



961 St. David Street North, Fergus

Preliminary Hydrogeological Investigation

Project Location:

961 St. David Street North, Fergus, ON

Prepared for:

RE/Max Real Estate Centre Inc.
766 Hespeler Road
Cambridge, ON N3H 5L8

Prepared by:

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December 6, 2023

MTE File No.: 48650-400





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1.0 Introduction

MTE Consultants Inc. (MTE) was retained by RE/MAX Real Estate Centre Inc. to conduct a Preliminary Hydrogeological Investigation for a proposed development at 961 St. David Street North, Fergus, Ontario (herein referred to as the “Site”). **Figure 1** illustrates the Site location.

The Site is currently vacant and consists of an abandoned dwelling, a detached structure and a grassed field. The proposed development consists of 50 residential units with associated parking, and new roadway to access the development. The Site will be municipally serviced for water supply, wastewater, and stormwater.

1.1 Scope and Methodology

1.1.1 Background Review

- Topography, physiography, geological and hydrogeological mapping on file with the Community of Fergus, Grand River Conservation Authority, the Ontario Geological Survey, and the Ministry of Natural Resources and Forestry (MNR).
- Available nearby well records on file with the Ministry of the Environment, Conservation and Parks (MECP).

1.1.2 Field Investigation

- Development of three monitoring wells installed during the concurrent geotechnical investigation.
- Collection of stabilized water levels from newly constructed monitoring wells.
- In-situ single well hydraulic response testing (slug testing) of select representative monitoring wells to determine the hydraulic conductivity of the saturated soils on-site.
- Collection of two groundwater samples from select monitoring locations for analysis of a suite of water quality parameters to assess pre-development water quality conditions.
- Installation of electronic data loggers to monitor groundwater on a continuous basis in select newly constructed monitoring wells.

1.1.3 Preliminary Analysis and Reporting

Summarize findings in a letter report to be reviewed and signed by a Professional Geoscientist or Engineer licensed to practice in Ontario. The report will address the following items:

- The topography, physiography, and geology of the subsurface soils.
- A hydrogeological characterization of the Site including groundwater levels, gradients, flow direction, and hydraulic conductivity.
- Preliminary assessment of groundwater quality.
- Summary of identified groundwater receptors and discussion of the potential for the proposed development to impact these receptors.
- Generation of one geologic cross-section showing the encountered subsurface conditions and any available design details.
- Descriptions of the regional setting, encountered stratigraphy and groundwater conditions, including any observed seeps.
- Recommendations for additional work, groundwater monitoring and/or mitigation, as appropriate.

1.1.4 Ongoing Monitoring and Report Update

This Preliminary Hydrogeological Investigation Report is based on data collected at the time of the field investigation and includes water levels that represent a limited duration of time. To support final design, an addendum to this report will be prepared that will include a longer monitoring time period, which will also evaluate the seasonal high groundwater level based on continuous monitoring of groundwater levels at the Site.

2.0 Site Description

The Site is approximately 1.4 hectares (3.5 acres) in size, currently vacant consisting of an abandoned dwelling, a detached structure and a grassed field. The Site is bordered by St. David Street North (Highway 6) to the east, adjacent residential properties to the south and west, and a commercial property to the north. The ground surface at the Site generally slopes down from the east to the west. Ground surface elevations measured at the borehole locations range from Elevation 424.4 to 423.1m above mean sea level (amsl). The Site features are shown on **Figure 2**.

A Land Use Plan for the proposed development is provided in **Appendix A**. The plan includes 50 residential units with associated parking and a new roadway to access the development.

3.0 Field Program

3.1 Borehole Advancement and Monitoring Well Construction

In conjunction with the Geotechnical investigation, boreholes were advanced and monitoring wells installed at three locations across the Site. On June 27, 2023, London Soil Test Ltd. used a track-mounted CME75 drill rig to complete the advancement and installation of monitoring wells MW101-23, MW102-23, and MW104-23. Boreholes and monitoring wells were advanced to depths ranging from 5.0m to 6.7m below ground surface (bgs).

The monitoring wells at the Site were surveyed by MTE to a geodetic benchmark. Borehole and monitoring well locations are illustrated on **Figure 2**. Borehole logs are provided in **Appendix B**.

3.2 Monitoring Well Development

The monitoring wells were developed on July 26 and August 16, 2023, using Waterra™ Surge Blocks to remove any accumulated sediments from the bottom of the well and to remove fine grained materials from the well screen and sand pack. Monitoring well development was deemed complete once a minimum of three well volumes of water was removed, and the water was observed to be silt-free. Monitoring well development was completed prior to the installation of the data loggers.

3.3 Groundwater Levels

Manual groundwater levels were collected from the monitoring wells on four occasions between July 26 and October 11, 2023, to allow for the interpretation of shallow groundwater flow directions. Manually measured groundwater levels and elevations within the monitoring wells are presented in **Table 1**. In addition, data loggers were installed in each of the three monitoring wells. Data loggers measure the pressure of water (in cm) above the logger, which can then be compensated for atmospheric pressure to determine a groundwater level. The continuous hourly groundwater level information collected by the data loggers allows for an assessment of seasonal groundwater trends and responses to precipitation events.

Hydrographs 1 to 3 (Appendix C) present groundwater elevation information from the data loggers installed within monitoring wells MW101-23, MW102-23 and MW104-23. Precipitation data (Environment Canada Fergus Shand Dam Station) is also presented on the hydrographs to illustrate the relationship between the shallow groundwater table and precipitation events.

3.4 Groundwater Quality

Two monitoring wells were sampled on July 26, 2023, and submitted to ALS Environmental Laboratories (ALS) in Waterloo, Ontario for analysis of general chemistry parameters including total metals, nutrients and petroleum hydrocarbons (PHCs). Prior to collecting groundwater samples, the monitoring wells were purged to obtain a groundwater sample representative of the surrounding formation. Groundwater samples were collected after approximately three well volumes had been removed.

4.0 Regional Geology and Hydrogeology

4.1 Physiography

The Site is located within the broad physiographic region known as the Guelph Drumlin Field. The Guelph Drumlin Field occupies an approximate area of 830km² and contains drumlins that are generally broad and oval in shape. The drumlins mainly consist of loamy and calcareous till derived from the dolostone of the Amabel Formation. Within this physiographic region the overburden materials encountered are stony tills which are sand rich based on grain sizes (Chapman and Putnam, 1984).

The Site is located in the physiographic landform known as till plains (drumlinized). The physiographic landforms are presented on **Figure 3** (Chapman and Putnam, 1984).

4.2 Quaternary Geology

Quaternary geology mapping (**Figure 4**) indicates that the surficial geology beneath the Site is mapped as sandy glaciofluvial deposits within the Port Stanley Till. The Port Stanley Till is described as a silt to sandy silt matrix becoming silt to silty clay near Lake Erie. (*Ontario Geologic Survey*, 2010).

4.3 Paleozoic Geology

The Site is underlain by the Upper Silurian dolomite of the Guelph Formation. The Guelph formation is described as tan to brown, fine- to medium-crystalline, fossiliferous, dolostone that is locally biohermal (Armstrong and Carter, 2010). Bedrock was not encountered during the drilling program.

Based on water well records in the area, the bedrock surface is expected to be encountered at depths of approximately 27m to 76m bgs.

4.4 Regional Groundwater Flow

Regional shallow groundwater elevations, provided by the Grand River Conservation Authority (GRCA) (published 2009), indicate that the regional shallow groundwater elevations in the vicinity of the Site range from approximately 423 to 425m amsl. In addition, the regional shallow groundwater flow direction is indicated as southerly towards the Grand River, located approximately 2km southeast of the Site.

4.5 Water Well Record Search

Hydrogeological data related to private water supply wells within 250m of the Subject Lands were obtained from water well records on-file with the Ministry of the Environment, Conservation and Parks (MECP). A total of 74 water well records were located within 250m of the Site. Of the 74 water well records, the following primary use was listed on the water well record:

- 26 water supply wells;
- 28 monitoring/observation wells or test holes;
- 13 abandonment records; and
- Seven records with no use specified.

MECP water well records are summarized in **Table 2**. Based on the available water well records, there are private water supply wells within the Study Area that are used for Domestic and Municipal water supply. According to the water well records, the majority of these wells are completed into the underlying bedrock.

4.6 Source Water Protection

The closest municipal well to the Site is Fergus Well 7 (F7), located approximately 900m southwest of the Site. This municipal well is completed into the deep bedrock aquifer and is approximately 139m deep. The western portion of the Site is located in Wellhead Protection Area (WHPA) B which is the two to five-year time of travel capture zone (**Figure 5**), with a vulnerability score of 8. The eastern portion of the Site is located in WHPA C. The Site is also located within a mapped Significant Groundwater Recharge Area (SGRA).

5.0 Local Hydrogeological Setting

5.1 Geological Cross-Section

Boreholes and monitoring wells installed for this investigation were used to interpret local hydrostratigraphic units and generate one geological cross-section. The location of the cross-section is provided on **Figure 2**; the geological cross-section is presented in **Figure 6**.

Geological Cross-Section A-A' (Figure 6):

- Extends approximately 190m from southwest to northeast.
- Illustrates sloping topography from approximately 424 to 423 m amsl towards the southwest.
- Shows the Site is underlain by sand deposits, consisting of sand with some silt, extending to the depth of investigation in the vicinity of MW101-23 and BH103-23.
- Shows the sand deposits as being underlain by a silt deposit extending to the depth of investigation in the vicinity of MW102-23 and MW104-23.
- Interprets the shallow groundwater table at the Site at approximately 421m amsl.

The stratigraphy consists of a surficial layer of topsoil with sand with some silt, with silt deposits, consistent with the Port Stanley Till, in the vicinity of MW102-23 and MW104-23. Bedrock was not encountered in the boreholes to the depths explored (up to 6.7 m bgl).

5.2 Groundwater Elevations and Flow Direction

Groundwater flow mapping was created for the Site using the September 12, 2023, groundwater levels. Shallow groundwater elevation contours and flow patterns are illustrated in **Figure 7**. The water table at the Site is shown to flow towards the south, generally following the regional groundwater flow towards the Grand River, ranging from an approximate high of 421.6m amsl to a low of 421.1m amsl on September 12, 2023.

5.3 Hydraulic Conductivity

5.3.1 In-Situ Hydraulic Conductivity Testing

MTE conducted single well hydraulic response tests (SWRT) on two monitoring wells (MW101-23 and MW102-23) in August 2023. SWRTs typically involve the rapid introduction and/or removal of a slug of known displacement to raise and/or lower the water level in a well. The response of this rapid change is measured over time and used to calculate hydraulic conductivity. In wells with very low hydraulic conductivity, the response to the introduction of solid slug occurs very slowly.

Groundwater levels were monitored using a data logger programmed to collect a water level approximately every 0.5 second. Where possible, response tests were carried out multiple times using solid slugs of different displacements to assess the viability of assumptions underlying slug test analysis methods.

A representative test from each well was analyzed using the Bouwer and Rice methodology using AquiferTest© Pro Software (Waterloo Hydrogeologic Inc., 2020). A copy of the AquiferTest© data sheets are presented in **Appendix D**.

5.3.2 Grain Size Analyses

Selected soil samples obtained during drilling activities were submitted for gradation and hydrometer analysis, as part of the geotechnical investigation. Particle size distribution reports are provided in **Appendix E**.

5.3.3 Hydraulic Conductivity Results

Based on review of the borehole logs and grain size analyses, sediment types generally range from sand to sandy silt. Altogether, three samples were analyzed with the results summarized in **Table 3**. The hydraulic conductivities of the tested soils across the Site ranges from 1.5×10^{-4} m/sec to 4.9×10^{-6} m/sec. These results are consistent with average published values for sand and silty sand soils (Freeze and Cherry, 1979).

The hydraulic conductivity results from the in-situ hydraulic response tests completed at MW101-23 and MW102-23 ranged from 3.1×10^{-5} m/sec to 1.3×10^{-5} m/sec, with the estimated geometric hydraulic conductivity value from SWRTs being 2.0×10^{-5} m/sec.

5.4 Average Linear Groundwater Velocity

The horizontal hydraulic gradient, based on the September 12, 2023, groundwater elevations, is calculated to be 0.008 m/m across the Site.

The average linear groundwater velocity can be calculated using Darcy's Law, as follows:

$$q = (Ki)/n_e$$

Where:

q = average linear groundwater velocity (m/s)

K = hydraulic conductivity (2.0×10^{-5} m/s (in-situ geometric mean))

i = horizontal hydraulic gradient (0.008 m/m)

n_e = effective sediment porosity (0.30 based on published values for sandy soils)

Using the above values, the average linear groundwater velocity at the Site is estimated at approximately 17 m/year (5×10^{-7} m/s).

5.5 Groundwater Quality

The groundwater samples were analyzed for general chemistry parameters. Analytical results have been compared to the Provincial Water Quality Objectives (PWQO), as reference, and are presented in the appended **Table 4**. Unabbreviated laboratory certificates of analysis are presented in **Appendix F**.

6.0 Preliminary Design Considerations

6.1 Dewatering

The shallowest elevation to water measured by MTE in on-Site monitoring wells to date is 421.81m amsl (2.5m bgs). The current concept plan for the Site includes one level of basement beneath each of the residential units with proposed basement finished floor elevations (BFFEs) ranging between 421.94m amsl to 422.71m amsl. Based on the current concept plan and the highest measured groundwater elevation, groundwater is anticipated within 0.2m of the BFFE, as such some dewatering of groundwater may be required for the installation of services or building foundations. Groundwater levels at the Site will continue to be monitored to confirm this conclusion.

7.0 Conclusions and Recommendations

Based on this hydrogeological investigation, MTE offers the following findings:

- The stratigraphy consists of a surficial layer of topsoil above sand and sandy silt deposits, consistent with the Port Stanley Till. Bedrock was not encountered in the boreholes to the depths explored.
- The shallow groundwater flow direction beneath the Site is interpreted to be southerly at elevations of 421.6 to 421.1m amsl.
- Estimate of the horizontal hydraulic gradient of the groundwater table beneath the Site was approximately 0.008.
- Hydraulic conductivity of the water table zone is estimated to range from 3.1×10^{-5} m/sec to 1.3×10^{-5} m/sec with a geometric mean of 2.0×10^{-5} m/sec.
- Based on the plan for one level of underground basement construction, dewatering may be required for the installation of services or building foundations. at the Site.

Recommendations

- Continuous groundwater monitoring should be ongoing and utilized during the site plan approval process, as well as during final design.
- During the development application process, existing on-site groundwater monitoring wells should be maintained.
- Upon monitoring well decommissioning, monitoring wells will need to be decommissioned in accordance with Ontario Regulation 903 (as amended).

8.0 Limitations

Services performed by **MTE Consultants Inc.** (MTE) were conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the Environmental Engineering & Consulting profession. No other warranty or representation expressed or implied as to the accuracy of the information, conclusions or recommendations is included or intended in this report.

This report was completed for the sole use of MTE and the Client. The assignment was carried out in accordance with the Scope of Work described in Section 1.1 as reviewed with and agreed to by the Client. MTE makes no representation that the present report has dealt with all of the important environmental issues, except as provided in the Scope of Work. This report is not intended to be exhaustive in scope or to imply a risk-free facility. As such, this report may not deal with all issues potentially applicable to the Site and may omit aspects which are or may be of interest to the reader.

In addition, it should be recognized that a soil sample or groundwater level measurement represents one discrete portion of the Site at the time it is collected, and that the findings of this report are based on conditions as they existed during the time period of the investigation.

Any use which another party makes of this report, or any reliance on, or decisions to be made based upon it, are the responsibility of such parties. MTE accepts no responsibility for liabilities incurred by or damages, if any, suffered by another party as a result of decisions made or actions taken, based upon this report. Others with interest in the Site should undertake their own investigations and studies to determine how or if the condition affects them or their plans.

It should be recognized that the passage of time may affect the views, conclusions and recommendations (if any) provided in this report because environmental conditions of a property can change, along with regulatory requirements. Should additional or new information become available, MTE recommends that it be brought to our attention in order that we may determine whether it affects the contents of this report.

All of which is respectfully submitted,

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Ministry of the Environment and Climate Change Source Protection Information Atlas:

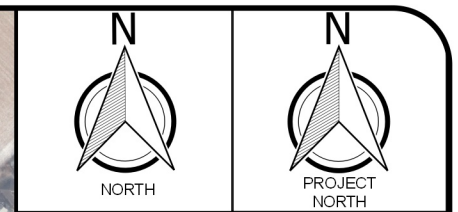
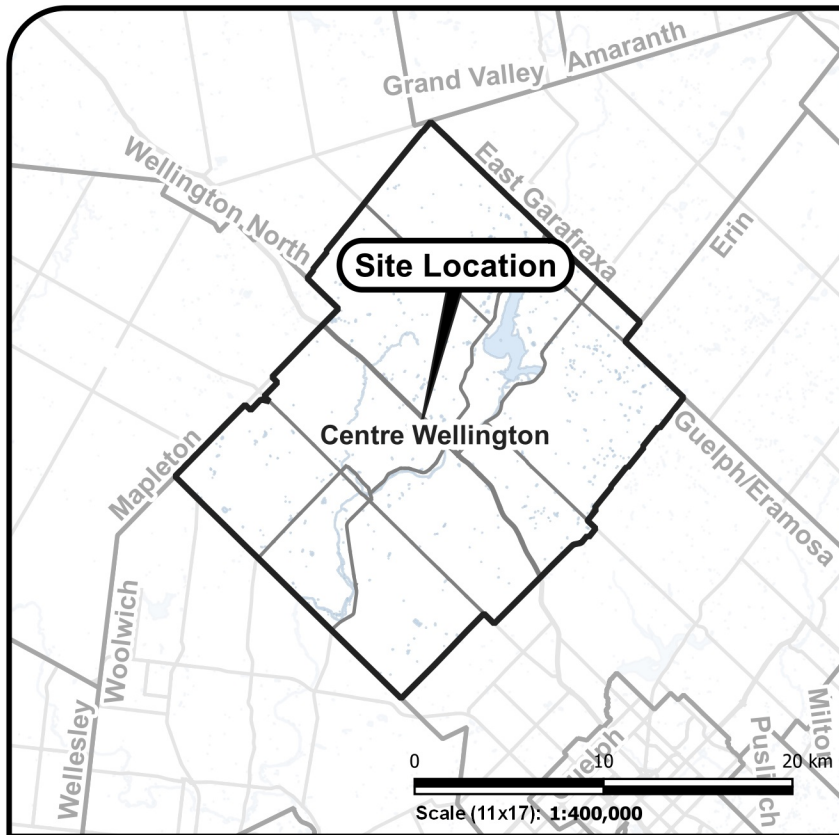
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Figures



Legend

- Site Boundary
- 250m Study Area
- 5m Contours
- Provincially Significant Wetland
- Unevaluated Wetland
- Waterbody
- Watercourses

Data Sources: Contains information licensed under the Open Government License Ontario.
Project CRS: NAD83 / UTM zone 17N



Client
RE/MAX Real Estate Centre Inc.

Project
Preliminary Hydrogeological Investigation

Site
961 St. David Street North, Fergus, Ontario

Title
Site Location Map

Reviewed By	PAG	Project No	48650-400
Prepared By	KNR	Figure No	1
Drawn By	SAR		
Date	September 2023		



Legend

- Site Boundary
- A Geological Cross Section Location
- Watercourses
- + Monitoring Well
- ⊕ Borehole

Data Sources:
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Scale (11x17): 1:1,000

Project CRS: NAD83 / UTM zone 17N



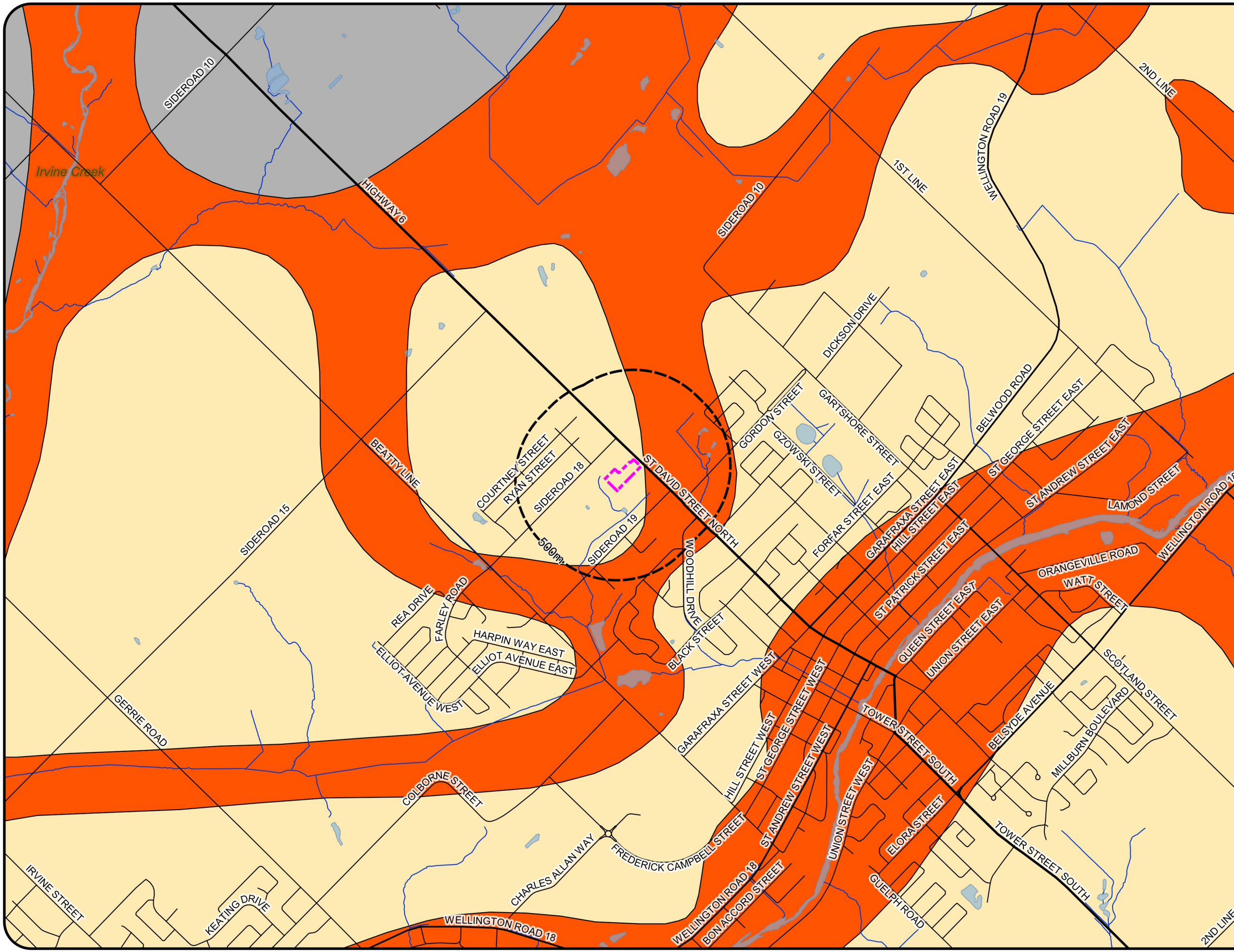
Client
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Project
Preliminary Hydrogeological Investigation








Site
961 St. David Street North, Fergus, Ontario

Title
Site Layout and Sampling Locations

Reviewed By	PAG	
Prepared By	KNR	Project No 48650-400
Drawn By	SAR	Figure No
Date	October 2023	2



Legend

-  Site Boundary
-  250m Study Area
-  Waterbody
-  Watercourses
- Physiographic Landforms**
-  3. Spillways
-  5. Till Plains (Undrumlinized)
-  6. Till Plains (Drumlinized)

Data Sources:
 Chapman, L.J. and Putnam, D.F. 2007. Physiography of southern Ontario; Ontario Geological Survey, Miscellaneous Release—Data 228.

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Scale (11x17): 1:20,000

Project CRS: NAD83 / UTM zone 17N



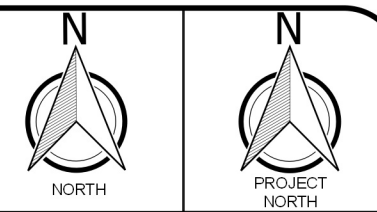
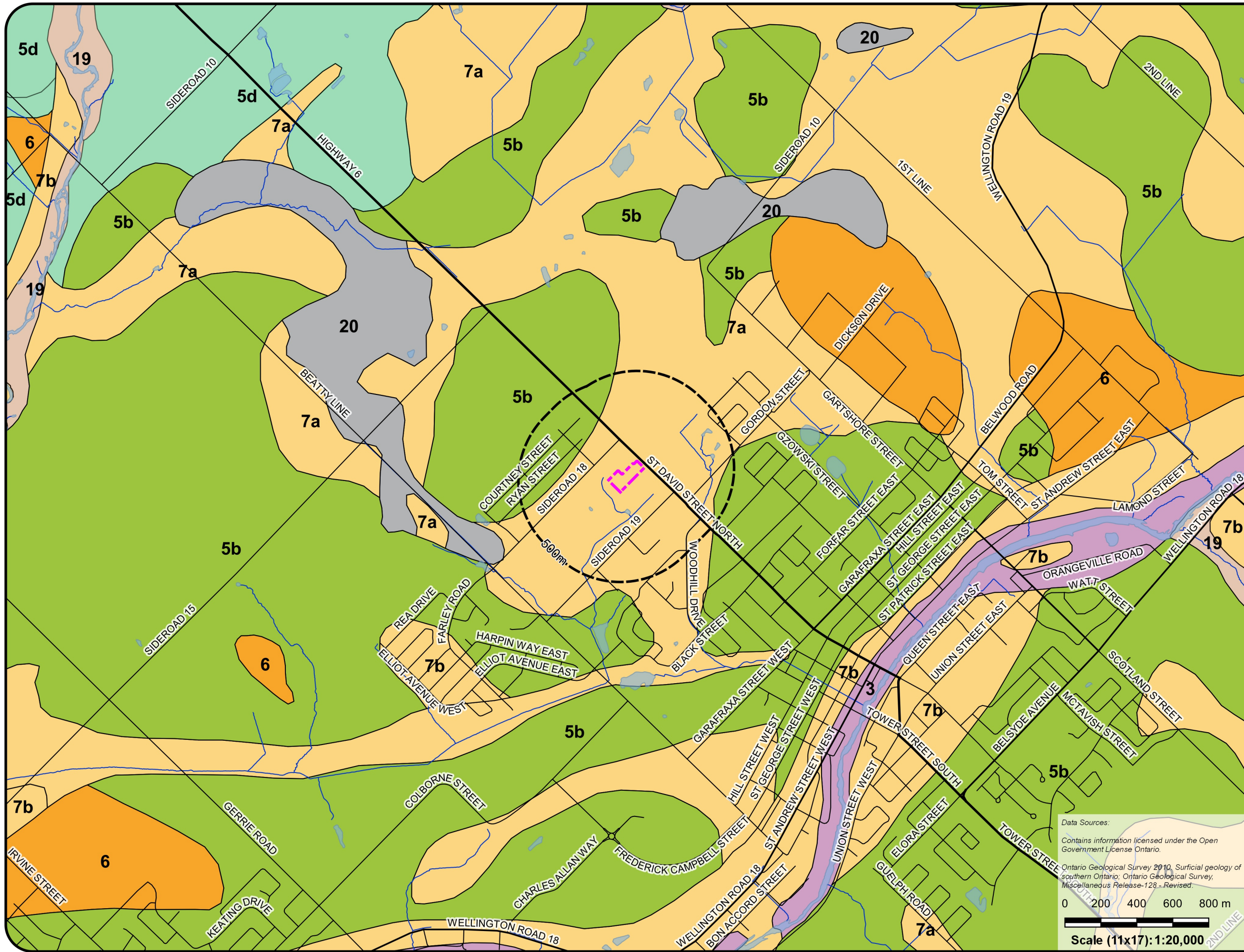
Client
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Project
 Preliminary Hydrogeological Investigation

Site
 961 St. David Street North, Fergus, Ontario

Title
 Physiographic Landforms

Reviewed By	PAG	Project No	48650-400
Prepared By	KNR	Figure No	3
Drawn By	SAR		
Date	September 2023		



Legend

- Site Boundary
- 250m Study Area
- Waterbody
- Watercourses
- Quaternary Geology**
- Quaternary
- 20. Organic Deposits: peat, muck, marl
- 19. Modern alluvial deposits: clay, silt, sand, gravel, may contain organic remains
- 7. Glaciofluvial deposits: river deposits and delta topset facies
- 7a. Sandy deposits
- 7b. Gravelly deposits
- 6. Ice-contact stratified deposit: sand and gravel, minor silt, clay and till
- 6. Ice-contact stratified deposit: sand and gravel, minor silt, clay and till
- 5. Till:
- 5b. Stone-poor, sandy silt to silty sand-textured till on Paleozoic terrain
- 5d. Clay to silt-textured till (derived from glaciolacustrine deposits or shale)
- Paleozoic
- 3. Paleozoic bedrock

Project CRS: NAD83 / UTM zone 17N



Client
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Project
Preliminary Hydrogeological Investigation

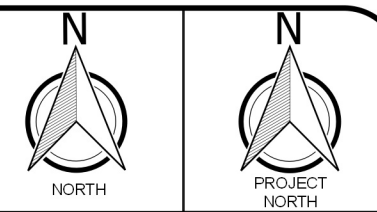
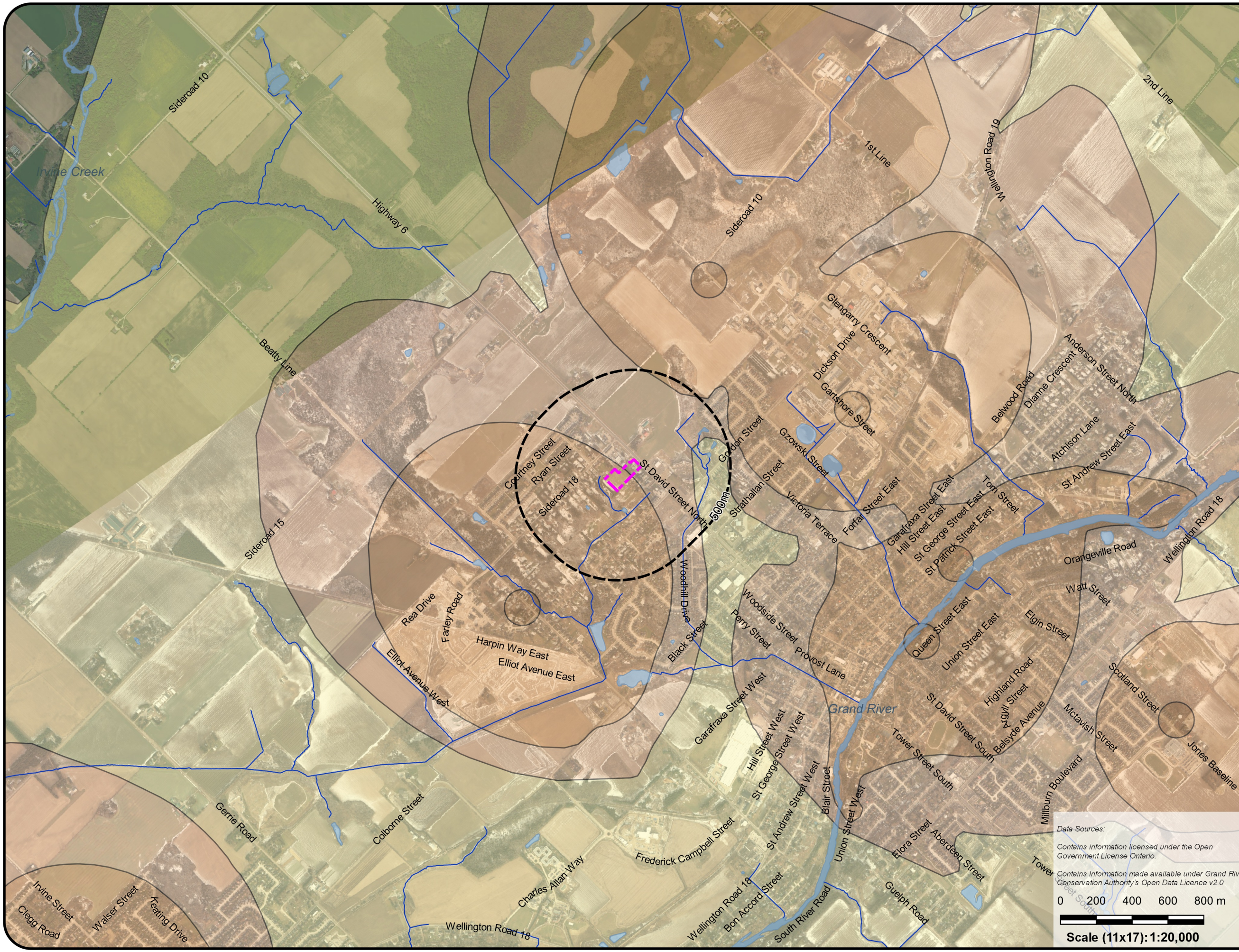
Site
961 St. David Street North, Fergus, Ontario

Title
Quaternary Geology

Reviewed By	PAG	Project No	48650-400
Prepared By	KNR	Figure No	4
Drawn By	SAR		
Date	September 2023		

Data Sources:
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Ontario Geological Survey 2010, Surficial geology of southern Ontario; Ontario Geological Survey, Miscellaneous Release-128 - Revised.

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Legend

- Site Boundary
 - 250m Study Area
 - Waterbody
 - Watercourses
- Wellhead Protection Area Zones**
- A - 100m Radius Exclusion Zone
 - B - 2 Year Travel Time
 - C - 5 Year Travel Time
 - D - 25 Year Travel Time

Project CRS: NAD83 / UTM zone 17N



Client
RE/MAX Real Estate Centre Inc.

Project
Preliminary Hydrogeological Investigation

Site
961 St. David Street North, Fergus, Ontario

Title
Source Water Protection Areas

Reviewed By	PAG	Project No	48650-400
Prepared By	KNR	Figure No	5
Drawn By	SAR	Date	September 2023

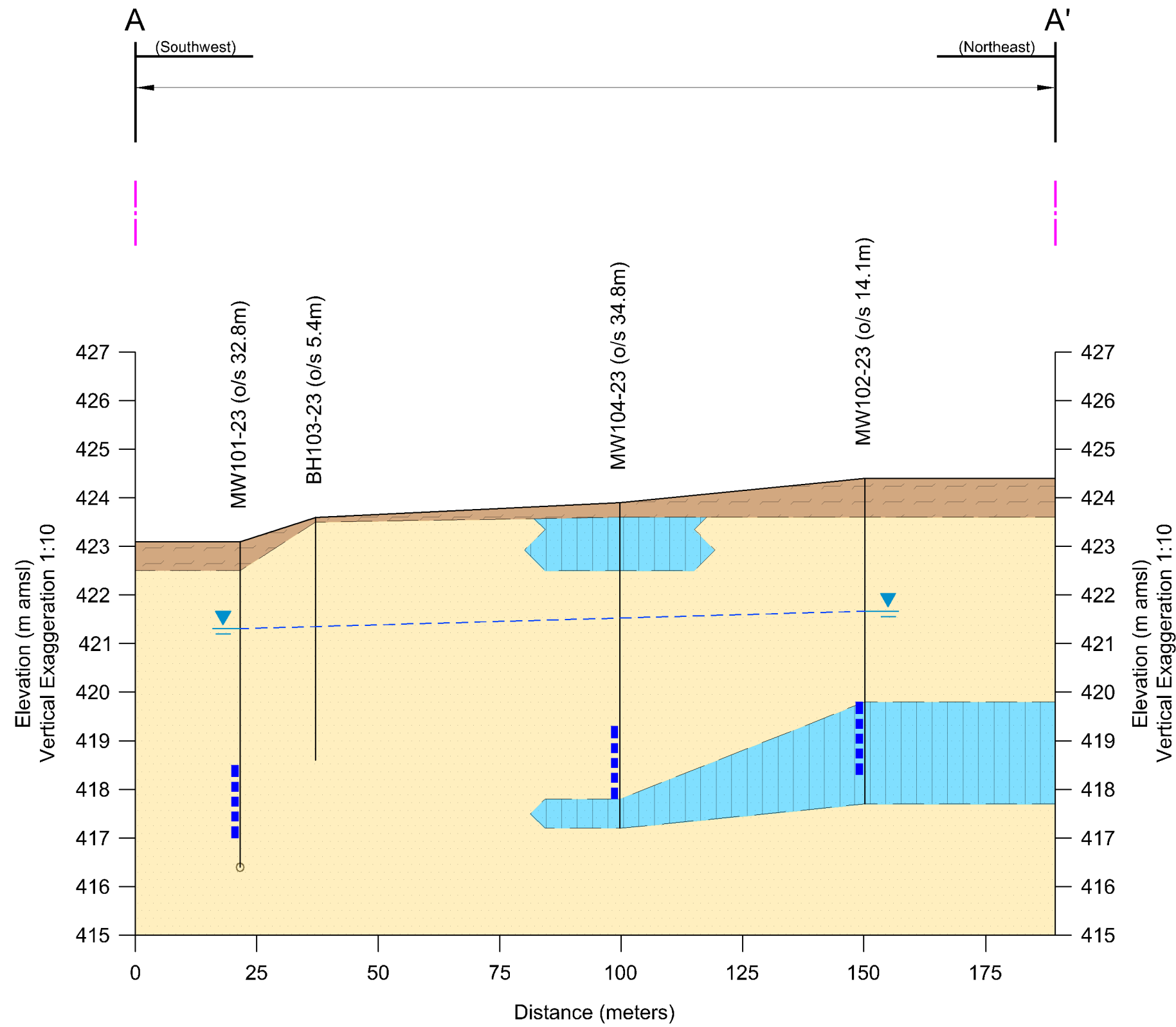
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Scale (11x17): 1:20,000



THIS FIGURE IS SCHEMATIC ONLY AND TO BE READ IN CONJUNCTION WITH ACCOMPANYING TEXT.

WIDTH OF BOREHOLES FOR ILLUSTRATION PURPOSES ONLY AND DO NOT CORRESPOND TO ACTUAL SPATIAL EXTENT.

THE SIMPLIFIED STRATIGRAPHY PRESENTED HEREIN IS BASED ON PROFESSIONAL INTERPRETATION FROM THE OVERBURDEN SEDIMENTS RECORDED DURING DRILLING, ACTUAL STRATIGRAPHY CONDITIONS MAY VARY BETWEEN AND BEYOND LOCATIONS. ALL LOCATIONS ARE APPROXIMATE.

LEGEND

- Interpreted Water Level
- Property Boundary

HYDROSTRATIGRAPHIC LEGEND





- Topsoil
- Sand
- Sandy Silt



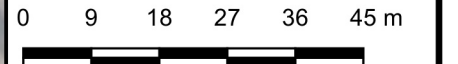
CLIENT	RE/MAX Real Estate Centre Inc.	
PROJECT	Preliminary Hydrogeological Investigation	
SITE	961 St. David Street North, Fergus, Ontario	
TITLE	Geological Cross-Section A-A'	
Reviewed By	PAG	
Prepared By	KNR	Project No. 48650-400
Drawn By	SGL	Figure No. 6
Date	October 2023	



Legend

-  Site Boundary
-  Watercourses
-  Groundwater Contours (0.2m Interval)
Groundwater Flow Direction (Interpreted)
-  Monitoring Well (Groundwater Elevation (mAMSL))

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Project CRS: NAD83 / UTM zone 17N



Client
RE/MAX Real Estate Centre Inc.

Project
Preliminary Hydrogeological Investigation

Site
961 St. David Street North, Fergus, Ontario

Title
Interpreted Groundwater Flow Map

Reviewed By	PAG	
Prepared By	KNR	Project No 48650-400
Drawn By	SAR	Figure No
Date	October 2023	7

Tables

Table 1: Manual Groundwater Measurements



Date	MW101-23		MW102-23		MW104-23	
	mBTOC	mAMSL	mBTOC	mAMSL	mBTOC	mAMSL
2023-07-26	2.80	421.34	3.82	421.73	3.74	421.17
2023-08-16	2.79	421.35	3.80	421.75	3.72	421.19
2023-09-12	2.83	421.31	3.88	421.67	3.80	421.11
2023-10-11	2.89	421.25	3.97	421.58	3.87	421.04

Notes: *mBTOC = metres below top of casing*
 mAMSL = metres above sea level

Table 2: MECP Water Well Record Summary



MECP Well No.	Easting	Northing	Year Drilled	Nominal Casing Diameter (mm)	Casing End (mBGS)	Drilling Method	Well Status	Well Use	Water Quality	First Water Found (mBGS)	Total Depth (mBGS)	Static Level (mBGS)	Rate (LPM)	Depth to Unit Base (m)	Colour	Material 1	Material 2	Material 3
6704053	548764.2	4840173	1971	787.4	5.2	Boring	Water Supply	Domestic	Fresh	3.7	5.18	3	54.6	0.3	Brown	Fill		
														3	Brown	Clay		
														3.7	Yellow	Gravel	Sand	
														5.2	Black	Coarse Sand	Gravel	
6704054	548814.2	4840223	1971	787.4	5.2	Boring	Water Supply	Domestic	Fresh	2.7	5.18	2.7	45.5	0.3	Brown	Fill		
														2.7	Brown	Clay		
														4	Black	Coarse Sand	Gravel	Stones
6704780	548884.2	4840173	1973	762	6.1	Boring	Water Supply	Domestic	Fresh	1.5	6.1	1.2	36.4	1.5	Brown	Clay		
														3.7	Brown	Sand	Gravel	
														6.1	Grey	Clay	Rock	
6705305	548847.2	4840324	1974	152.4	72.5	Cable Tool	Water Supply	Domestic	Fresh	72.5	72.54	23.8	159.1	3	Brown	Clay	Sand	Loose
														8.5	Brown	Sand	Loose	
														55.8	Grey	Clay	Gravel	Loose
														71.9	Grey	Sand	Loose	
														72.2	Grey	Gravel	Packed	
6706607	548964.2	4840373	1977	762	4.6	Boring	Water Supply	Domestic	Fresh	1.5	4.57	1.5	45.5	0.9	Brown	Fill		
														2.1	Brown	Sand		
														3.4	Brown	Gravel		
														4.6	Blue	Clay		
6707078	548864.2	4840273	1979	762	9.1	Boring	Water Supply	Domestic	Fresh	3.7	9.14	3.7	22.7	0.3		Topsoil		
														3	Brown	Clay	Stones	Sandy
														4.6	Brown	Sand	Gravel	
														8.5	Grey	Clay		
6709841	548967.2	4840317	1989	152.4	103.6	Rotary (Air)	Water Supply	Domestic	Fresh	73.2	103.63	29.6	68.2	9.1		Gravel	Sand	
														4		Gravel	Clay	
														14.3	Grey	Sand	Gravel	Silt
														39.6	Grey	Clay	Gravel	
														52.1	Grey	Sand	Gravel	
														60	Grey	Clay	Gravel	
														70.1	Brown	Quicksand		
														74.7	White	Limestone	Porous	
76.5	Brown	Limestone																
6710312	548548.2	4840490	1990	152.4	43	Rotary (Air)	Water Supply	Domestic	Fresh	35.1	42.98	22.6	45.5	97.8	White	Limestone		
														103.6	Brown	Limestone		
														10.7	Brown	Fine Sand		
														22.9	Brown	Clay	Sand	
														27.1	Brown	Clay	Gravel	
														43	Brown	Rock		

Table 2: MECP Water Well Record Summary



MECP Well No.	Easting	Northing	Year Drilled	Nominal Casing Diameter (mm)	Casing End (mBGS)	Drilling Method	Well Status	Well Use	Water Quality	First Water Found (mBGS)	Total Depth (mBGS)	Static Level (mBGS)	Rate (LPM)	Depth to Unit Base (m)	Colour	Material 1	Material 2	Material 3
6710432	548622.2	4840589	1990	127	41.1	Cable Tool	Water Supply	Domestic	Fresh	38.1	41.15	9.1	90.9	1.5	Brown	Clay		
														27.1		Sand		
														32	Brown	Limestone		
														41.1	Grey	Limestone		
6710780	548947.2	4840292	1991	127	93	Rotary (Convent.)	Water Supply	Domestic	Fresh	91.4	92.96	15.2	22.7	0.3		Topsoil		
														10.7	Brown	Clay	Sand	Stones
														33.5	Grey	Clay	Sand	Gravel
														54.9	Brown	Clay	Gravel	
														76.8	Grey	Clay	Sand	Gravel
6710877	548839.2	4840204	1991	127	96	Rotary (Convent.)	Water Supply	Domestic	Fresh	76.2	96.01	25.3	22.7	0.3	Black	Topsoil		
														1.8	Brown	Fill		
														8.5	Brown	Clay	Coarse Gravel	
														25.9	Grey	Clay	Stones	
														96	Grey	Rock		
6710878	548626.2	4840525	1991	127	51.8	Rotary (Convent.)	Water Supply	Domestic	Fresh	45.7	51.82	19.2	45.5	1.8	Brown	Fill		
														7.9	Brown	Clay	Coarse Gravel	
														27.7	Grey	Clay	Stones	
														51.8	Grey	Rock		
6710879	548516.2	4840413	1991	127	27.4	Rotary (Convent.)	Water Supply	Domestic	Fresh	45.7	54.86	10.7	45.5	1.2	Black	Topsoil	Fill	
														9.8	Brown	Clay	Fine Sand	
														26.8	Grey	Clay	Rock	
														54.9	Grey	Rock		
6711273	548538.2	4840372	1993	762	6.1	Boring	Water Supply	Domestic	Fresh	2.4	6.1	2.4	-	0.9	Brown	Clay		
														2.7	Grey	Sand	Fine Sand	
														6.1	Grey	Sand	Medium Sand	
6711379	548546.2	4840431	1994	762	5.8	Boring	Water Supply	Domestic	Fresh	2.7	5.79	2.7	-	0.3	Brown	Clay		
														0.6	Brown	Sand	Clay	Sandy
														2.7	Brown	Sand		
														4.3	Grey	Sand		
														5.8	Brown	Clay	Sandy	
6711725	548556.2	4840447	1995	838.2	4.6	Digging	Water Supply	Domestic	Fresh	3	4.57	3	45.5	3.7		Previously Dug		
														4.6	Brown	Sand	Stones	Coarse Sand
6711726	548513.2	4840457	1995	685.8	3.7	Digging	Water Supply	Domestic	Fresh	1.8	3.66	1.8	45.5	3		Previously Dug		
														3.7	Brown	Sand	Coarse Sand	
6712757	548483	4840347	1998	152.4	67.1	Rotary (Air)	Water Supply	Domestic	Fresh	48.8	67.06	20.4	45.5	9.1	Brown	Clay	Sand	
														26.5	Grey	Clay	Stones	
														67.1	Brown	Rock		

Table 2: MECP Water Well Record Summary



MECP Well No.	Easting	Northing	Year Drilled	Nominal Casing Diameter (mm)	Casing End (mBGS)	Drilling Method	Well Status	Well Use	Water Quality	First Water Found (mBGS)	Total Depth (mBGS)	Static Level (mBGS)	Rate (LPM)	Depth to Unit Base (m)	Colour	Material 1	Material 2	Material 3
6712890	548886	4840258	1999	152.4	96.9	Rotary (Air)	Water Supply	Domestic	Fresh	92	96.93	36	18.2	0.3		Topsoil		
														8.2	Brown	Clay		
														42.1	Grey	Clay		
														73.2	Brown	Clay	Silty	Gravel
														76.8	Brown	Limestone	Silt	
														96.9	Brown	Limestone		
6713384	548653	4840624	2000	152.4	-	Rotary (Convent.)	Water Supply	Domestic	Not Stated	51.8	59.74	27.1	27.3	8.8	Brown	Sand		
														15.8	Grey	Clay	Sand	
														25.6	Grey	Clay	Stones	
														29		Limestone		
														39.3	Grey	Limestone		
														50	Brown	Limestone		
														57.9	Brown	Limestone		
														59.7	Grey	Limestone		
6714246	548781.3	4840151	2002	152.4	-	Rotary (Air)	Water Supply	Domestic	Fresh	56.4	56.39	29.6	36.4	0.6	Black	Topsoil		
														25.6	Brown	Clay	Stones	
														26.5		Limestone	Soft	Fractured
														56.4		Limestone		
6714852	548814	4840415	2004	762	9.4	Boring	Water Supply	Domestic	Fresh	1.5	9.44	-	-	0.3	Brown	Topsoil		
														0.3	Brown	Topsoil		
														1.5	Brown	Sand		
														1.5	Brown	Sand		
														2.4	Brown	Sand		
														2.4	Brown	Sand		
														3	Grey	Sand		
														3	Grey	Sand		
														9.4	Grey	Clay	Stones	
														9.4	Grey	Clay	Stones	
6715971	548529	4840531	2006	50	1.8	Other Method	Test Hole	-	-	1.8	3.3	-	-	0.3	Brown	Topsoil		
														3.3	Brown	Sand	Silt	
6716005	548818	4840224	2006	158.7	101.2	Rotary (Convent.)	Water Supply	Domestic	Fresh	99.7	101.19	25.6	45.5	3.7	Brown	Clay	Gravel	
														11	Grey	Clay		
														24.1	Grey	Clay	Stones	
														30.8	Brown	Limestone		
														97.8	Grey	Limestone		
														101.2	Brown	Limestone		
7122270	548979	4840337	2009	51	4	Boring	Test Hole	Monitoring	Fresh	1.7	4	-	-	1.1	Brown	Sand	Gravel	Fill
														3.2	Brown	Silt	Clay	Dense
														4	Brown	Clay	Silt	Hard
7122270	548977	4840358	2009	-	1	-	Test Hole	Monitoring	-	-	4	-	-					
7122270	548983	4840341	2009	-	1	-	Test Hole	Monitoring	-	-	4	-	-					
7131004	548535	4840470	2008	-	3	-	Observation Wells	Monitoring	-	-	9.1	2.1	-					

Table 2: MECP Water Well Record Summary



MECP Well No.	Easting	Northing	Year Drilled	Nominal Casing Diameter (mm)	Casing End (mBGS)	Drilling Method	Well Status	Well Use	Water Quality	First Water Found (mBGS)	Total Depth (mBGS)	Static Level (mBGS)	Rate (LPM)	Depth to Unit Base (m)	Colour	Material 1	Material 2	Material 3
7131004	548661	4840608	-	-	6	-	Observation Wells	Monitoring	-	-	9.1	2.1	-					
7145117	548897	4840230	2010	51	-	Boring	Test Hole	Monitoring	-	2.8	3.7	-	-	0.6	Brown	Silt		
														1.9	Brown	Silt	Clay	Sand
														2.8	Brown	Sand	Gravel	
														3.6	Brown	Sand		
														3.7	Grey	Silt	Sand	Gravel
7145117	548896	4840231	2010	-	6	-	Test Hole	Monitoring	-	-	3.7	2.8	-					
7193783	548803	4840120	-	762	9.4	Boring	Water Supply	Domestic	Untested	3.4	9.45	4	45.5	4.9	Brown	Medium Sand		
														5.5	Brown	Clay		
														8.8	Grey	Clay		
														9.4	Grey	Fine Sand	Clay	Stones
7194462	548789	4840173	2012	914	0	-	Abandoned-Other	Domestic	-	-	-	-	-					
7203469	548460	4840552	2013	38	6	Driving	Observation Wells	Monitoring	-	-	7.6	-	-	7.6	Brown	Silt	Sand	Layered
7203472	548460	4840552	2013	38	2.1	Driving	Observation Wells	Monitoring	-	-	36	-	-	36	Brown	Sand	Silt	
7212222	548853	4840617	2013	-	-	-	-	-	-	-	-	-	-					
7217972	548672	4840605	2014	-	-	-	-	-	-	-	-	-	-					
7219366	548912	4840515	2014	50.8	2.1	Direct Push	Test Hole	Monitoring And Test Hole	-	-	4.57	-	-	1.2	Black			
														1.2	Brown	Fill		
														4.6	Brown	Clay	Silt	Till
7219367	548936	4840512	2014	50.8	2.1	Direct Push	Observation Wells	Monitoring And Test Hole	-	-	4.57	-	-	0.1	Black			
														0.9	Brown	Fill		
														4.6	Brown	Clay	Silt	Till
7223555	548853	4840517	2014	-	-	-	-	-	-	-	-	-	-					
7223954	548964	4840524	2014	38.1	0.9	Direct Push	Test Hole	Monitoring And Test Hole	-	-	3.66	-	-	3	Brown	Sand	Gravel	
														3.7	Brown	Silt	Sand	
7231008	548484	4840569	2014	-	-	-	Abandoned-Other	Monitoring	-	-	-	-	-					
7236871	548505	4840555	2015	50.8	2.7	Boring	Test Hole	Test Hole	Untested	3	4.27	-	-	4.3	Brown	Sand		
7241640	548758	4840116	2015	-	-	-	Abandoned-Other	-	-	-	-	-	-					
7246301	549067	4840533	-	38	1.2	Driving	-	Monitoring	-	-	2.7	-	-	2.7	Brown	Sand	Silt	
7246302	549027	4840477	-	38	3	-	-	-	-	-	4.5	-	-	4.5	Brown	Sand	Silt	Gravel
7262060	549067	4840533	2016	-	-	-	Abandoned-Other	-	-	-	-	-	-					
7262061	549027	4840477	2016	-	-	-	Abandoned-Other	-	-	-	-	-	-					
7270847	548882	4840322	2016	-	-	-	Abandoned-Other	Domestic	-	-	-	-	-					

Table 2: MECP Water Well Record Summary



MECP Well No.	Easting	Northing	Year Drilled	Nominal Casing Diameter (mm)	Casing End (mBGS)	Drilling Method	Well Status	Well Use	Water Quality	First Water Found (mBGS)	Total Depth (mBGS)	Static Level (mBGS)	Rate (LPM)	Depth to Unit Base (m)	Colour	Material 1	Material 2	Material 3
7270848	548932	4840297	2016	-	-	-	Abandoned-Other	Domestic	-	-	-	-	-					
7338945	548906	4840224	2019	-	-	-	Abandoned-Other	-	Untested	3.1	-	-	-					
7338946	548906	4840224	2019	-	-	-	Abandoned-Other	-	-	4.5	-	-	-					
7344061	548959	4840432	2019	51	0.9	Boring	Observation Wells	Monitoring	Untested	1.5	3.9	-	-	3.9	Grey	Silt	Clay	Dense
7344063	548988	4840446	2019	51	0.9	Boring	Observation Wells	Monitoring	Untested	1.5	3.9	-	-	2.1	Brown	Sand		Loose
														3.9	Grey	Silt	Clay	Dense
7344068	549033	4840377	2019	51	0.9	Boring	Observation Wells	Monitoring	-	-	3.3	-	-	1.5	Brown	Sand	Silt	Soft
														3.3	Grey	Silt	Sand	Soft
7344081	549067	4840393	2019	51	0.9	Boring	Observation Wells	Monitoring	Untested	1.2	3.9	-	-	2.7	Brown	Sand	Silt	Soft
														3.9	Brown	Silt	Sand	Soft
7344097	549007	4840408	2019	51	0.9	Boring	Observation Wells	Monitoring	Untested	1.5	3.9	-	-	2.1	Brown	Sand		Loose
														3.9	Grey	Silt	Clay	Dense
7346404	548411	4840396	2019	-	-	-	Abandoned-Quality	-	-	-	-	4	-					
7346405	548403	4840370	2019	-	-	-	Abandoned-Supply	-	-	-	-	3	-					
7357949	548404	4840377	2018	158.7	28	Rotary (Convent.)	Water Supply	Domestic	Fresh	30.5	47.24	9.1	45.5	0.6	Brown	Topsoil		
														7.9	Brown	Sand		Soft
														12.2	Brown	Clay	Sand	Soft
														27.4	Brown	Clay	Stones	Hard
														28	Brown	Limestone	Shale	Layered
														36	Brown	Limestone		Fractured
47.2	Blue	Limestone		Hard														
7368359	549046	4840355	2020	-	-	-	Abandoned-Other	-	-	-	-	-	-					
7368438	548419	4840393	2020	157.5	49.4	Rotary (Convent.)	Water Supply	Domestic	Untested	-	49.4	39.3	45	13.1	Brown	Clay	Sand	
														17.2	Grey	Clay	Fine Gravel	
														27.1	Grey	Clay	Gravel	Stones
														28.5	Grey	Limestone	Fractured	
														49.4	Grey	Limestone		
7377195	548868	4840510	2020	50.8	1.5	Direct Push	Observation Wells	Monitoring	-	-	3.05	-	-	3	Brown	Sand	Silt	
7377196	548771	4840550	2020	50.8	4.6	Direct Push	Observation Wells	Monitoring	-	-	6.1	-	-	5.2	Brown	Sand		
														6.1	Grey	Silt		
7405170	548962	4840315	2021	50	0.3	-	Abandoned-Other	-	Untested	1.1	-	-	-					
7405245	548972	4840467	2021	50.8	1.5	Auger	Observation Wells	Monitoring	-	-	4.57	-	-	1.8	Brown	Fill	Topsoil	
														3.8	Brown	Sand		
														4.6	Brown	Till	Clay	

Table 2: MECP Water Well Record Summary



MECP Well No.	Easting	Northing	Year Drilled	Nominal Casing Diameter (mm)	Casing End (mBGS)	Drilling Method	Well Status	Well Use	Water Quality	First Water Found (mBGS)	Total Depth (mBGS)	Static Level (mBGS)	Rate (LPM)	Depth to Unit Base (m)	Colour	Material 1	Material 2	Material 3
7405246	549067	4840585	2021	50.8	3	Auger	Observation Wells	Monitoring	-	-	6.1	-	-	0.9	Brown	Topsoil		
														1.8	Brown	Clay	Hard	
														6.1	Grey	Clay	Gravel	
7405247	549006	4840646	2021	50.8	2.3	Auger	Observation Wells	Monitoring	-	-	3.81	-	-	0.9	Brown	Topsoil		
														1.8	Brown	Clay	Hard	
														3.8	Grey	Clay	Till	Hard
7405248	548968	4840464	2021	50.8	6.1	Auger	Observation Wells	Monitoring	-	-	9.14	-	-	2.1	Brown	Fill	Topsoil	
														3	Brown	Sand		
														6.1	Brown	Till	Clay	
														9.1	Grey	Gravel		
7405249	548940	4840558	2021	50.8	1.5	Auger	Observation Wells	Monitoring	-	-	4.57	-	-	1.5	Brown	Fill		
														2.1	Brown	Clay		
														4.6	Brown	Sand	Silt	
7405250	548978	4840529	2021	50.8	1.5	Auger	Observation Wells	Monitoring	-	-	4.57	-	-	2.1	Brown	Fill	Topsoil	
														3.7	Brown	Sand		
														4.6	Brown	Till	Clay	
7405251	549003	4840506	2021	50.8	1.5	Auger	Observation Wells	Monitoring	-	-	4.57	-	-	1.8	Brown	Fill	Topsoil	
														3.8	Brown	Sand		
														4.6	Brown	Till	Clay	
7406148	548673	4840487	2021	-	-	-	-	-	-	-	-	-	-					
7417861	549013	4840377	2022	-	-	-	-	-	-	-	-	-	-					

**Table 3: Hydraulic Conductivity
Summary (m/sec)**



In-Situ Hydraulic Conductivity						
Monitoring Well	Ground Surface Elevation	Screened Interval (m bgs/ m amsl)	Soil Description	Hydraulic Conductivity (m/sec)	Method	Calculation
MW101-23	423.10	4.6 - 6.1 418.5 - 417.0	SAND, trace Silt and Clay	3.1×10^{-5}	Rising Head	Bouwer & Rice
MW102-23	424.40	4.6 - 6.1 419.8 - 418.3	Sandy SILT, trace Clay	1.3×10^{-5}	Rising Head	Bouwer & Rice
Particle Size Distribution						
Monitoring Well / Borehole Name	Ground Surface Elevation	Sample Identification and Depth (m bgs)	Screened Interval (m bgs/ m amsl)	Soil Description	Hydraulic Conductivity Range (m/sec)	Formula
MW101-23	423.10	SS-5 4.6-5.0	4.6 - 6.1 418.5 - 417.0	SAND, trace Silt and Clay	1.5×10^{-4}	Kozeny Carmen
MW102-23	424.40	SS-5 4.6-5.0	4.6 - 6.1 419.8 - 418.3	Sandy SILT, trace Clay	4.9×10^{-6}	Kozeny Carmen
MW104-23	423.90	SS-5 4.6-5.0	4.6 - 6.1 419.3 - 417.8	SAND, some Silt, trace Clay	3.9×10^{-5}	Kozeny Carmen

Table 4: Groundwater Analytical Results



Sample ID				MW102-23	MW104-23
Date Sampled				26-Jul-2023	26-Jul-2023
Time Sampled				12:50	12:35
ALS Sample ID				WT2322882-001	WT2322882-002
Parameter	Lowest Detection Limit	PWQO	Units		
Physical Tests (Water)					
Colour, Apparent	2.0	NV	CU	118	512
Conductivity	2.0	NV	umhos/cm	2440	2540
Hardness (as CaCO3)	0.5	NV	mg/L	540	868
pH	0.1	6.5-8.5	pH units	7.75	7.57
Total Dissolved Solids	10	NV	mg/L	1460	1630
Turbidity	0.1	NV	NTU	35.0	408
Anions and Nutrients (Water)					
Alkalinity, Total (as CaCO3)	2	NV	mg/L	296	327
Ammonia, Total (as N)	0.005	NV	mg/L	<0.0050	0.0236
Chloride (Cl)	0.5	NV	mg/L	581	547
Fluoride (F)	0.02	NV	mg/L	<0.100	<0.100
Nitrate (as N)	0.02	NV	mg/L	5.21	14.1
Nitrite (as N)	0.01	NV	mg/L	<0.050	<0.050
Orthophosphate-Dissolved (as P)	0.001	NV	mg/L	0.0053	<0.0010
Phosphorus (P)-total	0.002	0.01*	mg/L	0.0854	0.453
Sulfate (SO4)	0.3	NV	mg/L	23.0	108
Total Metals					
Aluminium (Al)-total	0.005	0.075*	mg/L	0.661	3.65
Antimony (Sb)-total	0.0001	0.02*	mg/L	<0.0010	<0.0010
Arsenic (As)-total	0.0001	0.10	mg/L	<0.0010	0.00197
Barium (Ba)-total	0.0001	NV	mg/L	0.0762	0.105
Beryllium (Be)-total	0.0001	1.10	mg/L	<0.00020	0.000201
Bismuth (Bi)-total	0.00005	NV	mg/L	<0.00050	<0.00050
Boron (B)-total	0.01	0.2*	mg/L	<0.10	<0.10
Cadmium (Cd)-total	0.00005	0.0002	mg/L	<0.000050	0.000112
Calcium (Ca)-total	0.05	NV	mg/L	162	268
Cesium (Cs)-total	0.00001	NV	mg/L	<0.00010	0.000369
Chromium (Cr)-total	0.0005	NV	mg/L	<0.0050	0.00605
Cobalt (Co)-total	0.0001	0.0009*	mg/L	<0.0010	0.00269
Copper (Cu)-total	0.0005	0.005*	mg/L	<0.0050	0.0108
Iron (Fe)-total	0.01	0.3	mg/L	1.05	6.23
Lead (Pb)-total	0.00005	0.025	mg/L	0.00138	0.00656
Lithium (Li)-total	0.001	NV	mg/L	<0.010	<0.010
Magnesium (Mg)-total	0.005	NV	mg/L	32.9	48.3
Manganese (Mn)-total	0.0005	NV	mg/L	0.0642	0.288
Molybdenum (Mo)-total	0.00005	0.04*	mg/L	<0.00050	<0.00050
Nickel (Ni)-total	0.0005	0.025	mg/L	<0.0050	0.00934
Phosphorus (P)-total	0.05	0.01*	mg/L	<0.50	0.592

Table 4: Groundwater Analytical Results



Sample ID				MW102-23	MW104-23
Date Sampled				26-Jul-2023	26-Jul-2023
Time Sampled				12:50	12:35
ALS Sample ID				WT2322882-001	WT2322882-002
Parameter	Lowest Detection Limit	PWQO	Units		
Potassium (K)-total	0.05	NV	mg/L	2.41	4.06
Rubidium (Rb)-total	0.0002	NV	mg/L	<0.0020	0.00550
Selenium (Se)-total	0.00005	0.10	mg/L	<0.00050	<0.00050
Silicon (Si)-total	0.1	NV	mg/L	6.86	10.9
Silver (Ag)-total	0.00005	0.0001	mg/L	<0.00010	<0.00010
Sodium (Na)-total	0.05	NV	mg/L	314	295
Strontium (Sr)	0.001	NV	mg/L	0.355	0.615
Sulfur (S)-total	0.5	NV	mg/L	7.54	38.1
Tellurium (Te)-total	0.0002	NV	mg/L	<0.0020	<0.0020
Thallium (Tl)-total	0.00001	0.0003*	mg/L	<0.00010	<0.00010
Thorium (Th)-total	0.0001	NV	mg/L	<0.0010	0.00141
Tin (Sn)-total	0.0001	NV	mg/L	<0.0010	<0.0010
Titanium (Ti)-total	0.0003	NV	mg/L	0.0282	0.144
Tungsten (W)-total	0.0001	0.03*	mg/L	<0.0010	<0.0010
Uranium (U)-total	0.00001	0.005*	mg/L	0.000434	0.000752
Vandium (V)-total	0.0005	0.006*	mg/L	<0.0050	0.0080
Zinc (Zn)-total	0.003	0.03	mg/L	<0.030	<0.030
Zirconium (Zr)-total	0.0002	0.004*	mg/L	<0.0020	0.00222
VOCs					
Benzene	0.50	100*	µg/L	<0.50	<0.50
Ethylbenzene	0.50	8*	µg/L	<0.50	<0.50
Toluene	0.50	0.8*	µg/L	<0.50	<0.50
Xylene, m+p-	0.40	2*	µg/L	<0.40	<0.40
Xylene, o-	0.30	40*	µg/L	<0.30	<0.30
Xylene, total	0.50	NV	µg/L	<0.50	<0.50
BTEX, total	1.0	NV	µg/L	<1.0	<1.0
Hydrocarbons					
F1 (C6-C10)	25	NV	µg/L	<25	<25
F2 (C10-C16)	100	NV	µg/L	<100	<100
F3 (C16-C34)	250	NV	µg/L	<250	<250
F4 (C34-C50)	250	NV	µg/L	<250	<250
F1-BTEX	25	NV	µg/L	<25	<25
Hydrocarbons, total (C6-C50)	240	NV	µg/L	<370	<370

PWQO = Provincial Water Quality Objectives

* - Interim PWQO

Bold and Highlighted = parameter exceeds PWQO

Appendix A

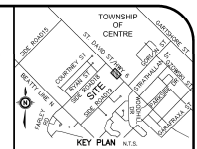
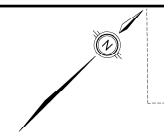
Site Concept Plan

LEGEND OF EXISTING FEATURES

- SITE BOUNDARY
- EXISTING CONTIGURS
- EXISTING BUILDING
- EXISTING OVERHEAD DOOR
- EXISTING HAN DOOR
- EXISTING FENCE
- EXISTING BOLLARD

LEGEND OF PROPOSED FEATURES

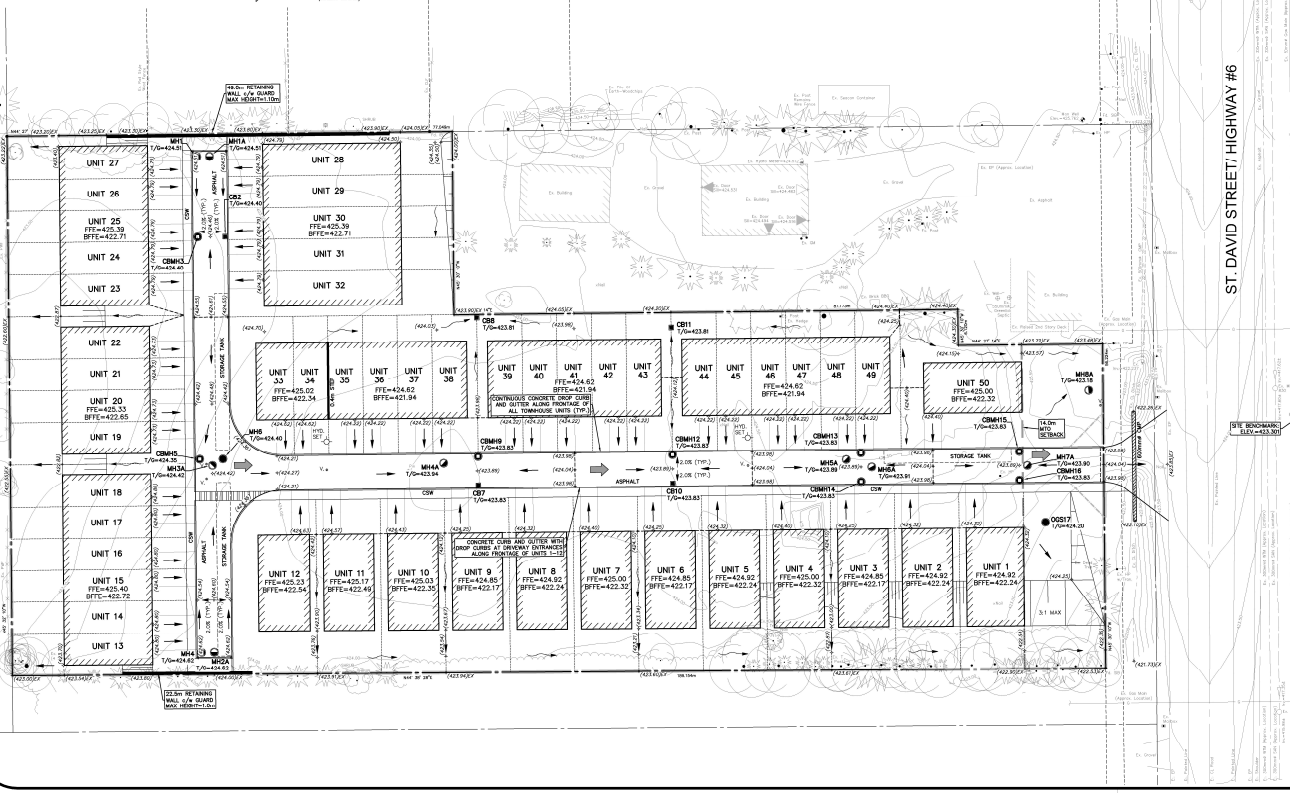
- PROPOSED SPLIT ELEVATIONS
- PROPOSED DRAINAGE/GRABE
- DRAINAGE SPLIT (RIDGE)
- CONCRETE CURB
- RETAINING WALL
- DRAINAGE (SLOPE AS NOTED)
- UNDERGROUND SANITARIAN OVERLAIN FLOW ROUTE (DRAINAGE DITCH)



GEODETIC BM ELEV. = 399.32m
 1" = 10' HORIZONTAL SCALE, 1" = 10' VERTICAL SCALE (UNDER 100' HORIZONTAL DISTANCE)
SITE BENCHMARK ELEV. = 423.30m
 1" = 10' HORIZONTAL SCALE, 1" = 10' VERTICAL SCALE (UNDER 100' HORIZONTAL DISTANCE)

NOTE TO CONTRACTOR
 DO NOT SCALE DRAWINGS.
 CONTRACTORS MUST CHECK AND VERIFY ALL DIMENSIONS AND LOCATIONS AND DISCREPANCIES TO THE ENGINEER BEFORE ALL WORK BEGINS. THE PROPERTY OF THE ENGINEER SHALL NOT BE RESPONSIBLE FOR ERRORS MADE BY THE CONTRACTOR WITHOUT THE ENGINEER'S WRITTEN PERMISSION.

- NOTES:**
- PROPERTY-LINE IS APPROXIMATE ONLY.
 - INVERTS IDENTIFIED WITH "I" AND SERVICES INFORMATION ARE TAKEN FROM SANITARIAN AND PROFILE DRAWINGS COMPLETED BY TRISTON ENGINEERING SERVICES LIMITED DATED MARCH 2000 AND ARE CONSIDERED APPROXIMATE ONLY. CONTRACTOR TO FIELD VERIFY AND REPORT ANY DISCREPANCIES TO ENGINEER.



ST. DAVID STREET/HIGHWAY #6

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MTE
 Engineers, Scientists, Surveyors
 519-743-6500

OWNER
 2687734 ONTARIO INC.
 961 ST. DAVID STREET NORTH

FUNCTIONAL SITE GRADING PLAN

PROJECT MANAGER: J. LERCH
DESIGN BY: NGK
DRAWN BY: SWH/SJC
CHECKED BY: MTE
DATE: Feb. 12/21

CLIENT: 48650-100
CHECKED BY: JPL
DRAWN BY: NGK
CHECKED BY: NGK
DATE: Feb. 12/21

Scale: 1" = 30'0"

Sheet: 2 of 3

Appendix B

Borehole Logs

ID No.: MW101-23

Project Name: 961 St. David Street North Geotechnical Investigation

MTE File No.: 48650-300

Client: 2687734 Ontario Inc.

Site Location: 961 St. David Street North, Fergus, ON

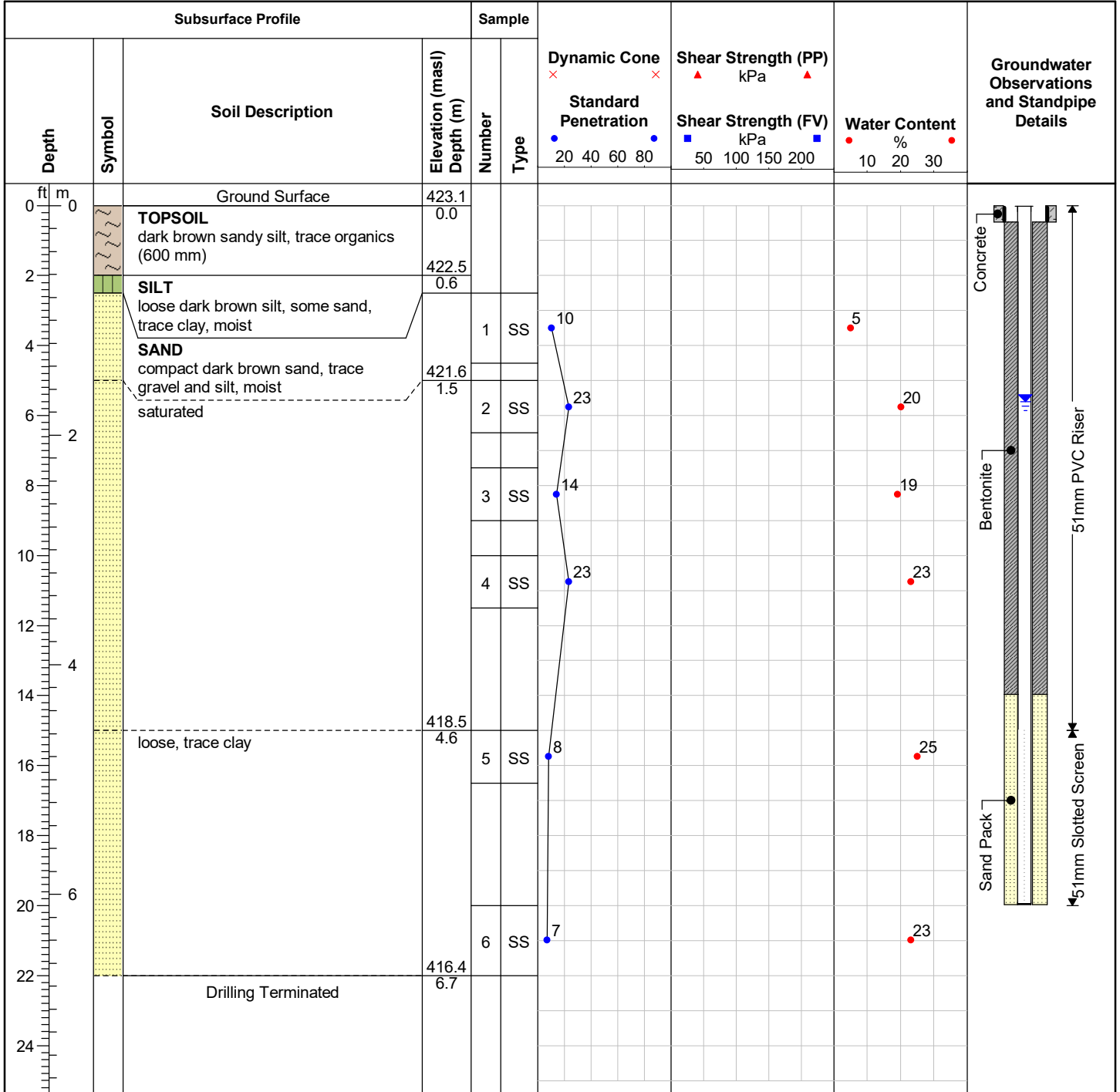
Date Completed: 6/27/2023

Drilling Contractor: London Soil Test Ltd.

Drill Rig: CME75 Track Mounted

Drill Method: Hollow Stem Augers

Protective Cover: Monument Casing



Field Technician: C. McCulla

Drafted by: A. Challis

Reviewed by: K. Rundle Drake



Sheet: 1 of 1

Notes:

Water encountered at 1.5 mbgs during drilling.
Water measured at 1.7 mbgs (Elevation 421.4 masl) on August 16, 2023.

ID No.: MW102-23

Project Name: 961 St. David Street North Geotechnical Investigation

MTE File No.: 48650-300

Client: 2687734 Ontario Inc.

Site Location: 961 St. David Street North, Fergus, ON

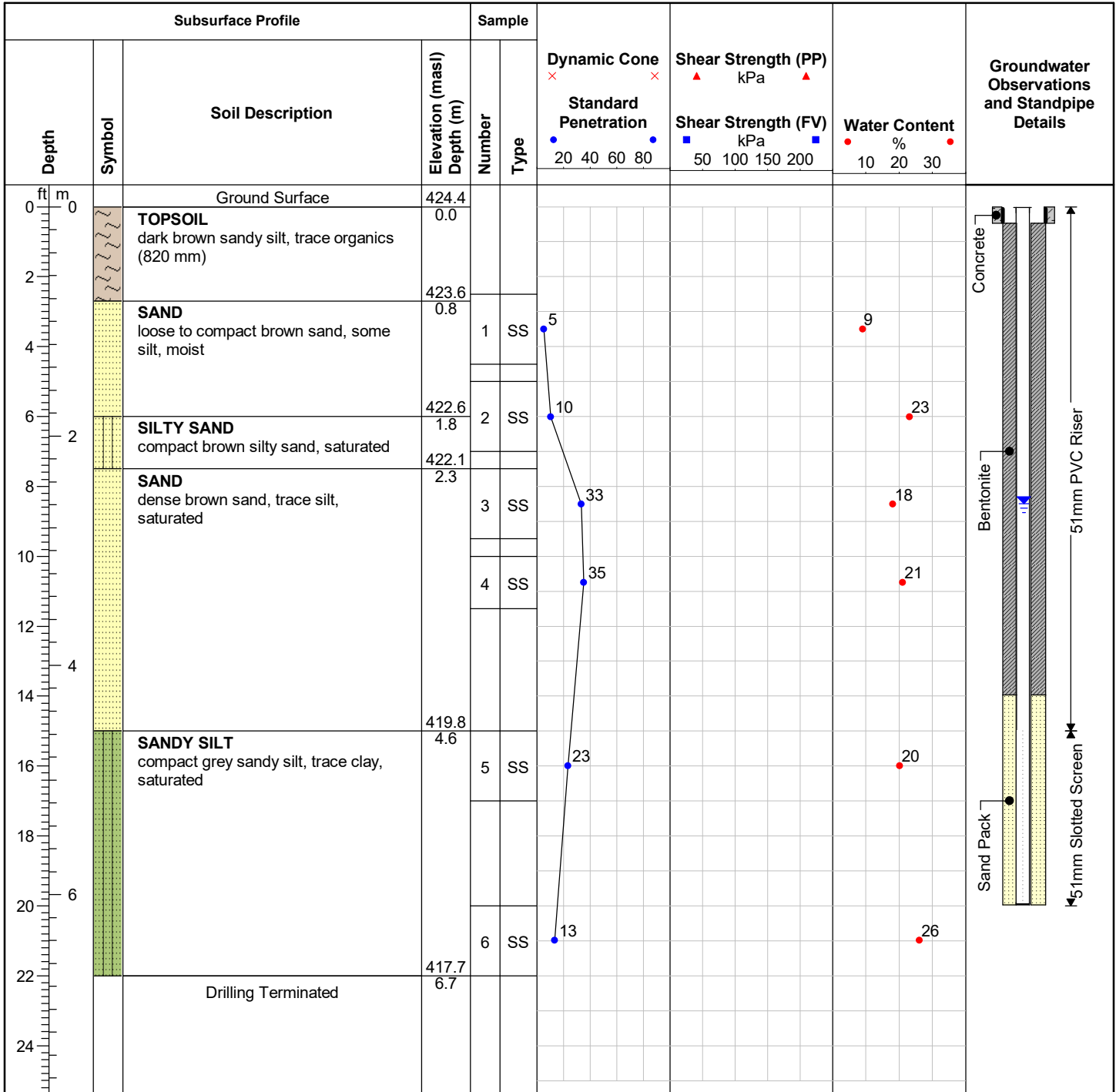
Date Completed: 6/27/2023

Drilling Contractor: London Soil Test Ltd.

Drill Rig: CME75 Track Mounted

Drill Method: Hollow Stem Augers

Protective Cover: Monument Casing



Field Technician: C. McCulla

Drafted by: A. Challis

Reviewed by: K. Rundle Drake



Sheet: 1 of 1

Notes:

Water encountered at 1.8 mbgs during drilling.
Water measured at 2.6 mbgs (Elevation 421.8 masl) on August 16, 2023.

ID No.: BH103-23

Date Completed: 6/27/2023

Project Name: 961 St. David Street North Geotechnical Investigation

Drilling Contractor: London Soil Test Ltd.

MTE File No.: 48650-300

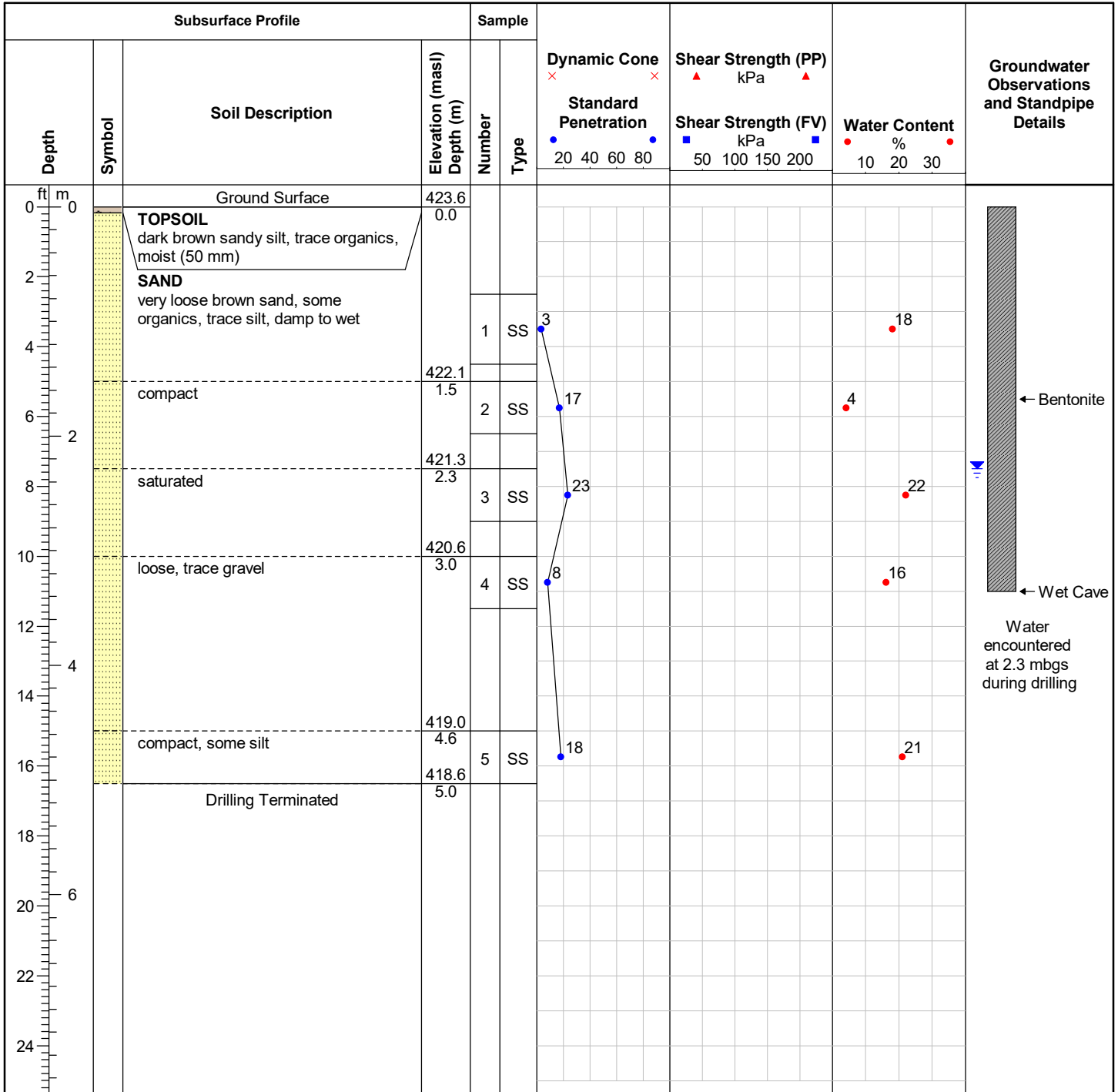
Drill Rig: CME75 Track Mounted

Client: 2687734 Ontario Inc.

Drill Method: Hollow Stem Augers

Site Location: 961 St. David Street North, Fergus, ON

Protective Cover: N/A



Field Technician: C. McCulla

Drafted by: A. Challis

Reviewed by: K. Rundle Drake



ID No.: MW104-23

Project Name: 961 St. David Street North Geotechnical Investigation

MTE File No.: 48650-300

Client: 2687734 Ontario Inc.

Site Location: 961 St. David Street North, Fergus, ON

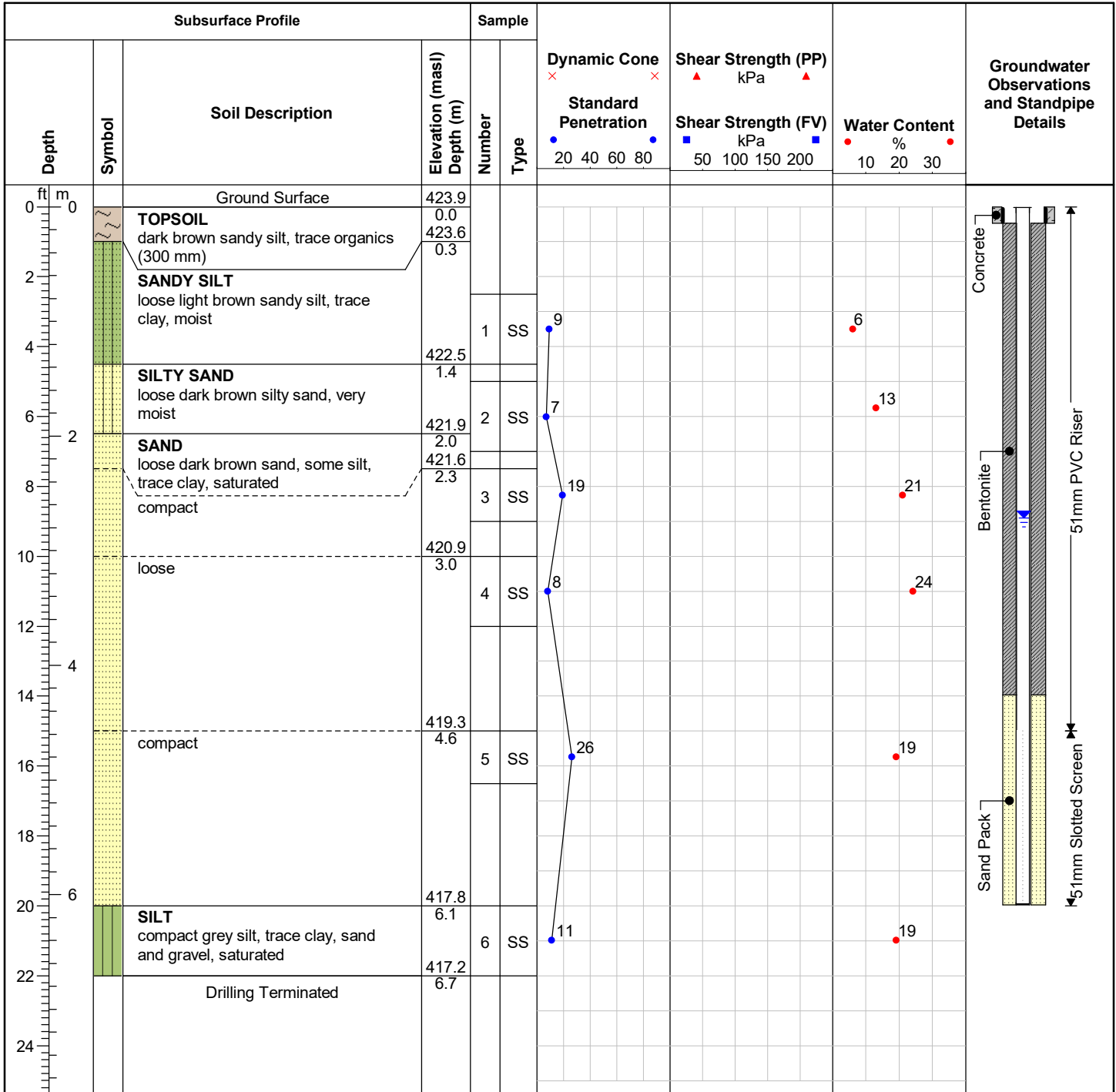
Date Completed: 6/27/2023

Drilling Contractor: London Soil Test Ltd.

Drill Rig: CME75 Track Mounted

Drill Method: Hollow Stem Augers

Protective Cover: Monument Casing



Field Technician: C. McCulla

Drafted by: A. Challis

Reviewed by: K. Rundle Drake



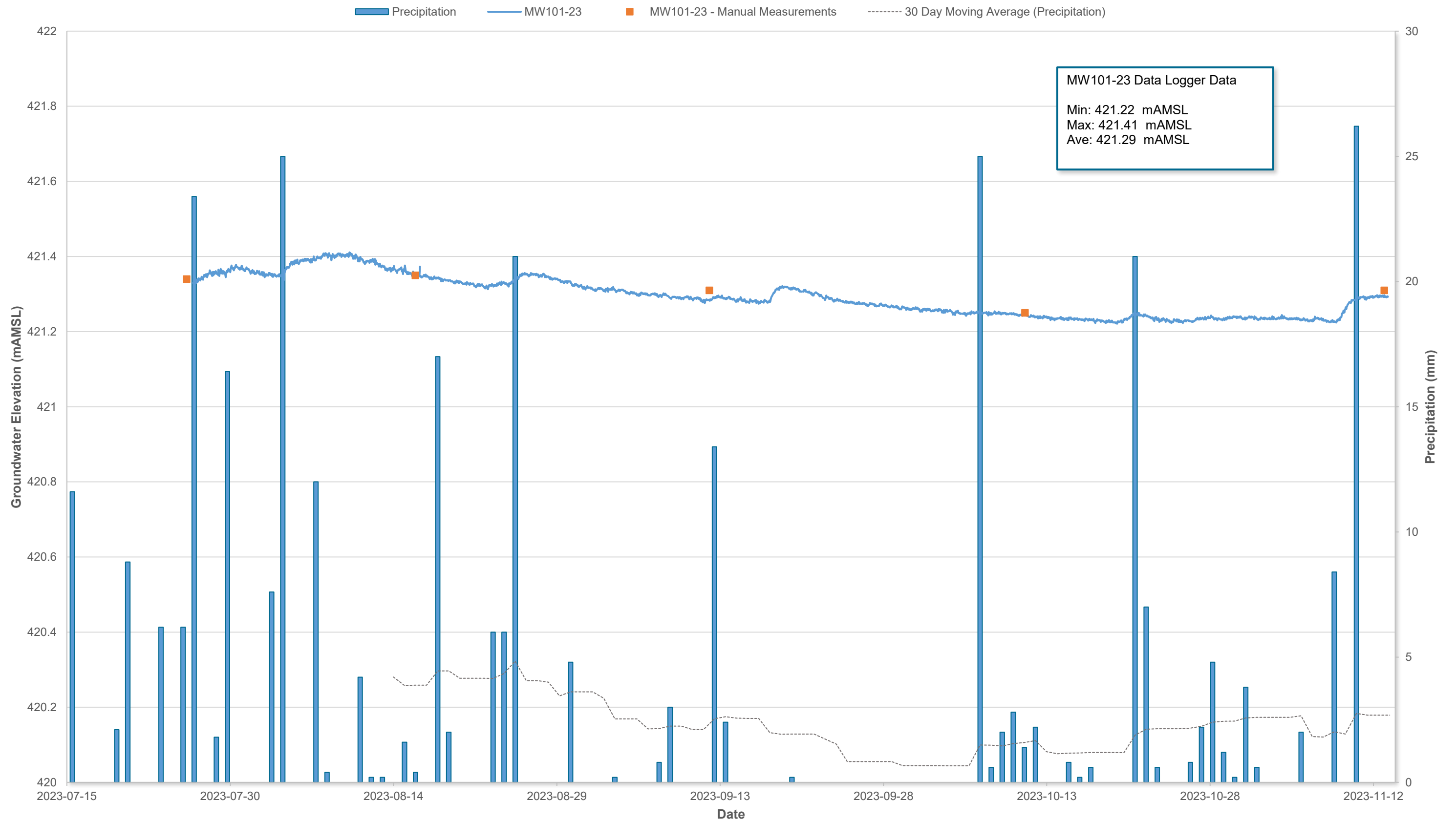
Notes:

Water encountered 2.0 mbgs during drilling. Water measured at 2.7 mbgs (Elevation 421.2 masl) on August 16, 2023.

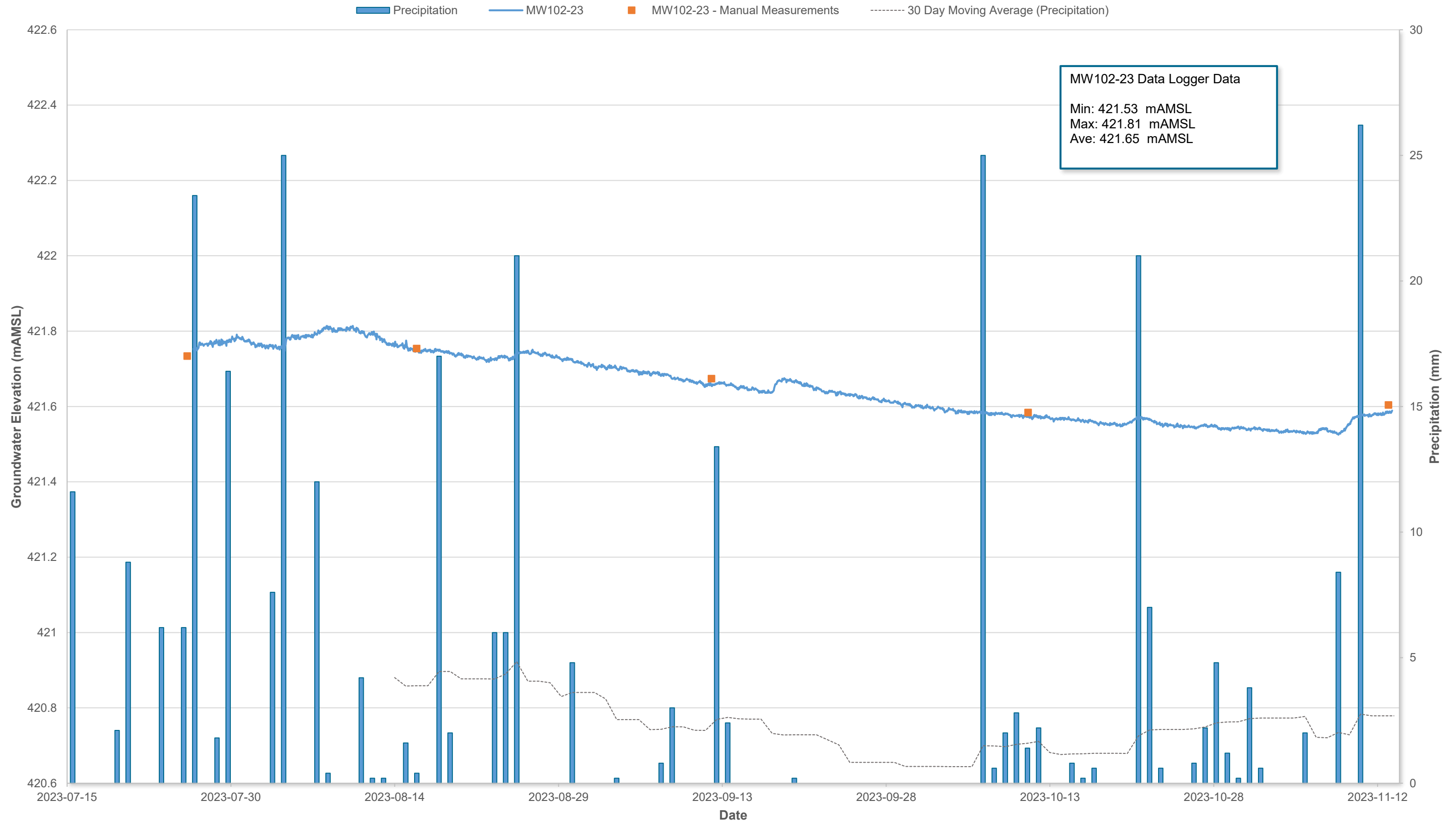
Appendix C

Hydrographs

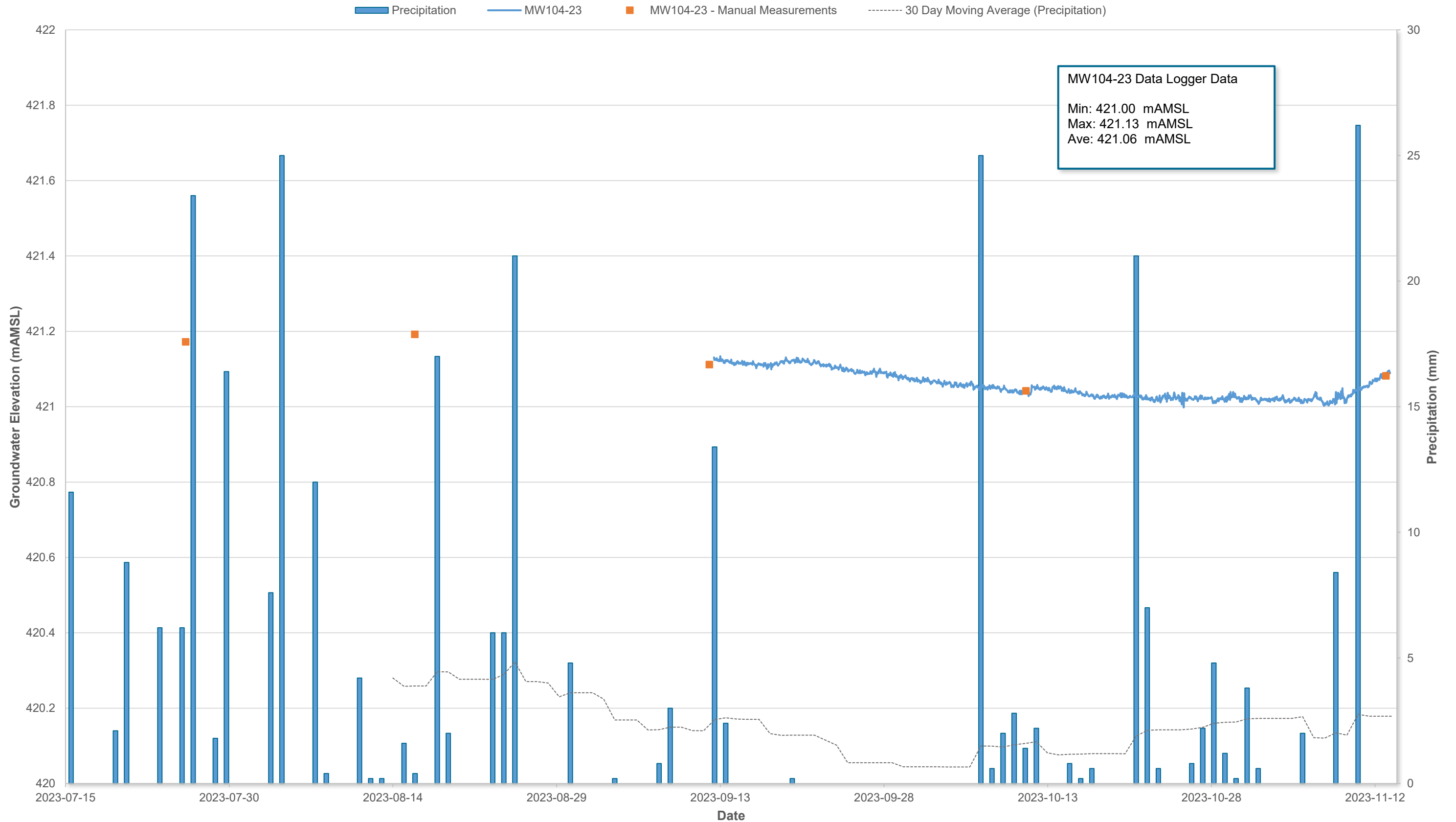
Hydrograph 1: Groundwater Elevations (mAMSL) - MW101-23



Hydrograph 2: Groundwater Elevations (mAMSL) - MW102-23



Hydrograph 3: Groundwater Elevations (mAMSL) - MW104-23



Appendix D

AquiferTest Results



MTE Consultants Inc.
 520 Bingemans Centre Drive
 Kitchener, ON
 N2B 3X9

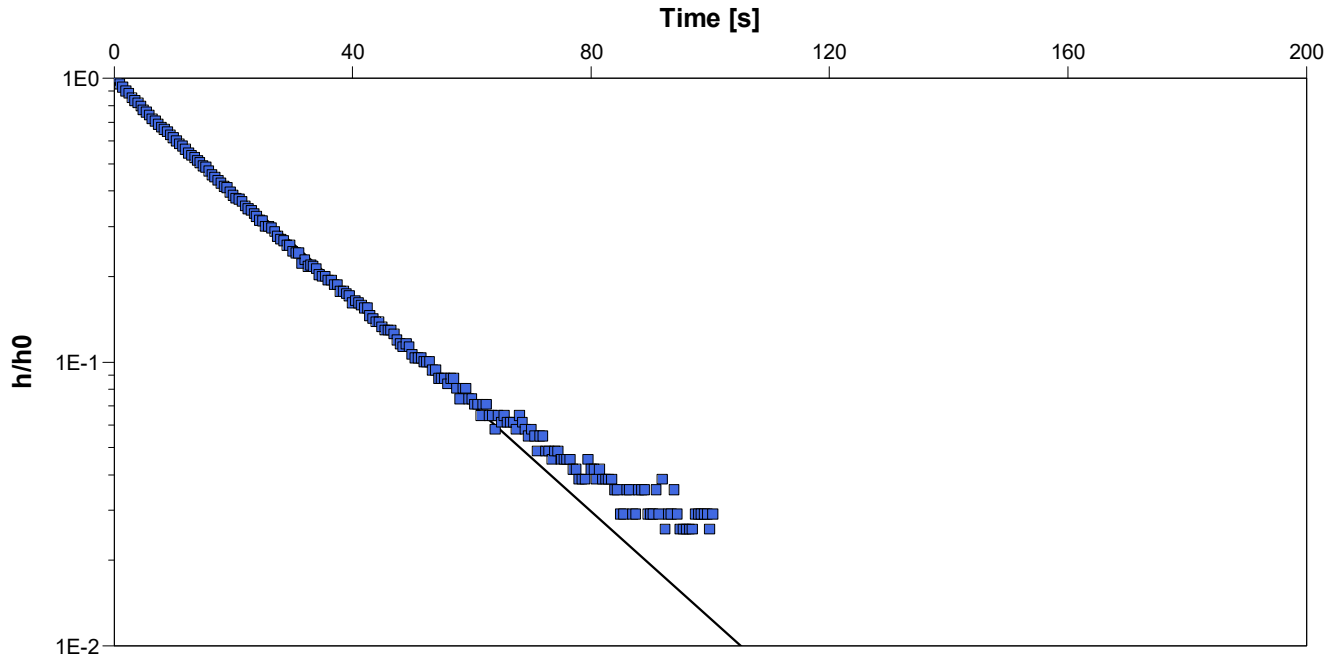
Slug Test Analysis Report

Project: 961 St. David Street North

Number: 48650-400

Client: Re/Max Real Estate Centre Inc.

Location: Fergus, Ontario	Slug Test: MW101-23 Rising Head	Test Well: MW101-23
Test Conducted by: ALC		Test Date: 8/16/2023
Analysis Performed by: KNR	Bouwer & Rice	Analysis Date: 8/25/2023
Aquifer Thickness: 6.00 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
MW101-23	3.14×10^{-5}	



MTE Consultants Inc.
520 Bingham Centre Drive
Kitchener, ON
N2B 3X9

Slug Test Analysis Report

Project: 961 St. David Street North

Number: 48650-400

Client: Re/Max Real Estate Centre Inc.

Location: Fergus, Ontario

Slug Test: MW102-23 Rising Head

Test Well: MW102-23

Test Conducted by: ALC

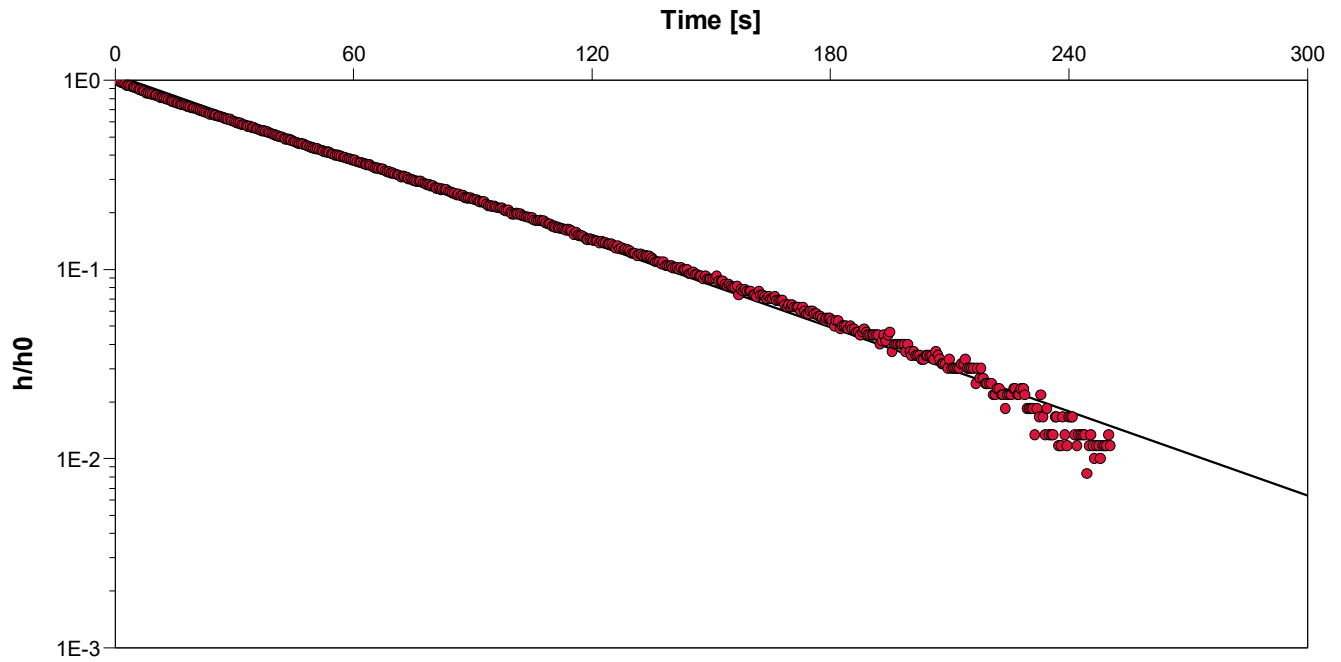
Test Date: 8/16/2023

Analysis Performed by: KNR

Bouwer & Rice

Analysis Date: 8/25/2023

Aquifer Thickness: 6.70 m



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
MW102-23	1.26×10^{-5}	

Appendix E

Particle Size Distribution and Hydraulic Conductivity Estimates



Particle Size Distribution Analysis Test Results

Project Name: 961 St. David Street North Investigation

Date Sampled: June 27, 2023

MTE File No.: 48650-300

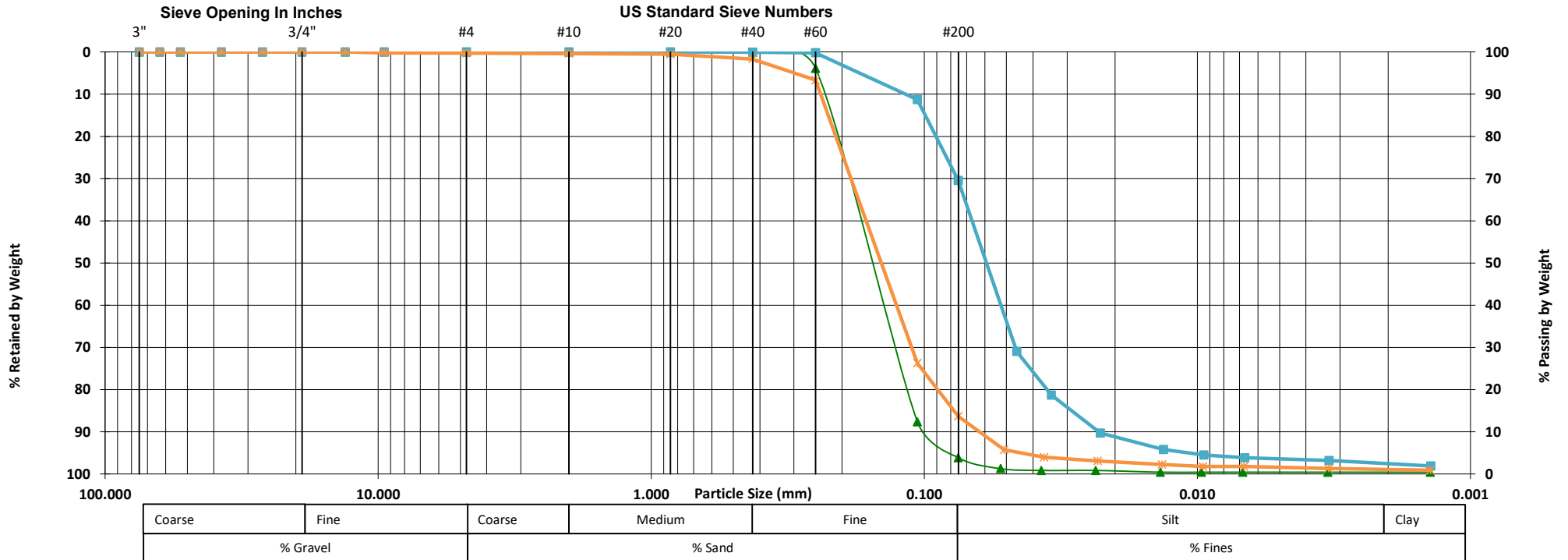
Client: 2687734 Ontario Inc.

Date Tested: July 5 - July 6, 2023

Table No: 101

Project Location: Fergus, ON

Unified Soil Classification



Symbol	Borehole ID	Sample #	Sample Depth	Description
▲	MW101-23	SS-5	4.6-5.0 mbgs	SAND, trace Silt and Clay
■	MW102-23	SS-5	4.6-5.0 mbgs	Sandy SILT, trace Clay
✱	MW104-23	SS-5	4.6-5.0 mbgs	SAND, some Silt, trace Clay



NOTES:

Hydraulic Conductivity and Porosity from Particle Size Distribution Analysis



Well ID	Sample ID	Depth Top (m)	Depth Bottom (m)	Soil Description	Grain Size at which 10% is finer (mm) d_{10}	Grain size at which 60% is finer (mm) d_{60}	% passing .02mm sieve % P_1	% passing .06mm sieve % P_2	Soil State Description (-) SSD	Hazen Coefficient (-) C	Uniformity Index ¹ (-) $C_u = d_{60}/d_{10}$	Porosity ² (-) $n=0.255(1+0.83^{C_u})$	Hydraulic Conductivity ³ (m/sec)						
													Hazen ³	Beyer ³	Kozeny-Carmen ³	Wang ³	Kaubisch ⁴	MacDonald ⁵	Geometric Mean
MW101-23	SS-5	4.6	5.0	SAND, trace Silt and Clay	0.11	0.18	1	2	2	100	1.6	0.443	1.2E-04	3.4E-04	1.5E-04	1.8E-04	N/A	4.4E-05	1.4E-04
MW102-23	SS-5	4.6	5.0	Sandy SILT, trace Clay	0.024	0.068	8	50	4	100	2.8	0.405	N/A	N/A	4.9E-06	N/A	N/A	2.3E-06	3.4E-06
MW104-23	SS-5	4.6	5.0	SAND, some Silt, trace Clay	0.065	0.17	3	9	3	100	2.6	0.412	N/A	1.1E-04	3.9E-05	6.6E-05	N/A	1.2E-05	4.3E-05

N/A The formula is not appropriate to use for grain size distribution of the sample

Hazen Formula:

$$K = Cd_{10}^2$$

Where:

- K Hydraulic conductivity (cm/sec)
- d_{10} Grain size at which 10% is finer (cm)
- C Coefficient as follows:

Very fine sand, poorly sorted	40-80
Fine sand with appreciable fines	40-80
Medium sand, well sorted	80-120
Coarse sand, poorly sorted	80-120
Coarse sand, well sorted	120-150

Applicability: where $0.1 < d_{10} < 3.0$ mm

Beyer Formula:

$$K = 6 \times 10^{-4} \frac{g}{\nu} \ln \left(\frac{500}{C_u} \right) d_{10}^2$$

Where:

- K Hydraulic conductivity (m/sec)
- g Gravitational acceleration (9.8 m/s²)
- ν Kinematic viscosity of water (1.2×10^{-6} m²/s)
- d_{10} Grain size at which 10% is finer (m)

Applicability: where $0.06 < d_{10} < 0.6$ mm AND $C_u \leq 20$

Kozeny-Carmen Formula:

$$K = \frac{1}{180} \frac{g}{\nu} \left(\frac{n^3}{(1-n)^2} \right) d_{10}^2$$

Where:

- K Hydraulic conductivity (m/sec)
- g Gravitational acceleration (9.8 m/s²)
- ν Kinematic viscosity of water (1.2×10^{-6} m²/s)
- d_{10} Grain size at which 10% is finer (m)

Applicability: where $d_{10} < 3.0$ mm AND $P_1 < 20\%$

Wang Et Al. Formula:

$$K = 2.9 \times 10^{-3} \frac{g}{\nu} \left(\log \frac{gd_{60}^3}{\nu^2} \right)^{-1} d_{10}^2$$

Where:

- K Hydraulic conductivity (m/sec)
- g Gravitational acceleration (9.8 m/s²)
- ν Kinematic viscosity of water (1.2×10^{-6} m²/s)
- d_{10} Grain size at which 10% is finer (m)
- d_{60} Grain size at which 60% is finer (m)

Applicability: where $0.05 < d_{10} < 0.83$ mm, $0.09 < d_{60} < 4.29$ mm, AND $1.3 < CU < 18.3\%$

Kaubisch Formula:

$$K = 10^{0.0005P_2^2 - 0.12P_2 - 3.59}$$

Where:

- K Hydraulic conductivity (m/sec)
- P_2 percent passing .06mm sieve

Applicability: where $5 < C_u < 400$ AND $10\% < P_2 < 60\%$

MacDonald Formula:

$$K = 10^{0.79 \log d_{10}^{\frac{1}{2}} + (2.1 - 0.38SSD)}$$

Where:

- K Hydraulic conductivity (m/day)
 - d_{10} Grain size at which 10% is finer (mm)
 - SSD Soil State Description as follows
- | | |
|------------------------|---|
| Very loose, very soft | 1 |
| Loose, soft | 2 |
| Medium dense, medium | 3 |
| Dense, stiff | 4 |
| Very dense, very stiff | 5 |

Applicability: where $0.001 < d_{10} < 0.715$ mm

¹ Craig, R.F. 1992. "Soil Mechanics, Fifth Edition". Chapman and Hill.

² Vukovic, M., and Soro, A. 1992. "Determination of Hydraulic Conductivity of Porous Media from Grain-Size Composition"

³ Duffield, G.M. "Representative Values of Hydraulic Properties" http://www.aqtesolv.com/aquifer-tests/aquifer_properties.htm

⁴ Cai, Jialiang, Taute, Thomas, Hamann, Enrico, and Schneider, Michael. 2013. "An Integrated Laboratory Method to Measure and Verify Directional Hydraulic conductivity in Fine-to-Medium Sandy Sediments". Groundwater.

⁵ MacDonald, A.M., Maurice, L., Dobbs, M.R., Reeves, H.J. & Auton, C.A. 2012. Relating in situ hydraulic conductivity, particle size and relative density of superficial deposits in a heterogeneous catchment. Journal of Hydrology 434-435, 130-141.

Appendix F

Laboratory Certificates of Analysis





CERTIFICATE OF ANALYSIS

<p>Work Order : WT2322882</p> <p>Client : MTE Consultants Inc.</p> <p>Contact : Kyle Reed</p> <p>Address : 520 Bingemans Centre Drive Kitchener ON Canada N2B 3X9</p> <p>Telephone : 519 743 6500</p> <p>Project : 48650-300</p> <p>PO : ----</p> <p>C-O-C number : 20-955728</p> <p>Sampler : TXG</p> <p>Site : ----</p> <p>Quote number : Standing Offer 2023</p> <p>No. of samples received : 2</p> <p>No. of samples analysed : 2</p>	<p>Page : 1 of 5</p> <p>Laboratory : ALS Environmental - Waterloo</p> <p>Account Manager : Emily Hansen</p> <p>Address : 60 Northland Road, Unit 1 Waterloo ON Canada N2V 2B8</p> <p>Telephone : +1 519 886 6910</p> <p>Date Samples Received : 26-Jul-2023 14:05</p> <p>Date Analysis Commenced : 26-Jul-2023</p> <p>Issue Date : 01-Aug-2023 14:07</p>
--	--

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
- Surrogate Control Limits

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.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Jeremy Gingras	Team Leader - Semi-Volatile Instrumentation	Organics, Waterloo, Ontario
John Tang	Lab Analyst	Inorganics, Waterloo, Ontario
Jon Fisher	Production Manager, Environmental	Inorganics, Waterloo, Ontario
Jon Fisher	Production Manager, Environmental	Metals, Waterloo, Ontario
Sarah Birch	VOC Section Supervisor	VOC, 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).

<i>Unit</i>	<i>Description</i>
-	no units
µg/L	micrograms per litre
µS/cm	microsiemens per centimetre
CU	colour units (1 cu = 1 mg/l pt)
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.

Qualifiers

<i>Qualifier</i>	<i>Description</i>
DLDS	<i>Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.</i>
DLHC	<i>Detection Limit Raised: Dilution required due to high concentration of test analyte(s).</i>
OWP	<i>Organic water sample contained visible sediment (must be included as part of analysis). Measured concentrations of organic substances in water can be biased high due to presence of sediment.</i>



Analytical Results

Sub-Matrix: Water					Client sample ID				
(Matrix: Water)					MW 102-23	MW 104-23	----	----	----
Client sampling date / time					26-Jul-2023 12:50	26-Jul-2023 12:35	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	WT2322882-001	WT2322882-002	-----	-----	-----
					Result	Result	---	---	---
Physical Tests									
Colour, apparent	---	E330/WT	2.0	CU	118	512 ^{DLHC}	---	---	---
Conductivity	---	E100/WT	2.0	µS/cm	2440	2540	---	---	---
Hardness (as CaCO3), from total Ca/Mg	---	EC100A/WT	0.50	mg/L	540	868	---	---	---
pH	---	E108/WT	0.10	pH units	7.75	7.57	---	---	---
Solids, total dissolved [TDS]	---	E162/WT	10	mg/L	1460 ^{DLDS}	1630 ^{DLDS}	---	---	---
Turbidity	---	E121/WT	0.10	NTU	35.0	408	---	---	---
Alkalinity, total (as CaCO3)	---	E290/WT	2.0	mg/L	296	327	---	---	---
Anions and Nutrients									
Ammonia, total (as N)	7664-41-7	E298/WT	0.0050	mg/L	<0.0050	0.0236	---	---	---
Chloride	16887-00-6	E235.Cl/WT	0.50	mg/L	581 ^{DLDS}	547 ^{DLDS}	---	---	---
Fluoride	16984-48-8	E235.F/WT	0.020	mg/L	<0.100 ^{DLDS}	<0.100 ^{DLDS}	---	---	---
Nitrate (as N)	14797-55-8	E235.NO3/WT	0.020	mg/L	5.21 ^{DLDS}	14.1 ^{DLDS}	---	---	---
Nitrite (as N)	14797-65-0	E235.NO2/WT	0.010	mg/L	<0.050 ^{DLDS}	<0.050 ^{DLDS}	---	---	---
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/WT	0.0010	mg/L	0.0053	<0.0010	---	---	---
Phosphorus, total	7723-14-0	E372-U/WT	0.0020	mg/L	0.0854	0.453	---	---	---
Sulfate (as SO4)	14808-79-8	E235.SO4/WT	0.30	mg/L	23.0 ^{DLDS}	108 ^{DLDS}	---	---	---
Total Metals									
Aluminum, total	7429-90-5	E420/WT	0.0030	mg/L	0.661 ^{DLHC}	3.65 ^{DLHC}	---	---	---
Antimony, total	7440-36-0	E420/WT	0.00010	mg/L	<0.00100 ^{DLHC}	<0.00100 ^{DLHC}	---	---	---
Arsenic, total	7440-38-2	E420/WT	0.00010	mg/L	<0.00100 ^{DLHC}	0.00197 ^{DLHC}	---	---	---
Barium, total	7440-39-3	E420/WT	0.00010	mg/L	0.0762 ^{DLHC}	0.105 ^{DLHC}	---	---	---
Beryllium, total	7440-41-7	E420/WT	0.000020	mg/L	<0.000200 ^{DLHC}	0.000201 ^{DLHC}	---	---	---
Bismuth, total	7440-69-9	E420/WT	0.000050	mg/L	<0.000500 ^{DLHC}	<0.000500 ^{DLHC}	---	---	---
Boron, total	7440-42-8	E420/WT	0.010	mg/L	<0.100 ^{DLHC}	<0.100 ^{DLHC}	---	---	---
Cadmium, total	7440-43-9	E420/WT	0.0000050	mg/L	<0.0000500 ^{DLHC}	0.000112 ^{DLHC}	---	---	---
Calcium, total	7440-70-2	E420/WT	0.050	mg/L	162 ^{DLHC}	268 ^{DLHC}	---	---	---
Cesium, total	7440-46-2	E420/WT	0.000010	mg/L	<0.000100 ^{DLHC}	0.000369 ^{DLHC}	---	---	---
Chromium, total	7440-47-3	E420/WT	0.00050	mg/L	<0.00500 ^{DLHC}	0.00605 ^{DLHC}	---	---	---
Cobalt, total	7440-48-4	E420/WT	0.00010	mg/L	<0.00100 ^{DLHC}	0.00269 ^{DLHC}	---	---	---
Copper, total	7440-50-8	E420/WT	0.00050	mg/L	<0.00500 ^{DLHC}	0.0108 ^{DLHC}	---	---	---



Analytical Results

Sub-Matrix: Water					Client sample ID	MW 102-23	MW 104-23	----	----	----
(Matrix: Water)					Client sampling date / time	26-Jul-2023 12:50	26-Jul-2023 12:35	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	WT2322882-001	WT2322882-002	-----	-----	-----	
					Result	Result	----	----	----	
Total Metals										
Iron, total	7439-89-6	E420/WT	0.010	mg/L	1.05 ^{DLHC}	6.23 ^{DLHC}	----	----	----	
Lead, total	7439-92-1	E420/WT	0.000050	mg/L	0.00138 ^{DLHC}	0.00656 ^{DLHC}	----	----	----	
Lithium, total	7439-93-2	E420/WT	0.0010	mg/L	<0.0100 ^{DLHC}	<0.0100 ^{DLHC}	----	----	----	
Magnesium, total	7439-95-4	E420/WT	0.0050	mg/L	32.9 ^{DLHC}	48.3 ^{DLHC}	----	----	----	
Manganese, total	7439-96-5	E420/WT	0.00010	mg/L	0.0642 ^{DLHC}	0.288 ^{DLHC}	----	----	----	
Molybdenum, total	7439-98-7	E420/WT	0.000050	mg/L	<0.000500 ^{DLHC}	<0.000500 ^{DLHC}	----	----	----	
Nickel, total	7440-02-0	E420/WT	0.00050	mg/L	<0.00500 ^{DLHC}	0.00934 ^{DLHC}	----	----	----	
Phosphorus, total	7723-14-0	E420/WT	0.050	mg/L	<0.500 ^{DLHC}	0.592 ^{DLHC}	----	----	----	
Potassium, total	7440-09-7	E420/WT	0.050	mg/L	2.41 ^{DLHC}	4.06 ^{DLHC}	----	----	----	
Rubidium, total	7440-17-7	E420/WT	0.00020	mg/L	<0.00200 ^{DLHC}	0.00550 ^{DLHC}	----	----	----	
Selenium, total	7782-49-2	E420/WT	0.000050	mg/L	<0.000500 ^{DLHC}	<0.000500 ^{DLHC}	----	----	----	
Silicon, total	7440-21-3	E420/WT	0.10	mg/L	6.86 ^{DLHC}	10.9 ^{DLHC}	----	----	----	
Silver, total	7440-22-4	E420/WT	0.000010	mg/L	<0.000100 ^{DLHC}	<0.000100 ^{DLHC}	----	----	----	
Sodium, total	7440-23-5	E420/WT	0.050	mg/L	314 ^{DLHC}	295 ^{DLHC}	----	----	----	
Strontium, total	7440-24-6	E420/WT	0.00020	mg/L	0.355 ^{DLHC}	0.615 ^{DLHC}	----	----	----	
Sulfur, total	7704-34-9	E420/WT	0.50	mg/L	7.54 ^{DLHC}	38.1 ^{DLHC}	----	----	----	
Tellurium, total	13494-80-9	E420/WT	0.00020	mg/L	<0.00200 ^{DLHC}	<0.00200 ^{DLHC}	----	----	----	
Thallium, total	7440-28-0	E420/WT	0.000010	mg/L	<0.000100 ^{DLHC}	<0.000100 ^{DLHC}	----	----	----	
Thorium, total	7440-29-1	E420/WT	0.00010	mg/L	<0.00100 ^{DLHC}	0.00141 ^{DLHC}	----	----	----	
Tin, total	7440-31-5	E420/WT	0.00010	mg/L	<0.00100 ^{DLHC}	<0.00100 ^{DLHC}	----	----	----	
Titanium, total	7440-32-6	E420/WT	0.00030	mg/L	0.0282 ^{DLHC}	0.144 ^{DLHC}	----	----	----	
Tungsten, total	7440-33-7	E420/WT	0.00010	mg/L	<0.00100 ^{DLHC}	<0.00100 ^{DLHC}	----	----	----	
Uranium, total	7440-61-1	E420/WT	0.000010	mg/L	0.000434 ^{DLHC}	0.000752 ^{DLHC}	----	----	----	
Vanadium, total	7440-62-2	E420/WT	0.00050	mg/L	<0.00500 ^{DLHC}	0.00799 ^{DLHC}	----	----	----	
Zinc, total	7440-66-6	E420/WT	0.0030	mg/L	<0.0300 ^{DLHC}	<0.0300 ^{DLHC}	----	----	----	
Zirconium, total	7440-67-7	E420/WT	0.00020	mg/L	<0.00200 ^{DLHC}	0.00222 ^{DLHC}	----	----	----	
Volatile Organic Compounds										
Benzene	71-43-2	E611A/WT	0.50	µg/L	<0.50	<0.50 ^{OWP}	----	----	----	
Ethylbenzene	100-41-4	E611A/WT	0.50	µg/L	<0.50	<0.50 ^{OWP}	----	----	----	
Toluene	108-88-3	E611A/WT	0.50	µg/L	<0.50	<0.50 ^{OWP}	----	----	----	
Xylene, m+p-	179601-23-1	E611A/WT	0.40	µg/L	<0.40	<0.40 ^{OWP}	----	----	----	



Analytical Results

Sub-Matrix: Water					Client sample ID	MW 102-23	MW 104-23	----	----	----
(Matrix: Water)					Client sampling date / time	26-Jul-2023 12:50	26-Jul-2023 12:35	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	WT2322882-001	WT2322882-002	-----	-----	-----	
					Result	Result	----	----	----	
Volatile Organic Compounds										
Xylene, o-	95-47-6	E611A/WT	0.30	µg/L	<0.30	<0.30 ^{OWP}	----	----	----	
Xylenes, total	1330-20-7	E611A/WT	0.50	µg/L	<0.50	<0.50	----	----	----	
BTEX, total	----	E611A/WT	1.0	µg/L	<1.0	<1.0	----	----	----	
Hydrocarbons										
F1 (C6-C10)	----	E581.F1-L/WT	25	µg/L	<25	<25 ^{OWP}	----	----	----	
F2 (C10-C16)	----	E601.SG/WT	100	µg/L	<100	<100	----	----	----	
F3 (C16-C34)	----	E601.SG/WT	250	µg/L	<250	<250	----	----	----	
F4 (C34-C50)	----	E601.SG/WT	250	µg/L	<250	<250	----	----	----	
F1-BTEX	----	EC580/WT	25	µg/L	<25	<25	----	----	----	
Hydrocarbons, total (C6-C50)	----	EC581SG/WT	240	µg/L	<370	<370	----	----	----	
Chromatogram to baseline at nC50	n/a	E601.SG/WT	-	-	YES	YES	----	----	----	
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (F2-F4 surrogate)	392-83-6	E601.SG/WT	1.0	%	81.9	83.8	----	----	----	
Dichlorotoluene, 3,4-	95-75-0	E581.F1-L/WT	1.0	%	94.4	90.4	----	----	----	
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A/WT	1.0	%	88.1	89.4	----	----	----	
Difluorobenzene, 1,4-	540-36-3	E611A/WT	1.0	%	98.2	97.2	----	----	----	

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.



QUALITY CONTROL INTERPRETIVE REPORT

<p>Work Order : WT2322882</p> <p>Client : MTE Consultants Inc.</p> <p>Contact : Kyle Reed</p> <p>Address : 520 Bingemans Centre Drive Kitchener ON Canada N2B 3X9</p> <p>Telephone : 519 743 6500</p> <p>Project : 48650-300</p> <p>PO : ----</p> <p>C-O-C number : 20-955728</p> <p>Sampler : TXG</p> <p>Site : ----</p> <p>Quote number : Standing Offer 2023</p> <p>No. of samples received : 2</p> <p>No. of samples analysed : 2</p>	<p>Page : 1 of 13</p> <p>Laboratory : ALS Environmental - Waterloo</p> <p>Account Manager : Emily Hansen</p> <p>Address : 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8</p> <p>Telephone : +1 519 886 6910</p> <p>Date Samples Received : 26-Jul-2023 14:05</p> <p>Issue Date : 01-Aug-2023 14:08</p>
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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 Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Method Blank value 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)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers occur - please see following pages for full details.



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
Method Blank (MB) Values								
Total Metals	QC-1058349-001	----	Magnesium, total	7439-95-4	E420	0.0096 ^B mg/L	0.005 mg/L	Blank result exceeds permitted value

Result Qualifiers

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.



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 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 : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) [ON MECP] MW 102-23	E298	26-Jul-2023	27-Jul-2023	28 days	1 days	✔	27-Jul-2023	27 days	0 days	✔
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) [ON MECP] MW 104-23	E298	26-Jul-2023	27-Jul-2023	28 days	1 days	✔	27-Jul-2023	27 days	0 days	✔
Anions and Nutrients : Chloride in Water by IC										
HDPE [ON MECP] MW 102-23	E235.Cl	26-Jul-2023	28-Jul-2023	28 days	2 days	✔	31-Jul-2023	26 days	3 days	✔
Anions and Nutrients : Chloride in Water by IC										
HDPE [ON MECP] MW 104-23	E235.Cl	26-Jul-2023	28-Jul-2023	28 days	2 days	✔	31-Jul-2023	26 days	3 days	✔
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE [ON MECP] MW 102-23	E378-U	26-Jul-2023	27-Jul-2023	7 days	1 days	✔	27-Jul-2023	6 days	0 days	✔
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE [ON MECP] MW 104-23	E378-U	26-Jul-2023	27-Jul-2023	7 days	1 days	✔	27-Jul-2023	6 days	0 days	✔



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group 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 : Fluoride in Water by IC										
HDPE [ON MECP] MW 102-23	E235.F	26-Jul-2023	28-Jul-2023	28 days	2 days	✓	31-Jul-2023	26 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE [ON MECP] MW 104-23	E235.F	26-Jul-2023	28-Jul-2023	28 days	2 days	✓	31-Jul-2023	26 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE [ON MECP] MW 102-23	E235.NO3	26-Jul-2023	28-Jul-2023	7 days	2 days	✓	31-Jul-2023	5 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE [ON MECP] MW 104-23	E235.NO3	26-Jul-2023	28-Jul-2023	7 days	2 days	✓	31-Jul-2023	5 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE [ON MECP] MW 102-23	E235.NO2	26-Jul-2023	28-Jul-2023	7 days	2 days	✓	31-Jul-2023	5 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE [ON MECP] MW 104-23	E235.NO2	26-Jul-2023	28-Jul-2023	7 days	2 days	✓	31-Jul-2023	5 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE [ON MECP] MW 102-23	E235.SO4	26-Jul-2023	28-Jul-2023	28 days	2 days	✓	31-Jul-2023	26 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE [ON MECP] MW 104-23	E235.SO4	26-Jul-2023	28-Jul-2023	28 days	2 days	✓	31-Jul-2023	26 days	3 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) [ON MECP] MW 102-23	E372-U	26-Jul-2023	27-Jul-2023	28 days	1 days	✓	28-Jul-2023	27 days	1 days	✓



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group 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 : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) [ON MECP] MW 104-23	E372-U	26-Jul-2023	27-Jul-2023	28 days	1 days	✓	28-Jul-2023	27 days	1 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID (Low Level)										
Glass vial (sodium bisulfate) MW 102-23	E581.F1-L	26-Jul-2023	27-Jul-2023	14 days	1 days	✓	27-Jul-2023	13 days	0 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID (Low Level)										
Glass vial (sodium bisulfate) MW 104-23	E581.F1-L	26-Jul-2023	27-Jul-2023	14 days	1 days	✓	27-Jul-2023	13 days	0 days	✓
Hydrocarbons : Silica Gel Treated CCME PHCs - F2-F4sg by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) [ON MECP] MW 102-23	E601.SG	26-Jul-2023	26-Jul-2023	40 days	0 days	✓	27-Jul-2023	40 days	1 days	✓
Hydrocarbons : Silica Gel Treated CCME PHCs - F2-F4sg by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) [ON MECP] MW 104-23	E601.SG	26-Jul-2023	26-Jul-2023	40 days	0 days	✓	27-Jul-2023	40 days	1 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE [ON MECP] MW 102-23	E290	26-Jul-2023	28-Jul-2023	14 days	2 days	✓	28-Jul-2023	12 days	0 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE [ON MECP] MW 104-23	E290	26-Jul-2023	28-Jul-2023	14 days	2 days	✓	28-Jul-2023	12 days	0 days	✓
Physical Tests : Colour (Apparent) by Spectrometer										
HDPE [ON MECP] MW 102-23	E330	26-Jul-2023	----	----	----		27-Jul-2023	48 hrs	24 hrs	✓
Physical Tests : Colour (Apparent) by Spectrometer										
HDPE [ON MECP] MW 104-23	E330	26-Jul-2023	----	----	----		27-Jul-2023	48 hrs	24 hrs	✓



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group 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	
Physical Tests : Conductivity in Water										
HDPE [ON MECP] MW 102-23	E100	26-Jul-2023	28-Jul-2023	28 days	2 days	✓	28-Jul-2023	26 days	0 days	✓
Physical Tests : Conductivity in Water										
HDPE [ON MECP] MW 104-23	E100	26-Jul-2023	28-Jul-2023	28 days	2 days	✓	28-Jul-2023	26 days	0 days	✓
Physical Tests : pH by Meter										
HDPE [ON MECP] MW 102-23	E108	26-Jul-2023	28-Jul-2023	14 days	2 days	✓	28-Jul-2023	12 days	0 days	✓
Physical Tests : pH by Meter										
HDPE [ON MECP] MW 104-23	E108	26-Jul-2023	28-Jul-2023	14 days	2 days	✓	28-Jul-2023	12 days	0 days	✓
Physical Tests : TDS by Gravimetry										
HDPE [ON MECP] MW 102-23	E162	26-Jul-2023	----	----	----		28-Jul-2023	7 days	2 days	✓
Physical Tests : TDS by Gravimetry										
HDPE [ON MECP] MW 104-23	E162	26-Jul-2023	----	----	----		28-Jul-2023	7 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE [ON MECP] MW 102-23	E121	26-Jul-2023	----	----	----		27-Jul-2023	48 hrs	20 hrs	✓
Physical Tests : Turbidity by Nephelometry										
HDPE [ON MECP] MW 104-23	E121	26-Jul-2023	----	----	----		27-Jul-2023	48 hrs	20 hrs	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE total (nitric acid) MW 102-23	E420	26-Jul-2023	27-Jul-2023	180 days	1 days	✓	27-Jul-2023	179 days	0 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group 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) MW 104-23	E420	26-Jul-2023	27-Jul-2023	180 days	1 days	✔	27-Jul-2023	179 days	0 days	✔
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) MW 102-23	E611A	26-Jul-2023	27-Jul-2023	14 days	1 days	✔	27-Jul-2023	13 days	0 days	✔
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) MW 104-23	E611A	26-Jul-2023	27-Jul-2023	14 days	1 days	✔	27-Jul-2023	13 days	0 days	✔

Legend & Qualifier Definitions

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	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
Analytical Methods							
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	1060384	1	14	7.1	5.0	✔
Ammonia by Fluorescence	E298	1058241	1	20	5.0	5.0	✔
BTEX by Headspace GC-MS	E611A	1058848	1	18	5.5	5.0	✔
CCME PHC - F1 by Headspace GC-FID (Low Level)	E581.F1-L	1058847	1	19	5.2	5.0	✔
Chloride in Water by IC	E235.Cl	1060388	1	10	10.0	5.0	✔
Colour (Apparent) by Spectrometer	E330	1058987	1	19	5.2	5.0	✔
Conductivity in Water	E100	1060385	1	8	12.5	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1058139	1	20	5.0	5.0	✔
Fluoride in Water by IC	E235.F	1060390	1	11	9.0	5.0	✔
Nitrate in Water by IC	E235.NO3	1060386	1	13	7.6	5.0	✔
Nitrite in Water by IC	E235.NO2	1060387	1	12	8.3	5.0	✔
pH by Meter	E108	1060383	1	20	5.0	5.0	✔
Sulfate in Water by IC	E235.SO4	1060389	1	8	12.5	5.0	✔
TDS by Gravimetry	E162	1061115	1	20	5.0	5.0	✔
Total metals in Water by CRC ICPMS	E420	1058349	0	14	0.0	5.0	✖
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	1058240	1	20	5.0	5.0	✔
Turbidity by Nephelometry	E121	1058243	1	7	14.2	5.0	✔
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	1060384	1	14	7.1	5.0	✔
Ammonia by Fluorescence	E298	1058241	1	20	5.0	5.0	✔
BTEX by Headspace GC-MS	E611A	1058848	1	18	5.5	5.0	✔
CCME PHC - F1 by Headspace GC-FID (Low Level)	E581.F1-L	1058847	1	19	5.2	5.0	✔
Chloride in Water by IC	E235.Cl	1060388	1	10	10.0	5.0	✔
Colour (Apparent) by Spectrometer	E330	1058987	1	19	5.2	5.0	✔
Conductivity in Water	E100	1060385	1	8	12.5	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1058139	1	20	5.0	5.0	✔
Fluoride in Water by IC	E235.F	1060390	1	11	9.0	5.0	✔
Nitrate in Water by IC	E235.NO3	1060386	1	13	7.6	5.0	✔
Nitrite in Water by IC	E235.NO2	1060387	1	12	8.3	5.0	✔
pH by Meter	E108	1060383	1	20	5.0	5.0	✔
Silica Gel Treated CCME PHCs - F2-F4sg by GC-FID	E601.SG	1057933	1	20	5.0	5.0	✔
Sulfate in Water by IC	E235.SO4	1060389	1	8	12.5	5.0	✔
TDS by Gravimetry	E162	1061115	1	20	5.0	5.0	✔
Total metals in Water by CRC ICPMS	E420	1058349	1	14	7.1	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	1058240	1	20	5.0	5.0	✔
Turbidity by Nephelometry	E121	1058243	1	7	14.2	5.0	✔



Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
Analytical Methods							
Method Blanks (MB)							
Alkalinity Species by Titration	E290	1060384	1	14	7.1	5.0	✔
Ammonia by Fluorescence	E298	1058241	1	20	5.0	5.0	✔
BTEX by Headspace GC-MS	E611A	1058848	1	18	5.5	5.0	✔
CCME PHC - F1 by Headspace GC-FID (Low Level)	E581.F1-L	1058847	1	19	5.2	5.0	✔
Chloride in Water by IC	E235.Cl	1060388	1	10	10.0	5.0	✔
Colour (Apparent) by Spectrometer	E330	1058987	1	19	5.2	5.0	✔
Conductivity in Water	E100	1060385	1	8	12.5	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1058139	1	20	5.0	5.0	✔
Fluoride in Water by IC	E235.F	1060390	1	11	9.0	5.0	✔
Nitrate in Water by IC	E235.NO3	1060386	1	13	7.6	5.0	✔
Nitrite in Water by IC	E235.NO2	1060387	1	12	8.3	5.0	✔
Silica Gel Treated CCME PHCs - F2-F4sg by GC-FID	E601.SG	1057933	1	20	5.0	5.0	✔
Sulfate in Water by IC	E235.SO4	1060389	1	8	12.5	5.0	✔
TDS by Gravimetry	E162	1061115	1	20	5.0	5.0	✔
Total metals in Water by CRC ICPMS	E420	1058349	1	14	7.1	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	1058240	1	20	5.0	5.0	✔
Turbidity by Nephelometry	E121	1058243	1	7	14.2	5.0	✔
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	1058241	1	20	5.0	5.0	✔
BTEX by Headspace GC-MS	E611A	1058848	1	18	5.5	5.0	✔
CCME PHC - F1 by Headspace GC-FID (Low Level)	E581.F1-L	1058847	1	19	5.2	5.0	✔
Chloride in Water by IC	E235.Cl	1060388	1	10	10.0	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1058139	1	20	5.0	5.0	✔
Fluoride in Water by IC	E235.F	1060390	1	11	9.0	5.0	✔
Nitrate in Water by IC	E235.NO3	1060386	1	13	7.6	5.0	✔
Nitrite in Water by IC	E235.NO2	1060387	1	12	8.3	5.0	✔
Sulfate in Water by IC	E235.SO4	1060389	1	8	12.5	5.0	✔
Total metals in Water by CRC ICPMS	E420	1058349	1	14	7.1	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	1058240	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
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.
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.
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.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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.
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U ALS Environmental - Waterloo	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
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.
CCME PHC - F1 by Headspace GC-FID (Low Level)	E581.F1-L ALS Environmental - Waterloo	Water	CCME PHC in Soil - Tier 1 (mod)	CCME Fraction 1 (F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law. Analytical methods for CCME Petroleum Hydrocarbons (PHCs) are validated to comply fully with the Reference Method for the Canada-Wide Standard for PHC. Unless qualified, all required quality control criteria of the CCME PHC method have been met, including response factor and linearity requirements.
Silica Gel Treated CCME PHCs - F2-F4sg by GC-FID	E601.SG ALS Environmental - Waterloo	Water	CCME PHC in Soil - Tier 1 (mod)	Sample extracts are subjected to in-situ silica gel treatment prior to analysis by GC-FID for CCME hydrocarbon fractions (F2-F4). Analytical methods for CCME Petroleum Hydrocarbons (PHCs) are validated to comply fully with the Reference Method for the Canada-Wide Standard for PHC. Unless qualified, all required quality control criteria of the CCME PHC method have been met, including response factor and linearity requirements.
BTEX by Headspace GC-MS	E611A ALS Environmental - Waterloo	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Hardness (Calculated) from Total Ca/Mg	EC100A ALS Environmental - Waterloo	Water	APHA 2340B	"Hardness (as CaCO ₃), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO ₃ 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.
F1-BTEX	EC580 ALS Environmental - Waterloo	Water	CCME PHC in Soil - Tier 1	F1-BTEX is calculated as follows: F1-BTEX = F1 (C6-C10) minus benzene, toluene, ethylbenzene and xylenes (BTEX).
SUM F1 to F4 where F2-F4 is SG treated	EC581SG ALS Environmental - Waterloo	Water	CCME PHC in Soil - Tier 1	Hydrocarbons, total (C6-C50) is the sum of CCME Fraction F1(C6-C10), F2(C10-C16), F3(C16-C34), and F4(C34-C50), where F2-F4 have been treated with silica gel. F4G-sg is not used within this calculation due to overlap with other fractions.

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.
Digestion for Total Phosphorus in water	EP372 ALS Environmental - Waterloo	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
VOCs Preparation for Headspace Analysis	EP581 ALS Environmental - Waterloo	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 ALS Environmental - Waterloo	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: WT2322882	Page	: 1 of 13
Client	: MTE Consultants Inc.	Laboratory	: ALS Environmental - Waterloo
Contact	: Kyle Reed	Account Manager	: Emily Hansen
Address	: 520 Bingemans Centre Drive Kitchener ON Canada N2B 3X9	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	:	Telephone	: +1 519 886 6910
Project	: 48650-300	Date Samples Received	: 26-Jul-2023 14:05
PO	: ----	Date Analysis Commenced	: 26-Jul-2023
C-O-C number	: 20-955728	Issue Date	: 01-Aug-2023 14:07
Sampler	: TXG 519 743 6500		
Site	: ----		
Quote number	: Standing Offer 2023		
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.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Jeremy Gingras	Team Leader - Semi-Volatile Instrumentation	Waterloo Organics, Waterloo, Ontario
John Tang	Lab Analyst	Waterloo Inorganics, Waterloo, Ontario
Jon Fisher	Production Manager, Environmental	Waterloo Inorganics, Waterloo, Ontario
Jon Fisher	Production Manager, Environmental	Waterloo Metals, Waterloo, Ontario
Sarah Birch	VOC Section Supervisor	Waterloo VOC, Waterloo, Ontario

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Work Order : WT2322882
Client : MTE Consultants Inc.
Project : 48650-300



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: 1058243)											
WT2322795-005	Anonymous	Turbidity	----	E121	0.10	NTU	0.11	0.11	0.003	Diff <2x LOR	----
Physical Tests (QC Lot: 1058987)											
HA2300429-001	Anonymous	Colour, apparent	----	E330	4.0	CU	316	313	0.937%	20%	----
Physical Tests (QC Lot: 1060383)											
WT2322844-002	Anonymous	pH	----	E108	0.10	pH units	8.16	8.17	0.122%	4%	----
Physical Tests (QC Lot: 1060384)											
WT2322844-002	Anonymous	Alkalinity, total (as CaCO ₃)	----	E290	2.0	mg/L	89.4	87.4	2.31%	20%	----
Physical Tests (QC Lot: 1060385)											
WT2322844-002	Anonymous	Conductivity	----	E100	2.0	µS/cm	805	805	0.00%	10%	----
Physical Tests (QC Lot: 1061115)											
HA2300435-003	Anonymous	Solids, total dissolved [TDS]	----	E162	20	mg/L	190	196	6	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1058139)											
WT2322605-002	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0026	0.0027	0.0001	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1058240)											
WT2322556-001	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0252	0.0265	4.98%	20%	----
Anions and Nutrients (QC Lot: 1058241)											
HA2300428-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.500	mg/L	20.0	20.1	0.256%	20%	----
Anions and Nutrients (QC Lot: 1060386)											
WT2322846-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3	0.020	mg/L	0.147	0.146	0.0009	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1060387)											
WT2322846-001	Anonymous	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: 1060388)											
WT2322846-001	Anonymous	Chloride	16887-00-6	E235.Cl	0.50	mg/L	129	128	0.148%	20%	----
Anions and Nutrients (QC Lot: 1060389)											
WT2322846-001	Anonymous	Sulfate (as SO ₄)	14808-79-8	E235.SO4	0.30	mg/L	39.2	39.0	0.402%	20%	----
Anions and Nutrients (QC Lot: 1060390)											
WT2322846-001	Anonymous	Fluoride	16984-48-8	E235.F	0.020	mg/L	0.186	0.184	0.002	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 1058848)											
BF2300165-001	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----

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 Client : MTE Consultants Inc.
 Project : 48650-300



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Analyte</i>	<i>CAS Number</i>	<i>Method</i>	<i>LOR</i>	<i>Unit</i>	<i>Original Result</i>	<i>Duplicate Result</i>	<i>RPD(%) or Difference</i>	<i>Duplicate Limits</i>	<i>Qualifier</i>
Volatile Organic Compounds (QC Lot: 1058848) - continued											
BF2300165-001	Anonymous	Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 1058847)											
BF2300165-001	Anonymous	F1 (C6-C10)	----	E581.F1-L	25	µg/L	<25	<25	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: 1058243)						
Turbidity	---	E121	0.1	NTU	<0.10	---
Physical Tests (QCLot: 1058987)						
Colour, apparent	---	E330	2	CU	<2.0	---
Physical Tests (QCLot: 1060384)						
Alkalinity, total (as CaCO3)	---	E290	1	mg/L	<1.0	---
Physical Tests (QCLot: 1060385)						
Conductivity	---	E100	1	µS/cm	1.0	---
Physical Tests (QCLot: 1061115)						
Solids, total dissolved [TDS]	---	E162	10	mg/L	<10	---
Anions and Nutrients (QCLot: 1058139)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	---
Anions and Nutrients (QCLot: 1058240)						
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	---
Anions and Nutrients (QCLot: 1058241)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	---
Anions and Nutrients (QCLot: 1060386)						
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	<0.020	---
Anions and Nutrients (QCLot: 1060387)						
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	<0.010	---
Anions and Nutrients (QCLot: 1060388)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	---
Anions and Nutrients (QCLot: 1060389)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	---
Anions and Nutrients (QCLot: 1060390)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	---
Total Metals (QCLot: 1058349)						
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	---



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 1058349) - continued						
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	# 0.0096	B
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	----
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	----
Volatile Organic Compounds (QCLot: 1058848)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 1058848) - continued						
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 1057933)						
F2 (C10-C16)	----	E601.SG	100	µg/L	<100	----
F3 (C16-C34)	----	E601.SG	250	µg/L	<250	----
F4 (C34-C50)	----	E601.SG	250	µg/L	<250	----
Hydrocarbons (QCLot: 1058847)						
F1 (C6-C10)	----	E581.F1-L	25	µg/L	<25	----

Qualifiers

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.



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				
Analyte	CAS Number	Method	LOR	Unit	Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Physical Tests (QCLot: 1058243)									
Turbidity	----	E121	0.1	NTU	200 NTU	97.0	85.0	115	----
Physical Tests (QCLot: 1058987)									
Colour, apparent	----	E330	2	CU	25 CU	111	70.0	130	----
Physical Tests (QCLot: 1060383)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 1060384)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	150 mg/L	110	85.0	115	----
Physical Tests (QCLot: 1060385)									
Conductivity	----	E100	1	µS/cm	1409 µS/cm	102	90.0	110	----
Physical Tests (QCLot: 1061115)									
Solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	100	85.0	115	----
Anions and Nutrients (QCLot: 1058139)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.0212 mg/L	92.3	80.0	120	----
Anions and Nutrients (QCLot: 1058240)									
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.845 mg/L	98.7	80.0	120	----
Anions and Nutrients (QCLot: 1058241)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	97.4	85.0	115	----
Anions and Nutrients (QCLot: 1060386)									
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	2.5 mg/L	99.4	90.0	110	----
Anions and Nutrients (QCLot: 1060387)									
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	0.5 mg/L	98.6	90.0	110	----
Anions and Nutrients (QCLot: 1060388)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	99.6	90.0	110	----
Anions and Nutrients (QCLot: 1060389)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 1060390)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	101	90.0	110	----
Total Metals (QCLot: 1058349)									
Aluminum, total	7429-90-5	E420	0.003	mg/L	0.1 mg/L	102	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	0.05 mg/L	107	80.0	120	----



Sub-Matrix: Water

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 1058349) - continued									
Arsenic, total	7440-38-2	E420	0.0001	mg/L	0.05 mg/L	109	80.0	120	----
Barium, total	7440-39-3	E420	0.0001	mg/L	0.0125 mg/L	106	80.0	120	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	0.005 mg/L	110	80.0	120	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	0.05 mg/L	104	80.0	120	----
Boron, total	7440-42-8	E420	0.01	mg/L	0.05 mg/L	102	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.005 mg/L	104	80.0	120	----
Calcium, total	7440-70-2	E420	0.05	mg/L	2.5 mg/L	104	80.0	120	----
Cesium, total	7440-46-2	E420	0.00001	mg/L	0.0025 mg/L	109	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.0125 mg/L	106	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.0125 mg/L	104	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.0125 mg/L	103	80.0	120	----
Iron, total	7439-89-6	E420	0.01	mg/L	0.05 mg/L	104	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.025 mg/L	106	80.0	120	----
Lithium, total	7439-93-2	E420	0.001	mg/L	0.0125 mg/L	106	80.0	120	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	2.5 mg/L	111	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.0125 mg/L	107	80.0	120	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.0125 mg/L	104	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	110	80.0	120	----
Potassium, total	7440-09-7	E420	0.05	mg/L	2.5 mg/L	109	80.0	120	----
Rubidium, total	7440-17-7	E420	0.0002	mg/L	0.005 mg/L	110	80.0	120	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	0.05 mg/L	103	80.0	120	----
Silicon, total	7440-21-3	E420	0.1	mg/L	0.5 mg/L	107	80.0	120	----
Silver, total	7440-22-4	E420	0.00001	mg/L	0.005 mg/L	100	80.0	120	----
Sodium, total	7440-23-5	E420	0.05	mg/L	2.5 mg/L	109	80.0	120	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	0.0125 mg/L	106	80.0	120	----
Sulfur, total	7704-34-9	E420	0.5	mg/L	2.5 mg/L	105	80.0	120	----
Tellurium, total	13494-80-9	E420	0.0002	mg/L	0.005 mg/L	103	80.0	120	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	0.05 mg/L	106	80.0	120	----
Thorium, total	7440-29-1	E420	0.0001	mg/L	0.005 mg/L	104	80.0	120	----
Tin, total	7440-31-5	E420	0.0001	mg/L	0.025 mg/L	106	80.0	120	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.0125 mg/L	100	80.0	120	----
Tungsten, total	7440-33-7	E420	0.0001	mg/L	0.005 mg/L	104	80.0	120	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	0.00025 mg/L	109	80.0	120	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	0.025 mg/L	106	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.025 mg/L	105	80.0	120	----



Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 1058349) - continued									
Zirconium, total	7440-67-7	E420	0.0002	mg/L	0.005 mg/L	108	80.0	120	----
Volatile Organic Compounds (QCLot: 1058848)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	97.5	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	95.4	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	97.5	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	98.1	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	100	70.0	130	----
Hydrocarbons (QCLot: 1057933)									
F2 (C10-C16)	----	E601.SG	100	µg/L	3685.12 µg/L	106	70.0	130	----
F3 (C16-C34)	----	E601.SG	250	µg/L	7481.33 µg/L	110	70.0	130	----
F4 (C34-C50)	----	E601.SG	250	µg/L	4274.88 µg/L	104	70.0	130	----
Hydrocarbons (QCLot: 1058847)									
F1 (C6-C10)	----	E581.F1-L	25	µg/L	2000 µg/L	99.2	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: 1058139)										
WT2322605-002	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0195 mg/L	0.0196 mg/L	99.6	70.0	130	----
Anions and Nutrients (QCLot: 1058240)										
WT2322556-001	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0966 mg/L	0.1 mg/L	96.6	70.0	130	----
Anions and Nutrients (QCLot: 1058241)										
HA2300428-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	ND mg/L	0.1 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 1060386)										
WT2322846-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3	2.46 mg/L	2.5 mg/L	98.2	75.0	125	----
Anions and Nutrients (QCLot: 1060387)										
WT2322846-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2	0.490 mg/L	0.5 mg/L	98.0	75.0	125	----
Anions and Nutrients (QCLot: 1060388)										
WT2322846-001	Anonymous	Chloride	16887-00-6	E235.Cl	ND mg/L	100 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 1060389)										
WT2322846-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	96.6 mg/L	100 mg/L	96.6	75.0	125	----
Anions and Nutrients (QCLot: 1060390)										
WT2322846-001	Anonymous	Fluoride	16984-48-8	E235.F	0.992 mg/L	1 mg/L	99.2	75.0	125	----
Total Metals (QCLot: 1058349)										
WT2322844-002	Anonymous	Aluminum, total	7429-90-5	E420	ND mg/L	0.1 mg/L	ND	70.0	130	----
		Antimony, total	7440-36-0	E420	0.0544 mg/L	0.05 mg/L	109	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.0558 mg/L	0.05 mg/L	112	70.0	130	----
		Barium, total	7440-39-3	E420	ND mg/L	0.0125 mg/L	ND	70.0	130	----
		Beryllium, total	7440-41-7	E420	0.00513 mg/L	0.005 mg/L	102	70.0	130	----
		Bismuth, total	7440-69-9	E420	0.0487 mg/L	0.05 mg/L	97.3	70.0	130	----
		Boron, total	7440-42-8	E420	ND mg/L	0.05 mg/L	ND	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.00519 mg/L	0.005 mg/L	104	70.0	130	----
		Calcium, total	7440-70-2	E420	ND mg/L	2.5 mg/L	ND	70.0	130	----
		Cesium, total	7440-46-2	E420	0.00279 mg/L	0.0025 mg/L	112	70.0	130	----
		Chromium, total	7440-47-3	E420	0.0130 mg/L	0.0125 mg/L	104	70.0	130	----
		Cobalt, total	7440-48-4	E420	0.0130 mg/L	0.0125 mg/L	104	70.0	130	----
		Copper, total	7440-50-8	E420	0.0126 mg/L	0.0125 mg/L	101	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: 1058349) - continued										
WT2322844-002	Anonymous	Iron, total	7439-89-6	E420	ND mg/L	0.05 mg/L	ND	70.0	130	----
		Lead, total	7439-92-1	E420	0.0253 mg/L	0.025 mg/L	101	70.0	130	----
		Lithium, total	7439-93-2	E420	ND mg/L	0.0125 mg/L	ND	70.0	130	----
		Magnesium, total	7439-95-4	E420	ND mg/L	2.5 mg/L	ND	70.0	130	----
		Manganese, total	7439-96-5	E420	ND mg/L	0.0125 mg/L	ND	70.0	130	----
		Molybdenum, total	7439-98-7	E420	ND mg/L	0.0125 mg/L	ND	70.0	130	----
		Nickel, total	7440-02-0	E420	0.0252 mg/L	0.025 mg/L	101	70.0	130	----
		Phosphorus, total	7723-14-0	E420	0.572 mg/L	0.5 mg/L	114	70.0	130	----
		Potassium, total	7440-09-7	E420	ND mg/L	2.5 mg/L	ND	70.0	130	----
		Rubidium, total	7440-17-7	E420	0.00559 mg/L	0.005 mg/L	112	70.0	130	----
		Selenium, total	7782-49-2	E420	0.0526 mg/L	0.05 mg/L	105	70.0	130	----
		Silicon, total	7440-21-3	E420	ND mg/L	0.5 mg/L	ND	70.0	130	----
		Silver, total	7440-22-4	E420	0.00482 mg/L	0.005 mg/L	96.4	70.0	130	----
		Sodium, total	7440-23-5	E420	ND mg/L	2.5 mg/L	ND	70.0	130	----
		Strontium, total	7440-24-6	E420	ND mg/L	0.0125 mg/L	ND	70.0	130	----
		Sulfur, total	7704-34-9	E420	ND mg/L	2.5 mg/L	ND	70.0	130	----
		Tellurium, total	13494-80-9	E420	0.00493 mg/L	0.005 mg/L	98.7	70.0	130	----
		Thallium, total	7440-28-0	E420	0.0506 mg/L	0.05 mg/L	101	70.0	130	----
		Thorium, total	7440-29-1	E420	0.00523 mg/L	0.005 mg/L	105	70.0	130	----
		Tin, total	7440-31-5	E420	0.0265 mg/L	0.025 mg/L	106	70.0	130	----
		Titanium, total	7440-32-6	E420	0.0129 mg/L	0.0125 mg/L	103	70.0	130	----
		Tungsten, total	7440-33-7	E420	0.00528 mg/L	0.005 mg/L	106	70.0	130	----
		Uranium, total	7440-61-1	E420	ND mg/L	0.00025 mg/L	ND	70.0	130	----
		Vanadium, total	7440-62-2	E420	0.0272 mg/L	0.025 mg/L	109	70.0	130	----
		Zinc, total	7440-66-6	E420	0.0248 mg/L	0.025 mg/L	99.2	70.0	130	----
		Zirconium, total	7440-67-7	E420	0.00540 mg/L	0.005 mg/L	108	70.0	130	----
Volatile Organic Compounds (QCLot: 1058848)										
BF2300165-001	Anonymous	Benzene	71-43-2	E611A	95.4 µg/L	100 µg/L	95.4	60.0	140	----
		Ethylbenzene	100-41-4	E611A	96.6 µg/L	100 µg/L	96.6	60.0	140	----
		Toluene	108-88-3	E611A	96.8 µg/L	100 µg/L	96.8	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	200 µg/L	200 µg/L	99.9	60.0	140	----
		Xylene, o-	95-47-6	E611A	101 µg/L	100 µg/L	101	60.0	140	----
Hydrocarbons (QCLot: 1058847)										
BF2300165-001	Anonymous	F1 (C6-C10)	----	E581.F1-L	2120 µg/L	2000 µg/L	106	60.0	140	----

Page : 13 of 13
Work Order : WT2322882
Client : MTE Consultants Inc.
Project : 48650-300





Telephone : + 1 519 886 6910

Report To Contact and company name below will appear on the final report Company: MTE Contact: Kyle Reed Phone:		Reports / Recipients Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL) Merge QC/QCI Reports with COA <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX Email 1 or Fax: kreed@mte85.com Email 2: kgreer@mte85.com Email 3:		Turnaround Time (TAT) Requested <input checked="" type="checkbox"/> Routine [R] if received by 3pm M-F - no surcharges apply <input type="checkbox"/> 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum <input type="checkbox"/> 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum <input type="checkbox"/> 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum <input type="checkbox"/> 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum <input type="checkbox"/> Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional may apply to rush requests on weekends, statutory holidays and non-rout	
Company address below will appear on the final report Street: City/Province: Kitchener Postal Code:		Invoice Recipients Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX Email 1 or Fax: Email 2: Email 3:		Date and Time Required for all E&P TATs:	
Project Information ALS Account # / Quote #: 48650-300 Job #: 48650-300 PO / AFE: LSD:		Oil and Gas Required Fields (client use) AFE/Cost Center: PO# Major/Minor Code: Routing Code: Requisitioner: Location:		Analysis Request Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below	
ALS Lab Work Order # (ALS use only): WT2322882 FA		ALS Contact: Emily H		Sampler: TXG	
Sample Identification and/or Coordinates (This description will appear on the report)		Date (dd-mmm-yy)		Time (hh:mm)	
ALS Sample # (ALS use only)		Sample Type		NUMBER OF CONTAINERS	
MW 102-23 MW 104-23		26-Jul-23 26-Jul-23		12:50 12:35	
				Gen Chem 1 Total Metals Total P THC + BTEX	
				000 X X X X	
Drinking Water (DW) Samples¹ (client use) Are samples taken from a Regulated DW System? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO Are samples for human consumption/ use? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)		SAMPLE RECEIPT DETAILS (ALS use only) Cooling Method: <input type="checkbox"/> NONE <input type="checkbox"/> ICE <input checked="" type="checkbox"/> ICE PACKS <input type="checkbox"/> FROZEN <input checked="" type="checkbox"/> COOLING INITIATED Submission Comments identified on Sample Receipt Notification: <input type="checkbox"/> YES <input type="checkbox"/> NO Cooler Custody Seals Intact: <input type="checkbox"/> YES <input checked="" type="checkbox"/> N/A Sample Custody Seals Intact: <input type="checkbox"/> YES <input checked="" type="checkbox"/> N/A INITIAL COOLER TEMPERATURES °C: 17.5 FINAL COOLER TEMPERATURES °C:	
SHIPMENT RELEASE (client use) Date: July 26/23 Time: 14:05		INITIAL SHIPMENT RECEPTION (ALS use only) Received by: HL Date: July 26/23 Time: 14:05		FINAL SHIPMENT RECEPTION (ALS use only) Received by: HL Date: July 26/23 Time: 14:05	

ALS LOCATIONS AND SAMPLING INFORMATION
 If 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.
 from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

N-056 VW-088
 OR-945 GC-387
 MM-316 EC