504	15 1504 25027
O G Charbo		& Cable Drilling, 1504	SOURCE / 1504 123027
O G Charbo	2. Box 194. Orl		D DATE OF INSPECTION INSPECTOR S REMARKS:

VALLEY LEED HEES The Ontario Water Resources Commission Act CHARIN WATERTownship, Village, Town or City Cumberlin Russell County or District Lot part of lot 15 _____Date completed _____22 December 1968 ______ Conlst. from Ottawa R. dress Cumberland, Ont. **Pumping Test** Casing and Screen Record Static level85! Total length of casing 22¹ Pumping level 85 Type of screen Duration of test pumping 3 hrs. Length of screen Water clear or cloudy at end of test clear Depth to top of screen Diameter of finished hole 6" with pump setting of ______ feet below ground surface Water Record Well Log Kind of water Depth(s) at To ft. From (fresh, salty, sulphur) which water(s) Overburden and Bedrock Record ft. found 255 fresh clay & loose rock soft grey limestone 245 255 245 white sand stone Location of Well For what purpose(s) is the water to be used? domestic In diagram below show distances of well from road and lot line. Indicate north by arrow, Is well on upland, in valley, or on hillside? hillside Drilling or Boring Firm G. Charbonneau, Diamond & Cable Drilling, Address R. R. 1, Box 194, Orleans, Ont. Licence Number 3039 OLD 17 Name of Driller or Borer. G. Charbonneau..... Address R. R. 1, Orleans, Ont. 25 Date 22 December, 1968 Charter Signature of Licensed Drilling or Boring Contractor) Form 7 5M 60-20912 OWRC COPY

1M 18 2 46 4 4 400 ED 3 9 4 R 5 T 0 3 8 8 A 0 Ontario Water Resources Commission Act

OWRC COPY

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19

Sa Sa A 2 7 5 WATER WELL RECORD

County or District Dussell				Cumberland	
Con. 1st. from Ottawa R. Lot 24	Date co	ompleted	29 June 196	8	
			(any	month ad	• ,
					<u></u>
Casing and Screen Record	Τ		Pumping	lest	
Inside diameter of casing 61"					
Total length of casing 20.	ļ				
Type of screen	1				
Length of screen	1			.hrs	
Depth to top of screen	1			testclear	
Diameter of finished hole 6*	1			6	
	wi	th pump setti	ng of 60	feet belo	
Well Log				ļ ₁	Record
Overburden and Bedrock Record		From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
blue clay		0	3	100	fresh
loose rock		3	7		
grey limestone		7	100		
	- ,,,,,				
For what purpose(s) is the water to be used?domestic		In diagra	Location um below show	of Well distances of wellicate north by	ll from
Is well on upland, in valley, or on hillside? upland		road and	1 lot line. Inc	ilcate north by	allow.
Drilling or Boring Firm	1		1		· 1
G. Charbonneau, Diamond & Cable Drilling,	1		1	$\frac{1}{\sqrt{2}}$	sino mariti
Address R. R. 1, Box 194, Orleans, Ont.					y
Licence Number3039	i				
Name of Driller or Borer Jim Presley	1			01	.p 17
Address R. R. 2, Amprior, Ont.		•			
Date 29 June 19681			25		
(Signature of Licensed Drilling or Boring Contractor)					
Form 7 5M 60-20912	- [1 1		



SOUTENE

GROUND WATER BRANC

AUG 1 5 1961

WATER WELL RECORD

The Ontario Water Resources Commission Act

ONTARIO WATER
RESOURCES COMMISSION

County or District Russell	Townsł	nip, Villag	e, Town or City	RESOURCES CU	WIMI22ION
Con. lat from Ottawa R. Lot S. 1 lot 25	Date co	ompleted	August 1 (day erland, Ont.	month 5131	25 ^y 4r)
Casing and Screen Record			Pumping		• • • • • • • • • • • • • • • • • • • •
Inside diameter of casing 2"	Sta	tic level	75'		
Total length of casing	Te	st-pumpin	g rate 3		G.P.
Type of screen	ł		el85!.		
Length of screen	Du	ration of t	test pumping	3 hrs.	
Depth to top of screen	1				
Diameter of finished hole	1		ed pumping rate		
	wi	th pump s	etting of 85!	feet belo	w ground surfa
Well Log		Z			Record
Overburden and Bedrock Record		From ft.	To ft.	Depth(s) at which water(s) found	Kind of wate (fresh, salty sulphur)
bolders & gravel		_0_	10	210'	fresh
grey limestone	-	10	210		
For what purpose(s) is the water to be used?domestic		In di road	Location agram below show and lot line. In	distances of we	ell from arrow.
Is well on upland, in valley, or on hillside? upland.		: .			
Orilling or Boring Firm G. CHARBONNEAU DIAMOND DRILLER ARTESIAN WELLS MODERN HOME BUILDERS Address ORLEANS, ONT. R.R. 1 Navan 9R - 25			0-D#13	7	1165
Licence Number 224			EONI LO725		- C.
Name of Driller or Borer		(00-)	L0725		1
Address R. R. # 1, Orleans, Ont.	I				
Date Juguet 1st, 1961					
(Signature of Licensed Drilling or Boring Contractor) Form 7 15M Sets 60-5930				Css.sv	
OW B C COPY		1	t	,	

Ministry of the Environment

Well Tag Number (F A 004703 Well Record
Regulation 903 Ontario Water Resources Act

Instructions for Completing Form

A004703

page ___ of _

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 	s shall be reported to 1/1	Oth of a metre	the water				
Please print clearly in blue	e or black ink only.		1		Ministry Use	Only	
Address of Well Location (County)	/District/Municipality)	To	wnship	,	Loh	Conces	sion
O Harris	i Can leton	, _, (um	berla	$n\alpha$	8 1	
RR#/Street Number/Name	d worther k	d	City/Town/Vi	10.10		tment/Block/Tra	ct etc.
GPS Reading NAD Zon	e Easting No	rthing	Unit Make/M	odel Mode	e of Operation: Undiff		Averaged
Log of Overburden and Be		0737969	mag.	ellan	Diffen	entiated, specify	
General Colour Most common		Materials	- n	Genera	al Description	Depti	
100						Fron	
Crown + grey	clay						8 85,3
grey Times!	ONL	**** * * *******				16.	8:00-0
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	A THE WAR AND A SECOND CO. LANSING MICH.					<u>.</u>	
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			THE STATE OF STATE OF	1 . 11 f 1 more more construction of	A CONTRACTOR OF STREET		
Company of the Compan							•
Hole Diameter					1	- 6 141 - 11 3/1 - 1-1	
Depth Metres Diameter		nstruction Rec			Pumping test method	of Well Yield Draw Down	Recovery
From To Centimetres	Inside Material	Wall thickness	Depth	Metres		Time Water Level	Time Water Level
0 85.3 15.24	centimetres	centimetres	From	То	Pump intake set at -	min Metres	min Metres
		Casing			(metres)	Static 30.57	59.3
	Steel Fibreglas				Pumping rate (litres/min)/5.1	1 32.44	1 58.4
Water Record	75.88 Plastic Concrete	• .48	0	18.3	Duration of pumping	2 33.70	2 57.4
Water found Kind of Water	Steel Fibregla	ss		·	hrs + min	55.05	
37.15 Fresh Sulphur	Plastic Concrete	• .			Final water level end of pumping metres	3 33.90	3 56.4
Gas Salty Minerals Other: NO + Minerals	Galvanized				Recommended pump	4 34.5	4 55.5
85 n3 Fresh Sulphur	Steel Fibregla	i		ì	type. Shallow Deep	7.0	
Gas Satty Minerals Other:	Plastic Concrete				Recommended pump depth.	5 35.3	5 54.9
m Fresh Sulphur		Screen		*	Recommended pump	10 38.2	10 52,4
Gas Salty Minerals	Outside - Steel Fibregla	ss Slot No.	!		rate. (litres/min)	15 41.1	15 50.4
After test of well yield, water was	diam Plastic Concrete	•			If flowing give rate - (litres/min)	20 43.4	20 47.6
Clear and sediment free do ther, specify	Galvanized				If pumping discontin- ued, give reason.	30 Y8.58	30 45 28
Other, specify	No	Casing or Sci	reen		ueo, give reason.	40 54.10	40 41.10
Chlorinated Yes No	Open hole		17.7	85.3		50 56 80	50 35.0
			<u> </u>		<u> </u>	60 59.30	60 3684
Plugging and Se Depth set at - Metres Material and type From To		ular space	Abandonment me Placed		Location o		and building
		(cub	ic metres)	Indicate north by		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Å ,
17.714.6 Cen	nent shury	04 15	10+				141
14.6 0 ON	Milosun	my 26	2112				
					~ (O)	ld mont	real
	Method of Construction				7.4r	lean St	- Rd
Cable Tool Rotary			Digging		~ \U &		
Rotary (conventional) Air per	cussion Jetting		Other		S-3/ 11K	一 しつ	≤'
Rotary (reverse) Boring	☐ Driving Water Use			1 6			
Domestic Industri		ipply [Other	`	~ <i>(</i> //		ļ
Stock Comme		air conditioning			O C O O O I Date	e Well Completed	
	Final Status of Well	an conditioning		Audit No. Z	U4889 ""	2004	[™] ტ [™] ბზ
Water Supply Recharge w			ioned, (Other)		WHO S I MUTHOROTI	Delivered Y	MM DD
Observation well Abandoned. Test Hole Abandoned.	. insufficient supply Dewaterii , poor quality Replacen			package deliver	ed? Tyes No	2004	04 02
Weli Con	ntractor/Technician Informa	tion			Ministry Use		
Name of Well Contractor	Log Delta	Well Contractor's	Licence No.	Data Source	:Cor	tractor 1	8
Business Address (street same, numb	ber, city/etc.)			Date Received	YYYY 20MM DD Date	of Inspection y	YYY MM DD
Name of Well Tophnican Charles	MUNC , UNI	Well Technician's	License No	JUN	U / <u>(UU4</u>	Record Number	
Name of Well Technician (last name	uiel	10112	LICENCE NO.	Remarks	, Wei		CAA
Signature of echnician/Contractor		Date Submitted	V. MM DD	C		1534	641

		12,		
UTM	118 z	416	13:415	7 0 E
			4.9.2	



CROUND WATER BRANCH

JAN 19 1960

Elev. 19th 31314:5

The Ontario Water Resources Commission Act, 1957

RECOURCES COMMISSION

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ATER WELL RECOR

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nship,	Village,	/6e. Town o	City	.Cumbe:	rl.and!	Ľwp

County or	District	Russell		Towns	hip, Village	e,'Town or C	lityCumberl.:	andTwp
-	- 6		× 27			Sept		
				ate	completed	(day	month	year)
				ldres	ssR	·R#.·1Ct	mberlandO	nŧ

Casing and Screen Record	Pumping Test			
Inside diameter of casing 2"	Static level 71.			
Total length of casing49!	Test-pumping rate9G.P.M.			
Type of screen	Pumping level 90!			
Length of screen	Duration of test pumping2.hrs.			
Depth to top of screen	Water clear or cloudy at end of testolear			
Diameter of finished hole2"	Recommended pumping rate			
	with pumping level of 80'			

Well Log

Water Record

Well Log			77 4101 1104914			
Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, sulphur)	
clay	o	43	147	76	fresh	
sand	¥ 43	46	<u></u>	-	_	
gravel		48		-		
limestone	48	147			-	
	_				-	
			-		-	
				_		

For what purpose(s) is the water to be used	For	what	purpose(s)	is	the	water	to	be	usedî
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domestic

Is well on upland, in valley, or on hillside?...hillside.....

G. CHARBONNEAU ORLEANS, ONT. 1.

Licence Number 164

of Licensed Drilling Contractor)

Location of Well

In diagram below show distances of well from

road and lot line. Indicate north by arrow.

CSS.58

Basin Jaka Water Water		ice of (andera.	_	RANCH MINES	/\
County or District Runsell Tp. Co	umberla	al C	Gon Z	Lot . 2.9	Pt. Lot	
D. W. O. E. I.	em	fer	lar	Ac	res	
		-			,	
Tipe and Casing Necord			Pum	ping Test	·	
Casing diameter(s)	1					•
Length of screen						
Type of screen	l l					
Type of pump	Drawdown.	35		<i></i>		
Capacity of pump	Static level of	of compl	eted well	1. <i>1.14</i>	ux	
Depth of pump setting	Is well a gra	vel-wall	type?			
	Water Record			D .1()	<u> </u>	
Kind (fresh or mineral)				Depth(s) to ater Horizon(Kind of Water	N W
Quality (hard, soft, contains iron, sulphur etc.)	rand.		,	90'	5)	-
Appearance (clear, cloudy, coloured)	C-2,					-
For what purpose(s) is the water to be used? How far is well from possible source of contamination	n? 10 f	uK				
For what purpose(s) is the water to be used?	home ni lo f					
For what purpose(s) is the water to be used? How far is well from possible source of contamination. What is source of contamination?	home ni lo f			L	ocation of We	
For what purpose(s) is the water to be used? How far is well from possible source of contamination What is source of contamination? Enclose a copy of any mineral analysis that has been	n? lo f	То	In	diagram b	elow show dist	ance
For what purpose(s) is the water to be used? How far is well from possible source of contamination. What is source of contamination?	n?lof	To ft.	In	diagram b	elow show dist	ance
For what purpose(s) is the water to be used? How far is well from possible source of contamination. What is source of contamination?	homefofofofofofofo	То	In	diagram b	elow show dist	ance
How far is well from possible source of contamination. What is source of contamination? Enclose a copy of any mineral analysis that has been Well Log Drift and Bedrock Record	n?lof	To ft.	In	diagram b	elow show dist	ance
For what purpose(s) is the water to be used? How far is well from possible source of contamination. What is source of contamination?	homefofofofofofofo	To ft.	In	diagram be no road and	elow show dist	ance
How far is well from possible source of contamination. What is source of contamination? Enclose a copy of any mineral analysis that has been Well Log Drift and Bedrock Record	homefofofofofofofo	To ft.	In	diagram b	elow show dist	ance
How far is well from possible source of contamination. What is source of contamination? Enclose a copy of any mineral analysis that has been Well Log Drift and Bedrock Record	homefofofofofofofo	To ft.	In	diagram be no road and	elow show dist	ance
How far is well from possible source of contamination. What is source of contamination? Enclose a copy of any mineral analysis that has been Well Log Drift and Bedrock Record	homefofofofofofofo	To ft.	In	diagram be no road and	elow show dist	ance
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How far is well from possible source of contamination. What is source of contamination? Enclose a copy of any mineral analysis that has been Well Log Drift and Bedrock Record	homefofofofofofofo	To ft.	In	diagram be no road and	elow show dist	ance
How far is well from possible source of contamination. What is source of contamination? Enclose a copy of any mineral analysis that has been Well Log Drift and Bedrock Record Blue Clay June June June June June June June June	From Oft.	To ft.	In	diagram be no road and	elow show dist	ance
How far is well from possible source of contamination. What is source of contamination? Enclose a copy of any mineral analysis that has been Well Log Drift and Bedrock Record	From Oft.	To ft.	In	diagram be no road and	elow show dist	ance
How far is well from possible source of contamination. What is source of contamination? Enclose a copy of any mineral analysis that has been Well Log Drift and Bedrock Record Blue Clay June June June June June June June June	From Oft.	To ft.	In	diagram b n road and	elow show dist	ance
How far is well from possible source of contamination. What is source of contamination? Enclose a copy of any mineral analysis that has been Well Log Drift and Bedrock Record Blue Clay June June June June June June June June	From Oft.	To ft.	In	diagram be no road and	elow show dist	ance
How far is well from possible source of contamination. What is source of contamination? Enclose a copy of any mineral analysis that has been well Log Drift and Bedrock Record Blue Clay Jimestone	From O ft.	70ft 3 -	In fror	diagram b n road and	elow show dist	ance
How far is well from possible source of contamination What is source of contamination? Enclose a copy of any mineral analysis that has been Well Log Drift and Bedrock Record Blue Clay Jimestone Situation: Is well on upland, in valley, or on hills	From Oft.	70ft.	In fror	diagram b n road and	elow show dist	ance
For what purpose(s) is the water to be used?	From Oft.	70ft.	In from	diagram b n road and	elow show dist	ance
For what purpose(s) is the water to be used?	From Oft.	70ft.	In from	diagram b n road and	elow show dist	ance



OWNER'S COPY

WATER WELL RECORD

FORM 7 MOE 07-091

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2	45	FRES.		ULPHUR IINERAL	61	GALVANIZE			0	21	Ľ	ň					OL PÉKEEN	FEC
		SALT		ULPHUR IINERAL	-	OPEN HOLE						DEPTH 5	PLI				ING RECO	ORD
		FRES SALT		ULPHUR IINERAL		☐ STEEL ☐ GALVANIZE ☐ CONCRETE	р				-	FROM	10		MATERI	AL AND	TYPE LEAD P	ACKER ETC
		FRES		ULPHUR AINERAL		DOPEN HOLE					-		-	-				
_		☐ FRES		ULPHUR MINERAL		GALVANIZE CONCRETE OPEN HOLE	[$\ \cdot\ $				T			
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	15	FEET 2	15 FEET	215	185	1	Ì	- 1										
	IF FLOWING			PUMP INTAKE	SET AT	WATER AT E	ND OF TEST											
	ı	DED PUMP TYPE	GPM	RECOMMENDE PUMP	D	RECOMMEND PUMPING												
	□ SHA	ALLOW E	EEP	SETTING	235	FEET RATE	2	GPM										
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	ì	WELL CONTRA	CTOR				LICENCE HUMBER	\exists	\equiv	LERS REMAR	KS:	T			T	λDI	R 0 4 2	กกว
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Ministry

0506 (07/00) Front Form 9

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Print only in space Mark correct box	Environment es provided. with a checkmark, where ap	plicable.	11 2	153320)4	Municipality (Con.	1 1 22 23 24
County or District OTTA	WA - Carle	Addres //	51- M	own/village	extraction RC	Con block tract sur	d 15/0	Al-53 Omlifi year
1 7 7 - 7 - 6	LC	OG OF OVERBURD	EN AND BEDRO	OCK MATERIALS (see instruction	· · · · · · · · · · · · · · · · · · ·		
General colour	Most common material	,	Other materials		General d	escription	Depth From	r feet To
Brown	Clar	R	oulde.		ha	as e	0	5
60-1	Lin adam				16	ml	5	262
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31 32 1 1				<u> </u>			<u> </u>	الللل
10 10	ER RECORD	51 CASING 8	OPEN HOLE F	RECORD	Sizes of o	pening 31-33 Diam	eter 34-38 Lenç	75 80 1th 39-40
Water found at - feet	Kind of water	Inside diam Material	Watl thickness	Depth - feet From To	(Slot No.)		inches	feel
2500	Fresh 3 Sulphur 14 Minerals	Inches 10-11 1 Steel	Inches 12	13:16	Material a	nd type	Depth at top	of screen 30
	☐ Salty 6 ☐ Gas ☐ Fresh 3 ☐ Sulphur 19	2 Galvanize 3 Goncrete 4 Gopen hole	120	0 40	,[feet
	Salty 6 Gas	5 Plastic	-19 '.	20-23		PLUGGING & SEAL Annular space	ING RECORD Abandono	
, ,	☐ Fresh 4 ☐ Minerals ☐ Salty 6 ☐ Ges	2 Galvanize 3 Concrete 4 Gopen hol		40 262	Depth set at	feet Material and typ	(Cement grout, b	entonite, etc.)
	☐ Fresh 3 ☐ Sulphur 29 ☐ Salty 6 ☐ Ges	5 Plastic	26	27-30	00-13	10 Cen	est 1	rent.
30-33 1	☐ Fresh 3 ☐ Sulphur 34 60	2 ☐ Galvaniza 3 ☐ Concrete 4 ☐ Open hol			18-21	30-33 80		
2	☐ Salty 6 ☐ Gas	5 Plastic						
71 Pumping test		11-14 Duration of p	oumping 5-16 Ours 3 O _{Min6}		LOC	ATION OF WELL		W.
. Static level	Water level 25 Water levels dur		2 PRECOVERY		am below show north by arrow	distances of well fro	m road and to	t line. 🖊
1 / 1 ES		minutes 45 minutes	34 60 minutes 35-37		0	22.1		\d
N feet	feet feet rate 38-11 Pump intake set at		et feet		- Yu	KEN		7
PUMPING TEST	GPM $\hat{\alpha}$	52 feet Zee	ar 🗆 Cloudy		- Gre	384.57		P
Recommended Shallow	pump type Recommended pump setting	43-45 Recommen pump rate	5 GPM	2	SEQ	UOIA	< (العا(
50-53		· · · · · · · · · · · · · · · · · · ·					} `	~
FINAL STATI	upply 5 Abandoned, in	sufficient supply 9 🖸 U	nfinished	1/2			1	
² ☐ Observa ³ ☐ Test hole ⁴ ☐ Rechard	e 7 🗆 Abandoned (O	ther)	aplacement well	7,				
WATER USE	55-58			1	. 1]4	25	at.	
1 ☐ Domesti 2 ☐ Stock	ic 5' ☐ Commercial 6 ☐ Municipal	9. 🗀 No 18 🗀 O		4	Jonguin	. .	San	
3 ☐ (migation 4 ☐ Industria	n 7 🗔 Public supply al 8 🔲 Cooling & air c	conditioning	!	3	V	Morrowi	eB)	
	CONSTRUCTION					0.41		
1 ☐ Cable to 2 ☐ Rotary ((conventional) ⁶ 🗍 Boring	9 D D	lgging			42		
3 ☐ Rotary ((ceverse) 7 ☐ Diamond (air) 8 ☐ Jetting	" 0	VIUI			200	251	.087
Name of Well Co	ntractor	Well Cor	tractor's Licence No.	> Data	ss Contractor	59-62 Dat		63-68 60
Vak	WATER-Well	Wrilling	6006	Data source Date of inspection		06 Inspector	OCT 0 4	2002
54.	Albert.	on7.		NS		****		
Name of Well Tec			hnician's Licence No.	> Remarks				



MINISTRY OF THE ENVIRONMENT COPY

WATER WELL RECORD

UNITY OR DISTRICT	-	Ţ	OX WHERE APPLICABLE			CON.,	BLOSK, TRACT, SUR	1EV. ETC.		024
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ATER FOUND	KIND OF W		CASING & C	WALL	DEPTH - FEET	出			INCHES	F 41-49
10-13	FRESH 1	SULPHUR 14	DIAN MATERIAL 10-19 1 DESTEEL 12	THICKNESS INCHES	FROM TO 13-16	SCH	ERIAL AND TYPE		OF SCREEN	FEET
15-16	SALTY 4 (SULPHUR 18	GALVANIZED CONCRETE	188	+1/0044	61	PLUGG	ING & SEA	LING REC	ORD
1	SALTY 4	MINERAL	4 OPEN HOLE 17-18 STEEL 19 12 GALVANIZED	1	20-23	DEPTH FROM	SET AT - FEET	MATERIAL AP	ID TYPE LEAD	ENERT GROUT, PACKER, ETC.)
ļ :	SALTY 4	MINERAL A	6 CONCRETE		44 0215		0-13 14-17			
	SALTY 4	MINERAL	24-25 3 STEEL 26 2 GALVANIZED 3 CONCRETE		27-30	1	8-21 22-25 8-29 30-33	80		
I :	SALTY 4	MINERAL	OPEN HOLE							
T SE PUI	T METHOD. AIT BAILE	PUMPING RATE	30 GPM 01 HO				LOCATION			D. AND
STATIC LEVEL	WATER LEVE END OF PUNPING	WATER LEVE	LS DURING 2 10	PUMPING RECOVERY	LOT L	GRAM BEI	LOW SHOW DISTA DICATE NORTH E	Y ARROW.	L TROM ROX	
120 SP FLOWING, GIVE RATE WECOMMERSE		15 MINUTES 24-24 120 EET 120 EET	120 LET 120 LE	.34 35-3						•
IF FLOWING,		PUMP INTAKE SET	AT WATER AT END	OF TEST 41	7 <i>] </i>	•	1	7	\	7
NECONNEHDS	CD PUMP TYPE	RECOMMENDED PUNP	43-45 RECOMMENDED					已複	1	天义
□ 5HA	LLOW DEEP	SETTING	165eer RATE C	<u>30 مە</u>	37			-		2
FINAL		WATER SUPPLY	s 🗋 ABANDONED, INSU		<u> </u>	۰.	1/35	0	{	
STATU OF WE	s , ; u	OBSERVATION WELL TEST HOLE RECHARGE WELL	6 ABANDONED, POOR 7 UNFINISHED	R QUALITY	1	n Mi	الخ			
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WATE USE	R 🗻 l s 🗅	1 RIGATION 7	PUBLIC SUPPLY COOLING OR AIR CONI	DITIONING				•.		
		OTHER	• O NO	OT USED	_				•	8
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OF DRILLI	NG ' 1 🕱	ROTARY (REVERSE) ROTARY (AIR) AIR PERCUSSION	a 🖂 DEINING		DRILBERS REMAR	KS.			. Jane Wester	•
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FORM 7 MOE 07-091

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The Ontario Water Resources Act WATER WELL RECORD

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FORM NO. 0506 (11/86) FORM 9

The Ontario Water Resources Act WATER WELL RECORD

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2 GAL	TY 6 GAS	1 OSTEEL 2 OGALVANI: 3 OCONCRET	re l		27-30	20-	i	·)	منده	
2 <u>SAI</u>	"" 4 MINERALS	4 DOPEN HO 5 DPLASTIC	DLE	<u> </u>		<u></u>				
71 PUMPING TEST METHOD	BAILER PUMPING RA	H	N OF PUMPING	17-78 MINS		L	OCATION	OF WE	LL	-
auria I wa	TER LEVEL 25	LEVELS DURING	PUMPING		IN DIA	AGRAM BELO	OW SHOW DISTA	NCES OF WE Y ARROW.	LL FROM ROAD	AND
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O IF FLOWING GIVE RATE RECOMMENDED PUMP TY	СРИ	7881]		3UDY	· `					
SHALLOW &	PUMP	2 /5 FEET PUMPIN	4	GPN		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \			(1)	
0-53					A A			•		
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OF WELL	4 RECHARGE WELL	D DEWATERING		_ <u> </u>	N. C.				19903	
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USE	4 INDUSTRIAL	COOLING OF ALE			1	Rag/	اهَ	<i>,</i>	D	•
57	1 GABLE TOOL	• □ so		$\dashv \mid$)	<u>√³/</u>	ر,	Y	
METHOD OF	POTARY (CONVE	entional) 7 🔲 Dia (SE) 8 🗎 JES	MOND TTING				σ	~~~	`	-,
CONSTRUCTION	ROTARY (AIR) AIR PERCUSSION	*	IVING SGING OTHER	يا لـــــ	RILLERS REMAR	axs			15	180
NAME OF WELL CON	TRACTOR	1016	WELL CONTRAC	TOR'S	DATA	50 0	ONTRACTOR SE	A NC		94 ''
NAME OF WELL T	1/2007	10/5	11414		SOURCE DATE OF INSP	ECTION	INSPECTO		,, , , , ,,	
NAME OF WELL T	16 or T		WELL TECHNIC	IAN'S	MEMARKS					
IZ Jac	gratia	m mel	D 5 3	ל ו "ל	21.0					
SIGNATURE OF THE	NICIAN/CONTRACTOR	SUBMISSION	DATE	—— li	Ē ··					

rne Untario water Resources Act

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selm of Well Technician

Signature of Technician/Contracto

1517

Well Technician's Licence No

USE

MINISTRY

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Date of inspection CSS.ES2

0506 (07/00) Front Form 9

The Ontario Water Resources Act WATER WELL RECORD

TY OR DISTRICT	2. (HECK X CORRE			Y, TOWN, VILLA		51919		BLOCK, TRACT, SUR			0./ 0./
Ottawa	-Carle	ton	A	Cumber	land					DATE COMP	PLETED	
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2	FRESH 3	MINERAL	24-25	PEN HOLI STEEL GALVANIZE	26	<u> </u>	27-30		18-21 22-25			
30-33 1 2	☐ FRESH 3 ☐ SALTY 4	SULPHUR 34 B	`	3 CONCRETE 4 OPEN HOL		<u> </u>			\$-Z9 30-33	80		
DUMPING TEST	ETHOD	PUMPING RAT	E	11-14 DURATION O	F PUMPING 15-16 OO HOURS	17.16	3753	3!	LOCATION	OF WE	LL	
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IF FLOWING, GIVE RATE	EET	FEET FO	SET AT	FEET WATER AT E	ND OF TEST	12						
RECOMMENDED	PUMP TYPE	GPM RECOMMEND	10	FEET 1 CL		0U DY 46-49			,	na	-	7
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OF DRILLIN	G 47 · 0	POTARY (REVER ROTARY (AIR) AIR PERCUSSION	1.	DRIVI			DRILLERS REMAR	₹ € KS '-:			<u>. </u>	
	LL CONTRACTO	R	· · · · ·		FICENCE NAME		DATA	51	CONTRACTOR	59-62 DATE ECE	4º09	84
	arbonn	eau+Sor	Dri	lling L	ta 15	04	O DATE OF INSP	ECTION	(504	.ton		
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Ray	iond Ch	arbonne		SUBMISSION DA			OFFICE					
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The Ontario Water Resources Act

110 WATER WELL RECORD

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25-28	² □ SA	LTY C M	INERAL	1 1	GALVANIZED CONCRETE OPEN HOLE					10-13	14-17			
	2 D SA	LTY 4 N	INERAL	24-25	STEEL Z	•		27-30		18-21	22-25			
30-33	1 [] FR	ESH 3 5	ULPHUR 34 INERAL		CONCRETE					26-29	30-33 60			
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<u>ت</u> ا	NDED FUMP T		RECOMMEND PUMP	200	PUMPUNE TO	41	-45		-	مديان احتقاده المستحد الم		50	The state of	3
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E G.C					ing Ltd		\dashv	SOURCE DATE OF INS	PECTION	1 /30	INSPECTOR			
[₽ R.F	2. 2,	Box	194,	Orlean	s,Ont.	CLC 1T1		M O D REMARKS					· <u>-</u> ·	
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WATER WELL RECORD

Ontario		SPACES PROVIDED	15181	65	MUNICIP. [/K,O,/,	ı Şe		
DUNTY OR DISTRICT	SCOLL-RUSSEL	Cumberland		CON.	BLOCK, TRACT, SURVI	Ö.FI		28
		R. 1 Cumber	land . 0	nt.		DATE COMPL	MD OY	¥**53 y _R 82
		375991 14	10.270		AASIN CODE		111	iv
	10 12 L	OG OF OVERBURDEN AND BEDRO	CK MATERIA	30	31	<u></u>		
ENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS		GENERA	L DESCRIPTION		DE PT F	TO TO
yellow	clay						0	40
lue	clay				,, ,		40	74
brown s			•				74	75
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—	ATER RECORD	51 CASING & OPEN HOLE		Z SIZE IS	OF OPENING	31-33 OIAMET	E9 34-38	LENGTH :
TER FOUND	KIND OF WATER	TIES MATERIAL THICKNESS	DEPTH - FEET	1231	RIAL AND TYPE		DEPIH TO TOP OF SCREEN	41-44
	X FRESH 3 SULPHUR DE SALTY 4 MINERAL	6 1 10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0 00 77	ν.				FEET
	☐ FRESH 3 ☐ SULPHUR 19 ☐ SALTY 4 ☐ MINERAL	OG 1 CONCRETE		61	PLUGGIN	IG & SEAL		
20-23 1	FRESH 3 SULPHUR 24	17-18 1 STEEL 19 66 1 GALVANIZED 1 CONCRETE	20-23	FROM	10	MATERIAL AND		MENT GROUT PACKER ETC)
25-24 1	FRESH 3 SULPHUR 29	64 4 DEPEN HOLE	77 0142		1-21 22-25			
30-33 1	FRESH 3 SULPHUR 34	GALVANIZED 1 CONCRETE		26	-29 30-33 B4	1		<u>-</u> -
PUMPING TEST M	ETHOD PUMPING RA	TE II-14 DURATION DE PUMPING			OCATION	OE WELL		
У РИМР			in Di		DW SHOW DISTANC			AND
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IF FLOWING. GIVE RATE	38-81 PUMP INTAK	E SET AT WATER AT END OF TEST 42						
RECOMMENDED	GPM 1 PUMP TYPE RECOMMEND	20 FEET 1 CLEAR 2 CLOUDY ED 43-45 RECOMMENDED 46-49				H		Ĺ
☐ SHALL		120 FEET PUMPING 0016 GPM				- E		1
FINAL	1 X WATER SUPPLY	s 🗍 ABANDONED, INSUFFICIENT SUPPLY]		13	TOTAL TOTAL	54
STATUS OF WELL	2 OBSERVATION W	7 UNFINISHED		1		-11-5		
O. WELL	35-56 1 DOMESTIC	5 COMMERCIAL	Q		10		,	
WATER USE	2 STOCK 3 REGATION 4 NOUSTRIAL	MUNICIPAL DUBLIC SUPPLY COOLING OR AIR CONDITIONING					;	
USE '	OTHER	9 O NOT USED						
METHOD				•	,			
OF DRILLING	P D ROTARY (REVER	SE) # 🗆 JETTING # 🖸 DRIVING						
	AIR PERCUSSION	LICENCE NUMBÉR	DRILLERS REMAR		CONTRACTOR 59-1	12 DATE RECEIVED		63-61
d an	arbonneau+Sor	Drilling Ltd 1504	Source	,	1504	05	04 9	3.9
ADDRESS R.R. NAME OF DRI RAYT SIGNATURE,	2, Box 194, 0	rleans, Ont. KLC 1T1	DATE OF INSP	ECTION .	INSPECTOR	•	(, •
NAME OF DRI	nond/Charbonr	LIGENCE NUMBER	S REMARKS					
SIGNATURE	F CONTRACTOR	12 04 82	OFFICE					
	Charles	DAYYR					FORM NO. 05	SS. 6

The Ontario Water Resources Act

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	Omano water		
WATER	WEL	LRE	CORD

1516925 1. PRINT ONLY IN SPACES PROVIDED 2. CHECK X CORRECT BOX WHERE APPLICABLE COUNTY OR DISTRICT TOWNSHIP, BORDUGH, CITY, TOW 105 Cumberland Canlatan DATE COMPLETED DAY 25 NO. 04 <u>berland, Ontario</u> 37799 LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS) DEPTH - FEET GENERAL DESCRIPTION OTHER MATERIALS GENERAL COLOUR FROM COMMON MATERIAL 0 10 clay vellow 10 49 blue clay 49 55 slate rock brown 140 55 limestone grev 140 150 slate brown 1001101505 1 1 1 100493105 1 1 1 100551611211 1 101401215 1 1 1 1015016119 1 1 1 32 CASING & OPEN HOLE RECORD 51 41) WATER RECORD DEPTH . FEET KIND OF WATER INSIDE DIAM INCHES MATERIAL AND TYPE MATERIAL DEPTH TO TO OF SCREEN FRCM TO FRESH 1 SULPHUR
C SALTY 4 MINERAL 7150 06 " R STEEL 188 0 **2048** PLUGGING & SEALING RECORD 61 113 CONCRETE 4 [] OPEN HOLE DEPIH SET AT . FEET MATERIAL AND TYPE LEAD PACKER, ETC.1 1 (STEEL) GALVANIZED 1 | FRESH 3 | SULPHUR
2 | SALTY 4 | MINERAL 3 CONCRETE 4 () OPEN HOLE 1 | FRESH 1 | SULPHUR
2 | SALTY 4 | MINERAL 27-30 1 C STEEL Z [] GALVANIZED 1 [] FRESH 3 [] SULPHUR 2 [] SALTY 4 [] MINERAL 3 CONCRETE 4 DO OPEN HOLE IMPING TEST METHOD

1 KPUMP 2 G BAILER LOCATION OF WELL 00 17-11 0020 IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE INDICATE NORTH BY ARROW. WATER LEVEL END OF PUMPING 1 C PUMPING WATER LEVELS DURING 2 5 RECOVERY 160" 70,200 060 INTAKE SET A 110 1 X CLEAR 2 CLOUDY FEET ECOMMENDED PUMP TYPE 43-45 RECOMMENDED PUMPING FEET RATE RECOMMENDED SETTING 110 0011 GPM 🗆 SHALLOW 🏖 DEEP GPM / FT. SPECIFIC CAPACITY S ABANDONED, INSUFFICIENT SUPPLY 9 WATER SUPPLY DESERVATION WELL FINAL 5 ABANDONED POOR QUALITY **STATUS** 7 🗍 UNFINISHED 3 TEST HOLE OF WELL 1 X DOMESTIC S COMMERCIAL WATER 01 6 MUNICIPAL ≥ □ STOCK 3 | IRRIGATION
4 | INDUSTRIAL T PUBLIC SUPPLY ■ CODLING OR AIR CONDITIONING USE .☐ OTHER 9 D NOT USED CABLE TOOL
ROTARY (CONVENTIONAL) 6 D BORING METHOD 7 [] DIAMOND 3 | ROTARY (REVERSE) # [] JETTING AND ROTARY (AIR) 9 DRIVING DRILLING 1504 .Charbonneau + Son Drilling Ltd 1504 NO USE KIC 1T1 Orléans, Ont. REMARKS Р OFFICE WI CSC 34 DAY 25 NO 04 FORM 7 MOE 07-091 MINISTRY OF THE ENVIRONMENT COPY

The Ontario Water Resources Act WATER WELL RECORD

		RECT BOX WHERE APPLICABLE	151724		1 2 -	10:1
COUNTY OR DISTRICT	- embli	COMMSHIP, BOROUGH, CITY, TOWN, VILLAGE	611)	CON. BLOCK, TRACT. SU	~ ~ /	028""
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		nberland, Ont	ELEVATION	ac assin code	11 111	* "
	10 11		0200	4 38		
		OG OF OVERBURDEN AND BEDROO	K MATERIAL		DE	TH . FEET
GENERAL COLOUR	R COMMON MATERIAL	OTHER MATERIALS		GENERAL DESCRIPTION	FROM	го
yellow	clay				0	13
blue	clay				13	60_
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brown	slate				95	144
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	<u> </u>					
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	 3505 1906			(1) bagg\$2/3		
O144 15-18 20-23 21-28 23-28 23-30 STATIC LEVEL DON STATIC LEVEL O75 IF FLOWING GIVE RATE ACCOMMENDED	PATE LEVEL 25 WATER PUMPING 15 WHITE PUMPING 15 WHITE PUMPING 15 WATER SUPPLY 2 OBSERVATION W	LEVELS DURING 1 DURATION OF PUMPING 1 STIME DURATION OF PUMPING 1 STIME DURING 2 RECOVERY S JO MINUTES 1 D PUMPING 2 RECOVERY S JO MINUTES 1 D STIME DO FIEST 1 D CLEAR 2 CLOUDY 1 D CLEAR 2 CLOUDY 1 D CLEAR 2 CLOUDY 1 D CLEAR 2 D CLOUDY 1 D CLEAR 1 D CLEAR 2 D CLOUDY 1 D CLEAR 1	20 82 20 20 20 23	DLPH SET AT - FEET FROM TO 10-13 14-17 16-21 22-25 24-29 30-33 LOCATION GRAM BELOW SHOW DISTA	OF WELL	CORD COMENT BROUT AG PACKER, ETC. 1
WATER USE METHO OF DRILLIN	L S. RECHARGE WELL 55-56 1 SP DOMESTIC 2 STOCK 3 SINGISATION 4 NDUSTRIAL OTHER 77 7 CABLE TOOL 2 ROTARY (CONYE 3 ROTARY (REVER 4 AIR PERCUSSION	S COMMERCIAL MUNICIPAL PUBLIC SUPPLY COOLING OR AIR CONDITIONING NOT USED SORING	DRILLERS REMARK		33-42 0 43 -42 940 10	0.000
R. 1R		ils Drilling Ltd 1504 Orléans, Ont. KlC 1TI	DATA SOURCE OATE OF INSPE	11504	2002	00
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OUNTY OR DISTRICT	t. PRINT ONLY IN S 2. CHECK ⊠ CORRE	CT BOX WHERE APPLICABLE	<u> </u>	3		OF		.01 25
Carleton		Cumberland	r. FOWN. VILLAGE		CON., BLOCK, TRACT.	OF.	I)o	23
		R	, Cu	MBERL	AND	DAY 16		6-53 YR
		0.3.8	6.62 14	0.285	RC. BASIN CODE			IV.
	LO	G OF OVERBURDEN	AND BEDROC	K MATERIAL	S (SEE INSTRUCTIONS)			
SENERAL COLOUR	MOST COMMON MATERIAL	OTHER MA	TERIALS		GENERAL DESCRIPTIO	N	DEPTH FROM	· FEET TO
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32	14 15 21	<u> </u>	التلتلتل	لللبيا		ليا ليا	بلبلب	75
	TER RECORD	CASING &	OPEN HOLE RI	ECORD	SIZE(\$) OF OPENING (SLOT NO)	31-33 DIAME	INCHES	E HTDM3
WATER FOUND AT - FEET 10-13	FRESH 3 SULPHUR 14	DIAM. MATERIAL	THICKNESS FROM	м то	MATERIAL AND TYPE		DEPTH TO TOP OF SCREEN	41-44
<u> </u>	SALTY 4 MINERAL FRESH 3 SULPHUR 19	2 GALVANIZED	188 0			GING & SEAI	ING BECO	FLET
2 [SALTY 4 MINERAL FRESH 3 SULPHUR. 24	4 OPEN HOLE	19	20-23	DEPTH SET AT - FEET	MATERIAL AN	ICENE	NT GROUT
3 (SALTY 4 MINERAL FRESH 1 SULPHUR 29	06 GALVANIZED	•	0125	10-12 14-17			
	SALTY 4 MINERAL	24-25 1 STEEL 2 GALVANIZED	26	27-30	18-21 22-21 26-29 30-3			
17 1 1 1 4	FRESH 3 SULPHUR 34 80	3 CONCRETE 4 OPEN HOLE			26-29 30-3	150		
UMPING TEST ME	THOD 10 PUMPING RATI		9U MPING 5-16 17-18 OURS 17-18		LOCATIO	N OF WEL	L 64	18
STATIC	WATER LEVEL 25	EVELS DURING	PUMPING RECOVERY	IN DIAG	RAM BELOW SHOW DIST NE. INDICATE NORTH			
LEVEL	22-24 15 HINUTES	30 MINUTES 45 MINUTE	S 60 MINUTES				ambu	laus
LEVEL 19-2	040 875	28 29-31	35.34	V	12	les-	cur.	
LEVEL 19-2	7 D40 FEET D35 FE	29-31 ET 0 35 FEEY 6 35 SET AT WATER AT EN	32-34 35-37 FEET 035 FEET 0 OF TEST 42	N _	20 x x	1 miles +	34.	>
LEVEL 19-2	T 040 FEET 035 FE 38-41 PUMP INTAKE GPM. PMP TYPE RECONMENDE	29-31 635 SET AT WATER AT EN 50 FEET 1 SECLEA 0 43-45 RECOMMENDE	32-34 35-37 FEET 35 FEET 42 D OF TEST 42	/ =	V	1 miles -	34.	_>
D NI D ST FLOWING.	T 040 FEET 035 FE 38-41 PUMP INTAKE GPM IMP TYPE RECONMENDE PUMP SETTING	29-31 6-35 ET 0-35 FEEY 0-35 SET AT WATER AT EN 1 CTCLEA	32-34 35-37 FEET 35 FEET 42 D OF TEST 42	 	V	1 milin-	34.	_ - >
D SHALLO	TO 40 FEET 055 FEET 38-41 PUMP INTAKE GPM RECOMMENDE PUMP SETTING 2-18	29-31 0 35 SET AT WATER AT EN D 43-45 RECOMMEND D 50 FEET ROOM 9 S □ ABANDONED, INS	35-34 35-37 FEET 035 FEET 41 D OF TEST 42 AR 2 CLOUDY D 45-49 GPN UFFICIENT SUPPLY	=	V		34.	_>
DESCRIPTION OF SHALLO	TO 40 FEET 055 FE STING	29-31 0 35 SET AT WATER AT EN D 43-45 RECOMMEND D 50 FEET ROOM 9 S □ ABANDONED, INS	35-34 35-37 FEET 035 FEET 41 D OF TEST 42 AR 2 CLOUDY D 45-49 GPN UFFICIENT SUPPLY	?	V		34.	->
ON THE STATUS OF WELL	TO 40 FEET 055 FEET S8-41 PUMP INTAKE GPM RECOMMENDE PUMP SETTING 8 54 WATER SUPPLY 2 OBSERVATION WE 2 RECHARGE WELL 55-54 RECHARGE WELL	29-31	35-34 35-37 FEET 035 FEET 41 D OF TEST 42 AR 2 CLOUDY D 45-49 GPN UFFICIENT SUPPLY		V		34.	->
ON THE STATUS OF WELL	SS-41 PUMP INTAKE GPM RECOMMENDE PUMP SETTING SS-41 TW WATER SUPPLY 2 OBSERVATION WE 2 OBSERVATION WE 4 RECHARGE WELL SS-54 TEST HOLE 4 RECHARGE WELL SS-554 TEST HOLE 4 RECHARGE WELL	29-31 29-31 29-31 39-35 FEET 39-36 FEET 39-36 FEET 43-45 FEE	35-37 FEET 035 FEET POT 15 FEE		V		34.	>
STATUS OF WELL 19-2 19	SA-41 PUMP INTAKE GPM RECOMMENDE PUMP SETTING 1 TEST HOLE 1 RECHARGE WELL 2 STOCK 3 IRRIGATION 4 SHOUSTRIAL 1 OTHER	SCT AT WATER AT EN 50 FEET 1 SCLEAR 60 ABANDONED, INS 60 ABANDONED, POO 70 UNFINISHED 50 COMMERCIAL 60 MUNICIPAL 70 PUBLIC SUPPLY 80 COOLING OR AIR CON 90 N	JS-34 JS-37 FEET JSS FEET D OF TEST AE RR Z CLOUDY D 46-49 GPN UFFICIENT SUPPLY DR QUALITY		V		34.	→
TIPE OF WELL NATER WATER WA	TO 440 FEET 055 FEET 058 FEET	29-31 29	JS-24 JS-57 FEET JS-57 FEET D OFF TEST AE AR Z CLOUDY D AG-49 GPM LIFFICIENT SUPPLY DR QUALITY JOITIONING OUT USED		V		34.	
SHALLO SOF WELL WATER USE	SA I CABLE TOOL STORM TO A COMMENCE SA I CAMP INTAKE GPM RECOMMENDE PUMP SETTING SETTING TEST HOLE A RECHARGE WELL STOCK SIRRIGATION A IRRIGATION A GOTARY ICONVER TO A COTARY ICONVER ROTARY ICONVER	29-31 29	JS-34 JS-37 FEET D OF TEST AE AR Z CLOUDY D AG-49 GPN UFFICIENT SUPPLY DR QUALITY ADITIONING OOT USED	DRILLERS REMARK	7		34.	
TEVEL 19-2	S4-41 PUMP INTAKE GOM S4-41 PUMP INTAKE GOM RECONMENDE PUMP SETTING 3-8 54 ! ** WATER SUPPLY 2 OBSERVATION WE 3 TEST HOLE 4 RECHARGE WELL 55-56 ! ** DOMESTIC 2 STOCK 3 IRRIGATION 4 INDUSTRIAL OTHER 57 CABLE TOOL 4 ROTARY (CONVEN 3 ROTARY (LAIR) 5 AIR PERCUSSION	29-31 29-31 29-31 30 30 30 30 30 30 30 30 30	JEST JOSS FEET J	DRILLERS REMARK DATA DATA SOURCE	7	9	1000	
TIPE OF WELL	S4-41 PUMP INTAKE GOM S4-41 PUMP INTAKE GOM RECONMENDE PUMP SETTING 3-8 54 ! ** WATER SUPPLY 2 OBSERVATION WE 3 TEST HOLE 4 RECHARGE WELL 55-56 ! ** DOMESTIC 2 STOCK 3 IRRIGATION 4 INDUSTRIAL OTHER 57 CABLE TOOL 4 ROTARY (CONVEN 3 ROTARY (LAIR) 5 AIR PERCUSSION	29-31 29-31 29-31 29-31 30-35 FEET 50 3-45 FEET 50 43-45 FEET 60 43-45 FEET 70 70 10 10 10 10 10 10 10 10	JS-24 JS-57 FEET JS-57 FEET JS-57 FEET JS-57 FEET JS-57 FEET JS-27	DATA SOURCE O DATE OF INSPE	1 7304	9 es Date Receive	34.	
FINAL STATUS OF WELL METHOD OF DRILLING MANE OF WELL MANE OF WELL	SECONMENDE SETTING SECONMENDE PUMP INTAKE GOM RECONMENDE PUMP SETTING SETTING SETTING TEST HOLE A RECHARGE WELL STACK I DOMESTIC STOCK INDUSTRIAL OTHER CABLE TOOL FOR TARY (CONVENT ROTARY (LANY) A ROTARY (LANY) CONTRACTOR	29-31 29-31 29-31 30-35 FEET 50 A3-45 FEET 1 SCLEA 1 SCLEA 2 ABANDONED, INS 6 ABANDONED, INS 6 ABANDONED, POO 7 UNFINISHED 5 COMMERCIAL 9 PUBLIC SUPPLY 1 COOLING OR AIR COM 9 N 1TIONAL) 6 BORING 7 DIAMON 9 DRIVING 6 DRIVING	JS-24 JS-57 FEET JS-57 FEET JS-57 FEET JS-57 FEET JS-57 FEET JS-27	DATA	1 7304	9 es Date Receive	1000	



WATER WELL RECORD 3/6/11 W

ntario	1. PRINT ONLY IN S 2. CHECK 🗵 CORRI	CT BOX WHERE APPLICABLE		151393		F	<u> </u>	1 0 1 LOT 25-2
Carle ton		CURDOTIA	V, TOWN, VILLAGE		EON,, BLOCK, TRACT. SURV	ara R.	}	0 25
		R. 1	, Cumberla	nd		DATE COMPLE	_ мо. <u>()9</u>	48-53 YR. 7
		0,3.8	5.8.7 4	0395	RC BASIN CODE	"		1
	LC	G OF OVERBURDEN	AND BEDRO	CK MATERIAL				
NERAL COLOUR	MOST COMMON MATERIAL	OTHER MA	TERIALS		GENERAL DESCRIPTION		FROM	TO TO
prown	hardpan						0	6
brown	slate						6	80
prown	limestone slate						<u>80</u> 200	200
			OWRC	,				
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31) 1000		0619 1020				ساليك	. 1 1 . 1	اللا
32	14 15 21	CASING &	OPEN HOLE	43	SIZE(S) OF OPENING	31-33 DIAMETI	ER 34-38	LENGTH 1
WATER FOUND	ER RECORD	INSIDE DIAM. MATERIAL	WALL THICKNESS	DEPTH - FEET	C (SLOT NO.) MATERIAL AND TYPE		INCHES DEPTH TO TOP	41-44
O 230°13	FRESH 3 SULPHUR 4 SALTY 4 MINERAL	10-11 1 STEEL	12 180	0 23.ss	ပ္တ		OF SCREEN	FEET
15-18 1 2	FRESH 3 SULPHUR 19 SALTY 4 MINERAL	2 GALVANIZED 3 CONCRETE 4 OPEN HOLE	·	0021		NG & SEAL		
20-23 1	FRESH 3 SULPHUR 24	17-18 1 STEEL 2 GALVANIZED 3 CONCRETE)	20-23	DEPTH SET AT - FEET FROM TO 10-13 14-17	MATERIAL AND		MENT GROUT, PACKER, ETC.
25-28	FRESH 3 SULPHUR 29 SALTY 4 MINERAL	OPEN HOLE	26	0230	18-21 22-25			
30-33 1	FRESH 3 SULPHUR 34	2 GALVANIZES 3 GCONCRETE 4 GOPEN HOLE			26-29 30-33	0		
DUMPING **	HOD 10 PUMPING RA	E (I-14 DURATION OF			LOCATION	OF WELI	- 64	38
STATIC	WATER LEVEL 25 WATER	GPN. U L	SNIK OO SRUOI	IN SUA	GRAM BELOW SHOW DISTAN	CES OF WELL	FROM ROAD	
L LEVEL	PUMPING	30 HINUTES 45 HINUT	RECOVERY ES 60 MINUTES 32-34 35-37					W
IP-21 O D FEE O RECOMMENDED PU	200 FEET 150 38-41 PUMP INTAK		FEET 050 FEET				11 11	Y
RECOMMENDED PU	GPM.	PEET	AR 2 CLOUDY					
SHALLOW	V DEEP SETTING	200 REET RATE	04 GPM		OLP 11			
	54 1 WATER SUPPLY	5 ABANDONED, INS	SUFFICIENT SUPPLY	i			#.	
FINAL STATUS OF WELL	2 OBSERVATION W	LL 6 ABANDONED PO 7 UNFINISHED			3		- 1	C. S. A. S.
	4 D RECHARGE WELL	5 COMMERCIAL		11	7		2 4	04
WATER	2 D STOCK 3 D IRRIGATION 4-D INDUSTRIAL	6 MUNICIPAL 7 PUBLIC SUPPLY A COOLING OR AIR COI	NDITIONING		•		11,	j
	OTHER		NOT USED			,	1	
METHOD OF	CABLE TOOL CONVE CONVE CONVE CONVE CONVE		ID.		1	422		
DRILLING	11	9 🗀 DRIVING		DRILLERS REMAR	KS:	, ^U		
NAME OF WELL		4 4 Malia Madii	LICENCE HUNDER	DATA	58 CONTRACTOR SS	DATE RECEIVE		63-1
ADDRESS		d & Cable Drill	THE 17/4	SOURCE OF INSPI	ECTION JOSPECTO	. 18	037	4
NAME OF DRILL		and Ann	LICENCE NUMBER	S REMARKS:		<u> </u>		P //
SIGNATUR POF	co Bourgeois	SUBMISSION DATE		3 OFFICE		\$0.58		-
1/2	earl Narber	DAY _ 19 N	9 YR. 7	<u> </u>	C	4000		WI



WATER WELL RECORD 3/9/11d

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Carreeor		in Bella Vista	. Cumberlan	d. Ont.	10 MO7	48-53 YR 7 2
		ING 7 7 CO JOAN	C ELEVATION	RC/ BASIN CODE	DAY MO:	YR. <u></u> IV
2 /	7 16 12	D 38 8 / D	ā <u>(</u>	31		
	LO MOST	G OF OVERBURDEN AND BEDR	OCK MATERIA		DEP	TH · FEET
VERAL COLOUR	COMMON NATERIAL	OTHER MATERIALS		GENERAL DESCRIPTION	FROM	то
TOWN .	hardpan				0	32
rown alat	shale				12	90
геу	limestone				90	150
LORU	slate				150	220
1) 600	461/4 II 1601	2/4/17 1 1 20.8/04/19 1	10150216	111 0220611911		لبلنا
2	14 15	32	43	54	55 31-33 DIAMETER 34-3	B LENGTH
	TER RECORD	51 CASING & OPEN HOL	DEPTH - FEET	SIZE(S) OF OPENING (SLOT HO.)	INCHE	,
TER FOUND AT - FEET	KIND OF WATER FRESH 3 SULPHUR 14	DIAM. MATERIAL THICKNESS INCHES	FROM TO	C MATERIAL AND TYPE	DEPTH TO TO	OP 41-44
2 0	SALTY 4 NINERAL	10-11 1 SPEEL 12 188	0 (0)2113-16			rec aana
1 . [FRESH 3 SULPHUR 19 SALTY 4 MINERAL	3 CONCRETE 4 OPEN HOLE	20-23		G & SEALING RE	CEMENT GROUT
] FRESH ³	17-18 1 STEEL 19 2 GALVANIZED 3 GONCRETE		FROM TO 10-13 14-17	MATERIAL AND TYPE LEA	AD PACKER, ETC.
25-28	FRESH 3 SULPHUR 29 SALTY 4 MINERAL	4 OPEN HOLE	27-30	18-21 22-25		
30-33 1	FRESH 3 SULPHUR 34	80 2 ☐ GALVANIZED 3 ☐ CONCRETE		26-29 30-33 86	,	
	SALTY 4 MINERAL	4 OPEN HOLE TE II-18 DURATION OF PUMPING	7		OF WELL	
1 PUMP	BAILER OU16	GPM. (15-16 0 0)7-	ue t I	LOCATION		
STATIC LEVEL	DIMBING I	LEVELS DURING PUMPING PECOVERY	LOT	HAGRAM BELOW SHOW DISTAN- LINE. INDICATE NORTH BY	SES OF WELL FROM ROA ARROW.	, 7
100		S 30 MINUTES AS MINUTES 60 MINUTES 60 MINUTES 128 120 32-34 1105	37	ist like	0 K1	11/
FEE IF FLOWING. GIVE RATE	T FEET TO F		5	conc to	لان الم	y
IF FLOWING. GIVE RATE RECOMMENDED P	GPM.	160 FEET 1 M GLEAR 2 □ CLOUD ED 43-45 RECOMMENDED 46-		WT 25	1 1	
SHALLO	PUMP	160 PUNPING 100/D G	1 1	76'	, 1	
50-53	OO DEGPM./FT. SI	PECIFIC CAPACITY	_	1 - 1	"	(15)
FINAL	1 WATER SUPPLY 2 GBSERVATION W	5 ABANDONED, INSUFFICIENT SUPPLIELL 6 ABANDONED POOR QUALITY	'	0.05m	1/16	49 9 7
STATUS OF WELL	3 TEST HOLE 4 RECHARGE WELL	7 🗍 UNFINISHED		0 5		1 • y
	55-56 1 DOMESTIC 2 D STOCK	5 COMMERCIAL 6 MUNICIPAL				<u>o</u> c #
WATER USE	3 IRRIGATION 4 INDUSTRIAL	7 D PUBLIC SUPPLY 8 COOLING OR AIR CONDITIONING		MARTI	4 8 ~ (&	
	C\ □ OTHER_	9 🖺 NOT USED	_	CORN	F '	
METHOD		ENTIONAL) 7 🗆 DIAMOND		marti Corn 8 K		
OF DRILLING	POTARY (REVER	SE) 8 🗍 JETTING 9 🗍 DRIVING		line.		
	S D AIR PEROUSSION	N .	DRILLERS REMA		-62 DATE RECEIVED	. 63
G. Char	bonneau, Diamor	à & Cable Drilling 1504	DATA SOURCE DATE OF INS	SB CONTRACTOR 59	DATE SECEIVED	.;
ō	Box 194, Orle	<u> </u>	DATE OF INS		<u> </u>	
۲۱'		LICENCE NUMBER	S REMARKS:			
NAME OF DRIL	Bourgeois,	l l	73 0			IP £

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Ontario	

WATER WELL RECORD 31-G/11-W

ntario	1. PRINT ONLY IN S 2. CHECK ⊠ CORRI	ECT BOX WHERE APPLICABLE	11	11	51450	<u> </u>	5,011	ØF.	1 1 1 1	0/
Carlet		Cumberland	IY, YOWN, VILLAGE			100 ALGER	TRACT, SURVEY	Q Z-		024
		R. 1	l. Cumber	l and.	Ont.			DATE COMPLE	HO. 04	YR. 7
		ING 3.8	7.6.8.2		EVATION 5.30 S	\$ 26	CODE	" 1	111	IV
2	H 10 12	OG OF OVERBURDE	14	SOCK I	MATERIAL	30 31				
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prown	hardpan						<u>.,</u>		0	3
grey	shale								3	10
brown	alate								10	125
grey	limestone	JAW	· —		<u></u>				125	150
brown	slate	10 5							150	250
rey	limestone		9 /		-				250	305
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32		-	. .				حبا ليا	ШШ	ليك
	ATER RECORD	(51) CASING	& OPEN HOL	F RFC	OBD	SIZE(S) OF C	PENING	31-33 DIAMET	ER 34-38	LENGTH 3
WATER FOUND	KIND OF WATER	INSIDE DIAM. MATERIAL	WALL THICKNESS INCHES		1 · FEET	MATERIAL A	IND TYPE		INCHES DEPTH TO TOP OF SCREEN	41-44
10-13 1	T FRESH 1 SULPHUR 14	10-11 1 STEEL	12	·	13-16	S			OF SCREEN	FEET
10 5U2	FRESH 1 SULPHUR 19	06 1 GALVANIZE		0	0021	61		G & SEAL	ING REC	ORD
	SALTY 4 MINERAL OFRESH 3 SULPHUR 24	17-10 1 STEEL	19		20-23	DEPTH SET AT	FEET TO	MATERIAL AND		MENT GROUT, PACKER, ETC. I
] •	SALTY 4 MINERAL FRESH 1 SULPHUR 29	CONCRETE			0305	10-13	14-17			
1 2	SALTY 4 MINERAL	14-21 STEEL 2 GALVANIZ			27-30	18-21 25-29	30-33 80	Г		
	FRESH 1 SULPHUR ³⁴ 1 SALTY 4 MINERAL	3 CONCRETE 4 OPEN HOL								
71 JUNPING TEST	METHOD 10 PUMPING RA	01	18-14 07 17			LOC	ATION	OF WEL	L	
STATIC	WATER LEVEL 28	97.00	DUMPING COVERY	INS	IN DI. LOT L	AGRAM BELOW S	HOW DISTANCE NORTH BY	ES OF WELL ARROW.	FROM ROAD	AND 4
ES COSO	PUMPING 0-21 12-24 2 57	225 20	Q., 175,	is 1-27			- •			- N
IF FLOWING.	300 FEET 38-41 PUMP (NTA)	FEET _cf WATER AT	END OF TEST	EET 42						41
IF FLOWING. GIVE PATE RECONMENDE	GPM	700 FEET 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1								
RECONMENDE		PUMPING _		GPM.		47				
80-53	000.0 GPM./FT. S	PECIFIC CAPACITY							موسوده د کامردی مودی مود : دردوسردی دردی	and the second s
FINAL		B ABANDONED. I		LY	041	1	-1		7,0	
STATU: OF WEI		7 🗖 UNFINISHED L			04				'W	
	SS-S4 : TEDOMESTIC	S COMMERCIAL MUNICIPAL		7 -						
WATER	R I IRRIGATION	7 PUBLIC SUPPLY COOLING OR AIR C				الم				
	OTHER	• 0	NOT USED			1+25				
METHO			IOND			יוסע			4	40T2
OF DRILLI	NG S PROTARY (REVE	● □ DRIVI				1 · · · · · · · · · · · · · · · · · · ·				
<u> </u>	AIR PERCUSSION		LICENCE NUMBER	-	DATA		ACTOR 50	" 2"3"	17 F	\$ 13-1
1 1 0	Charbonneau & So	n Drilling Ltd.			Sonscr	1 15	504	2 3 6		<i>,</i>
ADDRESS R.	R. 2. Roy 104. 0	rléans. Ont. KO	A 2VO		DATE OF INSI	PECTION	INSPECTOR			/
MAME OF C	R. 2, Box 194, 0		LICENCE NUMBER		S HEWARKS:					PI
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Z	L. Bourgeo	IB SUBMISSION DA			OFFICE			(1) b		WI

illano	1. PRINT ONLY IN 2. CHECK 🗵 CORF	SPACES PROVIDED	PLICABLE		15	14535		1.5.	01.1	Ø.		
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2	~ 10 12	OG OF OVER	RURDEN	AND REDR	25 26		- 10	51	NS)	ن د	şî.	
ENERAL COLOUR	MOST COMMON MATERIAL	1	OTHER MATE					L DESCRIP			DEPTH	1 - FEET
yellow	clay									*****	0	15
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32 MATER FOUND	SISDS	INSIDE		6 7	سيا ل	RD RD	Z SIZE CS	I DF OPENIN	6	31-53 DIA	INCHES	
32 10 WATER FOUND AT - FEET 10-13 1 10	KIND OF WATER	INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	E RECO	RD FEET TO	S SIZE (5	DF OPENIN	6	31-53 DIA		41-44
32 WATER FOUND AT - FEET 0185 2 0	KIND OF WATER FRESH 3 SULPHUR 16 SALTY 4 MINERAL FRESH 3 SULPHUR 19	INSIDE DIAM. INCHES	MATERIAL STEEL 12 GALVANIZED CONCRETE	WALL	E RECO	RD reer	Z SIZE CS	TOF OPENIN	g YPE		INCHES	41-44 FEET
32 10 WA' WATER FOUND AT - FEET 0 185 2 0	KIND OF WATER FRESH 3 SULPHUR 14 MINERAL FRESH 3 SULPHUR 19	10-11 1 P	STEEL 12 GALVANIZED CONCRETE OPEN HOLE STEEL 19	WALL THICKNESS INCHES	E RECO DEPTH · FROM O	RD FEET TO O125.16	Sizers istor	TOF OPENIN	ype UGGIN		DEPTH TO TOP OF SCREEN	FEET GROUT
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32 10 WA' 10 WA' WATER FOUND ATT FEET 0 185 2 0 20-23 1 0 21-28 1 0 21-28 1 0 21-30 1 1 0 21-30 1 1 0 21-30 1 1 0 21-30 1 1 0 21-30 1 1 0 21-30 1 1 0 21-30 1 1 0 21-30 1 1 0 21-30 1 1 0 21-30 1 1 0 21-30 1 1 0 21-30 1 1 0	KIND OF WATER	10-11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	STEEL 12 GALVANIZED OPEN HOLE STEEL 19 GALVANIZED CONCRETE OPEN HOLE STEEL 20 GALVANIZED GALVANIZED GALVANIZED GALVANIZED GALVANIZED	WALL THICKNESS INCHES 188	E RECO DEPTH . FROM O	RD 7657 TO 0125-16 21-30 22-30 22-30	STEED	PLIST AT - FEI	UGGIN	G & SE/MATERIAL A	DEPTH TO TOP OF SCREEN ALING REC	FEET CORD
32 1 1 WA' WATER FOUND AT - FEET 2 2 2 2 2 2 2 2 2	KIND OF WATER FRESH 3 SULPHUR 14 SALTY 4 MINERAL FRESH 3 SULPHUR 19 SALTY 4 MINERAL ETWO 10 PUMPING RI SULPHUR 19 WATER LEVEL WA	10-11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	STEEL 12 GALVANIZED CONCRETE OPEN HOLE STEEL 19 GALVANIZED CONCRETE OPEN HOLE STEEL 28 GALVANIZED CONCRETE OPEN HOLE DURATION OF PU 15-1 HOU	WALL INCKES 1208 188 188 IMPING ITHES I	E RECO DEPTH - FROM O O O O O O O O O O O O O	RD FEET TO 0125-16 21-22 27-36	STEED	PLISET AT - FEL TO	G G G G G G G G G G G G G G G G G G G	G & SEA	DEPTH TO TOP OF SCREEN ALING REC	FEET CORD
32 WA 41 WA WATER FOUND AT - FEET AT - FEET 20-23 1 20-23 1 21-26 1 20-23 2 21-26 5 21-27 UMPING TEST M STATIC LEVEL 19-27 19-28 10-27 19-28 10-27 19-28 10-27 19-28 10-27 19-28 10-27 19-28 10-27 19-28 10-27 19-28 10-27 19-28 10-27 19-28 10-28 19-28	KIND OF WATER FRESH 3 SULPHUR 14 SALTY 4 MINERAL FRESH 3 SULPHUR 15 SALTY 4 MINERAL FRESH 3 SULPHUR 16 WATER LEVEL FULL 15 FULL 15 FULL	18510C DIAM. 190-11 1 2 2 2 2 2 3 2 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	STEEL 12 GALVANIZED CONCRETE OPEN HOLE STEEL 18 GALVANIZED CONCRETE OPEN HOLE STEEL 24 GALVANIZED CONCRETE OPEN HOLE DURATION OF PU 15 45 45 45 41 41 45 47	MALL THICKNESS INCHES INCHESS INCHES	E RECO DEPTH FROM O	RD FEET TO 0125-16 21-22 27-36	SISTEM MATER SISTEM SISTEM MATER O O O O O O O O O O O O O	PLISET AT - FEL TO	G G G G G G G G G G G G G G G G G G G	G & SEA	DEPTH TO TOP OF SCREEN ALING REC	FEET CORD
32 1 1 WA' WATER FOUND AT - FEET 1 0 185 1 2	FRESH 3 SULPHUR 14 FRESH 3 SULPHUR 14 FRESH 3 SULPHUR 15 FRESH 3 SULPHUR 16 FRESH 3 SULPHUR 16 FRESH 3 SULPHUR 16 FRESH 3 SULPHUR 16 SALTY 4 MINERAL THOO TO THE STATE OF THE STATE	10-11 1 1 10-1	STEEL 12 GALVANIZED CONCRETE OPEN HOLE STEEL 20 GALVANIZED CONCRETE OPEN HOLE STEEL 20 GALVANIZED CONCRETE OPEN HOLE DURATION OF PU 15-1 HOU 25 45 MINUTES 027 FIE WATER AT END	MALL THICKNESS INCHES I	E RECO DEPTH - FROM O	RD FEET TO 0125-16 21-22 27-36	SISTEM MATER SISTEM SISTEM MATER O O O O O O O O O O O O O	PLISET AT - FEL TO	G G G G G G G G G G G G G G G G G G G	G & SEA	DEPTH TO TOP OF SCREEN ALING REC	FEET CORD
32 1 1 WA' WATER FOUND AT - FEET 1 0 185 1 2	FRESH 3 SULPHUR SALTY 4 MINERAL TOPO	10-11 1 2 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	STEEL 12 GALVANIZED CONCRETE OPEN HOLE STEEL 19 GALVANIZED CONCRETE OPEN HOLE STEEL 41 GALVANIZED CONCRETE OPEN HOLE DURATION OF PU 45 45 MINUTES 027 FILE WATER AT END. 1 CECLEAR RECONMENDED	WALL THICKNESS 188 188 188 190 170 170 180 170 180 170 180 170 180 170 180 18	E RECO DEPTH - FROM O O O O O O O O O O O O O	RD 7EEY TO 0125-16 27-30 IN DIA LOT L	SISLOT PLI TO TO CAT TO CATE NO CAT NO CAT NO CAT NO CAT NO CAT NO CATE NO CA	UGGIN	G & SEA	DEPTH TO TOP OF SCREEN ALING REC AND TYPE LEAD LL G A	ALIAS PEET ORD MENT GROUT PACKER CIC	
41) WA WATER FOUND AT - FEET 0 185 15-19 1 20-23 20-23 21-24 21-24 21-24 21-25 21-25 21-25 21-26 21-27 15-19 21-27 21-28 21-28 21-28 21-29 21-	FRESH 3 SULPHUR 19 SALTY 4 MINERAL FRESH 3 SULPHUR 19 SALTY 4 MINERAL FRESH 3 SULPHUR 24 SALTY 4 MINERAL FRESH 3 SULPHUR 34 SALTY 4 MINERAL TOTO FEET OZZ TOTO FEET OZZ TOTO FEET OZZ JANA SALTH STANDUR 11 JMP TYPE WATER LEVEL GPM GPM FRECOMMEN PUMP INTA BECOMMEN PUMP TYPE RECOMMEN PUMP TYPE RECOMMEN PUMP TYPE PUMP TYPE RECOMMEN PUMP TYPE RECOMMEN PUMP TYPE RECOMMEN PUMP TYPE PUMP TYPE RECOMMEN PUMP TYPE PUMP	11510K DIAM. 10-011 1	STEEL 12 GALVANIZED CONCRETE OPEN HOLE STEEL 19 GALVANIZED CONCRETE OPEN HOLE STEEL 41 GALVANIZED CONCRETE OPEN HOLE DURATION OF PU 45 45 MINUTES 027 FILE WATER AT END. 1 CECLEAR RECONMENDED	MALL THICKNESS 188 188 199 MPING 17- 185 30 NI RECOVERY 60 MINUTES 20 21 COULD 44	E RECO DEPTH - FROM O O O O O O O O O O O O O	RD 7EEY 70 0125-16 27-30 IN DIA LOT L	SISLOT PLI TO TO CAT TO CATE NO CAT NO CAT NO CAT NO CAT NO CAT NO CATE NO CA	UGGIN	G & SEA	DEPTH TO TOP OF SCREEN ALING REC	FEE	
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CABLE TOOL
CONTROL (CONVENTIONAL)
CONTROL (CONTROL (BORING
DIAMOND
JETTING
DRIVING OF 4 METHOD 34 HI GOWAX DRILLERS REMARKS: DATA OF US OF THE OF TH DATE 210 310 1 7 5 LICENCE NUMBER G. Charbonneau & Son Drilling Ltd. CONTRACTOR DATE OF INSPECTION R. R. 2, Box 194, Orleans, Ont. KOA 2WO LICENCE NUMBER REMARKS: P L. Bourgeois wı CSS-S8 30 но. 10 FORM 7 07-091 MINISTRY OF THE ENVIRONMENT COPY

ine Untario Water Resources Act WATER WELL RECORD 11514989 Z. CHECK X CORRECT BOX WHERE APPLICABLE COUNTY OR DISTRICT TOWNSHIP, BOROUGH CITY, TOWN Carleton Cumberland Old Survery DAY_26 **,₀**29 ox 141 Cumberland, Ontario 26 037909 0282 LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS) DEPTH - FEET SENERAL COLOUR OTHER MATERIALS GENERAL DESCRIPTION FROM TO 0 17 prown clay 68 blys clay 68 76 boulders gray hardpan packed 76 298 grev limestone soft 32 CASING & OPEN HOLE RECORD 41 WATER RECORD 51 SCREEN WATER FOUND AT - FEET DEPTH - FEET INSIDE DIAM INCHES KIND OF WATER MATERIAL MATERIAL AND TYPE I DE FRESH 3 SULPHUR
3 SALTY 4 MINERAL 64 10-11 1 CKSTEEL
2 GALVANIZED
3 CONCRETE 0078" O165 188 1 G FRESH 3 G SULPHUR
2 G SALTY 4 G MINERAL PLUGGING & SEALING RECORD 295 DEPTH SET AT . FEET MATERIAL AND TYPE ICEMENT GROUT. FRESH 3 SULPHUR
SALTY 4 MINERAL Z [] GALVANIZED 3 CONCRETE 0298 1 | FRESH 1 | SULPHUR 2 | SALTY 4 | MINERAL OPEN HOLE 22.2 2 GALVANIZED 1 | FRESH 2 | SULPHUR
2 | SALTY 4 | MINERAL 4 OPEN HOLE MPING TEST METHOD LOCATION OF WELL 15-16 DO 17-18 2 D BAILER з 🐙 РИМР 0003 IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD LOT LINE. INDICATE NORTH BY ARROW. PUMPING RECOVERY STATIC WATER LEVELS DURING PUMPING TES 075 175 FEET 175 FEET FEET 175 FEET IF FLOWING 1 ECLEAR 2 E CLOUDY 43-45 RECOMMENDED PUMPING RATE OO 4 RECOMMENDED 43-45 SETTING 175 0003 T SHALLOW TEDEEP __ GPM./FT. SPECIFIC CAPACITY 0 مر WATER SUPPLY 5 ABANDONED, INSUFFICIENT SUPPLY bolov 2 OBSERVATION WELL STATUS I C TEST HOLE 7 🗆 UNFINISHED OF WELL 4 | RECHARGE WELL 1 M DOMESTIC
2 STOCK
3 IRRIGATION
4 INDUSTRIAL S COMMERCIAL A V WATER O! # D MUNICIPAL
PUBLIC SUPPLY 2 • COOLING OR AIR CONDITIONING
• NOT USED USE OTHER METHOD 2 | ROTARY (CONVENTIONAL) 7 DIAMOND 3 | ROTARY (REVERSE)
4 | ROTARY (AIR) BUITTING 9 DRIVING DRILLING 7 S AIR PERCUSSION DRILLERS 1558 0.810 75 ONLY CONTRACTOR Capitalw Water Supply Ltd. 1558 14 USE Box 490 Stittsville, Ontario

OFFICE

MINISTRY OF THE ENVIRONMENT COPY

D. McDougal

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			Cumberland, O	at		DAY_	14 no 06	YR
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·	LC	OG OF OVERBL	JRDEN AND BEDR	OCK MATERIA	LS (SEE INSTRUCTI	ONS)		- FEET
SENERAL COLOUR	- MOST COMMON MATERIAL	от	HER MATERIALS		GENERAL DESCR	IPTION	FROM	10
рхоми	hardpan	-					0	6
prom	- shale						6	20
brom	slate						20	80
STOY	limestone						- 80-	-24
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32	1 1 2 21		22	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	SIZE (S) OF OPER	TING 31-33	65 DIAMETER 34-38	75 LENGTH
WATER FOUND AT - FEET	TER RECORD	105	TERIAL WALL	DEPTH - FEET	MATERIAL AND		INCHES	41-4
10-13 1	FRESH SULPHUR M	10-11 1 T ST	EEL 12	0 0 022	S ALLENAL AND		DEPTH TO TOP OF SCREEN	re
15-18 1	☐ FRESH 3 ☐ SULPHUR 19	3 0 00	LVANIZED 188	0 0022	61 P	LUGGING & S	SEALING REC	ORD
	SALTY 4 MINERAL FRESH 3 SULPHUR 24	17-18 1 🗆 S1	EEL 19	20-23		TO MATERIA	AL AND TYPE LEAD	MENT GROUT PACKER, ETC
2	SALTY 4 MINERAL FRESH 3 SULPHUR 29	3 🗆 cc	DNCRETE PEN HOLE		10-13	***	Y	-
2	SALTY 4 MINERAL		LVANIZED	27-34	26-29	30-33 80		
1 1 '	FRESH 3 SULPHUR SALTY 4 MINERAL		ONCRETE PEN HOLE		<u> </u>			
71 PUMPING TEST M	ENHOD 10 PUMPING. 9.	GPM	IRATION OF PUMPING 15-16 0 017-			TION OF W		
STATIC LEVEL 4	WATER LEVEL 25	DEVELS DURING	PUMPING PECOVERY	IN C		NORTH BY ARROW.	WELL FROM ROAD	AND
EST	21 22-24 15 MINUT	20 HIMUTES	130 32-34 130 5 FEET	37 Lus	25 / 60/2	4 / []	. ferm	0 - R
S IF FLOWING.	MEN PUNP INTA	FEET (C) FEET		4	1 / 1	et. Comp	. 100-	,
SN IF FLOWING. GIVE RAYE RECOMMENDED		to heri	1 CLEAR 2 CLOUD		\ \ \			
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50-53	000.1			11-11	! 3			
FINAL	OBSERVATION V		ONED. INSUFFICIENT SUPPLIONED POOR QUALITY		(00)			,
OF WELL	A RECHARGE WEL	,L			0:10:		, 0,0	- \$ 5
WATER	2 DOMESTIC 2 STOCK 3 DIRRIGATION	S COMMERCI MUNICIPA PUBLIC SI			. Tim		OLD I	7.
1105	ON HOUSTRIAL OTHER		DNINGTTIGNOD RIA RC — OSSU TON □ *		2010	72		
	CABLE TOOL		BORING	lo	bio.	·		
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DRILLIN	G S REPUBLICATION	À		DRILLERS REM		<u> </u>		
-	LL CONTRACTOR		LICENCE NUMBER	DOTA SOURCE	SB CONTRAC	04 DATE	T. Q / 1 A	~ .
ADDRESS		d & Cable I	TATALINE -		ISPECTION	INSPECTOR	7003	14
R. R.	2, Box 194, Orle	enal Ont.	LICENCE HUMBER	D BEMARKS:	·	1	<u>^</u>	0
1 - 1								



The Ontario Water Resources Commission Act

Now. Region attern Carllett	ER WELL	RECO)RD ("UMBERL	LANP
District Castelland The	Towns	ship, Village, To	wn or City#	USSELLX	PRESCOTT
Con Joseph District P	T 29 Date o	completed	/5 day	June month	1969 year)
	re	ss ORLE	ANS O	NT	
			Pumping		
Casing and Screen Record	St	atic level	66		
Inside diameter of casing /26	DIVISION OF TO	est-pumping rat	te		G.P.M.
Type of screen	WATER RESOURCESPA	umping level		/3	
Length of screen	AUS 2 5 1969 D	uration of test p	umping	2 M	1
Depth to top of screen	l w	Vater clear or clo	oudy at end of	test Clear	<u> </u>
Diameter of finished hole	RESOURCES COMMON R	ecommended p	umping rate	foot holos	w ground surface
	W	vith pump settin	g oi		r Record
Overburden and Bedrock Ro	ecord	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
Clark		0	105	128	Fresh
		105	/23		
Bolden y So	ind	105	723		
Limestone		123	130		
JM 1/82 4/6/3/0/21	10'				
7 9 7 0 0 7	<u>0</u> •				
14 8 0 3 7 2 2	<u>a</u> !'w				
For what purpose(s) was fare falle used?			Location		11. 5
asin 251 88	House	In diagra road and	m below show I lot line. In	distances of we dicate north by	arrow.
Is well on upland, in valley, or on hillside?	icesiae	11		5	IN
Drilling or Boring Firm F. R. CossETTE				>	• •
Address /5/0 BASEL/N	IE Rd			1	A I N UV
Address OTTAWA 5			3m >		<u> </u>
Licence Number 3/82		>	11	· (,	文 を
Name of Driller or Borer		VAVA N		*	A S
		Ž		40	1 22
Address Date June 15-196 A Cassette (Simplyon of Licensed Drilling or Borr	4	1/2	3	7 10.	CREEK
(Signature of Licensed Drilling or Bort	ing Contractor)				AR.
Form 7 15M-60-4138		/	\		\7
				2758.7	u3 /
OWRC COPY					•

UTM 448 2 4460 372 610 E	1513		WATER RESOURCE BUSINANO MAY 1719	762 3	
	Township, Village Date completed	, Town or City	Twp. of Cum	SION SION (NO PROPERTY)	
	dress	RR #1, Cumber	4		
Casing and Screen Record		Pumpin	g Test		
Inside diameter of casing 64	Static level	301			
Total length of casing 26.		g rate14			
Type of screen		60 '			
Length of screen	Duration of to	est pumping	3 hrs.		
Depth to top of screen	Water clear o	r cloudy at end of	test Clear	<u>r</u>	
Diameter of finished hole 6"	Recommende	ed pumping rate	6		
	with pump se	etting of70	feet bel	ow ground surfac	
Well Log			Water Record		
Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)	
Broken rock and clay	0 8	8			
Grey Limestone White sand stone	180	183	1.83 KTAK	Fresh	
For what purpose(s) is the water to be used?		Location			
Domestic & green house Is well on upland, in valley, or on hillside? Upland Drilling or Boring Firm G. Charbonneau Diamond & Cable Drilling Address RR #1, Box 194, Orleans, Ont. Licence Number 1331	road a	gram below show and lot line. In	dicate north by		
Name of Driller or Borer Bruck Stacey, RR #1, Jasper, Ont. Address March 24, 1965 Date March 24, 1965 (Signature of Licensed Drilling or Boring Contractor) Form 7 15M-60-4138 OWRC COPY		KOLHOC.		C 1,778	

- 125 miles		rces Commiss	13113 sion Act, 1957.	GROL Ó Ó WA TE AUG 15 ONTARIO W RESOUNCES COM	1950 PATES
unty or District Russell Lot FAST.		Township V	ECORD 3/6 illage, Town or 6 eted	ity Cumberla	60 year)
Casing and Screen Record		Pumj	ping Test		
otal length of casing	Static level 16 feet Test-pumping rate 8 G.P.M. Pumping level 130 feet Duration of test pumping 1 hour Water clear or cloudy at end of test clear Recommended pumping rate 3 G.P.M.				
		with	pumping level of		50
Well Log			Wat	er Record	1
Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, sulphur)
Loam	0	3 130	130	134	fresh
For what purpose(s) is the water to be used? Domestic Is well on upland, in valley, or on hillside? uplands Drilling Firm T. H. Adams	>		In diagram below	e. Indicate nor	of well from
Address r.r. #5 Ottawa Licence Number 450 Name of Driller Address The Same Date August 8, 1960. (Signature of Licensed Drilling Contract Form 5 19M-58-4149			64, 49	. NELC	No 11

Department of Min		ce of Ont	ario GEOL	6 NO CEIVE PR - 3 1952 OGICAL BRAN RTMENT OF MI	754 D SCH INES
Date Completed	376 Town c S	age, Fown or City)	Leesland	onkerl.	and
Pipe and Casing Record			Pumping Test		·
Length(s) of casing(s)	Pate Jed tatic level Cumping leve Cumping rate Ouration of to Distance from	14. f	o gol	· · · · · · · · · · · · · · · · · · ·	
Wat	er Record				
Kind (fresh or mineral)	A		Depth(s) to Water Horizon(s)	Kind of Water	No, of Feet Water Rises
Appearance (clear, cloudy, coloured)			921	fresh	98 feet
How far is well from possible source of contamination?	~K		1		
What is the source of contamination? Septim Le. Enclose a copy of any mineral analysis that has been made Well Log	of water			cation of We	11
Enclose a copy of any mineral analysis that has been made		Toft.	Loc In diagram	below show die	stances of
Enclose a copy of any mineral analysis that has been made Well Log	From	То	Local In diagram well from		stances of
Enclose a copy of any mineral analysis that has been made Well Log	From	Το ft. 2 υ	Local In diagram well from	below show dis road and lot l	stances of
Enclose a copy of any mineral analysis that has been made Well Log Overburden and Bedrock Record 1 to 20 feet Landpoor.	From 0 ft.	Το ft. 2 υ	Local In diagram well from	below show dis road and lot l	stances of
Enclose a copy of any mineral analysis that has been made Well Log Overburden and Bedrock Record 1 to 20 feet Landpoor.	From 0 ft.	Το ft. 2 υ	Local In diagram well from	below show dis road and lot l	stances of
Enclose a copy of any mineral analysis that has been made Well Log Overburden and Bedrock Record 1 to 20 feet Landpoor.	From 0 ft.	Το ft. 2 υ	Local In diagram well from	below show dis road and lot l	stances of
Enclose a copy of any mineral analysis that has been made Well Log Overburden and Bedrock Record 1 to 20 feet Landpan 20 to 92 feet Black limeston	From 0 ft / 2 a -	Το ft. 2 υ	In diagram well from dicate north	below show die road and lot I h by arrow.	stances of line. In-
Enclose a copy of any mineral analysis that has been made Well Log Overburden and Bedrock Record 1 to 20 feet Landpoor.	From 0 ft / 2 a -	Το ft. 2 υ	In diagram well from dicate north	below show die road and lot I h by arrow.	stances of line. In-

FORM 5



#10 E
31/ N

The Ontario Water Resources Commission Act, 1957

W/ A TIDD WILST T

Basin

Casing and Screen Record Inside diameter of casing St. Total length of casing Property of screen Property of screen Description of	nship, Village, Town or completed	City umb	erland 1960 year)
Casing and Screen Record Inside diameter of casing St. Total length of casing Property of screen Property of screen Description of the screen Desc	Pum tatic level 3 4 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	month ping Test Jeul Jeul	gear)
Casing and Screen Record Inside diameter of casing	Pum tatic level 28 est-pumping rate tumping level 5 Duration of test pumping Vater clear or cloudy at	oping Test S Sect	G.P.M.
Casing and Screen Record Inside diameter of casing St. Total length of casing Property of screen Property of screen Description of	ratic level 28 40 est-pumping rate 25 20 curation of test pumping Vater clear or cloudy at	of feet	
Inside diameter of casing St Total length of casing Total length of screen Properties Company of the Company o	est-pumping rate umping level 5.5 Duration of test pumping	of feet	
Total length of casing 3 Property of screen Property of screen Description of screen Des	est-pumping rate	, 12	
Total length of casing 3 feel To Total length of screen Po	umping level 5.3 Ouration of test pumping Vater clear or cloudy at	, 12	
Type of screen. Property of screen. Description of screen.	Ouration of test pumping Vater clear or cloudy at o	, 12	
Length of screen.	Vater clear or cloudy at	, , , , , , , , , , , , , , , , , , , ,	***************************************
·		. V	J
	Recommended numning		
Diameter of finished hole	with pumping		G.P.M

Well Log		ter Record	1
	Depth(s) at which	No. of feet water rises	Kind of water (fresh, salty,
Overburden and Bedrock Record ft, f	t. water(s) found	Water fises	sulphur)
sand bolders grave 0 9	98	70	fresh
gray lime store 9 10	Z		ļ -
		_	
			-
			<u> </u>
For what purpose(s) is the water to be used?	Loc	ation of Well	11)
house	In diagram belov	v show distances	of well from
	road and lot lin	ne. Indicate nort	h by arrow.
Is well on upland, in valley, or on hillside? Mylanus			
	•	1 1	
Drilling Firm Vister Cosselle			
1 1 6 6 6		Yo,	
Address 6 Marquelle Ad		"v "	
Walke & Co	011	DITHWY	
Licence Number 7 3		a T	The supply well as a supply of the supply of
Name of Driller & Casselle	atj.		
16 Margarthe at		7521	
Address (1971)		1	
Date disc 76		11	
(Signature of Licensed Drilling Contractor)		1/	
(Signature of Licensed Diming Contractor)			5.58

Form 5 15M-58-4149

HPM 1 8 Z 4 8 5 0 E 5 R 5 0 B 9 0 0 The Ontario Water Research 5 R 0 3 1 2 WATER WE Basin 2 5	LL	RECO	RD	56 ONTARIO RESOURCES C	
County or District Con					67.
	dress	ρ .	/	nf R	Nsi.
Casing and Screen Record			Pumping		
Inside diameter of casing				• • • • • • • • • • • • • • • • • • • •	
Total length of casing	Tes	t-pumping rat	e <i>18</i>		G.P.M
Type of screen				, , , , , , , , , , , , , , , , , , ,	
Length of screen	Dui	ration of test p	amping	3 hys.	
Donth to top of screen	1			test Clear.	
Diameter of finished hole	Re	commended p	amping rate	L	G.P.M
•	wit	h pump setting	ر of 50	feet below	w ground surfac
Well Log				Water	Record
Overburden and Bedrock Record		From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
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The Ontario Water Resources Act

WATER WELL RECORD

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APPENDIX 3

□ REFERENCES AND SUPPORTING DOCUMENTATION

EARTH SCIENCE INVENTORY CHECKLIST

PART ONE: SUMMARY PAGE

NAME Cardinal Creek Karst	OLL ID	MAP NAME	NTS NUMBER 31 G/6	UTM REFERENCE 463500 5037500
OBM NUMBER	- 30	LAT. E 'N	LONG.	ELEVATION MIN. MAX.
COUNTY City of Ottawa				Location Map
тоwnsнір Cumberland				
LOT CONCESSION	ı			
AREA	hectares			
OWNERSHIP			MA	P
AERIAL PHOTOGRAPHS	BASEMAPS:			
YEAR ROLL FLIGHT LINE NUMBERS	Docket			
1991 37 4532 31-33	454752			
MNR REGION MNR DISTRICT Southeast Kemptville	PARK ZONE Southern			

earth science features Bedrock Geology - Paleozoic limestene of the Beboaygoon Fermation; this unit hosts the karst features; Surficial Geology – Up to 20m banks of Champlain Sea clay deposits over discontinuous, thin, silty and stony till; southeast-trending glacial movement indicators; Karst Features – a complex system of caves and chambers with interconnected springs; notable occurrence of "breakdown collapse" features.

SIGNIFICANCE Breakdown Collapse Features are considered to be provincially significant as they have not been reported elsewhere in the province. All other features described above are associated with, and enhance, the karst system here.

SENSITIVITY Natural erosion of steep clay banks occurs, as well as internal modifications of karst features; human impacts which affect the karst system here include landfill, stormwater and other water management, garbage, tree felling into the creek valley, with the potential to alter karst hydrology and features, and the plugging of cavities. Intensive housing developments surround the natural areas where the karst occurs, and have likely already modified the hydrology of the karst system.

RECOMMENDATIONS That a new earth science ANSI be defined to incorporate the main (core) Cardinal Creek Karst, containing the caves, chambers and surface sinkholes. It still needs to be determined where there are features that may be required to maintain the existing functionality of the hydrology of the karst. The boundary follows property lines owned by the City of Ottawa for ease of locating the site.

MAJOR REFERENCES Williams 1991; Johnson et al. 1992; Beaupre and Schroeder 1991

COMPILER PSG Kor DATE COMPILED 1 April 2009



Ministry of

Ministère des Richesses Resources naturelles

Ontario Ministry of Natural Resources Ontario Parks 300 Water Street, Peterborough, Ontario K9J 8N1



PART TWO: DETAILED INFORMATION

PROTECTION HISTORY AND SETTING

The Cardinal Creek karst site was first identified to MNR District staff in 1991 (or earlier) as a "geologic site of interest" by a high school teacher and a university professor from the Ottawa area (names not recorded). At that time, the site was treated as a candidate (i.e. unconfirmed), regionally- to provincially- significant (yet to be determined) earth science ANSI. It resurfaced as a provincially significant candidate earth science ANSI in a consultant's report in 2001 (see earth science checksheet: Gorrell 2001). Although identified as a provincially significant ANSI, it was noted that the nature and extent of the karst system was largely unknown to the scientific community at that time, and required more study to determine its core values.

The creek flowing through the karst area here is sometimes called Leonard Creek, whereas the Cardinal Creek karst site is also known locally as Cumberland Cave (Quebec) and Orleans Cave (Ontario). This should not to be confused with Cumberland Caves #1 and #2 which occur further downstream along the Ottawa River.

The Cardinal Creek valley formed within the relatively flat-lying Chaplain Sea basin after its retreat from the region, and formed a drainage-way to the proto-Ottawa River. The valley is characterised by a meandering course, very steep banks, deep ravines, and a largely bedrock substrate. The karst area can be roughly divided into two main areas, separated by the major gravel road works along Watters Road. A southern portion includes that main cave system, whereas the northern portion includes the main valley and springs system of the karst. Most of the interest and descriptions on the site has focussed on the cave system.

DETAILED EARTH SCIENCE FEATURES

Introduction:

Two sketches of the main features of the karst system are attached (Figures 1, 2). These are representational in nature, and are not to scale (Marcus Buck, caver and karst expert, pers.com. 2008). The surficial and subterranean features of the karst system are described in some detail by Beaupre and Schroeder (1991), based on extensive observations and measurements during field work. Some of their results are referenced and summarized here.

The Cardinal Creek Karst represents a karst tunnel valley system by which groundwater disappears beneath the surface into an entrance cave, and re-appears at several waterfalls along Cardinal Creek as springs, until it re-emerges at the foot of the system. Groundwater is partially controlled with a storm sewer, which directs runoff into the karst cave entrance. A natural dry channel (part of a man-made berm?) may also feed this system during periods of high run-off. Water run-off in the system may be fed by an artificial pond held up by a small dam upstream of this entrance cave.

The following descriptions are based on a review of the existing literature specific to the Cardinal Creek karst system, speaking with karst and groundwater (hydrogeologists) experts, and two reconnaissance field visits in early spring and midsummer 2008 by the present author (Kor 2008).

The Cardinal Creek Karst site incorporates features which are probably Holocene in age (they were formed in the last 10 000 years), and which are covered by the "Postglacial and Holocene Events Environment" and, more significantly, the "Karst Landforms Processes and Environments" as outlined and described in the *Earth Science Framework* (Davidson 1981). There is some discussion that the karst may have been inherited during the Holocene, suggesting that the system was formed during an earlier time.

Bedrock Geology:

The bedrock exposed at the site consists of the Middle Ordovician Bobcaygeon Formation of the Ottawa Group (Johnson et al. 1992). It is made up of pure, fossiliferous, coarse-grained, massive to thick-bedded limestone, with thin shale partings (Photo 3). The Bobcaygeon Formation was laid down in a shallow, marine, inland sea environment. Important joint sets, roughly east-west in orientation, occur within the bedrock that are utilized by underground water in the development of the karst system. The bedrock is generally buried beneath up to 20 metres of insoluble, glaciomarine silt and clay.

Surficial Geology:

Till and shallow to deepwater marine sediments are overlain by deltaic sand and gravel formed along the western shores of the Champlain Sea. Following glacial retreat, the valley of Cardinal Creek entrenched itself into the clay plain of the Champlain Sea. The eroding banks of the valley expose these sediments and their history.

Glacial striae on the area's bedrock surface indicate a roughly south-southeast ice movement direction. Striae and features related to water erosion are present on some of the exposed bedrock surfaces in the creek valley (Figure 3). They are best exposed on the bedrock surface at the base of the clay bluff just north of the Watters Road bridge. Here it is overlain by glacial till.

The oldest sedimentary deposit in the valley is a thin- to discontinuous, stony, silty clay diamict (till) with erratic boulders of Paleozoic and Precambrian origins. It can be seen lying directly on top of the bedrock surface in the valley. It was likely modified once the Champlain Sea inundated the Ottawa River valley. In some places it is absent; in others, it can be seen to overly directly on bedrock. Its presence suggests that it was deposited at the base of the glacial ice at a time when the karst was still forming, which in turn suggests that the karst may have been inherited; i.e., that it may be older than postglacial (i.e., preglacial or interglacial). After the last glaciation, once Cardinal Creek cut through the surficial sediments down to bedrock, it opened up the cave entrances to the karst system.

The banks of the creek are dominated by treed and exposed sections of glaciomarine, silty clay representing deposition in deep water conditions in the Champlain Sea, which inundated the Ottawa River valley once the glacial ice cover was removed. The clays are grey, thinly laminated, non-fossiliferous, and non-calcareous. The clays are susceptible to slumping, most of which likely occurs during heavy runoff conditions (like spring melting and severe storm events).

The upper surface of the creek valley exposes a discontinuous layer of sand and gravel material which are thought to have been deposited as a delta along the western shores of

the sea. All the described sediments are likely exposed in the unvegetated walls of the Cardinal Creek valley.

Karst Features:

The main karst features which occur in the system at Cardinal Creek include karren (surface etching and pooling by waters), dry stream beds, sinks (all of which are impenetrable due to clayey plugs of sediment), springs (mainly impenetrable artesian types, some of which have been buried or otherwise impacted by slumping from upslope materials), and sinkholes (also known as dolines). These features occur mainly in the clay plain south of Watters Road.

In addition, Buck (pers.com. 2008) noted the presence of a "breakdown collapse" structure which is not known to be present in other karst systems of the province. These occur in the main cave section of the system south of Watters Road. He indicates that this feature consists of a large suffosion doline above the central portion of the cave system on the surface. Inside the cave, the breakdown is largely sealed by clay that has settled in from above creating an effective hydraulic constriction. There are a number of examples of large collapse dolines over collapsed cave roofs (e.g., Bonnechere Cave, Ottawa River Caves, Dewdney's Caves, Puzzle Lake Cave, possibly Warsaw Caves, etc), but this may be the only such site where the surface expression is entirely within overburden, with no bedrock exposed. The closest example of such a feature is Tyendinaga Cave, which is a straight passage terminating in breakdown at either end.

The caves are transitory in shape and scale. The upstream caves consist of a group of short, straight small galleries with walls of collapsed limestone blocks and debris. The central portion of the caves consists of two, sub-parallel, horizontal galleries. Finally, the southern portion of the cave consists of a vadose maze, in which intersecting cavities form a grid pattern of limestone cavities. These caves probably focus groundwater into springs which exit, among other places, along the banks of Cardinal Creek north of Watters Road.

None of the other core features in themselves are notably representative, as they commonly occur frequently in other karst systems, including in protected areas of the province (e.g., the Eramosa Karst site and many Bruce Peninsula sites). The karst features of the site are well-described by Beaupre and Schroeder 1991). A sketch diagram is presented showing the character of the main cave system south of Watters Road. This map (Figure 2) is not to scale.

DETAILED SIGNIFICANCE

The evaluation of significance of the Cardinal Caves Karst site is partially based on discussions with experts in this very specialized field of study (i.e., karst). In this case, the input by consultants Marcus Buck and Daryl Cowell is here credited. (any errors in the presentation of this checksheet are mine).

The evaluation of significance is also based on a comparison of similar features elsewhere. Karst terranes have recently been studied in more detail (notably by the Ontario Geological Survey) because of (among other criteria) their impacts on land use planning. As such, the Cardinal Creek karst features were compared in quality, condition, complexity and special features with other known sites in Ontario.

Despite the noted impacts (see Detailed Sensitivity section), there is one feature that is not known to be represented elsewhere in the province that may still be intact (not confirmed; Buck pers.com. 2008). There is a large "breakdown collapse" in the centre of the main cave with a large suffosion doline above it on the surface. Inside the cave, the breakdown is largely sealed by clay that has settled in from above, creating an effective hydraulic constriction. There are a number of examples of large collapse dolines over collapsed cave roofs (e.g., Bonnechere Cave, Ottawa River Caves, Dewdney's Caves, Puzzle Lake Cave, etc) but there may not be any other site where the surface expression is entirely within overburden with no bedrock exposed. The closest example may be Tyendinaga Cave which is a straight passage terminating in breakdown collapse structures at either end. However, it is a fossil cave that may be pre-glacial in origin.

Furthermore, there are some complexities in the cave geometry upstream from the breakdown collapse structures that strongly suggest maze-development in response to the breakdown constriction. These phenomena are well-described in the literature. A constriction, in this case created by collapse of the cave roof and plugging by infilling overburden, causes a localized area of steep hydraulic gradients that leads to rapid enlargement of completing flow routes. This leads to development of new passages around the constriction. There is no indication that the downstream impacts at the presumed original springs have had an impact to the hydraulics in the upstream portion of the cave. Therefore, the form and function of this feature are still intact. This is considered to be a valid argument for assessing this site as provincially significant (Buck pers.com. 2008).

The small valley created by Cardinal Creek in post-Champlain Sea time has value as an indicator of the hydraulic function of the downstream end of the karst system. This area may be significantly impacted, both physically and functionally, by the construction along Watters Road. Despite its high scenic qualities, the geological valleys of the valley system north of Watters Road is considered to be locally significant. Studies of groundwater patterns in the area (if undertaken in the future) may enhance the significance of the northern portion of the site.

The bedrock exposures in the area of the site, being primarily limestone of the Bobcaygeon Formation, are not well-exposed along the creek, and are better represented in other protected sites in the region. Similarly, the surficial deposits encompassed by the site, including the till and glaciomarine clay and silt, are well represented in other protected areas in the region. However, these features do contribute to the "story" of the karst development in the Cardinal Creek valley.

Besides the presence of provincially significant karst features and systems, the Cardinal Creek Karst site is located in an urban area, and as such has excellent educational and recreational potential. It is a scenic, interesting landscape that is well worth preserving for public enjoyment and education. It is also a relatively large and complex cave (being roughly the 12th longest cave in the province), with an estimated length of some 340 metres. There is still much to learn from the hydrology, geology and geomorphology of this cave, so the potential for scientific study is also emphasized here. The valley and springs portion of the site (north of Watters Road) is of high scenic value.

The site is of great interest to the caving community as it is considered to be an excellent caving site. The main cave is reputed to be about the 12th longest in Ontario. Although sketch maps exist for the site, there has been recent interest by the caving community to

properly map the system. It may be one of the most-visited caves by cave specialists in the Ottawa area (Buck, pers.com. 2008).

DETAILED SENSITIVITY

The site is not pristine. It has been impacted by human activities in the form of a culvert, an artificial berm, an abandoned water well, collapsed roof materials, and the burial of a spring have all been reported or noted in the past, in and around the cave system (undocumented). The construction of Watters Road and its corridor cut a wide swatch through the middle portion of the site, and are responsible for most of the observed impacts. In addition, steep banks of clay and silt have been eroded by foot traffic throughout the site. Natural slumping of the unstable clays and silts are also ongoing, and may be enhanced by foot traffic.

Buck (pers.com. 2008) indicates that there have been at least three key impacts to the karst. First, the sinkpoint (and upstream entrance) has been landscaped so its geomorphology has been impacted. Also, Watters Road has likely buried one of the original springs, which has implications regarding the hydraulics and hydrology of the cave system. Finally, the nature of recharge to the cave may have been altered as a result of the landscaping at the sinkpoint, although it is not clear exactly how this may have occurred. Beaupre and Schroeder (1991) suggest that these disturbances generally have not impacted the form and function of the karst along Cardinal Creek.

DETAILED RECOMMENDATIONS

It is recommended that the Cardinal Creek Karst site be confirmed as a **Provincially Significant** earth science ANSI. The recommended boundary of the ANSI site consists of that portion of the main (core) cave and karst system south of Watters Road. It includes lands entirely owned by the City of Ottawa, and excludes most of the impacts made by Watters Road and the existing housing lot near the caves. It also does not encompass the Cardinal Creek valley north of Watters Road at this time. The recommended boundary is presented in Figure 4.

REFERENCES

Beaupre, M. and Schroeder, J. (Speltech Inc.) 1991. The Cumberland Cave and Karst System. A Geological and Geomorphological Study; consultant's report for Tamarack Developments Corporation; 46p. + photos and diagrams.

Buck, M.J. and Cowell, D.W. 2008. Evaluation and Revision of the Karst Process Theme for Ontario's Earth Science Framework; consultant's report for Ontario Parks, Planning and Research, Peterborough, Ontario; Open File Earth Science Report 0802, 16p. + tables and diagrams.

Johnson, M.D., Armstrong, D.K., Sanford, B.V., Telford, P.G. and Rutka, M.A. 1992. Paleozoic and Mesozoic Geology of Ontario; Chapter 20 in: Geology of Ontario, Special Volume 4, Part 2; pp.907-1008.

Williams, D.A., Rae, A.M. and Wolf, R.R. 1984. Paleozoic geology of the Ottawa area, southern Ontario; Ontario Geological Survey, Map 2716, scale 1:50 000.

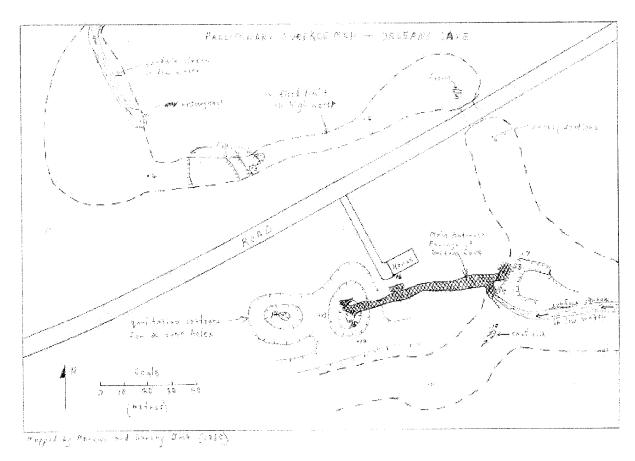


Figure 1. General setting of Cardinal Creek cave system and karst features. The long polygon with dark hashed lines represents the main ("core") karst cave system.

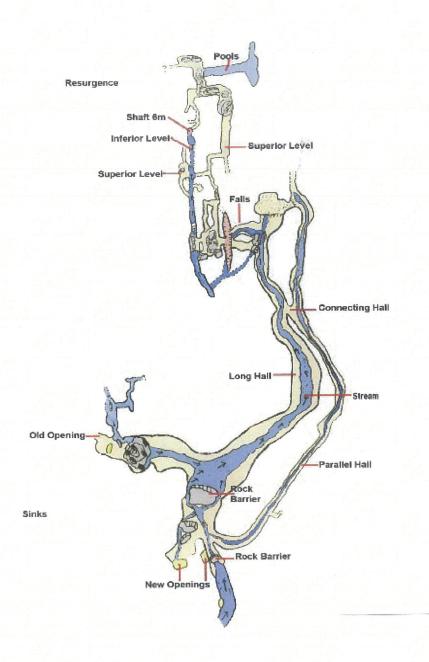


Figure 2. Sketch map of main cave system. North to the right.



Figure 3. Water-carved surface of the Paleozoic limestone bedrock, above the first falls near the Watters Road bridge, within the City of Ottawa right-of-way lands.



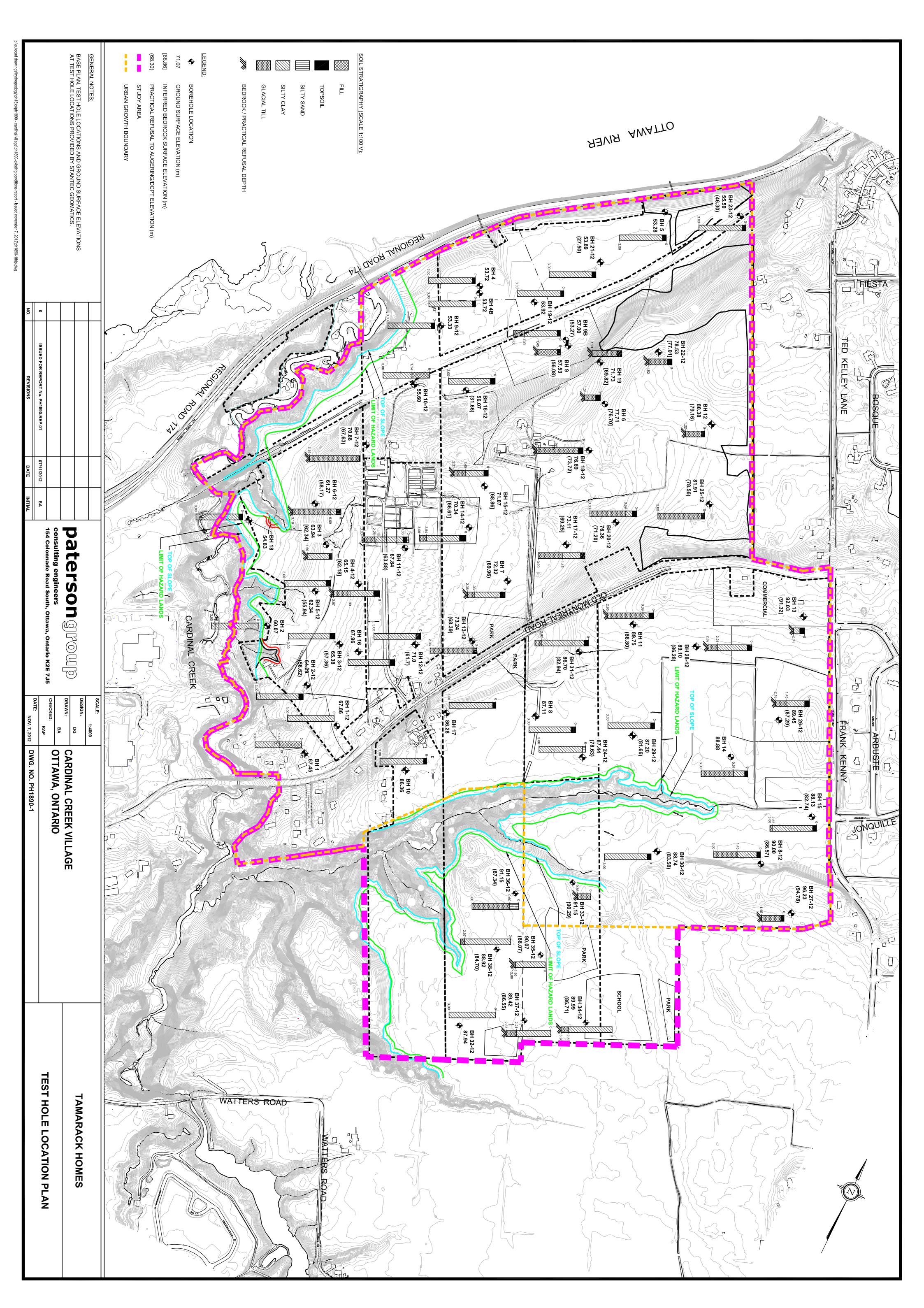
Figure 4. Cardinal Creek Karst ANSI boundary consists of the property line enclosing the City of Ottawa lands designated as PIN 145260100 (central portion of map).

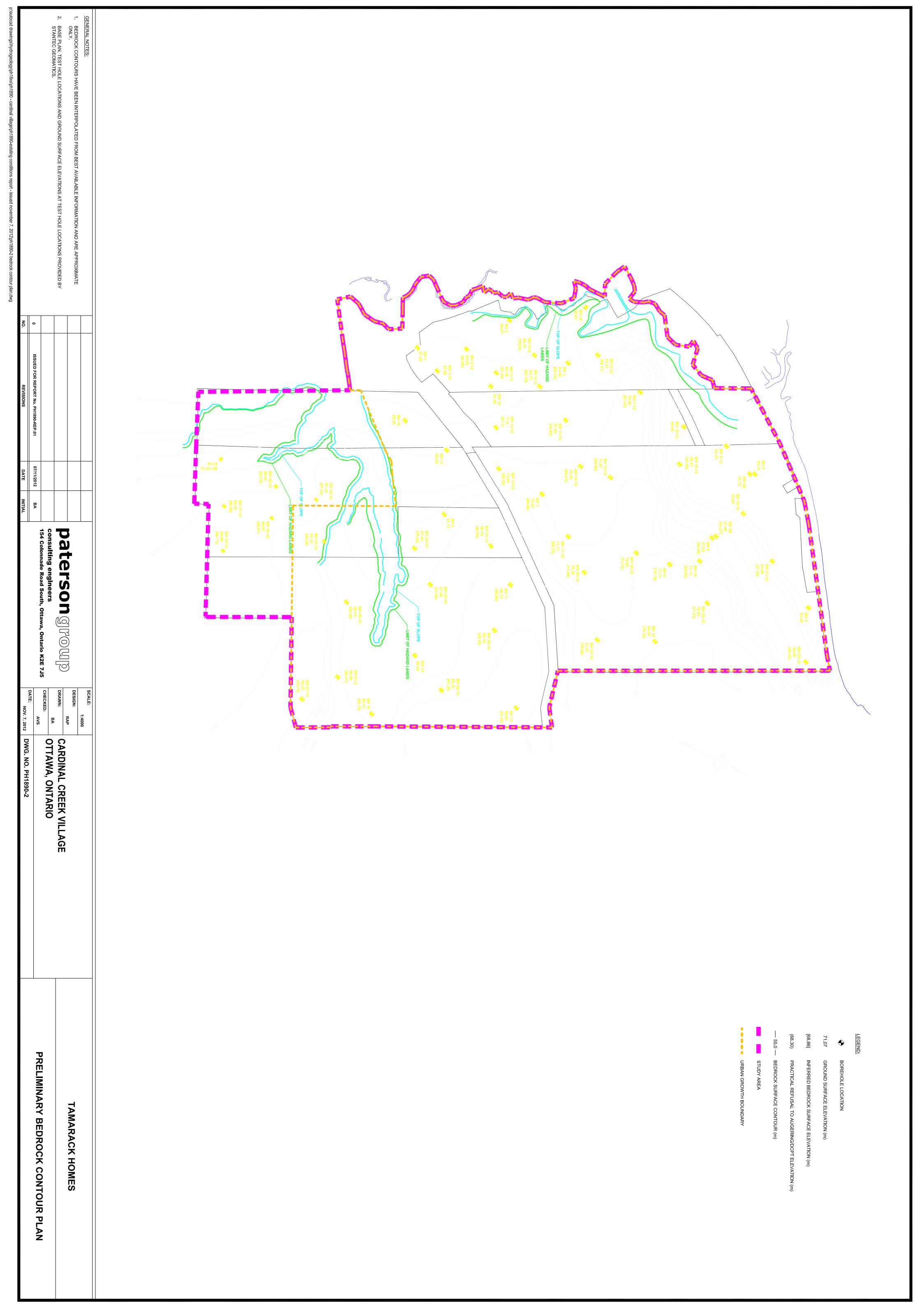
APPENDIX 4

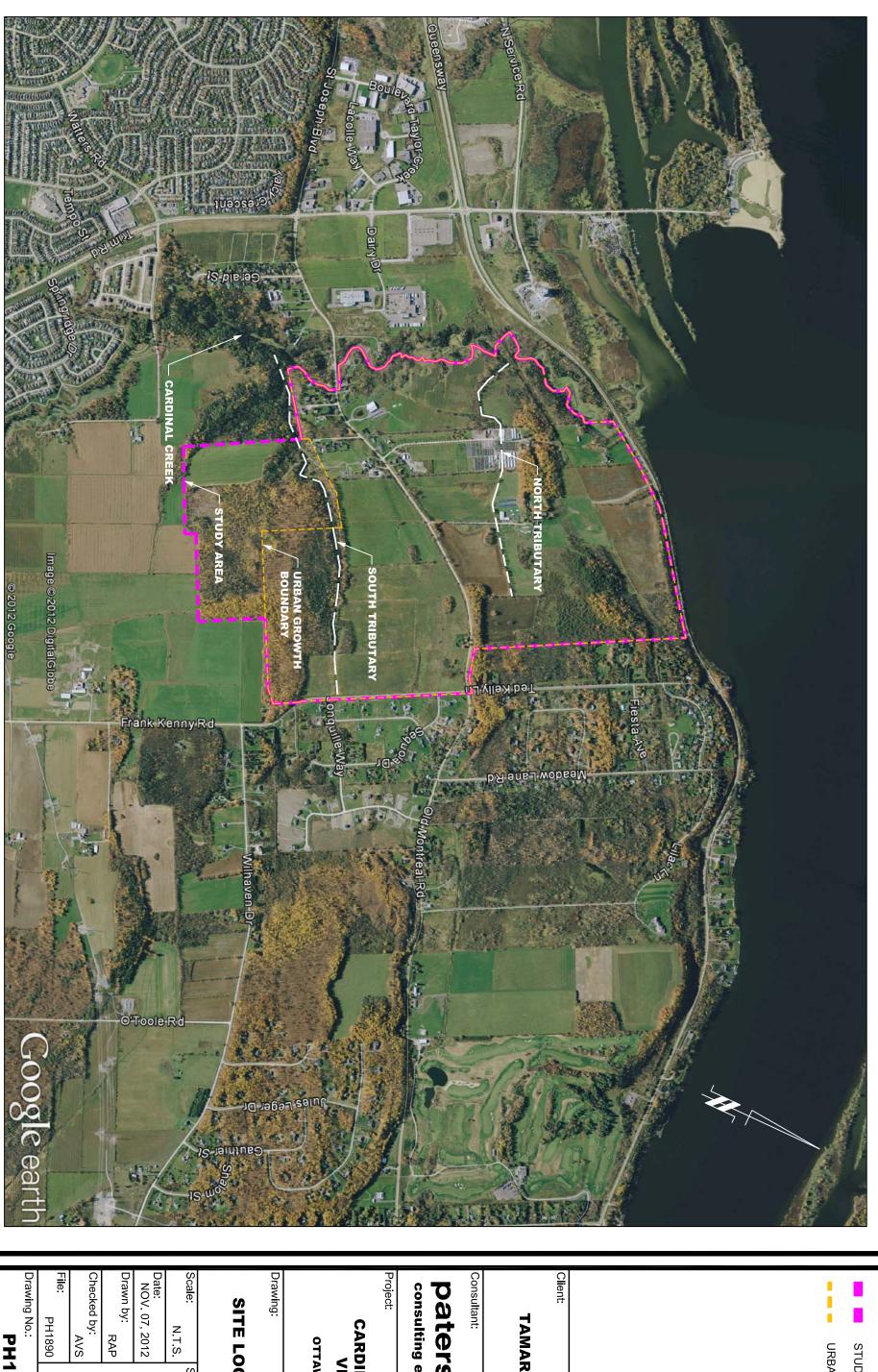
DRAWINGS & FIGURES

- □ PH1890-1 TEST HOLE LOCATION PLAN
- □ PH1890-2 PRELIMINARY BEDROCK CONTOUR PLAN
- □ PH1890-FIG.1: SITE LOCATION PLAN
- □ PH1890-FIG.2: SURFICIAL SOILS DELINEATION
- ☐ PH1890-FIG.3: REGIONAL BEDROCK MAPPING AND

WATER WELL DELINEATION







consulting engineers

CARDINAL CREEK
VILLAGE

OTTAWA, ONTARIO

SITE LOCATION PLAN

NTS

Seal

paterson group

TAMARACK HOMES

LEGEND:

STUDY AREA

N N N

URBAN GROWTH BOUNDARY

Drawing No.:

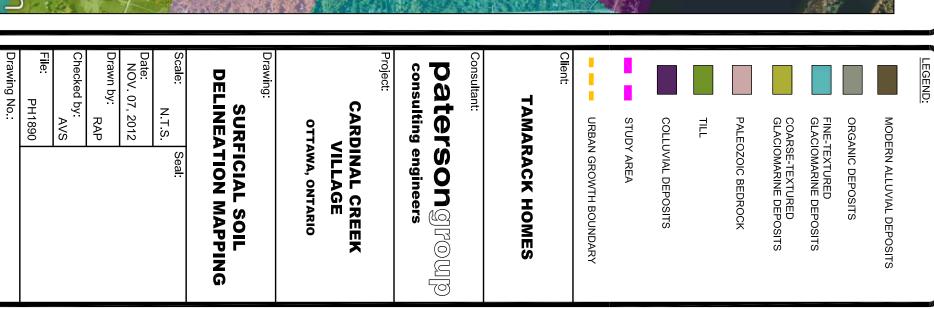
PH1890

PH1890-FIG.1

NOTE: INFORMATION REPRODUCED FROM ONTARIO GEOLOGICAL SURVEY G.I.S. OVERLAY FOR GOOGLE EARTH REFERENCE SHOULD BE MADE TO SITE SPECIFIC GEOTECHNICAL INVESTIGATION FINDINGS BY PATERSO

ON GROUP INC

PH1890-FIG.2



Date: NOV. 07, 2012 Scale Client: Fle Drawing Drawing No.: Checked by: Project Drawn by: Consultant: _EGEND: consulting engineers paterson@roup 15149891514989 • REGIONAL BEDROCK TAMARACK HOMES PH1890 CARDINAL CREEK APPROXIMATE LOCATION OF KARST AREA (2009) - AS PER GOLDER ASSOCIATES LTD. REPORT No. 09-1127-0086 N.T.S. RAP LOWER AQUIFER WATER WELL (>80ft) (PUBLISHED MOE RECORDS) LOCAL DIRECTION OF GROUNDWATER FLOW WATER WELL RECORD (PUBLISHED MOE RECORDS) UPPER AQUIFER WATER WELL (<80ft) (PUBLISHED MOE RECORDS) OXFORD REGIONAL FLOW IN BEDROCK AQUIFER BOBCAYGEON **GULL RIVER** ROCKLIFFE PH1890-FIG.3 AVS OTTAWA, ONTARIO **MAPPING VILLAGE** Sea