HYDROGEOLOGICAL INVESTIGATION REPORT

752 PETERSON ROAD

MUNICIPALITY OF HASTINGS HIGHLANDS

PREPARED FOR:

SHAHRAM RASHVAND

PREPARED BY:

C.F. CROZIER & ASSOCIATES INC.
55 WYNDHAM STREET N, SUITE 215
GUELPH, ON N1H 7T8

DECEMBER 2025

CFCA FILE NO. 2497-6768

CROZIER

Revision Number	Date	Comments
Rev.0	August 2024	Issued for First Submission
Rev.1	June 2025	Issued for Second Submission (DRAFT)
Rev.2	July 2025	Issued for Second Submission
Rev.3	December 2025	Issued for Third Submission

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

LIST OF FIGURES

1.0 Site Description

C.F. Crozier & Associates Inc. (Crozier) has been retained by Shahram Rashvand (Owner) to prepare a Hydrogeological Study in support of the proposed development located at 752 Peterson Road, in Maynooth, within the Municipality of Hastings Highlands (Figure 1). The scope of this study was designed to meet the relevant criteria of the Municipality of Hastings Highlands and other local approval agencies.

The subject lands (herein referred to as the Site) cover an area of approximately 5.19 ha and is located on the northern side of Peterson Road north of Cannon Lake, approximately 4 km west of the village of Maynooth. The majority of the site is zoned as Rural Residential (RR) with a northern portion of the site zoned as Environmental Protection (EP) per the Municipality of Hasting Highlands Zoning By-Law.

The Site currently consists of an existing garage, the foundation for the future management building and the septic system to service that building. The remainder of the property is densely forested. The property is accessed by a gravel driveway off Peterson Road. The elements envisioned for the proposed development include:

- 17 cabins with trails to a common area and parking lot.
- The common area will include a management building and pool. The common area will be serviced by a water well and septic system (both which have already been constructed).

A review of the Ministry of Environment, Conservation and Parks (MECP) Source Protection Information Atlas reveals that the Site is not located within a regulated area therefore, no specific source protection policies apply.

Please note that the following report has been revised to address the Municipality of Hastings Highlands comments addressed February 2025.

2.0 Physical Setting

2.1 Physiography

The Site is located within the physiographic region known as the Algonquin Highlands (Figure 2). The Algonquin Highlands are found in Eastern Ontario and cover an area of approximately 40,144 square kilometers. This region is characterized by hard Precambrian rock overlain by a thin layer of sandy glacial till of variable depth (Figure 3). The soils in this region are generally shallow but thickness over the bedrock varies greatly over short distances. Within the Site, there are some areas of exposed bedrock.

2.2 Topography and Drainage

According to the Ontario Watershed Boundaries (OWB) mapping, the Site area is situated in the Baptiste Lake - York River watershed. Surface drainage is interpreted to flow to the southeast of the Site. The topography of the site is characterised by a significant slope from the north of the property to the south towards Cannon Lake.

2.3 Surficial Geology

According to Ontario Geological Survey (OGS) mapping (Figure 4), the surficial geology of the Site predominantly consists of fine textured glaciolacustrine deposits comprised of silt, clay and minor sand and gravel. Pockets of modern alluvial deposits and clay to silt till are mapped within the Site boundary.

3.0 Hydrogeology

3.1 MECP Well Records

Crozier completed a review of the MECP well record database for wells within 500 m of the Site Area boundary (Figure 5). Only nine (9) wells are located within 500 m of the property, with 743500 being mapped within the property (Appendix A). Table 1 below summaries all the wells within 500 m.

Table 1: MECP Well Records Summary

Well ID	Diameter (cm)	Depth (m)	Static Level (m)	Quantity (Lpm)	Quality	Materials	Aquifer	Use	Date Completed
2907831	15.24	10.97	4.267	45.46	Fresh	Granite	BR	Domestic	06/01/1976
2908373	15.24	30.48	4.267	40.95	Fresh	Red Granite	BR	Domestic	07/13/1977
2916314	15.875	49.38	6.401	13.65	Untested	Gray/Red Granite	BR	Domestic	09/01/1994
2917532	15.875	43.28	-	31.85	Untested	Gray/Red Granite	BR	Domestic	07/29/1997
2917533	15.875	43.28	3.353	31.85	Fresh	Gray/Red Granite	BR	Domestic	07/30/1997
2921359	16.000	36.58	0.600	40	Untested	Red Granite	BR	Domestic	08/04/2006
7160138	15.875	81.44	4.084	45.5	Untested	Gray/Red Granite	BR	Domestic	11/29/2010
7388986	15.875	85.34	16.154	36.4	Untested	Gray/Red Granite	BR	Domestic	05/25/2021
7433500	15.875	59.4	6.4	30	Fresh	Gray/Red Granite	BR	Domestic	09/02/2022

Based on Table 1, the following remarks can be made:

- In general, the main material encountered in majority of the wells was gray to reddish granite bedrock.
- All nine (9) records were identified for domestic use.
- Of the nine (9) wells where pumping test were completed in, there was a maximum reported pumping rate of 45.46 litres per minute (LPM), and a minimum reported pumping rate of 13.65 LPM. The average pumping rate was 33.841 LPM.
- Static water levels range from 0.6 meters below ground surface (mbgs) to 16.154 mbgs across the Site area. The average static water level was 6 mbgs.
- Well ID 7433500 is mapped within the Site boundary. The well is a 15.85 cm diameter steel cased domestic well constructed for the site to a depth of 59.4 mbgs within granite bedrock.

The materials presented in nearby well records to the Site are consistent with OGS mapping and the soils observed onsite.

4.0 Water Supply Assessment

4.1 Groundwater Quantity

A pumping test of the existing well was completed on April 18, 2024. It should be noted that the Site is unoccupied and the domestic well has not been used with the exception of the testing completed. The pumping test was completed on well 7433500 and was pumped for 90 minutes with 50 minutes of recovery. Crozier staff measured water levels at the begging, end and throughout the testing using a manual water level meter. Detailed testing data is provided in Appendix B.

The well was tested at a constant rate of 30 liters per minute (LPM) to evaluate the capacity of the well and it's capability of producing adequate water quantity to the proposed development. After 90 minutes of pumping the water level declined from 4.60 mbgs to a pumping level of 15.70 mbgs. Following 50 minutes of recovery, the water level recovered to 8.90 mbgs, approximately 51 % of static water level. It is estimated that 95% would be achieved after an elapsed time of 197 minutes from the start of the pumping test or 107 minutes of recovery.

The well has a total available drawdown of 54.80 m based on a total depth of 59.40 m and a static water level of 4.60 m. Using a safety factor of 80% (only allowing for 80% of the total available drawdown to be utilized) the total available drawdown in the well would be 43.84 mbgs.

Extrapolating the equation to 1 year, a drawdown of approximately 33 mbgs would be seen with 1 year of continuous pumping, leaving roughly 10 m of available drawdown in the well. Crozier is of the opinion, based on the results of the pumping test and analysis, that the existing well on property is capable of producing water in at 30 LPM on a long term basis which exceeds the requirement for the development of 13.33 LPM (see Servicing Report under separate cover).

4.2 Groundwater Quality Sampling

Two (2) water samples were collected from the existing well during the pumping test. The first sample was collected within the first 15 minutes of pumping and the final sample was collected immediately after the pump was turned off. The samples were collected using standard sampling methods for test wells and were submitted to a third-party laboratory for analysis. Samples were analysed for the following parameters. A laboratory report is appended to this report as Appendix C.

- E.Coli and Total Coliforms
- Anions including fluoride, chloride, nitrate, nitrate, bromide, sulphate, and phosphate
- Physical tests such as conductivity, alkalinity, hardness, pH, etc.
- Ion Balance
- Total Metals

The results were compared to the Ontario Drinking Water Quality guidelines as shown in Table 2 below.

Table 2: Exceedances of the Ontario Drinking Water Quality Standards

Parameter	Guideline/Standard	Type	Sample 1 Beginning	Sample 2 End
Total Coliforms	Non-Detect	MAC	1	Non-Detect
Iron	0.3 mg/L	AO	0.787	0.398
Colour	5 NTU	AO	49.0	13.0
Turbidity	5 NTU	AO	7.93	2.05

OG – Operational objective; AO – Aesthetic objective; MAC – Maximum Allowable Concentration

Only one exceedance of a health-related parameter was observed in the water sample analysis – total coliforms. Total coliforms is a measure of bacteria within the sample; any detection is deemed unsuitable for consumption. The first sample was collected within 15 minutes of turning the pump on. It can be reasonably assumed that the first sample is representative of stagnant water since the bacteria was not detected after pumping for 90 minutes and the well sat unopened and unused for 2 years following installation.

Exceedances of the standards for iron, colour and turbidity were noted in the first sample as well. Similar to the above, the first sample results are interpreted to be as a result of stagnant water and not thought to be representative of aquifer quality. The objectives for iron, turbidity and colour can affect taste, look and odour of drinking water but do not impact human health. The elevated levels of iron decrease to near the guideline objective after 90 minutes of pumping and colour and turbidity decrease significantly after the first 90 minutes. It is expected that after pumping for longer periods, both would decrease to below the objective.

Although the well water meets all the health-related objectives of the Ontario Drinking Water Quality Standards, it is recommended that treatment for particulates, bacteria and the aesthetic parameters above be investigated. The intended use of the property for rentals and it is expected that water quality will be a top concern of visitors. The design of the treatment system is beyond the scope of this report, however, options for types of treatment are presented in section 5 below.

4.3 Impact to Nearby Well Users & Natural Features.

The zone of influence of a well can be estimated using the Sidchart equation:

$$\mathbf{R = 3000 \times H \times \sqrt{K}}$$

Where **H:** is the drawdown of the well in meters.

K: is the hydraulic conductivity of the soil or transmissivity of the bedrock.

According to literature values for granite transmissivity in the area, transmissivity of the bedrock on the Site is estimated to range from 1 to 5 m^2/day. Assuming a conservative saturated thickness of 50 m, the hydraulic conductivity of the rock is estimated to be on the order of 10^{-7} m/s.

Given the above assumptions, it was determined that the estimated zone of influence of the existing well is approximately 100 m from the well at the maximum available drawdown of 43.84 m. There are wells located on neighbouring properties; however, they are located greater than 100 m from the well head and the well will not operate at its maximum allowable drawdown, no significant impacts to neighbouring well users or natural heritage features are anticipated.

5.0 Nitrate Impact Assessment

Onsite sewage systems can contribute nitrate-nitrogen to the shallow groundwater regime, which may impact drinking water quality. Therefore, the impacts of a proposed onsite sewage system must be examined to ensure that downgradient groundwater users have access to a safe and reliable drinking water supply.

The impact assessment of the proposed leaching bed has been completed in accordance with MECP Procedure D-5-4 Technical Guidelines for Individual Onsite Sewage Systems: Water Quality Impact Risk Assessment (Procedure D-5-4).

Crozier has completed a mass balance calculation to predict the concentration of nitrate-nitrogen at the property boundary using the following general assumptions, per D-5-4 Guidelines:

- The background nitrate concentration is 0.0 mg/L.
- The concentration of nitrate in the effluent is 40 mg/L, typical for conventional septic tank/leaching beds system without advanced treatment.
- The average volume of effluent generated by the proposed development is estimated to be 9,600 L/day, per the Functional Servicing & Preliminary Stormwater Management Report (Crozier, December 2025)
- The only dilution mechanism is by infiltration of surface precipitation. An infiltration value of 150 mm/year has been assigned, based on MECP Guidelines.
- 5.19 ha of the property is available for dilution purposes.

Impact assessment calculations are included in Appendix D. Using this approach, the resulting theoretical concentration of nitrate-nitrogen at the downgradient Site boundary is predicted to be 12.42 mg/L, which is above the maximum allowable concentration of nitrate-nitrogen of 10 mg/L. With 25% nitrogen removal, the nitrate concentration at the property boundary is 9.31 mg/L. Therefore, Crozier recommends that an advanced treatment unit be implemented, which may assist with further removal of nitrate-nitrogen. There are a number of CAN/BNQ certified treatment systems that can significantly reduce nitrogen in effluent, including the Waterloo Biofilter recirculating system, among others.

As outlined in the Functional Servicing & Preliminary Stormwater Management Report, an alternative scenario was considered where the total daily design sewage flow for the proposed development is 18,100 L/day (1,000 L/day per cabin). When the total daily design sewage flow for the Site is greater than 10,000 L/day, an impact assessment in accordance with Chapter 22 – Large Subsurface Disposal Systems of the MECP Design Guidelines for Sewage Works (2008) is required. Impact assessment calculations were completed in accordance with the procedure described in Chapter 22, and the target effluent concentration of nitrate-nitrogen was calculated as follows:

$$C_{effluent} = C_{max}\left(V_{effluent} + V_{influent}\right)/V_{effluent}$$

Where **$C_{effluent}$** is the concentration of nitrate-nitrogen required in the effluent to meet the maximum allowable concentration at the receptor.

C_{max} is the maximum allowable concentration of nitrate-nitrogen at the downgradient boundary, which is 2.5 mg/L per Chapter 22.

$V_{influent}$ is the volume of infiltration based on an infiltration rate of 150 mm/m^2/year over the area of the attenuation zone available for infiltration (e.g., dilution area). 5.19 ha of the property is available for dilution purposes.

$V_{effluent}$ is the average volume of treated effluent discharged to the leaching beds. As noted above the maximum daily volume to be discharged to the leaching beds is 18,100 L/day. Applying a peaking factor of 3, the average value is expected to be 6,033 L/day.

Impact assessment calculations are included in Appendix D. In this scenario, the maximum allowable concentration of nitrate-nitrogen permitted in the effluent is 11.34 mg/L. This equates to approximately 72% nitrogen removal, which is achievable by a number of CAN/BNQ certified treatment systems, including the Waterloo Biofilter WaterNOX system, etc.

Therefore, with an advanced treatment unit that includes denitrification, the proposed onsite sewage systems can meet D-5-4 and Chapter 22 requirements.

6.0 Conclusions & Summary

Based on the hydrogeological report above, Crozier is prepared to make the following conclusions:

- According to nearby well records and information obtained about the existing water supply well at 752 Peterson Road, it is interpreted that the groundwater supply aquifer can produce in excess of the anticipated flow rate of 13.33 LPM to service the proposed development.

- Laboratory testing of the well water in the existing water supply well revealed exceedances of the Ontario Drinking Water Quality Standards for total coliforms, iron, colour and turbidity. Only one health-related parameters were noted to be in exceedance – total coliforms. Due to the well sitting unused for two years prior to testing, the detection of coliforms in the sample is likely due to stagnant water and is not representative of aquifer conditions. Filtration systems and/or UV are commonly used to address elevated bacteria in well water.

- Exceedances of the Ontario Drinking Water Quality Standards for colour, iron and turbidity were observed in the well water sample. The objectives for these parameters are aesthetic objectives where exceedances in the guideline can negatively impact taste/smell/look of the water. Filtration and chlorination systems can reduce the total dissolved solids in water, improve colour and remove unwanted particulates.

Recommendations

Based on the above study, Crozier is prepared to make the following recommendations regarding water quality and quantity for the proposed development

- Onsite grading should consider the well such that surface water runoff is not directed to or is able to pond around the well. Any storage of gasoline, chemicals, paints, domestic de-icing agents, and other contaminants should be contained and stored away from the wellhead.

- The well must be constructed in accordance with the Ontario Regulation 903 at a minimum and consider all local regulations. The well must be constructed upgradient from the proposed onsite sewage system and be sited following all setbacks outlined in the Ontario Building Code.

- For educational purposes on well ownership, the owner should refer to the MECP's Water Supply Wells: Requirements and the local health unit for resources. Additional resources for the owner can be accessed through the Walkerton Clean Water Centre, Green Communities Canada and the Government of Canada website.

- It is recommended that the onsite well be pumped, disinfected and tested following approval to inform the design of the water treatment system.

- The owner should follow the regulatory well maintenance requirements as outlined in the MECP's Water Supply Wells: Requirements and Best Practices. The well must be accessible for maintenance purposes permanently.

- It is recommended that the new well water be tested on roughly an annual basis for bacterial parameters. Public Health Ontario offers free well water testing for E.Coli and total coliforms bacteria through the local Health Unit. Additional water quality testing for the full suite of potable water testing parameters should occur on a biannual basis.

- Based on the water quality results obtained from the sampled well, water treatment and/or filtration is required. To address health-related parameters a UV system should be employed. It is recommended that a water treatment systems expert be consulted such that specific systems can be recommended.

- To address aesthetic and/or operational objectives, a water softener can be explored to reduce hardness, and additional filters can improve colour, pH and sodium content in water.

- It is recommended that the future owner consult the Province of Ontario's "SepticSmart" document and the Ontario Onsite Wastewater Association's "A Homeowner's Guide to a Healthy Sewage (Septic) System" for educational purposes. The Municipality of Hastings Highlands may also provide a number of resources for homeowners on maintenance and care of their septic systems.

Respectfully submitted,

C.F. CROZIER & ASSOCIATES INC.

Chris Gerrits, M.Sc., P.Eng.
Director, Land Development

J:\2400\2497 - Shahram Rashvand\6768 - 752-8 Peterson Road\Reports\Hydrogeology\2025.12.15_(2497-6768)_752-8 Peterson Road Hydrogeology Report_3rd Sub_Final.docx

APPENDIX A

Water Well Records

MINISTRY OF THE ENVIRONMENT
The Ontario Water Resources Act

WATER WELL RECORD

Ontario

31F/4W

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

11 | 2907831 | MUNICIP. 29008 | CON. CON | 16

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT
Hastings	Herschel	16	8008

[redacted] Maynooth

DATE COMPLETED: DAY 01 MO. 06 YR. 76

ELEVATION: 011200 5 1300 6 | BASIN CODE: 26

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
	Gravel		Coarse	0	33
	Granite			33	36

31 | 0033 31 | 0036 21
32 |

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0036	1 ☒ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	TO
06 (6¼)	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	.188	0	0033
06	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE		33	0036
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

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

MATERIAL AND TYPE: | DEPTH TO TOP OF SCREEN: FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)
		Drive Shoe

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☐ PUMP 2 ☒ BAILER
PUMPING RATE: 0010 GPM
DURATION OF PUMPING: 02 HOURS 00 MINS

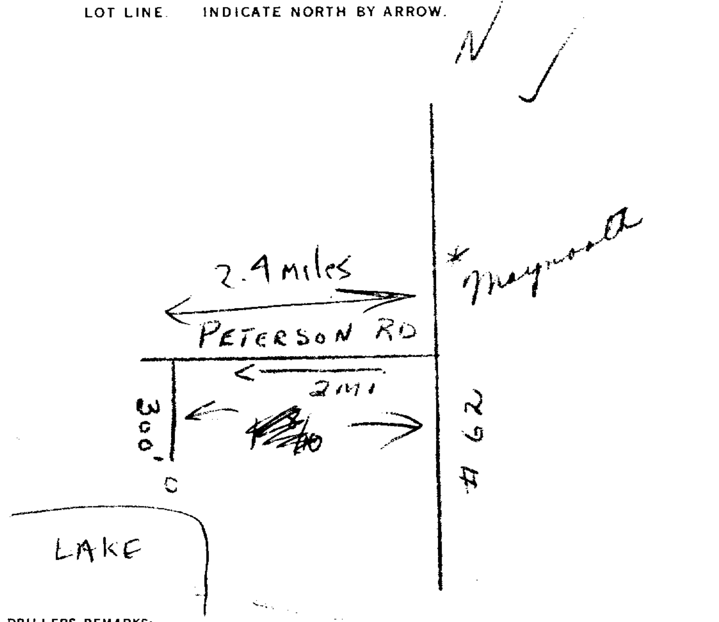
STATIC LEVEL	WATER LEVEL END OF PUMPING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
014 FEET	022 FEET	022 FEET	FEET	FEET	022 FEET

WATER LEVELS DURING: 1 ☒ PUMPING 2 ☐ RECOVERY

IF FLOWING, GIVE RATE: GPM
PUMP INTAKE SET AT: FEET
WATER AT END OF TEST: 1 ☒ CLEAR 2 ☐ CLOUDY
RECOMMENDED PUMP TYPE: ☒ SHALLOW ☐ DEEP
RECOMMENDED PUMP SETTING: 030 FEET
RECOMMENDED PUMPING RATE: 0009 GPM
GPM./FT. SPECIFIC CAPACITY

LOCATION OF WELL

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



DRILLERS REMARKS:

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

WATER USE 01: 1 ☒ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL ☐ OTHER 5 ☐ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED

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

CONTRACTOR

NAME OF WELL CONTRACTOR: Bernard Marquardt & Son | LICENCE NUMBER: 3610
ADDRESS: RR 2 Palmer Rapids
NAME OF DRILLER OR BORER: B Marquardt & D. Hannah | LICENCE NUMBER:
SIGNATURE OF CONTRACTOR: Bernard Marquardt | SUBMISSION DATE: DAY ___ MO. ___ YR. ___

OFFICE USE ONLY

DATA SOURCE: 1 | CONTRACTOR: 3610 | DATE RECEIVED: 250177
DATE OF INSPECTION: | INSPECTOR:
REMARKS:
P
WI

MINISTRY OF THE ENVIRONMENT COPY

FORM 7 MOE 07-091

MINISTRY OF THE ENVIRONMENT
The Ontario Water Resources Act

WATER WELL RECORD

31 F/4

Ontario

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

11 | 2908373 | MUNICIP. 29008 | CON. Con | 16

COUNTY OR DISTRICT: [redacted]
TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: Markham
CON., BLOCK, TRACT, SURVEY, ETC.: 16
LOT: 008
ADDRESS OF WELL LOCATION: [redacted] Bonnieview Rd Scarborough
DATE COMPLETED: DAY 13 MO Oct YR 77
UTM: 110.50 | RC 5 | ELEVATION 1300 | RC 6 | BASIN CODE 26

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
	Gravel			0	17
Dk gray	Granite			17	98
Red	Granite			98	100

MOE LF-17

31 | 0017 | 11 | 0098 | 22 | 165 | 0100 | 72

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0100	1 ☒ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
6	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	.188	0	17
6	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE		17	100
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER INCHES	LENGTH FEET
MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN FEET	

61 PLUGGING & SEALING RECORD

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

71 PUMPING TEST

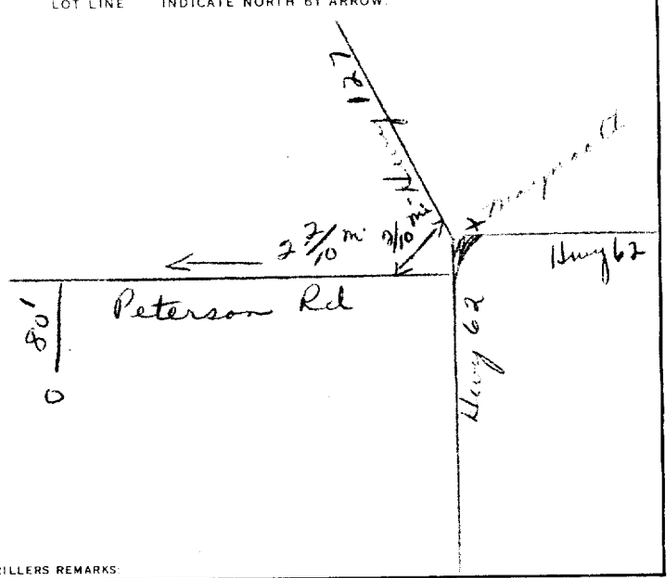
PUMPING TEST METHOD: 1 ☐ PUMP 2 ☒ BAILER
PUMPING RATE: 0009 GPM
DURATION OF PUMPING: 02 HOURS 00 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 1 ☒ PUMPING 2 ☐ RECOVERY			
		15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
014 FEET	085 FEET	060 FEET	085 FEET	FEET	FEET

IF FLOWING GIVE RATE: GPM
PUMP INTAKE SET AT: FEET
WATER AT END OF TEST: 1 ☒ CLEAR 2 ☐ CLOUDY
RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP
RECOMMENDED PUMP SETTING: 090 FEET
RECOMMENDED PUMPING RATE: 0008 GPM
GPM./FT. SPECIFIC CAPACITY

LOCATION OF WELL

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



DRILLERS REMARKS:

FINAL STATUS OF WELL 54: 1 ☒ WATER SUPPLY; 2 ☐ OBSERVATION WELL; 3 ☐ TEST HOLE; 4 ☐ RECHARGE WELL; 5 ☐ ABANDONED, INSUFFICIENT SUPPLY; 6 ☐ ABANDONED, POOR QUALITY; 7 ☐ UNFINISHED

WATER USE 55-56 01: 1 ☒ DOMESTIC; 2 ☐ STOCK; 3 ☐ IRRIGATION; 4 ☐ INDUSTRIAL; ☐ OTHER; 5 ☐ COMMERCIAL; 6 ☐ MUNICIPAL; 7 ☐ PUBLIC SUPPLY; 8 ☐ COOLING OR AIR CONDITIONING; 9 ☐ NOT USED

METHOD OF DRILLING 57 1: 1 ☒ CABLE TOOL; 2 ☐ ROTARY (CONVENTIONAL); 3 ☐ ROTARY (REVERSE); 4 ☐ ROTARY (AIR); 5 ☐ AIR PERCUSSION; 6 ☐ BORING; 7 ☐ DIAMOND; 8 ☐ JETTING; 9 ☐ DRIVING

CONTRACTOR

NAME OF WELL CONTRACTOR: Bernard Marquardt & Son | LICENCE NUMBER: 3610
ADDRESS: R.R. #2 Palmer Rapids
NAME OF DRILLER OR BORER: Bernard Marquardt | LICENCE NUMBER:
SIGNATURE OF CONTRACTOR: Bernard Marquardt | SUBMISSION DATE: DAY ____ MO. ____ YR. ____

OFFICE USE ONLY

DATA SOURCE 58: 1 | CONTRACTOR 59-62: 3610 | DATE RECEIVED 63-68 80: 810178
DATE OF INSPECTION | INSPECTOR: Km LCRW
REMARKS:
P
WI

MINISTRY OF THE ENVIRONMENT COPY

FORM 7 MOE 07-091

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

2916314

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

11

MUNICIP 29008 CON. CON 16

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON. BLOCK, TRACT, SURVEY, ETC.	LOT
HASTINGS	HERSCHEL	16	8

[redacted] 14 Citation Circle
Winnipeg Co. MANITOBA R3R-3B3

DATE COMPLETED: DAY 1 MO 9 YR 94

RING | RC. | ELEVATION | RC. | BASIN CODE

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
BRN	SAND	STONES, CLAY	PACKED	0	12
GRY	GRANITE		AVERAGE	12	27
RED	"		SOFT	27	38
GRY	"		"	38	45
RED	"		"	45	78
GRY, RED	"		AVERAGE	78	130
GRY	"		VERY SOFT, POROUS	130	155
GRY RED	"		AVERAGE	155	162

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
157	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 5 ☐ GAS — untested
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 5 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 5 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 5 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 5 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
6¼	1 ☑ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	188	0	20
5 15/16	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☑ OPEN HOLE 5 ☐ PLASTIC		20	162
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			

SCREEN

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

MATERIAL AND TYPE | DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER, ETC.)
0	20	PORTLAND

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☐ PUMP 2 ☐ BAILER — AIR

PUMPING RATE: 2½ GPM — DURATION OF PUMPING: 1 HOURS 30 MINS

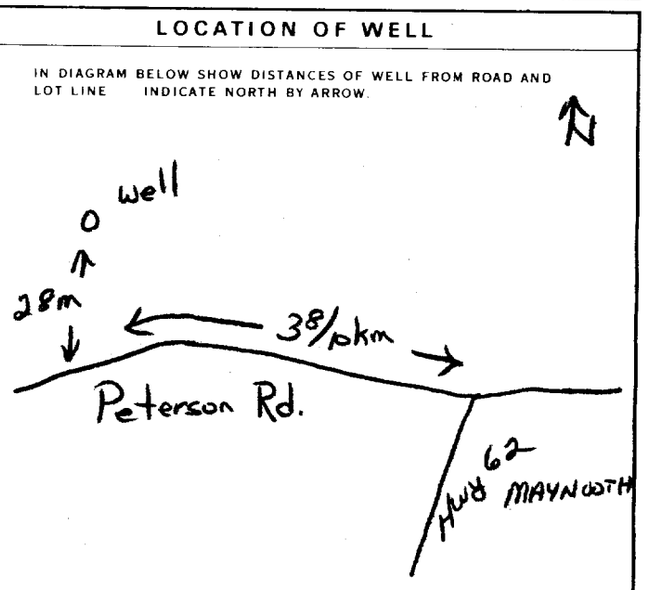
STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 1 ☐ PUMPING 2 ☑ RECOVERY			
		15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
21 FEET	162 FEET	132 FEET	105 FEET	81 FEET	60 FEET

IF FLOWING, GIVE RATE	PUMP INTAKE SET AT	WATER AT END OF TEST
— GPM	162 FEET	1 ☑ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
☐ SHALLOW ☑ DEEP	158 FEET	3½ GPM

LOCATION OF WELL

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



DRILLERS REMARKS: 142424

FINAL STATUS OF WELL

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

WATER USE

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

METHOD OF CONSTRUCTION

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

CONTRACTOR

NAME OF WELL CONTRACTOR: EARL V. MARQUARDT & SON INC — WELL CONTRACTOR'S LICENCE NUMBER: 3611

ADDRESS: RR1 Box 86 PALMER RAPIDS ONT. K0J-2E0

NAME OF WELL TECHNICIAN: GERRY PANNENHOUR — WELL TECHNICIAN'S LICENCE NUMBER: [illegible] 2179

SIGNATURE OF TECHNICIAN/CONTRACTOR: Gerry Marquardt — SUBMISSION DATE: DAY 7 MO 9 YR 94

OFFICE USE ONLY

DATA SOURCE | CONTRACTOR: 3611 | DATE RECEIVED: SEP 22 1994

DATE OF INSPECTION | INSPECTOR

REMARKS: CSS.ES

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

Ministry of Environment and Energy
Ontario

The Ontario Water Resources Act
WATER WELL RECORD

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

11 (1 2) **2917532**

Municipality (10 14) 29008 Con. (15 22 21 24) CON 16

County or District	Township/Borough/City/Town/Village	Con block tract survey, etc.	Lot (23-27)
[redacted]	HERSCHEL.	16	8
	Address PO Box 175 MAYNOOTH ON.	**Date completed** 29 day 7 month 97 year	

Northing RC Elevation RC Basin Code i ii iii iv

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)

General colour	Most common material	Other materials	General description	Depth – feet From	Depth – feet To
BRN	SAND GRAVEL		FIRM.	0	38
Red, gry	granite		average	38	65
Red	granite.		"	65	70
red, gry	"		"	70	85
Blk, gry	"		"	85	120
red, gry	"		"	120	142

31
32

41 WATER RECORD

Water found at – feet	Kind of water
85?	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 5 ☐ Gas 6 ☐ [illegible] — untested
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 5 ☐ Gas 6 ☐
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 5 ☐ Gas 6 ☐
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 5 ☐ Gas 6 ☐
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 5 ☐ Gas 6 ☐

51 CASING & OPEN HOLE RECORD

Inside diam inches	Material	Wall thickness inches	Depth – feet From	Depth – feet To
6¼	1 ☑ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☐ Open hole 5 ☐ Plastic	.188	1½	42½
6	1 ☐ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☑ Open hole 5 ☐ Plastic	-	42½	142
	1 ☐ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☐ Open hole 5 ☐ Plastic			

SCREEN

Sizes of opening (Slot No.) (31-33)	Diameter (34-38) inches	Length (39-40) feet
Material and type	**Depth at top of screen (41-44) feet**	(30)

61 PLUGGING & SEALING RECORD

☐ Annular space ☐ Abandonment

Depth set at – feet From	Depth set at – feet To	Material and type (Cement grout, bentonite, etc.)
0	25	PORTLAND
25	40	Bentonite

71 PUMPING TEST

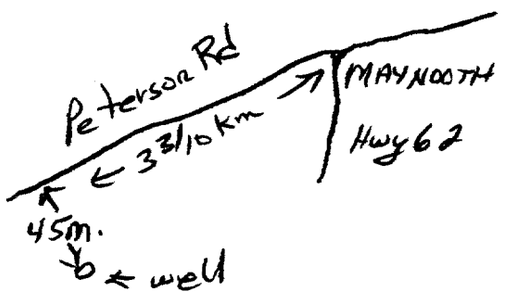
Pumping test method: 1 ☐ Pump 2 ☐ Bailer — AIR
Pumping rate: 7 GPM (11-14)
Duration of pumping: 1 Hours (15-16) ..... Mins (17-18)
Water levels during: 25 1 ☐ Pumping 2 ☑ Recovery

Static level (19-21) feet	Water level end of pumping (22-24) feet	15 minutes (26-28) feet	30 minutes (29-31) feet	45 minutes (32-34) feet	60 minutes (35-37) feet
	AIR 142	72	41	30	

If flowing give rate (38-41): ____ GPM
Pump intake set at: AIR 142 feet
Water at end of test (42): 1 ☑ Clear 2 ☐ Cloudy
Recommended pump type: ☐ Shallow ☑ Deep
Recommended pump setting (43-45): 130 feet
Recommended pump rate (46-49): 5 GPM
(50-53)

LOCATION OF WELL

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



175486

FINAL STATUS OF WELL (54)

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

WATER USE (55-56)

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

METHOD OF CONSTRUCTION (57)

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

Name of Well Contractor	Well Contractor's Licence No.
EARL V. MARQUARDT & SON INC	3611
Address RR1 Box 56 PALMER RAPIDS. ONT K0J 2E0	
Name of Well Technician HANNAH	**Well Technician's Licence No.** 2356
Technician/Contractor by Marquardt	**Submission date** 30 day 7 mo 97 yr

MINISTRY USE ONLY

Data source (58)	Contractor (59-62)	Date received (63-68) (80)
	3611	AUG 14 1997
Date of inspection	**Inspector**	
Remarks		

MINISTRY OF ENVIRONMENT & ENERGY COPY

Ministry of Environment and Energy
Ontario

The Ontario Water Resources Act
WATER WELL RECORD

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

11 (1 2) **2917533**

Municipality 29008 (10 14) Con. CON (15 22) 16 (24)

County or District	Township/Borough/City/Town/Village	Con block tract survey, etc.	Lot (25-27)
[redacted]	HERSCHEL	16	8

Address: P.O Box 175 MAYNOOTH ON.

Date completed: 30 (day) 7 (month) 97 (year) (45-48)

21 (1 2) T M (10) (12) (17) Northing (18 24) RC (25) Elevation (26 30) RC (30) Basin Code (31) ii iii iv (47)

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)

General colour	Most common material	Other materials	General description	Depth – feet From	Depth – feet To
BRN	GRAVEL	SAND	FIRM	0	38
RED	GRANITE	GRY MIX	average	38	65
RED	"		"	65	70
RED, GRY	"		"	70	85
BLACK	"	MICA	"	85	120
RED, GRY	"		"	120	142

31
32 (10 14 15 21 32 43 54 65 75 80)

41 WATER RECORD

Water found at – feet	Kind of water
85 (10-13)	1 ☐ Fresh 3 ☐ Sulphur 14; 2 ☐ Salty (untested) 4 ☐ Minerals 6 ☐ Gas
surge (18)	1 ☐ Fresh 3 ☐ Sulphur 19; 2 ☐ Salty 4 ☐ Minerals 6 ☐ Gas
(20-23)	1 ☐ Fresh 3 ☐ Sulphur 24; 2 ☐ Salty 4 ☐ Minerals 6 ☐ Gas
(25-28)	1 ☐ Fresh 3 ☐ Sulphur 29; 2 ☐ Salty 4 ☐ Minerals 6 ☐ Gas
(30-33)	1 ☐ Fresh 3 ☐ Sulphur 34; 2 ☐ Salty 4 ☐ Minerals 6 ☐ Gas (60)

51 CASING & OPEN HOLE RECORD

Inside diam inches	Material	Wall thickness inches	Depth – feet From	Depth – feet To
6 1/4 (10-11)	1 ☒ Steel 12; 2 ☐ Galvanized; 3 ☐ Concrete; 4 ☐ Open hole; 5 ☐ Plastic	.188	+2	42 (13-16)
6 (17-18)	1 ☐ Steel 19; 2 ☐ Galvanized; 3 ☐ Concrete; 4 ☒ Open hole; 5 ☐ Plastic	—	42	142 (20-23)
(24-25)	1 ☐ Steel 26; 2 ☐ Galvanized; 3 ☐ Concrete; 4 ☐ Open hole; 5 ☐ Plastic			(27-30)

SCREEN

Sizes of opening (Slot No.) (31 33)	Diameter inches (34-38)	Length feet (39-40)
Material and type	Depth at top of screen feet (41-44)	(30)

61 PLUGGING & SEALING RECORD

☒ Annular space ☐ Abandonment

Depth set at – feet From	Depth set at – feet To	Material and type (Cement grout, bentonite, etc.)
0 (10-13)	20 (14-17)	PORTLAND.
20 (18-21)	42 (22-25)	Bentonite
(26-29)	(30-33) (60)	

PUMPING TEST

71 Pumping test method: 1 ☐ Pump 2 ☐ Bailer AIR (11-14) — Pumping rate: 7 GPM (15-16) — Duration of pumping: ..... Hours (17-18) ..... Mins

Static level feet (19-21)	Water level end of pumping feet (22-24)	Water levels during (25): 1 ☐ Pumping 2 ☒ Recovery			
		15 minutes (26-28)	30 minutes (29-31)	45 minutes (32-34)	60 minutes (35-37)
11	142	71 feet	29 feet	17 feet	13 feet

If flowing give rate GPM (38-41)	Pump intake set at	Water at end of test (42)
—	AIR LIFT 142 feet	☒ Clear ☐ Cloudy
Recommended pump type	**Recommended pump setting (43-45)**	**Recommended pump rate (46-49)**
☐ Shallow ☒ Deep	130 feet	7 GPM

(50-53)

FINAL STATUS OF WELL (54)

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

WATER USE (55-56)

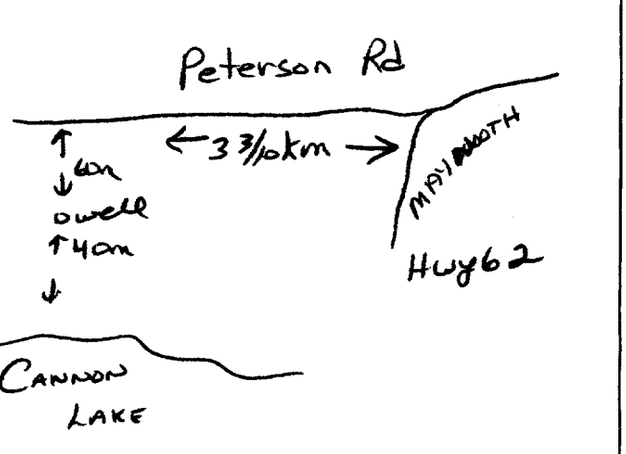
1 ☒ Domestic; 2 ☐ Stock; 3 ☐ Irrigation; 4 ☐ Industrial; 5 ☐ Commercial; 6 ☐ Municipal; 7 ☐ Public supply; 8 ☐ Cooling & air conditioning; 9 ☐ Not used; 10 ☐ Other .....

METHOD OF CONSTRUCTION (57)

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

LOCATION OF WELL

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



175453

Name of Well Contractor	Well Contractor's Licence No.
EARL V. MARQUARDT & SON INC	3611
Address	
RR 1 Box 86 PALMER RAPIDS ON K0J-2E0	
Name of Well Technician	**Well Technician's Licence No.**
DON HANNAH	2356
Signature of Technician/Contractor	**Submission date**
Barry Marquardt	4 (day) 8 (mo) 97 (yr)

MINISTRY USE ONLY

Data source (58)	Contractor (59-62)	Date received (63-68) (80)
	3611	AUG 14 1997
Date of inspection	**Inspector**	
Remarks		

2 - MINISTRY OF ENVIRONMENT & ENERGY COPY

0506 (07/94) Front Form 9

Ontario Ministry of the Environment

Well Tag Number (Place sticker and print number below): A038843

Well Record

Regulation 903 Ontario Water Resources Act

page ___ of ___

Instructions for Completing Form

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

Ministry Use Only

MUN | CON | LOT

Well Owner's Information and Location of Well Information

[redacted]

HASTINGS	HERSHEL	8	16
RR#/Street Number/Name: 715 Peterson Rd	City/Town/Village	Site/Compartment/Block/Tract etc.	

GPS Reading: NAD 83 | Zone 18 | Easting 266069 | Northing 5011416 | Unit Make/Model: Magellan Sportrac | Mode of Operation: ☐ Undifferentiated ☒ Averaged ☐ Differentiated, specify

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description		Depth From	Depth To (Metres)
BROWN	SAND	GRAVEL	FIRM	0-16	0	4.9
GREY	GRANITE		MEDIUM	16-65	4.9	19.8
light GREY	"		"	65.70	19.8	21.3
RED	"		"	70-79	21.3	24.1
GREY	"		"	79.105	24.1	32.0
RED	"		"	105-120	32.0	36.6

AIR TEST 60 gpm.

Hole Diameter

Depth From	Depth To (Metres)	Diameter (Centimetres)

Water Record

Water found at ___ Metres / Kind of Water

32 m ☒ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:

___ m ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:

___ m ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:

After test of well yield, water was ☒ Clear and sediment free ☐ Other, specify

Chlorinated ☒ Yes ☐ No

Construction Record

Inside diam centimetres	Material	Wall thickness centimetres	Depth From	Depth To (Metres)
Casing				
16	☒ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	.48	+.6	6.2
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
Screen				
Outside diam	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	Slot No.		
No Casing or Screen				
15.4	☒ Open hole		6.2	36.6

Test of Well Yield

Pumping test method: pump

Pump intake set at - (metres): 30

Pumping rate - (litres/min): 40

Duration of pumping: 1 hrs + ___ min

Final water level end of pumping: 3 metres

Recommended pump type: ☒ Shallow ☐ Deep

Recommended pump depth: 10 metres

Recommended pump rate: 40 (litres/min)

If flowing give rate - (litres/min)

If pumping discontinued, give reason: —

	Draw Down Time min	Draw Down Water Level Metres	Recovery Time min	Recovery Water Level Metres
Static Level		0.6		3.07
1	0.9		1	2.99
2	1.0		2	2.99
3	1.08		3	2.93
4	1.16		4	2.88
5	1.24		5	2.78
10	1.55		10	2.61
15	1.84		15	2.46
20	2.03		20	2.36
25	2.22		25	2.3
30	2.4		30	2.27
40	2.73		40	2.24
50	3.0		50	2.21
60	3.23		60	2.19

Plugging and Sealing Record

☒ Annular space ☐ Abandonment

Depth set at - Metres From	To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
0	6.2	Bentonite Slurry	1/3

Method of Construction

☐ Cable Tool ☐ Rotary (conventional) ☐ Rotary (reverse) ☐ Rotary (air) ☒ Air percussion ☐ Boring ☐ Diamond ☐ Jetting ☐ Driving ☐ Digging ☐ Other

Water Use

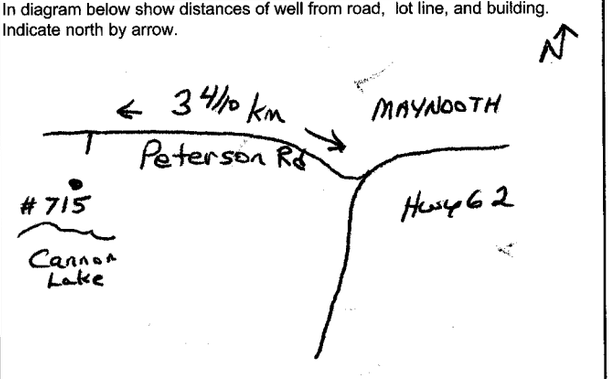
☒ Domestic ☐ Stock ☐ Irrigation ☐ Industrial ☐ Commercial ☐ Municipal ☐ Public Supply ☐ Not used ☐ Cooling & air conditioning ☐ Other

Final Status of Well

☒ Water Supply ☐ Observation well ☐ Test Hole ☐ Recharge well ☐ Abandoned, insufficient supply ☐ Abandoned, poor quality ☐ Unfinished ☐ Dewatering ☐ Replacement well ☐ Abandoned, (Other)

Location of Well

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



Well Contractor/Technician Information

Name of Well Contractor: EARL V. MARQUARDT & SON INC	Well Contractor's Licence No.: 3611
Business Address (street name, number, city etc.): RR1 BOX 86 PALMER RAPIDS ON K0J-2E0	
Name of Well Technician (last name, first name): MARQUARDT TERRY	Well Technician's Licence No.: T62
Signature of Technician/Contractor: X Terry Marquardt	Date Submitted YYYY MM DD: 06 08 17

Audit No.: Z 42061	Date Well Completed YYYY MM DD: 06 08 04
Was the well owner's information package delivered? ☒ Yes ☐ No	Date Delivered YYYY MM DD: 06 08 04

Ministry Use Only

Data Source	Contractor: 3611
Date Received YYYY MM DD: SEP 19 2006	Date of Inspection YYYY MM DD
Remarks	Well Record Number

0506E (09/03) Contractor's Copy ☐ Ministry's Copy ☐ Well Owner's Copy ☐

Cette formule est disponible en français

Ontario — Ministry of the Environment

Measurements recorded in: ☐ Metric ☑ Imperial

Well Tag No. (Sticker and/or Print Below) **A 095785**

Well Record

Regulation 903 Ontario Water Resources Act

Page ___ of ___

[redacted]

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
PETERSON ROAD	HERSCHEL	8	16

County/District/Municipality	City/Town/Village	Province	Postal Code
HASTINGS.	MAYNOOTH	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 8 3	18	266133	5011564		

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
BROWN	SAND	GRAVEL	LOOSE	0	14
GREY	GRANITE	RED GRANITE	BEDROCK	14	300

Annular Space

Depth Set at (m/ft) From	Depth Set at (m/ft) To	Type of Sealant Used (Material and Type)	Volume Placed (m^3/ft^3)
0	20	BENTONITE	5 FT^3

Method of Construction

☐ Cable Tool ☐ Diamond ☐ Rotary (Conventional) ☐ Jetting ☐ Rotary (Reverse) ☐ Driving ☐ Boring ☐ Digging ☑ Air percussion ☐ Other, *specify*

Well Use

☐ Public ☐ Commercial ☐ Not used ☑ Domestic ☐ Municipal ☐ Dewatering ☐ Livestock ☐ Test Hole ☐ Monitoring ☐ Irrigation ☐ Cooling & Air Conditioning ☐ Industrial ☐ Other, *specify*

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
6 1/4	STEEL	.188	0	22
6"	OPEN HOLE		22	300

Construction Record - Screen

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

Status of Well

☑ 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

Water found at Depth (m/ft)	Gas	Kind of Water	Other, specify
4K	☐	☐ Fresh ☑ Untested	
	☐	☐ Fresh ☐ Untested	
	☐	☐ Fresh ☐ Untested	

Hole Diameter

Depth (m/ft) From	Depth (m/ft) To	Diameter (cm/in)
0	20	9"
20	300	6"

Results of Well Yield Testing

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

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM): 10

Duration of pumping: 1 hrs + 0 min

Final water level end of pumping (m/ft): 181.0

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft): 290

Recommended pump rate (l/min / GPM): 10

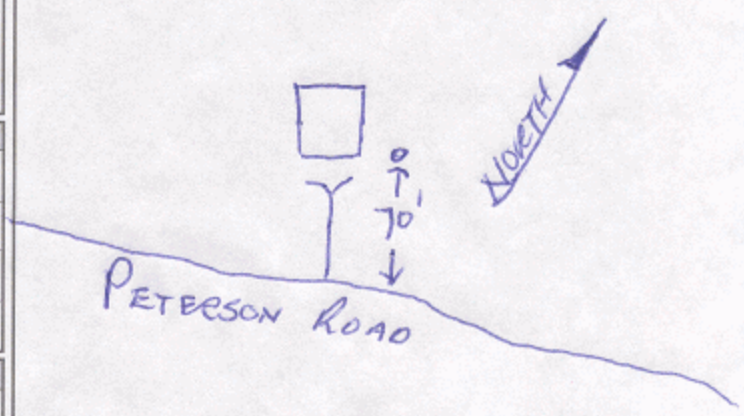
Well production (l/min / GPM): 4.0

Disinfected? ☑ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	13.4		181.0
1	22.9	1	172.6
2	30.6	2	165.7
3	38.4	3	162.5
4	46.7	4	159.4
5	54.9	5	156.3
10	92.6	10	127.2
15	130.7	15	100.6
20	169.6	20	76.9
25	181.0	25	57.8
30	181.0	30	42.3
40	11	40	31.7
50	11	50	25.6
60	181.0	60	22.9

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
JOE LEGGE & SONS	7052

Business Address (Street Number/Name)	Municipality
1344 INLET BAY ROAD	BANCROFT

Province	Postal Code	Business E-mail Address
ONT	K0L1C0	

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
6133392025	LEGGE JOE

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
1879	J Legge	

Well owner's information package delivered: ☑ Yes ☐ No

Date Package Delivered: 2010 11 29

Date Work Completed: 2010 11 29

Ministry Use Only

Audit No. z110560

Received MAR 09 2011

Ministry's Copy

Ontario

Ministry of the Environment, Conservation and Parks

Measurements recorded in: ☐ Metric ☒ Imperial

Well Tag No. *(Place Sticker and/or Print Below)*
Tag#:A297295

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
	Elite Property Group	projects@elitepropertygroup.org	

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
862 Upper Canada Drive	Sarnia	ON	N7T1A4	5193833063

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
(No Civic) Peterson Road	Hastings Highlands	9	16

County/District/Municipality	City/Town/Village	Province	Postal Code
Hastings		Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	265635	5011130		

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
brown	sand - gravel mix			0'	8'
dark grey	granite			8'	42'
red / grey	granite mix		bad broken seam 270' - 275'	42'	280'

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m^3/ft^3)
0'	20'	cement slurry	5 bags

Method of Construction

☐ Cable Tool ☐ Diamond
☒ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☐ Boring ☐ Digging
☐ Air percussion
☐ Other, *specify* _____

Well Use

☒ Public ☐ Commercial ☐ Not used
☒ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☐ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☐ Industrial
☐ Other, *specify* _____

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
6 1/4"	steel	.188"	+ 2'	20'

Construction Record - Screen

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

Status of Well

☒ 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

Water found at Depth (m/ft)	Kind of Water	Hole Diameter Depth (m/ft) From	To	Diameter (cm/in)
270' ☐ Gas	☐ Fresh ☒ Untested ☐ Other, *specify*	0'	20'	10"
275' ☐ Gas	☐ Fresh ☒ Untested ☐ Other, *specify*	20'	280'	6"
☐ Gas	☐ Fresh ☐ Untested ☐ Other, *specify*			

Results of Well Yield Testing

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

If pumping discontinued, give reason:

Pump intake set at (m/ft): 250'

Pumping rate (l/min / GPM): 8 gpm

Duration of pumping: 1 hrs + _____ min

Final water level end of pumping (m/ft): 128' 4"

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

Recommended pump depth (m/ft): 265'

Recommended pump rate (l/min / GPM): 10 gpm

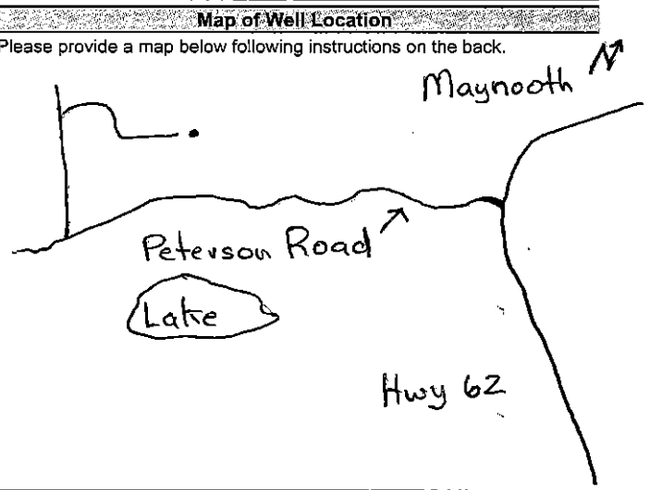
Well production (l/min / GPM): 10 gpm

Disinfected? ☒ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	53'		
1	56' 2"	1	122'
2	59' 6"	2	117' 3"
3	63'	3	113'
4	65' 5"	4	108' 2"
5	69'	5	104' 3"
10	77' 7"	10	97' 9"
15	83'	15	91'
20	90'	20	85'
25	95' 9"	25	80'
30	99' 7"	30	76' 2"
40	109' 2"	40	69' 1"
50	120' 3"	50	60'
60	128' 4"	60	54' 9"

Map of Well Location

Please provide a map below following instructions on the back.



Comments:
Distance from Property Line 375'
Distance from road 190'

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Bernard Marquardt & Son Ltd.	3651

Business Address (Street Number/Name)	Municipality
8 Crescent Drive, RR# 1	Palmer Rapids

Province	Postal Code	Business E-mail Address
ON	K0J2E0	info@cleandrinkingwater.ca

Bus. Telephone No. *(inc. area code)*	Name of Well Technician (Last Name, First Name)
6137582238	Marquardt, Brad

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
2781	B Marquardt	2021/06/03

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☐ Yes ☐ No	YYYY MM DD	2021/05/25

Ministry Use Only
Audit No. Z338976
JUN 06 2021
Received

0506E (2018/12)

Ministry's Copy

Ontario (https://www.ontario.ca/page/government-ontario)

Map: Well records

This map allows you to search and view well record information from reported wells in Ontario.

Full dataset is available in the Open Data catalogue (https://data.ontario.ca/dataset/well-records) .

Go Back to Map

Well ID

Well ID Number: 7433500
Well Audit Number: *Z389992*
Well Tag Number: *A354294*
This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	
Township	HERSCHEL TOWNSHIP
Lot	009
Concession	CON 16
County/District/Municipality	HASTINGS
City/Town/Village	
Province	ON

Postal Code	n/a
UTM Coordinates	NAD83 — Zone 18 Easting: 265875.00 Northing: 5011356.00
Municipal Plan and Sublot Number	
Other	

Overburden and Bedrock Materials Interval

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

Annular Space/Abandonment Sealing Record

Depth From	Depth To	Type of Sealant Used (Material and Type)	Volume Placed

Method of Construction & Well Use

Method of Construction	Well Use

Status of Well

Construction Record - Casing

Inside Diameter	Open Hole or material	Depth From	Depth To

Construction Record - Screen

Outside Diameter	Material	Depth From	Depth To

Well Contractor and Well Technician Information

Well Contractor's Licence Number: 7900

Results of Well Yield Testing

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

Recommended pump rate	
Well Production	
Disinfected?	

Draw Down & Recovery

Draw Down Time(min)	Draw Down Water level	Recovery Time(min)	Recovery Water level
SWL			
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	
20		20	
25		25	
30		30	
40		40	
45		45	
50		50	

60		60	

Water Details

Water Found at Depth	Kind

Hole Diameter

Depth From	Depth To	Diameter

Audit Number: Z389992

Date Well Completed: September 02, 2022

Date Well Record Received by MOE: November 07, 2022

Related

How to use a Ministry of the Environment map (https://www.ontario.ca/page/how-use-ministry-environment-map#wells)

Technical documentation: Metadata record (https://data.ontario.ca/dataset/well-records/resource/3031344e-e3f2-48d5-888c-c1deadfd2f77)

Updated: January 10, 2024

Published: March 20, 2014

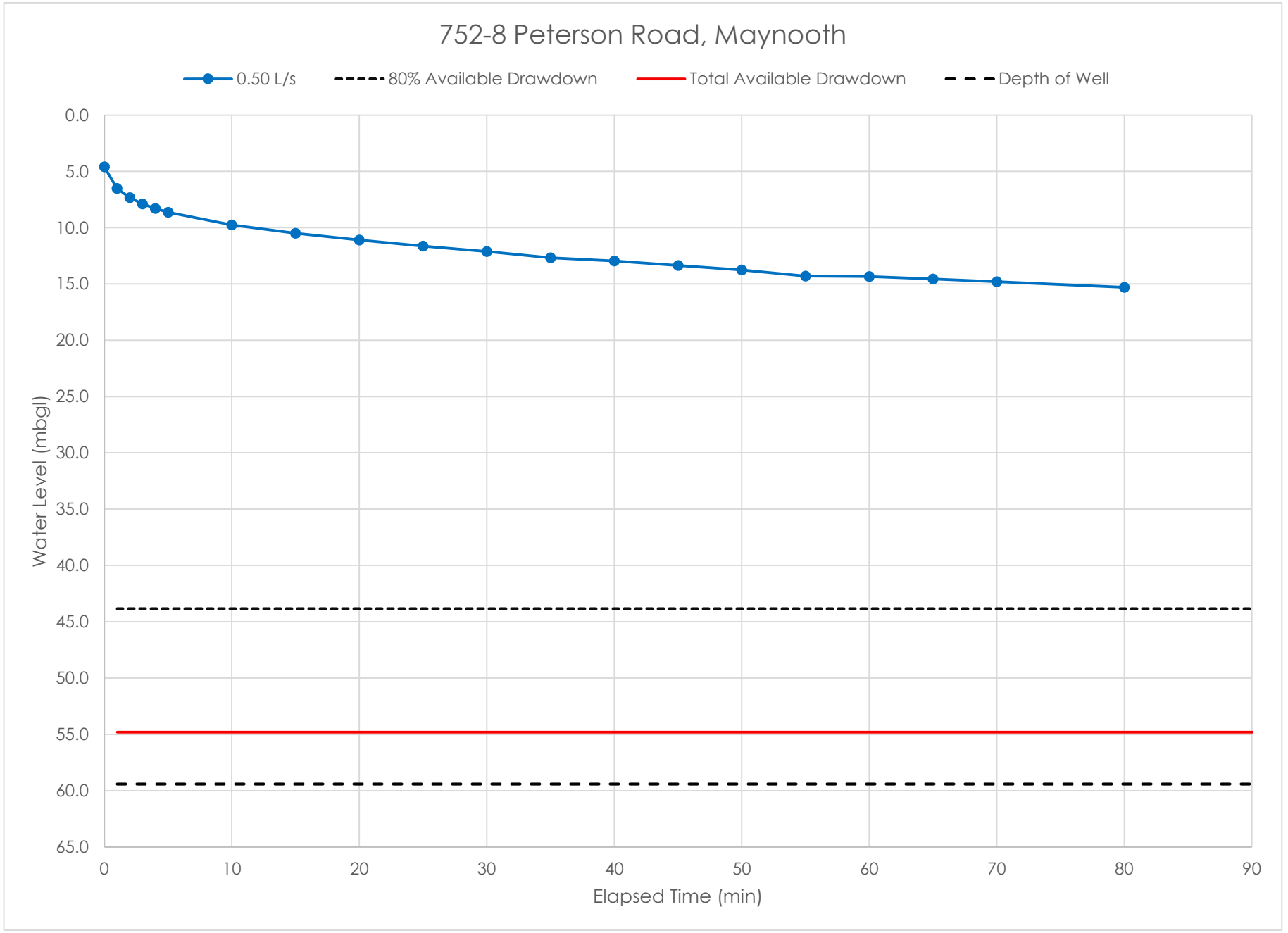
APPENDIX B

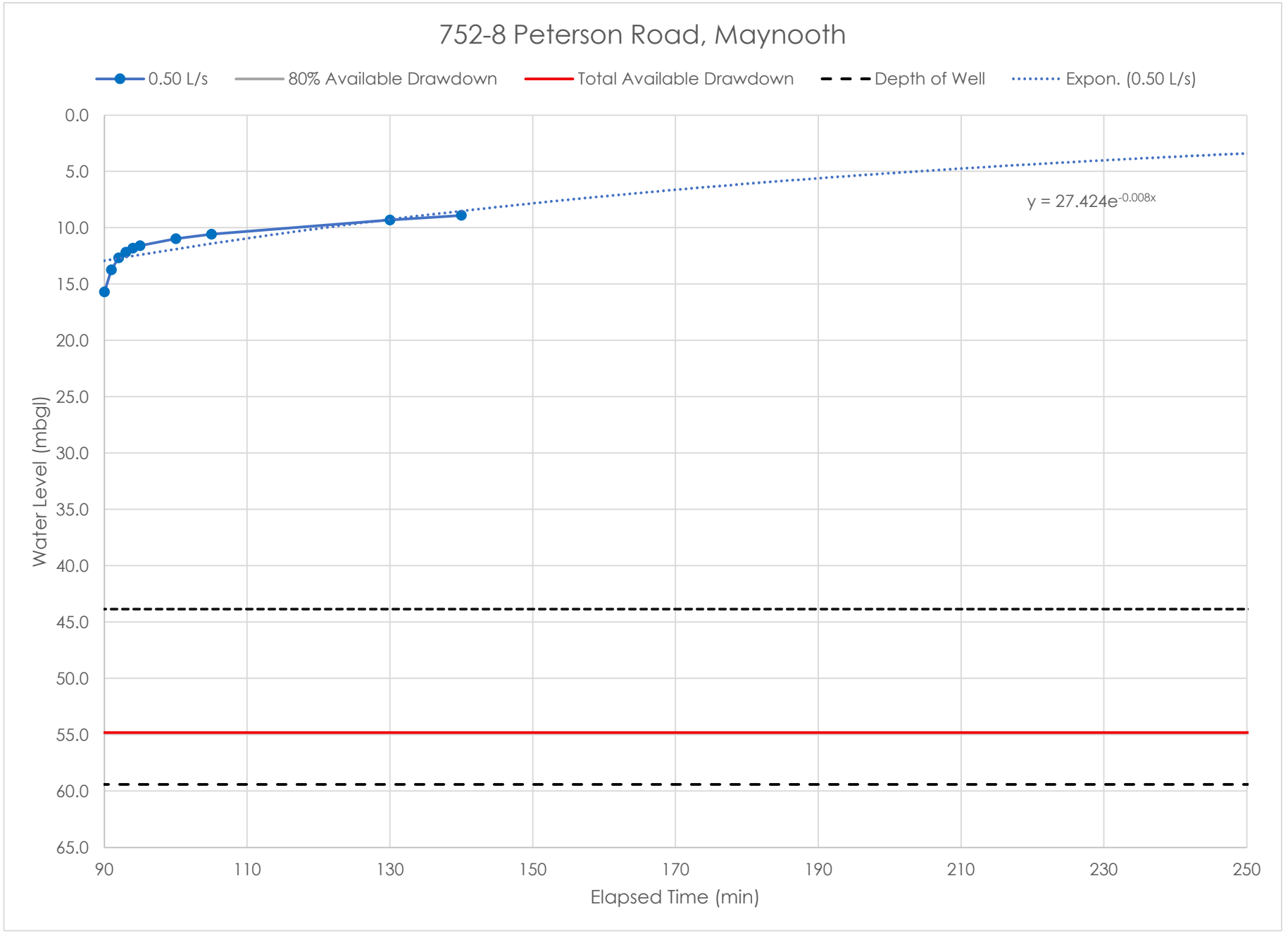
Pumping Test Results

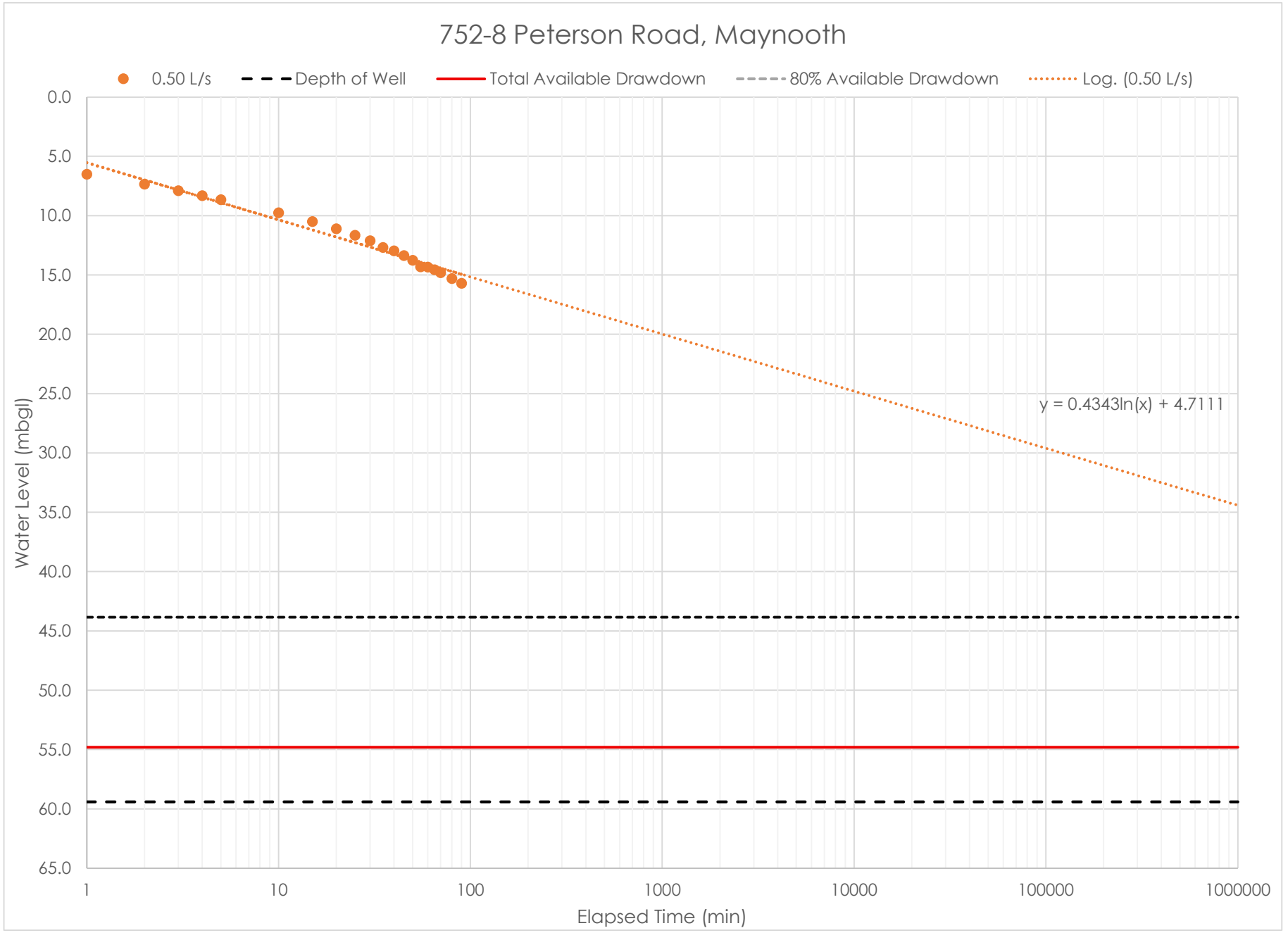
CROZIER CONSULTING ENGINEERS

Project:	752 Peterson Road	**Created By:**	VM
Project No.:	2497-6768	**Checked By:**	
Well ID:	7433599		
Date:	2024-04-18		

SWL		**4.60**			**Total Available Drawdown**	1	54.80		**Depth of Well**	1	59.40		
T/Screen		**59.40**				1000000	54.80			1000000	59.40		
Pump Intake					80% Available Drawdown	1	43.84						
Avail. DD		**54.80**				1000000	43.84						
	8	**IGPM**	**0.50**	**L/s**									
Time	**DD (ft)**	**WL (m)**	**REC (ft)**	**WL (m)**									
0		**4.60**											
1		6.52											
2		7.34											
3		7.90											
4		8.31											
5		8.65											
10		9.76											
15		10.50											
20		11.11											
25		11.65											
30		12.12											
35		12.69											
40		12.96											
45		13.37											
50		13.76											
55		14.31											
60		14.34											
65		14.56											
70		14.81											
80		15.30											
90		15.70		15.70									
91				13.73									
92				12.68									
93				12.17									
94				11.82									
95				11.60									
100				10.98									
105				10.58									
130				9.32									
140				8.90									
LPM		**0.50**											
DD		**11.10**											
Total DD%		**20.26**											
SC (L/s/m)		0.0450											
Inc. DD%													
Inc. L/s %													


752-8 Peterson Road, Maynooth
0.50 L/s
80% Available Drawdown
Total Available Drawdown
Depth of Well
Water Level (mbgl)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
55.0
60.0
65.0
0
10
20
30
40
50
60
70
80
90
Elapsed Time (min)


752-8 Peterson Road, Maynooth
0.50 L/s
80% Available Drawdown
Total Available Drawdown
Depth of Well
Expon. (0.50 L/s)
y = 27.424e-0.008x
Water Level (mbgl)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
55.0
60.0
65.0
90
110
130
150
170
190
210
230
250
Elapsed Time (min)


752-8 Peterson Road, Maynooth
0.50 L/s
Depth of Well
Total Available Drawdown
80% Available Drawdown
Log. (0.50 L/s)
y = 0.4343ln(x) + 4.7111
Water Level (mbgl)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
55.0
60.0
65.0
1
10
100
1000
10000
100000
1000000
Elapsed Time (min)

APPENDIX C

Water Quality Results

ALS Canada Ltd.

right solutions.
right partner.

CERTIFICATE OF ANALYSIS

Work Order	: **WT2409348**	Page	: 1 of 5
Client	: **CF Crozier & Associates**	Laboratory	: ALS Environmental - Waterloo
Contact	: Josie Gerrits	Account Manager	: Andrew Martin
Address	: 2800 High Point Drive Milton ON Canada L9T 6P4	Address	: 60 Northland Road, Unit 1 Waterloo ON Canada N2V 2B8
Telephone	: ----	Telephone	: +1 519 886 6910
Project	: 2457-6768	Date Samples Received	: 19-Apr-2024 14:00
PO	: ----	Date Analysis Commenced	: 20-Apr-2024
C-O-C number	: ----	Issue Date	: 27-Apr-2024 16:12
Sampler	: ----		
Site	: ----		
Quote number	: 2024 SOA		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
John Tang	Lab Analyst	Inorganics, Waterloo, Ontario
Jon Fisher	Production Manager, Environmental	Inorganics, Waterloo, Ontario
Kelly Fischer	Technical Specialist	Inorganics, Waterloo, Ontario
Kelly Fischer	Technical Specialist	Metals, Waterloo, Ontario
Nik Perkio	Inorganics Analyst	Inorganics, Waterloo, Ontario
Nik Perkio	Inorganics Analyst	Metals, Waterloo, Ontario
Zeba Patel	Analyst	Microbiology, Waterloo, Ontario

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
%	percent
µS/cm	microsiemens per centimetre
CFU/100mL	colony forming units per hundred millilitres
CU	colour units (1 cu = 1 mg/l pt)
meq/L	milliequivalents per litre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Workorder Comments

<1 or Not Detected with LOR of 1 equals Zero (0).

Not Detected = Absent; Detected = Present.

Qualifiers

Qualifier	*Description*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*

Analytical Results

Sub-Matrix: **Drinking Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	Sample 1	Sample 2	----	----	----
					Client sampling date / time	18-Apr-2024 12:00	18-Apr-2024 13:15	----	----	----
						WT2409348-001	WT2409348-002	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
Alkalinity, bicarbonate (as HCO3)	71-52-3	E290/WT	1.0	mg/L		106	106	----	----	----
Alkalinity, carbonate (as CO3)	3812-32-6	E290/WT	1.0	mg/L		<1.0	<1.0	----	----	----
Alkalinity, hydroxide (as OH)	14280-30-9	E290/WT	1.0	mg/L		<1.0	<1.0	----	----	----
Alkalinity, total (as CaCO3)	----	E290/WT	1.0	mg/L		87.1	86.8	----	----	----
Colour, apparent	----	E330/WT	2.0	CU		49.0	13.0	----	----	----
Conductivity	----	E100/WT	1.0	µS/cm		185	181	----	----	----
Hardness (as CaCO3), from total Ca/Mg	----	EC100A/WT	0.50	mg/L		82.1	82.6	----	----	----
pH	----	E108/WT	0.10	pH units		8.16	8.21	----	----	----
Solids, total dissolved [TDS]	----	E162/WT	10	mg/L		111 DLDS	120 DLDS	----	----	----
Solids, total dissolved [TDS], calculated	----	EC103A/WT	1.0	mg/L		120	118	----	----	----
Turbidity	----	E121/WT	0.10	NTU		7.93	2.05	----	----	----
Langelier index (@ 20°C)	----	EC105A/WT	0.010	-		0.147	0.190	----	----	----
Langelier index (@ 4°C)	----	EC105A/WT	0.010	-		-0.102	-0.057	----	----	----
pH, saturation (@ 20°C)	----	EC105A/WT	0.010	pH units		8.01	8.02	----	----	----
pH, saturation (@ 4°C)	----	EC105A/WT	0.010	pH units		8.26	8.27	----	----	----
Anions and Nutrients										
Ammonia, total (as N)	7664-41-7	E298/WT	0.0050	mg/L		<0.0050	0.0059	----	----	----
Bromide	24959-67-9	E235.Br/WT	0.10	mg/L		<0.10	<0.10	----	----	----
Chloride	16887-00-6	E235.Cl/WT	0.50	mg/L		0.54	0.55	----	----	----
Fluoride	16984-48-8	E235.F/WT	0.020	mg/L		0.118	0.117	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3/WT	0.020	mg/L		0.024	0.026	----	----	----
Nitrate + Nitrite (as N)	----	EC235.N+N/WT	0.0032	mg/L		0.0240	0.0260	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2/WT	0.010	mg/L		<0.010	<0.010	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/WT	0.0010	mg/L		<0.0010	<0.0010	----	----	----
Sulfate (as SO4)	14808-79-8	E235.SO4/WT	0.30	mg/L		9.13	8.93	----	----	----
Microbiological Tests										
Coliforms, Escherichia coli [E. coli]	----	E012A.EC/WT	1	CFU/100mL		Not Detected	Not Detected	----	----	----
Coliforms, total	----	E012.TC/WT	1	CFU/100mL		1	Not Detected	----	----	----

Analytical Results

Sub-Matrix: **Drinking Water** (Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	Sample 1	Sample 2	----	----	----
					Client sampling date / time	18-Apr-2024 12:00	18-Apr-2024 13:15	----	----	----
						WT2409348-001	WT2409348-002	--------	--------	--------
						Result	Result	----	----	----
Microbiological Tests										
coliforms, total background	----	E012.BG.TC/ WT	1	CFU/100mL		4	3	----	----	----
Metals										
Sodium adsorption ratio [SAR]	----	EC102/WT	0.10	-		0.14	0.14	----	----	----
Ion Balance										
Anion sum	----	EC101A/WT	0.10	meq/L		1.95	1.94	----	----	----
Cation sum (total)	----	EC101A/WT	0.10	meq/L		1.89	1.88	----	----	----
Ion balance (APHA)	----	EC101A/WT	0.010	%		-1.56	-1.57	----	----	----
Ion balance (cations/anions)	----	EC101A/WT	0.01	%		96.9	96.9	----	----	----
Total Metals										
Aluminum, total	7429-90-5	E420/WT	0.0030	mg/L		0.0082	0.0080	----	----	----
Antimony, total	7440-36-0	E420/WT	0.00010	mg/L		<0.00010	<0.00010	----	----	----
Arsenic, total	7440-38-2	E420/WT	0.00010	mg/L		<0.00010	<0.00010	----	----	----
Barium, total	7440-39-3	E420/WT	0.00010	mg/L		0.0391	0.0403	----	----	----
Beryllium, total	7440-41-7	E420/WT	0.000020	mg/L		<0.000020	<0.000020	----	----	----
Bismuth, total	7440-69-9	E420/WT	0.000050	mg/L		<0.000050	<0.000050	----	----	----
Boron, total	7440-42-8	E420/WT	0.010	mg/L		<0.010	<0.010	----	----	----
Cadmium, total	7440-43-9	E420/WT	0.0000050	mg/L		<0.0000050	<0.0000050	----	----	----
Calcium, total	7440-70-2	E420/WT	0.050	mg/L		25.3	25.3	----	----	----
Cesium, total	7440-46-2	E420/WT	0.000010	mg/L		<0.000010	<0.000010	----	----	----
Chromium, total	7440-47-3	E420/WT	0.00050	mg/L		<0.00050	<0.00050	----	----	----
Cobalt, total	7440-48-4	E420/WT	0.00010	mg/L		<0.00010	<0.00010	----	----	----
Copper, total	7440-50-8	E420/WT	0.00050	mg/L		0.00104	0.00071	----	----	----
Iron, total	7439-89-6	E420/WT	0.010	mg/L		0.787	0.398	----	----	----
Lead, total	7439-92-1	E420/WT	0.000050	mg/L		<0.000050	<0.000050	----	----	----
Lithium, total	7439-93-2	E420/WT	0.0010	mg/L		0.0014	0.0011	----	----	----
Magnesium, total	7439-95-4	E420/WT	0.0050	mg/L		4.60	4.72	----	----	----
Manganese, total	7439-96-5	E420/WT	0.00010	mg/L		0.0179	0.00798	----	----	----
Molybdenum, total	7439-98-7	E420/WT	0.000050	mg/L		0.00159	0.00124	----	----	----
Nickel, total	7440-02-0	E420/WT	0.00050	mg/L		<0.00050	<0.00050	----	----	----

Analytical Results

Sub-Matrix: **Drinking Water** (Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	Sample 1	Sample 2	----	----	----
					Client sampling date / time	18-Apr-2024 12:00	18-Apr-2024 13:15	----	----	----
						WT2409348-001	WT2409348-002	--------	--------	--------
						Result	Result	----	----	----
Total Metals										
Phosphorus, total	7723-14-0	E420/WT	0.050	mg/L		<0.050	<0.050	----	----	----
Potassium, total	7440-09-7	E420/WT	0.050	mg/L		3.70	3.41	----	----	----
Rubidium, total	7440-17-7	E420/WT	0.00020	mg/L		0.00154	0.00139	----	----	----
Selenium, total	7782-49-2	E420/WT	0.000050	mg/L		0.000232	0.000258	----	----	----
Silicon (as SiO2), total	7631-86-9	EC420.SiO2/WT	0.25	mg/L		8.13	8.62	----	----	----
Silicon, total	7440-21-3	E420/WT	0.10	mg/L		3.80	4.03	----	----	----
Silver, total	7440-22-4	E420/WT	0.000010	mg/L		<0.000010	<0.000010	----	----	----
Sodium, total	7440-23-5	E420/WT	0.050	mg/L		2.87	2.91	----	----	----
Strontium, total	7440-24-6	E420/WT	0.00020	mg/L		0.655	0.654	----	----	----
Sulfur, total	7704-34-9	E420/WT	0.50	mg/L		3.27	3.23	----	----	----
Tellurium, total	13494-80-9	E420/WT	0.00020	mg/L		<0.00020	<0.00020	----	----	----
Thallium, total	7440-28-0	E420/WT	0.000010	mg/L		<0.000010	<0.000010	----	----	----
Thorium, total	7440-29-1	E420/WT	0.00010	mg/L		<0.00010	<0.00010	----	----	----
Tin, total	7440-31-5	E420/WT	0.00010	mg/L		<0.00010	<0.00010	----	----	----
Titanium, total	7440-32-6	E420/WT	0.00030	mg/L		0.00048	0.00037	----	----	----
Tungsten, total	7440-33-7	E420/WT	0.00010	mg/L		0.00016	0.00010	----	----	----
Uranium, total	7440-61-1	E420/WT	0.000010	mg/L		0.00239	0.00358	----	----	----
Vanadium, total	7440-62-2	E420/WT	0.00050	mg/L		0.00137	0.00287	----	----	----
Zinc, total	7440-66-6	E420/WT	0.0030	mg/L		<0.0030	<0.0030	----	----	----
Zirconium, total	7440-67-7	E420/WT	0.00020	mg/L		<0.00020	<0.00020	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL REPORT

Work Order	: **WT2409348**	Page	: 1 of 13
Client	: CF Crozier & Associates	Laboratory	: ALS Environmental - Waterloo
Contact	: Josie Gerrits	Account Manager	: Andrew Martin
Address	: 2800 High Point Drive Milton ON Canada L9T 6P4	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: ----	Telephone	: +1 519 886 6910
Project	: 2457-6768	Date Samples Received	: 19-Apr-2024 14:00
PO	: ----	Date Analysis Commenced	: 20-Apr-2024
C-O-C number	: ----	Issue Date	: 27-Apr-2024 16:12
Sampler	: ----		
Site	: ----		
Quote number	: 2024 SOA		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
John Tang	Lab Analyst	Waterloo Inorganics, Waterloo, Ontario
Jon Fisher	Production Manager, Environmental	Waterloo Inorganics, Waterloo, Ontario
Kelly Fischer	Technical Specialist	Waterloo Inorganics, Waterloo, Ontario
Kelly Fischer	Technical Specialist	Waterloo Metals, Waterloo, Ontario
Nik Perkio	Inorganics Analyst	Waterloo Inorganics, Waterloo, Ontario
Nik Perkio	Inorganics Analyst	Waterloo Metals, Waterloo, Ontario
Zeba Patel	Analyst	Waterloo Microbiology, Waterloo, Ontario

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 1410394)											
WT2409394-001	Anonymous	Turbidity	----	E121	0.10	NTU	23.6	23.8	0.842%	15%	----
Physical Tests (QC Lot: 1411785)											
WT2409348-001	Sample 1	Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	87.1	87.5	0.527%	20%	----
Physical Tests (QC Lot: 1411786)											
WT2409348-001	Sample 1	Conductivity	----	E100	1.0	µS/cm	185	183	1.08%	10%	----
Physical Tests (QC Lot: 1411787)											
WT2409348-001	Sample 1	pH	----	E108	0.10	pH units	8.16	8.22	0.733%	4%	----
Physical Tests (QC Lot: 1413426)											
WT2409348-001	Sample 1	Colour, apparent	----	E330	2.0	CU	49.0	53.4	8.46%	20%	----
Physical Tests (QC Lot: 1416434)											
WT2409348-001	Sample 1	Solids, total dissolved [TDS]	----	E162	13	mg/L	111	123	13	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1411563)											
HA2400775-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.500	mg/L	4.77	4.81	0.0472	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1411779)											
WT2409348-001	Sample 1	Bromide	24959-67-9	E235.Br	0.10	mg/L	<0.10	<0.10	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1411780)											
WT2409348-001	Sample 1	Fluoride	16984-48-8	E235.F	0.020	mg/L	0.118	0.120	0.002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1411781)											
WT2409348-001	Sample 1	Nitrate (as N)	14797-55-8	E235.NO3	0.020	mg/L	0.024	0.025	0.002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1411782)											
WT2409348-001	Sample 1	Nitrite (as N)	14797-65-0	E235.NO2	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1411783)											
WT2409348-001	Sample 1	Chloride	16887-00-6	E235.Cl	0.50	mg/L	0.54	0.50	0.04	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1411784)											
WT2409348-001	Sample 1	Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	9.13	9.11	0.289%	20%	----
Anions and Nutrients (QC Lot: 1411788)											
HA2400788-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Microbiological Tests (QC Lot: 1410628)											
WT2409348-001	Sample 1	Coliforms, total	----	E012.TC	1	CFU/100mL	1	<1	0	Diff <2x LOR	----
Microbiological Tests (QC Lot: 1410629)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Microbiological Tests (QC Lot: 1410629) - continued											
WT2409348-001	Sample 1	coliforms, total background	----	E012.BG.TC	1	CFU/100mL	4	# <1	3	Diff <2x LOR	----
Microbiological Tests (QC Lot: 1410630)											
WT2409341-001	Anonymous	Coliforms, Escherichia coli [E. coli]	----	E012A.EC	1	CFU/100mL	<1	<1	0	Diff <2x LOR	----
Total Metals (QC Lot: 1411231)											
WT2409348-001	Sample 1	Aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0082	0.0075	0.0008	Diff <2x LOR	----
		Antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Arsenic, total	7440-38-2	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Barium, total	7440-39-3	E420	0.00010	mg/L	0.0391	0.0396	1.25%	20%	----
		Beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		Bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		Calcium, total	7440-70-2	E420	0.050	mg/L	25.3	25.3	0.0714%	20%	----
		Cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00050	mg/L	0.00104	0.00089	0.00015	Diff <2x LOR	----
		Iron, total	7439-89-6	E420	0.010	mg/L	0.787	0.783	0.419%	20%	----
		Lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Lithium, total	7439-93-2	E420	0.0010	mg/L	0.0014	0.0013	0.0001	Diff <2x LOR	----
		Magnesium, total	7439-95-4	E420	0.0050	mg/L	4.60	4.58	0.404%	20%	----
		Manganese, total	7439-96-5	E420	0.00010	mg/L	0.0179	0.0177	1.21%	20%	----
		Molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00159	0.00158	0.828%	20%	----
		Nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Potassium, total	7440-09-7	E420	0.050	mg/L	3.70	3.68	0.699%	20%	----
		Rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00154	0.00156	0.00002	Diff <2x LOR	----
		Selenium, total	7782-49-2	E420	0.000050	mg/L	0.000232	0.000268	0.000036	Diff <2x LOR	----
		Silicon, total	7440-21-3	E420	0.10	mg/L	3.80	3.77	0.783%	20%	----
		Silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, total	7440-23-5	E420	0.050	mg/L	2.87	2.88	0.673%	20%	----
		Strontium, total	7440-24-6	E420	0.00020	mg/L	0.655	0.668	1.99%	20%	----
		Sulfur, total	7704-34-9	E420	0.50	mg/L	3.27	3.19	0.08	Diff <2x LOR	----
		Tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 1411231) - continued											
WT2409348-001	Sample 1	Thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, total	7440-32-6	E420	0.00030	mg/L	0.00048	0.00034	0.00014	Diff <2x LOR	----
		Tungsten, total	7440-33-7	E420	0.00010	mg/L	0.00016	0.00016	0.000002	Diff <2x LOR	----
		Uranium, total	7440-61-1	E420	0.000010	mg/L	0.00239	0.00244	1.89%	20%	----
		Vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00137	0.00139	0.00002	Diff <2x LOR	----
		Zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		Zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1410394)						
Turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 1411785)						
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 1411786)						
Conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 1413426)						
Colour, apparent	----	E330	2	CU	<2.0	----
Physical Tests (QCLot: 1416434)						
Solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 1411563)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1411779)						
Bromide	24959-67-9	E235.Br	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 1411780)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 1411781)						
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 1411782)						
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	<0.010	----
Anions and Nutrients (QCLot: 1411783)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 1411784)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 1411788)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Microbiological Tests (QCLot: 1410628)						
Coliforms, total	----	E012.TC	1	CFU/100mL	<1	----
Microbiological Tests (QCLot: 1410629)						
coliforms, total background	----	E012.BG.TC	1	CFU/100mL	<1	----
Microbiological Tests (QCLot: 1410630)						
Coliforms, Escherichia coli [E. coli]	----	E012A.EC	1	CFU/100mL	<1	----
Total Metals (QCLot: 1411231)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 1411231) - continued						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
Barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
Boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
Calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
Cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
Iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
Lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
Phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
Potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
Rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
Sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
Sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
Tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
Thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
Tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
Tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 1411231) - continued						
Uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1410394)									
Turbidity	----	E121	0.1	NTU	200 NTU	103	85.0	115	----
Physical Tests (QCLot: 1411785)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	150 mg/L	102	85.0	115	----
Physical Tests (QCLot: 1411786)									
Conductivity	----	E100	1	µS/cm	1410 µS/cm	105	90.0	110	----
Physical Tests (QCLot: 1411787)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 1413426)									
Colour, apparent	----	E330	2	CU	25 CU	103	70.0	130	----
Physical Tests (QCLot: 1416434)									
Solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	90.7	85.0	115	----
Anions and Nutrients (QCLot: 1411563)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	103	85.0	115	----
Anions and Nutrients (QCLot: 1411779)									
Bromide	24959-67-9	E235.Br	0.1	mg/L	0.5 mg/L	95.4	85.0	115	----
Anions and Nutrients (QCLot: 1411780)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 1411781)									
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	2.5 mg/L	98.9	90.0	110	----
Anions and Nutrients (QCLot: 1411782)									
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	0.5 mg/L	97.2	90.0	110	----
Anions and Nutrients (QCLot: 1411783)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	100.0	90.0	110	----
Anions and Nutrients (QCLot: 1411784)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 1411788)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.031 mg/L	104	80.0	120	----
Total Metals (QCLot: 1411231)									
Aluminum, total	7429-90-5	E420	0.003	mg/L	0.1 mg/L	99.5	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	0.05 mg/L	102	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Target Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 1411231) - continued									
Arsenic, total	7440-38-2	E420	0.0001	mg/L	0.05 mg/L	106	80.0	120	----
Barium, total	7440-39-3	E420	0.0001	mg/L	0.012 mg/L	102	80.0	120	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	0.005 mg/L	92.6	80.0	120	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	0.05 mg/L	96.9	80.0	120	----
Boron, total	7440-42-8	E420	0.01	mg/L	0.05 mg/L	93.9	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.005 mg/L	97.8	80.0	120	----
Calcium, total	7440-70-2	E420	0.05	mg/L	2.5 mg/L	96.1	80.0	120	----
Cesium, total	7440-46-2	E420	0.00001	mg/L	0.002 mg/L	101	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.012 mg/L	103	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.012 mg/L	103	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.012 mg/L	103	80.0	120	----
Iron, total	7439-89-6	E420	0.01	mg/L	0.05 mg/L	99.3	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.025 mg/L	96.5	80.0	120	----
Lithium, total	7439-93-2	E420	0.001	mg/L	0.012 mg/L	87.0	80.0	120	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	2.5 mg/L	109	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.012 mg/L	103	80.0	120	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.012 mg/L	102	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.025 mg/L	103	80.0	120	----
Phosphorus, total	7723-14-0	E420	0.05	mg/L	0.5 mg/L	108	80.0	120	----
Potassium, total	7440-09-7	E420	0.05	mg/L	2.5 mg/L	101	80.0	120	----
Rubidium, total	7440-17-7	E420	0.0002	mg/L	0.005 mg/L	102	80.0	120	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	0.05 mg/L	102	80.0	120	----
Silicon, total	7440-21-3	E420	0.1	mg/L	0.5 mg/L	102	80.0	120	----
Silver, total	7440-22-4	E420	0.00001	mg/L	0.005 mg/L	91.7	80.0	120	----
Sodium, total	7440-23-5	E420	0.05	mg/L	2.5 mg/L	107	80.0	120	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	0.012 mg/L	99.7	80.0	120	----
Sulfur, total	7704-34-9	E420	0.5	mg/L	2.5 mg/L	104	80.0	120	----
Tellurium, total	13494-80-9	E420	0.0002	mg/L	0.005 mg/L	100	80.0	120	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	0.05 mg/L	99.5	80.0	120	----
Thorium, total	7440-29-1	E420	0.0001	mg/L	0.005 mg/L	94.3	80.0	120	----
Tin, total	7440-31-5	E420	0.0001	mg/L	0.025 mg/L	97.8	80.0	120	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.012 mg/L	96.0	80.0	120	----
Tungsten, total	7440-33-7	E420	0.0001	mg/L	0.005 mg/L	97.2	80.0	120	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	0 mg/L	95.4	80.0	120	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	0.025 mg/L	105	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.025 mg/L	101	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Target Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 1411231) - continued									
Zirconium, total	7440-67-7	E420	0.0002	mg/L	0.005 mg/L	95.6	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 1411563)										
HA2400775-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	ND mg/L	----	ND	75.0	125	----
Anions and Nutrients (QCLot: 1411779)										
WT2409348-001	Sample 1	Bromide	24959-67-9	E235.Br	0.47 mg/L	0.5 mg/L	93.2	75.0	125	----
Anions and Nutrients (QCLot: 1411780)										
WT2409348-001	Sample 1	Fluoride	16984-48-8	E235.F	1.10 mg/L	1 mg/L	110	75.0	125	----
Anions and Nutrients (QCLot: 1411781)										
WT2409348-001	Sample 1	Nitrate (as N)	14797-55-8	E235.NO3	2.44 mg/L	2.5 mg/L	97.7	75.0	125	----
Anions and Nutrients (QCLot: 1411782)										
WT2409348-001	Sample 1	Nitrite (as N)	14797-65-0	E235.NO2	0.479 mg/L	0.5 mg/L	95.8	75.0	125	----
Anions and Nutrients (QCLot: 1411783)										
WT2409348-001	Sample 1	Chloride	16887-00-6	E235.Cl	99.3 mg/L	100 mg/L	99.3	75.0	125	----
Anions and Nutrients (QCLot: 1411784)										
WT2409348-001	Sample 1	Sulfate (as SO4)	14808-79-8	E235.SO4	98.7 mg/L	100 mg/L	98.7	75.0	125	----
Anions and Nutrients (QCLot: 1411788)										
HA2400788-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0190 mg/L	0.02 mg/L	96.8	70.0	130	----
Total Metals (QCLot: 1411231)										
WT2409348-002	Sample 2	Aluminum, total	7429-90-5	E420	0.0949 mg/L	0.1 mg/L	94.9	70.0	130	----
		Antimony, total	7440-36-0	E420	0.0537 mg/L	0.05 mg/L	107	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.0533 mg/L	0.05 mg/L	106	70.0	130	----
		Barium, total	7440-39-3	E420	ND mg/L	----	ND	70.0	130	----
		Beryllium, total	7440-41-7	E420	0.00456 mg/L	0.005 mg/L	91.2	70.0	130	----
		Bismuth, total	7440-69-9	E420	0.0496 mg/L	0.05 mg/L	99.2	70.0	130	----
		Boron, total	7440-42-8	E420	0.047 mg/L	0.05 mg/L	93.3	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.00511 mg/L	0.005 mg/L	102	70.0	130	----
		Calcium, total	7440-70-2	E420	ND mg/L	----	ND	70.0	130	----
		Cesium, total	7440-46-2	E420	0.00255 mg/L	0.002 mg/L	102	70.0	130	----
		Chromium, total	7440-47-3	E420	0.0138 mg/L	0.012 mg/L	110	70.0	130	----
		Cobalt, total	7440-48-4	E420	0.0128 mg/L	0.012 mg/L	103	70.0	130	----
		Copper, total	7440-50-8	E420	0.0127 mg/L	0.012 mg/L	102	70.0	130	----
		Iron, total	7439-89-6	E420	ND mg/L	----	ND	70.0	130	----
		Lead, total	7439-92-1	E420	0.0250 mg/L	0.025 mg/L	100	70.0	130	----
		Lithium, total	7439-93-2	E420	0.0108 mg/L	0.012 mg/L	86.7	70.0	130	----
		Magnesium, total	7439-95-4	E420	ND mg/L	----	ND	70.0	130	----
		Manganese, total	7439-96-5	E420	0.0121 mg/L	0.012 mg/L	97.0	70.0	130	----
		Molybdenum, total	7439-98-7	E420	0.0129 mg/L	0.012 mg/L	103	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 1411231) - continued										
WT2409348-002	Sample 2	Nickel, total	7440-02-0	E420	0.0254 mg/L	0.025 mg/L	102	70.0	130	----
		Phosphorus, total	7723-14-0	E420	0.531 mg/L	0.5 mg/L	106	70.0	130	----
		Potassium, total	7440-09-7	E420	ND mg/L	----	ND	70.0	130	----
		Rubidium, total	7440-17-7	E420	0.00506 mg/L	0.005 mg/L	101	70.0	130	----
		Selenium, total	7782-49-2	E420	0.0523 mg/L	0.05 mg/L	105	70.0	130	----
		Silicon, total	7440-21-3	E420	ND mg/L	----	ND	70.0	130	----
		Silver, total	7440-22-4	E420	0.00454 mg/L	0.005 mg/L	90.8	70.0	130	----
		Sodium, total	7440-23-5	E420	ND mg/L	----	ND	70.0	130	----
		Strontium, total	7440-24-6	E420	ND mg/L	----	ND	70.0	130	----
		Sulfur, total	7704-34-9	E420	ND mg/L	----	ND	70.0	130	----
		Tellurium, total	13494-80-9	E420	0.00482 mg/L	0.005 mg/L	96.4	70.0	130	----
		Thallium, total	7440-28-0	E420	0.0498 mg/L	0.05 mg/L	99.5	70.0	130	----
		Thorium, total	7440-29-1	E420	0.00494 mg/L	0.005 mg/L	98.9	70.0	130	----
		Tin, total	7440-31-5	E420	0.0252 mg/L	0.025 mg/L	101	70.0	130	----
		Titanium, total	7440-32-6	E420	0.0124 mg/L	0.012 mg/L	99.2	70.0	130	----
		Tungsten, total	7440-33-7	E420	0.00501 mg/L	0.005 mg/L	100	70.0	130	----
		Uranium, total	7440-61-1	E420	ND mg/L	----	ND	70.0	130	----
		Vanadium, total	7440-62-2	E420	0.0261 mg/L	0.025 mg/L	104	70.0	130	----
		Zinc, total	7440-66-6	E420	0.0249 mg/L	0.025 mg/L	99.7	70.0	130	----
		Zirconium, total	7440-67-7	E420	0.00487 mg/L	0.005 mg/L	97.5	70.0	130	----

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **WT2409348**	Page	: 1 of 13
Client	: **CF Crozier & Associates**	Laboratory	: ALS Environmental - Waterloo
Contact	: Josie Gerrits	Account Manager	: Andrew Martin
Address	: 2800 High Point Drive Milton ON Canada L9T 6P4	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: ----	Telephone	: +1 519 886 6910
Project	: 2457-6768	Date Samples Received	: 19-Apr-2024 14:00
PO	: ----	Issue Date	: 27-Apr-2024 16:12
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: 2024 SOA		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Duplicate outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Microbiological Tests	WT2409348-001	Sample 1	coliforms, total background	----	E012.BG.TC	3 %	Diff <2x LOR	Low Level DUP DQO exceeded (difference > 2 LOR).

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) [ON MECP] Sample 1	E298	18-Apr-2024	22-Apr-2024	28 days	4 days	✓	23-Apr-2024	28 days	5 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) [ON MECP] Sample 2	E298	18-Apr-2024	22-Apr-2024	28 days	4 days	✓	23-Apr-2024	28 days	5 days	✓
Anions and Nutrients : Bromide in Water by IC										
HDPE [ON MECP] Sample 1	E235.Br	18-Apr-2024	22-Apr-2024	28 days	4 days	✓	23-Apr-2024	28 days	5 days	✓
Anions and Nutrients : Bromide in Water by IC										
HDPE [ON MECP] Sample 2	E235.Br	18-Apr-2024	22-Apr-2024	28 days	4 days	✓	23-Apr-2024	28 days	5 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE [ON MECP] Sample 1	E235.Cl	18-Apr-2024	22-Apr-2024	28 days	4 days	✓	23-Apr-2024	28 days	5 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE [ON MECP] Sample 2	E235.Cl	18-Apr-2024	22-Apr-2024	28 days	4 days	✓	23-Apr-2024	28 days	5 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE [ON MECP] Sample 1	E378-U	18-Apr-2024	22-Apr-2024	7 days	4 days	✓	23-Apr-2024	7 days	5 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE [ON MECP]										
Sample 2	E378-U	18-Apr-2024	22-Apr-2024	7 days	4 days	✓	23-Apr-2024	7 days	5 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE [ON MECP]										
Sample 1	E235.F	18-Apr-2024	22-Apr-2024	28 days	4 days	✓	23-Apr-2024	28 days	5 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE [ON MECP]										
Sample 2	E235.F	18-Apr-2024	22-Apr-2024	28 days	4 days	✓	23-Apr-2024	28 days	5 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE [ON MECP]										
Sample 1	E235.NO3	18-Apr-2024	22-Apr-2024	7 days	4 days	✓	23-Apr-2024	7 days	5 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE [ON MECP]										
Sample 2	E235.NO3	18-Apr-2024	22-Apr-2024	7 days	4 days	✓	23-Apr-2024	7 days	5 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE [ON MECP]										
Sample 1	E235.NO2	18-Apr-2024	22-Apr-2024	7 days	4 days	✓	23-Apr-2024	7 days	5 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE [ON MECP]										
Sample 2	E235.NO2	18-Apr-2024	22-Apr-2024	7 days	4 days	✓	23-Apr-2024	7 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE [ON MECP]										
Sample 1	E235.SO4	18-Apr-2024	22-Apr-2024	28 days	4 days	✓	23-Apr-2024	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE [ON MECP]										
Sample 2	E235.SO4	18-Apr-2024	22-Apr-2024	28 days	4 days	✓	23-Apr-2024	28 days	5 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Microbiological Tests : E. coli (MF-mFC-BCIG)										
Sterile HDPE (Sodium thiosulphate) [ON MECP]										
Sample 2	E012A.EC	18-Apr-2024	----	----	----		20-Apr-2024	48 hrs	46 hrs	✓
Microbiological Tests : E. coli (MF-mFC-BCIG)										
Sterile HDPE (Sodium thiosulphate) [ON MECP]										
Sample 1	E012A.EC	18-Apr-2024	----	----	----		20-Apr-2024	48 hrs	48 hrs	✓
Microbiological Tests : Total Coliforms (MF-mEndo)										
Sterile HDPE (Sodium thiosulphate) [ON MECP]										
Sample 2	E012.TC	18-Apr-2024	----	----	----		20-Apr-2024	48 hrs	46 hrs	✓
Microbiological Tests : Total Coliforms (MF-mEndo)										
Sterile HDPE (Sodium thiosulphate) [ON MECP]										
Sample 1	E012.TC	18-Apr-2024	----	----	----		20-Apr-2024	48 hrs	48 hrs	✓
Microbiological Tests : Total Coliforms Background (MF-mEndo)										
Sterile HDPE (Sodium thiosulphate) [ON MECP]										
Sample 2	E012.BG.TC	18-Apr-2024	----	----	----		20-Apr-2024	48 hrs	46 hrs	✓
Microbiological Tests : Total Coliforms Background (MF-mEndo)										
Sterile HDPE (Sodium thiosulphate) [ON MECP]										
Sample 1	E012.BG.TC	18-Apr-2024	----	----	----		20-Apr-2024	48 hrs	48 hrs	✓
Physical Tests : Alkalinity Species by Titration										
HDPE [ON MECP]										
Sample 1	E290	18-Apr-2024	22-Apr-2024	14 days	4 days	✓	23-Apr-2024	14 days	5 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE [ON MECP]										
Sample 2	E290	18-Apr-2024	22-Apr-2024	14 days	4 days	✓	23-Apr-2024	14 days	5 days	✓
Physical Tests : Colour (Apparent) by Spectrometer										
HDPE [ON MECP]										
Sample 2	E330	18-Apr-2024	----	----	----		23-Apr-2024	48 hrs	123 hrs	× EHTL

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Colour (Apparent) by Spectrometer										
HDPE [ON MECP] Sample 1	E330	18-Apr-2024	----	----	----		23-Apr-2024	48 hrs	124 hrs	× EHTL
Physical Tests : Conductivity in Water										
HDPE [ON MECP] Sample 1	E100	18-Apr-2024	22-Apr-2024	28 days	4 days	✓	23-Apr-2024	28 days	5 days	✓
Physical Tests : Conductivity in Water										
HDPE [ON MECP] Sample 2	E100	18-Apr-2024	22-Apr-2024	28 days	4 days	✓	23-Apr-2024	28 days	5 days	✓
Physical Tests : pH by Meter										
HDPE [ON MECP] Sample 1	E108	18-Apr-2024	22-Apr-2024	14 days	4 days	✓	23-Apr-2024	14 days	5 days	✓
Physical Tests : pH by Meter										
HDPE [ON MECP] Sample 2	E108	18-Apr-2024	22-Apr-2024	14 days	4 days	✓	23-Apr-2024	14 days	5 days	✓
Physical Tests : TDS by Gravimetry										
HDPE [ON MECP] Sample 1	E162	18-Apr-2024	----	----	----		25-Apr-2024	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE [ON MECP] Sample 2	E162	18-Apr-2024	----	----	----		25-Apr-2024	7 days	7 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE [ON MECP] Sample 2	E121	18-Apr-2024	----	----	----		20-Apr-2024	48 hrs	43 hrs	✓
Physical Tests : Turbidity by Nephelometry										
HDPE [ON MECP] Sample 1	E121	18-Apr-2024	----	----	----		20-Apr-2024	48 hrs	44 hrs	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
Sample 1	E420	18-Apr-2024	22-Apr-2024	180 days	4 days	✓	22-Apr-2024	180 days	4 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
Sample 2	E420	18-Apr-2024	22-Apr-2024	180 days	4 days	✓	22-Apr-2024	180 days	4 days	✓

Legend & Qualifier Definitions

EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	1411785	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	1411563	1	20	5.0	5.0	✓
Bromide in Water by IC	E235.Br	1411779	1	2	50.0	5.0	✓
Chloride in Water by IC	E235.Cl	1411783	1	20	5.0	5.0	✓
Colour (Apparent) by Spectrometer	E330	1413426	1	14	7.1	5.0	✓
Conductivity in Water	E100	1411786	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1411788	1	13	7.6	5.0	✓
E. coli (MF-mFC-BCIG)	E012A.EC	1410630	1	11	9.0	5.0	✓
Fluoride in Water by IC	E235.F	1411780	1	10	10.0	5.0	✓
Nitrate in Water by IC	E235.NO3	1411781	1	20	5.0	5.0	✓
Nitrite in Water by IC	E235.NO2	1411782	1	20	5.0	5.0	✓
pH by Meter	E108	1411787	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	1411784	1	20	5.0	5.0	✓
TDS by Gravimetry	E162	1416434	1	20	5.0	5.0	✓
Total Coliforms (MF-mEndo)	E012.TC	1410628	1	6	16.6	5.0	✓
Total Coliforms Background (MF-mEndo)	E012.BG.TC	1410629	1	5	20.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	1411231	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	1410394	1	13	7.6	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	1411785	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	1411563	1	20	5.0	5.0	✓
Bromide in Water by IC	E235.Br	1411779	1	2	50.0	5.0	✓
Chloride in Water by IC	E235.Cl	1411783	1	20	5.0	5.0	✓
Colour (Apparent) by Spectrometer	E330	1413426	1	14	7.1	5.0	✓
Conductivity in Water	E100	1411786	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1411788	1	13	7.6	5.0	✓
Fluoride in Water by IC	E235.F	1411780	1	10	10.0	5.0	✓
Nitrate in Water by IC	E235.NO3	1411781	1	20	5.0	5.0	✓
Nitrite in Water by IC	E235.NO2	1411782	1	20	5.0	5.0	✓
pH by Meter	E108	1411787	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	1411784	1	20	5.0	5.0	✓
TDS by Gravimetry	E162	1416434	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	1411231	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	1410394	1	13	7.6	5.0	✓
Method Blanks (MB)							

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Method Blanks (MB) - Continued							
Alkalinity Species by Titration	E290	1411785	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	1411563	1	20	5.0	5.0	✓
Bromide in Water by IC	E235.Br	1411779	1	2	50.0	5.0	✓
Chloride in Water by IC	E235.Cl	1411783	1	20	5.0	5.0	✓
Colour (Apparent) by Spectrometer	E330	1413426	1	14	7.1	5.0	✓
Conductivity in Water	E100	1411786	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1411788	1	13	7.6	5.0	✓
E. coli (MF-mFC-BCIG)	E012A.EC	1410630	1	11	9.0	5.0	✓
Fluoride in Water by IC	E235.F	1411780	1	10	10.0	5.0	✓
Nitrate in Water by IC	E235.NO3	1411781	1	20	5.0	5.0	✓
Nitrite in Water by IC	E235.NO2	1411782	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	1411784	1	20	5.0	5.0	✓
TDS by Gravimetry	E162	1416434	1	20	5.0	5.0	✓
Total Coliforms (MF-mEndo)	E012.TC	1410628	1	6	16.6	5.0	✓
Total Coliforms Background (MF-mEndo)	E012.BG.TC	1410629	1	5	20.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	1411231	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	1410394	1	13	7.6	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	1411563	1	20	5.0	5.0	✓
Bromide in Water by IC	E235.Br	1411779	1	2	50.0	5.0	✓
Chloride in Water by IC	E235.Cl	1411783	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1411788	1	13	7.6	5.0	✓
Fluoride in Water by IC	E235.F	1411780	1	10	10.0	5.0	✓
Nitrate in Water by IC	E235.NO3	1411781	1	20	5.0	5.0	✓
Nitrite in Water by IC	E235.NO2	1411782	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	1411784	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	1411231	1	20	5.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Coliforms Background (MF-mEndo)	E012.BG.TC ALS Environmental - Waterloo	Water	APHA 9222B (mod)	Noncoliform bacteria observed on Total Coliform plates are enumerated.
Total Coliforms (MF-mEndo)	E012.TC ALS Environmental - Waterloo	Water	APHA 9222B (mod)	Following filtration (0.45 µm), and incubation at 35.0 ±0.5°C for 24 hours, colonies exhibiting characteristic morphology of the target organism are enumerated and confirmed.
E. coli (MF-mFC-BCIG)	E012A.EC ALS Environmental - Waterloo	Water	ON E3433 (mod)	Following filtration (0.45 µm), and incubation at 44.5±0.2°C for 24 hours, colonies exhibiting characteristic morphology of the target organism are enumerated.
Conductivity in Water	E100 ALS Environmental - Waterloo	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 ALS Environmental - Waterloo	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 ALS Environmental - Waterloo	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TDS by Gravimetry	E162 ALS Environmental - Waterloo	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC	E235.Br ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC	E235.Cl ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Nitrite in Water by IC	E235.NO2 ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC	E235.NO3 ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 ALS Environmental - Waterloo	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 ALS Environmental - Waterloo	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Colour (Apparent) by Spectrometer	E330 ALS Environmental - Waterloo	Water	APHA 2120 C (mod)	Colour (Apparent) is measured in an unfiltered sample spectrophotometrically using the single wavelength method. The colour contribution of settleable solids are not included in the result. This method is intended for potable waters. Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U ALS Environmental - Waterloo	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 ALS Environmental - Waterloo	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Hardness (Calculated) from Total Ca/Mg	EC100A ALS Environmental - Waterloo	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Ion Balance using Total Metals	EC101A ALS Environmental - Waterloo	Water	APHA 1030E	Cation Sum (using total metals), Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).
Sodium Adsorption Ratio [SAR] from Total Metals	EC102 ALS Environmental - Waterloo	Water	CCME Sodium Adsorption Ratio (SAR)	The Sodium Adsorption Ratio (SAR) for a water sample is calculated from the Sodium, Calcium, and Magnesium concentrations of the water, using the same calculations as would be used for a sediment paste extract.
TDS calculated from conductivity	EC103A ALS Environmental - Waterloo	Water	APHA 1030 E	Total dissolved solids (as mg/L) can be estimated by multiplying electrical conductance (in umhos/cm) by 0.65.
Saturation Index using Laboratory pH (Ca-T)	EC105A ALS Environmental - Waterloo	Water	APHA 2330B	Langelier Index provides an indication of scale formation potential at a given pH and temperature, and is calculated as per APHA 2330B Saturation Index. Positive values indicate oversaturation with respect to CaCO3. Negative values indicate undersaturation of CaCO3. This calculation uses laboratory pH measurements and provides estimates of Langelier Index at temperatures of 4, 15, 20, 25, 66, and 77°C. Ryznar Stability Index is an alternative index used for scale formation and corrosion potential.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N ALS Environmental - Waterloo	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).
Total Silicon as Silica (Calculation)	EC420.SiO2 ALS Environmental - Waterloo	Water	N/A	Total Silicon (as SiO2) is a calculated parameter. Total Silicon (as SiO2 mg/L) = 2.139 x Total Silicon (mg/L).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 ALS Environmental - Waterloo	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.

GC-791

MM-510

Chain of Custody (COC)

Page

Canada Toll Free: 1 800 668 9878

W12409348

www.alsglobal.com

Telephone : +1 519 886 6910

Report To	Contact and company name below will appear on the final report
Company:	CF Crozier & Associates
Contact:	Josie Gerrits
Phone:	289.204.8450
	Company address below will appear on the final report
Street:	55 Wyndham St N #215
City/Province:	Guelph / ON
Postal Code:	N1H 7T8
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	

Project Information

ALS Client Code / QUOTE #:	CFCR100 / 2024 SOA
Job / Project #:	2457-6768
PO / AFE:	
LSD:	

Reports / Recipients

Select Report Format: ☑ PDF ☐ EXCEL ☐ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: jgerrits@cfcrozier.ca

Email 2:

Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: mhatt@cfcrozier.ca

Email 2:

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Contact: Andrew Martin | Sampler:

Turnaround Time (TAT) Requested

- ☐ Routine [R] if received by 3pm M-F - no surcharges apply
- ☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge mini
- ☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge mir
- ☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge mir
- ☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge mir
- ☐ Same day [E2] if received by 10am M-S - 200% rush surcha

Additional fees may apply to rush requests on weeke

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

ALS Lab Work Order # (ALS use only): WT2409348A

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Routine Potability	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	Sample 1	18/04/24	12:00	Drinking Water	5	✓			
	Sample 2	18/04/24	1:15	Drinking	5	✓			

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human consumption/ use? ☑ YES ☐ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Cooler Custody Seals Intact: ☐ YES ☐ N/A | Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				0.6			

SHIPMENT RELEASE (client use)

Released by: Chris Gerrits | Date: Apr. 19/24 | Time: 1:00 pm

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by: | Date: | Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by: FH | Date: 2024 - APR - 19 | Time: 14:00

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

MAY 2023 FRONT

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

[1] If samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

APPENDIX D

Nitrate Impact Assessment Calculations

CROZIER CONSULTING ENGINEERS

Project Name:	752-8 Petersen Road
Project Number:	2497-6768
Date:	2025-12-15
Designed By:	CM
Checked By:	CG

D-5-4 IMPACT ASSESSMENT

Calculate the Nitrate Concentration at Property Boundary

Parameter	Value	Unit	Notes:
Infiltration Volume			
Area of Dilution =	5.19	ha	Area of site and surroundings.
Background Nitrate Quality in Groundwater =	0.00	mg/L	
Annual Infiltration Rate =	150	mm/m2/yr	Estimated annual infiltration rate based on MECP values
	4,109.59	L/ha/day	
Annual Infiltration Volume =	7,785	m^3/year	
Total Average Background Nitrate =	0	mg/day	
Sewage Effluent Volume			
Proposed Number of Lots	1		
Average Daily Volume of Sewage Effluent =	9,600	L/day	Maximum daily flow
Number of Days of Operation/Use =	365	days/year	
Annual Volume of Sewage Effluent =	3,504	m^3/year	
Nitrate Concentration in wastewater =	40.0	mg/L	MECP standard effluent for conventional systems = 40 mg/L
Total Average Nitrate Loading =	384,000	mg/day	
Totals			
Total Dilutant = wastewater V + infiltration V =	11,289	m^3/year	
Nitrate Concentration in Percolate =	**12.42**	**mg/L**	Less than 10 mg/L, sufficient for D-5-4 Impact Assessment

CROZIER CONSULTING ENGINEERS

Project Name:	752-8 Petersen Road
Project Number:	2497-6768
Date:	2025-12-15
Designed By:	CM
Checked By:	CG

D-5-4 IMPACT ASSESSMENT (with Nitrate Removal)

Calculate the Nitrate Concentration at Property Boundary

Parameter	Value	Unit	Notes:
Infiltration Volume			
Area of Dilution =	5.19	ha	Area of site and surroundings.
Background Nitrate Quality in Groundwater =	0.00	mg/L	
Annual Infiltration Rate =	150	mm/m2/yr	Estimated annual infiltration rate based on MECP values
	4,109.59	L/ha/day	
Annual Infiltration Volume =	7,785	m^3/year	
Total Average Background Nitrate =	0	mg/day	
Sewage Effluent Volume			
Proposed Number of Lots	1		
Average Daily Volume of Sewage Effluent =	9,600	L/day	Maximum daily flow
Number of Days of Operation/Use =	365	days/year	
Annual Volume of Sewage Effluent =	3,504	m^3/year	
Nitrate Concentration in wastewater =	30.0	mg/L	Considering 25% nitrate removal
Total Average Nitrate Loading =	288,000	mg/day	
Totals			
Total Dilutant = wastewater V + infiltration V =	11,289	m^3/year	
Nitrate Concentration in Percolate =	**9.31**	**mg/L**	Less than 10 mg/L, sufficient for D-5-4 Impact Assessment

IMPACT ASSESSMENT

MOE, 2008

Calculate the Nitrate Concentration at a Boundary (Property *or* Surface Water)

= Manual Data Entry

Infiltration Volume

Area of Dilution =	5.19	ha
Background Nitrate Quality in Groundwater =	0	mg/L
Annual Infiltration Rate =	150	mm/m2/yr
Annual Infiltration Volume =	7,785	m^3

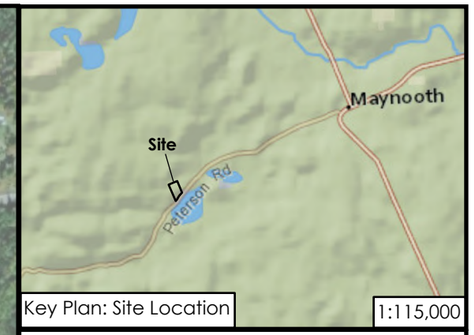
Sewage Effluent Volume

Average Daily Volume of Sewage Effluent =	6033.333	L/day (if residential, 1000 L/home/day)
Number of Days of Operation/Use =	365	days/year
Annual Volume of Sewage Effluent =	2,202	m^3
Maximum Nitrate Concentration at Boundary =	2.5	mg/L; use 2.5 for g/w, 3.0 for s/w

Totals

Total Dilutant = wastewater V + infiltration V =	9,987	m^3/year
Maximum Allowable Nitrate Concentration in Effluent	**11.34**	**mg/L**

FIGURES



Legend

Site Limits

Figure Notes:

THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION '

THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT. DO NOT SCALE THIS DRAWING.

ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

Project:

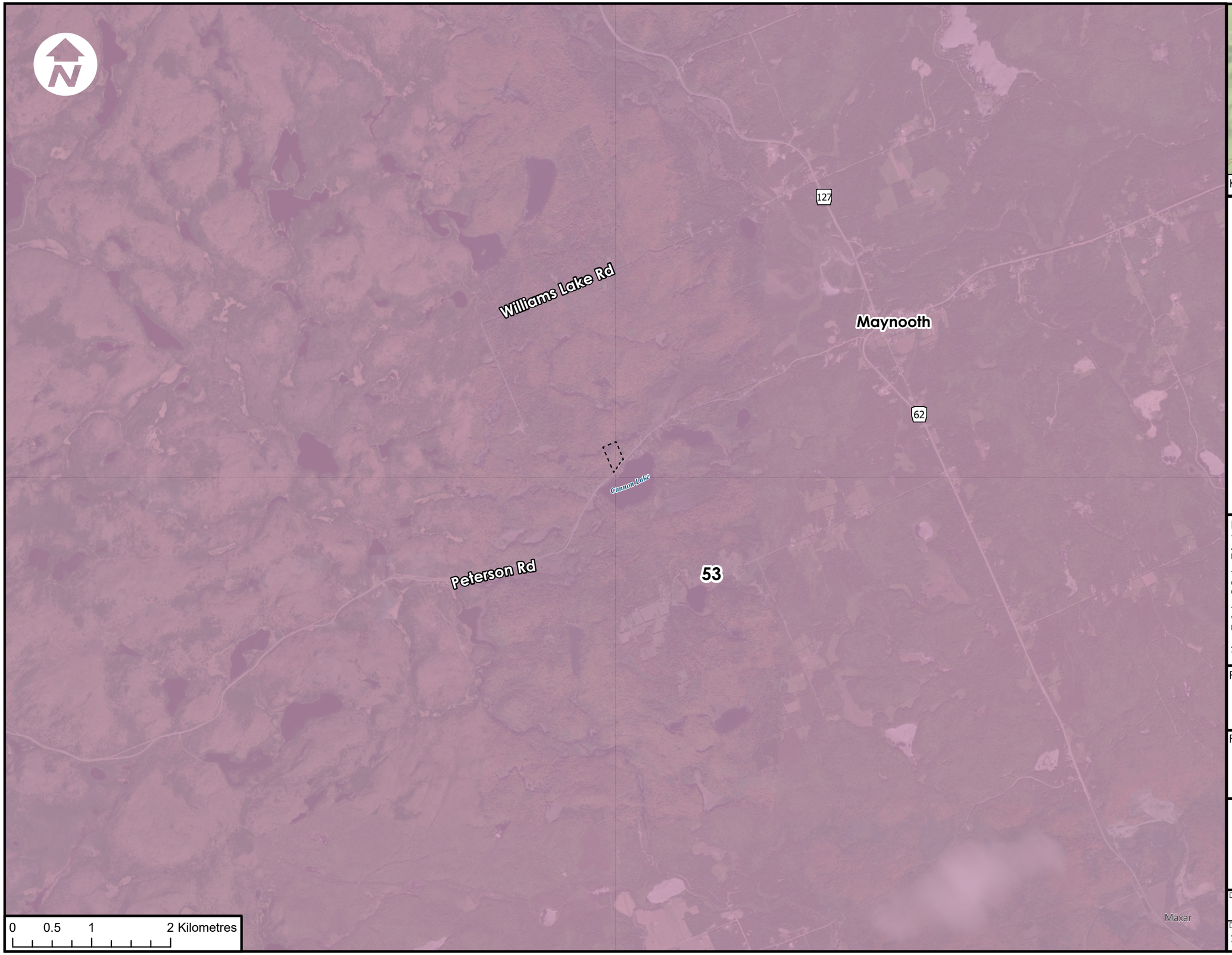
752 Peterson Road

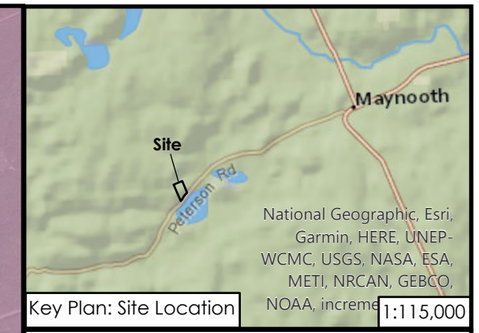
Figure:

Site Location Plan

CROZIER
CONSULTING ENGINEERS

Drawn:	Design:	Project No.	
J.M	J.M	2497 - 6768	
Date:	GCS:	Scale:	
2024-05-27	NAD 1983	1:7,500	Fig. 1





Key Plan: Site Location

1:115,000

Legend

Site Limits

Physiography

53: Algonquin Highlands

Figure Notes:

THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION '

THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT. DO NOT SCALE THIS DRAWING.

ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

Project:

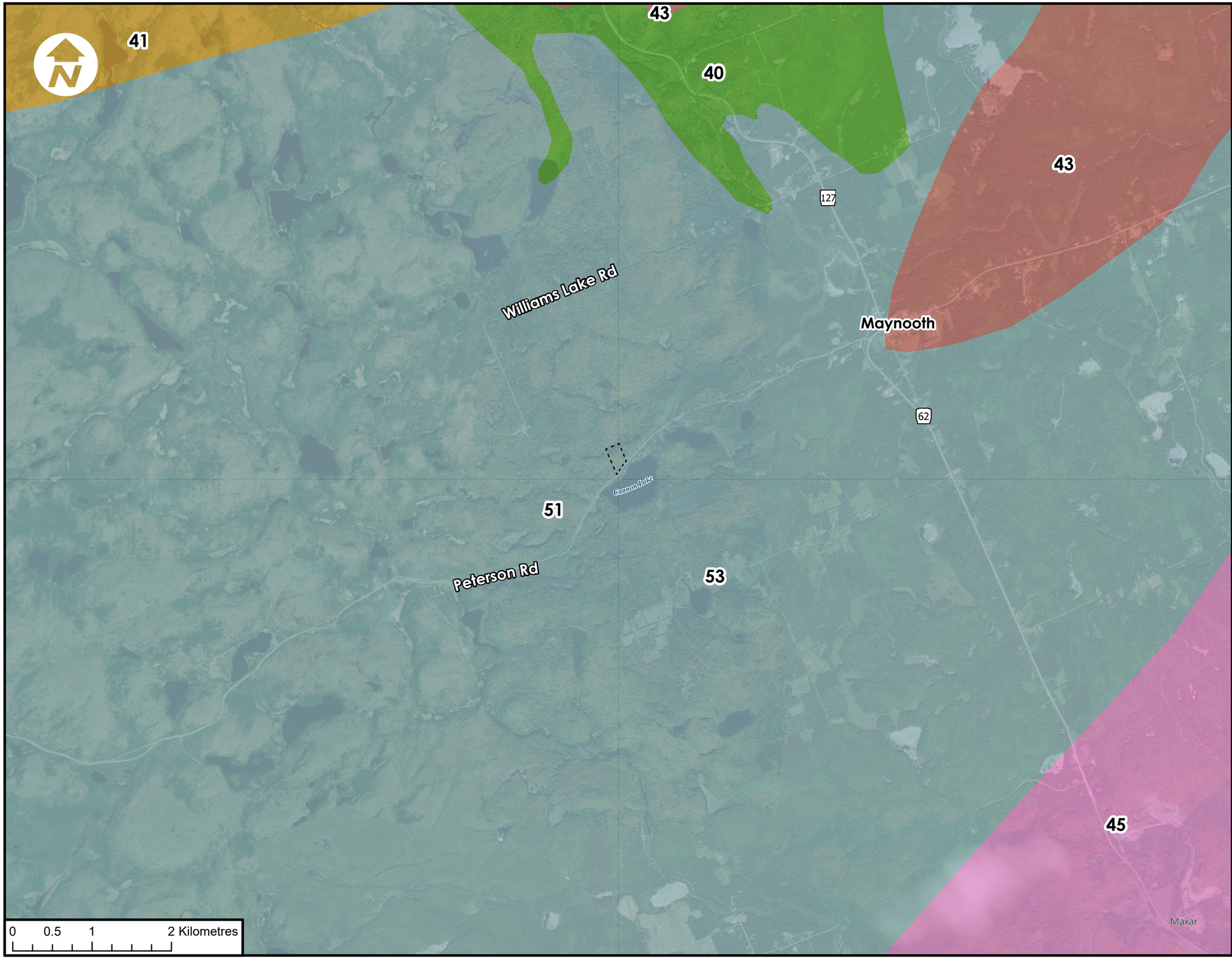
752 Peterson Road

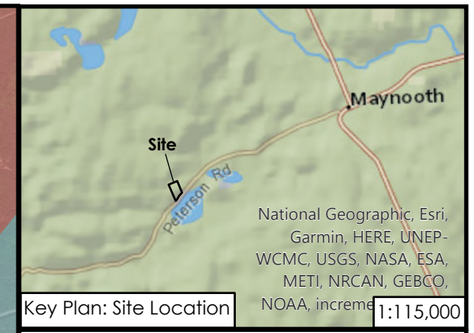
Figure:

Physiography

CROZIER CONSULTING ENGINEERS

Drawn:	Design:	Project No.	
J.M	J.M	2497 - 6768	
Date:	GCS:	Scale:	
2024-05-28	NAD 1983	1:45,000	Fig. 2





Key Plan: Site Location

1:115,000

Legend

- Site Limits

Bedrock Geology

- 51: Tectonite unit
- 45: Clastic metasedimentary rocks
- 43: Felsic igneous rocks
- 41: Migmatitic rocks and gneisses of undetermined protolith
- 40: Mafic rocks
- Carbonate metasedimentary rocks

Figure Notes:

THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION '

THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT. DO NOT SCALE THIS DRAWING.

ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

Project:

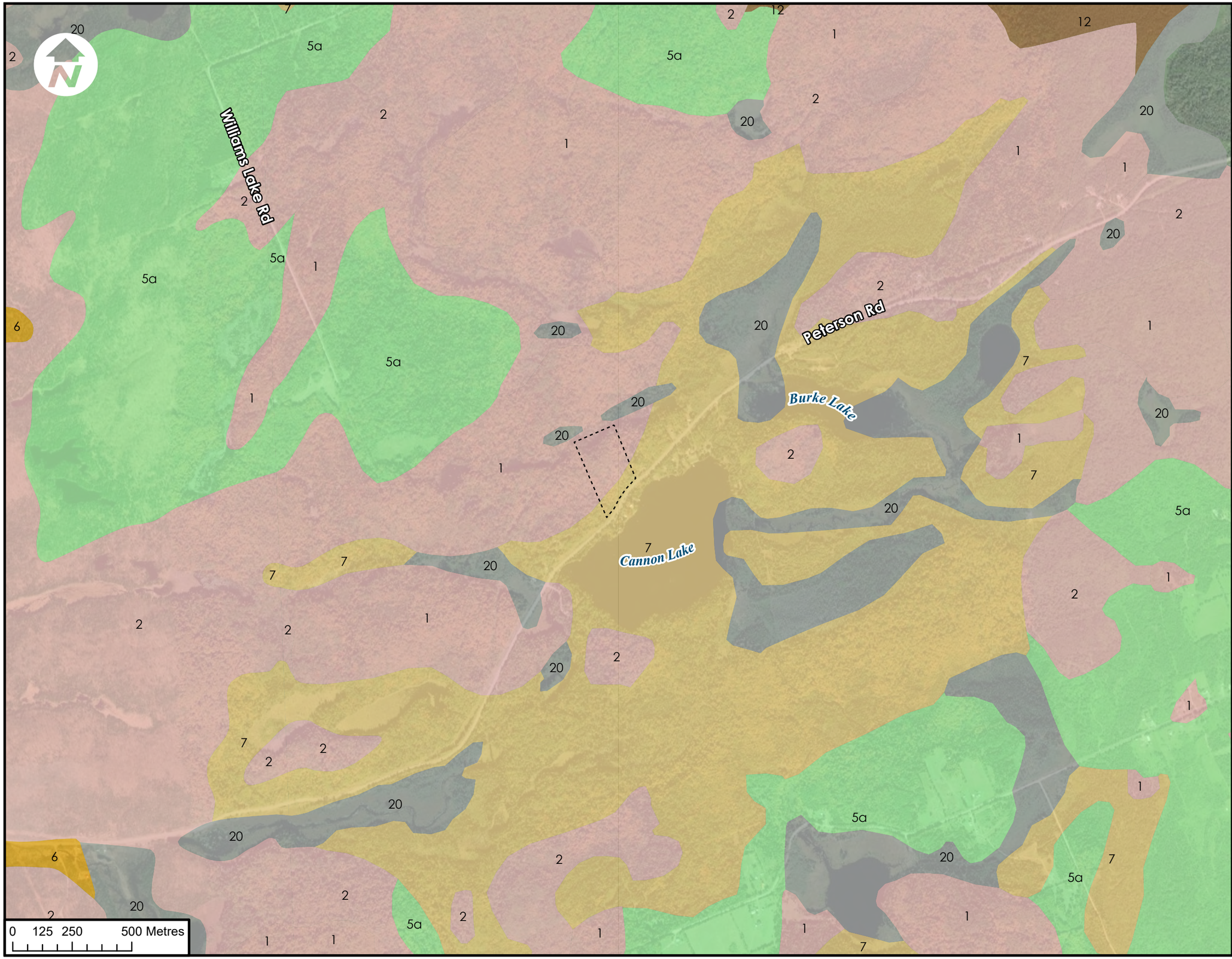
752 Peterson Road

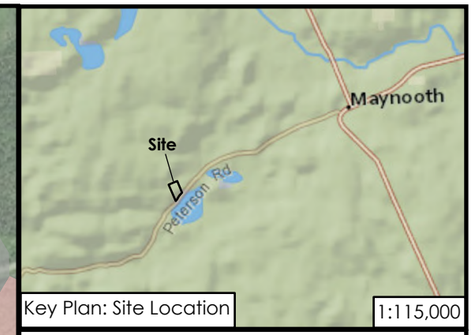
Figure:

Bedrock Geology

CROZIER CONSULTING ENGINEERS

Drawn:	Design:	Project No.	
J.M	J.M	2497 - 6768	
Date:	GCS:	Scale:	
2024-05-28	NAD 1983	1:45,000	Fig. 3





Key Plan: Site Location

1:115,000

Legend

- Site Limits

Surficial Geology

- 1: Precambrian bedrock
- 2: Precambrian bedrock-drift complex
- 5a: Shield-derived silty to sandy till
- 6: Ice-contact stratified deposits
- 7: Glaciofluvial deposits
- 12: Older alluvial deposits
- 20: Organic deposits

Figure Notes:

THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION '

THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT. DO NOT SCALE THIS DRAWING.

ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

Project:

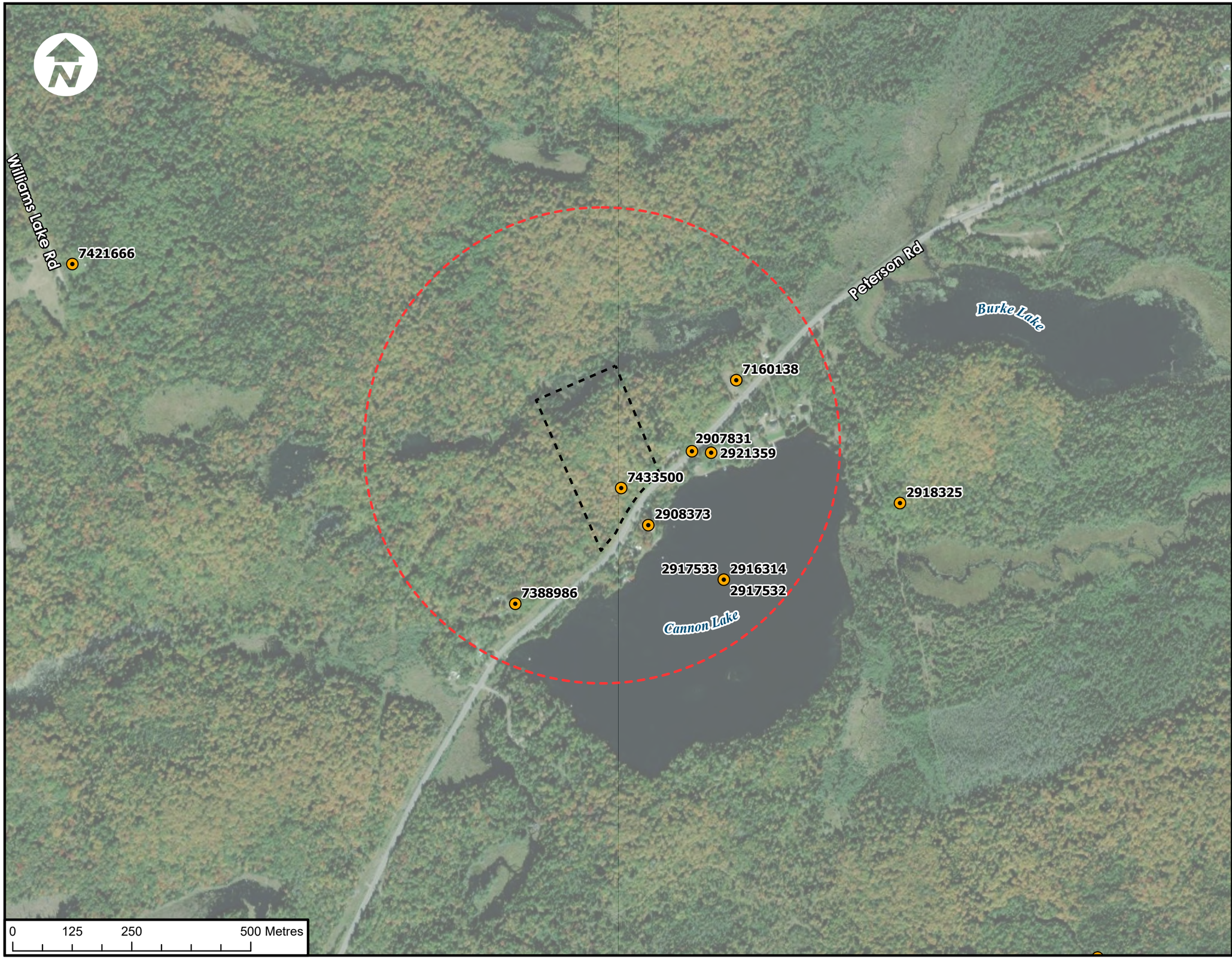
752 Peterson Road

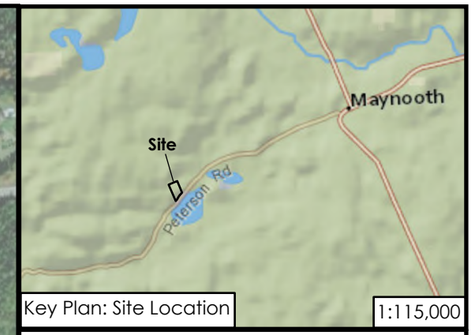
Figure:

Surficial Geology

CROZIER CONSULTING ENGINEERS

Drawn:	Design:	Project No.	
J.M	J.M	2497 - 6768	
Date:	GCS:	Scale:	
2024-05-28	NAD 1983	1:15,000	Fig. 4





Legend

- Site Limits
- 500m Site Buffer
- MECP Well

Figure Notes:

THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION '

THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT. DO NOT SCALE THIS DRAWING.

ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

Project:

752 Peterson Road

Figure:

Well Location Plan

CROZIER
CONSULTING ENGINEERS

Drawn:	Design:	Project No.	
J.M	J.M	2497 - 6768	
Date:	GCS:	Scale:	
2025-06-27	NAD 1983	1:7,500	Fig. 5