

2978 Carp Road - Cheer Training Facility

Servicing and Stormwater Management Report



Prepared for:
Ottawa Home Select

Prepared by:
Stantec Consulting Ltd.

Date:
July 28, 2026

Project/File:
160402325

2978 Carp Road - Cheer Training Facility

Revision	Description	Author	Date	Quality Check	Date	Independent Review	Date
1	Servicing and SWM	ZW	2025-09-11	PM	2025-09-16	DT	2025-09-16
2	Servicing and SWM	PM	2025-10-27	PM	2025-10-27	DT	2025-10-27
3	Revised Site Plan	MW	2026-06-17	PM	2026-06-24	DT	2026-06-24
4	MVCA Comments	MW	2026-07-27	AJ	2026-07-28	PM	2026-07-28



2978 Carp Road - Cheer Training Facility

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Prepared by

Signature

Michael Wu

Printed Name



Approved by

Signature

Peter Moroz

Printed Name



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1 Introduction

Stantec Consulting Ltd. has been commissioned by Ottawa Home Select to prepare the following Servicing and Stormwater Management Brief in support of the application for site plan control for the change of use of an existing warehouse building located at 2978 Carp Road and the residential dwelling with a municipal address of 2966 Carp Road, in the City of Ottawa, Ontario.

The site measures approximately 1.3 ha in area and is situated southeast of the intersection of McGee Side Road and Carp Road, bounded by Carp Road to the Southwest, an undeveloped parcel to the North, and adjacent to a residential dwelling (2966 Carp Road) to the Southeast. The site is currently zoned as RC7 - Rural Commercial Zone. The key plan of the site is shown in **Figure 1.1** below. The intent of this brief is to demonstrate, to the City's satisfaction, that adequate services are available and can be allocated to support the change of use of the existing warehouse to a Cheer Training Facility.



Figure 1.1: Key Plan of Site

The site consists of the existing 1,393.5 m² one-storey detached warehouse building, surface parking, and an existing 213.4m² residential dwelling with its associated landscaping area, well and septic system for servicing, and a dry pond for stormwater management. The site currently has two asphalt driveways



with access to Carp Road in the Southwest. Ottawa Home Select has provided a topographic survey and site plan dated July 27, 2026, attached in **Appendix A**.

1.1 Objective

The objective of this servicing and stormwater management brief is to demonstrate that the existing site can accommodate the proposed demands associated with the new land uses. It is to be noted that given that the site is serviced with well and septic, the water and sanitary services have been assessed by Paterson Group in their Hydrogeological Assessment and Terrain Analysis in support of the site plan control application and summarized in sections below. Further, this brief confirms that the existing runoff coefficients and grading patterns are not being altered and confirms that the existing stormwater management design will not be impacted.



2 Background

Documents referenced in preparation of this stormwater and servicing report for the proposed 2966 & 2978 Carp Road site include:

- *File PH5259-LET.01, Hydrogeological Assessment and Terrain Analysis – 2966 and 2978 Carp Road*, Paterson Group, 2026
- *File PH5103-LET.01-REV.01, Hydrogeological Assessment and Terrain Analysis – Re-zoning Application – 2966 and 2978 Carp Road, Ottawa (Carp), Ontario*, Paterson Group, October 2025.
- *Servicing Report – 2978 Carp Road*, Stantec, December 21, 2016.
- *Water Distribution Design Guidelines*, 2nd Edition, City of Ottawa, December 2025



3 Water Servicing

3.1 Background

The subject site is located outside the City of Ottawa's municipal water distribution network, as such the site requires private servicing to provide a sufficient water supply for domestic and emergency fire flow. The current storage building, as outlined in the site plan application, is serviced by a private well located in the north portion of the site via a 25 mm building service connection. The site is also equipped with precast concrete underground firewater storage tanks located in the southern portion of the site. The storage tanks receive water from the wells and are filled during off-peak hours.

Water Quantity and Quality Aquifer Analysis

Based on the Paterson Group assessment, the existing well can provide water flow of approximately 21,600 L. This is approximately 3.2 times the maximum total daily design volume of effluent (6,418 L/day) using 57% nitrate reduction required to support the site plan application. The 6,418 L/day is above the required flows as calculated under Part 8 – OBC for a subsequent application. Further discussion in the Terrain Analysis notes an additional technology that can support greater than 10,000 L/day.

A water quality aquifer analysis has been completed by the Paterson Group, and the following conclusions were noted:

- The preferred water supply intercepted by existing well contains a water supply that is potable and contains only elevated concentrations of hardness and total dissolved solids (TDS). The noted parameters can be treated with current readily available water conditioning equipment.
- Total Coliforms were detected at 0 ct/100 mL, however, it is recommended that a UV system is installed to assist in the removal of any remnant Total Coliforms found in the groundwater, as a precautionary measure.
- If desired by the property owner, a commercial grade water softener can be used to facilitate the reduction of the hardness concentration and reduce scaling. If a water softener is used for the proposed development, the owner should be made aware that additional sodium will be added to the water to reduce hardness. If desired, a point-of-use reverse osmosis system can be used to provide a drinking tap source without increasing sodium levels.
- It is recommended that either a point-of-use reverse osmosis system be used to reduce the TDS concentration, or bulk bottled water is provided as a drinking water source.

Detailed potable water aquifer analysis has been conducted by Paterson Group and is presented in the background report attached in **Appendix C.1** and the detailed report (File No. PH5259-LET.01) provided in the submission package.



Fire Flow Calculation

Assessment of required fire flows for the existing site was originally prepared within the *Servicing Report - 2978 Carp Road* (Stantec, 2016). At the time, fire flows were determined according to the Ontario Building Code (OBC) compendium Appendix A-3.2.5.7. Based on background information supplied by the Owner (see **Appendix A**), it appears that the existing building has a larger volume than that initially assumed by the 2016 Servicing Report. As such, a revised fire flow calculation is presented below to account for the building volume discrepancy and to meet the process established in Appendix J of the 2025 Water Design Guidelines.

The required fire flow has been calculated based on design drawings for the prefabricated building with building heights measuring on average 7.37 m and satisfying the 'non-combustible with fire resistance ratings' construction type as per OBC Appendix A-3.2.5.7:

$$\text{Minimum supply of Water (Litres)} = Q = K \times V \times S_{TOT}$$

K = water supply coefficient

V = Total building volume in m³

S_{TOT} = Total of spatial coefficient values from property line exposures on all sides

This subject site is outside the municipal water service network which requires on-site fire flow storage. Three precast concrete fire flow storage tanks have been installed with an approximate capacity of 150,000 L (roughly 50,000L each) as the fire water supply. The estimated OBC fire flow is **5,400 L/min (90 L/s)** and requires a total storage volume of **174,658 L**. Based on the calculated fire flow and the design process for rural fire flow calculations per Appendix J of the City of Ottawa Water Design Guidelines, the OBC fire flow is the governing criteria for calculating the required on-site storage volume for fire flow.

It is anticipated an additional tank in conjunction with the installed three on-site fire water storage tanks would be sufficient in support of this site plan control application. The detailed OBC fire flow analysis is provided in the calculations in **Appendix B**.



4 Wastewater Servicing

The site is located outside the City of Ottawa's sanitary collection system. In support of the site plan control application, Paterson Group has conducted a terrain analysis for the on-site septic system, which provides sanitary servicing for the existing storage building and residential building.

Based on the Paterson Group assessment, the subject site is sufficient in size to accommodate the modified sewage system and meet all of the regulatory separation criteria. As a precautionary measure, a 30 m setback should be maintained between the drinking water well and any septic system components. In addition, the following conclusions were noted:

- The subject site is sufficient in size to accommodate the modified, existing sewage system and meet all of the regulatory separation criteria. As a precautionary measure, a 30 m setback should be maintained between the drinking water well and any septic system components.
- A maximum sewage flow volume of **1.58 m³/day** at a nitrate concentration of 40 mg/L or **6.42m³/day** at a nitrate concentration of 17.2 mg/L can be accommodated on the subject site based on the current layout and still be below the predictive nitrate concentration threshold of 10 mg/L at the property boundary.
- Onsite sewage disposal needs can be accommodated with a Class 4 Sewage System utilizing tertiary treatment technologies.
- A Sewage System Permit and Building Permit need to be issued prior to the commencement of construction on the proposed structures or amenities/services.
- The results of the Hydrogeological Assessment and Terrain Analysis have provided satisfactory evidence that the subject site can support the proposed usage with respect to water quality, quantity and sewage system placement.

For further details to the design of the proposed septic system servicing site, please refer to the Paterson Group letter and drawings (File No. PH5259-LET01) submitted as part of the submission package.



5 Stormwater Management

5.1 Existing System

Stormwater Management (SWM) for the site was designed and constructed as part of the site development for the existing warehouse building, and it provides the required quantity and quality control for the site. In 2016, Stantec conducted a detailed stormwater management analysis for the current site, and the key analysis results are summarized below.

- The grading design incorporates emergency overland flow routes in compliance with the City of Ottawa's stormwater management standards. These routes are intended to safely convey runoff from storm events exceeding the 100-year design threshold toward the eastern portion of the site, where existing major drainage systems are located.
- On-site storage and infiltration were incorporated in the design of the dry pond as the best approach to manage site runoff so as to not increase the total uncontrolled runoff from the site.
- The existing On-site Dry Pond controls post-development storm runoff to below pre-development target release rates through infiltration of all storm events up to and including the 100-year storm event. **Table 5.1** summarizes the storage and outflow characteristics for the dry pond

Table 5.1: Pond Storage and Outflow Characteristics

ID	100-Year Discharge (L/s) (Infiltration)	100-Year Storage Required (m ³)	Available Storage (m ³)
Pond	9.8	385.3	389.6

- On-site quality control with a minimum target of 70% TSS removal was established with a treatment train approach as per the requirements of MVCA and established in the pre-consultation with the City of Ottawa. The grading design allows most of the surface runoff to flow through grassed areas for an initial infiltration and treatment of TSS. In addition, a vegetated buffer was incorporated around the dry pond to achieve a minimum 70% TSS removal efficiency as per the US EPA design manual for Low Impact Development (LID). As all pond outflow is through infiltration, site overall TSS removal rates would also achieve 80% TSS reduction to meet Enhanced criteria without additional modification.

The design was approved to meet the City of Ottawa Design Criteria and has received an Environmental Compliance Approval (Number: 9196-AQBQZV) on October 6, 2017, from the MECP.

The proposed modification to the existing external works comprises of a new gravel parking area to the east of the building and a new asphalt area at the building main entrance. However, neither modification presents any changes to the imperviousness of the site for the following reasons:



- The new gravel parking area simply reuses the existing gravel space to the east where storage racks were installed, therefore no changes to the gravel area is proposed.
- The new asphalt area measures around 44 m² in area and the impact on the imperviousness of the site area (within sub catchment area STM-1) is minimal, as tabulated in **Table 5.2**:

Table 5.2: Updated Imperviousness

Area ID	Area (ha)	C	A*C
Existing Entrance Area	0.0044	0.20	0.0009
STM-1 (without the entrance area))	1.1401	0.48	0.5485
Existing STM-1	1.1445	0.48	0.5494
Proposed Asphalt Area	0.0044	0.90	0.0039
Revised STM-1	1.1445	0.48	0.5524

As there are no changes to the imperviousness of the site, it is anticipated that the existing SWM facility will be maintained to service the proposed use without additional modifications. Background stormwater analysis conducted for the existing warehouse is detailed in **Appendix C.2**.



6 Conclusion

The water supply aquifer underlying the subject site is considered to be a sufficient water supply for domestic demands. The existing well contains supply that is potable and can be treated to reduce the elevated concentration of hardness and TDS, including total coliforms as a precautionary measure. The treatment can be easily accomplished with water softener, osmosis filter, and UV system. The existing fire flow storage can be expanded to accommodate the required fire flow for the development per OBC requirements.

The site is currently serviced by an on-site sewage system, which will need to be replaced with a new sewage system and meet all the regulatory separation criteria. Onsite sewage disposal needs can be accommodated with a Class 4 Sewage System utilizing tertiary treatment technologies. A Sewage System Permit and Building Permit needs to be issued prior to the commencement of construction on the proposed structures or amenities/services. Details of the design and approval of the septic system is provided by Paterson Group as part of the submission package.

The existing previously approved and constructed stormwater management system including an on-site dry pond and infiltration basin was designed and constructed to meet target discharge rates for all rainfall events up to and including the 100-year event. The system also provides sufficient quality control to meet 70% TSS removal criteria, although it can be immediately seen that the design would also meet an 'Enhanced' 80% TSS criteria given infiltration of all received runoff for up to the 100-year design storm event. Given that the existing runoff coefficients and grading patterns are not being altered, the existing stormwater management design will not be impacted, and is proposed to be maintained without additional modifications.

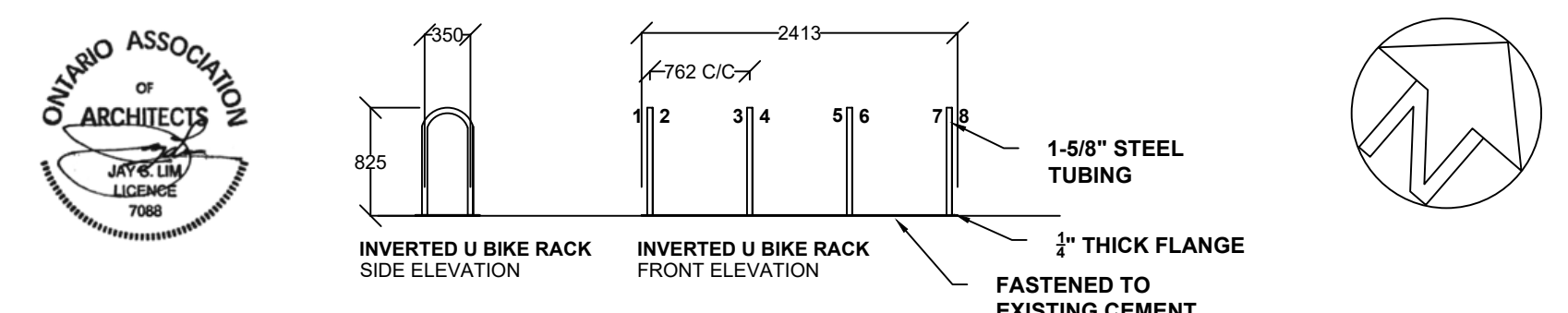


Appendices



Appendix A Background



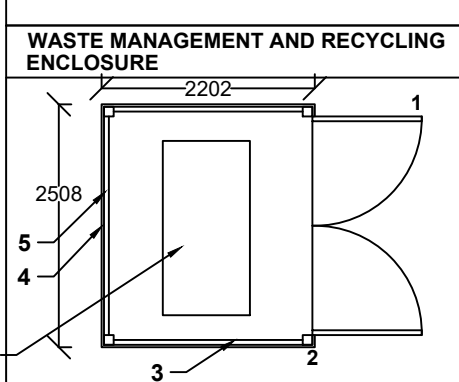


FIRE ROUTE SIGNS:

SIGN PROHIBITING PARKING IN A FIRE ROUTE SHALL,

1. SIZE:
45CM HIGH (MINIMUM)
30CM WIDE (MINIMUM)
2. BEAR THE MARKINGS AND MESSAGE THAT THE AREA IS A FIRE ROUTE WHERE PARKING IS PROHIBITED AND INCLUDE DOUBLE ARROWS, EXCEPT AT THE ENDS OF FIRE ROUTE WHERE SINGLE ARROWS SHALL BE INCLUDED
3. SHALL BE LOCATED NO MORE THAN 25.0 METRES APART UNLESS OTHERWISE SPECIFIED AND APPROVED BECAUSE OF UNUSUAL SITE CONDITIONS OR FIRE ROUTE CONFIGURATION, AND AT THE LOWER EDGE OF EACH SIGN SHALL BE BETWEEN 2.0 METRES AND 2.5 METRES ABOVE THE GROUND.
4. INCLUDE, IN BLACK LETTERS OF A MINIMUM HEIGHT OF 4.0 CM, THE ENGLISH LANGUAGE MESSAGE "FIRE ROUTE" AND THE FRENCH LANGUAGE MESSAGE "ITINÉRAIRE DES ÉVÉNEMENTS" BELOW THE MESSAGE "FIRE ROUTE"; AND

HAVE THE DESIGN AND DIMENSIONS AS DESCRIBED IN THE FOLLOWING FIGURE:



1. TWO P.T WOOD GATES COMPLETE WITH GALVANIZED STEEL FRAMES, GALVANIZED HINGES, AND GALVANIZED WHEEL-END SUPPORTS. HINGES TO BE SECURED TO GALVANIZED WHEEL END POSTS. PROVIDE LATCH/CLASP HARDWARE TO MAINTAIN GATES IN THE CLOSED POSITION.
2. SECURE POSTS TO THE CONCRETE SLAB WITH BOLTS/FASTENERS THROUGH GALVANIZED BASE PLATES CONNECTED TO THE COLUMNS.
3. WELDED GALVANIZED STEEL ANGLE SUPPORTS TO THE TOP AND BOTTOM TO PROVIDE FASTENING POINTS FOR THE PRESSURE-TREATED WOOD PANELS.
4. WOOD BOARDS 19 MM X 140 MM.
5. HSS COLUMNS WITH GALVANIZED FINISH.

25

46

ARCHITECTURE
URBAN DESIGN

R. Viau

Drafting & Design Ltd.

613-748-6157
rviaudrafting.ca

LEGEND		
PROJECT RESOURCES:		
OWNER: ALANA POTTER & ALISON MOFFATT, (CARP CHEER GYM INC.)		
ARCHITECT: JAY LIM (25.8 ARCHITECTURE)		
STRUCTURAL ENG. : CHRISTIAN GUIMOND (SALAS O BRIEN)		
MECHANICAL ENG. : PIERRE VAILLANCOURT (MEELE ENGINEERING)		
SURVEYOR: ANNIS, O SULLIVAN, VOLLEBEKK LTD.		
ALL SURVEY INFORMATION WAS OBTAINED FROM A SURVEY PLAN (DATED 2021) PRODUCED BY ANNIS, O SULLIVAN, VOLLEBEKK LTD.		
ZONING MATRIX		
RC7 ZONE	REQ.	PROVIDED
LOT AREA	4000m2	12,832m2
LOT WIDTH	30m	104.99m
FRONT YARD	10m	60.95m
REAR YARD	10m	60.66m
INT. SIDE YARD	4.5m (AS/UTTING) 3m (OTHER)	N/A 19.63m
CORNER SIDE YD	6m	N/A
BLDG HEIGHT	11m	7.68m
LOT COVERAGE	25%	12.3%
BICYCLE PARKING (1 PER 2000m²)	1	8
Zoning By-law 2026-50		
FLOOR AREA BREAKDOWN: LOT AREA: 12832m² GROUND FLOOR: 1360m² ADMIN: 202m² GYMNASIUM: 1158m² MEZZANINE: 33 m² SNOW STORAGE: PAVED AREA: 1280m² SNOW STORAGE REQUIRED: 10% OF 1280m² = 128m² SNOW STORAGE PROVIDED: 190m²		
 EXISTING EXTERIOR LIGHTING (SHARP CUT-OFF FIXTURES THAT DO NOT ALLOW LIGHT SPILLAGE ONTO ADJACENT PROPERTIES)  FIRE ROUTE *NO PARKING*-SIGN  EXISTING A/C UNIT (TO BE RELOCATED)		
EOP	EDGE OF PAVEMENTMT	
EOG	EDGE OF GRAVEL	
No.	Description	Date
1	ISSUED FOR PERMIT	2026-03-27
2	REISSUED FOR SPC	2026-07-27

PROPOSED RECREATIONAL AND ATHLETIC FACILITY

SITE & LANDSCAPE PLAN

2978 Carp Road

OTTAWA, ONTARIO

DRAWN BY:

CHARLES VIAU

CHECKED BY:

SCALE: 1:250

2026-05-15

A099

A.1 Topographic Survey



TOPOGRAPHIC PLAN OF SURVEY OF
PART OF LOT 10
CONCESSION 2
GEOGRAPHIC TOWNSHIP OF HUNTLEY
CITY OF OTTAWA
Surveyed by Annis, O'Sullivan, Vollebakk Ltd.

Scale 1 : 300
12 9 6 3 0 3 6 9 12 Metres

Metric
DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND
CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

Surveyor's Certificate
I CERTIFY THAT:
1. This survey and plan are correct and in accordance with the Surveys
Act and the Surveyors Act and the regulations made under them.
2. The survey was completed on the 5th day of October, 2021.

Date 04/15/21
T. Hartwick
Ontario Land Surveyor

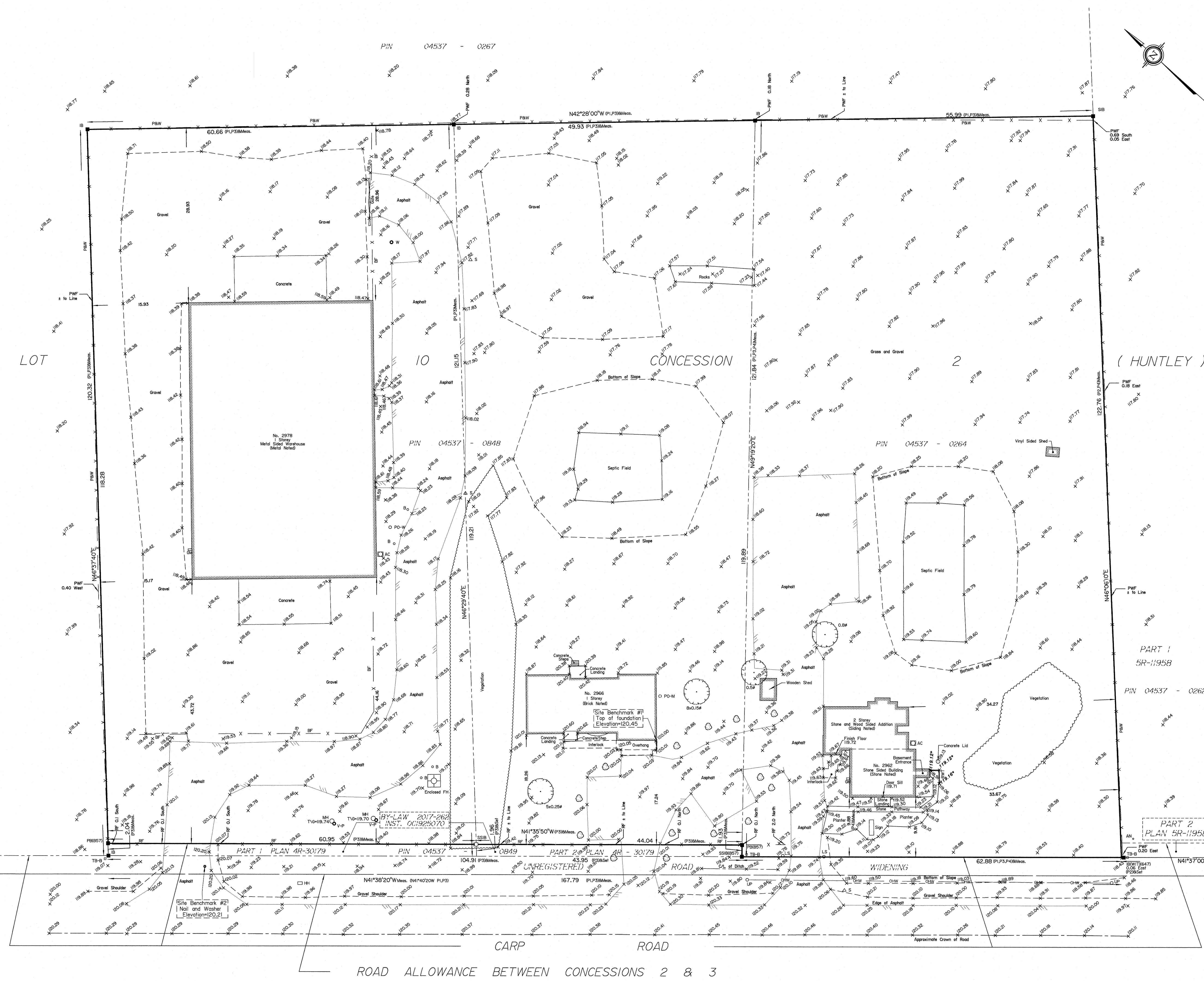
Notes & Legend

Denotes	
□	Survey Monument Planted
■	Survey Monument Found
SIB	Standard Iron Bar
PB	Plastic Bar
IB	Iron Bar
(WIT)	Witness
Meas.	Measured
(ACG)	Annis, O'Sullivan, Vollebakk Ltd.
(PI)	(857) Plan dated June 20, 2016 PIN 04537-0848
(P2)	Plan 5R-11958
(P3)	Plan 4R-30179
(P4)	(857) Plan dated June 20, 2016 PIN 04537-0264
○	Deciduous Tree
○ FH	Fire Hydrant
○ MH	Maintenance Hole (Unidentified)
OHW	Overhead Wires
T/G	Top of Grate
○ V-P	Vent Pipe
○ TB-B	Gas Meter
○ B	Bell Terminal Box
○ S	Bollard
△ S	Sign
RF	Rail Fence
BF	Board Fence
RWT	Timber Retaining Wall
□	Gate
○ PO-W	Wood Pole
○ U	Utility Pole
○ AN	Anchor
○ LS	Light Standard
○ W	Well Cap
○ AC	Air Conditioner
○	Diameter
○ 65.00	Location of Elevations
○ 65.00	Top of Retaining Wall Elevation
C/L	Centreline
□	Property Line
□ HH	Handhole
P&W	Post and Wire
○	Decorative Stone

Bearings are grid, derived from Can-Net 2016 Real Time Network GPS
observations and are referenced to Specified Control Points 01919680037
and 01919791051, MTM Zone 9 (76°30' West Longitude) NAD-83 (original).

ELEVATION NOTES

- Elevations shown are geodetic and are referred to the CGVD28 geodetic datum.
- It is the responsibility of the user of this information to verify that the job benchmark
has not been altered or disturbed and that its relative elevation and description
agrees with the information shown on this drawing.



ASSOCIATION OF ONTARIO
LAND SURVEYORS
PLAN SUBMISSION FORM
V-17007
THIS PLAN IS NOT VALID UNLESS
IT IS AN EMBOSSED ORIGINAL
COPY ISSUED BY THE SURVEYOR
in accordance with
Regulation 1026, Section 29 (3).

© Annis, O'Sullivan, Vollebakk Ltd. 2021. "THIS PLAN IS PROTECTED BY COPYRIGHT"
ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
14 Concourse Gate, Suite 500
Nepean, Ont. K2E 7S6
Phone: (613) 727-0850 / Fax: (613) 727-1079
Email: nepean@annissol.com

A.2 Construction Type Confirmation



Wu, Michael

From: Charles Viau <charles@rviaudrafting.ca>
Sent: June 22, 2026 09:28
To: Johnston, Anthony; Jay Lim
Cc: Peter Lyons; Moroz, Peter; Wu, Michael
Subject: Re: 2978 Carp Road - Zoning deficiency letter
Attachments: 2978 Carp Cheer Conversion_V2 Permit issue 2_20260505.pdf

You don't often get email from charles@rviaudrafting.ca. [Learn why this is important](#)

Good morning Anthony, i'm giving you some information about the building here but **Jay (cc'd) will have to confirm.**

Building Construction:

I believe the building is non-combustible - attached are the plans. The assembly fire ratings are the following:

Floors: 45min

Walls: 1h

Sprinkler system:

No, the building is not protected by a sprinkler system.

Kind regards



Charles Viau *BCIN 130297*
613-804-6157
charles@rviaudrafting.ca
www.rviaudrafting.ca

On Mon, Jun 22, 2026 at 9:10 AM Johnston, Anthony <Anthony.Johnston@stantec.com> wrote:

Good Morning,

We are in the process of finalizing our plans and reports and would appreciate confirmation of the following information:

- Is the building of non-combustible construction? If so, please confirm the fire-resistance rating (FRR) of the floors, walls, and roof assemblies.
- Is the building protected by a sprinkler system?

Please respond as soon as possible, and we will do our best to submit the stamped plans and reports shortly afterward.

Thanks!

From: Charles Viau <charles@rviaudrafting.ca>
Sent: Monday, June 15, 2026 7:01 AM
To: Johnston, Anthony <Anthony.Johnston@stantec.com>
Subject: 2978 Carp Road - Zoning deficiency letter

Good morning Anthony, we hope you had a great weekend!

I sent this document to Peter Moroz however it seems like he is out of the office! Just sending this incase it wasn't received - we're assuming the siteplan control application feedback already encapsulated this but we're just making sure no stone is being left unturned :)

Best regards



Charles Viau *BCIN 130297*
613-804-6157
charles@rviaudrafting.ca
www.rviaudrafting.ca

Caution: This email originated from outside of Stantec. Please take extra precaution.

Attention: Ce courriel provient de l'extérieur de Stantec. Veuillez prendre des précautions supplémentaires.

Atención: Este correo electrónico proviene de fuera de Stantec. Por favor, tome precauciones adicionales.

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Appendix B OBC Fire Flow Calculation



Fire Flow Calculations as per Ontario Building Code 2024 (Appendix A)

Job# 160401271 Designed by: ZW
Date 19-Jun-26 Checked by: DT

$$Q = KVS_{\text{tot}}$$

Q = Volume of water required (L)

V = Total building volume (m³)

K = Water supply coefficient from Table 1

S_{tot} = Total of spatial coefficient values from property line exposures on all sides as obtained from the formula

$$S_{\text{tot}} = 1.0 + [S_{\text{side1}} + S_{\text{side2}} + S_{\text{side3}} + S_{\text{side4}}]$$

1	Type of construction	Building Classification		Water Supply Coefficient
	Non-Combustible with Fire-Resistance Ratings	E, F-2		17
2	Area of one floor (m ²)	number of floors	height of ceiling (m)	Total Building Volume (m ³)
	1394	1	7.37	10,274
3	Side	Exposure Distance (m)	Spatial Coefficient	Total Spatial Coefficient
	North	14.5	0	1
	East	28.4	0	
	South	30	0	
	West	45.4	0	
4	Established Fire Safety Plan?	Reduction in Volume (%)		Total Volume Reduction
	no	0%		0%
5	Total Volume 'Q' (L)			
				174,658
				Minimum Required Fire Flow (L/min)
				5,400

Appendix C External Reports



C.1 Paterson Group Water Hydrogeological Assessment and Terrain Analysis Excerpts





October 23, 2025

PH5103-LET.01-REV.01

Nautical Lands Group

555 Legget Drive,
Tower A, Suite 920
Kanata, Ontario
K2K 3B8

Attention: Angela Mariani

Subject: **Hydrogeological Assessment and Terrain Analysis
Re-zoning Application
2966-2978 Carp Road
Ottawa (Carp), Ontario**

Consulting Engineers

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

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

patersongroup.ca

INTRODUCTION

Paterson Group Inc. (Paterson) was retained by Nautical Lands Group to conduct a Hydrogeological Assessment and Terrain Analysis in support of a Re-zoning Application for a proposed cheer academy located at 2966-2978 Carp Road in Ottawa (Carp), Ontario. It is our understanding that the current property consists of a 1.28 hectares (ha) parcel with an existing dwelling in the southern portion of the site. The proposed re-zoning application aims to change the zoning of the existing warehouse footprint that is designated as Rural Commercial (RC7) to include instructional facility and athletic & recreational facility use. For specific planning details, please refer to the consultant report application package and to the attached Key Plan for the approximate site location.

The purpose of this work has been to determine the suitability of the water supply aquifer underlying the site and to carry out a sewage system impact assessment (terrain analysis) to determine the site's suitability for private on-site sewage systems. Specifically, the intent of the report is to determine the quality and quantity of water underlying the subject site, as well as to provide the maximum sewage flow volume which the subject site can support from a nitrate attenuation standpoint.



BACKGROUND

Subject Site

The subject property consists of a warehouse with associated landscaped areas and parking lots, and a residential dwelling with associated landscaped areas and driveways located at 2966 and 2978 Carp Road in the City of Ottawa (Carp), Ontario. The ground surface across the site is relatively flat, with a general downslope direction to the east. The general overburden groundwater flow direction is assumed to be north to northeast towards the Carp River.

The Carp Road corridor and buildings onsite are serviced by private services. The site is bordered to the northeast and northwest by undeveloped lands, to the southwest by Carp Road, followed by residential properties, and to the southeast by a commercial property.

The subject site is largely rectangular in shape with a total area of 1.28 ha. The site is currently zoned as RC7 (Rural Commercial). The land parcels to the north and east are zoned RC9 (Rural Commercial), and the residential properties to the west are zoned RR5 (Rural Residential Zone).

Regional Geology

Published surficial geology mapping (OGS MRD128) for the area in the vicinity of the subject site indicates that the subject site is underlain predominantly by stone-poor silty sand to sandy silt-textured till on Paleozoic Terrain.

Published bedrock geology mapping (OGS MRD219) indicates that the subject lands are underlain by limestone and shale of the Simcoe Group and Verulam Formation. The available bedrock mapping coincides with the well driller's description on the Ministry of the Environment, Conservation and Parks (MECP) Water Well Records (WWR) for the surrounding well supplies installed within the subject area, which generally indicate a grey limestone.

Karst Mapping

Published karst mapping (OGS GRS005) for the area indicated that the subject site is not within a potential or inferred karst area.



MISSISSIPPI-RIDEAU SOURCE PROTECTION PLAN

The Mississippi-Rideau Source Protection Plan (MRSP) provides guidance as to which policies apply to a given property, municipality or specific activity and if there are specific designations that apply to the area. The subject site has been designated as a Highly Vulnerable Aquifer (HVA within the MRSP) and a Significant Groundwater Recharge Area (SGRA) and is identified as two of the four groundwater related vulnerable areas identified within the Clean Water Act (2006). The four vulnerable areas consists of HVA, SGRA, Intake Protection Zones (IPZ), and Wellhead Protection Areas (WHPA).

Based upon the designation, there are no restrictions of land uses on the subject site based upon its proposed usage. Therefore, there are no related requirements for an HVA or SGRA at this location.

Hydrogeological Pre-Consultation

A City of Ottawa pre-consultation was completed on August 27, 2025 to discuss the requirements for the hydrogeological assessment and terrain analysis of the subject site. Initial discussions were completed by email prior to the meeting.

FIELDWORK PROGRAM

Well Testing

As a means to demonstrate the adequacy of the aquifer underlying the subject lands, with respect to water quality and quantity, the existing drilled well (TW1) servicing the existing warehouse was tested. TW1 has a Water Well Record (WWR) Well ID of A212621. TW1 has a 150 mm diameter steel casing that extends to 6.82 m bgs with a 0.45 m stick up. The well itself extends to a depth of 58.9 m bgs. According to the water well record, limestone bedrock was recorded at a depth of approximately 4.34 m bgs. Based on available geological mapping, the drift thickness at TW1 varies from 2 to 3 m.

As a means to evaluate the water supply aquifer intercepted by the well, the well was subjected to a 8-hour constant rate pumping test. The pumping test was conducted on March 22, 2022 under the full-time supervision of Paterson personnel. Prior to the pumping test a data-logger was installed to monitor the background groundwater levels.

The existing submersible pump was used for the 8-hour pumping test. A licensed water well technician (Air Rock) completed the necessary plumbing related activities. The discharge line was placed at a sufficient distance to ensure that the discharge water was being directed away from the well and the septic system onsite. Upon completion of the test, the system was returned to its normal configuration.

The pumping test was carried out at a pumping rate of 45 L/min for a duration of 8 hours. During the pumping test, the pumping rate was periodically measured using the timed volume correlation method. The pumping rate was maintained within 5% of the selected



pumping rate. The static water level was recorded manually and an electric datalogger (VanEssen TD-Diver) was installed in the test well prior to the start of the pumping test.

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

Recovery data was collected from the well following the completion of the pumping. The well was noted to have achieved 100% recovery approximately 1 minute after the completion of pumping.

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

All samples were collected unfiltered and unchlorinated and were placed directly into clean bottles supplied by the analytical laboratory. Samples were placed immediately into a cooler with ice and were transported directly to Environmental Testing Canada Inc.(Eurofins) laboratory in Ottawa. All samples were received by the laboratory within 24 hours of collection.

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

Total coliforms were detected in the analytical testing of TW1 during the pumping test at 19 ct/100 mL (TW1-GW1) in the sample taken 4 hours into the pumping test and at 23 ct/100 mL (Tw1-GW2) at 8 hours into the pumping test.

Paterson personnel went to site on April 1, 2022 to disinfect TW1 as per the Ministry of the Environment, Conservation and Parks (MECP) disinfection instruction sheet, attached. The existing submersible pump was used to circulate the water column in order to ensure proper mixing of the disinfectant. Paterson personnel confirmed the presence and adequate mixing of the disinfectant.

On April 4, 2022, Paterson personnel confirmed the presence of free chlorine within the well water. The well was purged using the existing submersible pump to remove residual free chlorine prior to obtaining a bacteriological sample. The discharge locations were placed at a sufficient distance to ensure that the discharge water was being directed away from the wellhead.



TW1 was pumped for 8 hours at a rate of approximately 15 L/min. Paterson personnel confirmed that the free chlorine residual was 0 mg/L prior to the collection of the bacteriological sample (GW1) at the end of 8 hours of purging the well.

All samples were collected unfiltered and unchlorinated and were placed directly into clean bottles supplied by the analytical laboratory. Samples were placed immediately into a cooler with ice and were transported directly to the Eurofins Environmental Testing Canada Inc. (Eurofins) laboratory in Ottawa. All samples were received by the laboratory within 24 hours of collection.

Total Coliforms were reported as 4 ct/100 mL in the analytical testing of TW1 after the disinfection process. E. Coli was found to be non-detect as per the original results.

Additional sampling was completed on October 8, 2025 for the parameters of E.Coli, Total Coliforms and Nitrates/Nitrites. The sampling was completed by Nelson Water Inc. Total Coliforms and E.Coli were noted to be non-detect. Nitrate was found to be 0.25 mg/L and Nitrite was found to be non-detect.



Aquifer Analysis

Water Quantity

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

Table 1: SUMMARY OF WATER SUPPLY AQUIFER CHARACTERISTICS OF TW1	
AQUIFER PARAMETER	RESULT OF ANALYSIS
Transmissivity (m ² /day)	1,224
Pumping Rate (L/min)	45
Pre-test Static Water Level (m BTOC)	3.20
Post-test Static Water Level (m BTOC)	3.26
Maximum Drawdown (m BTOC)	3.34
Available Drawdown (m)	55.7
% Drawdown During Pumping Test (%)	0.3
Specific Capacity (L/min/m drawdown)	321

The drawdown data was analyzed using the Theis and Cooper Jacob methods of analysis. Aquifer transmissivity is estimated to be 1,224 m²/day. Refer to the Theis and Cooper Jacob methods of analysis data sheets attached to this report.

The pumping test results show that TW1 has a high yield to support the water demands that may be required. Overall maximum drawdown at a constant pumping rate for a period of 8 hours was approximately 0.14 m (0.3% of the available drawdown), but only 0.06 m at the end of the test period. 95% recovery was achieved approximately one minute after the end of pumping. It should be noted that the water level was measured to be increasing throughout the 8-hour constant rate pumping test.

The total volume of water pumped during the 8-hour pumping event was approximately 21,600 L. This is approximately 3.2 times the maximum total daily design volume of effluent (6,418 L/d) using 57% nitrate reduction required to support the Re-zoning Application. Further discussion in the Terrain Analysis notes an additional technology that can support greater than 10,000 L/day, however the 6,418 L/day is above the required flows as calculated under Part 8 – OBC for a subsequent application.

The suitability of the aquifer to support the proposed Re-zoning application was assessed using the methodology provided in the City of Ottawa Hydrogeological and Terrain Analysis Guidelines (HTAG).



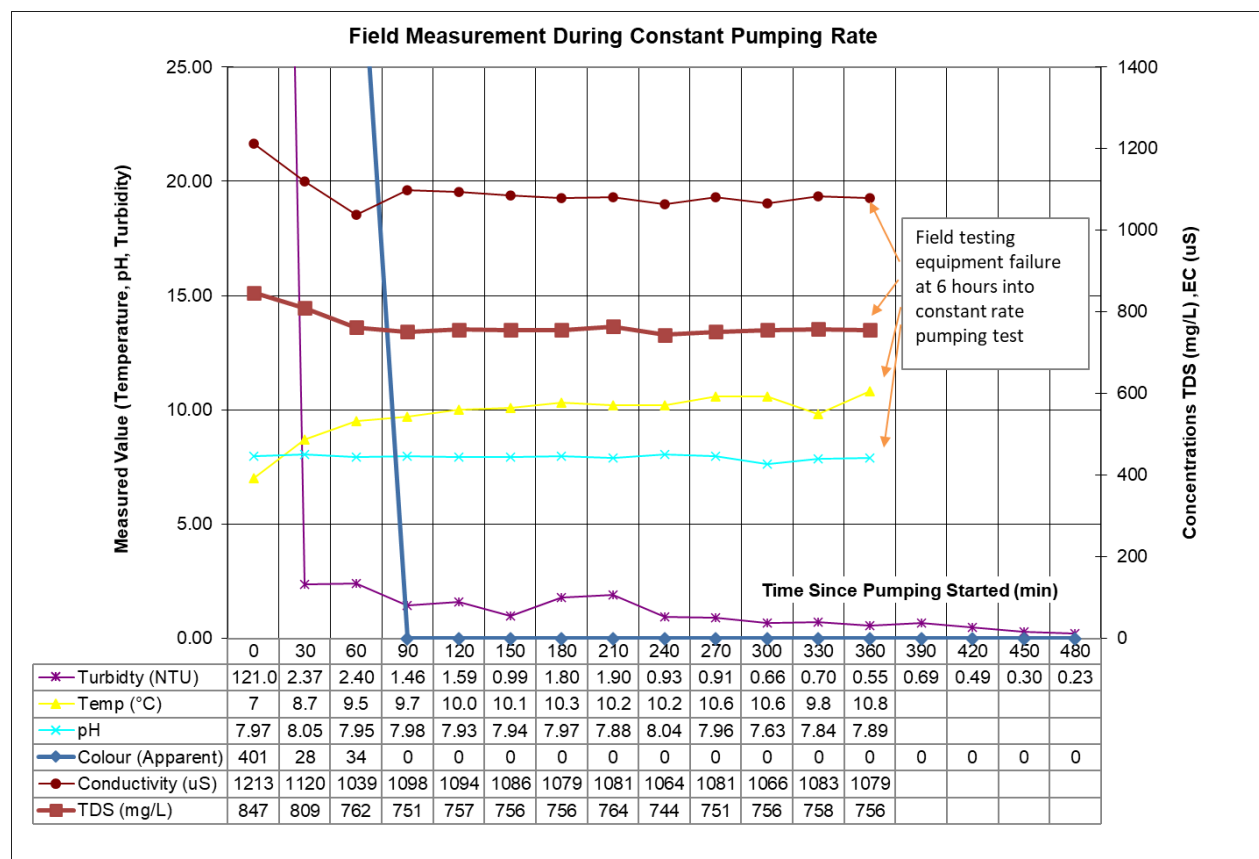
Based on the information summarized in Table 1, it is readily apparent that the water supply well has intercepted an adequately strong water supply aquifer which has sufficient quantity to service the proposed zoning usages.

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

Water Quality

Field Data

Turbidity, electrical conductivity, total dissolved solids (TDS), pH, true color and temperature were measured at the wellhead during the pumping test. The measurements and time intervals for each of these parameters are summarized on the graphical representation below. In addition, a HACH Pocket Colorimeter II chlorine reader was used to measure the free chlorine residual level. No chlorine residual was detected in the discharged water prior to the collection of the water samples. During the constant rate pumping test, the field-testing equipment which tests for pH, TDS, EC, and temperature malfunctioned at the 6-hour point. These parameters were noted to have stabilized prior to the malfunction of the equipment.





Laboratory Data

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

TABLE 2a: GROUNDWATER MICROBIOLOGY & GENERAL GEOCHEMISTRY						
PARAMETER	UNITS	ODWS		TW1		
		LIMIT	TYPE	GW1 (4 hr)	GW2 (8 hr)	GW1
				2022-03-22	2022-03-22	2022-04-04
MICROBIOLOGICAL						
Escherichia Coli (E.Coli)	ct/100mL	0	MAC	0	0	0
Total Coliforms	ct/100mL	0	MAC	19	23	4
GENERAL CHEMICAL - HEALTH RELATED						
Fluoride (F)	mg/L	1.5	MAC	<0.10	<0.10	-
Ammonia (N-NH ₃)	mg/L	-	-	<0.010	<0.010	-
Nitrite (N-NO ₂)	mg/L	1	MAC	<0.10	<0.10	-
Nitrate (N-NO ₃)	mg/L	10	MAC	3.15	3.02	-
Total Kjeldahl Nitrogen	mg/L	-	-	0.25	0.48	-
Turbidity (Field)	NTU	1.0 (5.0)	MAC/AO	0.93	0.23	-
Turbidity (Laboratory)	NTU	1.0 (5.0)	MAC/AO	0.50	0.50	-
GENERAL CHEMICAL - AESTHETIC RELATED						
Alkalinity (as CaCO ₃)	mg/L	30-500	OG	251	243	-
Chloride (Cl)	mg/L	250	AO	135	142	-
Colour	TCU	5	AO	<2	<2	-
Colour (Field - Apparent)	TCU	5	AO	0	0	-
Conductivity	uS/cm	-	-	1,180	1,180	-
Dissolved Organic Carbon	mg/L	5	AO	2.40	2.40	-
Hardness (as CaCO ₃)	mg/L	100	OG	454	451	-
Ion Balance	unitless	-	-	0.97	0.97	-
pH	unitless	6.5-8.5	AO	7.95	7.93	-
Phenols	mg/L	-	-	<0.001	<0.001	-
Sulphate (SO ₄)	mg/L	500	AO	182	175	-
Sulphide (S ₂ ⁻)	mg/L	0.05	AO	<0.01	<0.01	-
Tannin & Lignin	mg/L	-	-	1.00	1.00	-
Total Dissolved Solids	mg/L	500	AO	767	767	-

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

**TABLE 2b: GROUNDWATER GEOCHEMISTRY - METALS**

PARAMETER	UNITS	ODWS		TW1	
		LIMIT	TYPE	GW1 (4 hr)	GW2 (8 hr)
				2022-03-22	2022-03-22
Volatiles					
Aluminum (Al)	mg/L	0.1	OG	<0.01	<0.01
Antimony (Sb)	mg/L	0.006	IMAC	<0.0005	<0.0005
Arsenic (As)	mg/L	0.01	IMAC	<0.001	<0.001
Barium (Ba)	mg/L	1.0	MAC	0.12	0.12
Beryllium (Be)	mg/L	-	-	<0.0005	<0.0005
Boron (B)	mg/L	5.0	IMAC	0.04	0.04
Cadmium (Cd)	mg/L	0.005	MAC	<0.0001	<0.0001
Calcium (Ca)	mg/L	-	-	162	161
Chromium (Cr)	mg/L	0.05	MAC	<0.001	<0.001
Cobalt (Co)	mg/L	-	-	<0.0002	<0.0002
Copper (Cu)	mg/L	1.0	AO	<0.001	<0.001
Iron (Fe)	mg/L	0.3	AO	<0.03	<0.03
Lead (Pb)	mg/L	0.01	MAC	<0.001	<0.001
Magnesium (Mg)	mg/L	-	-	12	12
Manganese (Mn)	mg/L	0.05	AO	<0.01	<0.01
Mercury (Hg)	mg/L	0.001	MAC	<0.0001	<0.0001
Molybdenum (Mo)	mg/L	-	-	<0.005	<0.005
Nickle (Ni)	mg/L	-	-	<0.005	<0.005
Potassium (K)	mg/L	-	-	2	2
Selenium (Se)	mg/L	0.05	MAC	<0.001	<0.001
Silver (Ag)	mg/L	-	-	<0.0001	<0.0001
Sodium (Na)	mg/L	200	AO	77	75
Strontium (Sr)	mg/L	-	-	0.879	0.876
Thallium (Tl)	mg/L	-	-	<0.0001	<0.0001
Uranium (U)	mg/L	0.02	MAC	<0.001	<0.001
Vanadium (V)	mg/L	-	-	<0.001	<0.001
Zinc (Zn)	mg/L	5.0	AO	<0.01	<0.01

1. ODWS identifies the following types of parameters:

MAC = Maximum Acceptable Concentration

IMAC = Interim Maximum Acceptable Concentration

AO = Aesthetic Objective

OG = Operational Guideline

2. Shaded Concentration Indicates an Exceedance of the ODWS Objective



TABLE 2c: GROUNDWATER GEOCHEMISTRY - VOLATILES

PARAMETER	UNITS	ODWS		TW1	
		LIMIT	TYPE	GW1 (4 hr)	GW2 (8 hr)
				2022-03-22	2022-03-22
VOCs Surrogates					
1,2-dichloroethane-d4	%	-	-	100	119
4-bromofluorobenzene	%	-	-	71	76
Toluene-d8	%	-	-	91	98
Volatiles					
1,1,1,2-tetrachloroethane	µg/L	-	-	<0.5	<0.5
1,1,1-trichloroethane	µg/L	-	-	<0.4	<0.4
1,1,2,2-tetrachloroethane	µg/L	-	-	<0.5	<0.5
1,1,2-trichloroethane	µg/L	-	-	<0.4	<0.4
1,1-dichloroethane	µg/L	-	-	<0.4	<0.4
1,1-dichloroethylene	µg/L	14.0	MAC	<0.5	<0.5
1,2-dichlorobenzene	µg/L	200.0	MAC	<0.4	<0.4
1,2-dichloroethane	µg/L	5.0	IMAC	<0.2	<0.2
1,2-dichloropropane	µg/L	-	-	<0.5	<0.5
1,3,5-trimethylbenzene	µg/L	-	-	<0.3	<0.3
1,3-dichlorobenzene	µg/L	-	-	<0.4	<0.4
1,3-Dichloropropylene (cis+trans)	µg/L	-	-	<0.3	<0.3
1,4-dichlorobenzene	µg/L	5.0	MAC	<0.4	<0.4
Acetone	µg/L	-	-	<30	<30
Benzene	µg/L	1.0	MAC	<0.5	<0.5
Bromodichloromethane	µg/L	-	-	<0.3	<0.3
Bromoform	µg/L	-	-	<0.4	<0.4
Bromomethane	µg/L	-	-	<0.5	<0.5
c-1,2-Dichloroethylene	µg/L	-	-	<0.4	<0.4
c-1,3-Dichloropropylene	µg/L	-	-	<0.2	<0.2
Carbon Tetrachloride	µg/L	2.0	MAC	<0.2	<0.2
Chloroethane	µg/L	-	-	<0.2	<0.2
Chloroform	µg/L	-	-	<0.5	<0.5
Dibromochloromethane	µg/L	-	-	<0.3	<0.3
Dichlorodifluoromethane	µg/L	-	-	<0.5	<0.5
Dichloromethane	µg/L	50	MAC	<4.0	<4.0
Ethylbenzene	µg/L	140	MAC	<0.5	<0.5
Ethylene Dibromide	µg/L	-	-	<0.2	<0.2
Hexane	µg/L	-	-	<5	<5
m/p-xylene	µg/L	-	-	<0.4	<0.4
Methyl Ethyl Ketone (MEK)	µg/L	-	-	<10	<10
Methyl Isobutyl Ketone (MIBK)	µg/L	-	-	<10	<10
Methyl Tert Butyl Ether (MTBE)	µg/L	15	AO	<2	<2
Monochlorobenzene	µg/L	80	MAC	<0.5	<0.5
o-xylene	µg/L	-	-	<0.4	<0.4
Styrene	µg/L	-	-	<0.5	<0.5
t-1,2-Dichloroethylene	µg/L	-	-	<0.4	<0.4
t-1,3-Dichloropropylene	µg/L	-	-	<0.2	<0.2
Tetrachloroethylene	µg/L	10	MAC	<0.3	<0.3
Toluene	µg/L	60	MAC	<0.4	<0.4
Trichloroethylene	µg/L	5	MAC	<0.3	<0.3
Trichlorofluoromethane	µg/L	-	-	<0.5	<0.5
Vinyl Chloride	µg/L	1	MAC	<0.2	<0.2
Xylene; total	µg/L	90	MAC	<0.5	<0.5

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



The bacteriological test results (Certificate of Analysis – Report No. 1973843) indicated that the test samples at the 4- and 8-hour interval were non-detect (0 ct/100 mL) for E.Coli, however, Total Coliforms were detected at concentrations of 19 ct/100 mL and 23 ct/100 mL, respectively.

Paterson personnel returned to site to disinfect the well. After the disinfection of the well and subsequent pumping, a bacteriological test was performed on the well water (Certificate of Analysis – Report No. 1974461) which indicated that E. Coli was not present (0 ct/100 mL) and that only 4 ct/100 mL Total Coliforms were present in the well water. Paterson personnel confirmed that the free chlorine residual was 0 mg/L prior to the collection of the bacteriological sample.

A water sample was taken by others on October 8, 2025. A bacteriological test was performed on the well water (Certificate of Analysis – Report No. 4491110) which indicated E.Coli and Total Coliforms were both non-detect (0 ct/100 mL). Additionally, Nitrate and Nitrite were analyzed (Certificate of Analysis – Report No. 4492546) with Nitrates at 0.25 mg/L and Nitrites at <0.1 mg/L.

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

- ☐ Hardness (as CaCO_3)
- ☐ Total Dissolved Solids (TDS)

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

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

Hardness as CaCO_3

Hardness, expressed as calcium carbonate, is an operation guideline and does not appear in the ODWS. Rather, it appears in the Technical Support Documents for Ontario Drinking Water Standards, Objectives and Guidelines as a parameter with an operational guideline at 100 mg/L. At the measured concentrations of 454 and 451 mg/L, the water is considered to be very hard, however, it is below the reasonable treatable limit of 500 mg/L specified in Table 3 of the MOECC guidance document Procedure D-5-5 (1996), thus, hardness can be treated with readily available technologies.

It is recommended that water hardness be treated using conventional technologies such as water softening or reverse osmosis, if desired by the owner. Without treating hardness, scaling can occur which can result in discolouration and residue buildup on water fixtures, or reduction in boiler efficiency due to scale build-up. According to Health Canada's *Guidelines for Canadian Drinking Water Quality - Summary Tables* "Although hardness



may have significant aesthetic effects, a guideline has not been established because public acceptance of hardness may vary considerably according to the local conditions; major contributors to hardness (calcium and magnesium) are not of direct public health concern”.

Total Dissolved Solids (TDS)

TDS refers to the concentration of inorganic substances dissolved in water. The main constituents are typically chloride, sulphates, calcium, magnesium, and bicarbonates. The TDS concentration of 767 mg/L exceeds the Aesthetic Objective of 500 mg/L. At concentrations above 500 mg/L, some consumers may find the taste objectionable, however, as the objective is an aesthetic objective, no treatment is required. It is, however, recommended that a point-of-use reverse osmosis unit be installed or to provide bulk bottled water on an as-needed basis for drinking water purposes. As such, no taste problems will occur when the system is used, or bottled water is consumed.

The Langelier calculation provided an LSI of 0.7. Based on the evaluation of the result, the water is super saturated and tends to precipitate a scale layer of calcium carbonate (scale forming but non-corrosive). Based on the range of stability in the positive direction, it is recommended that water softening be used to prevent scaling. See Langelier Saturation Index Calculation attached for calculation details.

Total Coliforms

Total Coliforms are a type of bacteria which naturally occur in soil and decaying vegetation. Total Coliforms may also be associated with animal and/or human waste.

The maximum acceptable concentration (MAC) for Total Coliforms for potable drinking water in support of a Re-zoning application, as established by the City of Ottawa Hydrogeological and Terrain Analysis Guidelines (HTAG, 2021), is less than 6 ct/100 mL. According to the City of Ottawa HTAG, Total Coliforms counts of less than 6 per 100 mL sample shall be considered indicative of acceptable water quality.

Total Coliforms were detected at 19 and 23 count per 100 mL at the 4- and 8- hour mark of the pumping test, respectively. After disinfecting the well and purging the chlorinated water, Total Coliforms were detected at 4 ct/100 mL. 4 ct/100 mL Total Coliforms is below the City of Ottawa HTAG standard of less than 6 ct/100 mL.

As the site is not hydrogeologically sensitive (competent bedrock was encountered during the field investigations at depths of 2.4 to 5.9 m bgs), and is not located in an area which is mapped as potentially karstic, the Total Coliform level of 4 ct/100 mL. The subsequent analytical results in October 2025 indicate that Total Coliforms is non-detect (0 ct/100 mL) and is considered acceptable.

Consideration should be given to utilizing a Ultraviolet (UV) disinfection system on the water supply entering the existing warehouse and proposed development. Additionally,



the turbidity was less than 1 NTU, indicating that there should be no turbidity based interference in disinfection.

Sodium

Sodium (Na), an aesthetic parameter, was detected in the laboratory test sample at a concentration of 77 and 75 mg/L, which does not exceed the ODWS aesthetic objective of 200 mg/L. Although sodium is not toxic and no MAC has been set, concentrations above 20 mg/L require that the Medical Officer of Health be notified of the water quality results, so that this information may be passed on to local physicians for use in treatment of those requiring a sodium-restricted diet.



TERRAIN ANALYSIS

The fieldwork which was completed as part of a Geotechnical Investigation for the site (PH3834-1R, dated January 5, 2017; and PG3834-2, dated March 1, 2022) is used in support of this assessment. Additional information pertaining to this investigation was gathered from available geological mapping and surrounding WWRs.

Surficial Geology

A series of test pits were excavated on the subject parcel to delineate the subsurface soil conditions as part of a Geotechnical Field Investigation. On February 8, 2022, seven (7) test pits were completed on the property. A previous investigation (PG3834-1R, dated January 5, 2017) was completed at the subject site in June and November 2016, during which fourteen (14) test pits were excavated and eleven (11) boreholes were completed onsite. The location of the test pits are delineated on the drawing PH5103-1-Test Hole Location Plan, attached. Note that the site plan on the drawing is not reflective of the proposed usage.

The test hole locations were recorded and the subsurface conditions, including the soil morphology and depth to the groundwater table (if encountered), were carefully observed and recorded. The soils encountered were classified texturally in the field and later reviewed in the laboratory.

The boreholes and test pits were advanced to a maximum depth of 5.9 and 3.4 m below ground surface (bgs), respectively. Bedrock was recorded in the WWR for TW1 at 4.34 m bgs. Refusal to excavation was recorded at depths ranging from 0.7 m to 5.9 m bgs on fractured bedrock. Competent bedrock was encountered at depths of 2.4 to 5.9 m bgs.

The subsurface profile generally consisted of topsoil extending to a maximum depth of 0.6 m bgs, underlain by silty sand to sandy silt with gravel, cobbles, boulders and trace clay which extend to a maximum depth of 1.9 m bgs. Frost heave/ frost shattered bedrock infilled with silty sand, gravel, cobbles, and boulders (unconsolidated soils) was observed under the silty sand to sandy silt with gravel, cobbles, boulders and trace clay. The testhole logs note split spoon sampling within this layer with significant sample recovery. TP1-22, TP2-22, TP6-22, and TP7-22 noted a fill of varying composition underlying the topsoil extending to depths of 1.75 m bgs. Groundwater was observed at depths between 3.6 to 4.3 m bgs in the boreholes and test pits.

Reference should be made to the borehole logs appended to this report for the details of the soil profiles encountered at each test hole location. The client should be aware that any information pertaining to soils are furnished as a matter of general information only and borehole descriptions are not to be interpreted as descriptive of conditions at locations other than those described by the boreholes themselves.



Materials encountered during Paterson's Geotechnical Investigation were generally consistent with the available surficial and bedrock geology mapping.

Hydrogeological Sensitivity of the Site

The subject site currently consists of a warehouse and residential dwelling. The dwelling is currently unoccupied. The topography of the site is generally sloping downwards to the east. The local flow direction of the surficial aquifer is expected to be in the northeasterly direction towards the Carp River. The regional groundwater flow is considered to be in the northeast direction towards the Ottawa River.

The onsite overburden generally consists of topsoil overlying a brown silty sand with gravel, cobbles, boulders and trace clay which is underlain by a fractured bedrock (frost heave/frost shatter) infilled with unconsolidated soils. The unconsolidated soils are noted to have 50 to 80% recovery during split spoon sampling within this stratum. Competent bedrock was encountered during the field investigations at depths of 2.4 to 5.9 m bgs. The frost heave bedrock noted during the borehole field investigation contained high amounts of interspersed silty sand to sandy silt (unconsolidated soils), and some clay with fragmented bedrock. For the purposes of hydrogeological sensitivity, the "fractured bedrock" unit is considered an unconsolidated soil which would provide separation from the ground surface and the underlying competent bedrock. Furthermore, based on hydraulic conductivity testing, the fastest onsite T-time was 13.8 min/cm, which is an order of magnitude slower than the T-time of less than 1 min/cm required for highly permeable soils. There were five additional test locations completed that have estimated T-times in the range of 20 to 40 mins/cm and are all considered to be not hydrogeologically sensitive. Based on this, the soils and underlying interbedded materials are not considered as highly permeable when reviewing against Ontario Building Code (OBC) Section 8.7.2.1 (1) (b)(i) and the MMAH Supplementary Standards SB-6.

Refusal to excavation was recorded on competent bedrock ranging from 2.4 to 5.9 m bgs. According to the geotechnical investigation, the overburden thickness (which includes the fractured bedrock unit with interspersed unconsolidated soils) was observed to be greater than 2 m at all borehole locations. The subject site does not have any mapped karst topography on site. Furthermore, from the TW1 WWR, bedrock was observed at a depth of 4.34 m bgs. As the proposed site does not have bedrock within 2 m of the ground surface, the site is not considered hydrogeologically sensitive. Although mitigative measures, such as increased separation distances, are not required, there is sufficient space onsite to keep the onsite well greater than 30 m away from any onsite septic components.



Conceptual Lot Development

As this Terrain Analysis is completed to support a Re-zoning Application, a Site Plan is not available.

Sewage System Design and Total Daily Design Sewage Flow

As this Terrain Analysis is completed to support a Re-zoning Application, a Site Plan is not available at this time. As such a sewage system design and flows have not yet been completed. A maximum predicted nitrate concentration will be determined for the site as a whole, and the current assessment will be completed based on existing conditions.

The proposed property will be analyzed as part of the Re-zoning Application to ensure the theoretical impacts are below the Ontario Drinking Water Objective maximum allowable concentration of 10 mg/L of nitrate in the groundwater prior to the property line.

PREDICTIVE NITRATE IMPACT ASSESSMENT

Nitrate is considered to be a critical parameter of concern when assessing impacts to groundwater quality downgradient of an onsite sewage system. The City of Ottawa annotated MECP Procedure D-5-4 in the Hydrogeological and Terrain Analysis Guidelines (HTAG) applies for the proposed development. For the purpose of this guideline, the Ontario Drinking Water Objective of 10 mg/L of nitrate is the maximum allowable concentration detectable in the groundwater prior to the property line.

A detailed impact assessment is required due to the proposed zoning of the site. In order to demonstrate that private services would adequately support the proposed Re-zoning Application, a predictive nitrate impact assessment for the subject site was completed. This calculation was completed to determine the maximum sewage flow volume which could be applied to the subject site with the current site conditions. As the site is within the Carp Road Corridor, the use of tertiary treatment systems (nitrate reducing systems) are allowed to be considered in support of re-zoning. The values shown in the Predictive Nitrate Impact Assessment calculation attached to this report are summarized below:

☐	Site area	1.28 ha
☐	Impervious area %	45 %
☐	Concentration of nitrate in effluent (Value based on conventional effluent concentration)	40 mg/L
☐	Concentration of nitrate in effluent (Value based on using NSF 245/BNQ certified 57% nitrate reduction technology)	17.2 mg/L



- ❑ Surplus Water 378 mm/year
(The surplus water value was estimated based on Environment Canada Climate Office values with a soil type comprised of clay loam (urban lawn) and anthropogenic sources, which can be found attached.)

- ❑ Combined infiltration factor based on: 0.67
 - Topography infiltration factor 0.25
 - Soil texture infiltration factor 0.30
 - Cover infiltration factor 0.12

The topography infiltration factor of 0.25 is based upon a slope between “flat land” (<0.6 m/km) and “rolling land” (average slope of 2.8 to 3.8 m/km) based on available mapping.

The soil texture infiltration factor was based upon a soil that is between “open sandy loam” with a value of 0.4 and “medium combinations of clay and loam” with a value of 0.2 which is a reasonable generalization based upon the field investigation by Paterson, available geological mapping and surrounding WWRs.

The “vegetative cover infiltration factor” was calculated as 0.12 based upon the site being used as cultivated land with some trees throughout the site.

As part of the rezoning process, the City of Ottawa does not typically allow the use of tertiary treatment systems to support the re-zoning application, however, as the site is within the Carp Road Corridor, tertiary treatment systems can be used to support the re-zoning application. As a tertiary treatment system requires annual monitoring by the Ottawa Septic System Office (OSSO), and allows for advanced treatment of sewage effluent, a tertiary treatment system is being reviewed for the Subject Site. The mandatory monitoring required on tertiary treatment systems by the OSSO ensures that the system is properly maintained and replaced when required, whereas there is no mandatory monitoring on a conventional sewage system. In order to demonstrate the viability and sustainability aspects of private servicing on the subject site, a Nitrate Impact Assessment was completed using the above noted parameters.

The predicted nitrate concentration calculation for a conventional sewage system (system without nitrate reduction) results in a maximum of **1.58 m³/day** of effluent using a nitrate concentration of 40 mg/L. The inclusion of nitrate reduction technology (57 % nitrogen reduction in the of the effluent nitrate) would result in a maximum of **6.42 m³/day** of effluent using a nitrate concentration of 17.2 mg/L. The Waterloo-Biofilter technology (WaterNOx) is capable of up to 90% nitrate reduction, which would allow greater than **10 m³/day**. Both maximum sewage flow volumes with their respective reduced nitrate concentrations meet the nitrate concentration threshold of below 10 mg/L at the property boundary. Additional re-infiltration from stormwater (up to 10%) could be used to increase the dilution of septic effluent, if needed.



A sewage system installation application for a new sewage system on any site in the City of Ottawa with a sewage flow volume of less than 10 m³/day will require an OSSO application.

CONCLUSIONS

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

1. The water supply aquifer underlying the subject site is considered to be adequate to support the water quantity demands for the proposed zoning uses.
2. The preferred water supply intercepted by TW1 contains a water supply that is potable and contains only elevated concentrations of hardness and TDS. The noted parameters can be treated with current readily available water conditioning equipment.
3. Total Coliforms were detected at 0 ct/100 mL, however, it is recommended that a UV system is installed to assist in the removal of any potential Total Coliforms found in the groundwater, as a precautionary measure.
4. If desired by the property owner, a commercial grade water softener can be used to facilitate the reduction of the hardness concentration and reduce scaling. If a water softener is used for the proposed development, the owner should be made aware that additional sodium will be added to the water to reduce hardness. If desired, a point-of-use reverse osmosis system can be used to provide a drinking tap source without increasing sodium levels.
5. It is recommended that either a point-of-use reverse osmosis system be used to reduce the TDS concentration, or bulk bottled water is provided as a drinking water source.
6. The subject site is sufficient in size to accommodate two new sewage systems and meet all of the regulatory separation criteria. As a precautionary measure, a 30 m setback should be maintained between the drinking water well and any septic system components.
7. A maximum sewage flow volume of **1.58 m³/day** at a nitrate concentration of 40 mg/L or **6.42 m³/day** at a nitrate concentration of 17.2 mg/L can be accommodated on the subject site based on the current layout and still be below the predictive nitrate concentration threshold of 10 mg/L at the property boundary.



8. Onsite sewage disposal needs can be accommodated with a Class 4 Sewage System utilizing tertiary treatment technologies.
9. A Sewage System Permit and Building Permit need to be issued prior to the commencement of construction on the proposed structures or amenities/services.
10. The results of the Hydrogeological Assessment and Terrain Analysis have provided satisfactory evidence that the subject site can support the proposed zoning usage with respect to water quality, quantity and sewage system placement.

We trust that the current submission satisfies your immediate requirements.

Best Regards,

Paterson Group Inc.

Alexander Schopf, PhD, EIT



Michael Killam, P.Eng

Attachments:

- ☐ Key Plan
- ☐ MECP Water Well Records – 1973843 & 1974461
- ☐ Eurofins Certificate of Analysis
- ☐ Paterson PG3834 - Test Pit and Borehole Logs
- ☐ AQTESOLV - Pumping Test Analysis Reports
- ☐ Langelier Calculation
- ☐ Nitrate Impact Assessment Calculations
- ☐ Paterson Drawing PH5103-1 - Test Hole Location Plan
- ☐ Well Disinfection Instruction Sheet





Figure 1 – Key Plan



Tag #: A 212621

Measurements recorded in: ☒ Metric ☐ Imperial

Page _____ of _____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
Nautical Lands Group			
Mailing Address (Street Number/Name)	Municipality	Province	Postal Code
2962 Carp Rd	Carp	ON	K0A1K0

Well Location

Address of Well Location (Street Number/Name)		Township	Lot	Concession
2978 Carp Rd.		West Carleton	10	2
County/District/Municipality		City/Town/Village	Province	Postal Code
Ottawa			Ontario	
UTM Coordinates	Zone	Easting	North	Municipal Plan and Sublot Number
NAD 83	18	421689	5017621	

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft)
brown	sand + gravel			From To
gray	limestone			0 4.34
				4.34 58.90

Annular Space			
Depth Set at (m/ft)	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)	
From To			
0 6.20	Cement Grout	.14	

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

Construction Record - Casing				Status of Well	
Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft)		
			From To	☒ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☐ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☐ Abandoned, other, specify ☐ Other, specify	
15.55	Steel	.48	0 6.82		

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

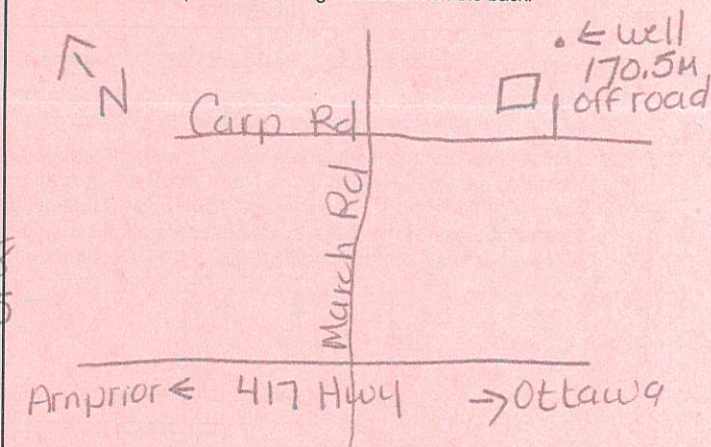
Water Details		Hole Diameter	
Water found at Depth (m/ft)	Kind of Water: ☐ Fresh ☒ Untested	Depth (m/ft)	Diameter (cm/in)
23.25		From To	
		0 6.20	27.28
58.90		6.20 58.90	15.55

Well Contractor and Well Technician Information			
Business Name of Well Contractor		Well Contractor's Licence No.	
George H. Law + Son Ltd		313 213	
Business Address (Street Number/Name)		Municipality	
4848A Calabogie Rd, Box 155 Calabogie			
Province	Postal Code	Business E-mail Address	
ON	K0J1H0		
Bus. Telephone No. (inc. area code)		Name of Well Technician (Last Name, First Name)	
613 752 2080		Fougere Allan	
Well Technician's Licence No.		Signature of Technician and/or Contractor	
041312		Allan Fougere	
		Date Submitted	
		20170515	

Results of Well Yield Testing					
After test of well yield, water was: ☒ Clear and sand free ☐ Other, <i>specify</i>	Draw Down		Recovery		
	Time (min)	Water Level (m/ft)	Time (min)	Water Level (m/ft)	
If pumping discontinued, give reason:	Static Level	2.16			
	1	2.23	1	2.16	
Pump intake set at (m/ft)	2	2.24	2	2.16	
Pumping rate (l/min / GPM)	3	2.25	3	↓	
Duration of pumping	4	2.26	4		
____ hrs + ____ min	5	2.27	5		
Final water level end of pumping (m/ft)	10	2.28	10		
If flowing give rate (l/min / GPM)	15	2.28	15		
Recommended pump depth (m/ft)	20	↓	20	↓	
	25		25		
Recommended pump rate (l/min / GPM)	30	↓	30		↓
Well production (l/min / GPM)	40	↓	40		
Disinfected?	50	2.28	50		2.16
☒ Yes ☐ No	60	2.28	60	2.16	

Map of Well Location

Please provide a map below following instructions on the back.



Comments:	Well owner's information package delivered ☒ Yes ☐ No	Date Package Delivered 20170512	Date Work Completed 20170516
Ministry Use Only		Audit No. 2242431	
Received			

Basin 25 | | | |

The Ontario Water Resources Commission Act, 1957

GROUND WATER BRANCH 004
15 N.
APR 6 1960
ONTARIO WATER
RESOURCES COMMISSION

WATER WELL RECORD

County or District..... Carleton Township, ~~Village, Town or City~~..... Huntley

Con. 2 ~~#~~ Lot 10 Date completed 18 mar 1960

(day month year)

Address Carp Ont.

Casing and Screen Record

Inside diameter of casing..... 4 "

Total length of casing..... 24'

Type of screen..... none

Length of screen.....

Depth to top of screen.....

Diameter of finished hole..... 4 "

Pumping Test

Static level..... 20'

Test-pumping rate..... 5..... G.P.M.

Pumping level..... 21'

Duration of test pumping..... $\frac{1}{2}$ hr

Water clear or cloudy at end of test..... clear

Recommended pumping rate..... 5..... G.P.M.

with pumping level of..... 21'

Well Log

Water Record

[illegible]

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

House

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

Upland

Drilling Firm. K L Sparks

Address South March

Ans

Licence Number 484

Name of Driller K L Sparks

Address South Branch Park

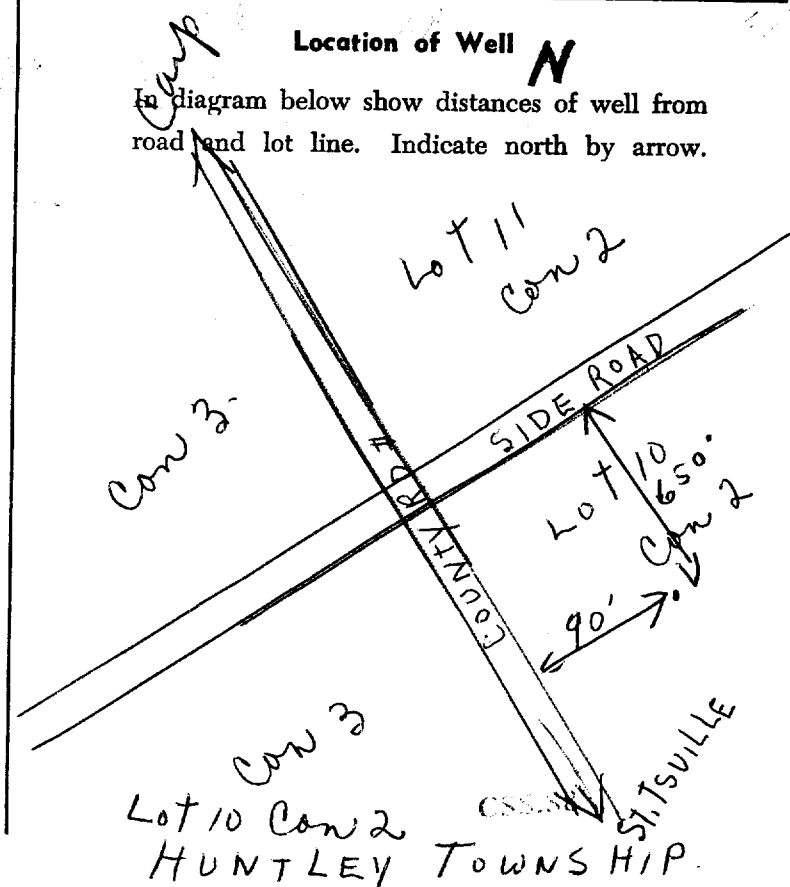
Address 2000 1/2 Rockwood Ave
Date May 18/60

Date August 10, 1961
K. L. Black

(Signature of Licensed Drilling Contractor)

Location of Well

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



UTM 18Z 422280E



15 No 3066

5R 5017910N

The Ontario Water Resources Commission Act

Elev. 4R 0388

WATER WELL RECORD

Basin 25

Carl

Township, Village, Town or City

Huntley

Con. II

Lot 10

Date completed

4

Nov

1985

Address 3159 Carling Ave

Casing and Screen Record

Inside diameter of casing 5"
Total length of casing 30'
Type of screen
Length of screen
Depth to top of screen
Diameter of finished hole 5"

Pumping Test

Static level 25'
Test-pumping rate 3 G.P.M.
Pumping level 75'
Duration of test pumping 1 hr
Water clear or cloudy at end of test cloudy
Recommended pumping rate 3 G.P.M.
with pump setting of 60 + 35' tailpipe feet below ground surface

Well Log

Water Record

Overburden and Bedrock Record

gravel & boulders
limestone

From ft.

To ft.

Depth(s) at which water(s) found

Kind of water (fresh, salty, sulphur)

0'
5'

5'
100'

70
95

sulphur
"

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

new house

Is well on upland, in valley or on hillside?

upland

Drilling or Boring Firm

Capital Water Supply

Address 1243 Heron Rd.
Ottawa 733-0600

Licence Number 1687

Name of Driller or Borer G Colburne

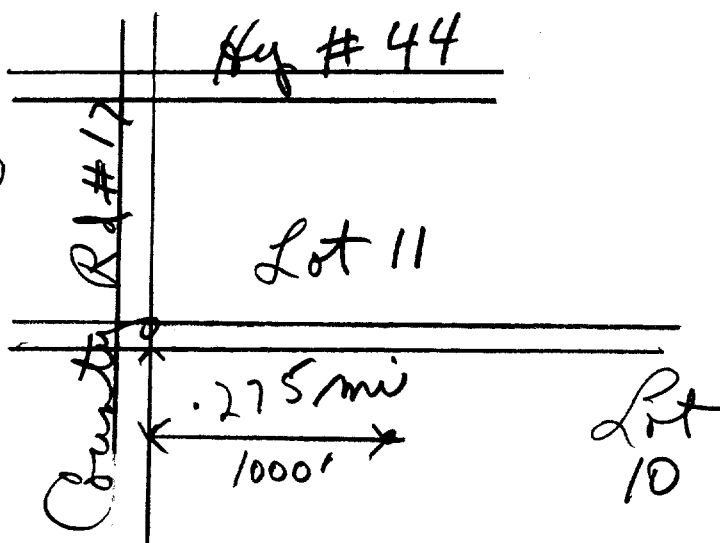
Address

Date 5 Nov 1965

Shalter Kavanagh
(Signature of Licensed Drilling or Boring Contractor)

Location of Well

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



98



GROUND WATER BRANCH
JUN 15 1962
ONTARIO WATER
RESOURCES COMMISSION

3069

UTM 18 Z 421735 E

5 R 5018140 N

The Ontario Water Resources Commission Act

Elev. 4 R 0380

WATER WELL RECORD

Basin 25
County or District *Carleton*

Township, Village, Town or City *Huntley*

Con. *2* Lot *11*

Date completed *28 May 62*
(day month year)

Address *RR3 Corp*

Casing and Screen Record

Inside diameter of casing *4 1/2"*
Total length of casing *12*
Type of screen
Length of screen
Depth to top of screen
Diameter of finished hole *4"*

Pumping Test

Static level *20'*
Test-pumping rate *6* G.P.M.
Pumping level *55'*
Duration of test pumping *1 1/2*
Water clear or cloudy at end of test *clear*
Recommended pumping rate *5* G.P.M.
with pump setting of *100* feet below ground surface

Well Log

Overburden and Bedrock Record

*previously drilled
limestone*

From
ft.

To
ft.

Depth(s) at
which water(s)
found

Kind of water
(fresh, salty,
sulphur)

<i>70</i>	<i>130</i>	<i>125'</i>	<i>fresh</i>
-----------	------------	-------------	--------------

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

house

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

upland

Drilling or Boring Firm

Ben E. Sparks

Address

Licence Number *700*

Name of Driller or Borer

Ben E. Sparks
413 Edgeworth

Address

Date *May 28/62*

(Signature of Licensed Drilling or Boring Contractor)

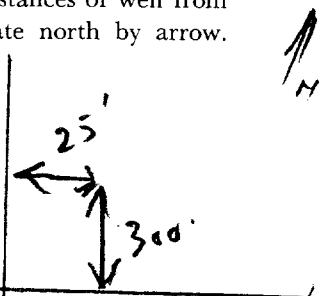
Ben E. Sparks

Form 7 15M Spts. 60-3930

OWRC COPY

Location of Well

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



RD 17

*CON 2
LOT 10*

UTM 18Z 421660E

ONTARIO WATER
RESOURCES COMMISSION9961 15 No
MAY 1 1966

3127

WATER RESOURCES
DIVISION

5R 5018059N

The Ontario Water Resources Commission Act

Elev. 4R 0375

WATER WELL RECORD

Basin 25 | | CANLETON

Township, Village, Town or City

Con. 3 Lot 11

Date completed

15 MAR 66
(day month year)

Address

CARR PR

Casing and Screen Record

Inside diameter of casing 4

Total length of casing 10

Type of screen

Length of screen

Depth to top of screen

Diameter of finished hole 4

Pumping Test

Static level 15

Test-pumping rate 3 G.P.M.

Pumping level 50

Duration of test pumping 1 HR

Water clear or cloudy at end of test Clear

Recommended pumping rate 3 G.P.M.

with pump setting of 70 feet below ground surface

Well Log

Water Record

Overburden and Bedrock Record

From
ft.To
ft.Depth(s) at
which water(s)
foundKind of water
(fresh, salty,
sulphur)

GRAVEL

0

10

Limestone

10

81

80

FRESH

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

House

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

Drilling or Boring Firm

F.P. SPARKS

Address STITTSVILLE

Licence Number

Name of Driller or Borer C. SPARKS

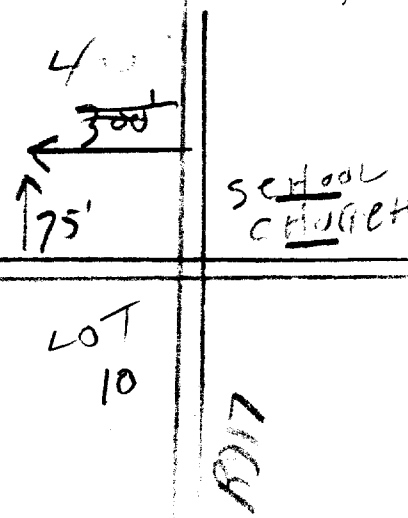
Address

Date 4/10/66

(Signature of Licensed Drilling or Boring Contractor)

Location of Well

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





Ministry
of the
Environment

Ontario

The Ontario Water Resources Act

WATER WELL RECORD

1. PRINT ONLY IN SPACES PROVIDED

2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

11

1517377

MUNICIP

15.005

CON

Cqn

02

COUNTY OR DISTRICT

TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE

CON. BLOCK, TRACT, SURVEY, ETC.

LOT

Carleton Place

West Carleton (Hanley)

Con 2.

010

DATE COMPLETED

DAY 30 MO 10 YR 80

18.199

4

0280

4

26

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET	
				FROM	TO
grey	clay	stones		0	12
grey	shaly limestone			12	84

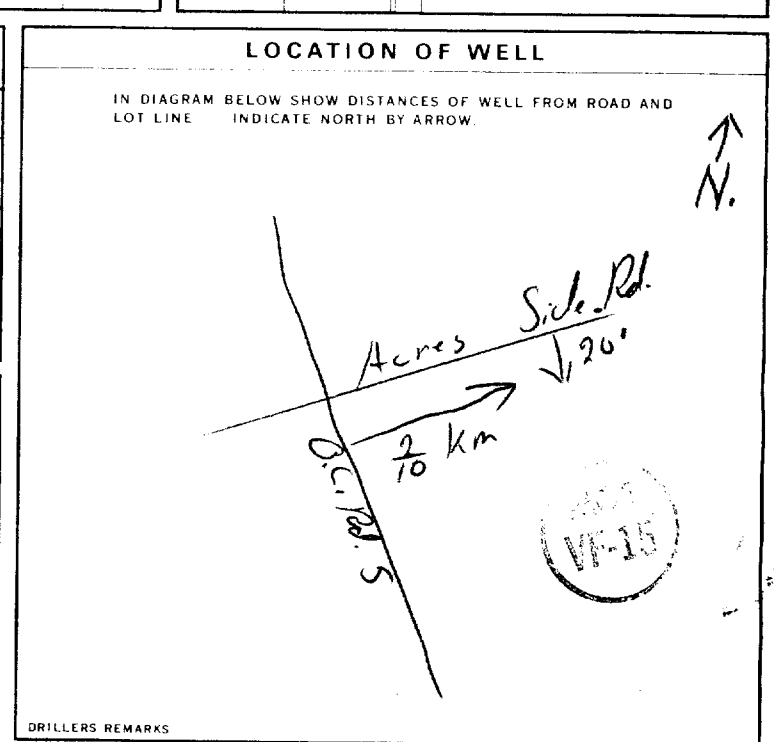
001720512	008421582
-----------	-----------

WATER RECORD	
WATER FOUND AT - FEET	KIND OF WATER
0080	1 ☒ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
15-18	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
20-23	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
25-28	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
30-33	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL

CASING & OPEN HOLE RECORD	
INSIDE DIAM. INCHES	MATERIAL
061/59	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE
17-18	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE
24-25	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE

SCREEN	
SIZE OF OPENING (SLOT NO.)	DIAMETER
31-33	34-38
LENGTH	39-40
FEET	FEET
41-44	10
PLUGGING & SEALING RECORD	
DEPTH SET AT - FEET	MATERIAL AND TYPE
10-13	14-17
18-21	22-25
26-29	30-33

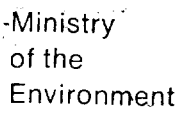
PUMPING TEST	
71	PUMPING TEST METHOD
1 ☒ PUMP 2 ☐ BAILER	
STATIC LEVEL	WATER LEVEL END OF PUMPING
025	080
19-21	22-24
FEET	FEET
IF FLOWING, GIVE RATE	PUMP INTAKE SET AT
38-41	42
GPM	FEET
RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING
1 ☐ SHALLOW 2 ☒ DEEP	080
43-45	46-49
FEET	GPM



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

CONTRACTOR	
NAME OF WELL CONTRACTOR	LICENCE NUMBER
Henry Mains Well Drilling	3644
ADDRESS	
Box 326, Richmond Ont.	
NAME OF DRILLER OR BORER	LICENCE NUMBER
Henry Mains	
SIGNATURE OF CONTRACTOR	SUBMISSION DATE
	DAY 11 MO 11 YR 80

OFFICE USE ONLY	
DATA SOURCE	CONTRACTOR
1	3644
DATE OF INSPECTION	INSPECTOR
	km
REMARKS	



WATER WELL RECORD

102

LOT	25.27
-----	-------

41-3 10

DATE COMPLETED ⁴⁸⁻⁵³
DAY 10 MO 5 YR. 88

Figure 1 consists of five horizontal bar charts, each representing a different type of basin: NG, RC, ELEVATION, RC, and BASIN CODE. The x-axis for all charts is divided into four categories: I, II, III, and IV. The y-axis represents the percentage of basins. The data is as follows:

Basin Type	Category I (%)	Category II (%)	Category III (%)	Category IV (%)
NG	10	10	10	10
RC	10	10	10	10
ELEVATION	10	10	10	10
RC	10	10	10	10
BASIN CODE	10	10	10	10

[illegible]

31

32

1 2

10 14 15

21

32

43

54

64

75

2	SIZE(S) OF OPENING (SLOT NO.)	31-33	DIAMETER	34-38	LENGTH	39-40

SCREEN	MATERIAL AND TYPE		INCHES	FEET
			DEPTH TO TOP OF SCREEN	41-44
				10
		FEET		

61 PLUGGING & SEALING RECORD				
DEPTH SET AT - FEET		MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER ETC.)		
FROM	TO			
0-13	13-27	Cement Grout.		
18-21	22-25			
26-29	30-33			
		80		

LOCATION OF WELL

LOCATION OF WELL

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

25' x WELL
50'

HOUSE

CAVANAGH DRIVE

32740

FINAL STATUS OF WELL	1 ☒ WATER SUPPLY	5 ☐ ABANDONED, INSUFFICIENT SUPPLY
	2 ☐ OBSERVATION WELL	6 ☐ ABANDONED, POOR QUALITY
	3 ☐ TEST HOLE	7 ☐ UNFINISHED
	4 ☐ RECHARGE WELL	8 ☐ DEWATERING

WATER USE

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

METHOD OF CONSTRUCTION

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

CONTRACTOR	NAME OF WELL CONTRACTOR Valley Drilling Co. H		WELL CONTRACTOR'S LICENSE NUMBER 5222	
	ADDRESS RR #1 Camp P.O. 437			
	NAME OF WELL TECHNICIAN Simon Kruse		WELL TECHNICIAN'S LICENSE NUMBER T-310	
	SIGNATURE OF TECHNICIAN/CONTRACTOR [Signature]		SUBMISSION DATE DAY _____ MO _____ YR _____	

OFFICE USE ONLY	DATA SOURCE		58	CONTRACTOR	59-62	DATE RECEIVED	63-68	80
				5222		JAN 09 1989		
	DATE OF INSPECTION		INSPECTOR					
REMARKS								
WDE								



The Ontario Water Resources Act

1528596

MUNICIPAL

com

1. PRINT ONLY IN SPACES PROVIDED

2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

11

MUNICIP.
15005

CON.
|CON

1102

COUNTY OR DISTRICT

TOWNSHIP. BOROUGH. CITY. TOWN. VILLAGE.

10	14
CON. BLOCK TRACT SURVEY ETC.	

	22	23	74
LOT		25 27	

Олег Сазанов

WEST CARLETON HUNTLEY #2

DATE COMPLETED 48-53
DAY 10 MO 5 YR 94

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

[illegible]

31

32

WATER RECORD

WATER FOUND AT - FEET		KIND OF WATER			
10-15 140	1	☒ FRESH	3	☐ SULPHUR	14
	2	☐ SALTY	4	☐ MINERALS	
			6	☐ GAS	
5-18 189	1	☒ FRESH	3	☐ SULPHUR	19
	2	☐ SALTY	4	☐ MINERALS	
			6	☐ GAS	
20-23	1	☐ FRESH	3	☐ SULPHUR	24
	2	☐ SALTY	4	☐ MINERALS	
			6	☐ GAS	
25-28	1	☐ FRESH	3	☐ SULPHUR	29
	2	☐ SALTY	4	☐ MINERALS	
			6	☐ GAS	
30-33	1	☐ FRESH	3	☐ SULPHUR	34
	2	☐ SALTY	4	☐ MINERALS	
			6	☐ GAS	

CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET	
			FROM	TO
10-11 6 1/4	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	12 188	0	13-16 22'
17-18 6	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☒ CONCRETE 4 ☒ OPEN HOLE 5 ☐ PLASTIC	19	22'	20-23 200'
24-25	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	26		27-30

PLUGGING & SEALING RECORD

DEPTH SET AT FEET		MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER ETC.)	
FROM	TO		
0-10-13	20-17	CEMENT GROUT	
18-21	22-25		
26-29	30-33	80	

PUMPING TEST 71

71	PUMPING TEST METHOD		10	PUMPING RATE		11-14	DURATION OF PUMPING		15-16	17-18
	AIR ☒ PUMP ☐ BAILER			3		GPM	2		15-16 HOURS	MINS
	STATIC LEVEL	WATER LEVEL END OF PUMPING	25	WATER LEVELS DURING			1 ☒ PUMPING 2 ☐ RECOVERY			
	19-21	22-24		15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES			
	18 FEET	175 FEET		26-28	29-31	32-34	35-37			
IF FLOWING, GIVE RATE		38-41	PUMP INTAKE SET AT		WATER AT END OF TEST				42	
			175 FEET		1 ☒ CLEAR 2 ☐ CLOUDY					
RECOMMENDED PUMP TYPE			RECOMMENDED PUMP SETTING		43-45	RECOMMENDED PUMPING RATE		46-49		
☐ SHALLOW ☒ DEEP			175 FEET			3				GPM
50-53										

**FINAL
STATUS
OF WELL**

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

WATER USE

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

METHOD OF CONSTRUCTION

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

LOCATION OF WELL

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

McGREGG RD

£ 1 million to 2000

149574

CONTRACTOR	VALLEY DRILLING INC		LICENCE NUMBER 5222
	ADDRESS P.O. Box 437 CARP, ONT		
	NAME OF WELL TECHNICIAN S. Skuse		WELL TECHNICIAN'S LICENCE NUMBER T-310
	SIGNATURE OF TECHNICIAN CONTRACTOR 		SUBMISSION DATE DAY _____ MO _____ YR _____

OFFICE USE ONLY

DATA SOURCE	58	CONTRACTOR 5222	59-62	DATE RECEIVED AUG 28 1995	63-68	80
DATE OF INSPECTION		INSPECTOR				
REMARKS						

CSS.ES

Well Owner's Information

First Name Camcor Industries	Last Name	E-mail Address	☐ Well Constructed by Well Owner
Mailing Address (Street Number/Name, RR) 2171 McGee Side Road Grp		Municipality Ont	Postal Code K0A 1L0
Province Ont		Telephone No. (inc. area code)	

Part A Construction and/or Major Alteration of a Well

Address of Well Location (Street Number/Name, RR) # 2171 McGee Side Road		Township Huntley	Lot 11	Concession 2
County/District/Municipality Ottawa - Gr leton		City/Town/Village Carp	Province Ontario	Postal Code
UTM Coordinates NAD 83 184219215018437	Zone 18	Easting 15018437	Northings Magellan 200	GPS Unit Make Magellan 200
Mode of Operation: ☐ Undifferentiated ☒ Averaged		☐ Differentiated, specify		

Overburden and Bedrock Materials (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (Metres) From	To
	Sand Gravel			0	4.27
	Gray Limestone			4.27	152.3
* Plan RPSR 12610 *					

Annular Space/Abandonment Sealing Record

Depth Set at (Metres) From	To	Type of Sealant Used (Material and Type)	Volume Placed (Cubic Metres)
6.10	0	Neat Cement Slurry	2724

Results of Well Yield Testing

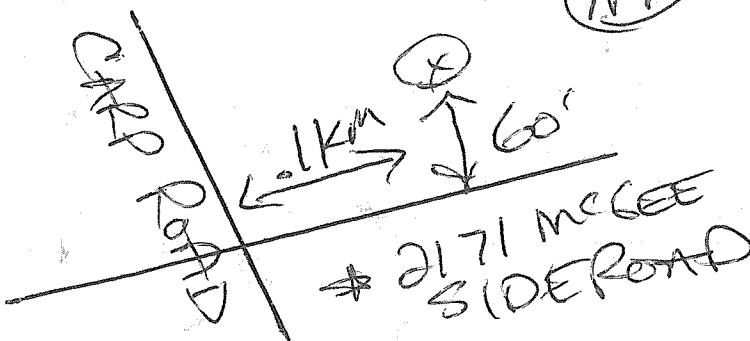
Check box if after test of well yield, water was: ☐ Clear and sand free ☒ Cannot develop to sand-free state		If pumping discontinued, give reason:	
Pumping test method Sub Pump		Pump intake set at (Metres) 91.44	
Pumping rate (Litres/min) 26.5		Duration of pumping 1 hrs + 0 min	
Final water level end of pumping (Metres) 34.90		Recommended pump type ☐ Shallow ☒ Deep	
Recommended pump depth (Metres) 91.44		Recommended pump rate (Litres/min) 26.5	
If flowing give rate (Litres/min)			
Draw Down	Recovery		
Time (Min)	Water Level (Metres)	Time (Min)	Water Level (Metres)
Static Level	5.75	Static Level	34.90
1	7.08	1	32.36
2	8.20	2	31.30
3	9.30	3	30.22
4	10.30	4	29.18
5	11.20	5	28.20
10	15.26	10	23.70
15	18.60	15	20.
20	21.40	20	16.60
25	23.37	25	13.90
30	26.	30	11.58
40	29.66	40	9.90
50	32.60	50	7.80
60	34.90	60	6.30

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

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

Location of Well

Please provide a map below showing:
 - all property boundaries, and measurements sufficient to locate the well in relation to fixed points,
 - an arrow indicating the North direction
 - detailed drawings can be provided as attachments no larger than legal size (8.5" by 14")
 - digital pictures of inside of well can also be provided



Date Well Completed (yyyy/mm/dd) 2007-08-31	Was the well owner's information package delivered? ☒ Yes ☐ No	Date the Well Record and Package Delivered to Well Owner (yyyy/mm/dd) 2007-08-31
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Well Contractor and Well Technician Information

Business Name of Well Contractor AIR ROCK DRILLING CO LTD		Well Contractor's Licence No. 10119
Business Address (Street No./Name, number, RR) RR #1		Municipality RICHMOND
Province ONT	Postal Code K0A 2R0	Business E-mail Address
Bus. Telephone No. (inc. area code) 613 838 2170	Name of Well Technician (Last Name, First Name) Desautels Ken	
Well Technician's Licence No. TA	Signature of Technician <i>[Signature]</i>	Date Submitted (yyyy/mm/dd) 2007-10-10

Water Details

Water found at Depth 105.63 Metres	Kind of Water ☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals
Water found at Depth 147.82 Metres	Kind of Water ☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals
Water found at Depth 147.82 Metres	Kind of Water ☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals

Casing Used	Screen Used	Casing and Well Details
☐ Galvanized ☒ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete	☐ Galvanized ☒ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete	Diameter of the Hole (Centimetres) 14.28
No Casing and Screen Used		Depth of the Hole (Metres) 152.39
Disinfected? ☒ Yes ☐ No		Wall Thickness (Metres) 1.48 cm
		Inside Diameter of the Casing (Metres) 1.588
		Depth of the Casing (Metres) 6.11

Ministry Use Only

Audit No. z 60149	Well Contractor No.
Date Received (yyyy/mm/dd) OCT 15 2007	Date of Inspection (yyyy/mm/dd)
Remarks	



Measurements recorded in: ☒ Metric ☐ Imperial

A076883

A076883

Page _____ of _____

Well Owner's Information

First Name	Last Name / Organization Shell Star Holdings	E-mail Address	☐ Well Constructed by Well Owner
Mailing Address (Street Number/Name) P.O. Box 569	Municipality Stittsville	Province Ontario	Postal Code K2S 1A6
Telephone No. (inc. area code) 613 831 9041			

Well Location

Address of Well Location (Street Number/Name) 245 West Lake Circle	Township West Carleton	Lot 10	Concession 3
County/District/Municipality Ottawa Carleton	City/Town/Village Carp	Province Ontario	Postal Code
UTM Coordinates NAD 83 18 421755 5018048	Municipal Plan and Sublot Number	Other	

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	To
Brown	Hardpan	Boulders		0	2.43
Gray	Limestone		Layered & Soft	2.43	6.09
Gray	Limestone		Medium	6.09	49.37

Annular Space			
Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
7.31	0	Grouted Cement & Bentonite	.31m³

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

Construction Record - Casing				Status of Well
Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To
15.86	Steel	.48	+ .45	7.31

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

Water Details		Hole Diameter	
Water found at Depth 33.52m/ft	Kind of Water: ☐ Fresh ☒ Untested	Depth (m/ft) From	To
Water found at Depth 49.07m/ft	Kind of Water: ☐ Fresh ☒ Untested	0	7.31
Water found at Depth (m/ft)	Kind of Water: ☐ Fresh ☐ Untested	7.31	49.37

Well Contractor and Well Technician Information			
Business Name of Well Contractor Capital Water Supply Ltd.	Well Contractor's Licence No. 1 5 5 8		
Business Address (Street Number/Name) Box 490	Municipality Stittsville		
Province Ontario	Postal Code K2S 1A6	Business E-mail Address office@capitalwater.ca	
Bus. Telephone No. (inc. area code) 613 836 1766	Name of Well Technician (Last Name, First Name) Miller, Stephen		
Well Technician's Licence No. 0 0 9 7	Signature of Technician and/or Contractor	Date Submitted 2 0 0 9 1 0 0 9	

Results of Well Yield Testing				
After test of well yield, water was: ☒ Clear and sand free ☐ Other, specify _____	Draw Down	Recovery		
If pumping discontinued, give reason:	Time (min)	Water Level (m/ft)	Time (min)	Water Level (m/ft)
	Static Level	4.89		
Pump intake set at (m/ft) 22.85	1	5.55	1	5.27
Pumping rate (l/min / GPM) 54.6	2	5.79	2	5.06
Duration of pumping 2 hrs + min	3	5.89	3	4.98
Final water level end of pumping (m/ft) 6.23	4	5.96	4	4.93
If flowing give rate (l/min / GPM)	5	5.97	5	4.90
Recommended pump depth (m/ft) 22.85	10	6.07	10	
Recommended pump rate (l/min / GPM) 45.5	15	6.10	15	
Well production (l/min / GPM)	20	6.12	20	
Disinfected? ☒ Yes ☐ No	25	6.13	25	
	30	6.14	30	
	40	6.17	40	
	50	6.22	50	
	60	6.23	60	

Map of Well Location	
Please provide a map below following instructions on the back.	
Comments:	
Well owner's information package delivered ☒ Yes ☐ No	Ministry Use Only Audit No. 2101735 FEB 16 2010
Date Package Delivered 2 0 0 9 1 0 0 9	Date Work Completed 2 0 0 9 1 0 0 2

Address of Well Location (Street Number/Name)		Township		Lot		Concession	
#305 West Lake Circle		West Carleton		10		3	
County/District/Municipality		City/Town/Village		Province		Postal Code	
Ottawa - Carleton		Carleton Place		Ontario			
UTM Coordinates		Zone		Easting		Northing	
NAD 83		18		421900		2017952	
Municipal Plan and Sublot Number		Other					
PLAN 4M-1316		S/L 28					

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft)
	Sand, Gravel + Boulders			0' 17'
	Grey limestone			17' 135'
	Grey limestone + Sandstone mix			135' 160'
	Grey limestone			160' 200'

Annular Space		
Depth Set at (m/ft)	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
28' 18'	Neat Cement Slurry	7.8
18' 0'	Neat Bentonite Slurry	16.8

Method of Construction	Well Use
☐ Cable Tool	☐ Public
☐ Rotary (Conventional)	☐ Commercial
☐ Rotary (Reverse)	☐ Municipal
☐ Boring	☐ Test Hole
☐ Air percussion	☐ Cooling & Air Conditioning
☐ Other, specify	☐ Not used
	☐ Dewatering
	☐ Monitoring
	☐ Industrial
	☐ Other, specify

Construction Record - Casing			Status of Well	
Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft)	
6" Steel		1.88"	12' 28'	☒ Water Supply
6" Open hole			28' 200'	☐ Replacement Well
				☐ Test Hole
				☐ Recharge Well
				☐ Dewatering Well
				☐ Observation and/or Monitoring Hole
				☐ Alteration (Construction)
				☐ Abandoned, Insufficient Supply
				☐ Abandoned, Poor Water Quality
				☐ Abandoned, other, specify
				☐ Other, specify

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

Water Details		Hole Diameter	
Water found at Depth (m/ft)	Kind of Water: ☐ Fresh ☒ Untested	Depth (m/ft)	Diameter (cm/in)
152'	☐ Gas ☐ Other, specify	From	To
186'	☐ Gas ☐ Other, specify	0' 200' 6"	

Business Name of Well Contractor		Well Contractor's Licence No.	
AIR ROCK DRILLING CO LTD 1119			
Business Address (Street Number/Name)		Municipality	
RR#1		Richmond	
Province	Postal Code	Business E-mail Address	
ONT	K0A2T0		
Bus. Telephone No. (inc. area code)		Name of Well Technician (Last Name, First Name)	
613 838 2170		Graham Ryan	
Well Technician's Licence No.		Signature of Technician and/or Contractor	
T3058		20100315	

Results of Well Yield Testing			
After test of well yield, water was:		Draw Down	
☐ Clear and sand free		Time (min)	Water Level (m/ft)
☒ Other, specify		Static Level	11' 7"
If pumping discontinued, give reason:		1	25' 9"
Pump intake set at (m/ft)		2	31' 2"
Pumping rate (l/min / GPM)		3	33' 9"
Duration of pumping		4	37' 7"
1 hrs + 0 min		5	40' 7"
Final water level end of pumping (m/ft)		10	49' 2"
If flowing give rate (l/min / GPM)		15	52' 1"
Recommended pump depth (m/ft)		20	53' 4"
Recommended pump rate (l/min / GPM)		25	54' 6"
Well production (l/min / GPM)		30	55'
Disinfected?		40	55' 6"
☒ Yes ☐ No		50	55' 8"
		60	56'

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

Comments:	Well owner's information package delivered Date Package Delivered: 20100209 Date Work Completed: 20100204	Ministry Use Only Audit No. Z108236 Received: MAR 22 2010
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Address of Well Location (Street Number/Name) **# 350 WEST LAKE CIRCLE** Township **West Carleton** Lot **10** Concession **3**
 County/District/Municipality **Ottawa-Carleton** City/Town/Village **Carleton Place** Province **Ontario** Postal Code
 UTM Coordinates Zone Easting Northing **18 46 52 32 15 02 94 54** Municipal Plan and Sublot Number **PLAN # 4M-1316 S/L # 11**

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)				
General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From To
	Sand, Clay & Gravel			0' 15'
	Grey Limestone			15' 12'

Annular Space			
Depth Set at (m/ft) From To	Type of Sealant Used (Material and Type)	Volume Placed (m ³ /ft ³)	
28' 18'	Neat Cement Slurry	7.8	
18' 0'	Neat Portland Cement Slurry	12.6	

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

Construction Record - Casing				Status of Well	
Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From To	☒ Water Supply	
6"	Steel	1.88"	12' 28'	☐ Replacement Well	
5 5/16"	Open hole		28' 120'	☐ Test Hole	
				☐ Recharge Well	
				☐ Dewatering Well	
				☐ Observation and/or Monitoring Hole	
				☐ Alteration (Construction)	
				☐ Abandoned, Insufficient Supply	
				☐ Abandoned, Poor Water Quality	
				☐ Abandoned, other, specify _____	
				☐ Other, specify _____	

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

Water Details		Hole Diameter	
Water found at Depth (m/ft) 112'	Kind of Water: ☐ Fresh ☒ Untested	Depth (m/ft) From To	Diameter (cm/in)
Water found at Depth (m/ft) 0'	Kind of Water: ☐ Fresh ☐ Untested	28' 6"	
Water found at Depth (m/ft) 28'	Kind of Water: ☐ Fresh ☐ Untested	120' 5 5/16"	

Well Contractor and Well Technician Information
 Business Name of Well Contractor **AIR ROCK DRILLING CO LTD** Well Contractor's Licence No. **1119**
 Business Address (Street Number/Name) **RR #1 RICHMOND** Municipality **RICHMOND**
 Province **ONT** Postal Code **K0A 2Z0** Business E-mail Address
 Bus. Telephone No. (inc. area code) **613 838 2170** Name of Well Technician (Last Name, First Name) **BOGAN DAN**
 Well Technician's Licence No. **13058** Signature of Technician and/or Contractor **[Signature]** Date Submitted **20100903**

Results of Well Yield Testing			
Draw Down		Recovery	
Time (min)	Water Level (m/ft)	Time (min)	Water Level (m/ft)
Static Level	16' 2"		111' 8"
1	26' 5"	1	84'
2	33' 4"	2	72' 2"
3	39' 3"	3	62' 5"
4	44'	4	55'
5	48'	5	48' 9"
10	61' 5"	10	32' 5"
15	69' 4"	15	25' 3"
20	78'	20	21' 7"
25	86' 2"	25	19' 7"
30	91' 5"	30	18' 1"
40	101' 3"	40	16' 2"
50	107' 3"	50	
60	111' 8"	60	

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

 Comments:
 Well owner's information package delivered ☒ Yes ☐ No
 Date Package Delivered **20100901**
 Date Work Completed **20100826**
Ministry Use Only
 Audit No. **z110663**
 Received **SEP 17 2010**

Address of Well Location (Street Number/Name) Lot 5 West Lake Estates		Township West Carleton-Huntley		Lot 10	Concession 3
County/District/Municipality Ottawa Carleton		City/Town/Village Carp		Province Ontario	Postal Code
UTM Coordinates NAD 83	Zone 18	Easting 421718	Northing 5018158		Municipal Plan and Sublot Number Other

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft)	
				From	To
Brown	Soil			0	.60
Brown	Shale		Soft	.60	5.48
Grey	Limestone	Brown Layers	Medium Soft	5.48	70.40

Annular Space			
Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m ³ /ft ³)
8.83	0	Grouted Cement Slurry	.21m ³

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

Construction Record - Casing				Status of Well	
Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From To		☒ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☐ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☐ Abandoned, other, specify _____ ☐ Other, specify _____
15.86	Steel	.48	+ .45	8.83	

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

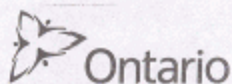
Water Details		Hole Diameter	
Water found at Depth 70.10-70.40 (m/ft)	Kind of Water: ☐ Fresh ☒ Untested	Depth (m/ft) From To	Diameter (cm/in)
Water found at Depth (m/ft) ☐ Gas ☐ Other, specify _____	Kind of Water: ☐ Fresh ☐ Untested	0 8.83	15.86
Water found at Depth (m/ft) ☐ Gas ☐ Other, specify _____	Kind of Water: ☐ Fresh ☐ Untested	8.83 70.40	15.55

Well Contractor and Well Technician Information			
Business Name of Well Contractor Capital Water Supply Ltd.		Well Contractor's Licence No. 1 5 5 8	
Business Address (Street Number/Name) Box 490		Municipality Stittsville	
Province Ontario	Postal Code K2S 1A6	Business E-mail Address office@capitalwater.ca	
Bus. Telephone No. (inc. area code) 613 836 1766		Name of Well Technician (Last Name, First Name) Miller, Stephen	
Well Technician's Licence No. 0 0 9 7	Signature of Technician and/or Contractor	Date Submitted 2 0 1 0 0 7 2 7	

Results of Well Yield Testing			
After test of well yield, water was: ☒ Clear and sand free ☐ Other, specify _____		Draw Down	
If pumping discontinued, give reason:		Time (min)	Water Level (m/ft)
Pump intake set at (m/ft) 18.28		Static Level	6.38
Pumping rate (l/min / GPM) 45.5		1	7.03
Duration of pumping 2 hrs + min		2	7.14
Final water level end of pumping (m/ft) 7.46		3	7.18
If flowing give rate (l/min / GPM)		4	7.19
Recommended pump depth (m/ft) 18.28		5	7.20
Recommended pump rate (l/min / GPM) 45.5		10	7.22
Well production (l/min / GPM)		15	7.26
Disinfected? ☒ Yes ☐ No		20	7.32
		25	7.40
		30	7.45
		40	
		50	7.48
		60	7.47

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

Well owner's information package delivered		Date Package Delivered			
☒ Yes ☐ No		2 0 1 0 0 7 2 6			
Date Work Completed		2 0 1 0 0 7 2 6			
Ministry Use Only					
Audit No. z115581					
Received					

Measurements recorded in: ☒ Metric ☐ Imperial

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization Shell Star Holdings	E-mail Address	☐ Well Constructed by Well Owner
Mailing Address (Street Number/Name) P.O. Box 569	Municipality Stittsville	Province Ontario	Postal Code K2S 1A6
Telephone No. (inc. area code) 613 831 9041			

Well Location

Address of Well Location (Street Number/Name) Lot 30 West Lake Estates	Township West Carleton - Huntley	Lot 10	Concession 3
County/District/Municipality Ottawa Carleton	City/Town/Village Carp	Province Ontario	Postal Code
UTM Coordinates NAD 83 18 421995 5017833	Municipal Plan and Sublot Number	Other	

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft)	
				From	To
Brown	Soil	Large Boulders		0	7.31
Grey	Limestone	Dark Layers	Medium	7.31	83.20

Annular Space		
Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)
10.36	0	Grouted Bentonite Slurry

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

Construction Record - Casing				Status of Well	
Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From To	☒ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☐ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☐ Abandoned, other, specify ☐ Other, specify	
15.86	Steel	.48	+4.5 10.36		

Construction Record - Screen				Status of Well	
Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From To	☒ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☐ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☐ Abandoned, other, specify ☐ Other, specify	

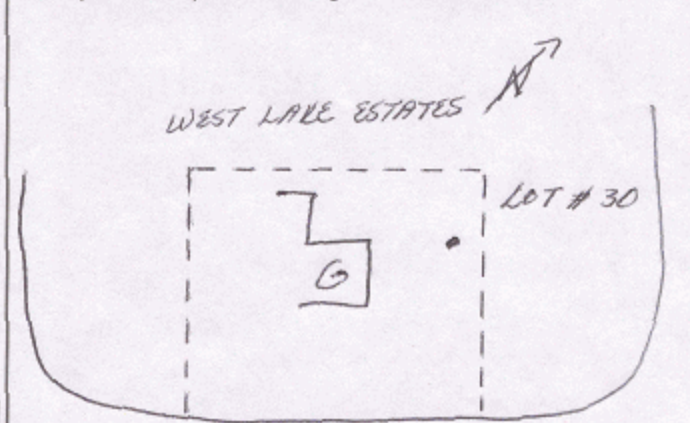
Water Details		Hole Diameter	
Water found at Depth 33.52(m/ft) ☐ Gas ☐ Other, specify	Kind of Water: ☐ Fresh ☒ Untested	Depth (m/ft) From To	Diameter (cm/in)
Water found at Depth 79.24(m/ft) ☐ Gas ☐ Other, specify	Kind of Water: ☐ Fresh ☒ Untested	0 10.36	15.86
Water found at Depth (m/ft) ☐ Gas ☐ Other, specify	Kind of Water: ☐ Fresh ☐ Untested	10.36 83.20	15.39

Well Contractor and Well Technician Information			
Business Name of Well Contractor Capital Water Supply Ltd.	Well Contractor's Licence No. 1 5 5 8		
Business Address (Street Number/Name) Box 490	Municipality Stittsville		
Province Ontario	Postal Code K2S 1A6	Business E-mail Address office@capitalwater.ca	
Bus. Telephone No. (inc. area code) 613 836 1766	Name of Well Technician (Last Name, First Name) Miller, Stephen		
Well Technician's Licence No. 0 0 9 7	Signature of Technician and/or Contractor	Date Submitted 20101115	

Results of Well Yield Testing			
After test of well yield, water was: ☒ Clear and sand free ☐ Other, specify		Draw Down	
If pumping discontinued, give reason:		Time (min)	Water Level (m/ft)
Pump intake set at (m/ft) 45.71		Static Level	4.14
Pumping rate (l/min / GPM) 36.40		1	6.40
Duration of pumping 1 hrs + min		2	8.53
Final water level end of pumping (m/ft) 41.0		3	
If flowing give rate (l/min / GPM)		4	10.42
Recommended pump depth (m/ft) 45.71		5	12.40
Recommended pump rate (l/min / GPM) 36.40		10	16.50
Well production (l/min / GPM)		15	20.08
Disinfected? ☒ Yes ☐ No		20	22.20
		25	25.13
		30	28.85
		40	32.95
		50	36.77
		60	41.

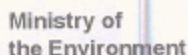
Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well owner's information package delivered ☒ Yes ☐ No	Date Package Delivered 20101111	Date Work Completed 20101110	Ministry Use Only Audit No. 2115651 DEC 09 2010 Received
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Well Tag No. (Place Sticker and/or Print Below)

Well Record

Regulation 903 Ontario Water Resources Act

Measurements recorded in: ☒ Metric ☐ Imperial

Page of

Well Owner's Information

First Name	Last Name / Organization		E-mail Address		☐ Well Constructed by Well Owner
	Shell Star Holding				
Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)	
P.O. Box 569	Stittsville	Ontario	K2S 1A6	613 831 9041	

Well Location

Address of Well Location (Street Number/Name)				Township		Lot		Concession	
Lot 12 West Lake Estates				West Carleton - Huntley		10		3	
County/District/Municipality				City/Town/Village				Province	
Ottawa Carleton				Carp				Ontario	
UTM Coordinates				Zone		Easting		Northing	
NAD				8		3		1	
				8		3		422071	
								5017793	
Municipal Plan and Sublot Number								Other	

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

[illegible]

Annular Space			
Depth Set at (m/ft)		Type of Sealant Used	Volume Placed
From	To	(Material and Type)	(m³/ft³)
37.48	0	Grouted Bentonite Hole Plug	3/8 inch
		(33 bags)	

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

Construction Record - Casing					Status of Well
Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft)		
			From	To	
					☐ Water Supply
					☐ Replacement Well
					☐ Test Hole
					☐ Recharge Well
					☐ Dewatering Well
					☐ Observation and/or Monitoring Hole
					☐ Alteration (Construction)
					☒ Abandoned,

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

Insufficient Supply

☐ Abandoned, Poor Water Quality

☐ Abandoned, other, *specify* _____

☐ Other, *specify* _____

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

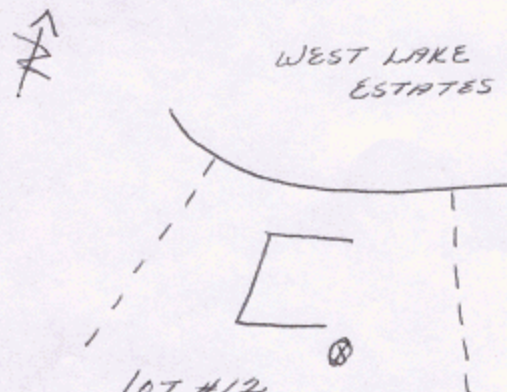
Well Contractor and Well Technician Information									
Business Name of Well Contractor							Well Contractor's Licence No.		
Capital Water Supply Ltd.							1 5 5 8		
Business Address (Street Number/Name)							Municipality		
Box 490							Stittsville		
Province		Postal Code		Business E-mail Address					
Ontario		K2S 1A6		office@capitalwater.ca					
Bus. Telephone No. (inc. area code)				Name of Well Technician (Last Name, First Name)					
613 836 1766				Miller, Stephen					
Well Technician's Licence No.		Signature of Technician and/or Contractor				Date Submitted			

Results of Well Yield Testing

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

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well owner's information package delivered	Date Package Delivered	Ministry Use Only
	Date Work Completed	
☐ Yes ☒ No	Y Y Y Y M M D D 2 0 1 1 0 1 0 2	Audit No. z115668 Receive AUG 05 2011

Measurements recorded in: ☒ Metric ☐ Imperial

Well Owner's Information

First Name		Last Name / Organization		E-mail Address		☐ Well Constructed by Well Owner	
		T. Goddard Construction					
Mailing Address (Street Number/Name)		Municipality		Province		Postal Code	
335 West Lake Circle		Carp		Ontario		K0A 1L0	
						Telephone No. (inc. area code)	
						613 227 7870	

Well Location

Address of Well Location (Street Number/Name)				Township		Lot		Concession	
Lot 29 West Lake Estates				West Carleton - Huntley					
County/District/Municipality				City/Town/Village				Province	
Ottawa Carleton				Carp				Ontario	
UTM Coordinates		Zone	Easting	Northing	Municipal Plan and Sublot Number				Other
NAD 83		18	421948	5017894					

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

[illegible]

Annular Space

Depth Set at (m/ft)		Type of Sealant Used (Material and Type)	Volume Placed (m ³ /ft ³)
From	To		
8.53	0	Grouted Bentonite Slurry	.46m ³

Results of Well Yield Testing

After test of well yield, water was:		Draw Down		Recovery	
		Time (min)	Water Level (m/ft)	Time (min)	Water Level (m/ft)
☒ Clear and sand free	If pumping discontinued, give reason:	Static Level	3.65		
☐ Other, specify		1	4.74	1	5.04
		2	5.13	2	4.29
		3	5.38	3	3.98
		4	5.56	4	3.87
		5	5.68	5	3.82
		10	5.96	10	3.76
		15	6.02	15	3.71
		20		20	3.68
		25	6.03	25	
		30	6.42	30	
		40	6.76	40	
	50	6.78	50		
	60	6.79	60		

Map of Well Location

Please provide a map below following instructions on the back.

WEST LAKE
ESTATES

LOT #29

WEST LAKE CIRCLE

MOORE SUB P1

Construction Record - Screen

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

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

Water Details

Water found at Depth 57.90 (m/ft) ☐ Gas	Kind of Water: ☐ Fresh ☒ Untested ☐ Other, specify _____
Water found at Depth 82.29 (m/ft) ☐ Gas	Kind of Water: ☐ Fresh ☒ Untested ☐ Other, specify _____
Water found at Depth (m/ft) ☐ Gas	Kind of Water: ☐ Fresh ☐ Untested ☐ Other, specify _____

Hole Diameter

Depth (m/ft)		Diameter (cm/in)
From	To	
0	8.53	15.86
8.53	83.20	15.23

Well Contractor and Well Technician Information

Business Name of Well Contractor										Well Contractor's Licence No.									
Capital Water Supply Ltd.										1 5 5 8									
Business Address (Street Number/Name)										Municipality									
Box 490										Stittsville									
Province				Postal Code				Business E-mail Address											
Ontario				K2S 1A6				office@capitalwater.ca											
Bus. Telephone No. (inc. area code)						Name of Well Technician (Last Name, First Name)													
613 836 1766						Miller, Stephen													
Well Technician's Licence No.				Signature of Technician and/or Contractor						Date Submitted									
0 0 9 7										20110617									

Well owner's information	Date Package Delivered
package delivered	2 0 1 1 0 6 1 7
☒ Yes	Date Work Completed
☐ No	2 0 1 1 0 6 1 7

Ministry Use Only
Audit No. **z115728**
NOV 02 2011
Received

Measurements recorded in: ☒ Metric ☐ Imperial

Well Owner's Information

First Name	Last Name / Organization Shell Star Holding	E-mail Address	☐ Well Constructed by Well Owner
Mailing Address (Street Number/Name) P.O. Box 569	Municipality Stittsville	Province Ontario	Postal Code K2S 1A6
		Telephone No. (inc. area code) 613 831 9041	

Well Location

Address of Well Location (Street Number/Name) Lot 6 West Lake Circle	Township West Carleton - Huntley	Lot	Concession
County/District/Municipality Ottawa Carleton	City/Town/Village Carp	Province Ontario	Postal Code
UTM Coordinates NAD 83 18 421781	Northings 5018130	Municipal Plan and Sublot Number	Other

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	To
Brown	Sandy Soil	Stones & Boulders	Loose	0	6.09
Grey	Limestone	Dark Layers	Medium	6.09	75.58

Annular Space			
Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
9.75	0	Grouted Cement & Bentonite	.928m³

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

Construction Record - Casing				Status of Well
Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To
15.86	Steel	.48	+4.5	9.75

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

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

Water Details		Hole Diameter	
Water found at Depth (m/ft)	Kind of Water: ☐ Fresh ☒ Untested ☐ Gas ☐ Other, specify _____	Depth (m/ft) From	To
42.66	Untested	0	9.75
73.75	Untested	9.75	75.58

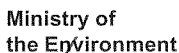
Well Contractor and Well Technician Information	
Business Name of Well Contractor Capital Water Supply Ltd.	Well Contractor's Licence No. 1 5 5 8
Business Address (Street Number/Name) Box 490	Municipality Stittsville
Province Ontario	Postal Code K2S 1A6
Business E-mail Address office@capitalwater.ca	

Bus. Telephone No. (inc. area code) 613 836 1766	Name of Well Technician (Last Name, First Name) Miller, Stephen
Well Technician's Licence No. 0 0 9 7	Date Submitted 2 0 1 2 0 4 2 0

Results of Well Yield Testing			
After test of well yield, water was:	Draw Down		Recovery
☒ Clear and sand free ☐ Other, specify _____	Time (min)	Water Level (m/ft)	Time (min)
If pumping discontinued, give reason:	Static Level	6.60	
	1	8.30	1
	2	9.05	2
	3	9.50	3
	4	9.81	4
	5	10.10	5
Pump intake set at (m/ft) 60.95			
Pumping rate (l/min / GPM) 36.40			
Duration of pumping 1 hrs + min			
Final water level end of pumping (m/ft) 11.77			
If flowing give rate (l/min / GPM)			
Recommended pump depth (m/ft) 30.47			
Recommended pump rate (l/min / GPM) 36.40			
Well production (l/min / GPM)			
Disinfected? ☒ Yes ☐ No			

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

Well owner's information package delivered	Date Package Delivered	Ministry Use Only
☒ Yes ☐ No	2 0 1 2 0 4 1 9	Audit No. 2139757
	Date Work Completed 2 0 1 2 0 4 1 9	Received SEP 20 2012



Well T-13 (10' 1" deep Sucker and/or Print Below)

A137237

Regulation 903 Ontario Water Resources Act

Measurements recorded in: ☒ Metric ☐ Imperial

Page of

Well Owner's Information

First Name Thomas	Last Name / Organization Cavanagh Construction	E-mail Address ccollins@thomascavanagh	☐ Well Constructed by Well Owner
Mailing Address (Street Number/Name) 9094 Cavanagh Road	Municipality Ashton	Province Ont	Postal Code K0A1B0
		Telephone No. (inc. area code) 6132572918	

Well Location

Address of Well Location (Street Number/Name) 305 West Lake Circle				Township West Carleton - March 28		Lot		Concession			
County/District/Municipality Ottawa Carleton				City/Town/Village Camp				Province Ontario		Postal Code 	
UTM Coordinates NAD 83		Zone 18		Easting 421941		Northing 5017942		Municipal Plan and Sublot Number 4m1316			
Other											

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

Annular Space			
Depth Set at (m/ft) From To		Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	2-31	hole plug	2 bags
2.31	5.66	filter sand	2 bags

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

Construction Record - Casing					Status of Well
Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft)		☐ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☒ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Inactive
			From	To	
5.2	plastic	0.4	0	2.62	

Construction Record - Screen				
Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft)	
			From	To
6.0	plastic	10	2.602	5.66

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

Water Details		Hole Diameter		
Water found at Depth <u>0.02 (m/ft)</u> ☐ Gas ☐ Other, <i>specify</i> _____	Kind of Water: ☐ Fresh ☐ Untested	Depth (m/ft)		Diameter (cm/in)
		From	To	
Water found at Depth _____ (m/ft) ☐ Gas ☐ Other, <i>specify</i> _____	Kind of Water: ☐ Fresh ☐ Untested	0	1.37	22
Water found at Depth _____ (m/ft) ☐ Gas ☐ Other, <i>specify</i> _____	Kind of Water: ☐ Fresh ☐ Untested	1.37	5.66	9

Well Contractor and Well Technician Information

Business Name of Well Contractor OGS INC		Well Contractor's Licence No. 6964	
Business Address (Street Number/Name) 5518 Appleton Side Road		Municipality Almonte	
Province Ont	Postal Code K0A1A0	Business E-mail Address ogsing@bellnet.ca	
Us. Telephone No. (inc. area code) 6132567666		Name of Well Technician (Last Name, First Name) Strude Jason	
Well Technician's Licence No. 3634	Signature of Technician and/or Contractor [Signature]		Date Submitted 20130717

Results of Well Yield Testing

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

Map of Well Location

Please provide a map below following instructions on the back.

Site plan and area map are enclosed.

Comments:

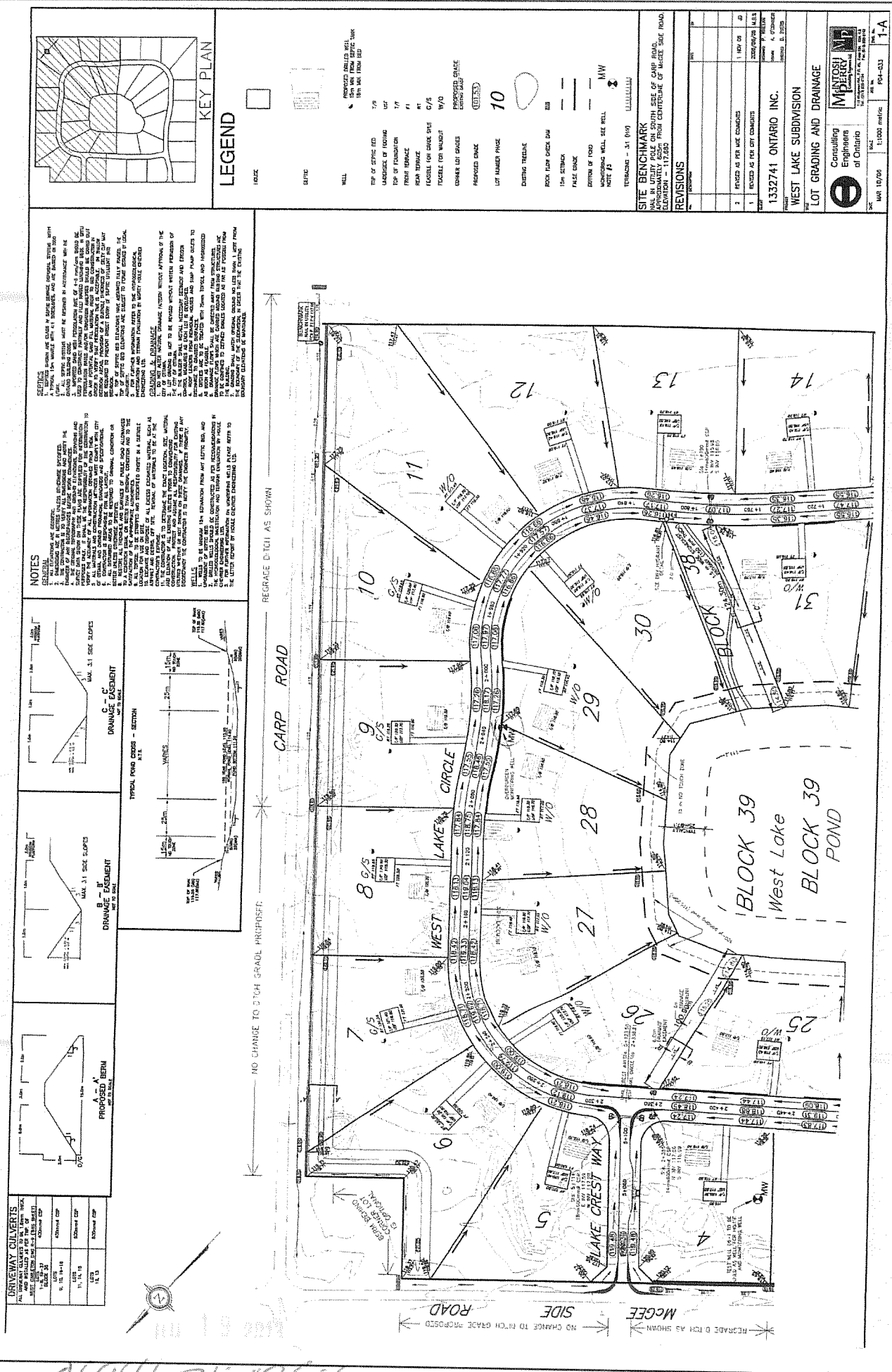
Well owner's information package delivered ☐ Yes ☐ No	Date Package Delivered Y Y Y Y M M D D	Ministry Use Only Audit No. Z 163946 Rec'd 19 2012
	Date Work Completed 20130108	



Note: This Well Record for Well Cluster Part 3 - Detailed Drawing of all Well Locations, must be attached to Parts 1 and 2. The drawing must include all property boundaries, an arrow indicating the North direction, all named roads and sufficient measurements to locate all wells in the cluster in relation to fixed points. The drawing must show the location of each well and each well must be numbered on the drawing to match number used for that well on the Well Record for Well Cluster Parts 1 and 2. The well with the well tag must be clearly identified on the Drawing.
UTM coordinates should appear beside each well, if space permits. Additional comments on wells can be included on the drawing

Well Tag Number: # A137237

"Well Record for Well Cluster" Form Audit Number: # 2163946



Certificate of Analysis

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

Report Number: 1973843
Date Submitted: 2022-03-23
Date Reported: 2022-03-30
Project: PH4484
COC #: 887701

Page 1 of 14

Dear Oliver Blume:

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

Report Comments:

APPROVAL:



Addrine Thomas
2022.03.30 13:55:02 -04'00'
Addrine Thomas, Inorganics Supervisor

All analysis is completed at Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) unless otherwise indicated.

Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on the scope of accreditation. The scope is available at: <http://www.cala.ca/scopes/2602.pdf>.

Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is licensed by the Ontario Ministry of the Environment, Conservation, and Parks (MECP) for specific tests in drinking water (license #2318). A copy of the license is available upon request.

Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is accredited by the Ontario Ministry of Agriculture, Food, and Rural Affairs for specific tests in agricultural soils.

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

Certificate of Analysis

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

Report Number: 1973843
Date Submitted: 2022-03-23
Date Reported: 2022-03-30
Project: PH4484
COC #: 887701

					Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1615821 GW 2022-03-22 GW1	1615822 GW 2022-03-22 GW2
Group	Analyte	MRL	Units	Guideline			
Anions	Cl	1	mg/L	AO 250		135	142
	F	0.10	mg/L	MAC 1.5		<0.10	<0.10
	N-NO2	0.10	mg/L	MAC 1.0		<0.10	<0.10
	N-NO3	0.10	mg/L	MAC 10.0		3.15	3.02
	SO4	1	mg/L	AO 500		182	175
General Chemistry	Alkalinity as CaCO3	5	mg/L	OG 30-500		251	243
	Colour (Apparent)	2	TCU	AO 5		<2	<2
	Conductivity	5	uS/cm			1180	1180
	DOC	0.5	mg/L	AO 5		2.4	2.4
	pH	1.00		6.5-8.5		7.95	7.93
	Phenols	0.001	mg/L			<0.001	<0.001
	S2-	0.01	mg/L	AO 0.05		<0.01	<0.01
	TDS (COND - CALC)	1	mg/L	AO 500		767*	767*
	Turbidity	0.1	NTU	AO 5		0.5	0.5
Hardness	Hardness as CaCO3	1	mg/L	OG 80-100		454*	451*
Indices/Calc	Ion Balance	0.01				0.97	0.97
Mercury	Hg	0.0001	mg/L	MAC 0.001		<0.0001	<0.0001
Metals	Ag	0.0001	mg/L			<0.0001	<0.0001
	Al	0.01	mg/L	OG 0.1		<0.01	<0.01
	As	0.001	mg/L	IMAC 0.01		<0.001	<0.001
	B	0.01	mg/L	IMAC 5.0		0.04	0.04
	Ba	0.01	mg/L	MAC 1.0		0.12	0.12
	Be	0.0005	mg/L			<0.0005	<0.0005
	Ca	1	mg/L			162	161
	Cd	0.0001	mg/L	MAC 0.005		<0.0001	<0.0001

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Certificate of Analysis

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

Report Number: 1973843
Date Submitted: 2022-03-23
Date Reported: 2022-03-30
Project: PH4484
COC #: 887701

					Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1615821 GW 2022-03-22 GW1	1615822 GW 2022-03-22 GW2
Group	Analyte	MRL	Units	Guideline			
Metals	Co	0.0002	mg/L			<0.0002	<0.0002
	Cr	0.001	mg/L	MAC 0.05		<0.001	<0.001
	Cu	0.001	mg/L	AO 1		<0.001	<0.001
	Fe	0.03	mg/L	AO 0.3		<0.03	<0.03
	K	1	mg/L			2	2
	Mg	1	mg/L			12	12
	Mn	0.01	mg/L	AO 0.05		<0.01	<0.01
	Mo	0.005	mg/L			<0.005	<0.005
	Na	1	mg/L	AO 200		77	75
	Ni	0.005	mg/L			<0.005	<0.005
	Pb	0.001	mg/L	MAC 0.010		<0.001	<0.001
	Sb	0.0005	mg/L	IMAC 0.006		<0.0005	<0.0005
	Se	0.001	mg/L	MAC 0.05		<0.001	<0.001
	Sr	0.001	mg/L			0.879	0.876
	Tl	0.0001	mg/L			<0.0001	<0.0001
	U	0.001	mg/L	MAC 0.02		<0.001	<0.001
	V	0.001	mg/L			<0.001	<0.001
	Zn	0.01	mg/L	AO 5		<0.01	<0.01
Microbiology	Escherichia Coli	0	ct/100mL	MAC 0		0	0
	Total Coliforms	0	ct/100mL	MAC 0		19*	23*
Nutrients	N-NH3	0.010	mg/L			<0.010	<0.010
	Total Kjeldahl Nitrogen	0.100	mg/L			0.252	0.477
Subcontract	Tannin & Lignin	1	mg/L				1
		1.0	mg/L			1.0	
VOCs Surrogates	1,2-dichloroethane-d4	0	%			100	119

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Nepean, ON
K2E 7T7
Attention: Mr. Oliver Blume
PO#:
Invoice to: Paterson Group

Report Number: 1973843
Date Submitted: 2022-03-23
Date Reported: 2022-03-30
Project: PH4484
COC #: 887701

					Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1615821 GW 2022-03-22 GW1	1615822 GW 2022-03-22 GW2
Group	Analyte	MRL	Units	Guideline			
VOCs Surrogates	4-bromofluorobenzene	0	%			71	76
	Toluene-d8	0	%			91	98
Volatiles	1,1,1,2-tetrachloroethane	0.5	ug/L			<0.5	<0.5
	1,1,1-trichloroethane	0.4	ug/L			<0.4	<0.4
	1,1,2,2-tetrachloroethane	0.5	ug/L			<0.5	<0.5
	1,1,2-trichloroethane	0.4	ug/L			<0.4	<0.4
	1,1-dichloroethane	0.4	ug/L			<0.4	<0.4
	1,1-dichloroethylene	0.5	ug/L	MAC 14		<0.5	<0.5
	1,2-dichlorobenzene	0.4	ug/L	MAC 200		<0.4	<0.4
	1,2-dichloroethane	0.2	ug/L	IMAC 5		<0.2	<0.2
	1,2-dichloropropane	0.5	ug/L			<0.5	<0.5
	1,3,5-trimethylbenzene	0.3	ug/L			<0.3	<0.3
	1,3-dichlorobenzene	0.4	ug/L			<0.4	<0.4
	1,3-Dichloropropylene (cis+trans)	0.3	ug/L			<0.3	<0.3
	1,4-dichlorobenzene	0.4	ug/L	MAC 5		<0.4	<0.4
	Acetone	30	ug/L			<30	<30
	Benzene	0.5	ug/L	MAC 1		<0.5	<0.5
	Bromodichloromethane	0.3	ug/L			<0.3	<0.3
	Bromoform	0.4	ug/L			<0.4	<0.4
	Bromomethane	0.5	ug/L			<0.5	<0.5
	c-1,2-Dichloroethylene	0.4	ug/L			<0.4	<0.4
	c-1,3-Dichloropropylene	0.2	ug/L			<0.2	<0.2
	Carbon Tetrachloride	0.2	ug/L	MAC 2		<0.2	<0.2
	Chloroethane	0.2	ug/L			<0.2	<0.2
	Chloroform	0.5	ug/L			<0.5	<0.5

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Certificate of Analysis

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

Report Number: 1973843
Date Submitted: 2022-03-23
Date Reported: 2022-03-30
Project: PH4484
COC #: 887701

					Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1615821 GW 2022-03-22 GW1	1615822 GW 2022-03-22 GW2
Group	Analyte	MRL	Units	Guideline			
Volatiles	Dibromochloromethane	0.3	ug/L			<0.3	<0.3
	Dichlorodifluoromethane	0.5	ug/L			<0.5	<0.5
	Dichloromethane	4.0	ug/L	MAC 50		<4.0	<4.0
	Ethylbenzene	0.5	ug/L	MAC 140		<0.5	<0.5
	Ethylene Dibromide	0.2	ug/L			<0.2	<0.2
	Hexane	5	ug/L			<5	<5
	m/p-xylene	0.4	ug/L			<0.4	<0.4
	Methyl Ethyl Ketone (MEK)	10	ug/L			<10	<10
	Methyl Isobutyl Ketone (MIBK)	10	ug/L			<10	<10
	Methyl Tert Butyl Ether (MTBE)	2	ug/L	AO 15		<2	<2
	Monochlorobenzene	0.5	ug/L	MAC 80		<0.5	<0.5
	o-xylene	0.4	ug/L			<0.4	<0.4
	Styrene	0.5	ug/L			<0.5	<0.5
	t-1,2-Dichloroethylene	0.4	ug/L			<0.4	<0.4
	t-1,3-Dichloropropylene	0.2	ug/L			<0.2	<0.2
	Tetrachloroethylene	0.3	ug/L	MAC 10		<0.3	<0.3
	Toluene	0.4	ug/L	MAC 60		<0.4	<0.4
	Trichloroethylene	0.3	ug/L	MAC 5		<0.3	<0.3
	Trichlorofluoromethane	0.5	ug/L			<0.5	<0.5
	Vinyl Chloride	0.2	ug/L	MAC 1		<0.2	<0.2
	Xylene; total	0.5	ug/L	MAC 90		<0.5	<0.5

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

Report Number: 1973843
Date Submitted: 2022-03-23
Date Reported: 2022-03-30
Project: PH4484
COC #: 887701

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 418950 Analysis/Extraction Date 2022-03-23 Analyst AaN Method C SM2130B			
Turbidity	<0.1 NTU	99	70-130
Run No 418958 Analysis/Extraction Date 2022-03-24 Analyst DRA Method AMBCOLM1			
Escherichia Coli			
Total Coliforms			
Run No 418995 Analysis/Extraction Date 2022-03-24 Analyst Z S Method M SM3120B-3500C			
Calcium	<1 mg/L	95	90-110
Potassium	<1 mg/L	96	87-113
Magnesium	<1 mg/L	95	76-124
Sodium	<1 mg/L	102	82-118
Run No 419016 Analysis/Extraction Date 2022-03-24 Analyst SKH Method EPA 350.1			
N-NH3	<0.010 mg/L	113	80-120
Run No 419027 Analysis/Extraction Date 2022-03-24 Analyst SKH Method EPA 351.2			
Total Kjeldahl Nitrogen	<0.100 mg/L	110	70-130

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Date Submitted: 2022-03-23
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COC #: 887701

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 419078 Analysis/Extraction Date 2022-03-24 Analyst YH Method EPA 8260			
Tetrachloroethane, 1,1,1,2-	<0.5 ug/L	92	60-130
Trichloroethane, 1,1,1-	<0.4 ug/L	88	60-130
Tetrachloroethane, 1,1,2,2-	<0.5 ug/L	114	60-130
Trichloroethane, 1,1,2-	<0.4 ug/L	104	60-130
Dichloroethane, 1,1-	<0.4 ug/L	94	60-130
Dichloroethylene, 1,1-	<0.5 ug/L	93	60-130
Dichlorobenzene, 1,2-	<0.4 ug/L	104	60-130
Dichloroethane, 1,2-	<0.2 ug/L	115	60-130
Dichloropropane, 1,2-	<0.5 ug/L	106	60-130
1,3,5-trimethylbenzene	<0.3 ug/L	97	60-130
Dichlorobenzene, 1,3-	<0.4 ug/L	96	60-130
Dichloropropene, 1,3-	<0.3 ug/L		
Dichlorobenzene, 1,4-	<0.4 ug/L	97	60-130
Acetone	<30 ug/L		60-130
Benzene	<0.5 ug/L	100	60-130
Bromodichloromethane	<0.3 ug/L	108	60-130

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Date Submitted: 2022-03-23
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QC Summary

Analyte	Blank	QC % Rec	QC Limits
Bromoform	<0.4 ug/L	104	60-130
Bromomethane	<0.5 ug/L	93	60-130
Dichloroethylene, 1,2-cis-	<0.4 ug/L	98	60-130
Dichloropropene, 1,3-cis-	<0.2 ug/L	103	60-130
Carbon Tetrachloride	<0.2 ug/L	93	60-130
Chloroethane	<0.2 ug/L	91	60-130
Chloroform	<0.5 ug/L	100	60-130
Dibromochloromethane	<0.3 ug/L	96	60-130
Dichlorodifluoromethane	<0.5 ug/L	86	60-130
Methylene Chloride	<4.0 ug/L	113	60-130
Ethylbenzene	<0.5 ug/L	85	60-130
Ethylene dibromide	<0.2 ug/L	98	60-130
Hexane (n)	<5 ug/L	110	60-130
m/p-xylene	<0.4 ug/L	93	60-130
Methyl Ethyl Ketone	<10 ug/L	100	60-130
Methyl Isobutyl Ketone	<10 ug/L		60-130
Methyl tert-Butyl Ether (MTBE)	<2 ug/L	110	60-130
Chlorobenzene	<0.5 ug/L	93	60-130

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K2E 7T7
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Date Submitted: 2022-03-23
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QC Summary

Analyte	Blank	QC % Rec	QC Limits
o-xylene	<0.4 ug/L	84	60-130
Styrene	<0.5 ug/L	90	60-130
Dichloroethylene, 1,2-trans-	<0.4 ug/L	89	60-130
Dichloropropene, 1,3-trans-	<0.2 ug/L	112	60-130
Tetrachloroethylene	<0.3 ug/L	91	60-130
Toluene	<0.4 ug/L	96	60-130
Trichloroethylene	<0.3 ug/L	82	60-130
Trichlorofluoromethane	<0.5 ug/L	87	60-130
Vinyl Chloride	<0.2 ug/L	88	60-130
Run No 419082 Analysis/Extraction Date 2022-03-25 Analyst YH Method EPA 8260			
Xylene Mixture			
Run No 419088 Analysis/Extraction Date 2022-03-25 Analyst IP Method SM5530D/EPA420.2			
Phenols	<0.001 mg/L	50	50-120
Run No 419093 Analysis/Extraction Date 2022-03-25 Analyst AsA Method C SM4500-S2-D			
S2-	<0.01 mg/L	111	80-120

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QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 419123 Analysis/Extraction Date 2022-03-28 Analyst AsA Method C SM2120C			
Colour (Apparent)	<2 TCU	106	90-110
Run No 419127 Analysis/Extraction Date 2022-03-28 Analyst AaN Method SM 4110			
Chloride	<5 mg/L		90-110
N-NO2	<0.10 mg/L	103	90-110
N-NO3	<0.10 mg/L	104	90-110
SO4	<5 mg/L	105	90-110
Run No 419170 Analysis/Extraction Date 2022-03-25 Analyst AET Method SUBCONTRACT-A			
Tannin & Lignin	<1.0 mg/L	106	
Run No 419184 Analysis/Extraction Date 2022-03-28 Analyst AsA Method SM2320,2510,4500H/F			
Alkalinity (CaCO3)	<5 mg/L	98	90-110
Conductivity	<5 uS/cm	101	90-110
F	<0.10 mg/L	99	90-110
pH		100	90-110

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QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 419188 Analysis/Extraction Date 2022-03-28 Analyst AsA Method SM 5310B			
DOC	<0.5 mg/L	102	80-120
Run No 419190 Analysis/Extraction Date 2022-03-25 Analyst R K Method SUBCONTRACT-A			
Tannin & Lignin	<1.0 mg/L	106	
Run No 419203 Analysis/Extraction Date 2022-03-29 Analyst AET Method C SM2340B			
Hardness as CaCO ₃			
Ion Balance			
TDS (COND - CALC)			
Run No 419228 Analysis/Extraction Date 2022-03-29 Analyst SD Method EPA 200.8			
Silver	<0.0001 mg/L	82	80-120
Aluminum	<0.01 mg/L	111	80-120
Arsenic	<0.001 mg/L	97	80-120
Boron (total)	<0.01 mg/L	116	80-120
Barium	<0.01 mg/L	102	80-120
Beryllium	<0.0005 mg/L	105	80-120

Guideline = ODWSOG

* = Guideline Exceedence

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

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

Certificate of Analysis

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

Report Number: 1973843
Date Submitted: 2022-03-23
Date Reported: 2022-03-30
Project: PH4484
COC #: 887701

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Cadmium	<0.0001 mg/L	101	80-120
Cobalt	<0.0002 mg/L	99	80-120
Chromium Total	<0.001 mg/L	94	80-120
Copper	<0.001 mg/L	106	80-120
Iron	<0.03 mg/L	99	80-120
Manganese	<0.01 mg/L	104	80-120
Molybdenum	<0.005 mg/L	99	80-120
Nickel	<0.005 mg/L	101	80-120
Lead	<0.001 mg/L	102	80-120
Antimony	<0.0005 mg/L	83	80-120
Selenium	<0.001 mg/L	108	80-120
Strontium	<0.001 mg/L	97	80-120
Thallium	<0.0001 mg/L	102	80-120
Uranium	<0.001 mg/L	99	80-120
Vanadium	<0.001 mg/L	98	80-120
Zinc	<0.01 mg/L	108	80-120
Run No 419288 Analysis/Extraction Date 2022-03-30 Analyst AaN Method M SM3112B-3500B			

Guideline = ODWSOG

* = Guideline Exceedence

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

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

Certificate of Analysis

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

Report Number: 1973843
Date Submitted: 2022-03-23
Date Reported: 2022-03-30
Project: PH4484
COC #: 887701

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Mercury	<0.0001 mg/L	96	76-123

Guideline = ODWSOG*** = Guideline Exceedence**

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

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

Certificate of Analysis

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

Report Number: 1973843
Date Submitted: 2022-03-23
Date Reported: 2022-03-30
Project: PH4484
COC #: 887701

Sample Comment Summary

Sample ID: 1615821	GW1	CI & SO4 MRL elevated due to matrix interference (dilution was done). Sediments not included for Hg analysis.
Sample ID: 1615822	GW2	CI & SO4 MRL elevated due to matrix interference (dilution was done). Sediments not included for Hg analysis.

Guideline = ODWSOG*** = Guideline Exceedence**

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

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

Certificate of Analysis

Client: Paterson Group
154 Colonnade Rd. South
Nepean, ON
K2E 7T7
Attention: Mr. Oliver Blume
PO#: 32614
Invoice to: Paterson Group

Report Number: 1974461
Date Submitted: 2022-04-04
Date Reported: 2022-04-05
Project: PH4484
COC #: 889009

Page 1 of 2

Dear Oliver Blume:

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

Report Comments:

Dragana
Dzeletovic
Dragana Dzeletovic
2022.04.05
16:55:16
-04'00'

APPROVAL: _____
Dragana Dzeletovic-Andric, Microbiology Team Lead

All analysis is completed at Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) unless otherwise indicated.

Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on the scope of accreditation. The scope is available at: <http://www.cala.ca/scopes/2602.pdf>.

Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is licensed by the Ontario Ministry of the Environment, Conservation, and Parks (MECP) for specific tests in drinking water (license #2318). A copy of the license is available upon request.

Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is accredited by the Ontario Ministry of Agriculture, Food, and Rural Affairs for specific tests in agricultural soils.

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



Certificate of Analysis

Client: Paterson Group
154 Colonnade Rd. South
Nepean, ON
K2E 7T7
Attention: Mr. Oliver Blume
PO#: 32614
Invoice to: Paterson Group

Report Number: 1974461
Date Submitted: 2022-04-04
Date Reported: 2022-04-05
Project: PH4484
COC #: 889009

Lab I.D.
Sample Matrix
Sample Type
Sampling Date
Sample I.D.

1617476
GW
2022-04-04
GW1

Group	Analyte	MRL	Units	Guideline	
Microbiology	Escherichia Coli	0	ct/100mL	MAC 0	0
	Total Coliforms	0	ct/100mL	MAC 0	4*

Guideline = ODWSOG

* = Guideline Exceedence

Results relate only to the parameters tested on the samples submitted.

Analytical Method: AMBCOLM1

additional QA/QC information available on request.

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

OFFICIAL CERTIFICATE OF ANALYSIS : 4491110**WORK REQUEST : 100392148****Report Date : 2025-10-09****Nelson Water**

248 Westbrook Rd.
Carp, Ontario
K0A 1L0
Attention : Customer Service

Reception Date : 2025-10-08
Project : NELSON WATER - Non-Regulated
Sampler : NA
PO Number : Not Applicable
Temperature : 14 °C

Analysis	Quantity	External Method
E.Coli and Total Coliforms (DC Plate)	1	Modified from MECP E3407

Criteria :

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

Sample status upon receipt :

9096463

Compliant

Notes :

- All analysis is completed at Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) unless otherwise stated.
- Eurofins Environment Testing Canada Inc. is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on the scope of accreditation. The scope is available at <https://directory.cala.ca/>
- Please note: Field data, where presented on the report, has been provided by the client and is presented for informational purposes only. Guideline or regulatory limits listed on this report are provided for ease of use (informational purposes) only. Eurofins recommends consulting the official guideline or regulation as required. Unless otherwise stated, measurement uncertainty is not taken into account when determining guideline or regulatory exceedances.

Legend :

RL : Reporting limit

N/A : Not applicable

* : Analysis conducted by external subcontracting

QC : Reference material (QC)

1 : Results in annex

^ : Analysis not accredited

OFFICIAL CERTIFICATE OF ANALYSIS - RESULTS

Client : Nelson Water

Project : NELSON WATER - Non-Regulated

Reception Date: 2025-10-08

Eurofins Sample No : Matrix : Sampling Date : Client Sample Identification :						9096463				
						Drinking water				
						2025-10-07				
						York - HOP				
Microbiology	RL	Unit	Criteria							
			A	B	C					
E.Coli and Total Coliforms (DC Plate)										
Escherichia coli (DC)	0	CFU/100mL	0			0				
Total Coliforms (DC)	0	CFU/100mL	0			0				

Approved by :


Jason Kennedy,
Project Manager

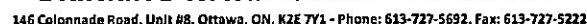
OFFICIAL CERTIFICATE OF ANALYSIS - QUALITY CONTROL

Client : Nelson Water
Project : NELSON WATER - Non-Regulated

Reception Date: 2025-10-08

Parameter	Unit	RL	Blank	QC		Matrix Spike		Duplicate	
				Recovery %	Range %	Recovery %	Range %	RPD %	Range %
E.Coli and Total Coliforms (DC Plate)									
Method : Total Coliforms and E.Coli by MF (Water, DC plate). Internal method: OTT-M-BAC-WI45296.									
Escherichia coli (DC)	CFU/100mL	0	0					-	0-30
Total Coliforms (DC)	CFU/100mL	0	0					-	0-30
Associated Samples : 9096463								Prep Date: 2025-10-08 Analysis Date: 2025-10-09	

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



100392148



Printed On : 2025-10-08 17:10:35

OFFICIAL CERTIFICATE OF ANALYSIS : 4492546**WORK REQUEST : 100392167****Report Date : 2025-10-14****Nelson Water**

248 Westbrook Rd.

Carp, Ontario

K0A 1L0

Attention : Customer Service

Reception Date : 2025-10-08

Project : NELSON WATER - Non-Regulated

Sampler : NA

PO Number : Not Applicable

Temperature : 14 °C

Analysis	Quantity	External Method
Nitrate and Nitrite (Water, Colorimetry)	1	Modified from SM 4500-NO3-F

Criteria :**A :** Ontario Regulation 169/03 (Non-Regulated Drinking Water)**Sample status upon receipt :**

9096602

Compliant**Notes :**

- All analysis is completed at Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) unless otherwise stated.
- Eurofins Environment Testing Canada Inc. is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on the scope of accreditation. The scope is available at <https://directory.cala.ca/>
- Please note: Field data, where presented on the report, has been provided by the client and is presented for informational purposes only. Guideline or regulatory limits listed on this report are provided for ease of use (informational purposes) only. Eurofins recommends consulting the official guideline or regulation as required. Unless otherwise stated, measurement uncertainty is not taken into account when determining guideline or regulatory exceedances.

Legend :

RL : Reporting limit

N/A : Not applicable

* : Analysis conducted by external subcontracting

QC : Reference material (QC)

1 : Results in annex

^ : Analysis not accredited

OFFICIAL CERTIFICATE OF ANALYSIS - RESULTS

Client : Nelson Water

Project : NELSON WATER - Non-Regulated

Reception Date: 2025-10-08

Eurofins Sample No :						9096602				
Matrix :						Drinking water				
Sampling Date :						2025-10-07				
Client Sample Identification :						YORK - HOP				
Nutrients	RL	Unit	Criteria							
			A	B	C					
Nitrate and Nitrite (Water, Colorimetry)										
Nitrate (as Nitrogen)	0.1	mg/L	10.0			0.25				
Nitrate + Nitrite (as Nitrogen)	0.1	mg/L				0.25				
Nitrite (as Nitrogen)	0.1	mg/L	1.0			<0.10				

Approved by :


Jason Kennedy,
Project Manager

OFFICIAL CERTIFICATE OF ANALYSIS - QUALITY CONTROL

Client : Nelson Water
Project : NELSON WATER - Non-Regulated

Reception Date: 2025-10-08

Parameter	Unit	RL	Blank	QC		Matrix Spike		Duplicate	
				Recovery %	Range %	Recovery %	Range %	RPD %	Range %
Nitrate and Nitrite (Water, Colorimetry)									
Method : Nitrates/Nitrates (Water, Colorimetry). Internal method: OTT-I-NUT-WI46199.									
Nitrate (as Nitrogen)	mg/L	0.1	<0.10	99	80-120			8	0-20
Nitrate + Nitrite (as Nitrogen)	mg/L	0.1	<0.10	99	80-120	104	80-120	5	0-20
Nitrite (as Nitrogen)	mg/L	0.1	<0.10	106	80-120	104	80-120	-	0-20
Associated Samples : 9096602								Prep Date: 2025-10-09 Analysis Date: 2025-10-09	

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

Printed On : 2025-10-08 17:46:27

DATUM Geodetic

REMARKS

BORINGS BY Backhoe

DATE 2022 February 8

FILE NO.

PG3834

HOLE NO.

TP 1-22

[illegible]

DATUM Geodetic

REMARKS

BORINGS BY Backhoe

DATE 2022 February 8

FILE NO.

PG3834

HOLE NO.

TP 2-22

[illegible]

DATUM Geodetic

REMARKS

BORINGS BY Backhoe

DATE 2022 February 8

FILE NO. PG3834

HOLE NO. TP 3-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %				
								20	40	60	80	
GROUND SURFACE												
TOPSOIL	0.10		G	1		0	119.19					
Brown SILTY SAND with gravel, cobbles and boulders			G	2								
			G	3								
			G	3		1	118.19					
Highly fractured BEDROCK interbedded with silty sand to sandy silt, some clay with fragmented bedrock	1.20		G	4								
End of Test Pit	1.45											
TP terminated on fractured bedrock surface at 1.45 m depth (TP dry upon completion)												
											</	

DATUM	Geodetic
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FILE NO. PG3834

REMARKS

HOLE NO. TP 4-22

BORINGS BY Backhoe

DATE 2022 February 8

[illegible]

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Office Building
2966 Carp Road - Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY Backhoe

DATE 2022 February 8

FILE NO.
PG3834

HOLE NO.
TP 5-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction	
		TYPE	NUMBER	% RECOVERY	N VALUE or RQD			○ Water Content %					
								20	40	60	80		
GROUND SURFACE													
TOPSOIL		G	1			0	117.88						
0.15		G	2										
Brown SILTY SAND with gravel, cobbles and boulders													
0.65		G	3										
Highly fractured BEDROCK interbedded with silty sand to sandy silt, some clay with fragmented bedrock													
1.75						1	116.88						
End of Test Pit													
TP terminated on fractured bedrock surface at 1.75 m depth													
(TP dry upon completion)													
													</

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Office Building
2966 Carp Road - Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY Backhoe

DATE 2022 February 8

FILE NO.
PG3834

HOLE NO.
TP 6-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction	
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %					
								20	40	60	80		
GROUND SURFACE						0	118.91						
BEDROCK	0.10	G	1										
FILL: Brown silty sand with brick fragments, concrete and gravel		G	2										
		G	3										
		G	4										
		G											
End of Test Pit	1.75					1	117.91						
TP terminated on fractured bedrock surface at 1.75 m depth (TP dry upon completion)													
								20	40	60	80	100	
								Shear Strength (kPa)					
								▲ Undisturbed △ Remoulded					

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Office Building
2966 Carp Road - Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY Backhoe

DATE 2022 February 8

FILE NO.
PG3834

HOLE NO.
TP 7-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %				
								20	40	60	80	
GROUND SURFACE												
TOPSOIL		G	1			0	118.67					
0.15		G	2									
FILL: Brown silty sand with gravel some clay		G	3									
1.05		G	4			1	117.67					
Highly fractured BEDROCK interbedded with silty sand to sandy silt, some clay with fragmented bedrock												
1.50												
End of Test Pit												
TP terminated on fractured bedrock surface at 1.50 m depth (TP dry upon completion)												
				</								

DATUM TBM - Top of magnetic nail in utility pole on Carp Road. Geodetic elevation = 119.73m.

REMARKS

BORINGS BY CME 55 Power Auger

DATE June 1, 2016

FILE NO.
PG3834

HOLE NO.
BH 1

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %				
								20	40	60	80	
GROUND SURFACE												
TOPSOIL	0.08					0	118.24					
Brown SILTY SAND with gravel, cobbles and boulders, trace clay and organics	0.76	SS	1	75	50+	1	117.24					
Highly fractured BEDROCK interbedded with silty sand to sandy silt, some clay with fragmented bedrock		SS	2	80	50+	2	116.24					
		SS	3	80	50+	3	115.24					
		SS	4	75	71	4	114.24					
		SS	5	75	50+							
		SS	6		50+							
End of Borehole	4.95											
Practical split spoon refusal at 4.95m depth												
(GWL @ 4.2m depth based on field observations)												
								20	40	60	80	100
								Shear Strength (kPa)				
								▲ Undisturbed △ Remoulded				

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario

DATUM TBM - Top of magnetic nail in utility pole on Carp Road. Geodetic elevation = 119.73m.

REMARKS

BORINGS BY CME 55 Power Auger

DATE June 1, 2016

FILE NO. PG3834

HOLE NO. BH 2

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %				
								20	40	60	80	
GROUND SURFACE												
TOPSOIL	0.10					0	118.42					
Brown SILTY SAND with gravel, cobbles and boulders, trace clay and organics		SS	1	92	51	1	117.42					
	1.45	SS	2	25	50+	2	116.42					
Highly fractured BEDROCK interbedded with silty sand to sandy silt, some clay with fragmented bedrock		SS	3	50	50+	3	115.42					
						4	114.42					
	4.80	SS	4	67	50+							
End of Borehole												
Practical split spoon refusal at 4.80m depth												
(BH dry - June 6, 2016)												
								20	40	60	80	100
								Shear Strength (kPa)				
								▲ Undisturbed △ Remoulded				

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario**

FILE NO. PG3834

HOLE NO. **BH 3**

DATE June 1, 2016

[illegible]

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario

DATUM TBM - Top of magnetic nail in utility pole on Carp Road. Geodetic elevation = 119.73m.

REMARKS

FILE NO.
PG3834

HOLE NO.
BH 3A

BORINGS BY CME 55 Power Auger

DATE June 1, 2016

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %				
								20	40	60	80	
GROUND SURFACE												
TOPSOIL	0.15					0	118.29					
Brown SILTY SAND with gravel, cobbles and boulders, trace clay and organics						1	117.29					
	1.80	SS	1	58	54	2	116.29					
Highly fractured BEDROCK interbedded with silty sand to sandy silt, some clay with fragmented bedrock						3	115.29					
		SS	2	75	50+	4	114.29					
End of Borehole	4.65	SS	3	67	50+							
Practical split spoon refusal at 4.65m depth												
(GWL @ 4.3m depth based on field observations)												
								20	40	60	80	100
								Shear Strength (kPa)				
								▲ Undisturbed △ Remoulded				

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario

DATUM TBM - Top of magnetic nail in utility pole on Carp Road. Geodetic elevation = 119.73m.

REMARKS

FILE NO.
PG3834

HOLE NO.
BH 4

BORINGS BY CME 55 Power Auger

DATE June 1, 2016

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %				
								20	40	60	80	
GROUND SURFACE												
TOPSOIL Brown SILTY SAND with gravel, cobbles and boulders, trace clay and organics	0.08 0.66					0	118.03					
Highly fractured BEDROCK interbedded with silty sand to sandy silt, some clay with fragmented bedrock		SS	1	50	46	1	117.03					
		SS	2		68	2	116.03					
End of Borehole	2.59											
Practical refusal to augering at 2.59m depth (BH dry upon completion)												
								20	40	60	80	100
								Shear Strength (kPa)				
								▲ Undisturbed △ Remoulded				

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario**

FILE NO. PG3834

HOLE NO. **BH 5**

DATE June 1, 2016

[illegible]

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario**

FILE NO. PG3834

HOLE NO. **BH 6**

DATE June 1, 2016

[illegible]

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario**

FILE NO. PG3834

HOLE NO. BH 7

DATE June 1, 2016

[illegible]

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario

DATUM TBM - Top of magnetic nail in utility pole on Carp Road. Geodetic elevation = 119.73m.

REMARKS

FILE NO.
PG3834

HOLE NO.
BH 8

BORINGS BY CME 55 Power Auger

DATE June 2, 2016

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %				
								20	40	60	80	
GROUND SURFACE												
TOPSOIL						0	117.54					
Brown SILTY SAND with gravel, cobbles and boulders, trace clay and organics	0.30	AU	1									
	0.76	SS	2	67	50+	1	116.54					
		SS	3	60	50+	2	115.54					
		SS	4	92	58	3	114.54					
Highly fractured BEDROCK interbedded with silty sand to sandy silt, some clay with fragmented bedrock		SS	5	50	50+	4	113.54					
		SS	6	76	79	5	112.54					
	5.94											
End of Borehole												
Practical refusal to augering at 5.94m depth												
(GWL @ 4.19m-June 6, 2016)												
								20	40	60	80	100
								Shear Strength (kPa)				
								▲ Undisturbed △ Remoulded				

SOIL PROFILE AND TEST DATA

HOLE NO. **BH 9**

[illegible]

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario**

FILE NO. **PG3834**

HOLE NO. **BH10**

DATE June 2, 2016

[illegible]

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario**

FILE NO. PG3834

HOLE NO. BH11

DATE June 2, 2016

[illegible]

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario

DATUM TBM - Top of magnetic nail in utility pole on Carp Road. Geodetic elevation = 119.73m.

REMARKS

FILE NO.
PG3834

HOLE NO.
TP 1

BORINGS BY Backhoe

DATE November 3, 2016

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction	
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %					
								20	40	60	80		
GROUND SURFACE						0	117.72						
TOPSOIL	0.20	G	1										
Brown SILTY SAND to SANDY SILT, some tree roots		G	2			1	116.72						
Highly fractured BEDROCK with sandy silt, gravel, cobbles and boulders, some clay	1.20 1.30												
End of Test Pit													
TP terminated on fractured bedrock surface at 1.30m depth (TP dry upon completion)													

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario**

FILE NO. **PG3834**

HOLE NO. TP 2

DATE November 3, 2016

[illegible]

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario

DATUM TBM - Top of magnetic nail in utility pole on Carp Road. Geodetic elevation = 119.73m.

REMARKS

BORINGS BY Backhoe

DATE November 3, 2016

FILE NO.
PG3834

HOLE NO.
TP 3

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction	
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %					
								20	40	60	80		
GROUND SURFACE						0	117.47						
TOPSOIL	0.20												
Brown SILTY SAND to SANDY SILT	0.50												
Highly fractured BEDROCK with sandy silt, gravel, cobbles and boulders, some clay	1.60					1	116.47						
End of Test Pit													
TP terminated on fractured bedrock surface at 1.60m depth (TP dry upon completion)													

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario**

FILE NO. PG3834

HOLE NO. **TP 4**

DATE November 3, 2016

[illegible]

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario**

DATUM TBM - Top of magnetic nail in utility pole on Carp Road. Geodetic elevation = 119.73m.

FILE NO. PG3834

REMARKS

HOLE NO. **TP 5**

BORINGS BY Backhoe

DATE November 3, 2016

[illegible]

SOIL PROFILE AND TEST DATA

HOLE NO. **TP 6**

[illegible]

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario**

FILE NO. PG3834

HOLE NO. **TP 7**

DATE November 3, 2016

[illegible]

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario**

FILE NO. PG3834

HOLE NO. **TP 8**

DATE November 3, 2016

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	% RECOVERY	N VALUE or RQD			○ Water Content %				
								20	40	60	80	
GROUND SURFACE						0	118.54					
Crushed stone	0.05											
TOPSOIL	0.20											
Brown SILTY SAND , trace gravel	0.80											
Highly fractured BEDROCK with brown silty sand, gravel and cobbles, trace boulders	1.50	G	1			1	117.54					
End of Test Pit												
TP terminated on fractured bedrock surface at 1.50m depth (TP dry upon completion)												

Shear Strength (kPa)
 ▲ Undisturbed △ Remoulded

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario**

FILE NO. PG3834

HOLE NO. **TP 9**

DATE November 3, 2016

[illegible]

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario

DATUM TBM - Top of magnetic nail in utility pole on Carp Road. Geodetic elevation = 119.73m.

REMARKS

BORINGS BY Backhoe

DATE November 3, 2016

FILE NO.
PG3834

HOLE NO.
TP10

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %				
								20	40	60	80	
GROUND SURFACE						0	118.24					
TOPSOIL	0.20											
Brown SILTY SAND with cobbles	0.60											
Grey SILTY CLAY	0.85	G	1									
Brown SILTY SAND	0.97	G	2									
High fractured BEDROCK with brown silty sand, cobbles and boulders						1	117.24					
							</					

SOIL PROFILE AND TEST DATA

HOLE NO. **TP11**

[illegible]

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario

DATUM TBM - Top of magnetic nail in utility pole on Carp Road. Geodetic elevation = 119.73m.

REMARKS

BORINGS BY Backhoe

DATE November 8, 2016

FILE NO.
PG3834

HOLE NO.
TP12

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction	
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %					
								20	40	60	80		
GROUND SURFACE						0	117.46						
TOPSOIL													
0.25													
Brown SILTY SAND , trace cobbles, boulders and clay - intermittent thin layers of silty clay from 1.25m depth		G	1			1	116.46						
1.50													
Highly fractured BEDROCK interbedded with sandy silt, some clay with fragmented bedrock throughout						2	115.46						
2.65													
End of Test Pit TP terminated on fractured bedrock surface at 2.65m depth (TP dry upon completion)													
								20	40	60	80	100	
								Shear Strength (kPa)					
								▲ Undisturbed △ Remoulded					

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario

DATUM TBM - Top of magnetic nail in utility pole on Carp Road. Geodetic elevation = 119.73m.

REMARKS

FILE NO.
PG3834

HOLE NO.
TP13

BORINGS BY Backhoe

DATE November 8, 2016

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction	
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %					
								20	40	60	80		
GROUND SURFACE						0	117.43						
TOPSOIL													
0.25													
Brown SILTY SAND , some clay and tree roots, trace gravel, cobbles and boulders													
1.00		G	1			1	116.43						
Highly fractured BEDROCK interbedded with sandy silt, some clay with fragmented bedrock throughout													
1.80													
End of Borehole													
TP terminated on fractured bedrock surface at 1.80m depth (TP dry upon completion)													

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario**

FILE NO. PG3834

HOLE NO. TP14

DATE November 8, 2016

[illegible]

SYMBOLS AND TERMS

SOIL DESCRIPTION

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

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

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

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

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

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

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

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

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

ROCK DESCRIPTION

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

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

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

SAMPLE TYPES

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

SYMBOLS AND TERMS (continued)

GRAIN SIZE DISTRIBUTION

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

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

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

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

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

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

CONSOLIDATION TEST

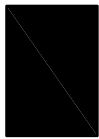
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidation ratio = p'_c / p'_o
Void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

PERMEABILITY TEST

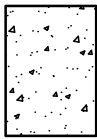
k	-	Coefficient of permeability or hydraulic conductivity is a measure of the ability of water to flow through the sample. The value of k is measured at a specified unit weight for (remoulded) cohesionless soil samples, because its value will vary with the unit weight or density of the sample during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

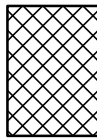
STRATA PLOT



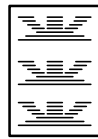
Topsoil



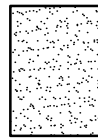
Asphalt



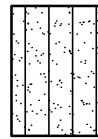
Fill



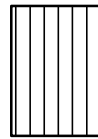
Peat



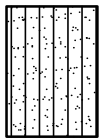
Sand



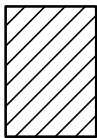
Silty Sand



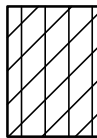
Silt



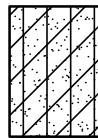
Sandy Silt



Clay



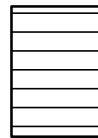
Silty Clay



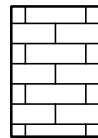
Clayey Silty Sand



Glacial Till



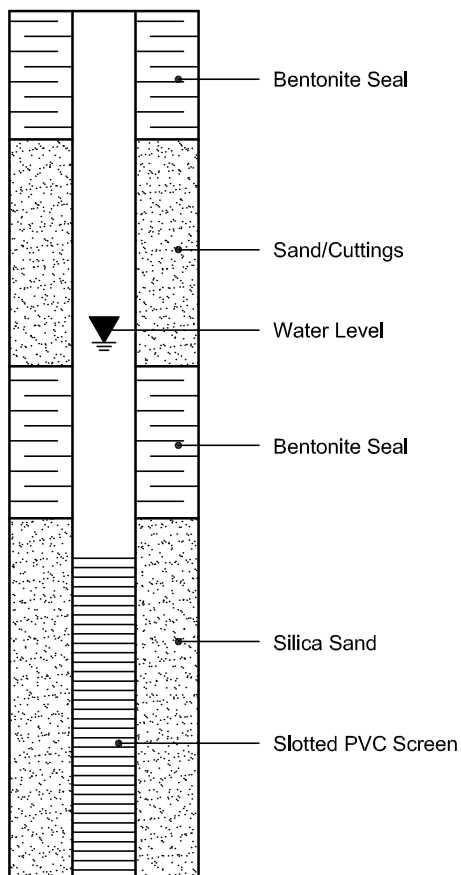
Shale



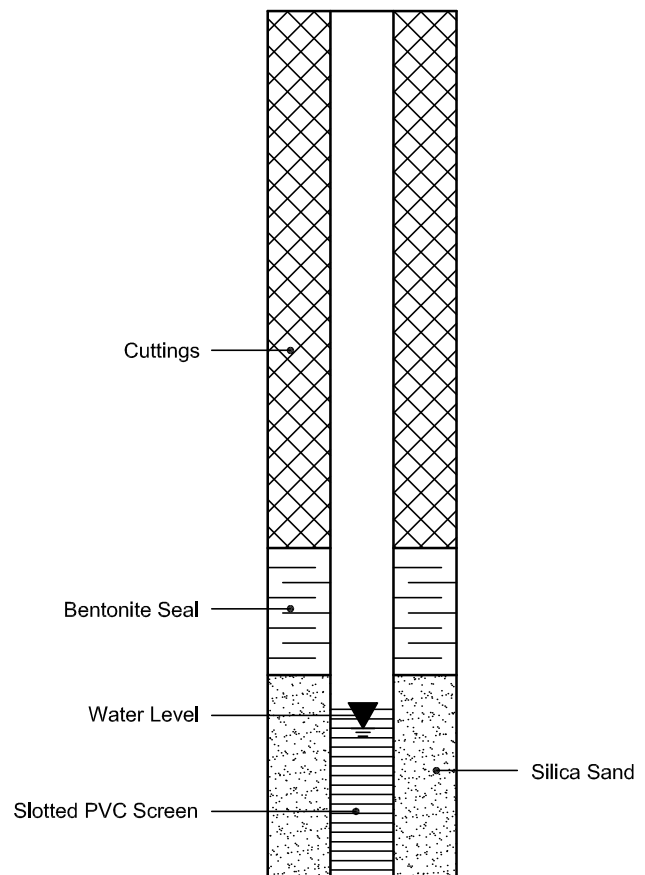
Bedrock

MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION

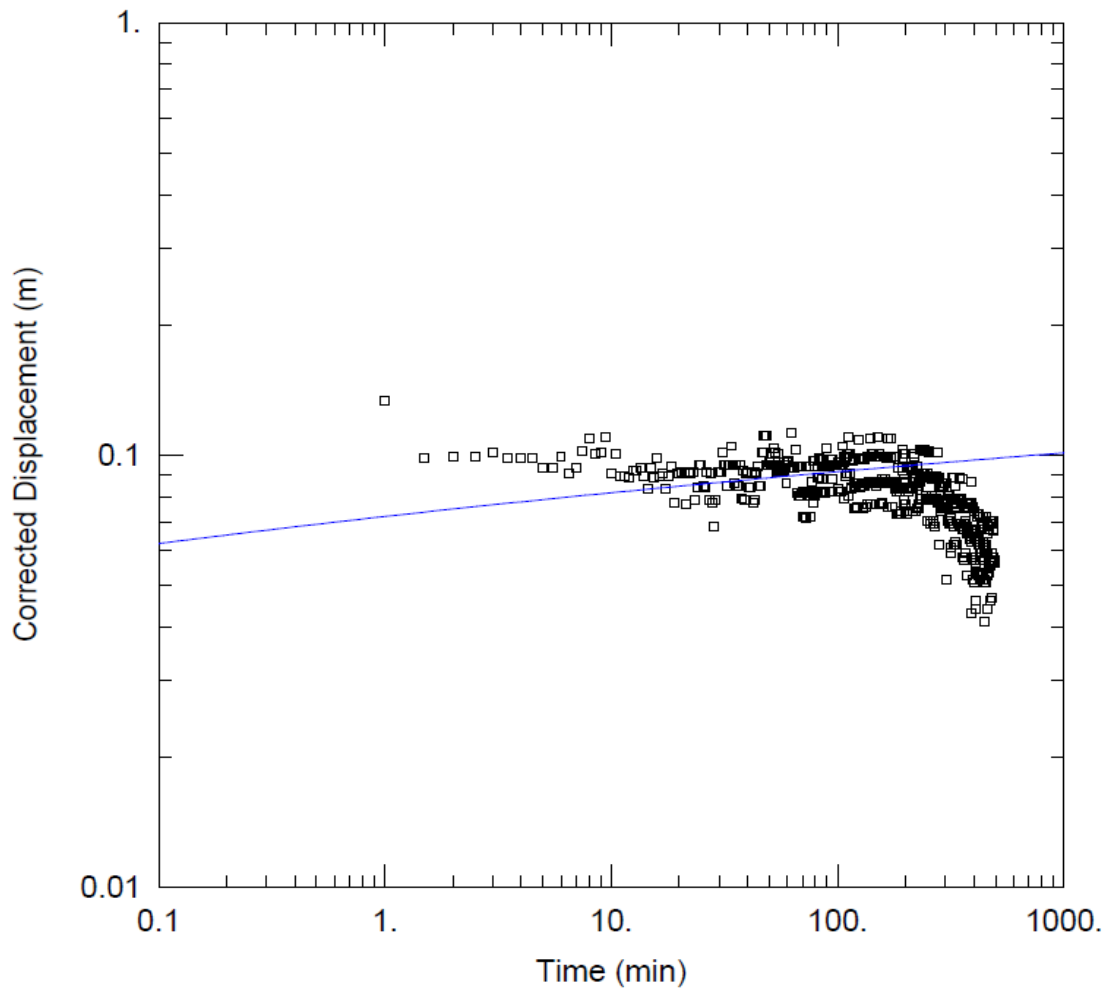


PIEZOMETER CONSTRUCTION



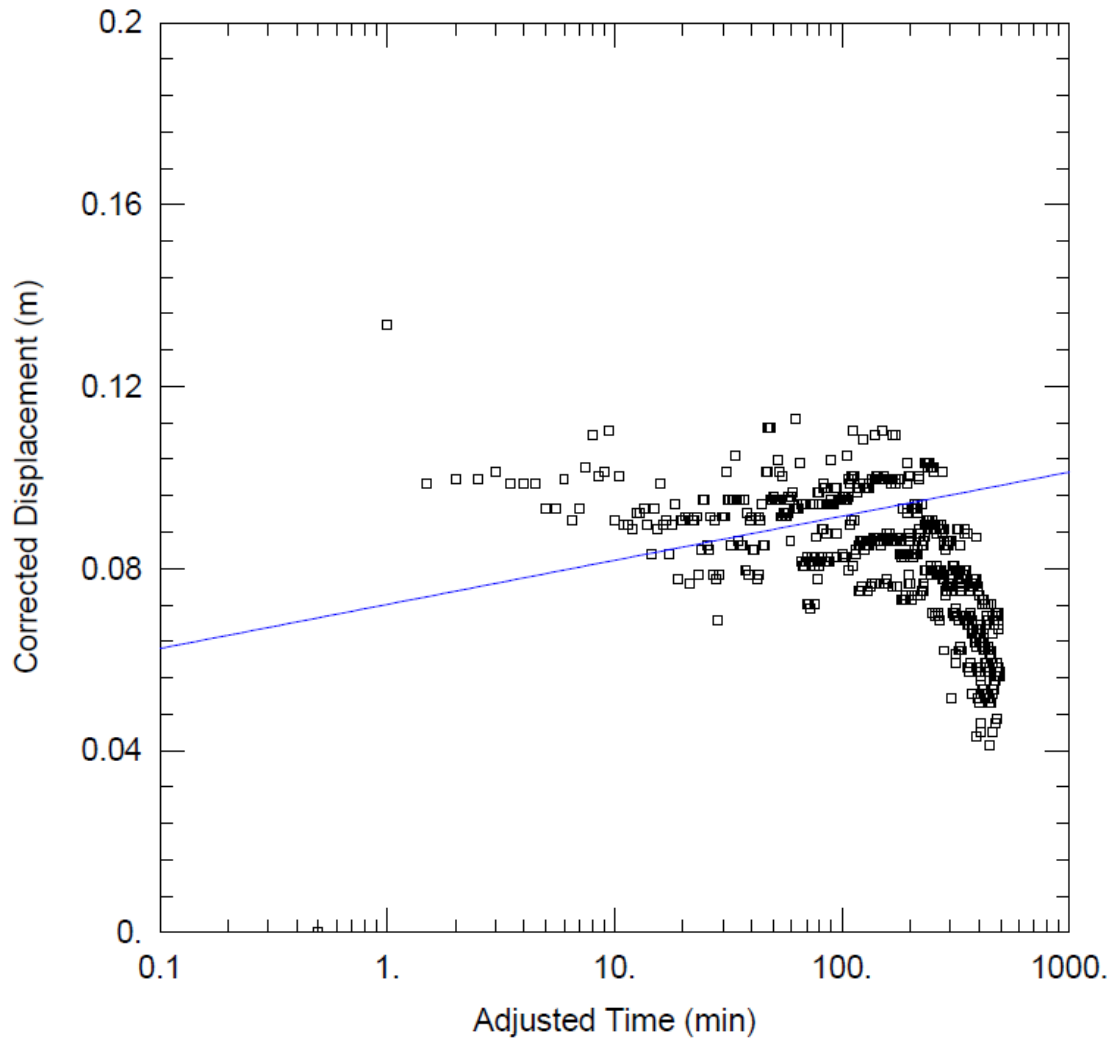
Pumping Test Analysis Report

File No.	PH4484	Well ID:	TW1
Date:	April 13, 2022	Solution Method:	Theis
Client:	Nautical Lands Group	Transmissivity (m ² /day):	1224.1
Site Address:	2966 Carp Road, Ottawa	Discharge Rate (L/min)	45
Project:	Site Plan Application	Analysis performed by:	EA



Pumping Test Analysis Report

File No.	PH4484	Well ID:	TW1
Date:	April 13, 2022	Solution Method:	Cooper-Jacob
Client:	Nautical Lands Group	Transmissivity (m ² /day):	1224.1
Site Address:	2966 Carp Road, Ottawa	Discharge Rate (L/min)	45
Project:	Site Plan Application	Analysis performed by:	EA



Pumping Test Analysis Report

File No. PH4484
Date: April 13, 2022
Client: Nautical Lands Group
Site Address: 2966 Carp Road, Ottawa
Project: Site Plan Application

Summary Table:		
Solution Method:	Well ID:	Transmissivity (m ² /day):
Theis	TW1	1224.1
Cooper-Jacob	TW1	1224.1
Average:		1224.10

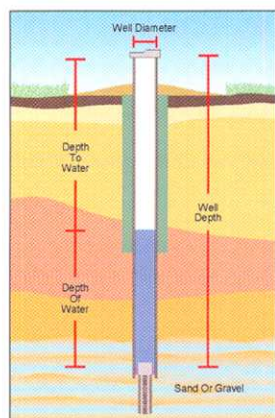
TW1 inputs		
pH	7.93	A
TDS	767	B
Hardness	451	C
Alkalinity	243	D
Temp.	10.8	
		pHs = 7.215174149

Langelier Saturation Index (LSI) Calculation		(Langelier, 1936)
$LSI = pH - pHs$ $pHs = (9.3 + A + B) - (C + D)$ Where: $A = (\text{Log}_{10} [\text{TDS}] - 1) / 10$ $B = -13.12 \times \text{Log}_{10} (\text{oC} + 273) + 34.55$ $C = \text{Log}_{10} [\text{Ca}^{2+} \text{ as CaCO}_3] - 0.4$ $D = \text{Log}_{10} [\text{alkalinity as CaCO}_3]$		
		LSI = 0.7
LSI	Effect	
0.5 to 2	Water is super saturated and tends to precipitate a scale layer of calcium carbonate (scale forming but non-corrosive)	
0 to 0.5	Water is super saturated and tends to precipitate a scale layer of calcium carbonate (slightly scale forming and corrosive).	
0	Water is saturated (in equilibrium) with calcium carbonate. A scale layer of calcium carbonate is neither precipitated nor dissolved.	
0 to -0.5	Water is under saturated and tends to dissolve solid calcium carbonate (slightly corrosivebut non-scale forming).	
-0.5 to -2	Water is under saturated and tends to dissolve solid calcium carbonate (seriously corrosive).	

PREDICTIVE NITRATE IMPACT ASSESSEMENT		
Infiltration Factors		
Topography	0.25	
Soil	0.30	
Cover	0.12	
Total	0.67	
Site Characteristics		
Area of Site :	12832	m ²
Total of roof areas:	1713	m ²
Total area of paved driveway areas:	4051	m ²
Roof + paved driveway areas	5764	m ²
Impervious Area	5764	m ²
Percent Impervious Area =	45	%
Infiltration Area =	7068	m ²
Septic Effluent		
Concentration of Effluent (Cs) =	17.2	mg/L
Infiltration Calculation		
Nitrate concentration in precipitation (C _i) =	0	mg/L
Surplus Water (Environment Canada)	378	mm/yr
Factored Water Surplus =	253	mm/yr
Infiltration % due to stormwater management measures	-	%
Infiltration rate from stormwater management measures =	0	mm/yr
Infiltration Flow Entering the System (Q _i) =	5	m ³ /day
Mass Balance Model (MOEE, 1995)		
$C_T = (Q_b C_b + Q_e C_e + Q_i C_i) / (Q_b + Q_e + Q_i) = \text{Cumulative Nitrate Concentration}$		
Q _b = flow entering the system across the upgradient area	0	m ³ /day
C _b = background nitrate concentration	0.25	mg/L
C _s = concentration of nitrates in the septic effluent	17.2	mg/L
Q _i = flow entering the system from infiltration	5	m ³ /day
C _i = Concentration of nitrates in the infiltrate	0	mg/L
C_T =	9.75	mg/L
Maximum Allowable Sewage Flow Volume		
Daily Sewage Flow (Q _s)=	6.418279445	m³
<i>Notes: Site characteristic values were measured as approximate values from the available site plans and GeoOttawa.</i>		

PREDICTIVE NITRATE IMPACT ASSESSEMENT		
Infiltration Factors		
Topography	0.25	
Soil	0.30	
Cover	0.12	
Total	0.67	
Site Characteristics		
Area of Site :	12832	m ²
Total of roof areas:	1713	m ²
Total area of paved driveway areas:	4051	m ²
Roof + paved driveway areas	5764	m ²
Impervious Area	5764	m ²
Percent Impervious Area =	45	%
Infiltration Area =	7068	m ²
Septic Effluent		
Concentration of Effluent (Cs) =	40	mg/L
Infiltration Calculation		
Nitrate concentration in precipitation (C _i) =	0	mg/L
Surplus Water (Environment Canada)	378	mm/yr
Factored Water Surplus =	253	mm/yr
Infiltration % due to stormwater management measures	-	%
Infiltration rate from stormwater management measures =	0	mm/yr
Infiltration Flow Entering the System (Q _i) =	5	m ³ /day
Mass Balance Model (MOEE, 1995)		
$C_T = (Q_b C_b + Q_e C_e + Q_i C_i) / (Q_b + Q_e + Q_i) = \text{Cumulative Nitrate Concentration}$		
Q _b = flow entering the system across the upgradient area	0	m ³ /day
C _b = background nitrate concentration	0.25	mg/L
C _s = concentration of nitrates in the septic effluent	40	mg/L
Q _i = flow entering the system from infiltration	5	m ³ /day
C _i = Concentration of nitrates in the infiltrate	0	mg/L
C_T =	9.75	mg/L
Maximum Allowable Sewage Flow Volume		
Daily Sewage Flow (Q _s)=	1.580700227	m³
<i>Notes: Site characteristic values were measured as approximate values from the available site plans and GeoOttawa.</i>		

Disinfection Instruction Sheet



If your drinking water continues to test positive on repeated submissions, consult your local health unit, which can help you interpret the results of your tests and provide you with advice on what measures you can take to safeguard your drinking water.

The first step in identifying the reason for repeated adverse water quality is to conduct a visual inspection of your well. Start with a close look at your well. The area around it should be

clear of any potential contaminant sources, such as pets, lawn care products, and gardens. Once you're satisfied that the area around your well is okay, take a good, close look at the well itself. If you have an older well, make sure that the cap and the sealant around the well casing isn't cracked or damaged. If it is, you need to fix or replace it right away.

If the source of the problem can't be detected, consult a licensed well contractor right away to identify the source of the problem and eliminate it. You can save yourself a lot of money by doing this instead of rushing out to buy a home treatment device that may be expensive to install, operate, and maintain. And it may not eliminate the source of your trouble.

(If you have a cistern, please talk to your public health unit about disinfection requirements.)

1. Measure the diameter of the well.
2. Measure the well depth and the static or resting water level, then calculate the depth of water in the well.
3. Using the table on this sheet, measure out the amount of bleach needed. (The table gives the volume of bleach needed for different well sizes.) Then, pour the mixture into your well.
4. If possible, mix the water in the well. This can be accomplished by attaching a hose to a tap, running water from the well, through the hose and back into the well.
5. After adding chlorine to the well, remove or bypass any carbon filters that are in the system for water treatment. If you don't, these filters will remove the chlorine from the water, and any pipes beyond the filter will not get disinfected. Replace with new filters after chlorination to avoid reintroducing bacteria into the system.
6. Run water at every faucet in the house (and barn, if you have one) until a strong chlorine odour is detected. Be aware that your nose may lose its ability to detect chlorine.
7. If there is no chlorine smell or it is very weak, add more bleach to the well and repeat Step 6 above.
8. Drain the water heater and fill with chlorinated water.
9. Backflush the water softener and all water filters (except carbon filters).

Volume of Bleach to Add for Every 3 Metres (10 Feet) of Water in the Well*		
Casing Diameter		Volume of Unscented Bleach (5.25% solution)
Millimetres	Inches	Millilitres
50	2	6
100	4	30
150	6	60
200	8	100
250	10	200
300	12	250
400	16	400
500	20	650
600	24	900
900	36	2000 (2 litres)
1200	48	3600 (3.6 litres)

For example: If you have 6 metres (20 feet) of water in your well and it has a casing diameter of 100 mm or 4 inches, you would add 60 mm or 2 fluid ounces of bleach.

* For questions or more information on how to disinfect your well, contact your local health unit.

For more information

Ontario Government Ministry Abbreviations

Ministry of Health and Long-Term Care
MOHLTC (also MOH)

Ministry of the Environment
MOE (also MOEE)

Ontario Ministry of Agriculture and Food
OMAF (also OMAFRA)

Ontario Government Information Lines

MOE Public Information Centre: 1-800-565-4923

MOE Water Well Records: 1-888-396-9355

MOHLTC INFOline: 1-800-268-1154

OMAF Agricultural Information Contact Centre: 1-877-424-1300

Ontario Government Web Sites

MOE: www.ene.gov.on.ca

MOHLTC: www.health.gov.on.ca

OMAF: www.gov.on.ca/omaf

Publications available on-line

Health Canada: www.hc-sc.gc.ca

- *A Guide to Well Water Treatment and Maintenance*;
- *Water treatment devices for disinfection of drinking water*.

MOHLTC: www.health.gov.on.ca

- *How to use water safely during a "Boil Water Advisory"*;
- *E. coli Bacteria*;
- List of Public Health Units in Ontario.

OMAF: www.gov.on.ca/omaf

- *Assessing the Potential for Ground Water Contamination on Your Farm*, Publication 97-017;
- *Best Management Practices: Water Wells*, OMAFRA and Agriculture and Agri-Food Canada, 2003 (to order).

MOE: www.ene.gov.on.ca

- *Important Facts About Water Well Construction*, Publication 3788;
- *Water Wells and Groundwater Supplies: The Protection of Water Quality in Bored and Dug Wells*, Information Sheet PIB 601b;
- *Water Wells and Groundwater Supplies: The Protection of Water Quality in Drilled Wells*, Information Sheet PIB 602b.

C.2 *Servicing Report – 2978 Carp Road, Stantec, December 21, 2016*



Servicing Report – 2978 Carp Road

Project # 160401271



Prepared for:
Nautical Lands Group

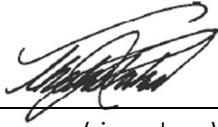
Prepared by:
Stantec Consulting Ltd.

December 21, 2016

Revision	Description	Author		Quality Check		Independent Review	
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3	3 rd submission	T.Rathnasooriya	2016/12/13	A.Lynch	2016/12/13	K.Kilborn	2016/12/13
4	4 th submission	T.Rathnasooriya	2016/12/20	A.Lynch	2016/12/20	K.Kilborn	2016/12/21

Sign-off Sheet

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Reviewed by  _____
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SERVICING REPORT – 2978 CARP ROAD

Introduction
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1.0 INTRODUCTION

Stantec Consulting Ltd. has been commissioned by Nautical Lands Group to prepare a servicing study in support of Site Plan Control submission of the proposed development located at 2978 Carp Road. Currently the site is divided into two parcels of land and is under approval to merge as one, 2978 and 2966 Carp Road (PIN 04537-0266 and 04537-0265). The site is situated southeast of the intersection of McGee Road and Carp Road within the City of Ottawa. The proposed development comprises approximately 1.30ha of land, and would replace a vacant property with a 15,000sq. ft pre-engineered steel storage building on the northern portion of the site. The site is zoned under Rural Commercial. The conceptual site development plan used for the purpose of this servicing brief is shown as **Figure 1**. The intent of this report is to provide a servicing scenario for the site that is free of conflicts, provides on-site servicing in accordance with City of Ottawa design guidelines, and utilizes the existing local infrastructure in accordance with the guidelines outlined per consultation with City of Ottawa staff.

Figure 1: Location Plan



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Background
December 21, 2016

2.0 BACKGROUND

Documents referenced in preparation of the design for the 2978 Carp Road development include:

- *Geotechnical Investigation – Proposed Storage Building – 2978 and 2966 Carp Road*, Paterson Group Consulting Engineers, November 11, 2016.
- *City of Ottawa Sewer Design Guidelines*, October 2012
- *Low Impact Development Stormwater Management Planning and Design Guide*, Credit Valley Conservation and Toronto Region Conservation Authority, 2010

3.0 WATER SUPPLY SERVICING

3.1 BACKGROUND

The proposed development comprises one pre-engineered steel storage building, complete with above ground parking and access areas. An existing well feeds the 1 storey building located on the south portion of the site. The proposed storage building will be serviced via a 19mm building service connection from a proposed drilled well located on the north portion of the property directly east of the proposed building. As per the Ministry of Ontario regulations the proponent must hire licensed well contractors which use licensed well technicians for installation of the on-site well, the second of two existing wells is located to the south of the access road and will be decommissioned.

3.2 PORTABLE WATER DEMANDS

Water demands for the development were estimated using the Ministry of Environment's Design Guidelines for Drinking Water Systems (2008).

The assessment for fire flow requirements was completed according to the Ontario Building Code (OBC) criteria using a "non-combustible with fire resistance" rating. The OBC indicates that low hazard occupancies include apartments, dwellings, dormitories, hotels, and schools, and as such, low hazard occupancy / limited combustible building contents credit was applied. Based on calculations per the OBC (**Appendix A.1**), the maximum required fire flows for this development are 75 L/s (4,500 L/min).

Utilizing water storage to supplement low yielding wells to meet fire flow water demands is common practice. Added water storage can be achieved by use of intermediate potable water storage tanks. The storage tanks will receive water from the well that are filled during off peak hours. The facility's water demand requires three portable storage tanks with a total 150,000 L capacity (50,000 L per tank) which is sufficient for the required volume of 149,532 L.

3.3 SUMMARY OF FINDINGS

The proposed development is located in an area of the City that will require private servicing to obtain the required domestic and emergency fire flows. The proposed servicing plan will provide sufficient water supply for fire flows for the proposed development based on OBC guidelines and as per the City of Ottawa water distribution guidelines.

4.0 WASTEWATER SERVICING

4.1 BACKGROUND

The subject site is located outside of the City's sanitary collection area. There are no special constraints for the proposed development to be serviced by a private sewage system other than those related to the Ontario Building Code (OBC) requirements. As a result, an existing septic tank and bed with private service is located on the eastern portion of PIN 04537-0265. The proposed building will require installation of a new septic tank and bed located east of the proposed storage building. Mississippi Valley authority permit approval is required. The proposed location is identified on the servicing and grading plans in **Appendix D.1** as provided by the geotechnical consultant.

5.0 STORMWATER MANAGEMENT

5.1 OBJECTIVES

The objective of this stormwater management plan is to determine the measures necessary to control the quantity/quality of stormwater released from the proposed development, and to provide sufficient detail for approval and construction.

5.2 SWM CRITERIA AND CONSTRAINTS

Criteria were established by combining current design practices outlined by the City of Ottawa Design Guidelines (2012), and through consultation with City of Ottawa staff. The following summarizes the criteria, with the source of each criterion indicated in brackets:

General

- Wherever feasible and practical, site-level measures should be used to reduce and control the volume and rate of runoff. (City of Ottawa)
- Assess impact of 100 year event outlined in the City of Ottawa Sewer Design Guidelines on major & minor drainage system (City of Ottawa)
- Water quality treatment to a 'Normal' level (70% TSS reduction) is required for the site per the Mississippi Valley Conservation Authority (MVCA)

Surface Storage & Overland Flow

- Building openings to be a minimum of 0.30m above the 100-year water level of any surface storage areas (City of Ottawa)
- Provide adequate emergency overflow conveyance off-site (City of Ottawa)

Site Specific Criteria

- Site topography indicates that no legal surface outlet exists for the site that would be feasible to discharge to. As such, on-site storage and infiltration is considered the best approach to manage site runoff so as to not increase the total uncontrolled runoff from the site (City of Ottawa and MVCA)

5.3 WATER QUANTITY CONTROL

The Modified Rational Method (MRM) was employed to assess the rate and volume of runoff generated during post-development conditions. The site was subdivided into subcatchments

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(subareas) tributary to stormwater controls as defined by the location of the proposed dry pond. A summary of subareas and runoff coefficients is provided in **Appendix B.1**, and **Drawing SD-1** indicates the stormwater management subcatchments. A clear stone base is proposed below the dry pond to provide additional storage and encourage infiltration.

5.3.1 Allowable Release Rate

The predevelopment release rate for the area has been determined using the rational method. Existing buildings, paved access areas and gravel access areas were considered as hard surfaces ($C=0.9$ paved, $C=0.75$ gravel), while the remainder of the site is grassed ($C=0.2$). A time of concentration for the predevelopment area (30 minutes) was assigned based on the Airport Method calculations for the relatively pervious nature of the proposed site. Runoff coefficient values have been increased by 25% for the 100-year storm event based on the City of Ottawa Sewer Design Guidelines. Peak flow rates have been calculated using the rational method as follows:

$$Q = 2.78 CIA$$

Where: Q = peak flow rate, L/s

A = drainage area, ha

I = rainfall intensity, mm/hr (per Ottawa IDF curves)

C = site runoff coefficient

The allowable release rate for surface discharge for the site is summarized in **Table 1** below:

Table 1: Allowable Surface Release Rates

Design Storm	Target Flow Rate (L/s)
5- Year	50.7
100- Year	86.3

5.3.2 In-situ Infiltration Testing

Field testing was completed by Paterson Group to establish in-situ saturated hydraulic conductivity rates using a Pask Permeameter. The methodology outlined in the Credit Valley Conservation LID Design Guidelines – Appendix C (CVC, 2012) was then used to calculate the infiltration rate and safety factor for each test location. Test results and calculations results are attached for reference and a summary is included in **Table 2** below.

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Table 2: Summary of Infiltration Rates

Auger hole ID	K _{fs} (cm/min)	Testing Depth below surface (m)	Infiltration Rate (i) (mm/hr)	Safety factor	Corrected Infiltration (mm/hr)
TP 1	3.20E-07	0.90	9.94	2.50	3.98
TP 4	9.40E-07	0.60	13.27		5.31
TP 5	9.40E-08	0.70	7.16		2.87
TP 11	5.30E-06	0.90	21.08		8.43
TP 12	1.20E-05	1.10	26.23		10.49
TP 13	5.30E-06	1.00	21.08		8.43

5.3.3 Groundwater and Bedrock Elevations

Groundwater level measurements were obtained from the on-site piezometers on June 2016 by Paterson Group. **Table 3** below summarizes the groundwater elevations (a reference plan with borehole locations is included in the attached Paterson letter). Test-pits excavated during the infiltration testing indicated shallow depths to highly fractured bedrock (previously identified as glacial till from the soil cores examined during borehole drilling). In most locations the groundwater elevation is identified to be lower than the fractured bedrock interface. As such, the bedrock elevation was considered to be controlling in establishing the dry pond elevation and footprint.

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Table 3: Summary of Groundwater and Bedrock Elevations

Stand-pipe well ID	Top of Riser Elevation (m)	Groundwater Elevations			Bedrock Elevation
		Date measured (d/m/y)	Groundwater Depth (m) below top of riser	Groundwater Elevation (m)	
BH1	118.24	01/06/16	4.20	114.04	117.48
BH2	118.42	01/06/16			116.97
BH3	118.29	01/06/16			117.38
BH3A	118.29	01/06/16	4.30	113.99	116.49
BH4	118.03	01/06/16			117.37
BH5	117.74	01/06/16			116.34
BH6	117.71	01/06/16	3.93	113.78	116.80
BH7	117.53	01/06/16	3.70	113.83	116.46
BH8	117.54	01/06/16	4.19	113.35	116.78
BH9	117.66	01/06/16			116.29
BH10	117.46	01/06/16	3.62	113.84	116.09
BH11	117.45	01/06/16			116.18

5.3.4 Storage Requirements

The site requires quantity control measures to meet the restrictive stormwater release criteria. It is proposed that surface grading (for a dry pond) be used to store site runoff to be infiltrated and limit surface release rates to the allowable existing condition rates.

5.3.4.1 Post-development Uncontrolled Catchments

Due to grading constraints, two catchments have been designed without a storage component (EXT-1 & EXT-2). These areas flow offsite uncontrolled. Areas that discharge offsite without entering the proposed stormwater management system must be compensated for in areas with controls. **Table 4** summarizes the peak 5 and 100-year catchment release rates for catchments that are released uncontrolled.

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Table 4: 5 and 100 Year Discharge from Uncontrolled Catchments

Catchment ID	5-Year Peak Discharge (L/s)	100-Year Peak Discharge (L/s)
EXT-1	16.8	36.0
EXT-2	3.5	7.5

Peak 5 and 100 year discharge values in the above table are based on minimum time of concentration values (10 minutes).

5.3.4.2 Surface Storage/Subsurface Storage

It is proposed to detain all stormwater in the pond to reduce peak surface discharge from the proposed site. The modified rational method (MRM) was employed to determine the peak volume required to be stored in surface ponding areas and subsurface clear stone storage basin and trenches.

The stormwater management dry pond and clear stone storage areas were sized using an iterative approach between pond grading, infiltration calculations and the MRM calculations to provide enough storage to restrict runoff from the 100 year event and meet the target release rates from the overall site and external areas. The release rate from the pond storage was calculated based on infiltration rates and pond footprint and was then input into the MRM calculations as the “controlled release rate” from drainage area STM-1. Note that the average flow rate over the pond storage depth was used. The entirety of the required storage volume is provided within the dry pond. Drawdown calculations indicate that a minimum infiltration rate of 8.3mm/hr would be needed to achieve a pond drawdown time of 48hr. In-situ infiltration testing included testing at two test pits (TP 11 and TP 12) in the footprint of the infiltration area and based on the values in Table 2 would have an average measured infiltration rate of approximately 9.46mm/hr. Therefore, it is estimated that the facility would drawdown in less than 48hrs following a 100-yr event.

Table 5 summarizes the estimated pond discharge rate resulting from infiltration and corresponding storage volume during the 100-year event.

Table 5: 100 Year Peak Surface Volume and Controlled Discharge Summary

ID	100-Year Event		
	Discharge Rate (L/s)	Vrequired (m ³)	Vavailable (m ³)
Pond	9.8	385.3	389.6

100-year volume available based on surface storage and a maximum spill depth not to exceed 0.40m, where required.

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Table 6 demonstrates the proposed stormwater management plan and confirms that the estimated release rates from the site are less than the allowable rate.

Table 6: Summary of Total 5 and 100 Year Event Surface Release Rates

	5-Year Peak Discharge (L/s)	100-Year Peak Discharge (L/s)
Uncontrolled (EXT-1 & EXT-2)	20.3	43.5
Allowable	50.7	86.3

5.3.5 Groundwater Mounding Check

Geotechnical investigations indicated shallow depths to highly fractured bedrock but did not encounter groundwater before the fractured bedrock interface. Therefore, the clearance from bedrock was the control in setting the base elevation of the infiltration basin area. The clearance from the bottom of the infiltration area and the referenced bedrock elevation is less than 1m, therefore mounding calculations were completed as a final check for the longer-term function of the infiltration area. Groundwater mounding calculations were completed using spreadsheet analysis tool developed by the USGS that applies the Hantush (1967) equation for groundwater mounding beneath an infiltration basin. Standard values for site soils and measured hydraulic conductivity rates were used. The maximum mounding depth was calculated to be approximately 0.002m resulting in a clearance from infiltration bottom to mounded groundwater of 0.11m. Spreadsheet calculations are included in **Appendix B.2**.

5.4 WATER QUALITY CONTROL

Water quality treatment to a 'Normal' level of protection (70% TSS removal) is required for the site per the MVCA. In order to achieve this level of treatment several a treatment train approach is proposed for the site. The proposed site drainage allows for most of the site to sheet drain across the grassed area around the dry pond rather than concentrated flow into the pond. This will allow for an initial filtering and settling of solids. Secondly, a 33m long (measured perpendicular to flow direction) vegetated buffer is proposed around the dry pond. Based on **Figure 5-4** from the US EPA design manual for Low Impact Development (LID) (see **Appendix B.3**), it is estimated that this configuration would provide an initial treatment rate of 60% to 90% TSS reduction before the runoff enters the dry pond. However, lower removal rates are anticipated in areas of steeper slopes. Additionally, these values assume that the design buffer width (in direction of flow) can be achieved in all areas. Equation 5-2 of the EPA LID manual defines the minimum buffer width as

$$W_G = 0.2L_i \text{ or } 8\text{ft (whichever is greater)}$$

Where, W_G = Design width (m)

L_i = length of flow path of upstream sheet flow (m)

Using an average flow path length of 55m would require a minimum vegetated buffer of 11.0m. Due to area and constraints the proposed vegetated buffer length will vary between 3.5m and 10m along the north and east sides of the pond. Therefore, it is estimated that some areas may provide lower or higher filtration of solids, but an average of near 70% removal could be achieved.

While the vegetated buffer will provide significant pre-treatment of runoff, additional settling and filtration will occur in the dry pond. The MOECC SWM Design Manual (2003) recognizes dry ponds as providing approximately 60% TSS removal. This removal rate is identified for a typical dry pond with a gravity outlet to a sewer or watercourse and does not include the filtration benefits achieved from the infiltration outlet of the proposed dry pond.

Therefore, with the various proposed measures it is estimated that at least 70% TSS removal will be achieved through the system.

6.0 GRADING AND DRAINAGE

The proposed development site measures approximately 1.30ha (3.22 acre) in area and is currently partly developed. The topography across the site is relatively flat, and the entirety of the site currently drains from west to east. A detailed grading plan (see **Drawing GP-1**) has been provided to satisfy the stormwater management requirements for the site. Site grading has been established to provide emergency overland flow routes required for stormwater management in accordance with City of Ottawa requirements.

The subject site maintains emergency overland flow routes for runoff from events exceeding the 100-year design event to the eastern portion of the development where major system flows are presently draining as depicted in **Drawing GP-1**.

7.0 UTILITIES

Hydro overhead lines exist along Carp Road. It is anticipated that existing infrastructure will be sufficient to provide a means of distribution for the proposed site under interim and ultimate conditions. Consultation with Hydro Ottawa will continue throughout the Composite Utility Planning process. Exact size, location, and routing of hydro utilities, as well as required transformer locations, will be finalized after design circulation.

Bell lines are expected to be able to service the proposed site via infrastructure within Carp Road. Bell may require easements for their respective cabinets and vaults. Easement requirements and location of telecommunication infrastructure will be determined as part of the Composite Utility Planning process, following design circulation.

8.0 APPROVALS

Consultation with the Ministry of the Environment and Climate Change (MOECC) will be completed to confirm whether an Environmental Compliance Approval (ECA, formerly Certificates of Approval (CofA) will be necessary for stormwater management (Correspondence included in **Appendix D**).

Will require approval for septic tank, line and bed from the Ottawa Septic System Office by way of OSSO permit. The Mississippi Valley Conservation authority permit approval is required for the septic tank and bed.

9.0 EROSION CONTROL DURING CONSTRUCTION

Erosion and sediment controls must be in place during construction. The following recommendations to the contractor will be included in contract documents.

It is noted that the site stormwater management is dependent on infiltration for release of stored runoff. As such, all infiltration trenches and basins shall be constructed after all other site grading and construction is complete. The SWM dry pond depression may be excavated during construction if they are required for stormwater management during construction. However, they should not be excavated to the depth of the infiltration areas until all other site works are complete. All accumulated sediment will need to be excavated from the pond and infiltration testing shall be completed before placing clear stone and geotextiles etc.

1. Implement best management practices to provide appropriate protection of the existing and proposed drainage system and the receiving water course(s).
2. Limit extent of exposed soils at any given time.
3. Re-vegetate exposed areas as soon as possible.
4. Minimize the area to be cleared and grubbed.
5. Protect exposed slopes with plastic or synthetic mulches.
6. Provide sediment traps and basins during dewatering.
7. Plan construction at proper time to avoid flooding.
8. Installation of a mud matt to prevent mud and debris from being transported off site.
9. Installation of silt fence to prevent sediment runoff.

The contractor will, at every rainfall, complete inspections and guarantee proper performance. The inspection is to include:

10. Verification that water is not flowing under silt barriers.

Refer to **Drawing EC-1** for the proposed location of silt fences, straw bales and other erosion control structures.

10.0 GEOTECHNICAL INVESTIGATION AND ENVIRONMENTAL ASSESSMENT

A geotechnical Investigation Report was prepared by Paterson Group on November 11, 2016. The report summarizes the existing soil conditions within the subject area and construction recommendations. For details which are not summarized below, please see the original Paterson report.

Subsurface soil conditions within the subject area were determined from 11 boreholes and 14 test pits across the proposed site. The investigation concluded that the site is underlain by dense silty sand with gravel layer of 1.1 to 6.0m below ground surface overlaid by a thin layer of topsoil. Bedrock is anticipated to lie within subjected area and is in the form of limestone and Verulam. In addition, six constant head pack permeameter tests were completed to verify existing hydraulic conductivity of the soils below the proposed area for infiltration.

Expected long-term groundwater levels were measured on June 6, 2016 and vary in elevation from 2.5m to 3.5m in depth.

The required pavement structure for proposed hard surfaced areas are outlined in **Table 7 and Table 8** below:

Table 7: Pavement Structure – Car Only Parking Areas

Thickness (mm)	Material Description
50	Wear Course – HL-3 or Superpave 12.5 Asphaltic Concrete
150	Base – OPSS Granular A Crushed Stone
300	Subbase - OPSS Granular B Type II
-	Subgrade – Either fill, in situ soil, or OPSS Granular B Type I or II material placed over in situ soil or fill.

Table 8: Pavement Structure – Access Lanes

Thickness (mm)	Material Description
40	Wear Course – HL-3 or Superpave 12.5 Asphaltic Concrete
50	Binder Course – HL-8 or Superpave 19.0 Asphaltic Concrete
150	Base – OPSS Granular A Crushed Stone
400	Subbase - OPSS Granular B Type II
-	Subgrade – Either fill, in situ soil, or OPSS Granular B Type II material placed over in situ soil or fill.

11.0 CONCLUSIONS

11.1 WATER SERVICING

The proposed new well is considered to be capable of supplying sufficient water supply for fire flows. Based on the OBC calculations the maximum required fire flow for the site is 45 L/s (2,700 L/min). Fire suppression will be provided through two onsite 53,000L water storage tanks.

11.2 STORMWATER SERVICING

The proposed stormwater management plan is in compliance with the goals specified through consultation with the City of Ottawa. Onsite storage will be provided for all runoff in excess of existing surface release rates. All stored stormwater up to the 100-year event will be infiltrated as existing site grading is such that no feasible surface outlet exists for the captured stormwater on the site.

11.3 GRADING

Grading for the site has been designed to provide an emergency overland flow route as per City requirements and reflects any restrictions recommended in the Geotechnical Investigation Report prepared by Paterson Group on November 11, 2016. Erosion and sediment control measures will be implemented during construction to reduce the impact on existing facilities.

11.4 UTILITIES

Utility infrastructure exists within overhead lines within the Carp Road ROW at the south western boundary of the proposed site. It is anticipated that existing infrastructure will be sufficient to provide a means of distribution for the proposed site. Exact size, location and routing of utilities will be finalized after design circulation.

11.5 APPROVALS/PERMITS

An MOECC ECA is not expected to be required for the subject site as site will remain private, under single ownership, however due to the infiltration component of the proposed stormwater management consultation with the MOECC will be required to confirm whether an ECA is required for stormwater management. A Permit to Take Water is not anticipated to be required for pumping requirements for service lateral/building footing installation. The Mississippi Valley Conservation Authority will need to be consulted in order to obtain municipal approval for site Water Supply Servicing.

SERVICING REPORT – 2978 CARP ROAD

Appendix A Water Supply Servicing
December 21, 2016

Appendix A WATER SUPPLY SERVICING

A.1 FIRE FLOW REQUIREMENTS PER OBC

Fire Flow Calculations as per Ontario Building Code 2006 (Appendix A)

Job# 160401271
Date 20-Dec-16

Designed by: TRK
Checked by: KJK

$$Q = KVS_{\text{tot}}$$

Q = Volume of water required (L)

V = Total building volume (m³)

K = Water supply coefficient from Table 1

S_{tot} = Total of spatial coefficient values from property line exposures on all sides as obtained from the formula

$$S_{\text{tot}} = 1.0 + [S_{\text{side1}} + S_{\text{side2}} + S_{\text{side3}} + S_{\text{side4}}]$$

1	Type of construction	Building Classification		Water Supply Coefficient
	Non-Combustible with Fire-Resistance Ratings	E, F-2		17
2	Area of one floor (m ²)	number of floors	hieght of ceiling (m)	Total Building Volume (m ³)
	1394	1	6.31	8,796
3	Side	Exposure Distance (m)	Spatial Coefficient	Total Spatial Coeffiecient
	North	14.5	0	1
	East	28.4	0	
	South	30	0	
	West	45.4	0	
4	Established Fire Safety Plan?	Reduction in Volume (%)		Total Volume Reduction
	no	0%		0%
5	Total Volume 'Q' (L)			
				149,532
				Minimum Required Fire Flow (L/min)
				4,500

Appendix B **STORMWATER MANAGEMENT**

B.1 RATIONAL METHOD CALCULATIONS

Stormwater Management Calculations

File No: 160401271
 Project: 2978 CARP ROAD
 Date: 18-Aug-16

SWM Approach:
 Post-development to Pre-development flows

Pre-Development Site Conditions:

Overall Runoff Coefficient for Site and Sub-Catchment Areas

Runoff Coefficient Table									
Sub-catchment Area		Area (ha) "A"		Runoff Coefficient "C"		"A x C"		Overall Runoff Coefficient	
Catchment Type	ID / Description								
Uncontrolled - Tributary	ET	Hard	0.112		0.9	0.101			
		Soft	1.192		0.2	0.238			
	Subtotal			1.303896			0.339013		0.260
Total				1.304			0.339		
Overall Runoff Coefficient= C:									0.26

Total Roof Areas	0.000 ha
Total Tributary Surface Areas (Controlled and Uncontrolled)	1.304 ha
Total Tributary Area to Outlet	1.304 ha
Total Uncontrolled Areas (Non-Tributary)	0.000 ha
Total Site	1.304 ha

Stormwater Management Calculations

Project #160401271, 2978 CARP ROAD Modified Rational Method Calculations for Storage

5 yr Intensity City of Ottawa	$I = a/(t + b)$	a =	998.071	t (min)	I (mm/hr)
		b =	6.053	5	141.18
		c =	0.814	10	104.19
				15	83.56
				20	70.25
				25	60.90
				30	53.93
				35	48.52
				40	44.18
				45	40.63
				50	37.65
				55	35.12
				60	32.94

5 YEAR Predevelopment Target Release from Portion of Site

Subdrainage Area: Predevelopment Tributary Area to Outlet
 Area (ha): 1.3030
 C: 0.26

Typical Time of Concentration

tc (min)	I (5 yr) (mm/hr)	Qtarget (L/s)
30	53.93	50.79

5 YEAR Modified Rational Method for Entire Site

Subdrainage Area: ET Uncontrolled - Tributary
 Area (ha): 1.30
 C: 0.26

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m³)
5	141.18	133.05	133.05		
10	104.19	98.20	98.20		
15	83.56	78.75	78.75		
20	70.25	66.21	66.21		
25	60.90	57.39	57.39		
30	53.93	50.82	50.82		
35	48.52	45.73	45.73		
40	44.18	41.64	41.64		
45	40.63	38.29	38.29		
50	37.65	35.49	35.49		
55	35.12	33.10	33.10		
60	32.94	31.05	31.05		

SUMMARY TO OUTLET

	Tributary Area	0.000 ha	Vrequired	Vavailable*	
Total 5yr Flow to Sewer		0 L/s	0	0 m³	Ok
Non-Tributary Area	1.304 ha				
Total 5yr Flow Uncontrolled	133 L/s				
Total Area	1.304 ha				
Total 5yr Flow Target	133 L/s				
	51 L/s				

Project #160401271, 2978 CARP ROAD Modified Rational Method Calculations for Storage

100 yr Intensity City of Ottawa	$I = a/(t + b)$	a =	1735.688	t (min)	I (mm/hr)
		b =	6.014	5	242.70
		c =	0.820	10	178.56
				15	142.89
				20	119.95
				25	103.85
				30	91.87
				35	82.58
				40	75.15
				45	69.05
				50	63.95
				55	59.62
				60	55.89

100 YEAR Predevelopment Target Release from Portion of Site

Subdrainage Area: Predevelopment Tributary Area to Outlet
 Area (ha): 1.3030
 C: 0.26

Estimated Time of Concentration after Development

tc (min)	I (100 yr) (mm/hr)	Q100yr (L/s)
30	91.87	86.52

100 YEAR Modified Rational Method for Entire Site

Subdrainage Area: ET Uncontrolled - Tributary
 Area (ha): 1.30
 C: 0.33

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m³)
10	178.56	210.36	210.36		
20	119.95	141.31	141.31		
30	91.87	108.23	108.23		
40	75.15	88.53	88.53		
50	63.95	75.34	75.34		
60	55.89	65.85	65.85		
70	49.79	58.66	58.66		
80	44.99	53.00	53.00		
90	41.11	48.43	48.43		
100	37.90	44.65	44.65		
110	35.20	41.47	41.47		
120	32.89	38.75	38.75		

SUMMARY TO OUTLET

	Tributary Area	0.000 ha	Vrequired	Vavailable*	
Total 100yr Flow to Sewer		0 L/s	0	0 m³	Ok
Non-Tributary Area	1.304 ha				
Total 100yr Flow Uncontrolled	210 L/s				
Total Area	1.304 ha				
Total 100yr Flow Target	210 L/s				
	87 L/s				

Stormwater Management Calculations

File No: 160401271
 Project: 2978 Carp Road
 Date: 17-Nov-16

SWM Approach:
 Post-development to Pre-development flows

Post-Development Site Conditions:

Overall Runoff Coefficient for Site and Sub-Catchment Areas

Runoff Coefficient Table								
Catchment Type	Sub-catchment Area	ID / Description	Area (ha)	Runoff Coefficient "C"			Overall Runoff Coefficient	
	"A"		"A x C"					
Controlled - Tributary	STM-1	Hard	0.456	0.9	0.410			
		Soft	0.684	0.2	0.137			
		Subtotal		1.14		0.5472	0.480	
Uncontrolled - Non-Tributary	EXT-2	Hard	0.000	0.9	0.000			
		Soft	0.060	0.2	0.012			
		Subtotal		0.06		0.012	0.200	
Uncontrolled - Non-Tributary	EXT-1	Hard	0.054	0.9	0.049			
		Soft	0.046	0.2	0.009			
		Subtotal		0.1		0.058	0.580	
Total			1.300		0.617			
Overall Runoff Coefficient= C:							0.47	

Total Roof Areas	0.000 ha
Total Tributary Surface Areas (Controlled and Uncontrolled)	1.140 ha
Total Tributary Area to Outlet	1.140 ha
Total Uncontrolled Areas (Non-Tributary)	0.160 ha
Total Site	1.300 ha

Stormwater Management Calculations

Project #160401271, 2978 Carp Road

Modified Rational Method Calculators for Storage

5 yr Intensity City of Ottawa	$I = a/(t + b)^c$	a = 998.071	t (min)	I (mm/hr)
		b = 6.053	5	141.18
		c = 0.814	10	104.19
			15	83.56
			20	70.25
			25	60.90
			30	53.93
			35	48.52
			40	44.18
			45	40.63
			50	37.65
			55	35.12
			60	32.94

5 YEAR Predevelopment Target Release from Portion of Site

Subdrainage Area: Predevelopment Tributary Area to Outlet
 Area (ha): 1.3000
 C: 0.26

Typical Time of Concentration

tc (min)	I (5 yr) (mm/hr)	Qtarget (L/s)
30	53.93	50.67

5 YEAR Modified Rational Method for Entire Site

Subdrainage Area: STM-1
 Area (ha): 1.14
 C: 0.48

Controlled - Tributary

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m³)
5	141.18	214.76	3.09	211.67	63.50
10	104.19	158.50	3.09	155.41	93.25
15	83.56	127.11	3.09	124.02	111.62
20	70.25	106.87	3.09	103.78	124.53
25	60.90	92.64	3.09	89.55	134.32
30	53.93	82.04	3.09	78.95	142.10
35	48.52	73.81	3.09	70.72	148.50
40	44.18	67.21	3.09	64.12	153.90
45	40.63	61.80	3.09	58.71	158.53
50	37.65	57.42	3.09	54.33	163.42
55	35.12	53.93	3.09	50.84	168.53
60	32.94	50.67	3.09	47.58	173.84

Storage: Above CB

Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
5-year Water Level	1.95	1.95	3.09	203.43	389.64 OK

Subdrainage Area: EXT-2
 Area (ha): 0.06
 C: 0.20

Uncontrolled - Non-Tributary

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m³)
5	141.18	4.71	4.71		
10	104.19	3.48	3.48		
15	83.56	2.79	2.79		
20	70.25	2.34	2.34		
25	60.90	2.03	2.03		
30	53.93	1.80	1.80		
35	48.52	1.62	1.62		
40	44.18	1.47	1.47		
45	40.63	1.36	1.36		
50	37.65	1.26	1.26		
55	35.12	1.17	1.17		
60	32.94	1.10	1.10		

Subdrainage Area: EXT-1
 Area (ha): 0.10
 C: 0.58

Uncontrolled - Non-Tributary

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m³)
5	141.18	22.76	22.76		
10	104.19	16.80	16.80		
15	83.56	13.47	13.47		
20	70.25	11.33	11.33		
25	60.90	9.82	9.82		
30	53.93	8.70	8.70		
35	48.52	7.82	7.82		
40	44.18	7.12	7.12		
45	40.63	6.55	6.55		
50	37.65	6.07	6.07		
55	35.12	5.66	5.66		
60	32.94	5.31	5.31		

Project #160401271, 2978 Carp Road

Modified Rational Method Calculators for Storage

100 yr Intensity City of Ottawa	$I = a/(t + b)^c$	a = 1735.688	t (min)	I (mm/hr)
		b = 6.014	5	242.70
		c = 0.820	10	178.56
			15	142.89
			20	119.95
			25	103.85
			30	91.87
			35	82.58
			40	75.15
			45	69.05
			50	63.95
			55	59.62
			60	55.89

100 YEAR Predevelopment Target Release from Portion of Site

Subdrainage Area: Predevelopment Tributary Area to Outlet
 Area (ha): 1.3000
 C: 0.26

Estimated Time of Concentration after Development

tc (min)	I (100 yr) (mm/hr)	Q100yr (L/s)
30	91.87	86.32

100 YEAR Modified Rational Method for Entire Site

Subdrainage Area: STM-1
 Area (ha): 1.14
 C: 0.60

Controlled - Tributary

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m³)
10	178.56	339.53	9.78	329.75	197.85
20	119.95	228.09	9.78	218.31	261.97
30	91.87	174.69	9.78	164.91	296.84
40	75.15	142.89	9.78	133.11	319.46
50	63.95	121.61	9.78	111.83	335.49
60	55.89	106.28	9.78	96.50	347.42
70	49.79	94.68	9.78	84.90	356.56
80	44.99	85.55	9.78	75.77	363.70
100	37.90	72.07	9.78	62.29	373.76
171	24.89	47.34	9.78	37.56	385.34
172	24.78	47.12	9.78	37.34	385.34
173	24.67	46.90	9.78	37.12	385.34

Storage: Surface Storage Above CB

Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
100-year Water Level	2.10	2.10	9.78	385.34	389.64 OK

Subdrainage Area: EXT-2
 Area (ha): 0.06
 C: 0.25

Uncontrolled - Non-Tributary

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m³)
10	178.56	7.45	7.45		
20	119.95	5.00	5.00		
30	91.87	3.83	3.83		
40	75.15	3.13	3.13		
50	63.95	2.67	2.67		
60	55.89	2.33	2.33		
70	49.79	2.08	2.08		
80	44.99	1.88	1.88		
90	41.11	1.71	1.71		
100	37.90	1.58	1.58		
110	35.20	1.47	1.47		
120	32.89	1.37	1.37		

Subdrainage Area: EXT-1
 Area (ha): 0.10
 C: 0.73

Uncontrolled - Non-Tributary

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m³)
10	178.56	35.99	35.99		
20	119.95	24.18	24.18		
30	91.87	18.52	18.52		
40	75.15	15.15	15.15		
50	63.95	12.89	12.89		
60	55.89	11.27	11.27		
70	49.79	10.04	10.04		
80	44.99	9.07	9.07		
90	41.11	8.29	8.29		
100	37.90	7.64	7.64		
110	35.20	7.10	7.10		
120	32.89	6.63	6.63		

Stormwater Management Calculations

Project #160401271, 2978 Carp Road Modified Rational Method Calculatons for Storage

SUMMARY TO OUTLET				
		Vrequired	Vavailable*	
Tributary Area	1.140 ha			
Total 5yr Flow to Sewer	10 L/s	0	0 m ³	Ok
Non-Tributary Area	0.160 ha			
Total 5yr Flow Uncontrolled	27 L/s			
Total Area	1.300 ha			
Total 5yr Flow	37 L/s			
Target	51 L/s			

Project #160401271, 2978 Carp Road Modified Rational Method Calculatons for Storage

SUMMARY TO OUTLET				
		Vrequired	Vavailable*	
Tributary Area	1.140 ha			
Total 100yr Flow to Sewer	10 L/s	0	0 m ³	Ok
Non-Tributary Area	0.160 ha			
Total 100yr Flow Uncontrolled	43 L/s			
Total Area	1.300 ha			
Total 100yr Flow	53 L/s			
Target	86 L/s			

Infiltration Trench and Basin Sizing

1) Summary of Site Areas

Area ID	area (ha)	% imp	imperv area (ha)
STM-1	1.14	44.74	0.51

2) Runoff Generation

a.) 100year rainfall depth	96.00 mm	12hr rainfall event per Carp River Model critical event
b.) Total site impervious area	0.51 ha	
c.) 100year runoff volume	489.6 m3	$c = a \times b \times 10,000/1,000$
d.) Volume to be infiltrated in pond	489.6 m3	$d = c$
e.) MRM Storage Volume Required	385.34 m3	From Modified Rational Method calculation sheets used iteratively with infiltration calculations

3) Dry Pond Volume

f.) Bottom area	740.00 m2	Per design drawings
g.) Top area	912.22 m2	Per design drawings
h.) depth	0.50 m	Per design drawings
i.) dry pond freeboard	0.10 m	Per design drawings
j.) active depth	0.40 m	Per design drawings
k.) Pond volume	330.44 m3	$k = ((f + g) / 2) \times j$

4) Infiltration Basin Under Pond for Trench Spillover Volume

l.) area	740.00 m2	Per design drawings
m.) depth	0.20 m	Per design drawings
n.) volume	148.00 m3	$n = l \times m$
o.) Porosity of clearstone basin	0.40	
p.) Infiltration basin storage volume	59.20 m3	$p = n \times o$

5) Calculate min infiltration rate for drawdown time

q.) Total storage volume	389.64 m3	$q = k + p$
r.) Total water depth	0.40 m	$r = j$
s.) Target drawdown time	48.00 hr	Standard
t.) Required infiltration rate	8.33 mm/hr	$t = r / s$
u.) Measured infiltration rate	9.46 mm/hr	Per field testing (average of TP 11&12)

6) Calculate Flow Rate Through Pond Bottom

$Q = KA(h_2 - h_1)/L$		
depth to g/w from surface of pond	1.15 m	TP 11 & BH 10 per Paterson Investigation
K =	8.50E-06 m/s	Per field testing
h2 =	1.15 m	
h1 =	0.45 m	
L =	0.45 m	
A =	740.00 m2	
Q =	0.00978 m3/s	
	9.78 l/s	controlled flow rate that can be input to MRM sheet

B.2 GROUNDWATER MOUNDING CALCULATIONS

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.

Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

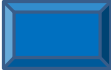
Input Values		use consistent units (e.g. feet & days or inches & hours)		Conversion Table	
				inch/hour	feet/day
0.0004	R	Recharge (infiltration) rate (feet/day)		0.67	1.33
0.160	Sy	Specific yield, Sy (dimensionless, between 0 and 1)			
0.00	K	Horizontal hydraulic conductivity, Kh (feet/day)*		2.00	4.00
47.970	x	1/2 length of basin (x direction, in feet)			
41.570	y	1/2 width of basin (y direction, in feet)	hours	days	
2.000	t	duration of infiltration period (days)		36	1.50
0.000	hi(0)	initial thickness of saturated zone (feet)			

0.005	h(max)	maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
0.005	Δh(max)	maximum groundwater mounding (beneath center of basin at end of infiltration period)

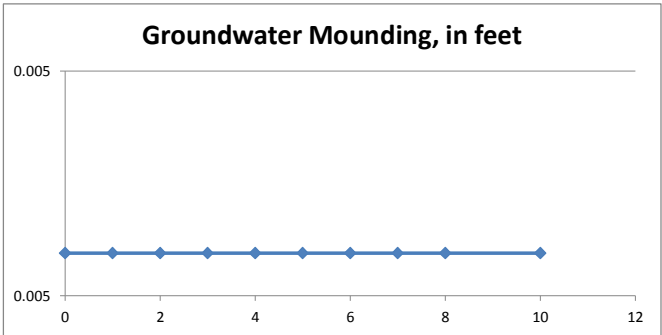
Ground-water Mounding, in feet

Distance from center of basin in x direction, in feet

0.005	0
0.005	1
0.005	2
0.005	3
0.005	4
0.005	5
0.005	6
0.005	7
0.005	8
0.005	10



Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

B.3 REMOVAL RATES FOR BUFFER STRIPS-US EPA DESIGN MANUAL FOR LOW IMPACT DEVELOPMENT (LID)

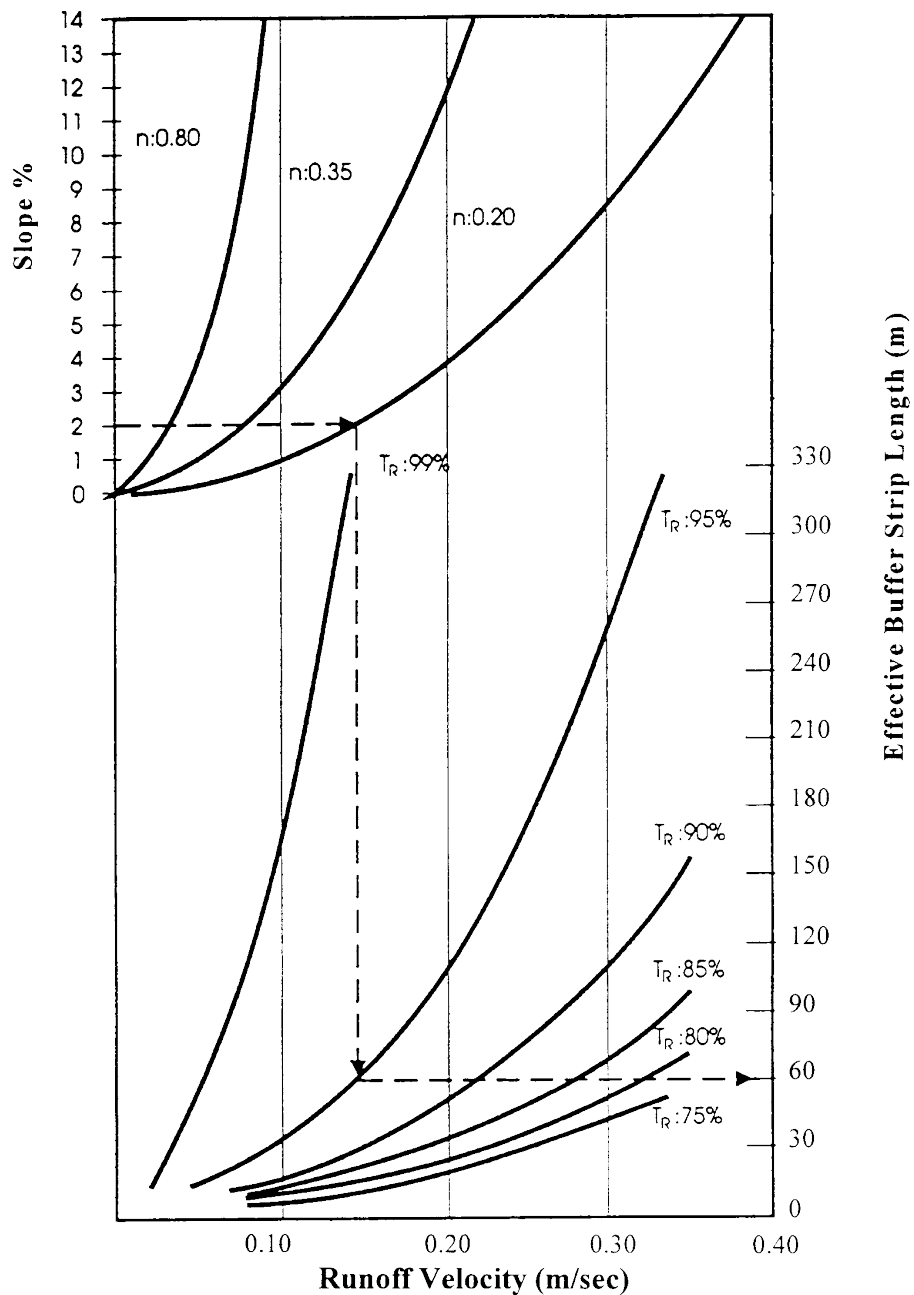


Figure 5-4 Removal rates (TR) for Buffer Strips (Wong and McCuen, 1982) (Reprinted with Permission of ASCE)

There are some significant limitations to design chart method as it does not take into account the particle size of the material or the infiltration rate of the soils. Consequently it over predicts trapping efficiency of soils with low permeability and under predicts trapping efficiency of soils with high permeability. For these reasons, the design

Appendix C **GEOTECHNICAL INVESTIGATION**

C.1 EXCERPTS FROM PATERSONGROUP INVESTIGATION

Geotechnical
Engineering

Environmental
Engineering

Hydrogeology

Geological
Engineering

Materials Testing

Building Science

Archaeological Services

Geotechnical Investigation

Proposed Storage Building
2978 and 2966 Carp Road
Ottawa, Ontario

Prepared For

York-HOP Inc.

Paterson Group Inc.
Consulting Engineers
154 Colonnade Road South
Ottawa, Ontario
Canada K2E 7J5

Tel: (613) 226-7381
Fax: (613) 226-6344
www.patersongroup.ca

November 11, 2016

Report PG3834-1R

Table 1 - Summary of Groundwater Level Readings				
Test hole Number	Ground Surface Elevation (m)	Groundwater Depth (m)	Groundwater Elevation (m)	Date
BH 2	118.42	Dry	-	June 6, 2016
BH 6	117.71	3.93	113.78	June 6, 2016
BH 8	117.54	4.19	113.35	June 6, 2016
BH 10	117.46	3.62	113.84	June 6, 2016
BH 11	117.45	Blocked	-	June 6, 2016

Groundwater is subject to seasonal fluctuations and therefore, groundwater could vary at the time of construction.

4.4 Pask Permeameter Testing

A total of six (6) constant head Pask permeameter tests were conducted at the test locations to verify the existing hydraulic conductivities of the soils below the proposed infiltration system at the subject site. The permeameter test locations were selected by Stantec in a manner to provide general coverage of proposed infiltration system. The hydraulic conductivity (K_{fs}) values for each test hole location is presented in Table 2.

Table 2 - Hydraulic Conductivity Values				
Test hole Number	Depth (m bgs)	18T UTM		K_{fs} (m/sec)
		Easting (m)	Northing (m)	
TP 1	0.9	421970	5018202	3.20E-07
TP 4	0.6	422013	5018181	9.40E-07
TP 5	0.7	421951	5018215	9.40E-08
TP 11	0.9	422035	5018200	5.30E-06
TP 12	1.1	422021	5018187	1.20E-05
TP 13	1.0	422049	5018186	5.30E-06

The values measured within the test hole locations are consistent with similar material Paterson has encountered on other sites. These values typically range from 1×10^{-5} to 1×10^{-7} m/sec due to the variability of the material encountered.

Table 3 - Recommended Pavement Structure - Car Only Parking Areas	
Thickness (mm)	Material Description
50	Wear Course - HL-3 or Superpave 12.5 Asphaltic Concrete
150	BASE - OPSS Granular A Crushed Stone
300	SUBBASE - OPSS Granular B Type II
	SUBGRADE - Either fill, in situ soil, or OPSS Granular B Type II material placed over in situ soil or fill

Table 4 - Recommended Pavement Structure - Access Lanes	
Thickness (mm)	Material Description
40	Wear Course - HL-3 or Superpave 12.5 Asphaltic Concrete
50	Binder Course - HL-8 or Superpave 19.0 Asphaltic Concrete
150	BASE - OPSS Granular A Crushed Stone
400	SUBBASE - OPSS Granular B Type II
	SUBGRADE - Either fill, in situ soil, or OPSS Granular B Type II material placed over in situ soil or fill

Minimum Performance Graded (PG) 58-34 asphalt cement should be used for this project. The pavement granular base and subbase should be placed in maximum 300 mm thick lifts and compacted to a minimum of 100% of the material's SPMDD using suitable compaction equipment.

It is our understanding that consideration is being taken to using a gravel pavement structure for car parking, access lanes and fire routes as part of the proposed development. The gravel pavement structure is further detailed in Table 5. It is expected that the gravel pavement structure may require annual maintenance, such as regrading and padding in poor performing areas.

Table 5 - Gravel Pavement Structure - Car Parking, Access Lanes and Fire Routes	
Thickness (mm)	Material Description
300	BASE - OPSS Granular A Crushed Stone
	SUBGRADE - Either fill, in situ soil, or OPSS Granular B Type II material placed over in situ soil or fill

DATUM TBM - Top of magnetic nail in utility pole on Carp Road. Geodetic elevation = 119.73m.

REMARKS

BORINGS BY CME 55 Power Auger

DATE June 1, 2016

FILE NO.
PG3834

HOLE NO.
BH 1

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %				
								20	40	60	80	
GROUND SURFACE												
TOPSOIL	0.08					0	118.24					
Brown SILTY SAND with gravel, cobbles and boulders, trace clay and organics	0.76	SS	1	75	50+	1	117.24					
Highly fractured BEDROCK interbedded with silty sand to sandy silt, some clay with fragmented bedrock		SS	2	80	50+	2	116.24					
		SS	3	80	50+	3	115.24					
		SS	4	75	71	4	114.24					
		SS	5	75	50+							
		SS	6		50+							
End of Borehole	4.95											
Practical split spoon refusal at 4.95m depth												
(GWL @ 4.2m depth based on field observations)												
								20	40	60	80	100
								Shear Strength (kPa)				
								▲ Undisturbed △ Remoulded				

DATUM TBM - Top of magnetic nail in utility pole on Carp Road. Geodetic elevation = 119.73m.

REMARKS

BORINGS BY CME 55 Power Auger

DATE June 1, 2016

FILE NO. PG3834

HOLE NO. BH 2

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %				
								20	40	60	80	
GROUND SURFACE												
TOPSOIL	0.10					0	118.42					
Brown SILTY SAND with gravel, cobbles and boulders, trace clay and organics		SS	1	92	51	1	117.42					
	1.45	SS	2	25	50+	2	116.42					
Highly fractured BEDROCK interbedded with silty sand to sandy silt, some clay with fragmented bedrock		SS	3	50	50+	3	115.42					
						4	114.42					
	4.80	SS	4	67	50+							
End of Borehole												
Practical split spoon refusal at 4.80m depth												
(BH dry - June 6, 2016)												
								20	40	60	80	100
								Shear Strength (kPa)				
								▲ Undisturbed △ Remoulded				

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario**

FILE NO. PG3834

HOLE NO. **BH 3**

DATE June 1, 2016

SOIL DESCRIPTION		STRATA PLOT 	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
			TYPE	NUMBER	% RECOVERY	N VALUE or RQD			○ Water Content %				
									20	40	60	80	
GROUND SURFACE													
TOPSOIL	0.15						0	118.29					
Brown SILTY SAND with gravel, cobbles and boulders, trace clay and organics													
Highly fractured BEDROCK interbedded with silty sand to sandy silt, some clay with fragmented bedrock	0.91 - 1.12		SS	1		50+	1	117.29					
End of Borehole													
Practical refusal to augering at 1.12m depth													
(BH dry upon completion)													

▲ Undisturbed △ Remoulded

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario

DATUM TBM - Top of magnetic nail in utility pole on Carp Road. Geodetic elevation = 119.73m.

REMARKS

FILE NO.
PG3834

HOLE NO.
BH 3A

BORINGS BY CME 55 Power Auger

DATE June 1, 2016

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %				
								20	40	60	80	
GROUND SURFACE												
TOPSOIL	0.15					0	118.29					
Brown SILTY SAND with gravel, cobbles and boulders, trace clay and organics						1	117.29					
	1.80	SS	1	58	54	2	116.29					
	Highly fractured BEDROCK interbedded with silty sand to sandy silt, some clay with fragmented bedrock		SS	2	75	50+	3	115.29				
						4	114.29					
4.65		SS	3	67	50+							
End of Borehole												
Practical split spoon refusal at 4.65m depth												
(GWL @ 4.3m depth based on field observations)												
								20	40	60	80	100
								Shear Strength (kPa)				
								▲ Undisturbed △ Remoulded				

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario

DATUM TBM - Top of magnetic nail in utility pole on Carp Road. Geodetic elevation = 119.73m.

REMARKS

FILE NO.
PG3834

HOLE NO.
BH 4

BORINGS BY CME 55 Power Auger

DATE June 1, 2016

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %				
								20	40	60	80	
GROUND SURFACE												
TOPSOIL Brown SILTY SAND with gravel, cobbles and boulders, trace clay and organics	0.08 0.66					0	118.03					
Highly fractured BEDROCK interbedded with silty sand to sandy silt, some clay with fragmented bedrock		SS	1	50	46	1	117.03					
		SS	2		68	2	116.03					
End of Borehole Practical refusal to augering at 2.59m depth (BH dry upon completion)	2.59											
								20 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded				

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario**

DATUM TBM - Top of magnetic nail in utility pole on Carp Road. Geodetic elevation = 119.73m.

FILE NO. PG3834

REMARKS

HOLE NO. **BH 5**

BORINGS BY CME 55 Power Auger

DATE June 1, 2016

[illegible]

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario**

FILE NO. PG3834

HOLE NO. **BH 6**

DATE June 1, 2016

[illegible]

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario**

FILE NO. PG3834

HOLE NO. BH 7

DATE June 1, 2016

[illegible]

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario

DATUM TBM - Top of magnetic nail in utility pole on Carp Road. Geodetic elevation = 119.73m.

REMARKS

FILE NO.
PG3834

HOLE NO.
BH 8

BORINGS BY CME 55 Power Auger

DATE June 2, 2016

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %				
								20	40	60	80	
GROUND SURFACE												
TOPSOIL						0	117.54					
	0.30											
Brown SILTY SAND with gravel, cobbles and boulders, trace clay and organics	0.76	AU	1									
		SS	2	67	50+	1	116.54					
		SS	3	60	50+							
		SS	4	92	58	2	115.54					
		SS	5	50	50+	3	114.54					
Highly fractured BEDROCK interbedded with silty sand to sandy silt, some clay with fragmented bedrock		SS	6	76	79	4	113.54					
						5	112.54					
	5.94											
End of Borehole												
Practical refusal to augering at 5.94m depth												
(GWL @ 4.19m-June 6, 2016)												
								20	40	60	80	100
								Shear Strength (kPa)				
								▲ Undisturbed △ Remoulded				

SOIL PROFILE AND TEST DATA

HOLE NO. **BH 9**

[illegible]

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario

DATUM TBM - Top of magnetic nail in utility pole on Carp Road. Geodetic elevation = 119.73m.

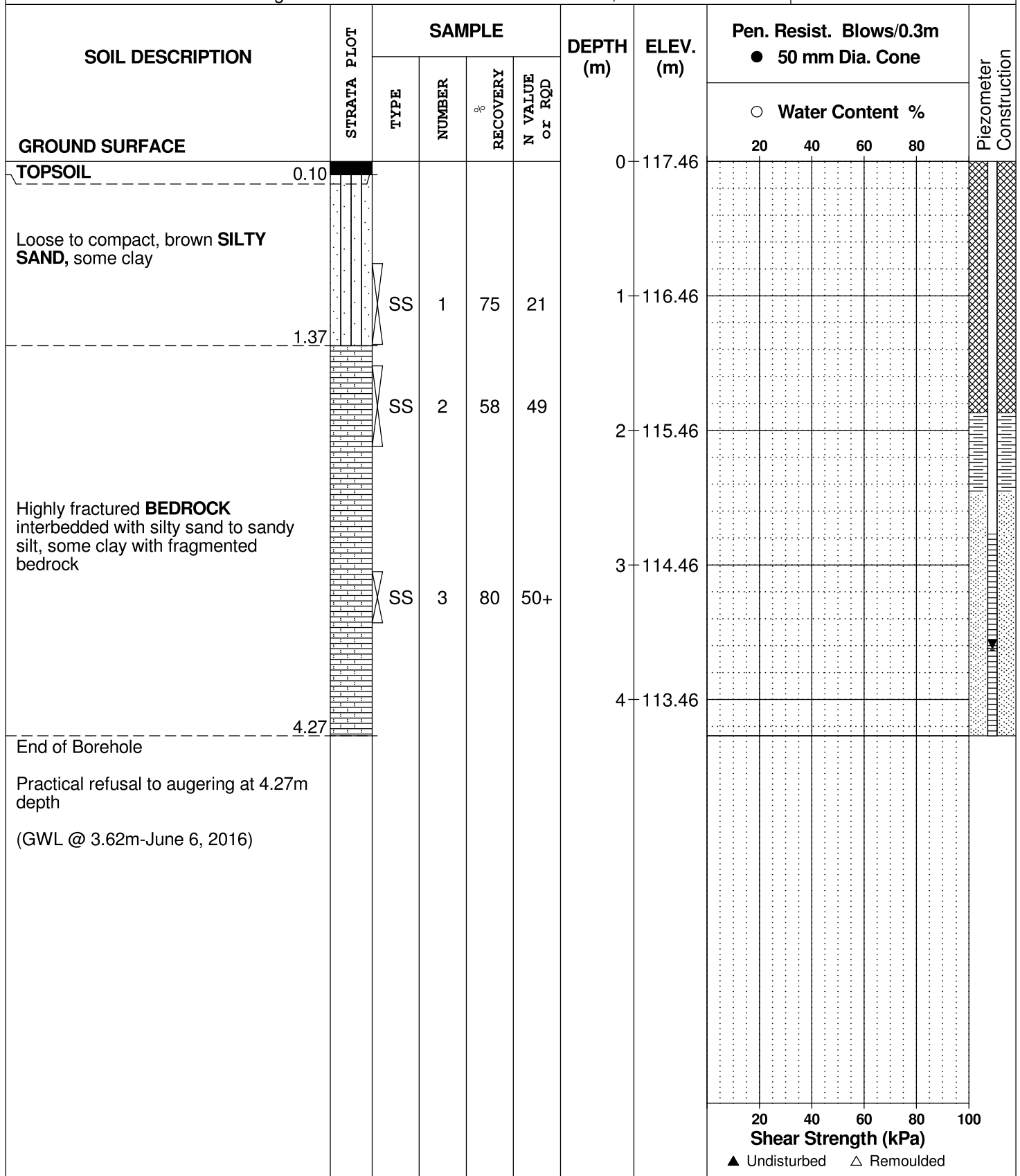
REMARKS

BORINGS BY CME 55 Power Auger

DATE June 2, 2016

FILE NO. PG3834

HOLE NO. BH10



SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario

DATUM TBM - Top of magnetic nail in utility pole on Carp Road. Geodetic elevation = 119.73m.

REMARKS

BORINGS BY CME 55 Power Auger

DATE June 2, 2016

FILE NO. PG3834

HOLE NO. BH11

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %				
								20	40	60	80	
GROUND SURFACE						0	117.45					
TOPSOIL		AU	1									
0.60												
Brown SILTY SAND with gravel, cobbles and boulders, trace clay and organics		SS	2	70	11	1	116.45					
1.27												
Highly fractured BEDROCK interbedded with silty sand to sandy silt, some clay with fragmented bedrock		SS	3	75	62	2	115.45					
3.05												
End of Borehole						3	114.45					
Practical refusal to augering at 3.05m depth												
(Piezometer blocked at 1.72m depth - June 6, 2016)												

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario

DATUM TBM - Top of magnetic nail in utility pole on Carp Road. Geodetic elevation = 119.73m.

REMARKS

BORINGS BY Backhoe

DATE November 3, 2016

FILE NO.
PG3834

HOLE NO.
TP 1

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction	
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %					
								20	40	60	80		
GROUND SURFACE						0	117.72						
TOPSOIL	0.20	G	1										
Brown SILTY SAND to SANDY SILT, some tree roots		G	2			1	116.72						
Highly fractured BEDROCK with sandy silt, gravel, cobbles and boulders, some clay	1.20 1.30												
End of Test Pit													
TP terminated on fractured bedrock surface at 1.30m depth (TP dry upon completion)													

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario**

DATUM TBM - Top of magnetic nail in utility pole on Carp Road. Geodetic elevation = 119.73m.

FILE NO. PG3834

REMARKS

HOLE NO. TP 2

BORINGS BY Backhoe

DATE November 3, 2016

[illegible]

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario

DATUM TBM - Top of magnetic nail in utility pole on Carp Road. Geodetic elevation = 119.73m.

REMARKS

BORINGS BY Backhoe

DATE November 3, 2016

FILE NO.
PG3834

HOLE NO.
TP 3

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction	
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %					
								20	40	60	80		
GROUND SURFACE						0	117.47						
TOPSOIL	0.20												
Brown SILTY SAND to SANDY SILT	0.50												
Highly fractured BEDROCK with sandy silt, gravel, cobbles and boulders, some clay	1.60					1	116.47						
End of Test Pit													
TP terminated on fractured bedrock surface at 1.60m depth (TP dry upon completion)													

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario**

FILE NO. PG3834

HOLE NO. TP 4

DATE November 3, 2016

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				Piezometer Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			○ Water Content %				
GROUND SURFACE								20	40	60	80	
TOPSOIL 0.30 Brown SILTY SAND to SANDY SILT , some clay, gravel, cobbles and boulders - clay content increasing with depth 0.80 End of Test Pit TP terminated on dense glacial till at 0.80m depth (TP dry upon completion)		G	1			0	117.46					

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario**

FILE NO. PG3834

HOLE NO. **TP 5**

DATE November 3, 2016

[illegible]

SOIL PROFILE AND TEST DATA

HOLE NO. **TP 6**

[illegible]

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario**

DATUM TBM - Top of magnetic nail in utility pole on Carp Road. Geodetic elevation = 119.73m.

REMARKS

BORINGS BY Backhoe

DATE November 3, 2016

FILE NO. **PG3834**

HOLE NO. **TP 7**

[illegible]

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario**

FILE NO. PG3834

HOLE NO. **TP 8**

DATE November 3, 2016

[illegible]

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario**

FILE NO. PG3834

HOLE NO. **TP 9**

DATE November 3, 2016

[illegible]

SOIL PROFILE AND TEST DATA

**Geotechnical Investigation
Proposed Storage Building - 2978 & 2966 Carp Road
Ottawa, Ontario**

DATUM TBM - Top of magnetic nail in utility pole on Carp Road. Geodetic elevation = 119.73m.

FILE NO. PG3834

REMARKS

HOLE NO. **TP10**

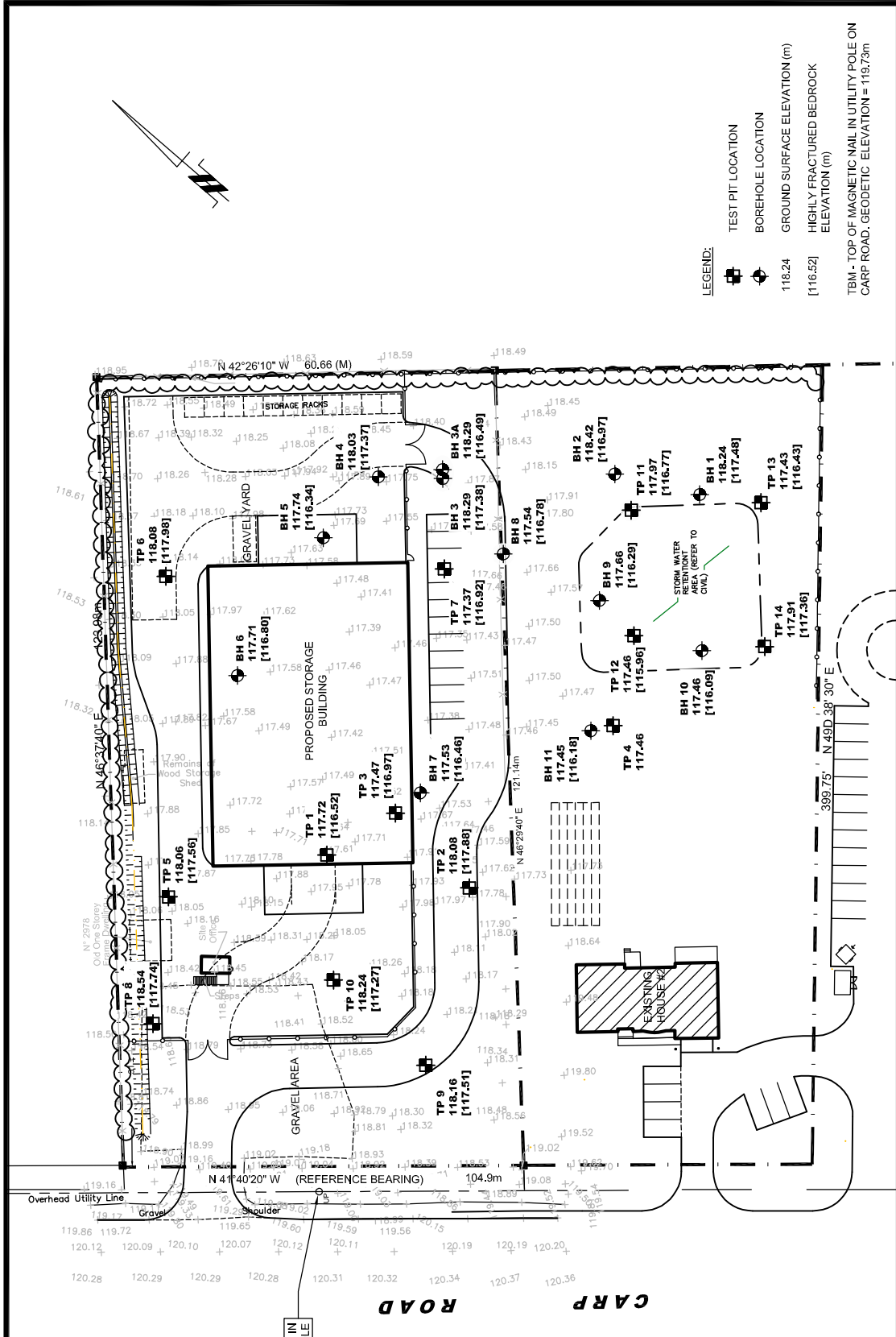
BORINGS BY Backhoe

DATE November 3, 2016

[illegible]



Figure 1 – Key Plan



Scale: 1:500		Date: 11/2016
Drawn by: RCG		Report No.: PG3834
Checked by: RG		Dwg. No.: PG3834-2
Approved by: RG		Revision No.: 1
NAUTICAL LANDS GROUP		
GEOTECHNICAL INVESTIGATION		
PROPOSED STORAGE BUILDING - 2978 & 2966 CARP ROAD,		
OTTAWA, ONTARIO		
Title:		
TEST HOLE LOCATION PLAN		
1		
BASE PLAN UPDATED		
14/11/2016		
RG		
DATE		
INITIAL		
REVISED		
154 Colonnade Road South		
Ottawa, Ontario K2E 7J5		
Tel: (613) 226-7381 Fax: (613) 226-6344		

patersongroup
consulting engineers

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

SERVICING REPORT – 2978 CARP ROAD

Appendix D Drawings
December 21, 2016

Appendix D DRAWINGS

C.3 Environmental Compliance Approval (ECA)





Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement
climatique

ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER 9196-AQBQZV

Issue Date: October 6, 2017

York-Hop Corp.
2962 Carp Road
Ottawa, Ontario
K0A 1T0

Site Location: 2978 and 2966 Carp Road
City of Ottawa

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

the establishment of stormwater management works to service the 1.30 hectare warehouse storage site at 2978 and 2966 Carp Road, in the City of Ottawa, for the collection, treatment and disposal of stormwater run-off, to provide Normal Level quality control and erosion protection, and to infiltrate and attenuate the post-development peak flows for all storm events up to and including the 100-year storm to allowable release rates, consisting of the following:

infiltration basin (catchment area 1.14 ha) located at the southeast corner of the site, with vegetated buffer area providing pre-treatment, comprising of 200 millimetre thick layer of 50 millimetre diameter clear stone covered by filter fabric, to store and infiltrate stormwater run-off from the site, having a total storage volume of approximately 389.6 m³, with an emergency overland flow in excess of the 100-year storm to the neighbouring property to the south;

including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned Works;

all in accordance with the submitted supporting documents listed in Schedule "A" forming part of this Approval.

For the purpose of this environmental compliance approval, the following definitions apply:

1. "Approval" means this entire document and any schedules attached to it, and the application;
2. "Director" means a person appointed by the Minister pursuant to section 5 of the EPA for the purposes of Part II.1 of the EPA;
3. "District Manager" means the District Manager of the appropriate local District Office of the Ministry, where the Works are geographically located;
4. "EPA" means the *Environmental Protection Act*, R.S.O. 1990, c.E.19, as amended;
5. "Ministry" means the ministry of the government of Ontario responsible for the EPA and OWRA and includes all officials, employees or other persons acting on its behalf;
6. "Owner" means York-Hop Corp., and includes its successors and assignees;
7. "OWRA" means the *Ontario Water Resources Act*, R.S.O. 1990, c. O.40, as amended;
8. "Works" means the sewage works described in the Owner's application, and this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL CONDITIONS

1. The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.
2. Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Approval, and the application for approval of the Works.
3. Where there is a conflict between a provision of any document in the schedule referred to in this Approval and the conditions of this Approval, the conditions in this Approval shall take precedence, and where there is a conflict between the documents in the schedule, the document bearing the most recent date shall prevail.
4. Where there is a conflict between the documents listed in Schedule "A" and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.
5. The conditions of this Approval are severable. If any condition of this Approval, or the application of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this Approval shall not be affected thereby.
6. The issuance of, and compliance with the conditions of, this Approval does not:
 - a. relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement, including, but not limited to, the obligation to obtain approval from the local conservation authority/MNR necessary to construct or operate the sewage works; or
 - b. limit in any way the authority of the Ministry to require certain steps be taken to require the Owner to furnish any further information related to compliance with this Approval.

2. EXPIRY OF APPROVAL

1. This Approval will cease to apply to those parts of the Work which have not been constructed within five (5) years of the date of this Approval.
2. In the event that completion and commissioning of any portion of the Works is anticipated to be delayed beyond the specified expiry period, the Owner shall submit an application of extension to the expiry period, at least twelve (12) months prior to the end of the period. The application for extension shall include the reason(s) for the delay, whether there is any design change(s) and a review of whether the standards applicable at the time of Approval of the Works are still applicable at the time of request for extension, to ensure the ongoing protection of the environment.

3. CHANGE OF OWNER

1. The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within thirty (30) days of the change occurring:
 - a. change of Owner;
 - b. change of address of the Owner;

- c. change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the *Business Names Act*, R.S.O. 1990, c.B17 shall be included in the notification to the District Manager; or
 - d. change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the *Corporations Information Act*, R.S.O. 1990, c. C39 shall be included in the notification to the District Manager.
2. In the event of any change in ownership of the Works, other than a change to a successor municipality, the Owner shall notify in writing the succeeding owner of the existence of this Approval, and a copy of such notice shall be forwarded to the District Manager and the Director.
 3. The Owner shall ensure that all communications made pursuant to this condition refer to the number at the top of this Approval.

4. OPERATION AND MAINTENANCE

1. If applicable, any proposed storm sewers or other stormwater conveyance in this Approval can be constructed but not operated until the proposed stormwater management facilities in this Approval or any other Approval that are designed to service the storm sewers or other stormwater conveyance are in operation.
2. The Owner shall make all necessary investigations, take all necessary steps and obtain all necessary approvals so as to ensure that the physical structure, siting and operations of the Works do not constitute a safety or health hazard to the general public.
3. The Owner shall inspect and ensure that the design minimum liquid retention volume is maintained in the Works at all times, except when maintenance is required.
4. The Owner shall undertake an inspection of the condition of the Works, at least once a year, and undertake any necessary cleaning and maintenance to ensure that sediment, debris and excessive decaying vegetation are removed from the Works to prevent the excessive build-up of sediment, oil/grit, debris and/or decaying vegetation, to avoid reduction of the capacity and/or permeability of the Works, as applicable. The Owner shall also regularly inspect and clean out the inlet to and outlet from the Works to ensure that these are not obstructed.
5. The Owner shall design, construct and operate the Works with the objective that the effluent from the Works is essentially free of floating and settleable solids and does not contain oil or any other substance in amounts sufficient to create a visible film, sheen, foam or discoloration on the receiving waters.
6. The Owner shall ensure the immediate clean-out of the Works after a fuel or oil spill capture.
7. The Owner shall ensure that equipment and material for the containment, clean-up and disposal of fuel and oil and materials contaminated with such, is on hand and in good repair for immediate use in the event of:
 - a. loss of fuel or oil to the Works; or
 - b. a spill within the meaning of Part X of the EPA.
8. The Owner shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook at the Owner's administration office for inspection by the Ministry. The logbook shall include the following:
 - a. the name of the Works;
 - b. the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed and method of clean-out of the Works; and
 - c. the date of each spill within the catchment area, including follow-up actions and remedial measures undertaken.
9. The Owner shall prepare an operations manual prior to the commencement of operation of the

Works that includes, but is not necessarily limited to, the following information:

- a. operating and maintenance procedures for routine operation of the Works;
 - b. inspection programs, including frequency of inspection, for the Works and the methods or tests employed to detect when maintenance is necessary;
 - c. repair and maintenance programs, including the frequency of repair and maintenance for the Works;
 - d. contingency plans and procedures for dealing with potential spills and any other abnormal situations and for notifying the District Manager; and
 - e. procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.
10. The Owner shall maintain the operations manual current and retain a copy at the location of the Works for the operational life of the Works. Upon request, the Owner shall make the manual available to Ministry staff.

5. TEMPORARY EROSION AND SEDIMENT CONTROL

1. The Owner shall install and maintain temporary sediment and erosion control measures during construction and conduct inspections once every two (2) weeks and after each significant storm event (a significant storm event is defined as a minimum of 25 mm of rain in any 24 hours period). The inspections and maintenance of the temporary sediment and erosion control measures shall continue until they are no longer required and at which time they shall be removed and all disturbed areas reinstated properly.
2. The Owner shall maintain records of inspections and maintenance which shall be made available for inspection by the Ministry, upon request. The record shall include the name of the inspector, date of inspection, and the remedial measures, if any, undertaken to maintain the temporary sediment and erosion control measures.

6. REPORTING

1. One (1) week prior to the start-up of the operation of the Works, the Owner shall notify the District Manager (in writing) of the pending start-up date.
2. The Owner shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to Ministry staff.
3. The Owner shall prepare and submit a performance report to the District Manager on an annual basis, within ninety (90) days following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the Works and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:
 - a. a description of any operating problems encountered and corrective actions taken;
 - b. a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the Works, including an estimate of the quantity of any materials removed from the Works;
 - c. a summary of any complaints received during the reporting period and any steps taken to address the complaints;
 - d. a summary of all spill or abnormal discharge events; and
 - e. any other information the District Manager requires from time to time.

7. SPILL CONTINGENCY PLAN

1. Within six (6) months from the issuance of this Approval, the Owner shall implement a spill contingency plan - that is a set of procedures describing how to mitigate the impacts of a spill within the area serviced by the Works. The Owner shall, upon request, make this plan available to Ministry staff. This plan shall include as a minimum:

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